The Prosody of Sluicing:
Production Studies on Prosodic Disambiguation

D i s s e r t a t i o n

zur

Erlangung des akademischen Grades

Doktor der Philosophie

an der Philosophischen Fakultät

der Eberhard Karls Universität Tübingen

vorgelegt von

Bettina Remmele

aus

München

2019

Gedruckt mit Genehmigung der Philosophischen Fakultät der Eberhard Karls Universität Tübingen

Dekan: Prof. Dr. Jürgen Leonhardt

Hauptberichterstatterin: Prof. Dr. Susanne Winkler

Mitberichterstatterin: Prof. Dr. Britta Stolterfoht

Tag der mündlichen Prüfung: 20. April 2018

TOBIAS-lib, Publikationssystem der Universitätsbibliothek Tübingen

Table of Contents

Abstract

With this thesis, I investigate the prosodic realizations of different sluicing structures, as produced by either trained or untrained native speakers of English. Sluicing is a subtype of ellipsis where the major part of a *wh*-question has been elided, leaving only a *wh*-remnant behind (Ross, 1969). From this follows that sluicing can be ambiguous if the *wh*-remnant has more than one possible antecedent in the preceding un-elided clause. If one of these possible antecedents is located within an island to extraction, the respective sluicing structure is called *complex sluicing* (Konietzko, Radó, & Winkler, submitted; Ross, 1969; Merchant, 2001). The perception, especially of simple sluicing, has been examined to some extent (Frazier & Clifton, 1998; Carlson, Dickey, Frazier, & Clifton, 2009), finding that listeners prefer a prosodically or syntactically focused NP to be the antecedent of an ambiguous *wh*-remnant. However, the prosodic production side has not been empirically investigated to date. With this thesis, I thus explore the relationship between prosody and the disambiguation of different sluicing structures in spoken language.

With three production studies, I investigate how various sluicing structures with different antecedent types are produced by speakers who are either trained or untrained with respect to the ambiguity of the target items and prosody as a disambiguation technique. I present the results of a pilot production study that examined globally ambiguous simple sluicing structures with contextual disambiguation and two production studies that examined temporarily ambiguous simple and complex sluicing structures with morphological disambiguation. Four preceding acceptability judgment studies made sure that there were no additional factors interfering with the prosodic realizations of the different sluicing structures. The three production studies found that both trained as well as untrained speakers use prosodic prominence as a disambiguating factor to emphasize which NP serves as the antecedent of a contextually or morphologically disambiguated simple or complex sluicing structure. However, an early, sentence-initial NP is more frequently disambiguated than a late, sentence-final NP, both by trained and untrained speakers. In complex sluicing, only a sentence-initial NP is prosodically disambiguated, only by trained speakers. Moreover, trained speakers generally make more frequent use of prosody as a disambiguation technique and they produce stronger prosodic cues than untrained speakers.

With this thesis, I thus show that prosody, in the form of prosodic prominence, is used by native speakers of English to indicate the meaning of an information-structurally triggered ambiguity. With this finding, I add further support to Romero (1998), Frazier and Clifton (1998) and Carlson et al. (2009), who argue that a constituent with a prosodic focus is preferably taken as the antecedent of the *wh*-remnant. Moreover, I add support to Remmele, Schopper, Winkler, and Hörnig (forthcoming 2019), who found that even untrained speakers use prosodic phrasing to resolve a structurally ambiguous word sequence. Furthermore, I contradict Wasow (2015) and Piantadosi, Tily, and Gibson (2012), who argue that one form of disambiguation suffices, thus rendering additional prosodic cues redundant. The results of this thesis thus contribute significantly to the research about the prosody of sluicing and the research about prosodic disambiguation in general.

Index of Abbreviations and Conventions

AComxSS	Ambiguous non-contrastive complex subject sluicing
ACSimS	Ambiguous contrastive simple sluicing
ADJ	Adjective
ADV	Adverb
ANOVA	Analysis of variance
ASimS	Ambiguous non-contrastive simple sluicing
AT	Antecedent type
CBM	Constraint Based Model
ComSimS	Complicated simple sluicing
ComxESS	Complex extraposed subject sluicing
ComxISS	Complex intraposed subject sluicing
ComxOS	Complex object sluicing
ComxSS	Complex subject sluicing
ComxSS_wNP	Unambiguous non-contrastive complex subject sluicing with *which NP*
ComxSS_wone	Unambiguous non-contrastive complex subject sluicing with *which one*
CST	Complex structure type
CT	Centering Theory
CP	Complementizer phrase
DP	Determiner phrase
GPM	Garden Path Model
H(x)	Hypothesis x
ip	Intermediate phrase
IPh	Intonational phrase
LC	Late closure
LF	Logical form
MA	Minimal attachment
NA	No accent
NP	Noun phrase
PD	Prosodic disambiguation
No PD	No prosodic disambiguation

PD open	It remains open whether prosodic disambiguating has taken place or not since both NPs were produced with equally strong accents
PF	Phonological form
PP	Prepositional phrase
PRN	Pronoun
QP	Quantifier phrase
RC	Relative clause
RQ	Research question
SimES	Simple embedded sluicing
SimS	Simple sluicing
SimS_wNP	Unambiguous non-contrastive simple sluicing with *which NP*
ST	Sluicing type
SVO	Subject Verb Object
TP	Tense phrase
VP	Verb Phrase

CAPITALS	Prominence (contrastive focus or prosodic prominence)
Italics	Antecedent of *wh*-remnant
Bold	*Wh*-remnant
<u>Underlining</u>	Structural attachment (or otherwise indicated)
X < Y	X worse/smaller Y
X > Y	X better/greater Y

List of Illustrations

Figures

Tables

1 Introduction

1.1 The Prosody of Sluicing: Perception Studies

This thesis explores the prosodic disambiguation of different sluicing structures by means of production studies. Sluicing is a subtype of ellipsis whose prosodic realizations, so far, have only been investigated in perception studies (Frazier & Clifton, 1998; Carlson et al., 2009). In this structure, the major part of a *wh*-question has been elided, leaving only a *wh*-remnant at the end of the structure, as illustrated in (1). The antecedent of the *wh*-remnant is usually a constituent that has been mentioned in previous discourse. Moreover, the elided part is syntactically or semantically identical to a corresponding part of the preceding discourse. In example (1), the antecedent of the *wh*-pronoun is the pronoun (PRN) *somebody*, which is also the only available constituent, thus leading to an unambiguous structure. The VP *just left*, which matches the VP from the main clause, has been elided. In all examples, *wh*-remnants will be printed in bold and possible antecedents will be printed in italics.

(1) *Somebody* just left, guess **who** [_ ~~just left~~].

(Ross, 1969, p. 252)

Depending on the availability of possible antecedents and how the elided part of the sluice is resolved, the structure can also be ambiguous. In (2), for example, the *wh*-phrase *who else* is globally ambiguous: even once the entire structure has been parsed, the ambiguity remains and, until further disambiguating information is given, its meaning cannot be resolved. As a result, the *wh*-remnant can either take the subject NP *Abby* or the object NP *Ben* as its antecedent which consequently leads to two different elided structures, as illustrated in (3)a. and (3)b.[1] Due to this simultaneous availability of several possible antecedents for an ambiguous *wh*-remnant, ambiguous sluicing is a subtype of *referential ambiguity*.

(2) *Abby* called *Ben* an idiot, but I don‘t know **who else.**

(3) a. Abby$_i$ called Ben an idiot, but I don‘t know who else [_ $_i$ called Ben an idiot].
b. Abby$_i$ called Ben$_j$ an idiot, but I don‘t know who else [Abby called _ $_j$ an idiot].

(Merchant, 2001, p. 23)

[1] Note that, for reasons of uniformity, I will use the abbreviation *NP* to refer to *NPs* and *DPs* equally throughout this dissertation.

Unlike German, English does not morphologically distinguish between different cases and is therefore ideal as a language of study for an investigation of ambiguous sluicing: compare the English structure in (2) to its German equivalent in (4). In (4), it is not possible to use one *wh*-remnant to express both the subject and the object reading since case requirements dictate the use of specific *wh*-pronouns in German: nominative *wer* for the subject reading and accusative *wen* for the object reading.

(4) *Abby*$_i$ hat *Ben*$_j$ einen Idioten genannt, aber ich weiß nicht **wer noch**$_i$/**wen noch**$_j$.

In English, further information is required in order to disambiguate such structures. This can be, for example, additional context, see (5), sentence internal morphological information such as number assignment, see (6), or accompanying prosody that indicates which constituent is the focus of the structure, and thus most likely the antecedent of the *wh*-remnant, see (7). In all examples, capital letters indicate prominence (either in the form of a contrastive focus or prosodic prominence).

(5) A: Elmer was at several parties last night – did he help anybody with the cleanup?
B: *Elmer*$_i$ helped *Leanne*$_j$ with the cleanup, but I don't know **who else**$_j$.

(6) On Tuesday, *some lawyer*$_i$ defended *some dealers*$_j$. Do you know **which ones**$_j$?

(7) *The captain*$_i$ talked with *the CO-pilot*$_j$ but we couldn't find out **who ELSE**$_j$.

(Carlson et al., 2009, p. 121)

This thesis is therefore concerned with the empirical investigation of the prosodic disambiguation of sluicing. So far, the research on the relationship between prosody and sluicing has concentrated exclusively on the perception of the construction (Frazier & Clifton, 1998; Carlson et al., 2009). The primary goal of this thesis is hence to explore the prosodic production rather than the prosodic perception of sluicing: I will explore if, how and under which conditions native speakers of English use prosody to disambiguate the different readings of an ambiguous sluicing structure. I will examine different types of sluicing structures (e.g., simple sluicing vs. complex sluicing), different types of antecedents (e.g., an antecedent in subject position vs. object position) and different additional disambiguation methods (e.g., prior contextual vs. morphological disambiguation) to obtain a general picture of the prosody of sluicing and to investigate whether structural complexity, antecedent differences and various disambiguation methods affect the prosody of sluicing. Previous perception studies found that prosodic prominence on a specific constituent increases its likelihood to be chosen as the antecedent of the ambiguous structure: Frazier and Clifton (1998) and Carlson et al. (2009) showed that manually shifting the focus of a simple sluicing structure from its default final argument position to a position higher up in the syntactic structure affects the percentages of antecedent choices. In (8), for example, without any prosodic manipulation, the preferred antecedent is the final argument NP *some occasion*. In (9), the antecedent choices for the indirect object NP *some occasion* decrease and those for the direct object NP *some present* increase if the pitch accent falls onto the direct object NP. However, the final argument preference cannot be overcome completely: there still remains some preference for the indirect object NP *some occasion* even though the focus of the structure has been shifted to another constituent.

(8) Lucy bought some present for some occasion, but I don't know what.

(9) Lucy bought some PRESent for some occasion, but I don't know what.

(Carlson et al., 2009, p. 126)

The question whether such a link between prosodic prominence and antecedent status can also be found in language production remains to be investigated and is thus the main goal of this thesis: I argue that native speakers of English use prosody in the form of prosodic prominence to emphasize the antecedent of different types of sluicing structures. However, I do not argue that antecedent preference is linked to the degree of prosodic disambiguation. I rather argue that the position of an antecedent within the overall structure is important, leading to either stronger or weaker prosodic values. Exploring this research gap of the prosodic disambiguation of sluicing from the production side is relevant not only for a more comprehensive understanding of prosodic disambiguation in general but also concerning the increasingly important research on speech technology and natural language processing: the more we learn about the actual prosodic realizations of certain structures as produced by native speakers of a given language, the more realistically can we synthesize speech for voice computers and all the better can automatic speech recognition systems understand what is actually being said.

There is a tremendous amount of research on the prosodic disambiguation of various structures in English. One of the central findings is that duration is the most reliable prosodic cue in disambiguating structural ambiguities of different sorts, such as attachment ambiguities, see (10) and (11), or coordination ambiguities, see (12) and (13). The different phrase structures are prosodically indicated by producing a pause at the end of a syntactic phrase, e.g., after *servant* in (11)a.

(10) Someone shot the servant of the actress who was on the balcony.

(11) a. Someone shot [the servant [of the actress [who was on the balcony]]].

→ The actress was on the balcony.

b. Someone shot [[the servant of the actress] [who was on the balcony]].

→ The servant was on the balcony.

(Hwang, Lieberman, Goad, & White, 2011, p. 267)

(12) The guards let small men and women exit first.

(13) a. The guards let [small [men and women]] exit first.

→ Small men, small women

b. The guards let [small men] and [women] exit first.

→ Small men, women

(Wasow, 2015, p. 5)

The majority of researchers has focused on investigating the prosodic disambiguation of such structural ambiguities that are caused by different phrase structures. However, more recent research has turned towards ambiguities that are caused by information structural differences (Breen, Fedorenko, Wagner, & Gibson, 2010; Katz & Selkirk, 2011). Breen et al. (2010), for example, examined structures like (14) where the location of the main focus, which is prosodically realized with a pitch accent, affects the meaning of the entire sentence. A pitch accent on the subject NP *Damon*, as illustrated in (15), for example, serves as an answer to the question *Did Harry fry an omelet this morning?* An accent on the VP *fried*, as illustrated in (16), though, serves as an answer to the question *Did Damon bake an omelet this morning*? In both examples, one constituent of the answer contrasts with one constituent of the question and, accordingly, is marked with a contrastive focus. The distribution of the information structure of the two examples is therefore different: In (15), the subject NP *Damon* is focused, whereas in (16), the verb *fried* is focused and thus the entire VP *fried an omelet this morning*.

(14) Damon fried an omelet this morning.

(15) DAMON fried an omelet this morning.

(16) Damon FRIED an omelet this morning.

(Breen et al., 2010, p. 1053)

Consequently, this area of research shows that prosodic prominence is a reliable cue to resolve certain English ambiguities. I hence argue that sluicing structures will be prosodically disambiguated by varying the location of a pitch accent in order to emphasize the antecedent of the ambiguous *wh*-remnant and thus the information structure of the entire sentence. However, the literature on prosodic disambiguation has also shown that conducting production studies comes with a considerable amount of work, which is why most researchers so far worked with only few speakers have focused on investigating prosodic disambiguation with perception studies (Price, Ostendorf, Shattuck-Hufnagel, & Fong, 1991; Hirschberg & Avesani, 1997; Carlson, Clifton, & Frazier, 2001; Kang & Speer, 2004; Hwang et al., 2011). It is hence all the more important to start exploring the prosodic productions of native speakers of various structures in order to get a more fine-grained picture of what the prosody of spoken language looks like. With this thesis, I thus continue the work of previous researchers like Price et al. (1991), Féry (1994), Breen et al. (2010) and Katz and Selkirk (2011), who conducted production studies to investigate different sorts of ambiguities, by investigating the prosodic realizations of various sluicing structures in English.

1.2 The Information Structure of Referential Ambiguities

The research on prosodic disambiguation has shown that listeners include the information of prosodic cues in spoken language when processing an ambiguous structure. Prosody is not only used to reflect phrase structure differences in the form of durational differences but also information structure differences in the form of prosodic prominence variations. The information structure of sluicing has been analyzed by Romero (1998). She argues that the *wh*-remnant can either be focused or not, but if it is focused, it has to contrast with its inner antecedent: Consequently, there is a parallelism of contrastive focus between the *wh*-remnant and its antecedent. A similar parallelism has been discussed by Carlson (2001) with respect to gapping structures (see also Winkler, 2015b). It thus seems that some sort of parallelism is a typical feature of elliptical structures. This parallelism requirement indicates that the preferred antecedent of the *wh*-remnant of a sluicing structure is the focused constituent of its previous structure.

Although sluicing may contain a referential ambiguity by virtue of having an ambiguous *wh*-pronoun whose referent is not clear, this requirement for a focused constituent to be the antecedent of the *wh*-remnant stands in contrast to the characteristics of reference resolution of regular pronouns discussed in the literature (Sheldon, 1974; Crawley, Stevenson, & Kleinman, 1990; Smyth, 1994; Stevenson, Crawley, & Kleinman, 1994; Grosz, Joshi, & Weinstein, 1995; Kehler, 2002; Kehler, Kertz, Rohde, & Elman, 2008). The research on the reference resolution of ambiguous pronouns has yielded different theories trying to explain the antecedent preferences of pronouns in different structures. Some early approaches were the *first mention advantage* (Gernsbacher & Hargreaves, 1988), the *subject assignment preference* (Crawley et al., 1990), the importance of theta roles (Stevenson et al., 1994) and the *parallel function hypothesis* (Smyth, 1994). However, there are two theories that provide the most convincing arguments for the underlying principles of reference assignment: *Centering Theory* (Grosz et al., 1995) and the importance of coherence relations (Kehler, 2002). These two theories also come with certain implications for the investigation of sluicing and will therefore be discussed in more detail in the following section.

In centering theory, a so-called *center* links two utterances within one discourse segment. It assumes the existence of a *backward-looking* center which ideally corresponds to the highest ranked element of the *forward-looking center* of the previous utterance. The main center of an utterance tends to be the topic rather than the focus. A pronoun in its typically deaccented state refers back to the main center of the previous utterance, thus, the topic, which is, in most cases, the subject. Placing additional prosodic prominence on a pronoun signals a *topic shift*: The topic of the utterance, and hence the antecedent of the pronoun, changes to another constituent that was previously part of the comment/background, for example, to the object NP. Based on the assumptions of the Centering Theory (Grosz et al., 1995), I argue, however, that there is one crucial difference between the reference resolution of regular pronouns and the reference resolution of *wh*-pronouns in sluicing: compare (17) to (18).

(17) *John* called *Bill* a Republican and then **HE** insulted **HIM**.

(Lakoff, 1971, p. 333)

(18) *The captain* talked to *the co-pilot*, but I don't know **who ELSE**.

(Carlson et al., 2009, p. 121)

Both structures are similar in that they have several constituents that potentially can serve as the antecedents (or referents) of an ambiguous pronoun. In reference resolution of a pronoun, see (17), the ambiguous pronoun is a personal pronoun which is by default deaccented. In sluicing, see (18), the ambiguous pronoun is a *wh*-pronoun (or -phrase, in this example) which is by default accented. A personal pronoun presupposes the existence of its referent, and that said referent is known to the listener (thus representing given information), whereas a *wh*-phrase ask for unknown information, presupposing that the referent is not known to the listener (thus asking for a focused constituent). An accent on a normally deaccented pronoun has therefore the effect that not the preferred antecedent but rather a dispreferred antecedent is chosen: a topic change has taken place. Deaccenting a *wh*-phrase, though, does not change the chosen antecedent from a preferred to a dispreferred constituent. In contrast, deaccentuation of the *wh*-remnant, as Romero (1998) claims, changes the entire meaning of the structure, by virtue of changing the information structure, compare (19) to (20).

(19) I know that Joan ate dinner with [SOMEONE]$_F$, but they don't know with [WHO]$_F$.

(20) [I]$_F$ know that Joan ate dinner with someone, but [THEY]$_F$ don't know with who.

(Romero, 1998, p. 27)

In reference resolution of a pronoun, a contrastive focus on a pronoun thus leads to a topic shift where not the preferred but a dispreferred antecedent is chosen. In reference resolution of a *wh*-pronoun, a contrastive focus on a *wh*-pronoun leads to the requirement that its antecedent must be contrastively focused as well. As a result, I argue that although sluicing is a subtype of referential ambiguity, there are nevertheless crucial differences between the reference resolution of a *wh*-pronoun and that of a pronoun. Approaches like the centering theory which try to explain the reference resolution of a pronoun, can therefore not be applied one-on-one to sluicing: Rather than assuming that the topic of a prior utterance is the antecedent of an ambiguous *wh*-remnant, research has shown that listeners and readers rather consider the focus of a prior utterance as the antecedent of an ambiguous *wh*-remnant (Frazier & Clifton, 1998; Carlson et al., 2009).

Kehler (2002) argues that the type of coherence relation between first and second utterance plays a crucial role in the reference resolution of pronouns, especially ambiguous ones. He argues that there are about six main types of coherence relations (e.g., *explanation* or *result*). Each of these coherence relations shows a certain preference for which antecedent a given pronoun should take, e.g., the subject NP or the object NP. For example, result coherence relations tend to favor the object NP of a previous clause as the antecedent of a following subject pronoun, as illustrated in (21) below.

(21) Matt$_i$ passed a sandwich to David$_i$. He$_j$ said thanks.

(Rohde, 2008, p. 44)

Moreover, the role of *Implicit Causality* verbs also plays into the effects of coherence relations. These are verbs that evoke certain expectations about the continuation of the discourse. Thus, in (22)a., the PRN *she* is more likely to refer back to the object NP *Lisa*, whereas in (22)b., it is more likely to refer back to the subject NP *Mary* due to the expectations that are evoked by the meanings of the two different verbs.

(22) a. Mary$_i$ admires Lisa$_j$ because she$_j$ is beautiful.
b. Mary$_i$ fascinates Lisa$_j$ because she$_i$ is beautiful.

(Rudolph & Forsterling, 1997, p. 132)

From Kehler's (2002) approach follows that the choice of a VP can have a tremendous effect upon the reference resolution of an ambiguous pronoun. Hence, I cannot rule out the possibility that different VPs have different effects upon the antecedent choice of an ambiguous *wh*-remnant in sluicing. I thus argue that it is crucial to include several lexicalizations in any empirical investigation of ambiguous sluicing in order to control for an effect of coherence relations and implicit causality verbs.

1.3 Production Studies on the Prosodic Disambiguation of Sluicing

For the empirical investigation of this thesis, I will explore the prosodic realizations of different sluicing structures as produced by native speakers of English. Previous perception studies showed that a prosodic focus on an NP increases its chances of being chosen as the antecedent of the structure (Frazier & Clifton, 1998; Carlson et al., 2009). Moreover, Romero (1998) claims that the antecedent of a focused *wh*-remnant must contrast with its antecedent and that said contrast is prosodically realized with a pitch accent. I therefore argue that native speakers of English use prosody in the form of prosodic prominence to emphasize the antecedent of an ambiguous *wh*-remnant. In order to examine this claim, I transform a globally ambiguous sluicing structure like (23) into a temporarily ambiguous one by adding a plural -s to the end of the *wh*-remnant, see (24). This leads to a morphological disambiguation of the structure once it has been entirely parsed due to the number agreement with either the subject NP or the object NP. Such a referential temporary ambiguity allows to investigate acceptability and production differences between sluicing structures with two different types of antecedents.

(23) Some lawyer defended some dealer. Do you know which one?

(24) Some lawyer defended some dealers.
   a. Do you know which one?
   b. Do you know which ones?

Besides such simple sluicing structures, I also explore the acceptability and the prosody of sluicing structures in which one of the two possible antecedents is located within an island to extraction (Ross, 1969; Chung, Ladusaw, & McCloskey, 1995; Merchant, 2001). These structures are called *complex sluicing* (Konietzko et al., submitted). An example of an unambiguous complex sluicing structure with the antecedent within an embedded relative clause (RC) is given in (25).

(25) They want to hire someone who speaks *a Balkan language*, but I don't remember **which**.

(Merchant, 2001, p. 4)

An example of an ambiguous complex sluicing structure with either an antecedent within the matrix clause, the matrix object NP *some lawyer*, or within an island to extraction, the embedded object NP *some dealer*, is given in (26).

(26) They fired *some lawyer* that had defended *some dealer*. Do you know *which one*?

Sluicing is a special case with respect to island extractions since the island structure with the extracted antecedent follows after the *wh*-remnant and is thus elided (following the deletion approach which assumes syntactic structure in the ellipsis site of sluicing, see Ross, 1969; Sag, 1976; Lasnik, 2001; Merchant, 2001). Sluicing with an antecedent within an island construction does not lead to an unacceptable structure: It is said to be island insensitive because the island has been repaired. Nevertheless, some residue of this repair process remains: Complex sluicing structures with an antecedent within an underlying island structure are slightly less acceptable than identical structures with an antecedent within a matrix clause (Konietzko et al., submitted; Frazier & Clifton, 2011). Whether this discrepancy of preferences shows up in the prosodic realizations of native speakers of English as well will be examined within the empirical part of this thesis.

In Remmele et al. (forthcoming 2019), we investigated the prosodic disambiguation of a German word sequence, see (27), where the presence or absence of a prosodic pause decided on one or the other meaning. The respective structure is an ambiguous word sequence that can either be interpreted as one SVO structure (see (28)) or as two structures containing a stripping construction (see (29)). Prior context disambiguates the word sequence towards one or the other reading. Note that in this example, punctuation alone already disambiguates the structure because a full stop or a comma after the VP indicates the end of the syntactic and thus the prosodic phrase that leads to the stripping reading. We therefore presented the items in capital letters.

(27) JANINA BADET NADINE NICHT
Janina baths Nadine not

(28) [$_{CP}$ [$_{NP1}$ Janina] [$_{VP}$ [$_{V}$ badet] [$_{NP2}$ Nadine] [$_{NEG}$ nicht]]].
Janina baths Nadine not.

'Janina is not bathing Nadine.'

(29) [$_{CP1}$ [$_{NP1}$ Janina] [$_{VP}$ badet]]. [$_{CP2}$ [$_{NP2}$ Nadine] [$_{NEG}$ nicht]].
Janina baths. Nadine not.

'Janina is bathing. Nadine isn't [bathing]'

(Remmele et al., forthcoming 2019, p. 9)

This study provides information about the prosodic disambiguation of a structure from another language (German rather than English), where prosodic phrasing instead of prosodic prominence resolves the ambiguity which is caused by structural rather than information structural differences. The unique feature of this study is the division of the participants into two groups, one receiving specific training regarding ambiguity and prosodic disambiguation prior to the experiment, the other one being left naïve. With the results of this study, we thus add further support to the findings by Lehiste (1973), Price et al. (1991), Allbritton, McKoon, and Ratcliff (1996), Schafer, Speer, Warren, and White (2000) and Snedeker and Trueswell (2003) who claimed that even untrained speakers produce enough prosodic cues in order to resolve a structural ambiguity. In our experiment, even untrained speakers use prosody in the form of duration differences in order to disambiguate the two phrase structures of a structurally ambiguous word sequence. Taking this study as a starting point, I argue that untrained speakers also use prosody in the form of prosodic prominence to disambiguate the two different focus distributions of an information-structurally induced ambiguity. Of course, specifically trained speakers will produce stronger prosodic cues in order to disambiguate the structures and they will do so more frequently, which is in line with previous findings on prosodic disambiguation of, for example, Price et al. (1991) and Allbritton et al. (1996). Whereas specifically trained speakers receive detailed instructions informing them about prosody as a disambiguation method and specifically asking them to keep this information in mind while making their productions, untrained speakers are left alone to detect the ambiguity and to discover prosody as a way of disambiguation. Consequently, untrained speakers have to do a lot more work in order to produce equally or nearly equally strong prosodic differences than trained speakers. They not only have to detect the ambiguity of the target items by themselves, but they also have to figure out how to use prosody in order to disambiguate the structures, if they do so at all. Whether prosodic disambiguation by untrained speakers results as a consequence of intuitions about language as a means of communication, or whether it stems from a learning process which then leads to the strategic use of prosodic disambiguation markers, requires further experimental investigation and goes beyond the scope of this thesis. With this thesis, I argue against Piantadosi et al. (2012) and Wasow (2015) who claim that speakers do not actively avoid ambiguities as long as one source of disambiguating information is given. Moreover, the results of my investigation support Lehiste (1973), Price et al. (1991), Allbritton et al. (1996), Schafer et al. (2000) and Snedeker and Trueswell (2003) in their assumption that specific ambiguity awareness and knowledge about prosody as a disambiguating method is not a requirement for prosodic disambiguation.

1.4 Central Research Questions

There are thus three central research questions regarding the prosody of sluicing structures in English that I will investigate with this thesis: First, do native speakers of English use prosody to emphasize the antecedent of an ambiguous *wh*-remnant in simple and complex sluicing? Second, do native speakers of English use stronger prosodic cues to emphasize a specific antecedent? Third, is there a difference in the frequency or the strength of prosodic cues used by trained vs. untrained speakers? It has been argued that the contrastive focus of a sluicing structure also has a prosodic reflex in spoken language (Romero, 1998). However, this claim has never been empirically examined by means of a production study. I propose that native speakers of English use prosody in the form of prosodic prominence to emphasize the antecedent of a *wh*-remnant, both in simple and complex sluicing. I will present evidence that this form of prosodic disambiguation is influenced by several factors, such as speaker training, position of NP or sentence length and complexity. I propose that native speakers of English use stronger prosodic cues to emphasize a sentence-initial antecedent (NP1) as opposed to a sentence-final antecedent (NP2). I will provide evidence that this early position of NP1 leads to a strong degree of prosodic prominence on NP1 in order to make the subject NP (of simple sluicing) or the matrix NP (of complex sluicing) salient as the antecedent of the *wh*-remnant. The sentence-final position of NP2, though, leads to a smaller degree of prosodic prominence on NP2 in order to make the object NP (of simple sluicing) or the embedded NP (of complex sluicing) salient as the antecedent of the *wh*-remnant. I argue that this difference between NP1 and NP2 is due to the sentence-final position of NP2 which is often affected by specific speech phenomena that flaw its prosodic values (for simple and complex sluicing) and to the underlying island construction of NP2 (for complex sluicing). Finally, I propose that even untrained speakers use prosodic prominence to emphasize the antecedent of a *wh*-remnant in different types of sluicing. However, specifically trained speakers produce not only more but also stronger prosodic cues in order to disambiguate the structures than untrained speakers. I will present evidence that untrained speakers use prosody to disambiguate sluicing and that trained speakers do so more frequently and with greater strength. The central research questions are summarized below.

Central Research Questions

(1) Do native speakers of English use prosody to emphasize the antecedent of an ambiguous *wh*-remnant in simple and complex sluicing? (RQ(1))

(2) Do native speakers of English use stronger prosodic cues to emphasize a specific antecedent of simple and complex sluicing? (RQ(2))

(3) Is there a difference in the strength or the frequency of prosodic cues used by trained vs. untrained speakers? (RQ(3))

1.5 Structure of the Thesis

This thesis is structured as follows: In chapter 2, I will discuss the relationship between sluicing, prosody and ambiguity. I will reveal open questions and discuss research gaps that will be addressed within the empirical investigations of this thesis. In chapter 2.1, I will start with a discussion of sluicing and its subtypes. I will explore the relationship between sluicing and ambiguity as well as between sluicing and structural complexity in the form of island constraints. Moreover, I will discuss three major approaches exploring the content of the ellipsis site. As a last point, I will discuss the current state of the art regarding antecedent preferences of different sluicing structures. In chapter 2.2, I will discuss the concept of prosody and how it is related to the information structure of sluicing. Moreover, I will present the current state of the art regarding different forms of prosodic disambiguation such as prosodic phrasing and prosodic prominence. I will furthermore discuss the prosodic disambiguation of elliptical structures, with a focus on sluicing. Finally, I will discuss the importance of speaker training with respect to the results of a production study. In chapter 3, I will present the empirical investigation, and thus the major contribution of this thesis. I will start in chapter 3.1 with an overview of previous production studies on prosodic disambiguation, concentrating, on the one hand, on elliptical structures and, on the other hand, on structures that can be disambiguated by means of prosodic prominence. These two features are combined in sluicing: it is an elliptical structure that is prosodically disambiguated by variations of prosodic prominence. In chapter 3.2, I will present four acceptability judgment studies and three production studies that I have conducted in order to explore the prosodic realizations of different sluicing structures as produced by either trained or untrained native speakers of English. In chapter 3.2.1, I will discuss the first pilot production study named *Chicago* which examines globally ambiguous contrastive simple sluicing structures that are contextually disambiguated towards one reading. In chapter 3.2.2, I will discuss the four acceptability judgment studies that I conducted prior to the subsequent production study in order to obtain the best possible set of target items for the prosodic investigation of different temporarily ambiguous sluicing structures. In chapter 3.2.3, I will discuss the production study *Quarterback* which is split into two parts to accommodate a comparison of both temporarily ambiguous simple and complex sluicing structures that are morphologically disambiguated towards one reading. In chapter 4, I will discuss the combined results of all the production and acceptability judgment studies conducted in chapter 3.2. I will provide a detailed analysis of the findings and combine the individual results to arrive at a universal representation of the prosody of sluicing. I will argue that there are certain prosodic differences between simple and complex sluicing structures. However, I will also show that production studies face certain challenges when the investigated material is long and complex. Moreover, I will argue against Piantadosi et al. (2012) and Wasow (2015) who claim that one source of disambiguation is sufficient, hence rendering additional prosodic disambiguation redundant. Finally, I will argue that both prosodic phrasing and prosodic prominence are used already by untrained speakers in order to disambiguate the meaning of a sentence. I will conclude in chapter 4, providing a summary of the major findings of this thesis. Moreover, I will provide an outlook, discussing newly raised questions that resulted from the findings of this thesis and offering first solutions as to how empirically investigate these questions.

2 Sluicing and Prosody

The main goal of this thesis is to investigate whether native speakers of English use prosody in spoken language to disambiguate the different readings of various types of ambiguous sluicing structures. In this chapter, I will therefore provide the necessary theoretical background regarding the phenomena of sluicing and prosody and discuss open questions. I will address the issues of ambiguity and especially prosodic disambiguation as core concepts of this thesis. Within this chapter, I will thus explore the following eight questions: First, what is sluicing and how is it defined? Second, what is the relationship between sluicing and ambiguity? Third, what are the different relevant types of sluicing? Fourth, what theoretical assumptions are there regarding the elided part of sluicing? Fifth, what is the relationship between the *wh*-remnant and its antecedent in different types of sluicing? Sixth, what is prosody and how is it related to sluicing? Seventh, what is information structure and how is it related to prosody and sluicing? Eighth, what is prosodic disambiguation and how is sluicing prosodically disambiguated? Consequently, this chapter provides the theoretical background of this thesis. It reveals the relevant research gaps and thus helps to investigate the following three central research questions:

Central Research Questions

(1) Do native speakers of English use prosody to emphasize the antecedent of an ambiguous *wh*-remnant in simple and complex sluicing? (RQ(1))
(2) Do native speakers of English use stronger prosodic cues to emphasize a specific antecedent of simple and complex sluicing? (RQ(2))
(3) Is there a difference in the strength or the frequency of prosodic cues used by trained vs. untrained speakers? (RQ(3))

This chapter is structured as follows: I will start with a discussion of sluicing, its various sub-types and the current state of the art regarding the research about sluicing in chapter 2.1. I will then go on with a discussion of prosody, its relationship to information structure and prosodic disambiguation, in chapter 2.2. I will conclude with a summary in chapter 2.3.

2.1 Sluicing

With this thesis, I want to examine the prosodic disambiguation of different English sluicing structures. The prosodic realizations of other elliptical phenomena has been investigated to some extent (as will be discussed in 3.1.1). Although sluicing is a widespread cross-linguistic phenomenon that "may in fact be found in some form or another in every language" (2006, pp. 269–270), an in-depth analysis of how native speakers of English realize it in spoken language is still missing. This chapter therefore explores the following five questions: First, how is sluicing defined? Second, what is the relationship between sluicing and ambiguity? Third, what are the different types of sluicing? Fourth, what is the theoretical background regarding the ellipsis site of sluicing? Fifth, what is the relationship between the *wh*-remnant and its several possible antecedent NPs in different sluicing types? This chapter is thus structured as follows: In chapter 2.1.1, I will define sluicing and provide a discussion of its structural background. In chapter 2.1.2, I will discuss ambiguous vs. unambiguous sluicing as well as global vs. temporary ambiguity and some general language processing accounts. In chapter 2.1.3, I will concentrate on complex sluicing and contrastive vs. non-contrastive sluicing to give an overview of the different types of sluicing that are relevant to this thesis. In chapter 2.1.4, I will focus on the different approaches exploring the content of the ellipsis site. In chapter 2.1.5, I will summarize the current state of the art regarding perception studies investigating antecedent preferences in simple and complex sluicing, including a discussion of acceptable island violations.

2.1.1 Sluicing as a Subtype of Ellipsis

Sluicing is a subtype of ellipsis which was first introduced by Ross (1969). By virtue of lacking certain constituents, elliptical structures are a common source of structural ambiguity (sometimes also referred to as *syntactic* ambiguity), which arises when a given sentence can be parsed in different ways due to several possible underlying syntactic structures. A widely studied type of structural ambiguity is *attachment* ambiguity, as illustrated in (30). Here, the PP *with a telescope* can either modify the subject PRN *we* or the object NP *a man* (for a more detailed discussion of structural ambiguity, see Allbritton et al., 1996; Winkler, 1996;

Hirschberg & Avesani, 1997; Kang & Speer, 2004; Wasow, Perfors, & Beaver, 2005; Hwang et al., 2011; Wasow, 2015; Winkler, 2015a).

(30) We saw a man with a telescope.

(31) a. We [[saw a man] [with a telescope]]

→ We saw the man by looking through a telescope.

b. We [saw [a man [with a telescope]]]

→ We saw the man who had a telescope.

(Wasow, 2015, p. 34)

The difference between attachment ambiguities and elliptical structures is that in ellipses, the structural ambiguity arises due to a lack of certain constituents rather than different attachment sites: An already given, and thus redundant part of the structure has been prosodically reduced in the form of deaccentuation or deletion (Selkirk, 1995; Ladd, 1996; Schwarzschild, 1999; Krifka, 2008; Büring, 2013, 2016), which is often considered to be an extreme case of deaccentuation (Tancredi, 1992). However, this deletion does not lead to erroneous structures. Elliptical structures "contain an incomplete clause as well as a complete clause (usually preceding) from which the incomplete one derives an interpretation in some way" (Carlson & Horn, 2002, p. 3). Besides sluicing, there are various types of ellipses, which all can but must not be ambiguous: *VP ellipsis, gapping, pseudogapping* and *stripping*. In VP ellipsis, a non-finite verb and its complement has been deleted, resulting in a structure like (32) below.

(32) a. Holly Golightly won't eat rutabagas. I don't think Fred will, either.

b. Holly Golightly won't eat rutabagas. I don't think Fred will [~~eat rutabagas~~], either.

(Johnson, 2008, p. 439)

Gapping applies to coordinate structures, where "all but two major constituents from the right conjunct under identity with corresponding parts of the left conjunct" have been deleted (Hankamer & Sag, 1976, p. 410), see (33).

(33) a. Ehrlichman duped Haldeman, and Nixon, Ehrlichman

b. Ehrlichman duped Haldeman, and Nixon [~~duped~~] Ehrlichman

(Hankamer & Sag, 1976, p. 410)

Pseudogapping is similar to VP ellipsis, except that a (contrastively focused) object is still part of the second conjunct, as illustrated in (34).

(34) a. I'm not citing their analysis so much as I am their data.

b. I'm not citing their analysis so much as I am [~~citing~~] their data.

(Levin, 1986, p. 74)

Stripping (which is also called *bare argument ellipsis,* see Konietzko, 2017) refers to an elliptical structure where everything that is identical to parts of the preceding clause is deleted, except for one constituent (Hankamer & Sag, 1976), see (35) for an example.

(35) a. Gwendolyn smokes marijuana, but seldom in her own apartment.

b. Gwendolyn smokes marijuana, but [~~she~~] seldom [~~smokes marijuana~~] in her own apartment.

(Hankamer & Sag, 1976, p. 409)

However, the elliptical structure that is most relevant for this thesis is sluicing. Besides VP ellipsis, sluicing is one of the best investigated subtypes of ellipsis (Merchant, in preparation). Merchant assumes that the term *sluicing* comes from the verb *to sluice* which means *to exclude, shut out* or *to wash off with a rush of water*. Sluicing can thus be understood as an exclusion or a washing away of the remainder of the *wh*-question following the *wh*-expression (Merchant, 2001, p. 3). Sluicing is a subtype of clausal ellipsis which is a special form of ellipsis where everything except for a single constituent has been elided (Griffiths & Lipták, 2014). Accordingly, sluicing describes a structure where the sentential part of a *wh*-question has been elided, leaving only the *wh*-remnant in the final position of the structure. The *wh*-remnant gets its meaning from a structurally parallel constituent in the previous clause which is called the *antecedent* (Chung et al., 1995), the *correlate* (Merchant, 2001) or the *ANT-phrase* (Romero, 1998).[2] There are different theories trying to explain where exactly the *wh*-remnant gets its meaning from, for example, by assuming that the ellipsis site is filled with syntactic structure that has been elided or by assuming that it gets is meaning from previous context. The different theories regarding the content of the ellipsis site will be discussed in detail in chapter 2.1.4. (36)a. and (37)a. illustrate the original examples by Ross (1969). (36)b.

[2] In the remainder of this thesis, I will refer to it as the *antecedent*.

and (37)b. illustrate what the un-elided, that is, the un-sluiced versions of the same structures would look like.

(36) a. *Somebody* just left – guess **who**.

b. *Somebody* just left – guess **who** [_ ~~just left~~].

(37) a. He is writing, but you can't imagine **what**.

b. He is writing (*something*), but you can't imagine **what** [~~he is writing~~ _].

(Ross, 1969, p. 252)

In (36)a., the antecedent of the *wh*-remnant *who* is the indefinite subject NP *somebody*.[3] In (37), the antecedent of the *wh*-remnant *what* is an implicit constituent in the previous phrase, one that has not been explicitly mentioned. This sub-type of sluicing with an implied antecedent is called *sprouting* (Chung et al., 1995). Carlson et al. summarize that sluicing, "[l]ike other ellipsis sentences, […] is interpreted by filling in the elided material, using a proposition derived from the antecedent clause by abstracting over the antecedent." (2009, p. 116).

In all the sluicing examples discussed so far, the *wh*-remnant always had only one possible antecedent in the previous discourse. The structures were thus unambiguous. However, sluicing can also be ambiguous. Moreover, additional structure can complicate a sluicing structure, turning it into complex sluicing. These, and other types of sluicing, will therefore be discussed in the following chapter.

[3] Note that sluicing is not restricted to one sentence, as it happens to be the case in examples (36) and (37) above and (1) below. It can also spread over several sentences, as illustrated in example (2). Frazier and Clifton specifically state that sluicing "may occur within a sentence or across sentence boundaries" (2005, p. 122), Konietzko et al. support this claim by stating that "[t]he remnant and the correlate clause may appear in the same sentence…or in separate sentences" (submitted, p. 3) (see also Nykiel & Sag, 2011).

(1) John met *most applicants* but I can't remember exactly **which ones.**

Merchant (2008, p. 147)

(2) He announced he had eaten *the asparagus*. We didn't know **which asparagus**.

Chung et al. (1995, p. 266)

2.1.2 Sluicing and Ambiguity

So far, I have discussed unambiguous simple sluicing structures. Sluicing can also be ambiguous. This chapter thus investigates the following questions: First, what is ambiguous sluicing and how can it be distinguished from unambiguous sluicing? Second, what is the difference between global and temporary ambiguity and why is this distinction important with respect to sluicing? Third, how does language processing work and how can certain models be used to describe the processing of ambiguous sluicing? This chapter is structured as follows: In chapter 2.1.2.1, I will discuss unambiguous vs. ambiguous sluicing. In chapter 2.1.2.2, I will discuss global vs. temporary ambiguity. In chapter 2.1.2.3, I will discuss different language processing accounts that help to understand the processing difficulties that temporary ambiguities can cause.

2.1.2.1 Unambiguous vs. Ambiguous Sluicing

Sluicing can either be unambiguous or ambiguous, depending on whether the *wh*-remnant has one or several possible antecedents in the preceding discourse. Generally speaking, most types of *wh*-word or *wh*-phrase can be part of either an ambiguous or an unambiguous structure. In the following, I will first discuss unambiguous sluicing, followed by a detailed discussion of ambiguous sluicing, including global vs. temporarily ambiguous cases.

Examples of unambiguous sluicing with the different *wh*-remnants *who*, *who else*, *which one* and *which NP* are given in (38).

(38) **Unambiguous Sluicing**

a. [*Somebody*]$_{\text{PRN}}$ is happy – guess **who**!
b. [John]$_{\text{NP\_definite}}$ likes [*someone*]$_{\text{PRN\_indefinite}}$ – guess **who**!
c. [Some girls]$_{\text{NP\_plural}}$ like [*some guy*]$_{\text{NP\_singular}}$ – guess **which one**!
d. [Some girls]$_{\text{NP\_girls}}$ like [*some guy*]$_{\text{NP\_guy}}$ – guess **which guy**!
e. [Some girls]$_{\text{NP\_girls}}$ like [*Johnny Depp*]$_{\text{NP\_guy}}$ – guess **who else**!
f. [Some guy]$_{\text{NP}}$ likes [*someone*]$_{\text{PRN}}$ – guess **who**!
g. [*Some guy*]$_{\text{NP}}$ likes [someone]$_{\text{PRN}}$ – guess **which one**!

In the examples in (38), there is always only one constituent that is preferred as a possible antecedent of the *wh*-remnant at the end of the structure, as indicated with italics: In (38)a., the

PRN *somebody* is the only constituent of the entire sentence referring to a person, it is thus the only possible antecedent of the *wh*-word *who*. In (38)b., there are two constituents that can generally serve as an antecedent, the NP *John* and the PRN *someone*. However, since the *wh*-remnant *who* is non-contrastive, it requires an indefinite NP to be its antecedent. Consequently, only the PRN *someone* constitutes a viable antecedent. A definite NP here is impossible because of the resulting "clash between presumed knowledge, signaled by the use of a definite with a uniqueness presupposition, and an implication of ignorance of those very presuppositions, an implication stemming from the question embedding" (Dayal & Schwarzschild, 2010, p. 93). In (38)c., there are two NPs, both of which are indefinite and therefore a possible antecedent for the non-contrastive d-linked *wh*-phrase *which one.* The number of said *wh*-remnant is singular which indicates that only a singular constituent can be the antecedent: the NP *some guy*. In (38)d., the non-contrastive *wh*-phrase is not only d-linked but also contentful, due to the addition of the word *guy*. The antecedent of the *wh*-remnant is unmistakably the NP *some guy*. Although the NP *some girl* carries the same number agreement (singular), it contains incompatible lexical material (*girl*). In (38)e., the contrastive *wh*-phrase *who else* requires a definite NP to be its antecedent (as stated by Merchant, 2001; van Craenenbroeck, 2010; Harris, 2015), and can thus only take the NP *Johnny Depp* as an antecedent. In (38)f., both the NP *some guy* and the PRN *someone* could serve as the antecedent of the non-contrastive *wh*-word *who*. However, there is a strong preference for a bare *wh*-word like *who* to take a PRN as its antecedent. This is reversed in (38)g., where the *wh*-remnant is the *wh*-phrase *which one*, which preferably takes an NP as its antecedent. The difference between *someone* and *some guy* lies in the presence or absence of a head NP. This is dubbed the *Antecedent-Correlate Harmony* (ACH) hypothesis, see (39), which is a phenomenon genuine to sluicing (Dayal & Schwarzschild, 2010).

(39) **Antecedent-Correlate Harmony**

The *wh*-correlate and antecedent agree on the presence/absence of a contentful head noun.

(Dayal & Schwarzschild, 2010, p. 100)

Barros (2013) summarizes the core of the ACH by stating that "if the correlate is an indefinite pronoun, the remnant must lack an NP complement, whereas an indefinite description requires a remnant with an NP" (p. 296). Collins, Popova, Sag, and Wasow (2014) empirically investigated the ACH hypothesis. An example of their experimental items is given in (40).

(40) a. I spoke with *a police officer* but I can't remember *which police officer*.

b. I spoke with *someone* but I can't remember *who*.

c. I spoke with *a police officer* but I can't remember *who*.

(Collins et al., 2014, p. 59)

In (40)a. and b., *wh*-remnant and antecedent agree in "terms of informativity" (Collins et al., 2014, p. 59) and should therefore lead to better judgments than (40)c. where there is a mismatch between *wh*-remnant and antecedent. They found that sluicing structures with matching constituents received significantly higher ratings than those with mismatching constituents (Collins et al., 2014, p. 62). They conclude that "[t]hese results show that mismatching the informativity of the correlate and remnant *wh*-item significantly degrades sluicing" (Collins et al., 2014, p. 62). The ACH and especially the empirical findings by Collins, Popova, Sag, and Wasow (2014) thus show that a bare *wh*-word like *who* prefers to take a PRN like *someone* or *somebody* as its antecedent, rather than an NP like *some guy*. These findings make important implications for the empirical investigation of this thesis: For the production study that I will discuss in chapter 3.2.3, I needed a *wh*-remnant that can serve as both an ambiguous and as an unambiguous *wh*-remnant. However, since the *wh*-remnant *who* only takes a PRN like *someone* or *somebody* as an acceptable antecedent, I had to eliminate this *wh*-remnant type as a possible candidate for the structures of my empirical investigations, as will be elaborated in the following paragraph.

Sluicing, like all elliptical structures, can be, but must not be, ambiguous. Ambiguity is a pervasive phenomenon in natural language (Pinkal, 1991; Wasow et al., 2005; Piantadosi et al., 2012; Winkler, 2014; Wasow, 2015).The term *ambiguity* stems from the Latin word *ambiguitas*, which means *to dispute about* or *to wander* (Greene et al., 2012, p. 43). It refers to expressions that have "two or more distinct denotations… [which are] associated with more than one region of meaning space" (Wasow et al., 2005, p. 265). Examples of ambiguous sluicing with different types of *wh*-remnants are given in (41).

(41) **Ambiguous Sluicing:**

a. ??[*Someone*]$_{\text{PRN1}}$ likes [*someone*]$_{\text{PRN2}}$ – guess **who**!

b. [*John*]$_{\text{NP1\_definite}}$ likes [*Mary*]$_{\text{NP2\_definite}}$ – guess **who else!**

c. [*Some girl*]$_{\text{NP1\_indefinite}}$ likes [*some guy*]$_{\text{NP2\_indefinite}}$ – guess **which one!**

d. [*Some girl invited some guy to go [somewhere]$_{PRN}$ together*]$_{\text{TP}}$ – guess **where**!

e. [*Some girl*]$_{\text{NP1\_indefinite}}$ invited [*some guy*]$_{\text{NP2\_indefinite}}$ to [*a party*]$_{\text{NP3\_indefinite}}$ – guess **which one**!

The examples in (41) always contain at least two constituents that can serve as possible antecedents of the ambiguous *wh*-remnant at the end of the structure. The structure in (41)a. illustrates why *who* is not a viable *wh*-remnant for ambiguous sluicing: the structure sounds odd because *who* prefers to take PRNs like *someone* or *somebody* as an antecedent. However, combining two PRNs in one sentence leads to an unnatural sounding structure. The *wh*-pronoun *who* thus had to be excluded for the empirical investigation of this thesis. In (41)b., the contrastive *wh*-phrase *who else* again requires a definite NP to be its antecedent. Accordingly, it can take either *John* or *Mary* as its antecedent. The structure remains ambiguous since there is no additional information that would help to disambiguate the structure towards one NP, such as number or case agreement. Note that. In German, case agreement obligatorily disambiguates the *wh*-remnant towards one NP, as illustrated in (42).

(42) [*John*]$_i$ mag [*Mary*]$_j$ – rate **wer$_i$/wen$_j$** **noch**!
John$_i$ likes Mary$_j$ – guess who$_i$/who$_j$ else!
John$_i$ likes Mary$_j$– guess who$_{i/j}$ else!

In (41)c., the non-contrastive *wh*-phrase *which one* requires an indefinite NP as its antecedent and can thus take either *some girl* or *some guy* as its antecedent. In (41)d., the *wh*-remnant *where* is ambiguous between taking either the indirect object PRN *somewhere* as its antecedent or the entire TP as in *…guess where [some girl invited some guy to go somewhere together]*. Because of this wide ambiguity, the PRN *where* also has to be excluded as a possible *wh*-remnant for the empirical investigation discussed in chapter 3.2.3. The structure in (41)e. is three way ambiguous: the ambiguous *wh*-remnant *which one* can either take the indefinite NP *some girl*, the indefinite NP *some guy* or the indefinite NP *a party* as its antecedent. From this summary of unambiguous as well as ambiguous sluicing structures with different types of *wh*-remnants, I conclude that only a subset of *wh*-remnants is suitable for future experimental investigations. These include *who else, which one* and *which NP,* since these are the only *wh*-remnants that can serve as both ambiguous as well as unambiguous *wh*-remnants without resulting in odd (like the PRN *who*) or three-way ambiguous structures (like the PRN *where*).

2.1.2.2 Global vs. Temporary Ambiguity

Considering the cases of ambiguous sluicing, it is important to note that there has been a long tradition of linguistic research on the field of ambiguity, resulting in different types of ambiguity which can be classified along the dimension of *temporary* vs. *global* ambiguity, as illustrated in Figure 1. Ambiguous sluicing, as a subtype of ambiguous ellipsis, is thus a referential ambiguity that can, depending on morphology, either be temporarily or globally ambiguous.[4]

[4] Note that a combination of different types of ambiguity is also possible, as indicated in example (3): Here, a combination of morphological ambiguity (ambiguity of suffix -s of *boy's/boys*) and homophony (identical phonetics of *boy's/boys*) leads to different syntactic analyses (as illustrated in (4)) and thus structural ambiguity.[4]

(3) [mɛri drɔz ðə bɔɪz ˈhæmər]

(4) a. ([[Mary]$_{DP}$ [draws]$_{VP}$ [[the boy's hammer]$_{DP}$]$_{TP}$)$_{IPh}$.
b. ([[Mary]$_{DP}$ [draws]$_{VP}$]$_{TP}$].)$_{IPh}$ ([[The boys]$_{DP}$ [hammer]$_{VP}$]$_{TP}$.])$_{IPh}$

Wiedmann and Winkler (2015, p. 185)

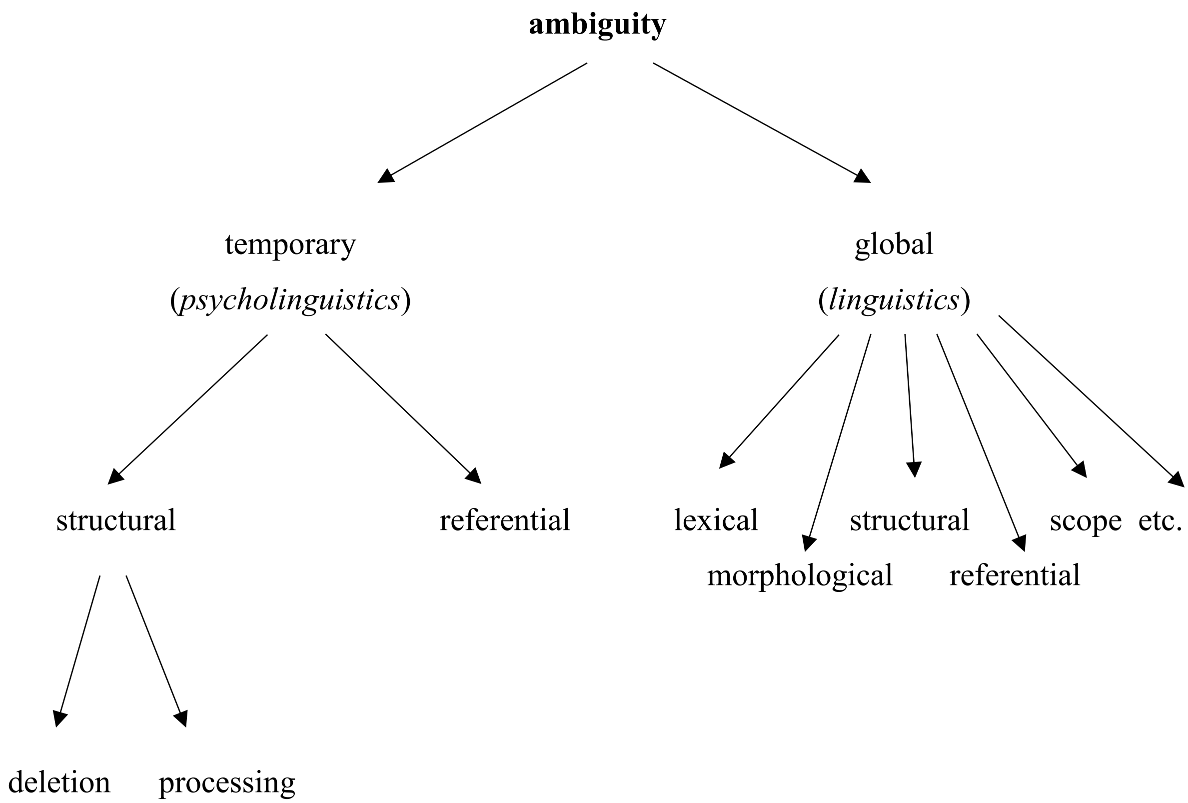


Figure 1. Different Types of Ambiguity

An example of a globally ambiguous sluicing structure is given in (43); an example of a temporarily ambiguous sluicing structure is given in (45).

(43) [*Some tourist*]$_i$ suspected that the hotelkeeper was hiding [*someone*]$_j$. Guess **who**$_{i/j}$?

(44) a. [*Some tourist*]$_i$ suspected that the hotelkeeper was hiding [someone]$_j$. Guess **who** [_ ~~suspected that the hotelkeeper was hiding someone~~]?

b. [Some tourist]$_i$ suspected that the hotelkeeper was hiding [*someone*]$_j$. Guess **who** [~~some tourist suspected that the hotelkeeper was hiding~~ _]?

(Frazier & Clifton, 1998, p. 515)

(45) *Some lawyer* defended *some dealers*, but I don't know **which one**.

(46) a. [Some lawyer]$_i$ defended [*some dealers*]$_j$, but I don't know *[**which one**]$_j$.

b. [*Some lawyer*]$_i$ defended [some dealers]$_j$, but I don't know [**which one**]$_i$.

In (43), the *wh*-word *who* can either take the NP *some tourist*, see (44)a., or the PRN *someone,* see (44)b., as its antecedent. Exactly which antecedent should be chosen remains unsolved. The structure is thus globally ambiguous. Global here means that the ambiguity remains, even once the end of the structure has been reached and the entire sentence has been processed (Harley, 2008, 2014). In (45), the singular *wh*-phrase *which one* can only take the singular subject NP *some lawyer* as its antecedent, see (46)b. Therefore, if someone parsed the sentence taking the plural object NP *some dealers* as the antecedent, see (46)a., temporary ambiguity would occur but would not be resolved once the disambiguation region *which one* is encountered.

One important type of global ambiguity is *referential* ambiguity, which is concerned with the reference resolution of ambiguous constituents, such as PRNs or NPs, as already addressed in chapter 1.2. Referential ambiguity is closely related to *binding* theory (see Chomsky, 1982, 1995, also Büring, 2005). Nieuwland and van Berkum (p. 606) state that PRNs are “formally ambiguous in the sense that the linguistic pronominal features (e.g., whether the pronoun is male/female, or singular/plural) do not logically warrant the retrieval of a unique antecedent.” (2008, p. 606). This phenomenon is closely related to the ambiguity of a *wh*-remnant in sluicing which may share certain pronominal features with either only one or several possible antecedents. Referential ambiguity is thus important for this thesis, since, in globally ambiguous sluicing, one of two possible constituents has to be identified as the antecedent of a *wh*-remnant, as it is the case in the reference resolution of regular PRNs (see empirical investigation, chapter 3). An example of a referential ambiguity is illustrated in (47), where the possessive PRN *his* can either refer back to the NP *John* or the NP *Tom*. An example of a referential ambiguity containing a sluicing structure is given in (48). The ambiguity in (48) is caused by the referential ambiguity of the *wh*-remnant *which one* which can either take the subject NP *some lawyer* or the object NP *some dealer* as antecedent.

(47) *John* and *Tom* play with **his** football.

(48) On Tuesday, *some lawyer* defended *some dealer*. Do you know **which one**?

As discussed in chapter 1.2, though, the reference resolution of regular pronouns differs from the reference resolution of *wh*-pronouns in several aspects. The most striking difference is that ambiguous pronouns seem to take the topic of a preceding discourse as the preferred antecedent, whereas *wh*-pronouns seem to take the focus of a preceding discourse as the preferred antecedent. In support of this, Nieuwland and van Berkum argue that anaphoric inference is easiest when there is "one potential antecedent [that] is especially prominent in the discourse" Nieuwland and van Berkum (2008, p. 607). This is the case in sluicing, where the final argument of a structure tends to be the preferred antecedent (see Frazier & Clifton, 1998; Carlson et al., 2009, discussion chapter 2.1.5). Ideally, the preferred antecedent is also the most prominent, thus, focused antecedent of a given structure. Whether such prominence is also realized prosodically in spoken language will be addressed in chapter 3. For a more detailed discussion of several other types of global ambiguity, I refer the reader to Wasow (2015) and Wasow et al. (2005).

In contrast to globally ambiguous structures, temporary ambiguities are structures that are only ambiguous up until a certain point, which is called the *disambiguation region* (Harley, 2008, 2014). This region disambiguates the structure towards one interpretation by rendering other, previously possible interpretations impossible (Ferreira, 2006; Harley, 2008, 2014): After the entire structure has been parsed, no ambiguity remains. The discussion of temporary ambiguity is important for this thesis since sluicing is a referential ambiguity that can not only be globally but also temporarily ambiguous. The literature does not distinguish between different types of temporary ambiguity. However, I argue that there are at least two types that have to be distinguished because they differ in several aspects. I will call these two types *structural temporary ambiguity* and *referential temporary ambiguity*. Structural temporary ambiguity can be further split into two types, namely those that are caused by *deletion* and those that are caused by *processing preferences*. I will individually discuss these three types of temporary ambiguity in the following paragraph.

An example of a *structural temporary ambiguity due to deletion* is the famous *garden path structure*, as illustrated in (49). The name *garden path* comes from the fact that the linguistic material guides the parser towards a reading that will have to be revised once the disambiguation region has been reached, hence *leading him up the garden path*.

(49) The horse raced past the barn <u>fell</u>.

(Bever, 1970, p. 316)

(50) The horse [~~that was~~] raced past the barn fell.

In this garden path, the reader tends to parse the structure as a regular SVO clause due to the morphology of the word *raced*, which triggers a simple past reading of the VP: *the horse raced past the barn*. Only once the unexpected last word *fell* (the disambiguation region) is encountered, the parser notes that his initial analysis is incompatible with the remainder of the structure. This primary interpretation cannot accommodate *fell* and, consequently, the entire structure has to be revised. As a result, the word *raced* needs to be parsed as a past participle and not as a simple past. The ambiguity is thus triggered by the morphological ambiguity of the *–ed* of *raced*. I call this type of temporary ambiguity *structural temporary ambiguity* because the first analysis and the reanalyzed second analysis differ in their syntactic phrase structures. The first analysis is an SVO clause, see (51); the second analysis is an SV clause with a complex subject, see (52). Moreover, I call it *due to deletion* because the ambiguity is triggered by a lack of the relative PRN *that* and the copula *was*, which have been deleted in this case of a *reduced relative clause*.

(51) [[The horse]$_{\text{Spec-TP}}$ [[raced]$_{\text{V}}$ [past the barn]$_{\text{NP}}$]$_{\text{VP}}$]$_{\text{TP}}$ *fell.

(52) [[The horse [[~~that was~~] raced past the barn]$_{\text{CP}}$]$_{\text{Spec-TP}}$ [fell]$_{\text{VP}}$]$_{\text{TP}}$.

An example of a *structural temporary ambiguity due to processing preferences* is given in (53). This is another example of a garden path structure where a preferred first analysis turns out to be incongruous with the lexical material of the disambiguation region. In contrast to (49), however, the garden path here is not triggered by deletion but results as a consequence of certain processing preferences. The syntactically preferred interpretation turns out to be incompatible with the lexical material of the disambiguation region: the VP *takes* cannot be parsed into one coherent clause with the previous clause *Before the king rides his horse*. The first, preferred analysis is given in (54). Like (49), it differs in its syntactic phrase structure from the second analysis, which is the dispreferred interpretation, given in (55), thus also being a structural temporary ambiguity.

(53) Before the king rides his horse *takes* ages to groom.

(54) Before [[the king]$_{\text{Spec-TP}}$ [rides]$_{\text{V}}$ [his horse]$_{\text{NP}}$]$_{\text{VP}}$]$_{\text{TP}}$ *takes ages to groom

(55) Before [[the king]$_{\text{Spec-TP1}}$ [rides]$_{\text{VP}}$]$_{\text{TP1}}$ [[his horse]$_{\text{Spec-TP2}}$ [takes ages to groom]$_{\text{VP}}$]$_{\text{TP2}}$

(Warren, 1985, p. 144)

To understand why certain processing preferences lead to a garden path in (53), one has to take the concepts of *Minimal Attachment* (MA) and *Late Closure* (LC) (Frazier, 1987) into consideration. MA means that one should not "postulate any potentially unnecessary nodes" (Frazier, 1987, p. 562) when parsing a sentence. LC demands that "if grammatically permissible, attach new items into the clause or phrase currently being processed" (Frazier, 1987, p. 562). The preferred reading of (53) is one in which no new node is created (following MA) and in which a new constituent is attached into a currently processed phrase (following LC). In this example, the two principles go hand in hand, resulting in the parse *Before the king rides his horse* since the NP *his horse* is directly attached to the VP *rides.* This, however, results in an incorrect parse which is not compatible with the second part of the structure *takes ages to groom*. This second part requires the NP *his horse* to be its subject, therefore postulating a new node. The preferred interpretation, obeying MA and LC, thus leads to an incorrect analysis that requires the parser to reanalyze the entire structure.[5] (56) is another example of a structural temporary ambiguity due to processing that leads to a garden path. Here, the first analysis follows from the processing principle of LC: the parser wants to attach the NP *the house* to the currently processed clause, namely *Roger leaves*. However, once he reaches the disambiguation region *is,* he realizes that his analysis is incompatible with *is dark*. The NP *the house* has to build a new node (following the concept of *early* rather than *late closure*), hence constituting the subject NP of the second clause *the house is dark*.

(56) When Roger leaves the house is dark.

(57) When [[Roger]$_{\text{Spec-TP}}$ [[[leaves]$_{\text{V}}$ [the house]$_{\text{NP}}$]$_{\text{VP}}$]$_{\text{TP}}$ *is dark.

(58) When [[Roger]$_{\text{Spec-TP1}}$ [leaves]$_{\text{VP}}$]$_{\text{TP1}}$] [[the house]$_{\text{Spec-TP2}}$ [[is]$_{\text{VP}}$ [dark]$_{\text{ADJ}}$]$_{\text{TP2}}$

(Kjelgaard & Speer, 1999, p. 156)

[5] Note that in example (49) above, the principles of MA and LC would lead to the correct parse given in (50): if the parser prefers to attach new material into the "phrase currently being processed", he should attach the VP *raced* directly to Spec-TP. However, for this direct attachment, the parser would have had to do the extra step of assuming deleted material in the structure, which is not part of the two principles MA and LC. Moreover, the word *raced* is more frequently interpreted as a simple past rather than a past participle. Therefore, the parser prefers an analysis as an SVO, thus leading him up the garden path.

The second type of temporary ambiguity that I want to distinguish is called *referential temporary ambiguity.* An example has already been briefly mentioned in (48) above and is repeated in (59).

(59) On Tuesday, some lawyer defended some dealers. Do you know which *one*?

The example here is a sluicing structure. It is especially important for this thesis since it is part of one of the production studies that will be discussed in chapter 3. Here, the ambiguity is not caused by the possibility of different syntactic phrases (as it was the case for the structural temporary ambiguities discussed above) but by different discourse preferences. As before, there is a preferred analysis which turns out to be incompatible with the lexical material of the disambiguation region. Here, the disambiguation region is the final word *one*. As previous research has shown, the preferred antecedent of an ambiguous *wh*-remnant in sluicing is the final argument of a sentence, in this case, the object NP *some dealers* (Frazier & Clifton, 1998; Carlson et al., 2009). Since the object NP *some dealers* is morphologically marked as plural (with the suffix -s), the *wh*-remnant *which one* can only take the subject NP *some lawyer*, which is singular, as its antecedent. The preferred object antecedent thus turns out to be incompatible with the number agreement of the *wh*-remnant: the parser has to reanalyze. The temporary ambiguity is caused by certain discourse preferences which result from the requirements of the Nuclear Stress Rule (NSR) (see Chomsky & Halle, 1968; Cinque, 1993, also discussion chapter 2.2.2.2) and therefore certain focus expectations: the default focus of a sentence is expected to be in a sentence-final position, resulting in a last argument preference, as discussed by Carlson et al. (2009) (also previously noted concerning an object NP by Frazier & Clifton, 1998). Note that the syntactic phrase structure is the same in both analyses, as opposed to the structural temporary ambiguities discussed above. Here, the two analyses rather differ in their reference resolution, as indicated with the indices *i* for the subject NP and *j* for the object NP in (60) and (61).

(60) On Tuesday, [some lawyer]$_i$ defended [some dealers]$_j$. Do you know *[which one]$_j$?

(61) On Tuesday, [some lawyer]$_i$ defended [some dealers]$_j$. Do you know [which one]$_i$?

Example (60) illustrates the first, preferred analysis which has to be revised, and (61) illustrates the second, dispreferred but compatible analysis.[6]

2.1.2.3 Language Processing

In order to shed some light on why temporary ambiguities occur and why they increase processing efforts, I want to discuss some of the major accounts that explain how language processing works. The two most dominant models trying to explain the processing of ambiguity are the *garden path model* (GPM), introduced by Frazier and Rayner (1982), and the *constraint based model* (CBM), introduced by Tanenhaus, Carlson, and Trueswell (1989) (Harley, 2008, 2014, p. 298).

Following from Harley (2008, 2014), the main difference between these two models is that the GPM is a serial two stage fixed choice autonomous model, whereas the CBM is an interactive one stage variable choice model. In terms of the GPM, this means that in the first stage, the parser takes only syntactic information into account to parse a sentence by applying the principles of MA and LC (Frazier, 1987). Note that if the two principles are in conflict, MA takes precedence. In a second stage, the parser then includes semantic, pragmatic, discourse, frequency and other types of information. If the information of the second stage clashes with the syntactic analysis of the first stage, the parser has to re-analyze his syntactic parse so that it fits the semantic, etc. meaning. In the CBM, there is only one stage: different types of information, e.g., syntactic, semantic or pragmatic information, which are called *constraints*, all affect the parsing process at the same time. The most highly activated interpretation is then chosen.

There is plenty of evidence and counter-evidence for both processing models (see Frazier & Rayner, 1982; Rayner, Carlson, & Frazier, 1983; Frazier, 1987 for evidence supporting the GPM and Tanenhaus et al., 1989; Boland, Tanenhaus, & Garnsey, 1990;

[6] Frazier and Clifton (2005) claim that disambiguation involves a *syntactic processor* and a *discourse processor*, which can be activated to different degrees. This approach might help to explain the intuitively different degrees of unacceptability of the dispreferred analysis for the three different types of temporary ambiguity discussed in this section. It seems that structural temporary ambiguities due to deletion require the highest amount of processing effort for the reanalysis which might be due to a high activation of the syntactic processor. Moreover, the parser has to assume deleted material. In structural temporary ambiguities due to processing differences, both the syntactic and the discourse processor seem to be at play, which might results in a decreased amount of processing effort for the reanalysis. Finally, in referential temporary ambiguities, only the discourse processor is at work since the two readings do not differ in their syntactic structures, which might result in only a small processing effort for the reanalysis. From this follows that ambiguities including work of the syntactic processor are more costly than those including work of the discourse processor

MacDonald, 1994; MacDonald, Pearlmutter, & Seidenberg, 1994 for evidence supporting the CBM). As a consequence, new models have been developed, which tried to make up for the shortcomings of the GPM and the CBM. These models include the *Unrestricted Race Model* (Traxler, Pickering, & Clifton, 1998), *Semantics comes first* (Bever, T.G., Sanz, M. & Townsend, D.J. J, 1998), the *Good Enough Approach* (Ferreira, Bailey, & Ferraro, 2002; Ferreira & Patson, 2007) and *Meaning Through Syntax* (McKoon & Ratcliff, 2003). See Harley (2008, 2014) for a summary of the different processing accounts, which are all to some degree mixtures of the two main models, GPM and CBM.

With that information in mind, I want to come back to the referential temporary ambiguity in (62), which is one of the crucial examples of this thesis.

(62) On Tuesday, some lawyer defended some dealers. Do you know which *one*?

According to the GPM, no ambiguity arises in the first stage where only syntactic information is processed, since there is no syntactic incongruence. In the second stage, discourse information is added which then leads to a temporary ambiguity because the discourse processor prefers to take the object NP *some dealers* as the antecedent of the *wh*-remnant rather than the required subject NP *some lawyer* (see Frazier & Clifton, 1998; Carlson et al., 2009). This in turn leads to decreased acceptability judgments of (62), as will be discussed in chapter 2.1.5 and as will be shown in the empirical part of this thesis, chapter 3. According to the CBM, discourse information is immediately included in the processing of the structure and thus leads right away to temporary ambiguity: the most highly activated structure is then chosen, which tends to be the object NP analysis. To conclude, both of the main processing models, the GPM and the CBM, predict a temporary ambiguity of the structure in (62), only at different stages of processing. As a consequence, this finding helps to explain the decreased acceptability of (62) as compared to a minimal pair with the object NP as antecedent, as found by Frazier and Clifton (1998) and Carlson et al. (2009) and as will be shown in the acceptability judgment studies discussed in chapter 3.2.2.

Another structure where decreased acceptability plays an important role are complex sluicing structures: Here, the position of one of the possible antecedent NPs within an island to extraction leads to decreased acceptability judgments, even when the respective antecedent is the final argument of the structure. The next chapter will therefore provide a discussion of complex sluicing structures.

2.1.3 Different Types of Sluicing

So far, I have discussed simple sluicing structures that always consisted of a regular SVO structure and mostly non-contrastive *wh*-remnants. However, sluicing can also be complex and contrastive. This chapter thus investigates the following questions: First, what is complex sluicing and why does the addition of structure lead to a decrease in acceptability of certain antecedents? Second, what is the difference between non-contrastive and contrastive *wh*-remnants and why is this distinction important for this thesis? This chapter is structured as follows: In chapter 2.1.3.1, I will discuss complex sluicing. In chapter 2.1.3.2, I will discuss non-contrastive and contrastive *wh*-remnants and their special requirements regarding antecedents and ambiguity.

2.1.3.1 Complex Sluicing

The term *complex sluicing* describes sluicing structures that contain additional material, e.g., in the form of an RC, that constitutes an island to extraction (Chung, Ladusaw, & McCloskey, 1995; Merchant, 2001; Ross, 1969). Surprisingly, complex sluicing structures with an antecedent within said island are mostly acceptable in their sluiced versions and only lead to unacceptable structures due to island violations in their un-sluiced (or un-elliptical) versions. In the sluiced versions, the syntactic island violation is not pronounced by virtue of being elided and therefore saves the entire structure from being unacceptable (following the deletion approach which assumes syntactic structure in the ellipsis site of sluicing, see Ross, 1969; Sag, 1976; Lasnik, 2001; Merchant, 2001 and the discussion in chapter 2.1.4). An example of such a complex sluicing structure with a repaired adjunct island violation is given in (63) below, with the un-repaired counterpart, an island violation in a regular *wh*-question, as a comparison in (64).

(63) We are willing to use force [under *certain circumstances*], but we will not say in advance **which ones**.

(64) *[*What circumstances*] will we use force [under _]?

(Chung et al., 1995, p. 273)

The relationship between sluicing and islands has first been discussed by Ross (1969) who claims that sluicing repairs syntactic island violations (further discussed by Chung et al., 1995; Lasnik, 2001; Merchant, 2001). He claims that this island insensitivity comes from the fact that the TP that contains the traces with the island violation is elided at PF, thus being unpronounced.

The name complex sluicing was first given to this structure by Konietzko et al. (submitted) who exclusively use it to refer to sluicing structures with an embedded RC.[7] Two examples of complex sluicing are given below: In (66)a. and (68)a., we see that the un-elliptical counterparts of the sluicing structures in (65) and (67) sound somewhat unacceptable, whereas the sluiced versions in (66)b. and (68)b. are fully acceptable.

(65) She kissed a man who bit *one of my friends*, but Tom doesn't realize **which one of my friends.**

(66) a. * She kissed a man who bit *one of my friends*, but Tom doesn't realize **which one of my friends** [she kissed a man who bits _].
b. She kissed a man who bit *one of my friends*, but Tom doesn't realize **which one of my friends** [~~she kissed a man who bits~~ _].

(Ross, 1969, p. 276)

(67) They want to hire someone who speaks *a Balkan language,* but I don't remember **which**.

(68) a. *They want to hire someone who speaks *a Balkan language,* but I don't remember **which** [they want to hire someone who speaks _].
b. They want to hire someone who speaks *a Balkan language,* but I don't remember **which** [~~they want to hire someone who speaks~~ _].

(Merchant, 2001, p. 148)

In both examples, the antecedent of the *wh*-remnant is located within the RC: in (65), *one of my friends* is the antecedent of *which one of my friends* and in (67), *a Balkan language* is the antecedent of *which*. Winkler (2013) discusses the equivalent of example (67) in German. She

[7] I will refer to sluicing structures with any type of underlying island structure as complex sluicing, although most examples will indeed be cases of RC island violations.

claims that in German, even the sluiced version with an island antecedent is unacceptable, see (69), as compared to the same structure with a matrix antecedent, see (70). However, she also finds that extraposition of the RC improves the acceptability of the island antecedent, as illustrated in (71).

(69) ??Sie wollen nur einen Linguisten, der *eine Balkansprache* spricht,
??They want only a linguist, who a Balkan language speaks

einstellen, aber ich weiß nicht **welche**.
hire, but I know not which.

They only want to hire a linguist [who speaks a Balkan language]$_{intraposed}$*, but I don't know which.*

(70) Sie wollen nur *einen Linguisten*, der eine Balkansprache spricht,
They want only a linguist, who a Balkan language speaks,

einstellen, aber ich weiß nicht **wen**.
hire, but I know not who.

They only want to hire a linguist who speaks a Balkan language, but I don't know who.

(71) ?Sie wollen nur einen Linguisten einstellen, der *eine Balkansprache* spricht
?They want only a linguist hire, who a Balkan language speaks

aber ich weiß nicht **welche**.
but I know not which.

They only want to hire a linguist [who speaks a Balkan language]$_{extraposed}$*, but I don't know who.*

(Winkler, 2013, p. 464)

The question whether extraposition has an effect upon the acceptability of an island antecedent of German complex sluicing has been empirically investigated by Konietzko et al. (submitted) and will be discussed in chapter 2.1.5.2. Moreover, I will address this question regarding English complex sluicing in the acceptability judgment study 3 discussed in chapter 3.2.2.

2.1.3.2 Contrastive vs. Non-Contrastive Sluicing

So far, the sluicing examples that have been discussed in this chapter were mostly cases of non-contrastive simple and complex sluicing. This means that the *wh*-remnant was not in a contrastive relationship with its antecedent. There are, however, cases of contrastive sluicing, as illustrated for an ambiguous case of sluicing in (72).

(72) *The captain* talked with *the co-pilot* but we couldn't find out **who else.**

(Carlson et al., 2009, p. 121)

(73) a. The captain talked with *the co-pilot* but we couldn't find out **who else** [the captain talked to _].
b. *The captain* talked with the co-pilot but we couldn't find out **who else** [_ talked to the co-pilot].

Here, the *wh*-remnant *who else* is contrastive in that it opens up a set of alternatives to the antecedent rather than depicting a sub-set of it, as it is the case in non-contrastive sluicing. As opposed to non-contrastive *wh*-remnants (such as *who, what, which one* or *which NP*), contrastive *wh*-remnants require their antecedents to be definite NPs, as illustrated with the two NPs *the captain* and *the co-pilot* in (72). The difference between contrastive and non-contrastive sluicing is important with respect to the empirical investigations discussed in chapter 3: The first production study explores the prosody of contrastive sluicing, whereas the second production study explores the prosody of non-contrastive sluicing. I will therefore discuss the exact differences between contrastive and non-contrastive sluicing in this chapter.

Merchant (2001) lists several non-contrastive sluicing structures with different types of *wh*-words, including the following: *who* (74), *what* (75), *which* (76), *whose* (77) and *when, how, why, where from* (78). An example of *wh*-phrases are *which one* or *which NP*, which have been investigated by Frazier and Clifton (2011), see (79). Examples (77)a. and (78)a. are cases of *sprouting*, which is a sub-type of sluicing where the *wh*-remnant only has an implicit antecedent. (77)b. and (78)b. illustrate what the implicit antecedent might look like. What all these non-contrastive *wh*-remnants have in common is that they all require an indefinite NP as their antecedent in order to result in acceptable structures.

(74) *Someone* called but I can't tell you **who**.

(75) Jack bought *something*, but I don't know **what**.

(76) They want to hire someone who speaks *a Balkan language*, but I don't remember **which**.

(77) a. A car is parked on the lawn — find out **whose**.
b. (*Someone's*) car is parked on the lawn – find out **whose**.

(78) a. Jack called, but I don't know {**when/how/why/where from**}**.**
b. Jack called (*sometime/somehow/for some reason/from somewhere*), but I don't know {**when/how/why/where from**}.

(Merchant, 2001, p. 3)

(79) Britney likes this guy who destroyed *a new vehicle* but she didn't reveal **which one/which vehicle.**

(Frazier & Clifton, 2011, p. 45)

In contrastive sluicing, either the *wh*-remnant itself is contrastive or it contains contrastive material. See (80) for an example of a contrastive *wh*-remnant, the *wh*-phrase *who else:* it contrasts with its antecedent NP *Beth*. Note that the NP *Beth* is not a subset of the *wh*-remnant *who else,* but rather the only person that cannot be part of that set. See (81) for an example of a *wh*-remnant that contains contrastive material: the NP *dogs* as opposed to the NP *cats*. Note that here, capital letters indicate contrastive focus.

(80) a. *BETH* was there, but you'll never guess **WHO ELSE**.
b. *BETH* was there, but you'll never guess **WHO ELSE** [_ ~~was there~~].

(Merchant, 2001, p. 3)

(81) She has *five CATS* but I don't know **how many DOGS.**

(Merchant, 2001, p. 36)

Contrastive sluicing comes with one special characteristic that sets it apart from non-contrastive sluicing: it is island sensitive. This means that extraction out of an island of a contrastive sluicing structure leads not only to an unacceptable structure in its un-elliptical version, as illustrated in (82) but also in its sluiced version, as illustrated in (83).[8]

(82) *They bought the chocolates that pleased *the customers*. Do you know **who else** [they bought the chocolates that pleased _]?

(83) *They bought the chocolates that pleased *the customers*. Do you know **who else**?

Moreover, the antecedent of the contrastive *wh*-remnant *who else* must be a definite NP, or as van Craenenbroeck (2010) argues, a focused XP. He also states that "this modifier signals that the expected response is partial and hence non-exhaustive" (van Craenenbroeck, 2010, p. 1716). Harris argues that *else* "triggers the presupposition that there is a contextually salient witness, which is removed from the domain of the quantifier it modifies" (Harris, 2014, p. 175), which supports the assumption that the antecedent is the only constituent that cannot be part of the set. He further argues that the presupposition can, for example, be satisfied from prior context, as it is the case for sluicing structures in general. An important aspect with respect to the contrastivity of sluicing structures with *who else* is his claim that "the individual or sequence of individuals denoted by someone else cannot corefer with any of its possible antecedents, regardless of locality" (Harris, 2014, p. 175), thus underlining the assumption stated above that *who else* opens up a set of alternatives. Accordingly, Culicover and Jackendoff define the phrase *x else* as *other than x,* with x being "an anaphor that can be marked coreferential (or identical in sense) with its antecedent" (1995, p. 261). An example is given in (84), with its paraphrase including *other than x* in (85) .

(84) Bush and Clinton (both) voted for someone else.

(85) Bush voted for someone *other than Clinton*, and Clinton voted for someone *other than Bush.*

(Culicover & Jackendoff, 1995, p. 254)

[8] Special thanks to Prof. Dr. Sam Featherston for his native speaker intuitions and especially for helping me with the design of contrastive sluicing structures with the *wh*-remnant *who else*.

This chapter illustrated that contrastive and non-contrastive sluicing structures differ in certain aspects. It is crucial to be aware of these differences before conducting production studies that investigate the prosody of these structures. I have shown that non-contrastive sluicing requires an indefinite antecedent NP, whereas contrastive sluicing requires a definite antecedent NP. Moreover, only non-contrastive sluicing structures can host an antecedent NP within an island to extraction without resulting in unacceptable structures. There are different theoretical approaches trying to explain the content of the ellipsis site of sluicing, which all deal differently with trying to explain the island insensitivity of sluicing. Since this characteristic is an important aspect of the empirical investigations of this thesis, I will discuss the different approaches trying to explain the content of the ellipsis site in the following chapter.

2.1.4 Structure vs. No-Structure Accounts

There have been three major approaches trying to explain the underlying structure (or the lack thereof) of the ellipsis site of sluicing which are trying to explain where the *wh*-remnant gets its meaning from. Two of these approaches assume that there is an underlying structure in the ellipsis site: the earliest theory is called the *deletion theory* (originally proposed by Ross, 1969, further discussed by Sag, 1976; Lasnik, 2001; Merchant, 2001). The second approach assuming structure is called *LF copying* (originally proposed by Chung et al., 1995). The third approach assumes that there is no underlying syntactic structure in the ellipsis site. It is called the *direct interpretation* approach (originally proposed by Ginzburg & Sag, 2000, further discussed by Culicover & Jackendoff, 2005). All three approaches have advantages and disadvantages concerning the explanation of certain phenomena that are unique to sluicing, such as island insensitivity or connectivity effects. Especially the explanation regarding island effects is crucial for this thesis, since one of the main research questions is whether prosody is used to disambiguate different types of sluicing, including complex sluicing structures. This chapter thus discusses the most important aspects of these three approaches.

The earliest approach explaining the underlying structure of sluicing was proposed by Ross (1969). His deletion theory assumes that the sluiced part consist of a moved *wh*-word and a deleted clause. He claims that the *wh*-word has been moved from a sentence-final position low in the tree structure. The deleted clause is mostly identical to a corresponding part in the main clause. The structure is illustrated in (86) and shows that the *wh*-remnant *who* is moved out of a clause, which is then subsequently being deleted. (87) is a representation of said movement with a tree structure, taken from Vicente (2018, p. 2).

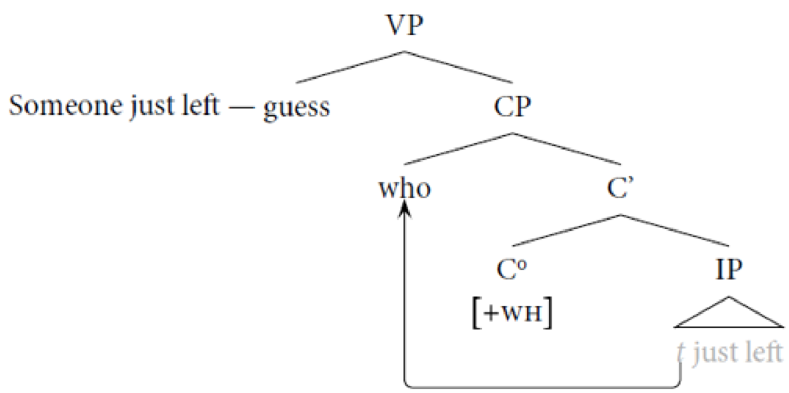
(86) a. Ralph is going to invite *somebody* from Kankakee to the party, but they don't know [[he's going to invite **who** to the party]$_{TP}$]$_{CP}$

b. Ralph is going to invite *somebody* from Kankakee to the party, but they don't know [**who**$_i$ [he's going to invite _$_i$ to the party]$_{TP}$]$_{CP}$

c. Ralph is going to invite *somebody* from Kankakee to the party, but they don't know [**who**$_i$ [~~he's going to invite _$_i$ to the party~~]$_{TP}$]$_{CP}$

(Ross, 1969, p. 252)

(87)



(Vicente, 2018, p. 2)

The deletion account is thus a combination of movement of the *wh*-remnant and ellipsis of identical and therefore redundant lexical material. It has been argued that this approach cannot explain why sluicing, as compared to its un-elided counterparts, is island insensitive, since there is no denying that the *wh*-remnant has been moved out – hence, extracted – out of an island, which is clearly an island violation. However, in sluicing, the trace resulting from said unacceptable *wh*-movement is deleted, thus yielding an acceptable, although somewhat degraded structure as compared to a sluicing structure with an antecedent within a matrix clause. Moreover, the deletion theory can easily explain the different connectivity effects of sluicing. Connectivity effects occur, "when some part of the clause that contains the ellipsis shows connectivity to some other, supposed, unpronounced part" (Merchant, in preparation, p. 7). Connectivity effects comprise, for example, case agreement, preposition stranding and binding. For a detailed discussion of the different connectivity effects, I refer the reader to Vicente (2018) and Merchant (in preparation, 2005, 2006).

LF-copying was introduced by Williams (1977) and further elaborated by Chung et al. (1995). Their approach assumes that the TP following the *wh*-remnant is not directly filled with syntactic structure and that the ellipsis site is therefore empty at Spell-Out. Rather than assuming movement of the *wh*-remnant, they argue that the *wh*-remnant is base-generated in Spec-CP. In order to get meaning, the content of the antecedent clause (containing the antecedent) is copied into the ellipsis site at LF. From this follows that LF-copying is clearly not a movement-based approach. However, it is a structure based account since it assumes some sort of structure within the ellipsis site. An example of how LF-copying is understood is given in (88).

(88) [**Someone x**] [$_{TP}$ **x** left the room yesterday], but I don't know [$_{CP}$ [**who x**] [$_{TP}$ **x** left the room yesterday]].

(Nykiel & Sag, 2011, p. 189)

This approach has thus no difficulties explaining island insensitivity: the *wh*-remnant is base-generated in Spec-CP rather than being extracted and moved out of an island. As a result, no island violation takes place and the resulting sluicing structure is acceptable. However, this does not explain the decreased acceptability that remains for complex sluicing structures with an island antecedent. Moreover, the major drawback of this theory is that it cannot explain the different connectivity effects: if there is no underlying elided syntactic structure following the *wh*-remnant, case agreement, for example, should not play a role.

The only account that assumes no underlying structure whatsoever is the direct interpretation approach introduced by Ginzburg and Sag (2000) and further discussed in Culicover and Jackendoff (2005). They assume neither an elided syntactic structure nor a copied structure. They rather argue that the *wh*-remnant is the only constituent of the sluice, which takes on the role of a regular anaphor. This approach supports the argument that sluicing may contain a referential ambiguity. In order to interpret which constituent the *wh*-anaphor refers back to, the parser has to consider context. An example is given in (89).

(89) *Somebody*$_i$ just left, but I don't know [*who*]$_i$.

Such an approach seems to combine the advantages of the two structure-based accounts: it easily explains island insensitivity (no underlying syntactic structure – no island violation) as well as connectivity effects (e.g., binding: an anaphor binds an antecedent). Nevertheless, like LF-copying, it fails to explain the decreased acceptability of sluicing structures with an antecedent within an island.

For this thesis, I will therefore assume that the *wh*-remnant moved from a clause-internal position up into Spec-CP and that the remaining syntactic structure of the interrogative clause has been deleted (or is left unpronounced), thus following the assumptions of the deletion theory, as introduced by Ross (1969) and Merchant (2001). This decision is based on cross-linguistic findings regarding sluicing (see Merchant, 2001; Merchant & Simpson, 2012) as well as on findings by Frazier and Clifton (2005). Moreover, deletion theory is the only approach that seems to be able to explain the decreased acceptability of complex sluicing with an island antecedent. The following chapter will discuss these differences in acceptability between different types of antecedent NPs in more detail, starting with ambiguous simple sluicing and then continuing with ambiguous complex sluicing.

2.1.5 Antecedent Preferences: Empirical Findings

An ambiguous sluicing structure can choose from a set of at least two possible NPs in the preceding clause which one it wants to take as the antecedent of its *wh*-remnant. From this follows that one NP might be preferred over another NP or might be chosen more frequently than another one. *Centering Theory* (CT) (Grosz et al., 1995) states that the main center of an utterance is the preferred antecedent of an ambiguous PRN in a subsequent utterance. The main center of an utterance, though, tends to be the subject of a clause, hence leading to the assumption that the subject NP should be the preferred antecedent of an ambiguous *wh*-remnant. However, the opposite is the case for sluicing, as discussed in chapters 1.2 and 2.2.3.2: the object NP tends to be the preferred antecedent of simple sluicing. So far, it has not been investigated whether this difference of antecedent preferences also shows up in the prosodic realizations of a sluicing structure, either in the form of stronger prosodic cues to indicate preference or in the form of weaker prosodic cues since the object is already salient as the antecedent of the structure. However, other factors might also play a role in the prosodic realizations of different antecedents, such as distance to the *wh*-remnant or default focus position. This chapter thus examines the following questions: First, which NP is the preferred antecedent of an ambiguous simple sluicing structure and where does this preference come from? Second, which NP is the preferred antecedent of an ambiguous complex sluicing structure and where does this preference come from? This chapter is therefore structured as follows: In chapter 2.1.5.1, I will discuss the antecedent preferences of simple sluicing structures. In chapter 2.1.5.2, I will discuss the antecedent preferences of complex sluicing structures.

2.1.5.1 Antecedent Preferences in Simple Sluicing

There are two major studies investigating the effect of prosody on antecedent preferences of ambiguous simple sluicing structures in English: Frazier and Clifton (1998) and Carlson et al. (2009). They both conducted various studies to investigate which antecedent is preferably chosen, what these preferences are related to and how they can be reversed. Both studies agree in that the preferred antecedent of simple sluicing is the last argument – in most cases, the object NP – of a given structure. They both relate this preference to the default sentence-final position of focus in English (see NSR (Chomsky & Halle, 1968; Cinque, 1993), chapter 2.2.2.2).

Frazier & Clifton (1998) conducted a self-paced reading experiment investigating ambiguous simple sluicing with either a subject NP or an embedded object NP as the antecedent, as illustrated in (90). Their main question was which of those two NPs is the preferred antecedent of the ambiguous *wh*-remnant *who*. They compared reading times to unambiguous sluicing with only the subject NP as a possible antecedent, which they assumed to be the dispreferred NP, as illustrated in (91). In (91), the presumably preferred embedded object NP is blocked as an antecedent since *Fred* is a definite NP and can therefore not serve as an antecedent for the non-contrastive *wh*-remnant *who*. Frazier and Clifton (1998) predicted that the structure in (91) should thus lead to longer reading times since the parser has to reanalyze the sluice towards the dispreferred subject NP *somebody*, as discussed in chapter 2.1.2.3.

(90) *Somebody* claimed that the president fired *someone*, but nobody knows **who**.

(91) *Somebody* claimed that the president fired Fred, but nobody knows **who**.

(Frazier & Clifton, 1998, p. 510)

Frazier and Clifton (1998) found that the structures in (90) were indeed read faster than those in (91), in which the embedded object NP was blocked by *Fred*. They concluded that the embedded object NP is the preferred antecedent: "readers prefer an antecedent which may be interpreted as focus" (Frazier & Clifton, 1998, p. 513). They conducted two further studies to support these findings: a written questionnaire study and an auditory perception study. In the written questionnaire study, they asked participants to explicitly choose which NP the *wh*-remnant *which one* takes as an antecedent, see (92).

(92) Some teacher says that the students will flunk an exam - guess which one.
Which one = …
a. some teacher?
b. some exam?

(Frazier & Clifton, 1998, p. 514)

The results of this study confirmed that the embedded object NP is highly preferred as an antecedent over the subject NP: "[o]ver three quarters (77.0% […]) of the responses indicated an interpretation in which the lower NP (*an exam*) was taken as antecedent of the sluiced constituent" (Frazier & Clifton, 1998, p. 515). They thus concluded that the faster reading times of the ambiguous structure from their first study were due to the availability of the preferred object NP to be the antecedent of the *wh*-remnant. In the auditory judgment study, they manipulated the focus position of ambiguous sluicing structures like (93) by placing a pitch accent on either the subject NP *some tourist* or the embedded object PRN *someone*, see (94).

(93) Some tourist suspected that the hotelkeeper was hiding someone. Guess who?

(Frazier & Clifton, 1998, p. 515)

(94) a. Some TOUrist suspected that the hotelkeeper was hiding someone. Guess who?
b. Some tourist suspected that the hotelkeeper was hiding SOMEone. Guess who?

This auditory representation was followed by a paraphrase selection task in which participants had to choose one of the two paraphrases given in (95).

(95) a. The tourist who suspected that the hotelkeeper was hiding someone was Don Knotts.

b. The person who the tourist suspected the hotelkeeper was hiding was Don Knotts.

(Frazier & Clifton, 1998, p. 515)

The results of this final study showed that prosody has an effect upon the interpretation of ambiguous sluicing structures: a prosodic focus on a dispreferred antecedent (here the subject NP) changes the preferences for the embedded object PRN to be the antecedent of the ambiguous *wh*-remnant *who* from previously 72% (if the embedded object PRN was prosodically focused) to 48%. At first, it seems that these results might have been negatively affected by the requirements of the ACH: Dayal and Schwarzschild (2010) and Collins et al. (2014) claimed that a bare *wh*-pronoun like *who* prefers an equally bare constituent to be its antecedent, see discussion chapter 2.1.2.1. Thus, the PRN *someone* would have an inherent advantage over the NP *some tourist* to be the antecedent of the *wh*-remnant *who*. However, having a look at the appendix, that is, the experimental items of Frazier and Clifton's (1998) study demonstrates that they counterbalanced the occurrence of NPs and PRNs. An effect of the ACH can therefore be excluded. In sum, the findings of Frazier and Clifton (1998) suggest that the embedded object NP is preferred as an antecedent of an ambiguous simple sluicing structure over a subject NP. Prosodically emphasizing the subject NP increases its chances of being selected as the antecedent of the *wh*-remnant. However, a certain preference for the embedded object NP remains.

Carlson et al. (2009) conducted four studies, also investigating which constituent is the preferred antecedent of an ambiguous sluicing structure, whether focus plays a role and how preferences can be reversed. Like Frazier and Clifton (1998), they based their studies on the assumption that speakers tend to place new information, thus focus, late in a sentence. Experiment 1 was a written questionnaire study investigating whether the object preference is linked to recency effects. They investigated contrastive ambiguous simple sluicing structures as in (96). They varied the position and the length of the material that intervened between the *wh*-remnant *who else* and the possible antecedents *the lawyer* and *the witness,* see (97), to control for distance effects. They claimed that if recency does play a role, additional material between the object NP and the *wh*-remnant should assimilate the possibility of subject NP and object NP to be the antecedent of the structure.

(96) The lawyer insulted the witness, but I don't remember who else.

(97) a. The lawyer insulted the witness **in the aftermath of the trial**, but I don't remember who else.

b. The lawyer insulted the witness, but **in the aftermath of the trial** I don't remember who else.

(Carlson et al., 2009, p. 118)

After each item, participants had to answer an interpretation question to indicate which reading they had in mind, as illustrated in (98).[9]

(98) I don't remember who else…

a. the lawyer insulted.

b. insulted the witness.

(Carlson et al., 2009, p. 119)

The results of this experiment showed that the object NP is always the preferred antecedent, independent of condition. This finding suggests that recency does not play a role in antecedent selection. Experiment 2 was an auditory study investigating whether a change of pitch accent location affects antecedent preferences. They examined sentences like (99) where they varied between a pitch accent on both subject NP and object NP simultaneously, on only the subject NP or the object NP and on only the VP, as illustrated in (100).

(99) The captain talked with the co-pilot, but we couldn't find out who else.

(100) a. The CAPtain talked with the CO-pilot, but we couldn't find out who else.

b. The CAPtain talked with the co-pilot, but we couldn't find out who else.

c. The captain talked with the CO-pilot, but we couldn't find out who else.

d. The captain TALKed with the co-pilot, but we couldn't find out who else.

(Carlson et al., 2009, p. 121)

[9] Carlson et al. (2009) are aware that (98)a. is theoretically not ambiguous because one would have to use *whom* rather than *who* for a grammatical structure. However, they argue that *whom* is slowly vanishing in colloquial American English and therefore take this structure to be fully ambiguous.

They hypothesized that conditions (100)a. and d. should yield similar results, namely a strong object NP preference, since neither the subject NP nor the object NP were specifically highlighted. On the contrary, condition (100)b. should lead to increased subject NP preferences and (100)c. to increased object NP preferences. After listening to the items, participants had to choose one of two paraphrases to indicate which reading they had in mind. Carlson et al. (2009) found that "there was an overall bias towards interpreting the object as the antecedent of the *wh*-remnant, which was only overcome in the *Subject Accent* condition. That condition received less than 50% object responses. The position of accents in all of the conditions had a strong effect on interpretation responses" (Carlson et al., 2009, p. 22). The results thus illustrate that there was a strong preference for the object NP to be the antecedent which could only be weakened by a pitch accent on the subject NP. Experiment 3 was a self-paced reading study with *it*-clefts, investigating whether a syntactically induced focus has a similar effect on antecedent preferences as a prosodic focus. They investigated sentences like (101). (101)a. indicates the object cleft condition, (101)b. the subject cleft condition.

(101) a. It was Lisa who Patty praised at the ceremony, but I don't know who else.
b. It was Patty who praised Lisa at the ceremony, but I don't know who else.

As this was a self-paced reading study, reading times were recorded for each clause separately. After having read an item, participants saw two possible un-sluiced versions of the same sentence and had to indicate which one they had in mind. The results of the reading times showed that participants were an average of 530 ms slower when reading the first clause of (101)a. than when reading the first clause of (101)b., which they explain with previous findings regarding a general difficulty with reading object clefts (Gordon, Hendrick, & Johnson, 2001; Warren & Gibson, 2005). The findings for the choice of un-sluiced versions are much more interesting with respect to the question of antecedent preferences: they indicate a strong effect of clefting, "with 75% object answers for the object cleft sentences and 39% object answers for the subject clefts" (Carlson et al., 2009, p. 25). This illustrates that most participants chose the clefted, and consequently, the focused NP, to be the antecedent of the *wh*-remnant, with only a slight bias towards the object NP. This supports the assumption that focus plays an important role in antecedent selection, no matter whether it is prosodically or syntactically induced. These results also support the previous findings that antecedent selection is not linked to recency effects since the focused, and thus preferred, constituent is farther away from the *wh*-remnant than the unfocused constituent. Their final experiment 4 was another auditory study investigating whether the object preference is connected to its status as a syntactic object (or a semantic theme/patient) or whether it is related to its status as being the last argument and the preferred focus position of a sentence. In this experiment, they investigated non-contrastive ambiguous simple sluicing structures as illustrated in (102) with accents on either the subject NP, the VP, the object NP or the NP of the clause final PP, as illustrated in (103)

(102) Lucy bought some present for some occasion, but I don’t know what.

(103) a. LUCY bought some present for some occasion, but I don’t know what.
b. Lucy BOUGHT some present for some occasion, but I don’t know what.
c. Lucy bought some PRESent for some occasion, but I don’t know what.
d. Lucy bought some present for some oCCASion, but I don’t know what.
(Carlson et al., 2009, p. 26)

Since they assume antecedent preferences to be linked to the focus of a sentence, they hypothesized that (103)c. would result in more object NP choices and that (103)d. would result in more PP choices. (103)a. and b. served as control conditions. After participants have heard an item, they had to choose one of two paraphrases to indicate which reading they had in mind. Carlson et al. (2009) found that the PP antecedent was chosen in 72% of the time when *occasion* was accented and in 60% of the time when *present* was accented. They further observed that there was a general preference for the PP antecedent across all conditions, which indicates that there is no general object preference but rather a last argument preference, thus a preference for the default focus position. Carlson et al. (2009) hence supported Frazier and Clifton's (1998) findings that the object NP is indeed preferred over the subject NP to be the antecedent of an ambiguous *wh*-remnant in sluicing. They attribute this preference to the default sentence-final position of a focus in English. Moreover, they generalized Frazier and Clifton's (1998) findings for non-contrastive sluicing to contrastive structures by investigating sluicing with the *wh*-remnant *who else*. From this follows that it can be assumed that there is no difference in antecedent preferences between contrastive and non-contrastive *wh*-remnants. They furthermore provided evidence that the last argument preference is not related to the distance between the *wh*-remnant and the object antecedent (which is further supported by Martin and McElree (2008) who argue that distance does not affect the processing of an antecedent in VP ellipsis). With their final experiment, Carlson et al. (2009) presented evidence that the strong preference for an object NP to be the antecedent, which has been found in various experiments before, is not related to its syntactic or semantic role, but that it is rather due to its overlap with the default focus position at the end of an English structure. They thus showed that it is possible to move the antecedent preference from a sentence-final position to, e.g., the subject position, by syntactically or prosodically shifting the focus towards this constituent.

2.1.5.2 Matrix vs. Island Antecedents and Acceptable Island Violations

In an all-new context, the preferred antecedent of an ambiguous simple sluicing structure is its last argument due to its overlap with the sentence-final default focus position of English sentences. In ambiguous complex sluicing, though, the preferred antecedent may not necessarily be its last argument but rather one at the beginning of the structure. In complex sluicing, a structure that constitutes an island to extraction in its un-elliptical version, such as an RC, has been added. This island to extraction may host an additional antecedent for an ambiguous *wh*-remnant. Complex sluicing can thus be ambiguous between a non-island antecedent and an island antecedent. If the embedded RC is an object RC in sentence-final position, the question comes up whether the final argument of the structure still constitutes the preferred antecedent: In such an example of complex sluicing, the usually preferred last argument NP is located within an underlying island to extraction, which might affect the acceptability of said NP as an antecedent. This is illustrated in example (104). As opposed to a simple SVO sluicing structure, in this example, the second NP *a Balkan language* is not the sole carrier of a default focus: the object NP *someone* also constitutes the most deeply embedded NP of a clause, namely the matrix clause, and is hence focused by default as well. Following the results of Carlson et al. (2009), who found that default focused plays a major role in antecedent preferences of ambiguous sluicing, the chances of the object NP *someone* and the embedded object NP *a Balkan language* should therefore be equally likely to be the antecedent of the *wh*-remnant (if it would be ambiguous, as it is not the case in this specific example). However, one also has to consider the position of the embedded object NP within an island to extraction when thinking about antecedent preferences.

(104) They want to hire someone who speaks a Balkan language but I don't know which.

(Merchant, 2001, p. 148)

Sluicing is assumed to be island in-sensitive, meaning that an antecedent within an island to extraction does not lead to ungrammaticality in sluicing since the extraction site has been elided and the island thus repaired (see discussion chapter 2.1.3.1). Nevertheless, sluicing with an antecedent within an island has been argued to be less acceptable than with an antecedent within a non-island structure (e.g., Ross, 1969). In certain complex sluicing structures, there is consequently a clash between default focus position and location within an island to extraction. The question how exactly these two factors interact and to investigate which constituent represents the preferred antecedent of complex sluicing has led to a series of studies by Frazier and Clifton (2005), Frazier and Clifton (2011), Konietzko et al. (submitted) and Cantor (2013). They all agree in that an island NP is somewhat dispreferred over a non-island NP, contrasting with the antecedent preferences of simple sluicing. In the following, I will therefore summarize each study individually.

Frazier and Clifton (2005) analyzed ambiguous complex sluicing structures with adjunct islands. They argue that island violations are acceptable in sluicing because the processing of such structures is guided by a discourse rather than a syntactic processor: "[t]he discourse processor […] can go inside an island to find the antecedent of a 'sluice', whereas the syntactic processor cannot" (Frazier & Clifton, 2005, p. 125). They conducted three studies investigating whether sluicing is island sensitive or not and which role the type of antecedent plays. Based on the results of their studies, Frazier and Clifton (2005) concluded that sluicing is island insensitive, but that the underlying island nevertheless decreases the acceptability of an island antecedent, supporting previous claims by Ross (1969), Chung et al. (1995), Lasnik (2001) and Merchant (2001). However, they also found that focusing an island antecedent improves its acceptability. Their first experiment was a self-paced reading study comparing complex sluicing with an antecedent within a repaired adjunct island, (105)b., to a minimal pair simple sluicing structure with an antecedent within an argument (and thus no underlying island), (105)a. They also included non-elliptical interrogatives with antecedents within unrepaired adjunct islands, (105)d., vs. antecedents within arguments, (105)c., as well as control clauses without any extraction, (105)e. and (105)f.

(105) a. Sally was impressed with some lecture, but I don't know what.
b. Sally was impressed after some lecture, but I don't know what.
c. What lecture was Sally impressed with?
d. What lecture was Sally impressed after?
e. Sally was impressed with some lecture.
f. Sally was impressed after some lecture.

(Frazier & Clifton, 2005, p. 31)

Participants were instructed to read the sentences at their own pace and to indicate at which point they become unacceptable (if they do). The results show that even though islands are repaired in sluicing, a significant decrease in acceptability remains in condition (105)b. as compared to (105)a. However, the un-elliptical island violation of condition (105)d. received even worse ratings, illustrating that some sort of repair process must have taken place in the sluicing structure in (105)b. Frazier and Clifton (2005) furthermore assumed that these results are evidence for the existence of syntactic structure in the ellipsis site, thus supporting the deletion theory and the LF-copying approach, see discussion chapter 2.1.4. In a second experiment, an acceptability judgment study, Frazier and Clifton (2005) investigated structures with an embedded RC. They were interested in whether the acceptability of an island antecedent is affected by capitalization to illustrate focus and by an implicit antecedent. Sluicing structures with implicit antecedents have been called *sprouting* (Chung et al., 1995), which is known to be island sensitive. Frazier and Clifton (2005) argue that this sensitivity stems from the fact that sprouting requires the syntactic processor to actively build structure, which is only implied. Sluicing, in contrast, has an overt antecedent and therefore only requires the discourse processor to go inside an island to bind a variable. Frazier and Clifton (2005) predicted that focusing the island antecedent with capitalizations will lead to decreased acceptability judgments since focusing the island antecedent emphasizes the unacceptability of the structure. They compared complex sprouting, (106)a., to complex sluicing, (106)b., and to complex sluicing with a capitalized and thus focused antecedent, (106)c. They further compared these sentences to un-elliptical minimal pairs with subject island violations.

(106) a. Frederica listened to some tenor who was singing but she didn't say what.

b. Frederica listened to some tenor who was singing something but she didn't say what.

c. Frederica listened to some tenor who was singing SOMETHING but she didn't say what.

(Frazier & Clifton, 2005, p. 143)

Frazier and Clifton (2005) found that focusing the island antecedent led to more acceptable (rather than unacceptable) judgments than a non-focused antecedent. The unfocused antecedent of the sluicing structure, in turn, was more acceptable than the implicit antecedent of the sprouting structure. These results emphasize that focus improves rather than decreases the acceptability of an island antecedent and that consequently, information structure plays an important role in antecedent selection. In a third experiment, a speeded acceptability judgment study, Frazier and Clifton re-tested the material from the second experiment to investigate whether the results were really due to the island status. They compared complex sluicing with an embedded RC, (107), to similar simple sentences, (108).

(107) a. They hired someone who won but I can't remember what.

b. They hired someone who won something but I can't remember what

c. They hired someone who won SOMETHING but I can't remember what

(108) a. Someone won but I can't remember what.

b. Someone won something but I can't remember what.

c. Someone won SOMETHING but I can't remember what.

(Frazier & Clifton, 2005, p. 145)

The acceptability judgment data showed that sprouting is significantly less acceptable when an island violation is involved, hence proving that the results of the previous experiment were due to the underlying island. However, they did not find an ameliorating effect of capitalization this time. The results of Frazier and Clifton's (2005) studies thus illustrates three points: First, they provide evidence that there is syntactic structure in the ellipsis site of sluicing which, due to it being elided and unpronounced, leads to a repair mechanism for island violations. Second, they show that sluicing is island insensitive but that sprouting is island sensitive. Third, they show that focusing an antecedent leads to higher acceptability judgments in complex sluicing, which

Frazier and Clifton (2005) find striking, since placing additional focus on an island antecedent emphasizes the underlying island structure and should, accordingly, decrease rather than improve its acceptability. They conclude that sluicing is island insensitive because only a discourse processor is at work which can go inside an island to find the antecedent of a *wh*-remnant. Sprouting, on the other hand, is island sensitive because a syntactic processor has to build syntactic structure to find an antecedent for the *wh*-remnant; however, the syntactic processor cannot go inside an island, which leads to unacceptable judgments for the sprouting cases with underlying islands.

Frazier and Clifton (2011) investigated the effect of d-linked *wh*-remnants on extraction out of sluicing structures with either an embedded complement clause (thus a simple sluicing structure) or an embedded RC (thus a complex sluicing structure). Although the focus of their study was on investigating whether there is an effect of d-linking in sluicing, their experiments also yielded important results about the relationship between simple and complex sluicing. In a written acceptability judgment study, Frazier and Clifton (2011) compared complex sluicing with a bare *wh*-remnant, (109)a., complex sluicing with a d-linked *wh*-remnant, (109)b., simple sluicing with a bare *wh*-remnant, (109)c., and simple sluicing with a d-linked *wh*-remnant, (109)d. They also varied between contentful (*which vehicle*) and non-contentful (*which one*) d-linked *wh*-phrases.

(109) a. Britney likes this guy [who destroyed *a new vehicle*]$_{RC}$ but she didn't reveal **what**.

b. Britney likes this guy [who destroyed *a new vehicle*]$_{RC}$ but she didn't reveal **which vehicle**.

c. I know [Britney destroyed *a new vehicle*]$_{CC}$ but she didn't reveal **what**.

d. I know [Britney destroyed *a new vehicle*]$_{CC}$ but she didn't reveal **which vehicle**.

(Frazier & Clifton, 2011, p. 45)

Participants had to judge the acceptability of each item on a five point scale. The results showed that overall, d-linked *wh*-remnants are more acceptable than non-d-linked ones, that is, (109)b. was more acceptable than (109)a. and (109)d. was more acceptable than (109)c. There was no effect of contentfulness. They found that extraction out of complement clauses (the simple sluicing conditions) is significantly more acceptable than out of RCs (the complex sluicing structures), that is, (109)c. and d. were more acceptable than (109)a. and b. However, the judgments for the complex sluicing structures were still around 3 - 3.5 (3.17 for non-d-linked and 3.69 for d-linked), illustrating that although complex sluicing is degraded, it is still in the upper half of the scale, thus suggesting acceptability. These results therefore add further support to the assumption that sluicing is generally island insensitive, but that the underlying island still causes some sort of degradation. Whether these findings can be replicated with different items, and also how the acceptability of an island antecedent compares to a matrix clause antecedent of the same sluicing structure, will be examined in the empirical part of this thesis, chapter 3.2.2. With respect to their main research question, Frazier and Clifton (2011) concluded that there is an effect of d-linking in sluicing, which should not be the case, since no overt material has to be processed between the *wh*-phrase and its gap. As a consequence, there is no need for retrieving an antecedent from memory in sluicing. They attributed this effect to a different explanation: a d-linked *wh*-phrase facilitates the activation of an antecedent by making it more salient rather than that the complexity of the structure facilitates memory retrieval. In an acceptability judgment study, Goodall (2014), however, showed that the ameliorating effect of d-linked antecedents is similar in islands and non-islands, and therefore attributes it to working memory.

Cantor (2013) discusses some special cases of complex sluicing that are not island insensitive. In these cases of complex sluicing, the underlying island cannot be repaired and, as a result, leads to ungrammaticality. The respective structures are complex sluicing structures with island violations of the left branch condition (which has been previously discussed by Ross, 1969 and Merchant, 2001). Cantor (2013) states that a combination of several islands at once still leads to acceptable structures, as long as no left branch violation is involved. In (110), for example, the antecedent of the *wh*-remnant *who* is located within an adjunct which is part of an RC, thus violating two island constraints but still resulting in an acceptable structure.

(110) I bought a car [that was totaled [because it hit *someone*]$_{\text{adjunct}}$]$_{\text{RC}}$, but I don't know **who**.

(Cantor, 2013, p. 1)

On the contrary, the combination of an RC and a subject island leads to an ungrammatical structure, see (111).

(111) *[A car [that *someone* spray-painted]$_{RC}$]$_{subject}$ crashed into the wall last night, but I don't know **who**.

(Cantor, 2013, p. 2)

She states that all antecedents that are within an island that is located in the left branch of a syntactic tree structure lead to ungrammatical sluicing since these cases cannot repair islands. Those left branch islands include *subjects*, (112), *sentential subjects*, (113), and *topicalization*, (114). Examples of these left branch violations in combination with an RC island violation are given in (112) through (114).

(112) a. *A car that hit someone crashed into the wall last night, but the report didn't say who [[a car [that hit _]$_{RC}$]$_{subject}$ crashed into the wall last night.]

b. ??A car that hit someone crashed into the wall last night, but the report didn't say who.

(113) a. *That John rented a car that hit someone surprised everyone, but the report didn't say who [[that he rented a car [that hit _]$_{RC}$]$_{sentential\ subject}$ surprised everyone.]

b. ??That John rented a car that hit someone surprised everyone, but the report didn't say who.

(114) a. *A car that hit someone, John rented, but he wouldn't say who [[a car [that hit_]$_{RC}$]$_{topicalization}$, he rented.]

b. ??A car that hit someone, John rented, but he wouldn't say who.

(Cantor, 2013, 14ff.)

Cantor states that extraposition improves the acceptability of left branch islands because it moves the island to a right branch (Cantor, 2013, p. 40). The ameliorating effect of extraposition upon island antecedent in general has also been noted by Winkler (2013) and empirically investigated by Konietzko et al. (submitted) concerning German complex sluicing structures including an RC island violation. The question whether the combination of a left branch violation and a second island constraint really does lead to unacceptable structures in English and also whether extraposition improves the acceptability of such structures, will be examined in the acceptability judgment study 3 in chapter 3.2.2.1.

Konietzko et al. (submitted) analyzed whether extraposition of an RC has an effect upon the acceptability of an island antecedent in German complex sluicing structures. They investigated two main questions: First, is an island NP less acceptable as an antecedent than a matrix NP? Second, does extraposition of the RC improve the acceptability of an island antecedent? They investigated whether the claim by Frazier and Clifton (2005) that focusing an island antecedent should decrease rather than improve its acceptability can be confirmed. Konietzko et al. (submitted) thus conducted two written acceptability judgment studies investigating the following conditions: a context creating a contrast with the matrix NP, which also serves as the antecedent of the *wh*-remnant, (115), a context creating a contrast with the matrix NP where the island NP serves as the antecedent of the *wh*-remnant, (116), a context creating a contrast with the island NP where the matrix NP serves as the antecedent of the *wh*-remnant, (117), and a context creating a contrast with the island NP, which also serves as the antecedent of the *wh*-remnant, (118). All conditions occurred either in an intraposed or an extraposed version, as illustrated with parentheses.

(115) A_{matrix}: Wenn die Polizei wegen Diebstahl ermittelt, handelt es sich häufig um ERSTTÄTER. Meist sind es Einbrüche in kleinere Geschäfte.

'When the police investigate a case of theft, the culprit is often a FIRST OFFENDER. They usually break into small stores.'

B_{matrix}: Die Polizei wird jetzt aber einen WIEDERHOLUNGSTÄTER $(suchen)_{extraposed}$, der ein Geschäft ausgeraubt hat, $(suchen)_{intraposed}$. Weißt du auch **wen**?

'*But now the police will look for a REPEAT OFFENDER that robbed a store. Do you know* ***who****?'*

(116) A_{matrix}: Wenn die Polizei wegen Diebstahl ermittelt, handelt es sich häufig um ERSTTÄTER. Meist sind es Einbrüche in kleinere Geschäfte.

'When the police investigate a case of theft, the culprit is often a FIRST OFFENDER. They usually break into small stores.'

B_{island}: Die Polizei wird jetzt aber einen WIEDERHOLUNGSTÄTER (suchen)$_{extraposed}$, der ein Geschäft ausgeraubt hat, (suchen)$_{intraposed}$. Weißt du auch **welches**?

'*But now the police will look for a REPEAT OFFENDER that robbed a store. Do you know* ***which****?'*

(117) A_{island}: Wenn die Polizei wegen Diebstahl ermittelt, handelt es sich häufig um Wiederholungstäter. Meist sind es Einbrüche in EIGENHEIME.

'When the police investigate a case of theft, the culprit is often a repeat offender. They usually break into HOMES.'

B_{matrix}: Die Polizei wird jetzt aber einen Wiederholungstäter (suchen)$_{extraposed}$,, der ein GESCHÄFT ausgeraubt hat, (suchen)$_{intraposed}$.. Weißt du auch **wen**?

'But now the police will look for a repeat offender that robbed a STORE. Do you know ***who****?'*

(118) A_{island}: Wenn die Polizei wegen Diebstahl ermittelt, handelt es sich häufig um Wiederholungstäter. Meist sind es Einbrüche in EIGENHEIME.

'When the police investigate a case of theft, the culprit is often a repeat offender. They usually break into HOMES.'

B_{island}: B1: Die Polizei wird jetzt aber einen Wiederholungstäter (suchen)$_{extraposed}$,, der ein GESCHÄFT ausgeraubt hat, (suchen)$_{intraposed}$.. Weißt du auch **welches**?

'But now the police will look for a repeat offender that robbed a STORE. Do you know ***which****?'*

(Konietzko et al., submitted, pp. 15–21)

Besides morphologically disambiguating the *wh*-remnants towards either the matrix NP (*wen*) or the island NP (*welches*), Konietzko et al. also used different contexts to contrastively focus one of the two NPs. The results of their studies showed that the focused NP was always the preferred antecedent, no matter whether it was located within the matrix clause or the RC and no matter whether the RC has been extraposed or not. Moreover, they found that extraposition improves the acceptability of an island antecedent, assuming that it adds prominence and thus focus to the respective NP. This additional focus "helps to establish the parallelism condition" (Konietzko et al., submitted, p. 2), as proposed by Romero (1998), see discussion chapter 2.2.3.3. They conclude that information structure plays a crucial role in antecedent selection processes of sluicing. Their results hence do not support Frazier and Clifton's (2005) claim that focusing an island antecedent should decrease its acceptability. In sum, Konietzko et al. (submitted) made three major findings: First, there is a strong preference for a focused NP to be the antecedent of a *wh*-remnant, thus supporting claims by Frazier and Clifton (1998) and Carlson et al. (2009) that a focused constituent is the preferred antecedent. Second, matrix antecedents are preferred over island antecedents, as illustrated by the fact that a focused RC antecedent received slightly lower ratings than a focused matrix antecedent. Third, extraposition improves the acceptability of an RC antecedent to a point where it does not differ in acceptability from matrix antecedents any more. The finding that an RC antecedent is less preferred when intraposed supports the claim that an underlying island has some effect upon the acceptability of a sluicing structure, as originally proposed by Ross (1969), thus supporting empirical findings by Frazier and Clifton (2005), Frazier and Clifton (2011).

2.1.6 Conclusion

In this chapter, I have given an overview about the different types of simple sluicing and complex sluicing as well as about the different characteristics and requirements that these structures have. This chapter answered the following questions: First, what is sluicing and how is it defined? Second, what is the relationship between sluicing and ambiguity and how are ambiguous sluicing structures processed? Third, what are the different types of sluicing relevant to this thesis? Fourth, what is the theoretical background regarding the ellipsis site of sluicing and how do they differ from each other? Fifth, what is the relationship between the *wh*-remnant and its several possible antecedent NPs in simple and complex sluicing? In this chapter, I have shown that sluicing is a subtype of ellipsis. It can either be an unambiguous sluicing structure or a global or temporary referential ambiguity. I have shown that there are different types of sluicing, such as complex sluicing, which contains an island to extraction that subsequently decreases the acceptability of an antecedent NP within said island. Sluicing can be contrastive or non-contrastive and that it can therefore come with a variety of different *wh*-remnants which all have different requirements regarding their antecedents as well as different consequences with respect to ambiguity. I have discussed the different approaches trying to explain what the ellipsis site of sluicing looks like. Moreover, it have provided an overview of the current state of the art regarding the relationship between a *wh*-remnant and its antecedent in simple and complex sluicing, which is closely related to information structure and thus prosody. It is apparent that there has been a considerable amount of research investigating the different antecedent preferences of simple and complex sluicing, making use of auditory perception studies, written acceptability judgment studies and questionnaire studies. However, what is clearly missing is an empirical investigation of the prosodic realizations that different types of native speakers of English make when producing such structures. With this thesis, I will therefore address the following research questions, as stated in chapter 1, and repeated here:

Central Research Questions

(1) Do native speakers of English use prosody to emphasize the antecedent of an ambiguous *wh*-remnant in simple and complex sluicing? (RQ(1))

(2) Do native speakers of English use stronger prosodic cues to emphasize a specific antecedent of simple and complex sluicing? (RQ(2))

(3) Is there a difference in the strength or the frequency of prosodic cues used by trained vs. untrained speakers? (RQ(3))

So far, I have addressed the concept of sluicing and how it is related to ambiguity. In the following chapter, I will discuss the concept of prosody and how it is related to sluicing and ambiguity.

2.2 Prosody

Prosody is a crucial aspect of spoken language. It is not only a by-product of speaking but contributes to and influences the meaning of what is being said. It is an important factor with respect to the antecedent selection of ambiguous sluicing structures, as various perception studies by Frazier and Clifton (1998) and Carlson et al. (2009) have shown. The focus of this thesis is the investigation of the prosodic realizations of different types of sluicing structures in spoken language. In this chapter, I will therefore investigate the following questions: First, how is the concept of prosody defined and which prosodic features play an important role in sluicing? Second, how is the concept of information structure defined, how is it related to prosody and what role does it play with respect to sluicing? Third, what is the current state of the art regarding the research about prosodic disambiguation, especially of sluicing, and how does linguistic knowledge, e.g., in the form of specific speaker training, affect the prosodic realizations of speakers in language production studies? In chapter 2.2.1, I will thus start with an overview of how prosody is defined. In chapter 2.2.2, I will discuss the notion of information structure and its relationship to prosody and sluicing. In chapter 2.2.3, I will give an overview of prosody as a disambiguating factor in spoken language.

2.2.1 Definition of Prosody and the Tones and Break Index (ToBI)

Prosody is defined as "a level of linguistic representation at which the acousticphonetic properties of an utterance vary independently of its lexical items" (Wagner & Watson, 2010, p. 905). It is a crucial aspect of spoken language, as stated by Cutler, Dahan, and van Donselaar "[p]rosody is an intrinsic determinant of the form of spoken language" (1997, p. 141). However, prosody is different from phonology, which refers to the segmental level of spoken language, that is, single phonemes. Prosody, in contrast, is concerned with the suprasegmental features of a spoken utterance, that is, any element that is located above the segmental level. There is a variety of approaches trying to define the exact characteristics of prosody:

- "[P]itch accents, phrase accents and boundary tones" combine to compose the different features of intonation which are "phrasing, accent placement, pitch range and tune" (Pierrehumbert & Hirschberg, 1990, p. 271).

- Prosody describes the "intonation, phrasal rhythmic pattern, and prosodic phrasing" of an utterance (Selkirk, 1995, p. 550).
- The main features of prosody are the "timing, amplitude and frequency spectrum of the utterance" (Cutler et al., 1997, p. 141).
- "Prosody refers to a grouping within an utterance and the prominence relations between the members within the group." (Jun, 2009, p. 423)
- The three dimensions of prosodic structure are "prosodic phrasing, prosodic prominence, and intonational tunes" (Wagner & Watson, 2010, p. 906). Prosody can be described as "all those phonological and phonetic properties that are not determined by the choice of words and morphemes it contains or their linear order but rather by how they relate to each other syntactically and semantically, by what aspects of the utterance are foregrounded and backgrounded, and by the role of the utterance in discourse" (Wagner & Watson, 2010, p. 906).

There seems to be quite some variation between these definitions. However, they do not stand in contrast to each other: in many cases, they merely use different words to describe identical or similar phenomena, e.g., prosodic phrasing vs phrase accents or pitch accents vs prominence. Nevertheless, the variety shows that there is some debate going on about exactly which features constitute the main aspects of prosody. The terminology concerning the term itself is not clear either: Jun states that the terms *intonation* and *prosody* are often used interchangeably, although they describe two different concepts: Intonation, as opposed to prosody, is defined as "the global changes in pitch over the course of a sentence or a phrase" (Jun, 2009, p. 423), thus relating to a pitch rise or fall. It is merely an instrument to describe the prominence relations between prosodic units, which constitute only one part of prosody. In sum, all these definitions agree in that prosody is concerned with the suprasegmental level of phonology. For this thesis, I therefore define prosody as the suprasegmental level of phonology whose main features are prosodic prominence (measured by fundamental frequency (F0), intensity and duration values), prosodic phrasing (indicated by boundary tones and measured by duration values) and intonation (measured by F0 and excursion size values), roughly following Pierrehumbert and Hirschberg (1990) and Wagner and Watson (2010). In the following section, I will summarize the characteristics of these three main features of prosody. I will start with a description of the

ToBI annotation scheme, to introduce the necessary terminology for a discussion of the different prosodic features.

The intonational tones and the prosodic structure of an English utterance can be represented with the *Tones and Break Index* (ToBI) (Pierrehumbert, 1980; Beckman & Pierrehumbert, 1986; Pierrehumbert & Hirschberg, 1990; Beckman & Elam, 1994). This transcription system helps to illustrate the distribution of pitch accents and prosodic phrases as well as the overall tune (or melody) of a sentence. Therefore, it is crucial for any discussion of prosody. Pitch accents mark the most prominent constituents of an utterance. In ToBI, pitch accents are always associated with the stressed syllable of the pitch accented word. They are signaled with an asterisk and can be either high (H*), low (L*) or bitonal (e.g., L*+H). The exact representation of the ToBI system has been revised over time. Whereas the original version by Pierrehumbert (1980) distinguishes between seven types of pitch accents (H*, L*, H- + L*, H* + L-, L* + H-, L- + H*, H* + H-), a more recent version by Beckman and Pierrehumbert (1986) distinguishes between merely six types (H*, L*, H+L*, H*+L, L*+H, L+H*, H*) and the latest version by Beckman and Elam (1994) distinguishes between only five pitch accents and additionally introduces the notion of downstep, as signaled by an exclamation mark. A downstep marks a high pitch accent that is lower than a preceding high pitch accent. The old sequence of H*+L H* is thus now replaced by H* !H*. The current five types of pitch accents are therefore: H*, L*, H+!H*, H* !H*, L*+H and L+H*. Phrase accents indicate the end of an intermediate phrase (ip) and are indicated by a minus sign. They can also be either high (H-) or low (L-). In contrast to pitch accents, phrase accents are not associated with only one syllable. Rather, they are realized “over a number of syllables covering all the syllables right after the [pitch accented] word until the phrase final syllable” (Jun, 2015b, p. 5). Boundary tones indicate the end of an intonational phrase (IPh) and are indicated by a percentage sign. They are associated with the last syllable of the IPh. Since the end of an IPh always coincides with the end of an ip, there are four types of boundary tones: H-H%, L-L%, L-H%, H-L% and, in the most recent version of ToBI, !H-L%. Besides the tones of a sentence, the ToBI system is also used to label breaks. There are five different types of breaks that are used to describe the “strength of association (coherence or disjuncture) between adjacent words” (Jun, 2015c, p. 4). The breaks range from 0, marking clitics, to 4, marking an IPh boundary. For a detailed discussion of the breaks index, I refer the reader to Beckman and Elam (1994). For now, I want to concentrate on the tones index, since this part of ToBI is most relevant to this thesis and the investigation of the prosody of sluicing.

The three main features of prosody are prominence, phrasing and intonation. Prosodic prominence refers to the pitch accent distribution across the single words of a sentence or, more precisely, to the "relative prominence of the [single] syllables" (Pierrehumbert & Hirschberg, 1990, p. 272). As opposed to *lexical stress*, which describes stressed and unstressed syllables within a word, and which is assigned by lexical-phonological rules (Pierrehumbert & Hirschberg, 1990), prosodic prominence is related to *phrasal stress* (Shport & Redford, 2014). It describes where in a phrase the main accent is located. Wagner and Watson (2010) note that it is often impossible to tell which of two constituents is more prominent, even though acoustically, prosodic prominence is clearly defined by several parameters, namely F0 values measured in Hertz (*Hz*), intensity values measured in decibel (*dB*) and duration values measured in milliseconds (*ms*) (Lieberman, 1966; Cooper, Eady, & Mueller, 1985; Pierrehumbert & Hirschberg, 1990; Wagner & Watson, 2010). Schafer (1996) specifically argues that "in production, new information receives more accent in one or more of the parameters of duration, amplitude and pitch excursion than old information" (Schafer 1996, p. 149). Consequently, not all three parameters must be combined in order to express a pitch accent. This apparent discrepancy between acoustic and perceptual measurements will play an important role in the discussion of the empirical results of this thesis. Moreover, phrasal stress is considerably affected by the information structure of a discourse: Following Pierrehumbert and Hirschberg (1990), the default prosodic contour of the example in (119) has the main pitch accent on the final word *vitamins*. This follows from the assumptions of the *Nuclear Stress Rule* (NSR) (Chomsky & Halle, 1968) which posits that the main stress of a phrase always falls on the most deeply embedded constituent. However, if the same sentence is embedded in a specific context, as illustrated in (120), the main stress has to be shifted from the NP *vitamins* to the ADJ *good*, which contrasts with information in the context (the ADJ *poor*). It thus represents the new information of the utterance, whereas the NP *vitamins* is already mentioned in the context.

(119) Legumes are a good source of VITAMINS.

(120) A: Legumes are a pretty poor source of vitamins.
B: No. Legumes are a GOOD source of vitamins.

(Pierrehumbert & Hirschberg, 1990, p. 272)

Prosodic phrasing is often assumed to reflect syntactic phrase structure (Lehiste, 1973; Steedman, 1991; Wagner & Watson, 2010)[10]. It describes the presence or absence of a prosodic break which mostly coincides with the presence or absence of a boundary tone. The following example illustrates how prosodic phrasing can be used for disambiguation.

(121) [If you wait] [around it'll come].

(122) [If you wait around] [it'll come].

(Wagner & Watson, 2010, p. 907)

The example in (121) means *If you wait, it will come around*. The first clause ends after the VP *wait* – there is thus the end of a prosodic phrase and thus an IPh. Prosodically, this IPh is signaled by a boundary tone at the end of the VP *wait* and a prosodic break (that is, a short pause) between the VP *wait* and the ADJ *around*. The sentence in (122) means *If you wait around, it will come.* Hence, the first clause ends after the ADJ *around* and the second clause starts with the PRN *it*. The end of an IPh and a boundary tone is therefore located after the ADJ *around*. However, Nicol (1996) claims that there is no one-to-one syntax-prosody mapping, meaning that one syntactic structure can be represented by more than one prosodic structure. This means, for example, that there is not one specific boundary tone that must be used in order to express one or the other meaning. Another example to illustrate prosodic phrasing is given in (123). Here, a prosodic break after the VP *schaukeln* (to swing) leads to a stripping construction, see (124), whereas a lack of a prosodic break leads to a regular SVO reading, see (125). This type of ambiguity and the question whether native speakers of German use prosody to disambiguate it or not will be discussed in chapter 3.1.1.2, where I will summarize the findings of Remmele et al. (forthcoming 2019).

[10] There is currently some debate going on about the exact relationship between syntax and prosody. For a detailed discussion, I refer the reader to Wagner and Watson (2010).

(123) [MARIA]$_{NP}$ [SCHAUKELT]$_{VP}$ [MARTIN]$_{NP}$ [NICHT]$_{NEG}$
Maria swings Martin not

(124) a. MARIA SCHAUKELT // MARTIN NICHT
b. Maria schaukelt. Martin [~~schaukelt~~] nicht.
Maria swings. Martin [~~swings~~] not.
'Maria swings. Martin doesn't [~~swing~~].

(125) a. MARIA SCHAUKELT MARTIN NICHT
b. Maria schaukelt Martin nicht.
Maria swings Martin not.
‚Maria doesn't swing Martin.“

(Féry, 1994, p. 100)

Prosodic phrasing can thus have a tremendous effect upon the interpretation of a word sequence. Prosodically, prosodic phrasing is realized with a pause, a phrase- or a boundary tone and increased duration measurements on the constituents preceding and following the pause, also referred to as *pre-boundary* or *phrase final lengthening* and *domain initial strengthening* (Lehiste, 1973; Price et al., 1991; Wagner & Watson, 2010). Phrase tones indicate the end of an ip; boundary tones the end of an IPh. Every IPh consists of at least one ip which in turn consists of at least one pitch accent and a high or a low ip boundary tone (H- or L-). The end of an IPh is signaled by a high or a low boundary tone that simultaneously indicates the end of an ip (L-L%, H-L%, H-H% or L-H%) (Beckman & Pierrehumbert, 1986; Pierrehumbert & Hirschberg, 1990).

Intonation describes the tune or the melody of a sentence as indicated by the shape of the F0 contour. The choice of a high versus a low tone can tremendously affect the meaning of a sentence. Intonation is thus closely related to pitch accent distribution since high tones are often also pitch accented. Nevertheless, prosodic prominence and phrasing "can be varied independently of the choice of the intonational tune" (Wagner & Watson, 2010, p. 942; Liberman, 1975; Ladd, 1996). Moreover, different intonational tunes are related to different speech acts, such as interrogative or declarative clauses (Wagner & Watson, 2010). They can also encode information about speaker attitude, such as politeness or surprise, emotions such as hate and propositional attitudes such as uncertainty, sarcasm or irony (Ward & Hirschberg, 1985; Pierrehumbert & Hirschberg, 1990; Wagner & Watson, 2010). An example of uncertainty is given in (126).

(126) My name is Mark Liberman

a. H* H* H-H%

b. H* H* L-L%

(Pierrehumbert & Hirschberg, 1990, p. 290)

Based on the lexical content of example (126), the sentence seems to be a declarative clause. From this follows that the intonational contour with an L-L% boundary tone given in (126)b. seems to be the logical choice. However, if one takes into account the specific context in which this sentence was originally uttered, the rising contour with an H-H% boundary tone, as illustrated in (126)a., seems appropriate: This sentence was originally uttered in a context where Mark Liberman was in a hotel and he was not sure whether it was the one he had booked a room in.[11] Consequently, he uttered this sentence with the intonational contour in (126)a. to indicate the meaning "My name is Mark Liberman, and are you expecting me, or, am I in the right place?" (Pierrehumbert & Hirschberg, 1990, p. 290). In both contours of this example, the H* pitch accents indicate new information.[12] However, the H-H% boundary tone of (126)a. signals that the information is not certain or even questionable, whereas the L-L% boundary tone of (126)b. indicates that the speaker is sure about the content of his utterance. The example in (127) illustrates that the choice of pitch accents and phrase accents also plays an important role concerning the intonation and thus the exact meaning of an utterance.

(127) Do you want an apple or banana cake?

a. L* H* L-L%

b. H* H- H* L-L%

c. H* L- H* L-L%

(Pierrehumbert & Hirschberg, 1990, p. 303)

[11] Mark Liberman is a well-known linguist who graduated in 1975 from MIT with a PhD in linguistics. He is the founder and director of the Linguistic Data Consortium as well as the faculty director of Ware College House at the University of Pennsylvania. He is the author of several papers about the intonation of English, including his PhD thesis Liberman (1975), Liberman and Pierrehumbert (1984), Liberman and Prince (1977) and Liberman and Kuang (2016).

[12] The notion of new-information focus will be discussed in more detail in chapter 2.2.2.1.

Without an ip boundary, as in (127)a., *apple* and *banana* are both taken to modify *cake*. Consequently, the speaker asks whether the listener wants an apple cake or a banana cake. With an ip boundary, as in (127)b. and c., the speaker offers either an apple (just the fruit) or a banana cake. The difference between the H- phrase accent in (127)b. and the L- phrase accent in (127)c. is that in the former, the two pieces of food are the only items being offered, whereas in the latter, other types of food might be available as well (Pierrehumbert & Hirschberg, 1990, p. 303).

As illustrated, the prosody of a sentence consists of many different factors that contribute to varying degrees to the meaning of a sentence. Prosodic prominence, prosodic phrasing and intonation are crucial features of spoken English that combine to form the meaning of an utterance. So far, I have thus shown that the meaning of a sentence can be realized by different prosodic structures. However, there are also factors external to a sentence that can influence its prosody, such as the information structure of a surrounding discourse. This is, for example, the case in sluicing, where the antecedent of the sluicing structure stands in a specific information structural relationship with its *wh*-remnant. Prosodic prominence, for example, plays an important role for the disambiguation of sluicing in spoken language. How exactly information structure influences the prosody of a sentence, and especially sluicing, will therefore be discussed in the following chapter.

2.2.2 Prosody and Meaning[13]

The prosody of an utterance is closely related to its meaning. For example, the default prosodic contour of an utterance is only apparent when it is uttered in an all-new context (e.g., following a question like "What happened?"). Wagner and Watson state that "there is a default distribution of accent placement, and deviations from this pattern are used to encode focus and givenness presuppositions" (2015, p. 1178). Hence, the information structure of an utterance plays a crucial role in determining not only its meaning but also its prosodic structure. The central questions of this chapter are thus: First, what are the core concepts of information structure and which notions are especially important with respect to sluicing? Second, what is

[13] The overview presented in chapter 2.2.2 is based on parts of chapter 2 of my master thesis Remmele (2014, pp. 23–34) from which I quote freely. However, note that the summary provided in this thesis has a very different focus than that in the aforementioned master thesis and thus differs considerably.

the relationship between information structure and prosody and how can information structure be used to predict the prosody of sluicing structures with different antecedent types? This chapter is structured as follows: In chapter 2.2.2.1, I will start with a definition of information structure and its three central notions. In chapter 2.2.2.2, I will discuss three approaches exploring the relationship between information structure and prosody, with a focus on sluicing.

2.2.2.1 Definition: Information Structure

The concept of information structure originally goes back to Halliday (1967): It describes the way speakers and hearers integrate units of information into the current discourse. It is defined as "a phenomenon of information packaging that responds to the immediate communicative needs of interlocutors" (Krifka, 2008, p. 243). The central notions of information structure are *focus*, *givenness* and *topic*. They all trigger different types of syntactic, semantic and phonological processes which consequently lead to prosodic differences as well (Winkler & Hartmann, 2013). The three central notions are defined as follows: Focus "indicates the presence of alternatives that are relevant for the interpretation of linguistic expressions" (Krifka, 2008, p. 247). Besides syntactic processes such as cleft constructions or dislocation, accentuation (or prosodic prominence) is an important factor to mark a word or a phrase as bearing focus (Jackendoff, 1972; Selkirk, 1995; Truckenbrodt, 1995; Krifka, 2008). The *focus domain* describes the size of the focused constituent: it can either be just the accented word (referred to as the *focus exponent,* Rochemont, 2011) or an entire phrase that contains the focused word (Winkler & Hartmann, 2013). The most common type of focus is *denotation focus,* which is related to the meaning of an expression.[14] An example of denotation focus is given in (128). Here, the alternative to the NP *princess* is, for example, the NP *maid*, which has a different denotation.

(128) Once upon a time, there was [a PRINcess]$_F$.

(Krifka, 2008, p. 251)

[14] Note that, whenever I write about *focus* in the remainder of this thesis, I refer to *denotation focus*.

Denotation focus can be divided into two subtypes: *new-information focus* and *contrastive focus*. New-information focus is also referred to as *information focus* (Kiss, 1998) or *presentational focus* (Gussenhoven, 2007). It is defined as "the part of the sentence that corresponds to the answer to a question, either overt or implied" (Kanerva, 1989 as cited in Gussenhoven, 2007, p. 11). An example of new-information focus is given in (128) above. Prosodically, new-information focus is usually realized with an H* pitch accent (Pierrehumbert & Hirschberg, 1990). Contrastive focus was first discussed by Rooth (1996). It is also described as *identificational focus* (Kiss, 1998) or *corrective focus* (Gussenhoven, 2007). It describes an utterance out of which two elements are in a contrastive relationship (Calhoun, 2009). Prosodically, it is usually realized with an L+H* pitch accent (Pierrehumbert & Hirschberg, 1990), although more recent approaches argue that there is no difference between an L+H* and an H* accent (Katz & Selkirk, 2011). Note that a word (or a constituent) that is usually deaccented is perceived to be much more contrastive when it is contrastively focused than a constituent that generally bears focus (Calhoun, 2009). From this follows that a sentence-final constituent that bears default focus may not be perceived as contrastive as a sentence-initial constituent that does not bear default focus. This argument is important in terms of the discussion of the empirical findings of this thesis and will thus be picked up again in chapter 4 since contrastive focus plays an important role in sluicing, as stated by (Romero, 1998). She claims that the prosody of sluicing is directly affected by the information structure, more precisely, the focus, of its *wh*-remnant and its antecedent: if the *wh*-remnant of a sluicing structure is focused, its antecedent has to carry a contrastive focus, for the entire structure to be acceptable (see Romero, 1998 and the discussion in chapter 2.2.3.3).

The second central notion of information structure is *givenness,* which was introduced by Chafe (1976). Givenness describes a denotation that is already known by virtue of being part of the immediate context (Krifka, 2008). It is prosodically expressed through deaccentuation or deletion (Halliday, 1967; Chafe, 1976; Prince, 1981; Gussenhoven, 1983; Selkirk, 1984). Note though that givenness is not just a "complementary notion of focus" (Krifka, 2008, p. 263). This becomes evident from the fact that a given constituent can be prominent and thus focused as well. This is illustrated in (129), where the focused PRN *her* is already given in the context by referring to *Mary*.

(129) Who did Mary's father meet? He met [HER$_{\text{GIVEN}}$]$_{\text{F}}$.

(Winkler & Hartmann, 2013, p. 3)

The third central notion of information structure is *topic*. It is described as the entity about which information is given (Krifka, 2008), as illustrated in (130). It is important to know that the dichotomy *topic/comment* is not identical to the dichotomy *focus/given,* since a focus can be part of a topic, as illustrated in (130) as well.

(130) a. When did [Aristotle Onassis]$_{\text{Topic}}$ marry Jacqueline Kennedy?
b. [He]$_{\text{Topic}}$ [married her [in 1968]$_{\text{Focus}}$]]$_{\text{Comment}}$.

(Krifka, 2008, p. 266)

This chapter showed that prosody is closely linked to the different notions of information structure, especially focus and givenness. A focused constituent tends to be realized with a pitch accent and a given constituent tends to be deaccented (but can be focused as well). The relationship between information structure and prosody, however, is much more complex than depicted here: This issue is an ongoing research topic that is still under debate (as evident by the manifold contributions to the workshop *Prosody and Information Structure* 2016 by Baumann & Heusinger, 2016; Calhoun, 2016; Féry, 2016; Kitagawa & Ishihara, 2016; Repp, 2016, etc., also Baumann, 2006; Büring, 2013, 2016). For this thesis, I want to focus the discussion of information structure and prosody exclusively on the prosodic realization of focused constituents, which plays a crucial role in sluicing and which will therefore be addressed in more detail in the following chapter.

2.2.2.2 Information Structure and Prosody

The goal of this thesis is to investigate the prosodic disambiguation of different antecedents of various sluicing structures. From this follows that it is important to know about the default prosodic contour of sluicing structures as well as the different effects that information structure (specifically focus) can have upon the meaning and the prosody of sluicing. There are several theories exploring the relationship between information structure and prosody. I will discuss three approaches to illustrate the main differences and their relation to sluicing: the *Nuclear*

Stress Rule (NSR, Chomsky & Halle, 1968; Cinque, 1993), the *Focus Projection Theory* (FPT, Selkirk, 1995) and *recursion and downstep* (Féry & Ishihara, 2009; Féry, 2010a).

The NSR (Chomsky & Halle, 1968; Cinque, 1993) predicts that the most deeply embedded constituent of a phrase will be the recipient of the (nuclear) pitch accent of the entire structure. The syntactic structure of a sentence thus directly affects its prosodic structure. This assumption predicts that the pitch accent falls onto the object NP of a globally ambiguous simple sluicing structure when uttered in an all-new context, see (131).

(131) On Tuesday, some lawyer$_i$ defended some DEAler$_j$. Do you know which one$_{i/j}$?

Moreover, it correctly predicts the pitch accent on the object NP of a temporarily ambiguous simple sluicing structure with an object antecedent, see (132).

(132) On Tuesday, some lawyer$_i$ defended some DEAlers$_j$. Do you know which ones$_j$?

However, it fails to correctly predict a pitch accent on the subject NP of a temporarily ambiguous simple sluicing structure with a subject antecedent, see (133).

(133) ??On Tuesday, some lawyer$_i$ defended some DEAlers$_j$. Do you know which one$_i$?

I therefore want to focus in this chapter on two more recent approaches that explain the relationship between information structure, or specifically focus, and pitch accent distribution from a different angle and which, consequently, better predicts the various pitch accent patterns of the sluicing structures investigated in this thesis: Selkirk (1995) and Féry (2010a) (also Féry & Ishihara, 2009; Féry, 2010b).[15]

Selkirk (1995) criticizes the NSR for not making correct predictions about the actual location of a pitch accent within a focused constituent. Rather than discussing the effects of information structure upon prosody, though, Selkirk discusses the effects of prosody upon information structure: She suggests that a pitch accent on a word automatically leads to focus marking (called *F-marking*) of this word. Keeping the notion of the focus domain in mind (Rochemont, 2011), though, the word that receives a pitch accent must not necessarily be the

[15] Note that there are, of course, several other approaches exploring the effects of information structure and prosody upon each other, such as Büring (2013) and Rochemont (2013). However, I will concentrate the discussion here on those concepts that seem to fit best to explain the expected prosodic realizations of the sluicing structures discussed in chapter 3. Besides, an in-depth discussion of the various approaches would go beyond the scope of this thesis.

only constituent that is focused. Selkirk hence introduces her *Focus Projection Theory* (FPT), according to which F-marked words can project their focus to phrases higher up in the syntactic tree structure. A pitch accent on one word, such as the NP *bats*, can thus turn its respective sentence into an answer to a variety of questions, as illustrated in (134) through (138).

(134) A: What did Mary buy a book about?
B: Mary bought a book about $[\text{BATS}]_F$.

(135) A: What kind of book did Mary buy?
B: Mary bought a book $[\text{about BATS}]_F$.

(136) A: What did Mary buy?
B: Mary bought $[\text{a book about BATS}]_F$.

(137) A: What did Mary do?
B: Mary $[\text{bought a book about BATS}]_F$.

(138) A: What's been happening?
B: $[\text{Mary bought a book about BATS}]_F$.

(Selkirk, 1995, p. 554)

A single pitch accent on the NP *bats* projects the focus up into the tree structure and consequently changes the dimension of the respective focus domain from merely the NP *bats* (see (134)) to the TP *Mary bought a book about bats* (see (138)). A pitch accent on the NP *bats* can therefore simultaneously be the answer to the question *What did Mary buy a book about?* as well as to *What's been happening?* However, a pitch accent on the NP *Mary*, as illustrated in (139), cannot project focus: an accent on the subject NP *Mary* can always only answer one question, namely *Who bought a book about bats?*

(139) A: Who bought a book about bats?
B: $[\text{MARY}]_F$ bought a book about bats.

(Selkirk, 1995, p. 554)

The reason for this lies in the principles of Selkirk's *Basic Focus Rule* and her *Focus Projection Rules*, as defined in (140) and (141).

(140) **Basic Focus Rule:**

An accented word is F-marked.

(141) **Focus Projection:**

(a) F-marking of the head of a phrase licenses the F-marking of the phrase.

(b) F-marking of the internal argument of a head licenses the F-marking of the head.

(Selkirk, 1995, p. 554)

The NP *bats* in (134) through (138) is part of the PP *about bats.* The head of this PP is the preposition *about* and the NP *bats* is the internal argument of this head. Following assumption (141)b., F-marking of an internal argument leads to F-marking of its head which, following (141)a., leads to F-marking of the entire phrase. In (139), though, the NP *Mary* is neither the head nor an internal argument of its maximal projection and can thus not project its focus on another phrase. Selkirk summarizes that the principles of *Focus Projection* together with the *Basic Focus Rule* serve "to define the relation between accent and focus in intonational languages like English, Dutch, and German" (Selkirk, 1995, p. 561). This makes her approach highly significant for this thesis for two reasons: First, the structures examined in this thesis are all English structures that contain a focused constituent. Second, the principles of Selkirk's FPT make correct predictions about the prosody of sluicing structures, whose prosodic realizations will be investigated in chapter 3. Examples are given in (142) and (143).

(142) [Some LAWyer]$_F$ defended some dealers. Do you know [which ONE]$_F$?

(143) Some lawyer defended [some DEAlers]$_F$. Do you know [which ONES]$_F$?

In (142), the subject NP *some lawyer* is focused by virtue of the singular *wh*-remnant *which one*. Whereas the NSR would predict a main pitch accent on the object NP *some dealers,* Selkirk's FPT correctly predicts an accent on the F-marked subject NP *some lawyer* (or to be more precise, an accent on *some lawyer* leads to F-marking of said constituent). Note that as discussed above, F-marking of the subject NP allows for the structure to be only an answer to the question *Which lawyer defended some dealers?* In (143), the object NP *some lawyers* is focused by virtue of the plural *wh*-remnant *which ones*. Here, F-marking of the object NP (as a consequence of an accent on *dealers*) allows the structure to be an answer to several questions, ranging from *Which dealer did some lawyer defend?* to *What happened?* The subsequent interrogative clause, though, limits the set of possible questions to *Which dealer did some lawyer defend?*

Like Selkirk (1995), Féry (2010a) also criticizes the predictions of the NSR (Chomsky & Halle, 1968; Cinque, 1993). However, she chooses a different approach than Selkirk (1995) to explain the relationship between information structure and prosody.[16] Unlike Selkirk, who assumes that prosody directly affects the information structure of a sentence, Féry (2010a) claims that syntactic structure influences prosodic phrasing and that information structure influences the tonal structure of a sentence. She thus clearly distinguishes between the effects of syntax on the one hand and information structure on the other hand on the prosody of an utterance. Féry (2010a) introduces the notion of *prosodic phrases* (*p-phrases*), which can be embedded into each other. Following her proposal, every p-phrase has a head which may be marked with a pitch accent. Moreover, "p-phrases have an abstract range inside of which accents are scaled" (Féry, 2010b, p. 7). This scaling is known as *downstep*. With respect to information structure, a focus enlarges and a given constituent compresses the F0 register of a sentence, or in other words, focus leads to an increase of prominence, whereas givenness leads to a decrease of prominence. In Féry's (2010a) approach, information structure does thus not influence the prosodic phrasing of a sentence. However, the tonal structure of a phrase is insofar affected by syntax and, accordingly, prosodic phrasing in that it is scaled relative to preceding p-phrases and is reset by boundary tones (Féry, 2010b). Following from this downstep pattern, a focused constituent early in a p-phrase will always be perceived as more prominent or higher than a focused constituent later in the same p-phrase. At the same time, a later constituent can be more prominent than an earlier one if the earlier constituent is part of a more deeply embedded p-phrase than the later constituent. As a result, Féry's approach makes the following predictions about sluicing structures: A simple sluicing structure like *Some lawyer defended some dealers* consists of two p-phrases, the subject on the one hand and the VP on the other hand, as illustrated in (144). Since the subject NP *some lawyer* is the only constituent of its p-phrase, it will always be accented, by virtue of being the head of its p-phrase. It will thus always exhibit a higher F0 than the object NP *some dealers*, which is also the head of its p-phrase, but

[16] Note that Féry (2010a) and Féry and Ishihara (2009) base their assumptions mostly on German and Japanese examples. However, they also discuss the model with respect to English, even though to a smaller extent.

which is located at the end of it. When the subject NP is contrastively focused, the subject NP will therefore be much more prominent than the object NP, see (144). In contrast, when the object NP is contrastively focused, both the subject NP and the object NP will be similarly prominent, see (145).[17]

(144) ([Some LAWyer])$_P$ (defended some dealers)$_P$. Do you know [which ONE]?

x x

x

(145) (Some lawyer)$_P$ (defended [some DEAlers])$_P$. Do you know [which ONES]?

x x

(x)

Concerning a complex sluicing structure like *They fired some lawyer that had defended some dealers,* the distribution of accents looks similar. There are again two p-phrases, the matrix clause *They fired some lawye*r and the embedded clause *that had defended some dealers*. Both the matrix NP *some lawyer* and the embedded NP *some dealers* are located at the end of their respective p-phrases, which they are also the heads of. Since the matrix NP is not as deeply embedded as the embedded NP and since it is part of an earlier p-phrase than the embedded NP, it will always be perceived as more prominent than or equally prominent as the embedded NP.

The three concepts discussed in this chapter vary in their predictions about the prosodic realizations of sluicing structures. Whereas the NSR (Chomsky & Halle, 1968; Cinque, 1993) makes correct predictions only with respect to sluicing with a sentence-final NP as antecedent, the FPT (Selkirk, 1995) and Féry's (2010a) model of recursion and downstep correctly predict the accent patterns of different antecedent types in sluicing. Whereas Selkirk (1995) does not separate the effects of syntax and information structure on prosody, Féry makes a clear distinction between the two. In Selkirk's FPT, accented focused constituents get F-marked and deaccented given constituents are non-F-marked. The FPT makes thus correct predictions about the pitch accent distribution and therefore the overall prosodic contour of sluicing structures with different antecedent types. According to Féry, though, Selkirk's FPT encounters several

[17] Note that I will only mark contrastive focus in the remainder of this thesis with capital letters. New-information focus might be mentioned but not specifically marked. For a discussion of F-marking contrastive vs. new-information focus, I refer the reader to Rochemont (2013).

problems: She criticizes, for example, that in the FPT, a focus always only affects one single pitch accent and has no effect upon the remainder of the sentence. Féry's model of recursion and downstep automatically affects the prosody of an entire utterance and is hence better fit to describe the prosody of sluicing structures with focused constituents of different types. Moreover, Féry criticizes the missing consideration of boundary tones in Selkirk's FPT. The biggest difference between Selkirk's approach (or earlier approaches in general) and Féry's more recent proposal is the fact that the prosodic structure of a sentence is influenced in different ways by syntax and information structure. Whereas syntactic structure only influences the prosodic phrasing of a sentence, information structure influences the F0 scaling by either raising, lowering or even deleting it. Since the sluicing structures investigated in this thesis do not differ in their syntactic structures (at least not the declarative phrases; the interrogative phrases do differ with respect to the elided material following the *wh*-word but not with respect to the location of a prosodic phrase boundary) but in their information structure, I will follow Féry's model of recursion and downstep to explain the different accent patterns of sluicing for the remainder of this thesis. Now that I have illustrated what the prosodic realizations of different sluicing structures theoretically look like, it is important to elaborate how exactly the different types of prosodic parameters are made use of as a means of disambiguation in spoken language. A discussion of the concept of prosody as a disambiguating factor will therefore be provided in the following chapter.

2.2.3 Prosodic Disambiguation

Prosody is an important factor, not only of spoken language in general but also for disambiguation and spoken language processing (Lehiste, 1973; Price et al., 1991; Kjelgaard & Speer, 1999; Kang & Speer, 2004, among others). Prosodic disambiguation is defined as the "suprasegmental information in speech, such as phrasing and stress, which can alter perceived sentence meaning without changing the segmental identity of the components" (Price et al., 1991, p. 2956). With this thesis, I will investigate the role of prosodic disambiguation in spoken language by focusing on sluicing as a subtype of ellipsis to contribute to the research on prosody as a crucial disambiguation method in general. Ellipses have been of special interest to the research on prosodic disambiguation since different possibilities for filling the ellipsis site lead to different prosodic patterns (Rooth, 1992; Frazier & Clifton, 1998; Hartmann, 2000; Carlson & Horn, 2002; Carlson et al., 2009; Hoeks, Redeker, & Hendriks, 2009). Especially the prosodic disambiguation of sluicing is of interest since it is an elliptical structure that so far, has only been analyzed from the perceptional side (Frazier & Clifton, 1998; Carlson et al., 2009). In this chapter, I will investigate the following questions: First, how important is prosody as a disambiguating factor in comparison to other disambiguation methods? Second, what are the main characteristics of prosodic disambiguation and which of these characteristics are especially important regarding sluicing? Third, what is the current state of the art regarding the investigation of prosody as a disambiguating factor in sluicing? Fourth, how important is speaker training for production studies? The chapter is thus structured as follows: In chapter 2.2.3.1, I will start with a short overview of disambiguation methods other than prosody, namely contextual and morphological disambiguation, and their relation to sluicing. In chapter 2.2.3.2, I will provide a detailed discussion of prosodic phrasing and prosodic prominence as the central notions of prosodic disambiguation. In chapter 2.2.3.3, I will present the current state of the art regarding the prosody of different elliptical structures, with a focus on sluicing. In chapter 2.2.3.4, I will discuss the importance of speaker training regarding the results of production studies.

2.2.3.1 Contextual and Morphological Disambiguation

Whereas Chomsky has argued that ambiguity negatively affects communication (Chomsky, Belletti, & Rizzi, 2002, p. 107), more recent research claims that ambiguity is a requirement for efficient communication (Pinkal, 1991; Piantadosi et al., 2012). Pinkal (1991), for example, states that ambiguity is a mandatory characteristic of natural languages which contributes to the efficiency and universality of communication.[18] More specifically, ambiguity decreases the processing effort of speaker and listener by enabling them to re-use single linguistic units (especially short and frequent units like syllables but also words or sounds). Moreover, people are fast at parsing and disambiguating language which supports the claim that ambiguity enhances rather than impairs communication (Ferreira et al., 2002; Ferreira & Patson, 2007; Harley, 2008, 2014). Piantadosi et al. (2012) argue that "ambiguity is rarely harmful to

[18] „Vagheit und Ambiguität sind konstitutive Eigenschaften natürlicher Sprachen, die maßgeblich zu deren Eigenschaft als effizientem und universellem Kommunikationsmittel beitragen" (Pinkal, 1991, p. 250).

communication in practice thanks to the comprehender's ability to effectively disambiguate between possible meanings" (p. 4, also Levinson, 2001; Wasow & Arnold, 2003; Wasow et al., 2005; Jaeger, 2006; Roland, Elman, & Ferreira, 2006; Ferreira, 2008; Jaeger, 2010). This ability to disambiguate language is further supported by the fact that language never occurs on its own: it is always either situated in a specific extra-linguistic environment (e.g., referring to a situation in the real world such as neighbors talking to each other over the garden fence) or it is situated in a linguistic environment (e.g., a linguistic example in a journal article). The several different meanings of one linguistic unit thus tend to go unnoticed, since co-text, context, world knowledge or prosody provide enough disambiguating cues to avoid misunderstandings (Lieberman, 1966; Wasow et al., 2005; Ferreira, 2008).

The most important disambiguation method is contextual disambiguation (Wasow et al., 2005; Piantadosi et al., 2012; Wasow, 2015). The concept of context here refers to "[t]he physical environment in which a word is used" (Yule, 2010, p. 128). Without context, linguistic units are highly ambiguous between different interpretations, which can result not only from different lexical meanings but also from different syntactic categories (Piantadosi et al., 2012). Wasow (2015) states that the reason why many sentences are ambiguous when in isolation is that "the context of use generally contributes a considerable amount of information about what the speaker is likely to be talking about"(Wasow, 2015, p. 43; also noted by Lieberman, 1984 and others). Especially regarding structural ambiguities, Wasow mentions that the ambiguity does not constitute a problem because either, "the meaning associated with one structure makes no pragmatic sense" or "the meanings associated with the two structures are the same or close enough that it doesn't matter" (Wasow, 2015, p. 39). Therefore, structural ambiguities that posit problems to the parser are extremely rare (Piantadosi et al., 2012). Fox Tree and Meijer (2000) specifically investigated the role of context and prosody in disambiguation and found that context is more important in listener's disambiguation of spoken language than prosody. In the empirical part of this thesis (see chapter 3.2.1), I will show that nevertheless, both context and prosody are used by speakers when disambiguating a globally ambiguous sluicing structure, as illustrated in (146).

(146) Elmer$_i$ helped Leanne$_j$ with the cleanup, but I don't know who else$_{i/j}$.

Ambiguities can not only be resolved by sentence external factors (such as context or prosody) but also by factors inherent to the sentence or the structure itself. As discussed in chapter 2.1.2.2, temporary ambiguities are only ambiguous up until the parser reaches the disambiguation region, which is usually a word that is incompatible with the initial analysis, as in the famous garden path example *The horse raced past the barn fell,* see (49) above. The disambiguation region, though, can also be a morpheme, as illustrated in example (56) and in the sluicing structure of example (59) above, repeated here as (147) and (148).

(147) When Roger leaves the house is dark.

(Kjelgaard & Speer, 1999, p. 156)

(148) On Tuesday, some lawyer defended some dealers. Do you know which one?

In (147), changing one letter renders the first analysis acceptable: Whereas the VP *is* is incompatible with the first analysis, the PRN *it* would be. Thus, changing the VP *is* into the PRN *it* by replacing the letter *s* with a *t* changes the meaning of the sentence. In (148), the singular *wh*-remnant *which one* is incompatible with the preferred analysis where the parser takes the object NP as the antecedent (as it is predicted by the NSR (Chomsky & Halle, 1968; Cinque, 1993)) and is consequently forced to reanalyze the structure by taking the dispreferred subject NP as the antecedent of the *wh*-remnant. However, adding the plural suffix *–s* to *one* would allow the parser to take the preferred object NP as the antecedent. Thus, a single morpheme can disambiguate a structure towards a different interpretation. Since the disambiguation can be triggered by a single letter and is taking place at the word level, I refer to this method of disambiguation as *morphological disambiguation*. Of course, this type of disambiguation is especially prominent with respect to morphological and lexical ambiguities. Nevertheless, it also plays a crucial role with respect to referential temporary ambiguities such as the sluicing structures, as illustrated in (148), which will be investigated in the empirical part of this thesis, see chapter 3.[19]

[19] One further method of disambiguation that I want to mention is *typographical disambiguation*. This form of disambiguation represents the prosodic structure of a sentence in written text, for example, by writing pitch accented words in capital letters. This form of disambiguation is closely related to the concept of *implicit prosody*, which assumes that readers subconsciously produce an implicit prosodic contour when reading written language. However, since this thesis is concerned with prosodic disambiguation of spoken language, a detailed discussion of implicit prosody goes beyond the scope of it. I therefore refer the reader to Jun (2010), Fodor (2002a, 2002b), Bader (1998) and Frazier, Gibson, and Fodor (2015).

2.2.3.2 Prosodic Phrasing and Pitch Accent Placement

Prosody is an important cue for resolving ambiguous structures in spoken language. A specific prosodic structure, however, does not necessarily reflect one specific meaning, as argued by Nicol (1996). Nevertheless, especially if further context is missing, prosody is often the only source of information about which reading of several possible ones is meant. In a sluicing structure like (72), repeated here in (149), for example, it is not clear whether the speakers' intended reading is the object reading (150)a. or the subject reading (150)b. A pitch accent on either *captain* or *co-pilot* can help to bias the hearer towards one of the two readings.

(149) The captain talked with the co-pilot but we couldn't find out who else.

(Carlson et al., 2009, p. 121)

(150) a. …but we couldn't find out *who else* [the captain talked to _].
b. …but we couldn't find out *who else* [_ talked to the co-pilot].

This chapter thus provides an overview of the current state of the art regarding the most influential research about prosodic disambiguation. I will start with a summary of the most well researched prosodic parameter regarding prosodic disambiguation, namely prosodic phrasing. This includes a discussion of the earliest stages of prosodic disambiguation research by Lieberman (1966), Lehiste (1973) and Wales and Toner (1979) as well as more recent research by Price et al. (1991) and Hirschberg and Avesani (1997). I will then go on to summarize the empirical investigations of prominence as a prosodic disambiguation factor, which is especially important concerning sluicing, including work by Allbritton et al. (1996), Winkler (1996), Schafer et al. (2000) and Frazier, Clifton, and Carlson (2007) as well as a theoretical discussion of prosodic prominence in referential ambiguities initiated by Lakoff (1971).

Prosodic Phrasing as a Disambiguating Factor

Lieberman (1966) was the first to discuss the role of prosody on disambiguating structural ambiguities. He distinguishes between ambiguities that have different surface structures, see (151), and ambiguities that have different deep structures, see (152). He concludes that only surface structure ambiguities can be disambiguated by prosodic means, more precisely, by prosodic phrasing.

(151) I'll move on Saturday.

a. [I'll move] [on Saturday]

b. [I'll move on] [(on) Saturday]

(Lieberman, 1966, p. 177)

(152) Flying planes can be dangerous.

a. [[Flying]$_{\mathrm{VP}}$ planes can be dangerous]

b. [[Flying]$_{\mathrm{ADJ}}$ planes can be dangerous]

(Lieberman, 1966, p. 176)

The surface structure ambiguity in (151) either means *I will move houses on Saturday*, placing a syntactic phrase (and thus also a prosodic phrase) break after the VP *move*, or *I will move on (e.g., with my life) on Saturday*, placing a syntactic phrase (and thus a prosodic phrase) break after the PP *on*. This difference has also been discussed and empirically investigated by Price et al. (1991). However, it seems that the second reading, "(to) move on" would require an additional *on* before *Saturday* for a fully grammatical sentence. A clearer example might be (153).

(153) The men won over their enemies.

a. [The men won] [over their enemies]

b. [The men won over] [their enemies]

(Price et al., 1991, p. 2963)

The surface structure ambiguity in (153) either means *The men beat their enemies*, where the VP means "to win something/over somebody" or *The men persuaded their enemies*, where the VP means "to win somebody over". Lieberman (1966) argues that such surface structure ambiguities can be prosodically disambiguated since the respective placement of a prosodic break (which coincides with the location of a syntactic break, as first discussed by Steedman (1991)) clearly biases the reading of the structure towards one or the other. With respect to deep structure ambiguities, which according to Lieberman (1966) cannot be disambiguated by prosody, example (152) either means *Flying a plane can be a dangerous activity* (either for the pilot or the passengers), or *Planes that fly around (in the air) can be dangerous* (for people on the ground). In this example, there is no difference in syntactic bracketing between the two readings. The syntactic and prosodic phrase structure is thus the same. The ambiguity rather arises due to different word classes (e.g., *flying* can be interpreted as either a VP or an ADJ) than different syntactic phrases. Lieberman claims that this is the reason why prosodic disambiguation is not possible here: both readings have the same underlying prosodic phrase structure. Therefore, no durational differences due to differences of prosodic phrasing are to be expected.

Lehiste (1973) and Wales and Toner (1979) empirically investigated Lieberman's claims with different types of lexical and structural (surface and deep structure) ambiguities. They both found that surface structure ambiguity is the ambiguity type that can best be distinguished prosodically. Lehiste found that "the means [speakers] use for disambiguation is mainly manipulation of the time dimension." (Lehiste, 1973, p. 119). She consequently claims that duration is the most important prosodic cue for prosodic disambiguation. Wales and Toner similarly argue that prosody, and especially the prosodic markings of surface structure differences, is used by the listener as a signal to indicate a change of meaning (Wales & Toner, 1979, p. 137). Following their results, it thus seems that, whereas durational differences can be used for disambiguation, prosody in general does not represent a reliable method for disambiguation.

Price et al. (1991) further explored the influence of prosody on surface structure ambiguities. They analyzed 35 sentence pairs that had identical phonetic structures, categorized into seven different types of ambiguities. Besides syntactically ambiguous structures with identical orthographic as well as phonetic structure (such as *far vs. near attachment of a final phrase*, illustrated in (154) below), Price et al. also included homophones where the orthographic structure differed, but the phonetic structure was the same. An example is given in (155) below, with the phonetic structure in (155)c.

(154) a. I read a [review of nasality] in German.
b. I read a review of [nasality in German].

(155) a. The neighbors who usually read, the Daleys, were amused.
b. The neighbors who usually read the dailies were amused.
c. [ðə ˈneɪbərz hu ˈjuʒəwəli rid ðə ˈdeɪliz wɜr əmˈjuzd]

(Price et al., 1991, pp. 2968–2969)

They analyzed the productions of four professional radio announcers who had to silently read short disambiguating contexts before reading the ambiguous structures out loud. In a subsequent perception study, Price et al. played the productions to naïve listeners who had to match them back to their corresponding contexts. The results showed that some structures were disambiguated less successfully than others: *far vs. near attachment of a final phrase* (see (154)), for example, was not as successfully disambiguated as *left vs. right attachment of a middle phrase* (see (156)).

(156) a. [They rose] [early in May.]
b. [They rose early] [in May.]

(Price et al., 1991, p. 2969)

Price et al. argue that “for a variety of syntactic classes but not all, naive listeners can reliably separate meanings on the basis of differences in prosodic information”. Based on phonetic analyses, they conclude that these differences are “syllable-final lengthening, a boundary tone and perhaps a pause” (Price et al., 1991, 2965ff.), that is, durational differences, as found by Lehiste (1973) and Wales and Toner (1979). Due to the early age of their research, there are some points of criticism concerning their method: First, Price et al. rerecorded about 20% of their items because of unwanted phonetic differences or an incorrect prosody. However, such a procedure interferes with the representativity of their data and thus casts doubt on the overall credibility of their findings. Second, whereas they admitted that several factors related to information structure might have influenced their prosodic findings, they claim that their number of items per condition (five) as well as their number of speakers (four) should even out any effects. From today’s perspective, five lexicalizations per condition and four speakers do not constitute a representative sample.[20] Third, Price et al. admit that the participants of their perception study were likely to have noticed the ambiguity as well as the respective conditions they were listening to. This affects the representativity of the results of their perception study, since participants admittedly were not blind to the conditions. Lastly, they state that their prosodic labelers were not blind to the conditions either which might have influenced their judgments. Although this seems like a lot of criticism, one has to keep in mind that this study

[20] Compare to at least eight lexicalizations and around 20 speakers in more recent production studies (Repp, 2015; Repp & Rosin, 2015; submitted; Poschmann & Wagner, 2016).

was the first of its kind and especially of this size and that it was therefore groundbreaking at its time and still remains in some respects today. Despite its problems, Price et al.'s (1991) study provides a number of important results and constitutes a basis for all subsequent research on prosodic disambiguation until today. Besides the structural ambiguities investigated here, prosodic phrasing has been found to play an important role in the disambiguation of various types of attachment ambiguities (Snedeker & Trueswell, 2003; Kang & Speer, 2004; Hwang et al., 2011).

Hirschberg and Avesani (1997) examined different types of scope ambiguities such as negation scope (157) to find out whether prosodic phrasing plays a role in other types of ambiguity as well.

(157) William isn’t drinking because he’s unhappy.

a. William [[isn’t$_i$ drinking$_i$] [because he’s unhappy]].

b. William [isn’t$_i$ [drinking because he’s unhappy$_i$]].

(Hirschberg & Avesani, 1997, pp. 189–191)

Despite the negation preceding the VP *drinking*, due to the scope ambiguity, William is either drinking or he is not: The negation in example (157) can either take scope over the VP *drink*, thus meaning that William decided not to drink because he was unhappy at the moment (reading (157)a., narrow scope) or over the ADJ *unhappy*, thus meaning that the reason for William’s alcohol problem was not the fact that he was unhappy (reading (157)b., wide scope). Hirschberg and Avesani (1997) found that negation scope is mostly prosodically disambiguated by varying the type of the boundary tone at the end of the structure (L-L% for narrow scope and L-H% for wide scope) and by placing an additional boundary tone (L-H%) after the first phrase to indicate reading (157)a. They hence show that not only surface structure ambiguities can be prosodically disambiguated, but that prosodic phrasing also plays an important role in the disambiguation of scope ambiguities.

Pitch Accents as a Disambiguating Factor

So far, most research has focused on durational differences as a prosodic disambiguation method. More recent research shifted its focus to ambiguities that are prosodically disambiguated by varying the location or the type of a pitch accent (Allbritton et al., 1996; Schafer, 1996; Schafer et al., 2000; Carlson, 2001; Frazier et al., 2007). Whereas prosodic phrasing is used primarily to disambiguate structural ambiguities, prosodic prominence is used to mark the information structure of a sentence or to disambiguate referential ambiguities as well as elliptical structures, such as sluicing. Therefore, this section will summarize the research about prosodic prominence as a disambiguating factor.

Besides different types of structural ambiguities, Allbritton et al. (1996) investigated the prosodic disambiguation of the ambiguity given in (158), which, depending on its information structure (or pragmatics, as Allbritton et al., 1996 call it) changes its meaning, see (159) and (160).

(158) Anna came with Manny.

(159) A: Who came with Manny?
B: ANNA came with Manny.

(160) A: Who did Anna come with?
B: Anna came with MANNY.

(Allbritton et al., 1996, p. 716)

Depending on the context preceding this sentence, either *Anna* or *Manny* is new information and thus the focus of the structure, whereas the respective other constituent is given, as illustrated in (159)[21] Besides different boundary tones, Allbritton et al. (1996) found that most participants of their production study produced *Manny* with a higher pitch accent when the context given in (160) preceded the sentence, thus when *Manny* was focused. Their findings illustrate that information structure influences the prosody of a sentence by affecting the distribution of pitch accents, which lends support to the claims made by Féry (2010a) who argued that information structure affects prosodic prominence relations.

[21] Note that this example was first discussed by Liberman and Pierrehumbert (1984) with respect to different boundary tones.

Schafer (1996) conducted two auditory comprehension studies to investigate how a prosodically realized focus affects antecedent choices in ambiguous RCs. Their respective structures looked as follows:

(161) The sun sparkled on the propeller of the plane that the mechanic was so carefully examining.

(162) a. The sun sparkled on the proPELLER of the plane that the mechanic was so carefully examining.

→ *The mechanic was carefully investigating the propeller.*

b. The sun sparkled on the propeller of the PLANE that the mechanic was so carefully examining.

→ *The mechanic was carefully investigating the plane.*

(Schafer, 1996, p. 142)

They accented either the NP *propeller*, see (162)a., or the NP *plane*, see (162)b., with an H* accent to find out whether this prosodically realized focus affects which NP is taken to be modified by the subsequent RC. In a second experiment, they also tested whether there was a difference between new-information H* accents and contrastive L+H* accents, in combination with accented vs. de-accented RCs (representing given or new information). They found that contrastively accented NPs "attracted relative clauses more frequently than focally accented NPs, an effect which held for both prosodically accented and unaccented relative clauses". They thus argue that there is a crucial difference between a contrastive L+H* accent and a non-contrastive H* accent. With their results, they provide support for the *Focus Attraction Hypothesis* and against the *Congruence Hypothesis*, as defined in (163) and (164).

(163) **Focus Attraction Hypothesis**: It is more likely that a phrase that is neither a complement nor syntactically obligatory will be taken to modify a phrase P if P is focused than if it is not, grammatical and pragmatic constraints permitting.

(Schafer, 1996, p. 136)

(164) **Congruence Hypothesis**: A modifier marked as conveying new information preferentially is related to another phrase also marked as new (and a modifier marked as conveying given information is preferentially related to another phrase also marked as given).

(Schafer, 1996, p. 137)

The study by Schafer (1996) thus provides evidence that varying the location of a pitch accent, and even varying the type of a pitch accent, has crucial effects upon the meaning of a sentence. These findings add further support to the claims made by Féry (2010a).

Schafer, A., Carlson, K., Clifton, H., and Frazier, L. (2000) investigated the effect of pitch accent distribution in a structure that contains an interrogative *wh*-word, hence being ambiguous between either an embedded question interpretation or an RC reading. With several auditory comprehension studies, they analyzed sentences like (165) with the different intonation contours given in (166).

(165) I asked the pretty little girl who is cold.

(166) a. I asked the pretty little girl WHO is cold.

→ *Who is cold?*

b. I asked the pretty little girl who is COLD.

→ *The girl is cold.*

(Schafer, A. et al., 2000, p. 79)

They found that a prominent pitch accent on the *wh*-word *who* influences participants' choices in biasing them towards the embedded question interpretation, meaning *The girl should tell me who is cold*, see (166)a. The lack of a prominent pitch accent on the *wh*-word *who* (thus shifting the clause's main pitch accent to *cold*) leads to a preferred RC interpretation, meaning *I asked the little girl who was feeling cold a question*, see (166)b. The results of their studies illustrate that "the presence of a pitch accent conveying focus can disambiguate the structure of ambiguous sentences" and that "the syntactic analysis of an ambiguous sentence can be disambiguated in favor of an embedded question by placing a pitch accent on the interrogative phrase" (Schafer, A. et al., 2000, p. 92). In comparison to previous studies investigating the relationship between syntax and prosodic phrasing, the results by Schafer, A. et al. (2000)

further illustrate that information structure influences the prosody of a sentence, consequently supporting Féry (2010a).

Carlson (2001) conducted an auditory comprehension study, investigating sentences like (167), which could either be interpreted as a gapping structure or as a non-gapping structure. A contrastive L+H* pitch accent on the NPs *Bob, dinner, Sam* and *dance* was supposed to trigger the gapping reading, see (168), whereas a contrastive L+H* pitch accent on the NPs *guests, dinner, Sam* and *dance* was supposed to trigger the non-gapping reading, see (169).

(167) Bob insulted the guests during dinner and Sam during the dance.

(Carlson, 2001, p. 14)

(168) BOB insulted the guests during DINNER and SAM during the DANCE.

→*Bob insulted the guests during dinner and Sam [~~insulted the guests~~] during the dance.*

(169) Bob insulted the GUESTS during DINNER and SAM during the DANCE.

→*Bob insulted the guests during dinner and [~~Bob insulted~~] Sam during the dance.*

Carlson (2001) found a general preference for the non-gapping reading, both in a previous written study and in the auditory study with baseline prosody. When the NP *Bob* as opposed to the NP *guests* was accented, she found an increased number of gapping choices. However, the preference for the non-gapping reading remained. Carlson concludes that pitch accent distribution plays a role in interpreting ambiguous gapping vs. non-gapping structures, but that a specific prosodic contour cannot eliminate the ambiguity completely. Moreover, she concludes that “perceivers greatly favor structural simplicity in processing, though they can consider other types of information [e.g., prosody] in determining an interpretation” (Carlson, 2001, p. 20). The results of this study lend further support to Féry's (2010a) assumption that information structure, here in the form of contrastive focus, and prosody, in the form of pitch accent placement, are closely linked.

In a similar study, Frazier et al. (2007) investigated with several auditory comprehension studies whether a contrastive pitch accent on one of two possible antecedents increases its likelihood to be the antecedent of a VP ellipsis, as exemplified in (170). The two possible intonation contours with the respective interpretations are given in (171).

(170) Julie said Maria went to the rally and Greg did too.

(Frazier et al., 2007, p. 6)

(171) a. JULIE said Maria went to the rally and GREG did too.

→ *Julie said Maria went to the rally and Greg [~~said Maria went to the rally~~], too.*

b. Julie said MARIA went to the rally and GREG did too.

→ *Julie said Maria went to the rally and Greg [~~went to the rally~~], too.*

Frazier et al. (2007) indeed found that a contrastive L+H* pitch accent on the matrix subject NP *Julie* influences participant's interpretations, biasing them towards a matrix VP reading (as illustrated in (171)a.). A contrastive pitch accent on the embedded subject NP *Maria*, however, biases them towards an embedded VP interpretation (as illustrated in (171)b.). These findings thus support the *contrastive remnant hypothesis*, "which predict[s] that placement of a L+H* accent on the matrix subject would increase the probability of listeners choosing the matrix predicate as the antecedent for an elided VP" (Frazier et al., 2007, p. 16). Interestingly, they state that the matrix VP interpretation increased only by 15% as opposed to the preferred embedded VP interpretation, hence demonstrating that a strong last argument preference (as found by Frazier & Clifton, 1998 and Carlson et al., 2009 for sluicing structures) cannot be completely overridden by a pitch accent on a less preferred constituent. Nevertheless, the results of this study illustrate that not only information structure influences pitch accent placement (supporting Féry, 2010a), but that also pitch accent placement influences information structure in that it focuses the accented constituent.

As a last point, I want to discuss an example in which contrastive focus and thus different prominence relations play an important role: Lakoff (1971), as well as a variety of other researchers (see Prince, 1981; Smyth, 1994; Prevost, 1996; Kameyama, 1998; Välimaa-Blum, 2001; Hirschberg, 2006; Hoop, 2016) have discussed the referential ambiguity given in (172), with the two readings given in (173).

(172) John called Bill a Republican and then he insulted him.

(Lakoff, 1971, p. 333)

(173) a. $John_i$ called $Bill_j$ a Republican and then he_i inSULted him_j.

→ *John called Bill a Republican and then, John insulted Bill.*

b. $John_i$ called $Bill_j$ a Republican and then HE_j insulted HIM_i.

→ *John called Bill a Republican and then, Bill also insulted John*.

This example illustrates the effect that prosodic prominence and deaccentuation in unexpected places can have upon the information structure but also the reference resolution of a sentence. In general, pronouns tend to be deaccented since they refer to material that has been mentioned in the previous discourse, ideally in the same syntactic position or with the same grammatical role (Sheldon, 1974; Crawley et al., 1990; Smyth, 1994; Grosz et al., 1995) or with an identical theta role (Stevenson et al., 1994). According to these theories, the PRN *he* in (172) must therefore refer back to the NP *John* and the PRN *him* to the NP *Bill*. However, if the pronouns are stressed (which is counter intuitive if we assume that they represent given information) as a result of being contrastively focused, the meaning of the sentence changes: suddenly, the PRN *HE* does not refer back to the NP *John* any more but to the opposite antecedent, namely the NP *Bill,* and vice versa. A topic shift has taken place: *Bill*, who was part of the background/comment in the first phrase, by virtue of being contrastively focused in the second phrase, becomes the topic. Specifically accenting a pronoun thus indicates some sort of change which results in the reading given in (173)b. where the roles of the NP *John* and the NP *Bill* are reversed. At the same time, the VP *insulted* is now deaccented, which suggests that the meaning of the VP *(to) insult* can be referred from a constituent mentioned in the previous clause, in this case the VP *(to) call someone a Republican.* The research discussing this example therefore illustrates that information structure and prosody, especially the interplay of focus and givenness, has a tremendous effect upon the reference resolution and, accordingly, the meaning of a structure.

To sum up, the research summarized here has shown that the location (or the type) of a pitch accent is closely linked to the meaning of a sentence. Information structure affects the prominence relations of a sentence, supporting Féry (2010a). It thus also affects the overall meaning of a structure. These finding are especially important with respect to elliptical structures (as illustrated by Frazier et al., 2007 and Carlson, 2001 above) and especially for sluicing, where the information structure of a phrase is affected by the elided material of the sluiced question. How exactly the two readings of an ambiguous elliptical (specifically sluicing) structure can in general be disambiguated prosodically will be summarized in the following chapter, picking up some of the research discussed in this section. What the prosody of these structures looks like in actual spoken language will then be investigated in chapter 3.

2.2.3.3 The Prosody of Sluicing

Prosody plays an important role in elliptical structures: Prosodic prominence can be used to create a contrast between two constituents, which helps the listener to correctly resolve the elided material (Carlson, 2001; Frazier et al., 2007). Moreover, prosody can be used to indicate which of several constituents serves as the antecedent of a *wh*-remnant. These two factors play an important role in sluicing, where an ambiguous *wh*-remnant can have more than one possible antecedent in the preceding discourse and where the exact content of the ellipsis site has to be resolved. In the first part of this chapter, I will therefore introduce several ways that prosody can be used to disambiguate elliptical structures in general. In the second part, I will discuss the prosodic disambiguation of sluicing in more detail.

Elliptical Structures

Winkler claims that "prosody plays an important role in the interpretation of elliptical utterances" and that it "bridges the gap between what is overtly expressed and what is understood" (Winkler, accepted, p. 2). This claim is illustrated in (174), where two types of ellipses are present, as illustrated in (175).

(174) On the principle that ONE swallow DOESN'T make a summer, but TWO probably DO.

(175) On the principle that ONE swallow DOESN'T make a summer, but TWO [~~swallows~~] probably DO [~~make a summer~~].

(cf. Walters, 1996, p. 42, as cited in Winkler, accepted, p. 2)

There are two contrastively focused constituent pairs in (174), namely *one* and *two* on the one hand and *doesn't* and *do* on the other hand. In order to emphasize their contrastive relationships, the constituents bare *parallel prosody*, meaning that they are produced with identical accent types. Prosody thus helps the listener to resolve what exactly has been elided in the structure (Winkler, accepted; Merchant, 2001; Repp, 2009). Winkler (2018) discusses two concepts that guide the prosody of elliptical structures: the *givenness marking hypothesis*, which states that given material must be prosodically reduced, and the *contrastive remnant condition,* which states that remaining material must be contrastively focused (Winkler, accepted; Sag, 1976; Hartmann, 2000; Winkler, 2015b). Winkler discusses two types of ellipses to illustrate these concepts: *contrastive ellipsis*, such as gapping, illustrated in (176), and *givenness marking ellipsis*, such as VP ellipsis, illustrated in (177).

(176) MANNY plays the PIANO and ANNA [~~plays~~] the FLUTE.

(177) Manny plays the piano but Anna DOESN'T [~~play the piano~~].

(Winkler, accepted, p. 6)

In (176), the VP *plays*, which represents given and therefore redundant material, has been deleted at PF, following the givenness marking hypothesis. At the same time, remaining material has been contrastively focused, namely the NPs *Anna* and *flute,* which contrast with the NPs *Manny* and *piano* from the antecedent clause, thus following the contrastive remnant condition. In (177), the givenness marking hypothesis is applied with respect to the deletion of the VP *play the piano* and the contrastive remnant condition has been applied with respect to the auxiliary verb *doesn't*. Winkler claims that fragment answers also belong to the category of contrastive ellipsis, see (178).

(178) What did you buy? A new PIANO.

(Winkler, accepted, p. 11)

From this follows that sluicing must also be a sub-type of contrastive ellipsis, since it is merely the reversal of question and answer from example (178).[22] In sluicing, see example (179), the contrast exists between the *wh*-remnant *which ones* and the antecedent NP *some dealers*. Given and therefore redundant material has been prosodically deleted, namely *some lawyer defended*.

[22] Note that Merchant (2001) considers sluicing to be a case of givenness marking ellipsis.

Moreover, the implied answer to the sluiced question is also a fragment answer, and thus a contrastive ellipsis in itself, as illustrated in (180).

(179) Some lawyer defended some DEAlers. Do you know which ONES [~~some lawyer defended~~ _]?

(180) A: Do you know which ONES/DEAlers [~~some lawyer defended~~ _]?
B: Yes, the DRUG dealers.

This claim of a parallel prosody has been empirically investigated by Carlson (2001) and Frazier et al. (2007).[23] Carlson (2001) examined whether parallel prosody can be used to disambiguate a structure that is ambiguous between a gapping and a non-gapping reading. She found that at least in potential gapping structures, a contrastive pitch accent on the subject NP does have an effect upon the interpretation of the overall structure. Nevertheless, she clearly states that prosody cannot override another strong preference, as it is the case here for the non-gapping reading. Frazier et al. (2007) examined VP ellipsis and found that a contrastive pitch accent on a matrix subject NP increases the chances of the gap to be interpreted as a matrix VP reading. However, like Carlson (2001), Frazier et al. (2007) found that a strong preference for another reading cannot be completely overridden by prosody. Interestingly, Frazier and Clifton (1998) and Carlson et al. (2009) found similar results for sluicing. What the role of information structure and prosody in sluicing looks like exactly will therefore be discussed in the following section.

Sluicing

In ambiguous sluicing structures with more than one possible antecedent, prosody helps to guide the listener towards one interpretation by varying the location of the main pitch accent (Frazier & Clifton, 1998; Carlson et al., 2009). What exactly the information structure, and thus the prosody of sluicing looks like, has first been discussed by Romero (1998). Among others, she claims that a focused antecedent must also be prosodically focused by receiving a pitch accent (Romero, 1998, p. 11). Frazier and Clifton (1998) and Carlson et al. (2009) conducted a series of perception studies to empirically investigate this interplay of information structure,

[23] For a more detailed discussion of Carlson (2001) and Frazier et al. (2007), please see chapter 2.2.3.2.

prosody and sluicing, see chapter 2.1.5. They conducted several auditory judgment studies to find out how a pitch accent on different constituents influences the antecedent preferences of an ambiguous *wh*-remnant. In the following, I will first discuss Romero (1998), followed by a brief summary of the findings by Frazier and Clifton (1998) and Carlson et al. (2009).[24]

Following Romero (1998), the prosody of sluicing is influenced by the information structure of the *wh*-remnant and its antecedent on the one hand and the relationship between these two constituents on the other hand. Romero (1998) claims that the information structure of sluicing is directly affected by the felicity conditions of focus. However, no matter what the type of relationship between *wh*-remnant and antecedent looks like, one requirement persists: the *wh*-remnant and its antecedent must bare parallel scope in their respective clauses (Romero, 1998, p. 13, 2000). This is illustrated in (181) by the example of a VP ellipsis.[25] The different scope distributions are given in (182).

(181) Exactly three boys admire every professor, and exactly three girls do, too.

(182) a. <u>There are exactly three boys that admire every professor</u>, and <u>there are exactly three girls that admire every professor</u>, too.
b. For every professor, there are exactly three boys that admire him/her, and, **for every professor, there are exactly three girls that admire him/her**, too.
c. *<u>There are exactly three boys that admire every professor</u>, and, **for every professor, there are exactly three girls that admire him/her,** too.

(Romero, 1998, p. 14)

This example illustrates that the indices of an elided phrase must be identical with the indices of its un-elided equivalent, see (182) a. and b. It is not possible to alternate the two readings between the antecedent phrase and the elided phrase, see (182)c. Romero bases this assumption on Fiengo and May (1994), who assume this required parallelism to be for syntactic reasons, and on Rooth (1992) and Schwarzschild (1997a, 1997b), who argue that the required parallelism is semantic and thus related to the felicity conditions of focus (see Romero, 1998, chapter 1.2.1 for a summary of the different approaches). Moreover, following Romero's

[24] For a more detailed discussion of Frazier and Clifton (1998) and Carlson et al. (2009), please see chapter 2.1.5.
[25] Note that, in example (181), underlining and bold print are used to mark reading (181)a. and (181)b.

proposal, the *wh*-remnant at the end of a sluicing structure can either be focused or not. However, the information structure of the *wh*-remnant has direct consequences upon the type of relationship it must have with its antecedent in order to result in an acceptable structure. As a result, a focused *wh*-remnant must contrast with its antecedent in order to result in an acceptable structure. This is illustrated in (183).[26]

(183) I know that Joan ate dinner with [SOMEONE], but they don't know with [WHO]$_{F}$.

(Romero, 1998, p. 27)

Romero (1998) relates this constraint to Schwarzschild's notion of *Avoid F* which postulates that one should "Focus-mark as little as possible, without violating Givenness" (p. 14). Consequently, F-marking of a constituent is only acceptable if said constituent represents new information. An F-marked *wh*-remnant is thus only acceptable if it contrasts with its antecedent, as it is the case in (183) above. Example (184) is inacceptable since the *wh*-remnant is focused but does not contrast with its antecedent: *four students* is a sub-set of *how many* and does not represent new information.[27]

(184) I know that [four students] came to the party, but they don't know [HOW MANY]$_{F}$.

(Romero, 1998, p. 25)

The structure in (184) can be acceptable if a few adjustments are made to its information structure: de-accenting and thus removing the focus from *how many* results in an acceptable sluicing structure, as illustrated in (185).[28]

(185) [I] know that four students came to the party, but [THEY]$_{F}$ don't know how many.

(Romero, 1998, p. 27)

[26] Note that Romero's (1998) claim that a focused *wh*-remnant must contrast with its antecedent is different from contrastive sluicing discussed in chapter 2.1.3.2. Here, *contrastive focus* means that the *wh*-remnant and its antecedent have to bare parallel – *contrastive* – prosody, whereas *contrastive sluicing* refers to a type of sluicing that contains a contrastive *wh*-remnant, such as *who else*, that requires a definite inner antecedent, such as an explicit name.
[27] Note that, in these examples, a lack of contrast is indicated with underlining.
[28] Note that, in example (185), the personal PRN *I* is contrastively focused as well. Due to the typography of *I*, however, this is not visible from the example itself.

In (185), the contrast has been shifted to *they* and *I* rather than between *how many* and *four*. Note that *how many* is still a sub-set of *four*. However, since it is not focused any more, there is no more requirement for it to represent new information and to thus contrast with its antecedent. Romero (1998) hence argues against Chung et al. 's (1995) claim that only weak indefinite NPs and *wh*-phrases are viable antecedents for a *wh*-remnant. She rather argues that any type of NP can serve as an acceptable antecedent of a focused *wh*-remnant, as long as it contrasts in meaning with its antecedent. On the contrary, an unfocused *wh*-remnant allows only for an antecedent whose denotation coincides with its own denotation, as illustrated in (185) above. Consequently, Romero makes the following claims with respect to the information structure of sluicing: First, the *wh*-remnant and its antecedent have to bare parallel scope. Second, if the *wh*-remnant is focused, its antecedent has to contrast with it semantically. Third, if the *wh*-remnant is unfocused, its antecedent has to carry the same denotation as itself. Regarding the prosodic realization of sluicing, Romero explicitly argues that a focused *wh*-remnant and its antecedent carry prosodic stress. She states that "part of the explicit material in the ellipsis clause is highlighted with contrastive focal intonation" and that "the left-over *wh*-word in [s]luicing usually receives focal intonation too" (Romero, 1998, p. 11). Moreover, she specifically states that "the most common pronunciation of sluiced *wh*-phrases involves [f]ocus stress on (part of) the remnant *wh*-phrase, often on the *wh*-[d]eterminer itself" (Romero, 2000, p. 205). Romero thus clearly addresses the prosodic structure of sluicing. Whereas there are various perception studies exploring the question whether this prosodic relationship between *wh*-remnant and antecedent is made use of in listening comprehension, an empirical investigation of whether these theoretical assumptions correspond to an actual pitch accent in spoken language has not been investigated to date.

A number of perception studies investigating this issue have already been conducted, see chapter 2.1.5. Frazier and Clifton (1998) found that there is a strong preference for an embedded object NP to be the antecedent of a *wh*-remnant, independent of prosodic realization. However, a main pitch accent on the matrix subject NP weakened the object preference by increasing the number of subject antecedent choices. As a result, they showed that focus, as indicated by a pitch accent, plays a crucial role in the antecedent selection process of ambiguous sluicing structures. Carlson et al. 's (2009) findings supported Frazier and Clifton's (1998) results that it is indeed the default focus position of a sentence-final argument that turns its NP into the preferred antecedent of an ambiguous *wh*-remnant. The studies by Frazier and Clifton (1998) and Carlson et al. (2009) both also showed that it is impossible to completely remove the final argument preference, which results from the default sentence-final position of focus in English (see NSR, (Chomsky & Halle, 1968; Cinque, 1993), discussion chapter 2.2.2.2). Nevertheless, they also illustrate that moving the focus from its default position to a position higher up in the structure weakens this strong final argument preference and increases the choices of a dispreferred antecedent. Prosodically shifting the focus of a structure to another constituent thus influences antecedent preferences by affecting the information structure of the sentence. Therefore, these studies add crucial findings to the research on the prosody of sluicing in revealing that a prosodically highlighted NP biases listeners towards that antecedent. It seems natural to assume that speakers would also produce this pitch accent on an antecedent NP in spoken language to indicate which reading they have in mind. So far, though, no production studies have been conducted to investigate the actual prosodic contours of sluicing. It may be the case that speakers only produce such prosodic cues when they are trained to do so by hinting them towards the possibility of using pitch accents as a prosodic disambiguation method. However, it may also be the case that even untrained, that is, naïve speakers naturally produce pitch accents on the antecedent of a *wh*-remnant to express the meaning of the sentence. There has been a number of studies investigating the differences in production of trained and untrained speakers in several non-elliptical structures. The state of the art regarding the influence of speaker training will be addressed in the following chapter.

2.2.3.4 Trained vs. Untrained Speakers

The early research on prosodic disambiguation has focused on whether professional and/or informed or trained speakers use prosody to resolve ambiguous structures (Lehiste, 1973; Price et al., 1991; Féry, 1994). More recent research turned towards the question how (or whether) also unprofessional and/or naïve, that is, untrained speakers use prosody to disambiguate language (Allbritton et al., 1996; Fox Tree & Meijer, 2000; Snedeker & Trueswell, 2003). Moreover, there was a trend towards investigating natural speech by means of different game tasks rather than scripted speech in the form of written text (Schafer et al., 2000). In the following, I will first discuss the early research focusing on professional and mostly trained speakers, followed by a discussion of the research investigating productions of unprofessional as well as untrained speakers. This topic is of tremendous interest to this thesis, since one of the main research questions is whether there are differences in the productions of sluicing structures of trained vs. untrained speakers, see (RQ(3)).[29]

The earliest and thus fundamental studies addressing the question whether speakers are able to use prosody as a disambiguating factor in spoken language have been conducted by Lehiste (1973), Price et al. (1991) and Féry (1994). Lehiste (1973) was the first to empirically investigate prosodic disambiguation in spoken language. She recorded the productions of four speakers who first read all target items out loud as untrained speakers and who then again produced them in a second round as trained speakers. Two speakers were linguists (and thus professional speakers) and two were non-linguists (and thus unprofessional speakers). They all produced the same 15 target items twice which were different types of surface and deep structure ambiguities. For the first round, speakers were assumed to be untrained. For the second round, Lehiste provided the speakers with paraphrases for the two readings. Participants were furthermore asked to produce each of the two readings, "making a conscious effort to convey one or the other meaning" (Lehiste, 1973, p. 107). From this follows that the speakers were explicitly informed about the ambiguity of the target items and about prosody as a disambiguating factor. The entire production study was followed by a perception study in which 30 participants were asked to decide for each recording which paraphrase it represents. The results showed that out of the 15 target items, the five deep structure ambiguities were not successfully disambiguated, neither when speakers were trained nor untrained. Only five out of the ten surface structure ambiguities were successfully disambiguated, both in the trained and in the untrained condition. The remaining five surface structure ambiguities, though, were only successfully disambiguated in the trained productions. These findings thus suggest that some structures are only prosodically disambiguated when speakers are made aware of the two readings and when they are specifically asked to distinguish them prosodically. Regarding the distinction professional vs. unprofessional speakers, Lehiste (1973) does not draw any conclusions.

[29] Parts of this chapter are based on chapter 2.2 of Remmele et al. (forthcoming 2019, pp. 5–7), from which I will quote freely. Moreover, note that some of the studies discussed here have already been summarized in chapter 2.2.3. For these studies, I will therefore concentrate exclusively on the differences between the different types of speakers here.

Price et al. (1991) also analyzed surface structure ambiguities; however, with untrained professional speakers only. They investigated seven different types of structural ambiguities, such as ambiguities caused by left vs. right attachment of a middle phrase or far vs. near attachment of a final phrase. Their speakers were four professional radio announcers who were provided with specific contexts that disambiguated the different readings of the ambiguous examples. However, Price et al. did not explicitly hint towards the ambiguity of the target items. Like Lehiste (1973), the production study was followed by a perception study in which naïve listeners were asked to disambiguate the examples towards one context. The results illustrate that a variety of structural ambiguities can be successfully disambiguated by the listeners. Price et al. provide evidence that professional, untrained speakers are able to produce specific prosodic cues that help listeners to correctly disambiguate a structure towards one reading. As previously discussed, Price et al. (1991) admitted that their speakers might have been aware of the ambiguity. Nevertheless, since they were not specifically asked to use prosody in order to disambiguate the structures, they can still be considered to be mostly untrained.

Féry (1994) investigated the productions of five trained native speakers of German.[30] They were asked to prosodically distinguish a series of 20 structural ambiguities which were presented to them by means of different phrase structures. The different types of ambiguities were, for example, attachment ambiguities (186), phonological ambiguities (187), or scope ambiguities (188).

(186) Anna hat junge Löwen und Tiger gesehen.
Anna has young lions and tiger seen.
Anna saw young lions and tigers.
a. [Anna hat junge Löwen] [und Tiger gesehen].
→ *Anna saw young lions and she also saw tigers.*
b. [Anna hat junge [Löwen und Tiger] gesehen].
→ *Anna saw young lions and young tigers.*

(187) Maria hat [aɪ ɐ k u: x ə n ʊ n t m ɪ l x] zum Mittagessen gehabt.
Maria has eggs cake and milk for lunch had.
Maria had (eggs, cake and milk/pancakes and milk) for lunch.

[30] Unfortunately, it is not clear from the text whether Féry (1994) speakers were professional or unprofessional speakers.

a. Eier, Kuchen und Milch
eggs, cake and milk
b. Eierkuchen und Milch
pancakes and milk

(188) Leo ist nicht gekommen, um Maria zu ärgern.
Leo is not come, for Maria to bother.
Leo didn't come to bother Maria.
a. Leo didn't come because he didn't want to bother Maria.
b. Leo didn't come because he wanted to bother Maria.

(Féry, 1994, p. 100)

Out of the five speakers, only three were able to prosodically disambiguate the structures. Like Lehiste (1973) and Price et al. (1991) before, Féry (1994) also conducted a subsequent perception study: the recordings were played to three participants who were asked to guess the correct meanings. The results show that except for three structures, all of the 20 ambiguities were successfully disambiguated by the listeners. Féry (1994) concludes that German structural ambiguities are mostly resolved by durational differences such as pauses, pre-boundary lengthening, and different types of boundary tones. She thus shows that in German, speakers who are made aware of ambiguity are able to produce two different prosodic contours in order to distinguish the two readings. The early research on prosodic disambiguation showed that professional (Lehiste, 1973; Price et al., 1991) as well as unprofessional (Lehiste, 1973) speakers are able to produce different prosodic contours to disambiguate structural ambiguities, both when they are trained (Lehiste, 1973; Féry, 1994) as well as when they are not trained (Lehiste, 1973; Price et al., 1991) about ambiguity and prosody as a disambiguating factor.

More recent research shifted its focus towards the question whether unprofessional and untrained speakers really use prosody to disambiguate spoken language. Allbritton et al. (1996) explicitly compared the recordings of professional to unprofessional speakers who were either trained or untrained with respect to the structural ambiguity of their target items. They investigated the productions of 23 unprofessional and nine professional speakers. They checked their data with a subsequent perception study in which they asked 64 untrained listeners to disambiguate the sentences toward one reading. Allbritton et al. (1996) found that untrained speakers do not produce enough prosodic cues to disambiguate structures. Trained speakers' productions were more reliably disambiguated, but there were no differences between professional and unprofessional speakers. They thus argue against previous results by Lehiste (1973) and Price et al. (1991) who argued that untrained speakers produce enough prosodic cues to resolve ambiguous structures.

Fox Tree and Meijer (2000) specifically examined whether untrained speaker's productions contain enough reliable prosodic cues in order to help listeners trace them back to their corresponding contexts. They re-investigated some of Price et al.'s (1991) target items. They investigated the productions of six untrained speakers and asked 18 listeners to match the recordings back to the respective contexts. Fox Tree and Meijer (2000) found that "listeners could not accurately match an ambiguous sentence to its context" (p. 4), thus contrasting with Price et al. 's (1991) findings. However, they specifically state that they do claim that there are no prosodic cues within untrained speaker's productions, but rather that they merely are not strong enough in order to lead to a clear disambiguation. As a reason for why their findings differ from Price et al. (1991), they claim that Price et al. (1991) worked with professional radio announcers who naturally speak with a clear prosody, whereas Fox Tree and Meijer (2000) worked with unprofessional speakers.

Schafer et al. (2000) sharply criticized the laboratory settings of previous production studies and therefore introduced a cooperative game task in order to elicit spontaneous rather than scripted speech. They worked with untrained speakers who interacted naturally with each other in a specific type of game which automatically leads to potentially ambiguous structures as given in (189).

(189) I want to change the position of the square with the triangle.

(Schafer et al., 2000, p. 173)

Contrary to Allbritton et al. 's (1996) findings, Schafer et al. (2000) observed that untrained speakers consistently produce prosodic cues in order to disambiguate different types of attachments ambiguities. They suggest that their results differ from previous results because their speakers had to fulfil a specific communicative task with a specific interlocutor rather than reading scripted speech from a written template without a direct listener.

Snedeker and Trueswell (2003) offered an explanation for the different findings of Allbritton et al. (1996) and Schafer et al. (2000). They suggest that the use of prosodic cues depends on how strongly a given context already disambiguates a structure. They compared the productions of untrained speakers in a referential game task, once with an ambiguous and once with an unambiguous setting. Participants naturally produced sentences like (190) with a specific listener in mind.

(190) Tap the frog with the flower.

(Snedeker & Trueswell, 2003, p. 105)

Snedeker and Trueswell (2003) found that untrained speakers use mostly durational differences to disambiguate the structural ambiguities, but only if the situational context does not provide enough disambiguating cues to resolve the structure, thus supporting their initial hypothesis.

From this overview of production studies investigating the productions of professional vs. unprofessional and trained vs. untrained speakers, natural vs. scripted speech and ambiguous vs. unambiguous contexts, I conclude that the use of disambiguating prosody depends on the following four factors: First, the type of ambiguity seems to play a role, e.g., deep structure ambiguities are not prosodically disambiguated, whereas surface structure ambiguities are (Lieberman, 1966; Lehiste, 1973). Second, the training of speakers is important in that specific information prior to an experiment increases the degree of prosodic disambiguation. Lehiste (1973), Féry (1994) and Allbritton et al. (1996) showed that trained speakers use prosody to disambiguate structural ambiguities. Fox Tree and Meijer (2000) showed that untrained speakers do not produce enough prosodic cues for disambiguation. However, Lehiste (1973), Price et al. (1991), Allbritton et al. (1996), Schafer et al. (2000) and Snedeker and Trueswell (2003) showed that untrained speakers use prosody to disambiguate different types of structurally ambiguous sentences, although to a lesser extent than trained speakers. Third, a clear communicative goal increases the degree of prosodic disambiguation. Schafer et al. (2000) and Snedeker and Trueswell (2003) demonstrated that speakers use prosody to disambiguate structural ambiguities in a game task with a specific interlocutor, simulating a more natural speech situation than scripted speech. Fourth, the presence of additional disambiguating information decreases the degree of prosodic disambiguation. This claim has already been made by Piantadosi et al. (2012) who argue that one source of disambiguating information is sufficient and does thus not require further disambiguation in the form of, for example, prosody. This claim has been further supported by the results of Snedeker and Trueswell (2003). Nevertheless, some of these results seem not conclusive: Although it has become clear that trained as well as untrained speakers are both able to use prosody as a disambiguating factor, the question remains under exactly which circumstances speakers use prosodic disambiguation. What exactly does informing participants comprise? Is information about ambiguity enough to trigger prosodic differences or is specific information about prosody as a disambiguation technique required? Another question that has not been addressed yet is whether different types of prosodic cues (such as pitch accents vs. prosodic boundaries) are used to varying degrees by the different types of speakers. As I will discuss in chapter 3.1.1.2, Remmele et al. (forthcoming 2019) showed that untrained as well as trained speakers make frequent use of prosodic pauses to indicate the end of an IPh that disambiguates the reading of an ambiguous word sequence towards a stripping construction. This study further showed that prosody is used even when enough disambiguating cues in the form of a disambiguating context are present, thus arguing against Snedeker and Trueswell (2003) and Piantadosi et al. (2012). The empirical investigation in chapter 3.2.1 will further support this argument. Moreover, the question whether pitch accents are also used as a disambiguating factor to indicate information structural differences by trained vs. untrained speakers, will be addressed in chapter 3.2.3.

2.2.4 Conclusion

This chapter has investigated a number of important aspects regarding the relationship between prosody, information structure and sluicing. It answered the following three questions: First, how is the concept of prosody defined and which prosodic features play an important role in sluicing? Second, how is the concept of information structure defined, how is it related to prosody, and what role does it play with respect to sluicing? Third, what is the current state of the art regarding the research about prosodic disambiguation of sluicing, and how does linguistic knowledge, e.g., in the form of speaker training, affect the prosodic realizations of language production studies? This chapter showed that first, prosody is a widespread phenomenon with different features that affect different aspects of language (such as syntactic structure vs. information structure). Second, it showed that information that cannot be deduced from prior context has to be marked syntactically and prosodically as focus (either new-information focus or contrastive focus). Givenness, on the contrary, refers to material that has already been mentioned or implied in the previous discourse. It is therefore prosodically reduced in the form of deaccentuation or even deletion (Tancredi, 1992; Selkirk, 1995; Ladd, 1996; Schwarzschild, 1999; Krifka, 2008; Büring, 2013, 2016). It is mostly applied in ellipsis where already given, and thus redundant, material from a preceding clause can be deleted at PF in a subsequent clause, as long as contrasting material is contrastively focused (Winkler, accepted; Kuno, 1976; Sag, 1976; Pesetsky, 1982; Hartmann, 2000; Winkler, 2015b). These concepts are crucial for the investigation of the prosody of sluicing, where the antecedent of a focused *wh*-remnant has to be contrastively focused in order to emphasize their relation (Romero, 1998). Redundant material, however, has been deleted, leaving only the *wh*-remnant at the end of the structure. Third, this chapter provided an overview of the current state of the art regarding the research about prosodic disambiguation, especially with respect to sluicing. It showed that there are some perception studies investigating sluicing, suggesting that a prosodically realized focus can affect the antecedent preferences of sluicing structures. Moreover, it showed that prior production studies have worked with a variety of different speaker types, not always considering the tremendous effects that for example, speaker training can have upon the productions and therefore the final results of their studies. In this chapter, I have thus revealed one substantial research gap: the investigation of the prosodic realizations of various sluicing structures from a production side. In chapter 3 of this thesis, I will provide the empirical investigation of the prosodic disambiguation of simple and complex sluicing structures, as produced by trained as well as untrained native speakers of English.

2.3 Conclusion

Chapter 2 discussed the topics of sluicing and prosody as well as the interplay between the two and related phenomena, such as ambiguity, prosodic disambiguation, information structure, ellipsis and structural complexity. It thus answered the following eight questions: First, what is sluicing and what is its structural background? Second, what is the relationship between sluicing and ambiguity? Third, what are the different types of sluicing? Fourth, what is the theoretical background regarding the ellipsis site of sluicing? Fifth, what is the relationship between the *wh*-remnant and the different antecedent possibilities in different types of sluicing? Sixth, what is the relationship between sluicing and prosody, and how is prosody defined? Seventh, what is information structure and how is it related to prosody and sluicing? Eighth, what is the current state of the art regarding prosodic disambiguation, especially with respect to sluicing and different speaker types? This chapter showed that sluicing is a sub-type of ellipsis. It can be ambiguous or unambiguous, contrastive or non-contrastive and it can either be a simple or a complex structure that contains an island to extraction. There are several different approaches trying to explain the content of the ellipsis site following the *wh*-remnant, namely deletion theory (see Ross, 1969; Sag, 1976; Lasnik, 2001; Merchant, 2001), LP copying (see Chung et al., 1995) and direct interpretation (see Ginzburg & Sag, 2000)). Due to the sentence-final default focus position of English (following the NSR, Chomsky & Halle, 1968; Cinque, 1993), the final argument of a structure is always the preferred antecedent of an ambiguous *wh*-remnant. However, prosody affects antecedent preferences by shifting the focus to another constituent (see Frazier & Clifton, 1998; Carlson et al., 2009). The two notions of prosody and information structure are closely connected to the meaning of a sentence and thus also affect the meaning of a sluicing structure. Especially prosodic prominence is an important prosodic parameter to disambiguate which NP serves as the antecedent of an ambiguous sluicing structure. With chapter 2, I have provided the theoretical background of this thesis. I have illustrated that there is a tremendous amount of research regarding sluicing. Moreover, I have shown that the relationship between sluicing and prosody has already been investigated to some extent. So far, though, there have only been perception studies investigating the prosodic disambiguation of sluicing. The perception studies have illustrated how hearers deal with prosodic information when listening to sluicing structures and how it helps them to process an ambiguous structure. What is clearly missing though is an investigation of the production side of sluicing structures: Do speakers use prosody when producing different types of sluicing structures? Or is prosody merely a feature that helps listeners to disambiguate a structure but which is not actively made use of in language production? This thesis thus investigates the following research questions, which will be dealt with in more detail in the following chapter of this thesis:

Central Research Questions

(1) Do native speakers of English use prosody to emphasize the antecedent of an ambiguous *wh*-remnant in simple and complex sluicing? (RQ(1))

(2) Do native speakers of English use stronger prosodic cues to emphasize a specific antecedent of simple and complex sluicing? (RQ(2))

(3) Is there a difference in the strength or the frequency of prosodic cues used by trained vs. untrained speakers? (RQ(3))

3 Production Studies on Prosodic Disambiguation

In this chapter, I provide an empirical investigation of the prosodic disambiguation of different types of sluicing structures. I examined whether both trained and untrained native speakers of English use prosodic prominence in order to emphasize the antecedent of an ambiguous *wh*-remnant. I explore the prosodic disambiguation of various sluicing types, such as contrastive and non-contrastive ones and simple and complex structures. Moreover, I investigate whether an early NP is more strongly disambiguated by prosody than a sentence-final one. This chapter is thus structured as follows: In chapter 3.1, I will discuss previous production studies on the prosodic disambiguation of different elliptical structures. In chapter 3.2, I will present four acceptability judgment studies and three production studies, exploring the prosodic disambiguation of simple and complex sluicing structures in English.

3.1 Previous Production Studies on Prosodic Disambiguation

Production studies are a work- and time intensive type of empirical investigations. They come with a considerable amount of work regarding not only the conduct of the study but also the acoustic and perceptual analysis of the acquired speech data. Hence, the past research on production studies has focused on prosodic phrasing as a disambiguation technique to resolve various types of structural ambiguities since duration has been proven to be the most reliable prosodic parameter in prosodic disambiguation (see discussion chapter 2.2.3.2).[31] The number of production studies exploring other prosodic parameters like prosodic prominence and intensity or the prosodic disambiguation techniques of ambiguities other than structural ones is rather limited. This chapter therefore considers the following two questions: First, what is the current state of the art regarding the investigation of the prosodic productions of elliptical structures? Second, what is the current state of the art regarding production studies exploring the role of prosodic prominence as a disambiguating factor? Sluicing combines these two features in being an elliptical structure that can be prosodically disambiguated by variations of prosodic prominence. This chapter is thus structured as follows: In chapter 3.1.1, I will discuss three studies that investigate the prosody (mostly prosodic phrasing) of different types of

[31] For an overview of the current state of the art regarding prosodic disambiguation of various linguistic ambiguities, I refer the reader to Remmele (2013).

elliptical structures (Remmele et al., forthcoming 2019; Straub, Wilson, McCollum, & Badecker, 2001; Kentner, 2007). In chapter 3.1.2, I will discuss four studies that investigate the role of prosodic prominence as a disambiguating factor in spoken language (Breen et al., 2010; Katz & Selkirk, 2011; Repp, 2015; Repp & Rosin, 2015).

3.1.1 Production Studies on Ellipsis

There is a number of perception studies investigating the prosody of elliptical structures from a listener's perspective (Frazier & Clifton, 1998; Carlson, 2001; Frazier et al., 2007; Kentner, Féry, & Alter, 2008). They all agree in that listeners use different prosodic parameters to resolve the meaning of an ambiguous elliptical structure. However, there are only few production studies focusing on the prosodic disambiguation techniques of elliptical structures as used by speakers. This chapter thus considers the following questions: First, do speakers mark the gap of an elliptical structure prosodically? Second, do even untrained speakers use prosody to disambiguate structural ambiguities? In chapter 3.1.1.1, I will therefore discuss two production studies that investigate the prosodic realization of a gap in elliptical structures (Straub et al., 2001; Kentner, 2007). In chapter 3.1.1.2, I will discuss a production study that shows that even untrained speakers use prosodic phrasing to disambiguate a structurally ambiguous word sequence that can either be interpreted as a regular SVO structure or as a structure containing an elliptical clause (Remmele et al., forthcoming 2019).

3.1.1.1 Prosodic Gap Hypothesis

The two studies discussed in this chapter both explore the prosodic realizations of an elliptical gap (Straub et al., 2001; Kentner, 2007). They base their investigations on previous findings by Nagel, Shapiro, and Nawy (1994) who suggest that the gap of an elliptical clause is prosodically marked. This phenomenon was later dubbed the *Prosodic Gap Hypothesis* (PGH) (Straub et al., 2001). Straub et al. (2001) examined the prosodic realizations of a *wh*-gap. Their findings argue against the PGH by Nagel et al. (1994). Kentner (2007) investigated the prosodic realizations of a cataphoric ellipsis site, also arguing against the PGH (Nagel et al., 1994) and thus supporting the findings by Straub et al. (2001). These two production studies suggest that the location of a gap in elliptical structures is not prosodically marked by speakers. I will therefore discuss these two studies in more detail in this chapter.

Straub et al. (2001) conducted a production study to review the findings by Nagel et al. (1994) who analyzed the prosodic contours of *wh*-questions with an elliptical gap at two different positions, as exemplified in (191) and (192).

(191) Which doctor did the supervisor call _ to get help for his youngest daughter?

(192) Which doctor did the supervisor call to get help for _ during his crisis?

Straub et al. (2001, p. 381)

Straub et al. (2001) criticize the findings about the prosodic marking of *wh*-gaps by Nagel et al. (1994) who claimed that the ellipsis site of a *wh*-gap is prosodically marked by phrase final lengthening of the word preceding the gap and increased pitch excursion size across the gap. Straub et al. (2001, p. 380) argue against this PGH: They claim that the respective prosodic differences found by Nagel et al. (1994) are not due to the gap but rather due to a different distribution of prosodic boundaries. Straub et al. (2001) argue that the two conditions investigated by Nagel et al. (1994) do not only differ in their gap extraction sites but also with respect to whether the infinitival clause following the VP is an adjunct or a complement, which has direct consequences upon the distribution of prosodic phrases and thus the prosodic structure of the sentence. In Nagel et al.'s (1994) example illustrated in (191), the gap coincides with an IPh boundary, indicating the end of a main clause and the beginning of an adjunct, whereas in (192), the gap is located in a phrase medial position. Straub et al. (2001) therefore conducted a production study to reexamine the question of whether the gap of an elliptical structure is prosodically marked. Their production study consisted of 24 lexicalizations, similar to the ones used by Nagel et al. (1994) but with the respective alterations to control for phrase structure as a factor. The three conditions *Phrase-Final Gap* vs. *Phrase-Medial Gap* vs. *Phrase-Medial Control* are illustrated in (193).

(193) **a. Phrase-Final Gap Condition**

(What did you *return* _) (*to* make sure you would get a full refund?)

b. Phrase-Medial Gap Condition

(What did you *return* _ *to* the store) (when you didn’t expect to get a full refund?)

c. Phrase-Medial Control Condition

(Who did you *return to* the store with _) (when you wanted to get a full refund?)

(Straub et al., 2001, 385/386)

Their production study consisted of overall 72 items that were embedded in short contexts. Six native speakers of English (three male, three female) took part in three sessions each. For the data analysis, Straub et al. (2001) measured the duration of the VP and the subsequent pause as well as pitch excursion values. The results of their production study argue against the findings by Nagel et al. (1994) and do thus not support the PGH: Straub et al. (2001) could not replicate the findings of increased lengthening or pitch excursion values on the gap. They hence argue that the "prosodic contours that Nagel et al. (1994) attribute to syntactic gaps were observed at gap locations only when the syntactic gap also coincided with sense unit boundaries (here, verb phrase boundaries)" (Straub et al., 2001, p. 391). Note that in sluicing, the gap also coincides with the end of an IPh boundary. However, since the gap is located at the end of the entire structure, the question whether or not it is prosodically marked is redundant.

Kentner (2007) conducted a production study to investigate the prosodic differences of the German structure illustrated in (194), which is ambiguous between an elliptical (see (195)) and a non-elliptical coordination (see (196)). The main interest of this study was to find out whether the gap of such a cataphoric ellipsis is marked prosodically, as argued by the PGH (Nagel et al., 1994).

(194) Die Bienen mögen Limonen(-) und Guavensirup.

(195) Die Bienen mögen Limonensirup und Guavensirup.

(196) Die Bienen mögen Limonen. Die Bienen mögen Guavensirup.

(Kentner, 2007, p. 1125)

The production study consisted of eight lexicalizations per condition, thus 16 items, which were combined with 62 filler items. Fifteen native speakers of German (six male, nine female) took part in the production study. The items were presented on a computer screen and participants were asked to familiarize themselves with the structures before reading them out loud. The elliptical reading of the ambiguous structure was indicated with a hyphen after NP1 of the coordination (*Limonen-*). After the experiment, the author himself manually labeled the 114 sentences according to the GToBI annotation system (Grice & Baumann, 2002; Grice, Baumann, & Benzmüller, 2005). Moreover, the data was analyzed acoustically (mostly F0 and duration measurements) with the speech analysis software *Praat* (Boersma & Weenink, 2017). Surprisingly, the results of this production study showed that speakers mark only the non-elliptical reading of the ambiguous structure prosodically: The final syllable of the first conjunct *Limonen* is lengthened and there are more IPh boundary tones (especially L-H%, indicating a continuation rise) than in the elliptical reading. The results argue against the PGH (Nagel et al., 1994), according to which speakers use prosody to indicate the location of a gap. Kentner showed that "ellipses are not marked by greater pitch excursion and lengthening of segments immediately preceding the gap but rather by less prosodic deflection compared to non-elliptic sentences" (2007, p. 1128). Although the results of this study are overall convincing, there are, however, a few points of criticism. First, the only cue that visually distinguished the elliptical from the non-elliptical reading was the placement of a hyphen after *Limonen-*. It is not clear whether this was enough to trigger the correct reading. Additional context or brackets indicating the elided material would have helped to trigger the elliptical vs. the non-elliptical reading. Alternatively, a subsequent paraphrase selection task could have been added to ensure that participants had the correct meaning in mind when reading the sentences out loud. Second, only the author himself labeled the data according to the GToBI annotation system. Since authors are never really blind to the conditions, I suggest to have the data double checked again by at least one additional, neutral annotator.

This chapter illustrates that previous production studies investigating elliptical structures focused on the prosodic realizations of the gap itself. The two studies discussed here suggest that the gap of an elliptical structure is not prosodically marked, as previously argued by Nagel et al. (1994). It rather seems that speakers avoid using prosody to mark the location of a gap, as illustrated by the findings of Kentner (2007) and Straub et al. (2001). Besides the prosody of an elliptical gap, a multitude of other questions related to the prosody of elliptical structures remain unanswered. For example, do speakers use prosody to disambiguate a structurally ambiguous word sequence that can either be interpreted as a simple SVO structure or as two phrases, one of which contains an elliptical structure? The core question here is whether a reading that contains complex material in the form of an ellipsis is prosodically emphasized to set it apart from a simple SVO structure. This question will thus be addressed in the following chapter, discussing a production study conducted by Remmele et al. (forthcoming 2019). The difference between Remmele et al. (forthcoming 2019) and the investigation by Kentner (2007) is that in Kentner (2007), the two readings did not differ tremendously in their underlying phrase structures, whereas in Remmele et al. (forthcoming 2019), the two readings result in either one IPh or two IPhs. Moreover, the gap is not in a phrase medial position but rather occurs as part of the second IPh in the Remmele et al.'s (forthcoming 2019) study. Another open question is whether the antecedent of a *wh*-remnant of a sluicing structure is prosodically marked. Previous perception studies showed that in spoken language, prosodically emphasized focused constituents (especially contrastive ones) help listeners to disambiguate elliptical structures (Frazier & Clifton, 1998; Carlson, 2001; Carlson et al., 2009). However, there have been no studies investigating whether speakers prosodically emphasize focused constituents in different types of elliptical structures in spoken language. This question will therefore be addressed in terms of sluicing in the empirical part of this thesis, chapters 3.2.1 and 3.2.3.

3.1.1.2 Stripping vs. SVO[32]

Remmele et al. (forthcoming 2019) conducted a production study to find out whether native speakers of German use prosodic phrasing to disambiguate a structurally ambiguous word sequence that can either be interpreted as a regular SVO structure or as two phrases, one of them containing a stripping construction (Hankamer & Sag, 1976). Culicover and Jackendoff (2012) claim that stripping and sluicing are “two variants of the same construction” (p. 325), which makes the discussion of this production study just the more significant. The respective word sequence was first investigated by Féry (1994, p. 100). An example is given in (197). Since this structure only remains ambiguous as long as disambiguating punctuation marks, context or prosody are missing, it is written in capital letters.[33] The SVO reading is given in (198) and the stripping reading is given in (199). Note that Carlson (2001) found that readers and listeners prefer a non-elliptical reading in cases where they can choose between an elliptical and a non-elliptical one, which suggests that the SVO reading is the preferred reading of the ambiguous word sequence here.

(197) JANINA BADET NADINE NICHT

Janina baths Nadine not

[32] Note that this is a discussion of a production study conducted by Bettina Remmele, Sophia Schopper, Susanne Winkler and Robin Hörnig, thus, among others, the author of this thesis. This chapter is therefore based on Remmele et al. (forthcoming 2019), from which I will quote freely.

[33] In this example, capital letters do not indicate prominence or focus.

(198) a. Janina badet Nadine nicht.

b. [[Janina]$_{NP}$ [badet]$_{VP}$ [Nadine]$_{NP}$ [nicht]$_{NEG}$]$_{CP/IPh}$

Janina baths Nadine not

'Janina doesn't bath Nadine.'

(199) a. Janina badet. Nadine nicht.

b. [[Janina]$_{NP}$ [badet]$_{VP}$]$_{CP/IPh}$ [[Nadine]$_{NP}$ [~~badet~~]~~VP~~ [nicht]$_{NEG}$]$_{CP/IPh}$

Janina baths Nadine [~~baths~~] not

'Janina baths. Nadine doesn't [~~bath~~] '

(Remmele et al., forthcoming 2019, p. 9)

The ambiguity of the word sequence is triggered by the two possible readings of the VP *baden*. Without disambiguating information, such verbs can be used transitively or intransitively in German. As a consequence, the word sequence is ambiguous between a regular SVO structure, in which the VP is used transitively, thus taking the NP after the VP as its direct object, and a fragmentary stripping construction, in which the VP is used intransitively. Here, the NP following the VP is interpreted as the subject of the following phrase. There are different prosodic disambiguation methods to distinguish the two readings from each other. The predominant method is to produce the two IPhs of the stripping reading with a clear prosodic boundary after the VP and the SVO reading as one IPh, and hence no prosodic boundary after the VP. Whereas correct punctuation in the form of a full stop or a comma after the VP *baden* disambiguates the structure in written language, it is not clear whether these two syntactic phrases are produced as two IPhs in spoken language as well, as argued by Steedman (1991). We therefore conducted a production study in German. We investigated the structure with two groups of participants to learn more about the degree of prosodic disambiguation by different speaker types. All participants were students from the University of Tübingen and thus unprofessional speakers. One group received a short training phase prior to the production study. They learned about some general prosodic disambiguation techniques and were informed about the ambiguity of the target sentences. The other group did not receive any training or specific information. With this experiment, we wanted to answer the following two questions: First, do even untrained speakers use prosody to indicate the different phrase structures of the two readings? Second, do trained speakers use prosody (in the form of prosodic phrasing, realized in terms of the length of duration between the VP and the second NP) to a stronger degree in order to disambiguate the word sequence? The focus of this study was to investigate the different degrees of prosodic disambiguation cues as used by trained vs. untrained speakers to learn more about strategic production planning.[34] We had two hypotheses with respect to this production study:

Hypotheses

(1) Untrained speakers produce durational differences to indicate the two IPhs of the stripping reading. (H(1))

(2) Trained speakers strategically produce stronger durational differences to indicate the two IPhs of the stripping reading. (H(2))

H(1) refers to the question whether untrained speakers organize their prosodic production in a similar way as speakers do who receive specific information. Both speaker groups are thus expected to produce a prosodic break after the VP to indicate the stripping reading. H(2) refers to the question whether the two groups differ concerning the duration of the pause in their productions of the stripping condition. We thus predicted that both participant groups would use context-adequate prosodic phrasing to distinguish the SVO from the stripping reading. However, we expected that the trained participants would produce stronger prosodic cues in the stripping reading than the untrained participants.

There were 21 native speakers of German taking part in the production study. Eleven speakers were part of the trained group and ten speakers were part of the untrained group. The production study consisted of 12 target items (as illustrated in (201) above) and 14 filler items. All items were ambiguous between two readings. A list of all target and filler items can be found in the appendix, section 1. They were all preceded by one or two short contexts that disambiguated the target sequence to one of the two readings: The untrained group saw one context, the trained group saw two contexts. Each context consisted of exactly three sentences. An example of one context (here triggering the SVO reading of *JANINA WÄSCHT NADINE NICHT*) is given in (200).

[34] This summary will focus on the findings regarding the different prosodic disambiguation techniques of an ambiguity containing an elliptical construction as made by two different groups of speakers. For more detailed information regarding strategic vs. non-strategic production planning, I refer the reader to Remmele et al. (forthcoming 2019).

(200) Kleinkinder brauchen noch viel Hilfestellung bei alltäglichen Dingen.
Small children need still much help with daily things.

So ist die kleine Nadine beim Baden noch auf die Unterstützung ihrer Mutter
So is the little Nadine when bathing still on the support of her mother

angewiesen
dependent.

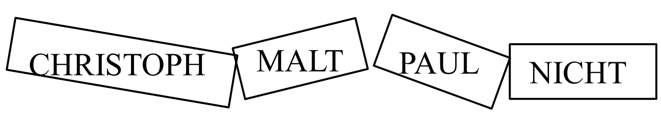
Aber Janina hat heute leider kaum Zeit und überlegt, wo sie
But Janina has today unfortunately hardly time and thinks, where she

Abstriche machen kann.
deductions make can.

'*Small children need a lot of help during daily activities. That's why little Nadine is dependent on aid from her mother when she is taking a bath. Unfortunately, Janina is in a hurry today and is thinking about where she can save time.*'

(Remmele et al., forthcoming 2019, p. 10)

Participants first read the provided context(s). They then saw the ambiguous word sequence, represented on cards to legitimize missing punctuation marks, as illustrated in (201).

(201) 

(Remmele et al., forthcoming 2019, p. 1)

The two experimental groups received different instructions. Untrained participants were presented with one of two possible context versions (thus triggering only one of the two readings) and received no additional information about the experimental design. They were asked to produce the target sequence as a follow-up to the context. Trained participants received additional information. First, they read two contexts. One of the contexts was visually highlighted to let participants know which one they should respond to. Second, they were explicitly told in the instructions that the target sequence is ambiguous and that each context is supposed to disambiguate the target sequence towards one of the possible readings. Third, they listened to a sample recording demonstrating some general prosodic disambiguation techniques. Fourth, they were given a clear communicative goal: we told the participants that they should aim for a clear prosodic differentiation as if there was a follow-up group that needed to be able to match their productions back to one of the two contexts in an auditory perception study.

The production study yielded the following results: Both trained as well as untrained participants use duration as a prosodic parameter to differentiate between the preferred SVO and the dispreferred stripping reading. There is a longer duration between the VP and the second NP in the stripping reading than in the SVO reading, where there is virtually no pause (thus reflecting the lack of an IPh). This difference between the two readings is clearly audible and is furthermore reflected in duration measurements, as illustrated in Figure 2. This figure furthermore illustrates that the pause to indicate the two IPhs of the stripping reading is much longer in the productions of the trained speakers as opposed to those of the untrained speakers. Consequently, both hypotheses have been supported.

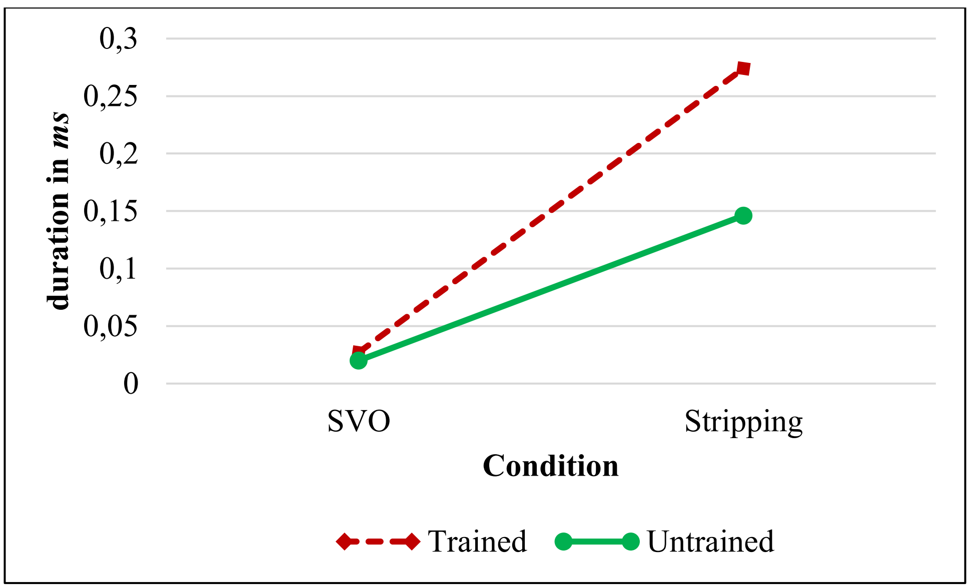


Figure 2. Marginal Mean of Critical Duration per IPh-Number and Group Type

(Remmele et al., forthcoming 2019, p. 13)

We argued that if speakers are made aware of the ambiguity of the target items as well as the fact that the two readings can be prosodically disambiguated, participants will pay closer attention to their prosodic productions than if they are not trained. This indicates that trained speakers made use of certain prosodic cues in order to convey a specific meaning and to trigger a specific interpretation within their (implied) hearer. There was a highly significant effect of the interaction between the two conditions and the two groups, which shows that the differences produced by trained vs. untrained speakers were not due to chance.

For the analysis of this study, we concentrated on duration measurements as the major prosodic parameter to disambiguate the two readings. This decision was based on the fact that duration is generally considered to be the most prominent prosodic parameter in prosodic disambiguation (Lehiste, 1973; Price et al., 1991; Féry, 1994). Especially concerning a word sequence that can be realized as one or two IPhs, pauses are the most reliable and most prominent cue to differentiate between the two readings. However, other prosodic cues, such as differences in pre-boundary lengthening of the VP, different boundary tones or a difference in the overall pitch accent scaling can add further support to the different degrees of prosodic disambiguation by the two groups.[35] Considering previous findings, though, I suspect that these additional prosodic cues are used less consistently. Further, I suspect that they are more strongly affected by speaker variation: with respect to the stripping reading, for example, we observed that although most speakers produced an L-H% boundary tone after the VP (indicating a continuation rise), some speakers produced an L-L% boundary tone or no boundary tone at all. However, to add further support to hypotheses H(1) and H(2), I conducted an additional analysis of accent type on the VP as well as the subsequent boundary tone (or the lack thereof). For this, I asked one neutral ToBI annotator to annotate the accent type of the VP for all target items. I myself did the same, while also annotating the respective boundary tones (in case there was one). The annotations of both annotators can be found in the appendix, section 2. Agreement was calculated following the method used by Silverman et al. (1992). Between the two annotators, there was a 97% agreement regarding the question whether or not there was an accent on the VP of a given item and 80% agreement regarding the type of accent on the VP, as summarized in Table 1.

[35] Considering the findings by Kentner (2007) regarding the PGH, it would be interesting to investigate whether the speakers of this production study produced an additional pause after the subject NP to indicate the location of the gap in the stripping construction. However, since there are already various studies investigating this issue and since this is not the main topic of this thesis, I refrain from conducting this analysis here.

Agreement on:	**Agreement in%**
Presence vs. Absence of Accent	97%
Type of Accent	80%

Table 1. Agreement between Annotators in%

For the following discussion, I averaged the 20% of diverging accent types to get a uniform accent pattern.[36] This resulted in the distributions illustrated in Figure 3 for the SVO reading and Figure 4 for the stripping reading. Note that in Figure 4, the X in e.g., H* X-L% means that this comprises all H* accents with any boundary tone ending in an L%, e.g., H-L% and L-L%.

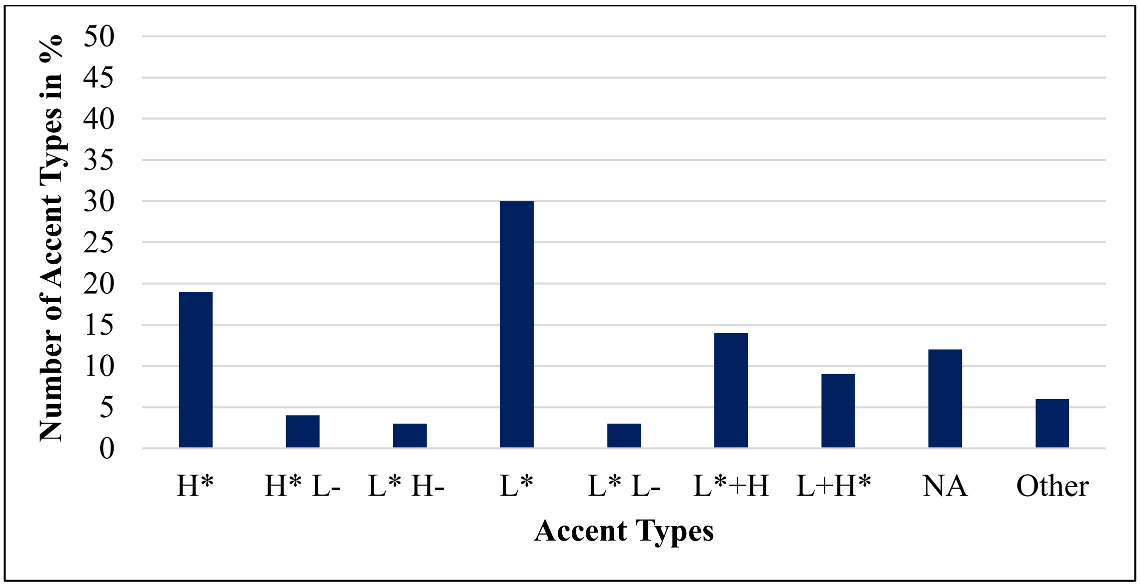


Figure 3. Number of VP Accent Types of SVO Reading in%

[36] The averaged accent types were calculated as follows: if both annotators agreed in one accent type, e.g. H*, the averaged annotation was given the label H*. If, for example, three annotations varied between H* and L*, two averaged annotations were given the label that reached an overall higher number in the respective condition, e.g. H* and one was given to the label that reached an overall lower number in the respective condition, e.g. L*. If an even number of annotations differed between two accent types, half was given one label and half was given the other label.

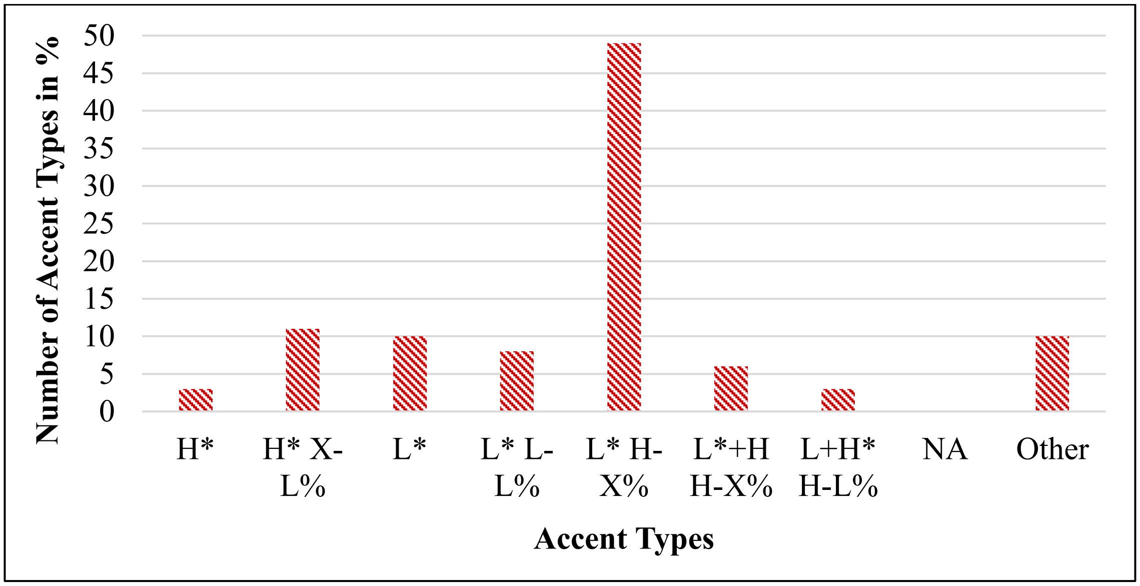


Figure 4. Number of VP Accent Types of Stripping Reading in%

There were almost no boundary tones following the VP in the SVO reading (2%), see Figure 3, whereas the majority of VPs in the stripping reading was followed by some sort of boundary tone (83%), see Figure 4. Most VPs in the SVO reading were produced with an L* (30%) or an H* (19%) accent. There was also a high number of deaccentuation (12% NA). The high amount of L* accents and the considerable degree of deaccentuation on the VP in the SVO condition illustrates that speakers did not put special emphasize on the VP, thus suggesting that the adjacent NPs received primary stress, as it is the case in regular SVO structures. With respect to the stripping reading, most VPs were produced with an L* followed by a boundary tone (57% L* L-L% and L* H-X%). In most cases, this was an H-H% (45%), illustrating a continuation rise that foreshadows the following elliptical clause. There was also some degree of L-L% (8%), which indicates the end of a declarative clause. Both boundary tone types illustrate the end of a syntactic and, accordingly, a prosodic phrase. They therefore indicate the existence of two phrases and thus emphasize the stripping reading. Moreover, there is no case of deaccentuation on the VP in the stripping reading, as opposed to the SVO reading, which adds further support to the prosodic disambiguation of the two readings. The results of the VP (+ boundary tone) analysis hence support the results of the analysis of the duration differences conducted in Remmele et al. (forthcoming 2019): speakers not only use different pause lengths but also different accent types and boundary tones (or the lack thereof) to differentiate between the SVO and the stripping reading.

The findings of this production study are especially important with respect to the empirical investigation of the prosody of different sluicing structures. First, they show that speaker training seems to play a crucial role, influencing the degree of prosodic disambiguation by speakers. Second, if the major disambiguating cue is prosodic phrasing, prosodic disambiguation of an ambiguous word sequence is already performed by untrained speakers. This raises the question whether speakers only disambiguate structures that differ in their syntactic and thus their prosodic phrase structures (which are prosodically indicated by longer pauses or different boundary tones), or whether the same effect can also be observed for structures in which prosodic prominence plays an important role, as it is the case in sluicing. Lehiste (1973) investigated different types of surface structure ambiguities and concluded that duration is a stronger factor than intonational cues to prosodically distinguish structural ambiguities. Interestingly, though, Lehiste (1973) did find intonational cues to matter in examples like (202) in which one of the two readings contains an ellipsis (as it is the case in the ambiguous word sequence of this study). The two possible readings are illustrated in (203): speakers produced *more* with a stronger pitch accent to indicate the elliptical reading.

(202) I know more beautiful women than Mary.

(203) a. I know more BEAUTIFUL women than MARY.

→ *I know women that are more beautiful than Mary.* (non-elliptical reading)

b. I know MORE beautiful women than MARY.

→ *I know more beautiful women than Mary [~~does~~].* (elliptical reading).

(Lehiste, Olive, & Streeter, 1976, p. 1200)

In this example, the pitch accent on either *more* or *beautiful* reflects the contrastive focus (and thus the contrastive relation) between the respective word and the NP *Mary*.

This chapter answered the following questions: First, do speakers prosodically mark the gap of an elliptical structure? Second, do even untrained speakers use prosody to disambiguate a structurally ambiguous word sequence? In contrast to the ambiguous word sequence of Remmele et al. (forthcoming 2019), sluicing is a subtype of ellipsis where prosody is not used to indicate the end of an IPh, or, as it was the case in Kentner (2007), to indicate the location of a gap. In sluicing, prosody is claimed to be used to emphasize which constituent serves as the antecedent of the *wh*-remnant that remains as the only constituent of the elided *wh*-question at the end of the structure. Previous studies have suggested that duration plays a more important role in prosodic disambiguation than intonational cues do, suggesting that sluicing should not be disambiguated by prosody as strongly as, for example, the ambiguous word sequence of Remmele et al. (forthcoming 2019). This claim emphasizes the need for an empirical investigation of the prosodic disambiguation techniques as used by native speakers of English in sluicing. The differences between the production studies examining ambiguous ellipses discussed in this chapter and the sluicing structures that will be investigated in chapters 3.2.1 and 3.2.3 are summarized in Table 2.[37] The production studies discussed in this chapter mostly investigated structures that were prosodically disambiguated by prosodic phrasing, thus addressing another prosodic disambiguation technique than the one that is assumed to be used in sluicing. However, what all these studies have in common is that ellipsis is part of the ambiguous structure and does therefore complicate the processing of the respective structure, which might consequently be reflected in its prosodic structure. In order to shed some light on the current state of the art regarding prosodic prominence as a disambiguating factor, the following chapter will discuss four more production studies.

Type of Ambiguity	**Example**	**Prosodic Disambiguation**	**Reference**
Elliptical vs. non-elliptical coordination	*Die Bienen mögen Limonen (-) und Guavensirup.* **Elliptical reading:** Die Bienen mögen Limonen[~~sirup~~]- und Guavensirup.	- No prosodic disambiguation after *Limonen*- to indicate location of gap → non-elliptical reading is marked with boundary tone and pause after *Limonen*	Kentner (2007), see chapter 3.1.1.1

[37] Note that Straub et al. (2001) is not included in Table 2 since the investigated structure is not ambiguous. Straub et al. (2001) did not investigate ambiguity but rather whether the gap is still prosodically marked when it does not coincide with a phrase boundary.

Ambiguous word sequence: Stripping vs. SVO	*JANINA BADET NADINE NICHT* **Elliptical reading:** Janina badet. Nadine [~~badet~~] nicht.	- Pause after VP to indicate end of IPh - Boundary tone after VP to indicate end of IPh - VP always accented	Remmele et al. (forthcoming 2019), see chapter 3.1.1.2
Globally ambiguous sluicing with two different antecedent possibilities	*Elmer helped Leanne with the cleanup, but I don't know who else.* **Two elliptical readings:** 1) Elmer helped Leanne with the cleanup, but I don't know who else [_ ~~helped Leanne with the cleanup~~]. **2)** Elmer helped Leanne with the cleanup, but I don't know who else [~~Elmer helped~~ _ ~~with the cleanup~~].	- Pitch accent on either *Elmer* or *Leanne* to emphasize antecedent	See chapter 3.2.1
Temporarily ambiguous sluicing with two different antecedent possibilities	*On Tuesday, some lawyer defended some dealers. Do you know which one?* **Two elliptical readings:** 1) Some lawyer defended some dealers. Do you know which one [_ ~~defended some dealers]~~ ? 2) Some lawyer defended some dealers. Do you know which ones [~~some lawyer defended~~ _] ?	- Pitch accent on *lawyer* to emphasize antecedent	See chapter 3.2.3

Table 2. Overview about Production Studies Investigating Elliptical Structures

3.1.2 Production Studies: Pitch Accent Differences

Duration is the most prominent prosodic parameter in prosodic disambiguation (Lehiste, 1973; Price et al., 1991; Féry, 1994) and the most reliable one (Lehiste et al., 1976). Therefore, most production studies investigating prosodic disambiguation concentrated on duration differences as an indicator of prosodic phrasing (e.g., Price et al., 1991; Allbritton et al., 1996; Kang & Speer, 2004). In the following, I will summarize four production studies exploring the disambiguation through prosodic prominence conducted by Breen et al. (2010), Katz and Selkirk (2011), Repp (2015) and Repp and Rosin (2015).[38]

Breen et al. (2010) investigated whether speakers use prosody as an indicator of information structure to differentiate between different types of focus (wide focus vs. subject or object focus and contrastive vs. non-contrastive focus). They conducted three production studies with nine to 17 pairs of participants: In each study, two speakers interacted with each other to naturally produce questions and answers with different types of information structural content. An example of a target answer is given in (204). Some examples of possible questions are given in (205). They compared the productions of 28 item pairs.

(204) Damon fried an omelet this morning.

(205)	a. What happened this morning?	→ wide focus, non-contrastive
	b. Who fried an omelet this morning?	→ subject focus, non-contrastive
	c. What did Damon fry this morning?	→ object focus, non-contrastive
	d. Did Harry fry an omelet this morning?	→ subject focus, contrastive

(Breen et al., 2010, pp. 1052–1053)

Besides exploring the prosodic realizations of different focus types, Breen et al. (2010) specifically tried to avoid previous methodological mistakes that have been made by earlier studies (e.g., Cooper et al., 1985; Birch & Clifton, 1995; Ito, Speer, & Beckman, 2004; Baumann, Grice, & Steindamm, 2006). For example, rather than relying exclusively on ToBI annotations, they additionally included acoustic measurements of several prosodic parameters,

[38] There are, of course, further production studies addressing the issue of prosodic prominence as a prosodic disambiguation technique, such as Poschmann and Wagner (2016) or Féry and Kügler (2008), Kügler and Féry (2017). However, discussing all the production studies that investigated the effects of prosodic prominence would go beyond the scope of this thesis. I therefore concentrate on production studies who are relevant to this thesis either because of their findings or because of their experimental design, procedure or data analysis.

they conducted data from at least 13 participants to increase experimental power and they included speaker variability as a factor in their statistical analysis to learn more about shared aspects of individual speakers' productions (Breen et al., 2010, pp. 1051–1052).[39] They claim that speakers naturally produce tremendous differences due to common differences in age, gender, speech rate, and especially "level of engagement with the task" (Breen et al., 2010, p. 1058). By means of their production study, Breen et al. (2010) thus investigated how "focus location, focus type, and focus breadth are conveyed in prosody" (Breen et al., 2010, p. 1088). Their results yielded three major findings: First, speakers do use prosody to indicate the location of a focused constituent. Second, speakers can use prosody to differentiate between contrastive and non-contrastive focus but they do not do so consistently. Third, speakers use prosody to differentiate between different focus breadths. Breen et al. (2010) were one of the first to use profound scientific methods to analyze the prosodic realizations of different information structural aspects. Especially the first finding, that speakers do use prosody to illustrate a focus, is relevant for the empirical investigations of this thesis. Moreover, the methodological approach of their production study is exemplary and should be kept in mind for future studies.

Katz and Selkirk (2011) also explored the prosodic realizations of information structure. They concentrated on the prosodic differences between new-information and contrastive focus. They thus compared sentences that varied only with respect to the information structure of their target constituents. Sentences like (206) were embedded in three different contexts, triggering the different types of foci on the NPs *Manny* and *the yellow one*: contrastive focus and new-information focus, (207)A., new-information focus and contrastive focus, (207)B., or both new-information focus (207)C.

(206) (But) they (only) gave Manny (the/that) yellow one.

(207) **A. Focus – New**

The Red Sox had an exhibition game for charity, and they gave the players various bright-colored uniforms. Bill Mueller and Nomar Garciaparra have really played well this year. <u>But they only gave [Manny] [the yellow one].</u> That's the one that's reserved for the most valuable player.

[39] Note that these aspects are also considered in the data analysis of the production experiments that I have conducted myself, see chapters 3.2.1 and 3.2.3.

B. New-Focus

The Red Sox had an exhibition game for charity, and they had special bright-colored uniforms made for the occasion. There were a lot of different colors; a couple of the jerseys were orange, one was purple. But they only gave [Manny] [that yellow one]. That was a lousy color.

C. New- New

The Red Sox had an exhibition game for charity, and they gave all the players crazy bright-colored uniforms to wear for the occasion. The whole thing was pretty funny to watch. They gave [Manny] [the yellow one]. It was so ugly.

(Katz & Selkirk, 2011, p. 781)

Katz and Selkirk (2011) conducted a production study with five native speakers of English (one female, four male) who took part in three sessions of the production study. Participants were asked to read the context and the underlined target item silently. They then heard a recording of the context sentence and were afterwards asked to read the last two sentences out loud, which contained the underlined target sequence. The production study consisted of 18 lexicalizations, resulting in 54 discourses. The acoustic analysis yielded the following results: Katz and Selkirk (2011) found that contrastive and new-information focus are both realized with an H* pitch accent, followed by an L- ip boundary tone. Note that it has previously been claimed that a contrastive pitch accent is realized with an L+H*, see Pierrehumbert and Hirschberg (1990), discussion chapter 2.2.1. Katz and Selkirk (2011) also found that contrastive focus is realized with a longer duration, a higher intensity and greater F0 movement than new-information focus. These findings thus illustrate that the two types of foci, new-information and contrastive focus, are both realized with an H* accent, but that the degree of prosodic prominence varies between the two foci. This information is crucial for this study for two reasons: First, it shows that prosodic prominence is used as a disambiguating factor in English. Second, it shows that contrastive focus, which also plays an important role in sluicing, leads to stronger degrees of prosodic prominence than new-information focus.

Rather than investigating the prosodic realization of information structure, Repp (2015) looked at the prosodic differences between German *wh*-questions and verb-second *wh*-exclamatives, as illustrated in (208) and (209).

(208) Wo hat die schon überall Aromen entdeckt!
Where has he already everywhere flavorings found
'The foods that she's already found flavorings in!'

(209) Wo hat die schon überall Aromen entdeckt?
Where has he already everywhere flavorings found
'Where has she already found flavorings?'

(Repp, 2015, p. 2)

Repp conducted a production study in which 16 native speakers of German (eight male, eight female) took part. Participants first heard and read a short context. They then saw the target sentence and were asked to quietly read it to themselves before reading it out loud. The production study consisted of eight lexicalizations, resulting in 32 target items and 16 filler items. The acoustic analysis was based on several different prosodic parameters like max F0, min F0, intensity or duration values which yielded the following results: Repp found that "speakers reliably distinguish questions from exclamatives at the beginning of a clause" in that the "*wh*-pronoun and the auxiliary are more prominent (higher F0, longer duration, larger intensity) in questions", whereas the pronoun *die* (she) is more prominent in exclamatives (Repp, 2015, p. 3). She thus found that prosodic prominence plays an important role in the disambiguation of *wh*-exclamatives from *wh*-questions in German and that prosodic prominence is made use of as a disambiguating factor by native speakers of German. The methodological design as well as the data analysis of this study can be considered as a model for future production studies and is therefore highly relevant for this thesis.

Repp and Rosin (2015) investigated the prosodic contours of German echo questions, as illustrated in (210). The different conditions and interpretations are summarized in Table 3.

(210) Und Anja will wen ermahnen?
And Anja wants who reprimand?
'And Anja wants to reprimand whom?'

(Repp & Rosin, 2015, p. 939)

Condition	**Target Item**	**Meaning**
New Info	Und Anja will wen ermahnen?	The participant wants to find out who, according to Anja, is worse.
Repeat Info	Und Anja will wen ermahnen?	The participant did not understand the utterance and asks for repetition.
Indignant	Und Anja will wen ermahnen?	The speaker is shocked about the news and expresses her disbelief.

Table 3. Three Conditions of Repp and Rosin (2015)

The target sentence thus varied in its meaning depending on whether it was uttered by a speaker who was asking for new information (new info), a speaker who did not understand the prior utterance (repeat info) or a speaker who was emotionally upset (indignant). Repp and Rosin (2015) based this study on the different prosodic implications that come with e.g., emotional arousal as opposed to a speaker who is asking for repetition due to acoustic failure. Repp and Rosin (2015) therefore conducted a production study with nine female native speakers of German. As in Repp (2015), participants first heard and read a short context and were then asked to quietly read the target item to themselves before reading it out loud. The production study consisted of eight lexicalizations, resulting in 24 target items and 32 filler items. The acoustic analysis yielded the following results: They found that the three interpretations are indeed produced with different intonation contours, with the greatest difference being found on the *wh*-word and the subsequent clause-final region. For example, on the *wh*-word, the L* pitch accent has a lower minimum F0 in new info and indignant conditions than in repeat info condition. The indignant condition was produced with higher maximal F0, longer duration and higher intensity values, thus confirming previous studies examining the prosodic realizations of emotional arousal.[40] Again, these findings illustrate that pitch accents – this time degree of accentuation rather than a different location - play a crucial role in the prosodic disambiguation of German ambiguities, specifically echo questions. This study, like Katz and Selkirk (2011), illustrates that not only pitch accent location but also a variation of pitch accent type or degree of emphasize can lead to different meanings.

[40] For a more detailed discussion of the effects of emotional arousal on prosody, I refer the reader to Repp and Rosin (2015) and the literature cited therein.

The four production studies discussed in this chapter illustrate that prosodic prominence is a means to differentiate between the several readings of an ambiguous structure, both in English and in German. Katz and Selkirk (2011) and Repp and Rosin (2015) showed that speakers use different degrees of prosodic prominence to disambiguate a structure, whereas Repp (2015) and Breen et al. (2010) showed that speakers use pitch accent location to differentiate between two readings of a structure. The methodological design and the data analysis of all four production studies are exemplary and should be taken as models for future production studies. The findings of all four studies thus illustrate that speakers readily use pitch accents as a prosodic disambiguation technique to differentiate between several readings of an ambiguous structure without being specifically asked to do so. From this follows that not only duration differences are used to indicate differences of prosodic phrasing, but that also differences of prosodic prominence are used to resolve ambiguous structures.

3.1.3 Conclusion

In this chapter, I have investigated the following two questions: First, what is the current state of the art regarding the research about the prosodic productions of elliptical structures? Second, what is the current state of the art regarding production studies exploring the role of prosodic prominence as a disambiguating factor? I discussed three studies that investigated the effects of prosodic phrasing on different types of elliptical structures (Remmele et al., forthcoming 2019; Straub et al., 2001; Kentner, 2007) as well as four studies analyzing the role of prosodic prominence as a disambiguating factor in spoken language (Breen et al., 2010; Katz & Selkirk, 2011; Repp, 2015; Repp & Rosin, 2015). Two studies concentrated on the prosodic realizations of an elliptical gap (Straub et al., 2001; Kentner, 2007), suggesting that the extraction site is not marked prosodically, consequently arguing against the PGH (Nagel et al., 1994). Remmele et al. (forthcoming 2019) focused on the prosodic realization of an ambiguous word sequence that can be disambiguated towards a regular SVO structure or two phrases, one of them containing an ellipsis. It showed that even untrained speakers use duration in the form of pauses as well as boundary tones to mark an elliptical reading. These findings thus not only add to the research about prosodic phrasing as a disambiguating factor (see Allbritton et al., 1996; Snedeker & Trueswell, 2003; Kraljic & Brennan, 2005; Anderson & Carlson, 2010; Baumann & Rathcke, 2013) but also to the research about the effects of speaker training in production studies

(Lehiste, 1973; Allbritton et al., 1996; Schafer et al., 2000; Snedeker & Trueswell, 2003). Regarding prosodic prominence as a prosodic disambiguation factor, the four studies by Breen et al. (2010), Katz and Selkirk (2011), Repp (2015) and Repp and Rosin (2015) showed that speakers use prosodic prominence to convey the meaning of a sentence.

This last finding about the use of prosodic prominence in prosodic disambiguation is crucial for the empirical investigation of this thesis, where the prosody of sluicing structures is the focus. In sluicing, it is not the gap that is of interest with respect to prosody since it is located at the end of the phrase, which is hence obligatorily followed by a boundary tone and is consequently prosodically marked by default. In sluicing, it is rather the simultaneous possibility of several constituents to serve as the antecedent of the *wh*-remnant that might trigger different prosodic realizations. Previous auditory perception studies showed that prosodic prominence in the form of pitch accents is used by listeners to disambiguate the correct antecedent of an ambiguous sluicing structure (Frazier & Clifton, 1998; Carlson et al., 2009), see chapter 2.1.5. However, there have been no production studies investigating the speaker's perspective regarding the use of prosody in such structures. Romero (1998) specifically argues that the antecedent of a focused *wh*-remnant must stand in a contrastive relationship with its *wh*-remnant and that the contrastively focused antecedent must receive a pitch accent in spoken language, see chapter 2.2.3.3. Taken together, these claims suggest that native speakers of English should automatically place a pitch accent on the antecedent of a *wh*-remnant in globally as well as temporarily ambiguous sluicing structures, as illustrated in (211) and (212).

(211) Amy likes JOHN$_i$, but I don't know who ELSE$_i$ [~~Amy likes~~ _].

(212) Some LAWyer$_i$ defended some dealers. Do you know which ONE$_i$ [_ ~~defended some dealers~~]?

That pitch accents carry meaning, and that speakers use different types of pitch accents or pitch accent locations to indicate a difference in meaning, has been demonstrated by the studies summarized in this chapter (Breen et al., 2010; Katz & Selkirk, 2011; Repp, 2015; Repp & Rosin, 2015). Whether speakers use prosodic prominence to indicate meaning in elliptical structures like sluicing as well, without receiving specific training prior to the production study as it has been found by Lehiste (1973), Price et al. (1991), Schafer et al. (2000) and Remmele et al. (forthcoming 2019), will be explored in the following chapter.

3.2 Production Studies[41]

In this chapter, I discuss three production studies and four acceptability judgment studies, investigating the three central research questions of this thesis:

Central Research Questions

(1) Do native speakers of English use prosody to emphasize the antecedent of an ambiguous *wh*-remnant in simple and complex sluicing? (RQ(1))
(2) Do native speakers of English use stronger prosodic cues to emphasize a specific antecedent of simple and complex sluicing? (RQ(2))
(3) Is there a difference in the strength or the frequency of prosodic cues used by trained vs. untrained speakers? (RQ(3))

This chapter is thus structured as follows: In chapter 3.2.1, I will discuss the first production study with the name Chicago which was conducted as a pilot study during the LSA Linguistic Summer Institute 2015 at the University of Chicago. In chapter 3.2.2, I will discuss four acceptability judgment studies that have been conducted as a pretest in order to obtain the best possible set of target items for the second production study named *Quarterback*. Finally, in chapter 3.2.3, I will discuss the production study Quarterback. It was named *Quarterback* because of one lexicalization that accompanied me for the entire time during which I was working on the design of this study.

[41] Special thanks to Dr. Robin Hörnig from the collaborative research center SFB 833 (project Z2) at the University of Tübingen for helping me with the statistical analyses of my experiments.

3.2.1 Pilot Production Study 1: *Chicago* (Simple Sluicing)

This pilot production study *Chicago* investigates globally ambiguous contrastive simple sluicing structures with the *wh*-remnant *who else*. The sluicing structures are embedded in either a disambiguating subject or object context to trigger one of the two possible readings, or an ambiguous neutral context to trigger neither reading specifically. This study has four main goals: three linguistic goals and one methodological goal. Linguistically, the first goal is to find out whether speakers use prosody to emphasize the (contextually triggered) antecedent of an ambiguous sluicing structure (Frazier & Clifton, 1998; Romero, 1998). The second goal is to investigate whether the previously found preference for a final argument to be the antecedent of an ambiguous sluicing structure can be further supported with production data (Frazier & Clifton, 1998; Carlson et al., 2009). The third goal is to investigate whether prosodic disambiguation of sluicing structures takes place despite the presence of a disambiguating context (Kraljic & Brennan, 2005). The methodological goal is to find out whether the design, the method and the procedure of this production study are adequate to investigate native speakers' prosodic contours of sluicing structures.

Research Questions and Hypotheses

In this pilot production study, I will investigate the following research questions:

1) Do native speakers of English use prosody in the form of prosodic prominence to highlight the antecedent of a *wh*-remnant in a globally ambiguous simple sluicing structure?[42] The literature claims that the *wh*-remnant and its antecedent must contrast with each other if the *wh*-remnant is focused (Romero, 1998). Moreover, a prosodic or syntactic focus increases the antecedent preference of an NP (Frazier & Clifton, 1998; Carlson et al., 2009). Whether these theoretical claims and the empirical findings of previous perception studies can also be replicated in language production has not been investigated to date.

[42] Note that I do not expect prosodic differences between the antecedents of contrastive and non-contrastive *wh*-remnants. Carlson et al. (2009) conducted auditory perception studies with contrastive sluicing structures as a contrast to Frazier and Clifton (1998) non-contrastive structures in order to "explore the possibility that the effect of focus and accent would be more substantial in definite sluices, which can be considered to be contrastive" (2009, p. 5). However, they did not find differences between their study and Frazier and Clifton's (1998) similar study with non-contrastive sluices.

2) Can the final argument preference, as found by Frazier and Clifton (1998) and Carlson et al. (2009) be replicated in language production? Do the productions following an all-new, and thus ambiguous context, result in similar prosodic contours as the ones made following a context that triggers an object focus? Previous studies showed that the object (or the last argument of a structure) is the preferred antecedent of an ambiguous sluicing structure due to its sentence-final position which coincides with the default focus position of English structures (Frazier & Clifton, 1998; Carlson et al., 2009). Consequently, I assume that the productions following an all-new, non-disambiguating context will be similar to the ones following an object context, although in the latter, the object NP might receive a somewhat stronger prosodic prominence in order to highlight its status as the antecedent of the sluicing structure.

3) Do native speakers prosodically disambiguate a sluicing structure that has already been contextually disambiguated? Previous studies showed that a disambiguating context already adds enough information, therefore rendering additional prosodic disambiguation of a structural ambiguity with two different phrase structures redundant (Kraljic & Brennan, 2005; Fox Tree & Meijer, 2000). However, the two meanings of the sluicing structures investigated in this pilot production study do not differ with respect to their syntax (and thus prosodic phrasing) but rather with respect to their information structure (and thus intonation) (see Féry, 2010a, discussion chapter 2.2.2.2). Moreover, it has been claimed that there is a strong connection between the information structure of a preceding context, or a question and subsequent material such as an answer, as discussed within the *question answer congruence* approach (see Reich, 2002; Krifka, 2006; Rochemont, 2011; Velleman & Beaver, 2015 and Barros, 2014 for a discussion of the closely related phenomenon of *question under discussion* in relation to sluicing). From this follows that a context, especially in the form of a question, has a strong influence on the meaning and therefore the prosody of a subsequent answer. This suggests that prosodic disambiguation to mark the focus of a sluicing structure is taking place despite the presence of disambiguating context.

4) Is the design, the method and the procedure of this production study adequate to investigate the prosodic differences between two sluicing structures with different antecedents as produced by native speakers of English? That is, do untrained speakers in a laboratory setting produce different prosodic contours to represent the different meanings or does this approach

merely trigger default prosodic contours, as it has been previously argued for reading tasks by Schafer et al. (2000) and Snedeker and Trueswell (2003)? There has been research including reading tasks to examine ambiguous structures whose several readings were triggered by information structural differences that did result in distinct prosodic contours (see Allbritton et al., 1996; Breen et al., 2010; Katz & Selkirk, 2011). I assume that the differences in information structure of the sluicing structures investigated in this pilot production study will result in distinct prosodic contours as well, despite the laboratory setting. Moreover, the design, the procedure and the analysis of this production study is based on previous production studies (see Breen et al., 2010; Katz & Selkirk, 2011; Repp, 2015; Repp & Rosin, 2015). This means that I will report the results of a perceptual analysis which has been conducted by at least two annotators, I will report the results of an acoustic analysis for which I will analyze the differences of several prosodic parameters and for which I will include speaker (F_1/ t_1) and item variability (F_2/ t_2) as a factor in the statistical analyses, and I will conduct data from at least 18 participants. I therefore assume that this production study is adequate to explore the prosody of sluicing structures.

I thus investigate the following hypotheses with respect to the pilot production study Chicago:

Hypotheses

(1) Speakers use prosody to emphasize the antecedent of a *wh*-remnant in globally ambiguous simple sluicing. (H(1))

(2) An all-new neutral context triggers similar prosodic contours as an object context. (H(2))

(3) Speakers use prosody as a disambiguating factor to mark the information structure of sluicing, despite disambiguating context. (H(3))

(4) The design, method and procedure of this production study trigger different prosodic contours that reflect the information structure of sluicing with different antecedents. (H(4))

Method

Design and Predictions

This pilot production study consists of a one factorial design with the within subjects factor *Context Type* referring to the type of context preceding each item. It comprises the three levels *Neutral Context* (triggering an ambiguous all-new reading allowing for both interpretations), *Subject Context* (triggering a subject focus reading) and *Object Context* (triggering an object focus reading). The study thus results in three conditions.

For this study, I make the following predictions: 1) With respect to H(1), I predict that native speakers of English will use prosody to emphasize the antecedent of the ambiguous *wh*-remnant *who else*. 2) With respect to H(2), I predict that the Neutral Context will trigger similar prosodic contours than the Object Context, albeit to a smaller extend: I assume that the subject NP and the object NP will receive similar prosodic prominence in the Neutral Context as in the Object Context. However, the object NP will receive slightly more prosodic prominence in the Object Context to highlight its status as the antecedent. 3) With respect to H(3), I predict that native speakers of English will use prosody as a disambiguating factor to indicate the information structure of sluicing with different antecedents, despite the presence of disambiguating context. 4) With respect to H(4), I predict that the design, the method and the procedure of this production study are adequate to trigger different prosodic contours, representing the information structure of a contextually disambiguated sluicing structure.

Participants

Twenty-one native speakers of English (American English, British English and Australian English) took part in the study, who were all naïve as to its purpose. They were all undergraduate, graduate or PhD students participating in the summer school *2015 Linguistic Summer Institute*, organized by the *Linguistic Society of America*, in July 2015 at the University of Chicago, Illinois. There were five males and 16 females, aged between 19 and 35 years with a mean age of 25.7 years. Sixteen participants were native speakers of American English, three participants were native speaker of Australian English and two participants were native speakers of British English. Each participant received $10 for taking part in the study, which lasted about 15-20 minutes. Seven participants had to be excluded: two females and one male due to a misunderstanding of the experimental task or recording problems and, additionally, four males to eliminate gender as a factor.

Material

The study consisted of overall 30 items, out of which six were target items and 24 were filler items. The target items consisted of six lexicalizations. All items were ambiguous between a subject and an object reading. An example of a target item is given in (213), with the two possible readings given in (214). All target and filler items can be found in the appendix, section 3.[43]

(213) Elmer helped Leanne with the cleanup, but I don't know who else.

(214) a. Elmer$_i$ helped Leanne$_j$ with the cleanup, but I don't know who else$_i$ [_ ~~helped Leanne~~].
b. Elmer$_i$ helped Leanne$_j$ with the cleanup, but I don't know who else$_j$ [~~Elmer helped~~ _].

All items (targets and fillers) were presented following a Latin Square so that each participant produced each item in only one of the three conditions. Each item was preceded by a short context that either disambiguated the structure towards one of the two readings (Subject Context or Object Context) or did not disambiguate the structure (Neutral Context). Each context consisted of one declarative clause and one interrogative clause. The declarative clause served to introduce the subject NP or the object NP (in the Subject Context and Object Context) or the general setting of the item (in the Neutral Context). The interrogative clause served to elicit one of the two possible readings (in the Subject and Object Context) or neither reading specifically (in the Neutral Context).

An example of the three different contexts, representing the three conditions of one target item, is given in Table 4.

[43] The target and filler items of the pilot production study Chicago were created together with Anja-Denise Seitz.

	Neutral Context	**Subject Context**	**Object Context**
Context	I couldn't stay until the end of the party – do you know what happened?	Leanne already spent hours organizing the party – who helped her with the cleanup?	Elmer was at several parties last night – did he help anybody with the cleanup?
Target Item	Elmer helped Leanne with the cleanup, but I don't know who else.		
Reading(s)	a. … but I don't know who else$_i$ [_ helped Leanne]. b. … but I don't know who else$_j$ [Elmer helped _].	a. … but I don't know who else$_i$ [_ helped Leanne].	b. … but I don't know who else$_j$ [Elmer helped _].

Table 4. Conditions of Pilot Production Study Chicago

The structure of the target items is illustrated in Table 5. All target items started with a subject NP, were followed by either a transitive or a ditransitive VP, and then an object NP, a PP or a NP and the sluiced interrogative clause *but I don't know who else.*

VP Type	**Subject NP**	**VP**	**Object NP**	**PP/NP**	**Interrogative clause**
Transitive VP	Elmer	helped	Leanne	with the cleanup,	but I don't know who else
Ditransitive VP	Barry	sent	Amber	some flowers,	but I don't know who else

Table 5. Structure of Target Items

Subject NP and object NP were always explicit names because of the contrastive *wh*-remnant *who else* that only takes a definite NP as its antecedent (see Romero, 1998; Carlson et al., 2009; van Craenenbroeck, 2010; Barros, 2012, also discussion chapter 2.1.3.2).

The filler items consisted of different types of ambiguous elliptical structures. The majority of them could be prosodically disambiguated, mostly by varying the location of the main pitch accent, as discussed in chapter 2.2.3.2. The fillers were, among others, cases of stripping (3), gapping (4), max elide (5) or ellipses that allow either a strict or a sloppy reading

(6). The filler items served to keep participants from getting used to the specific structure of the target items, which might have resulted in less informative productions.

(215) Elena likes Logan and Harmony, too.

a. Elena likes Logan and Harmony [~~likes Logan~~], too.

b. Elena likes Logan and [~~Elena likes~~] Harmony, too.

(216) Ryan invited Hale to dinner and Leah to lunch.

a. Ryan invited Hale to dinner and Leah [~~invited Hale~~] to lunch.

b. Ryan invited Hale to dinner and [~~Ryan invited~~] Leah to lunch.

(217) I think Riley has a new girlfriend. Hamlin does too

a. I think Riley has a new girlfriend. Hamlin [~~thinks Riley has a new girlfriend~~] too.

b. I think Riley has a new girlfriend. [~~I think~~] Hamlin [~~has a new girlfriend~~] too.

(218) Hanley invited his mother and Holly did, too.

c. Hanley invited his mother and Holly [~~invited Hanley's mother~~] too.

d. Hanley invited his mother and Holly [~~invited her mother~~] too.

Procedure

Before the start of the experiment, participants had to fill out a personal information sheet. They were asked to provide information about their gender, their age, where they grew up, their mother tongue, whether they speak any other languages than English and what they are/were studying (if so). Afterwards, participants were placed in front of a computer and a microphone, which was placed on a table about 25 cm from their mouth.

Participants then started with the production study, which was programmed as a power point presentation. There were three experimental lists which were manually randomized, resulting in overall nine combinations. There was no time pressure: Participants clicked through the slides at their own pace and were allowed to take as much time as they needed to complete the study. The production study started with an informed consent form to which participants had to agree in order to continue. This form informed participants of the general experimental task, risks and benefits, time involvement, their rights and the conditions of their participation.

The actual production study started with the instructions, illustrating the representation of context and target item, the exact point in time when participants would be asked to make their production and an illustration of the *paraphrase selection task* which followed after each item. After the instructions, there was a short practice session with three items so that participants could familiarize themselves with the task. Then, the study started. The items were presented in a manually randomized order and each item was preceded by one of three possible contexts. Participants' task was first, to read the context sentence silently, second, to listen to a recording of the context sentence, third, to read the target item silently and fourth, to read the target item out loud as a follow-up to the context.[44] Each item was then followed by a paraphrase selection task in which participants had to choose one paraphrase out of three that best represented their understanding of the item. An example of three paraphrases is given in (219), with (219)a. illustrating the correct paraphrase for the Subject Context or the Neutral Context and (219)b. the correct paraphrase for the Object Context or the Neutral Context. (219)c. served as a distractor to control that participants paid attention.

(219) a. Elmer helped Leanne with the cleanup, and someone else also helped Leanne.
b. Elmer helped Leanne with the cleanup, and Elmer also helped someone else.
c. Nobody helped Leanne.

The recordings of the productions were conducted in a separate study room with a stereo microphone with 96 kHz/24bit recording. Up until the end of the practice session, the experimenter was present to answer any questions the participant may have had. With the beginning of the actual experiment, the participant was left alone to ensure that he/she felt comfortable while reading out loud and was not influenced by the presence of the experimenter.

Analysis of Recordings

The 14 participants produced each condition (Subject Context, Object Context and Neutral Context) twice in two different lexicalizations, resulting in six productions per participant. There were thus 28 productions per condition, resulting in overall 84 sound files. These 84 sound files were manually extracted from the individual participants' voice recordings with the

[44] The context sentences were recorded by a female native speaker of American English.

help of the digital recording and editing software Audacity®, version 2.1.2.[45] For the perceptual analysis, four annotators listened to the single recordings while being blind to the conditions and annotated the respective ToBI labels. The acoustic analysis was conducted with the acoustic analysis software Praat (Boersma & Weenink, 2017) and the help of several Praat scripts provided by Sophie Repp as well as the open source Praat script *ProsodyPro* (Xu, 2017), version 5.7.0. For the acoustic analysis, I first created a *TextGrid* file for each sound file with the help of the Praat scripts by Sophie Repp. I then mapped every labeled segment of one TextGrid to a single syllable (or a word/phrase respectively) of one recording. Finally, I used the Praat script ProsodyPro, which is a "script for large-scale systematic analysis of continuous prosodic events" (Xu, 2013). It automatically extracts maximal F0 (*max F0*) and minimal F0 (*min F0*) values in Hertz (*Hz*), excursion size values in semitones (*st*), mean intensity values in decibel (*dB*) and duration values in milliseconds (*ms*) from each labeled segment of the single sound files. More specifically, this means that for each labeled segment of each individual recording as produced by a single participant, ProsodyPro automatically measures and exports the different prosodic values into an excel sheet which accelerates the analysis of the recordings by several days. Max F0, min F0, excursion size and duration values are given in absolute values. Intensity values are provided as a mean since there is a high amount of variation within one segment. *Excursion size* refers to *pitch excursion size* and thus describes the difference between the lowest F0 value and the highest F0 value per segment. These extracted values can then be statistically analyzed and compared, either by averaging over the individual participant's productions (per subject analysis, F_1/t_1) or over the productions of the individual lexicalizations (per item analysis, F_2/t_2). For this study, I was specifically interested in the prosodic values of the following segments: the stressed syllable of the subject NP (henceforth referred to as NP1) and the stressed syllable of the object NP (henceforth referred to as NP2) as well as the two parts of the *wh*-remnant *who else*, to make sure that participants focused the *wh*-remnant.[46] The respective segments are illustrated in Table 6.[47]

[45] Audacity® is a free open source digital audio editor created by Dominic Mazzoni. It is freely available for download at http://www.audacityteam.org/.

[46] NP1 refers to the first NP of the sentence, thus the subject NP. NP2 refers to the second NP of the sentence, thus the object NP. Whenever I write NP1/NP2, I refer to the actual NPs within the sentence, for example, *Elmer* or *Leanne*. Whenever I write subject/object NP, I refer to the subject or the object reading, that is, the condition.

[47] I focus the perceptual and acoustic analysis of this pilot production study on the two NPs, the subject NP and the object NP, and not the *wh*-remnant *who else*. This has to do with the fact that I am mostly interested in the

Item	*ELmer*	*helped*	*LeANNE*	*with the cleanup,*	*but I don't know*	*who*	*else.*
Segment	NP1		NP2			*who*	*else*

Table 6. Prosodically Analyzed Segments of Production Study Chicago

Perceptual ToBI Analysis

Analysis of ToBI Annotations and Agreement Calculations

For the perceptual analysis, the author and three neutral annotators listened to the sound files while being blind to the conditions of the productions. They individually decided for each sound file whether there was a pitch accent on the subject NP, the object NP and *who else*, and if so, which type of accent it was.

The resulting ToBI labels of the perceptual analysis of the four annotators were checked for agreement. Since all of the four annotators had different training backgrounds and therefore diverging methods of annotation (some following Pierrehumbert, 1980, others Beckman & Elam, 1994), the different labels were assimilated to make them comparable: All bitonal pitch accents containing an H* were changed to a monotonal H* (except for the contrastive L+H*) and all bitonal pitch accents containing an L* were changed to a monotonal L*. Furthermore, all downstepped !H* were changed to a monotonal H*. There were thus four remaining types of ToBI labels: H*, L*, L+H* and no accent (NA). I then calculated the agreement between the four annotators following Silverman et al. (1992).[48] Following this method, one first calculates the agreement regarding the presence vs. absence of any accent. Second, one calculates the agreement regarding the type of accent chosen. The respective results are illustrated in Table 7.

prosodic realizations of the two antecedent NPs, whereas the prosody of the *wh*-remnant only has to be checked in order to make sure that participants did not specifically deaccent it. Deaccenting of the *wh*-remnant would lead to accenting of the personal PRN *I* of the interrogative clause, which in turn would result in different information structural requirements for the declarative clause, as discussed by Romero (1998), see chapter 2.2.3.3.

[48] I decided against *Cohen's kappa* agreement calculations (Cohen, 1960) because of the diverging training backgrounds of the four annotators. Cohen's kappa is the method of choice for homogenous data sets. My present dataset is heterogenous in the sense of resulting out of four annotators with four different training backgrounds which would have led to low agreement rates according to Cohen's kappa. However, such a low agreement rate would not have correctly represented the actual differences and similarities between the four annotators. I therefore decided to use Silverman et al. (1992) method for agreement calculations.

Agreement	**Subject NP**	**Object NP**
Presence vs. Absence of Accent	100%	85%
Type of Accent	40%	46%

Table 7. Labeler-Agreement-Pair for Subject NPs and Object NPs

There was 100% agreement between all four ToBI annotators regarding the question whether or not there was an accent on NP1. With respect to NP2, there was 85% agreement. These results illustrate that NP1 mandatorily carries an accent by default due to being the first word of the structure, whereas an object NP accent seems to be less obligatory. With respect to the agreement regarding the type of accent, there was some variation between the four annotators: there was 40% agreement regarding the type of accent on NP1 and 46% agreement regarding the type of accent on NP2. Since the four annotators came from different training backgrounds and since accent types had to be assimilated to make them comparable, this seemingly low number of agreement regarding accent types is reasonable. I therefore also calculated agreement regarding the type of accent between each pair of annotators to find out which annotators agreed the most and which annotators agreed the least. The results are illustrated in Table 8.

Agreement btw.	**Subject NP**	**Object NP**
Annot. 1 and Annot. 2	45%	58%
Annot. 1 and Annot. 3	23%	55%
Annot. 1 and Annot. 4	98%	31%
Annot. 2 and Annot. 3	45%	60%
Annot. 2 and Annot. 4	45%	23%
Annot. 3 and Annot. 4	23%	17%

Table 8. Agreement between Single Annotators

The highest agreement can be found between annotators 2 and 3, with an agreement of 45% on NP1 and 60% on NP2. Least agreement can be found between annotators 3 and 4, with an agreement of 23% on NP1 and 17% on NP2. Agreement with annotator 4 resulted in the smallest percentages, which suggests that annotator 4 behaved differently from the remaining three annotators. The two figures below illustrate what the differences in annotations looked like regarding the question of prosodic disambiguation between the four annotators. Figure 5 illustrates the differences for the Subject Context and Figure 6 for the Object Context.[49] They both support the claim that annotator 4 has least agreement with the other three annotators and that most agreement can be found between annotators 2 and 3. In Figure 6, there is almost no difference between the annotations of annotators 2 and 3, which further supports the assumption that these two annotators are the most reliable ones. These figures also illustrate that there is an overall high number of prosodic disambiguation (green bars with horizontal lines) and a small number of no prosodic disambiguation (red solid bars), as found by all four annotators in both the Subject Context and the Object Context.[50]

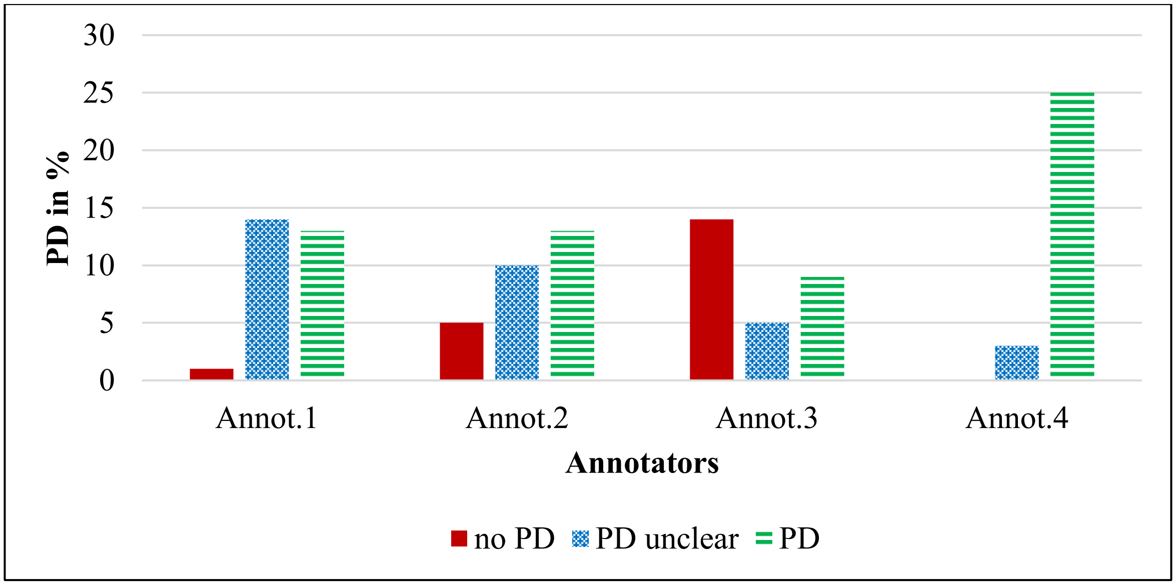


Figure 5. Differences between Four Annotators, Subject Context

[49] To illustrate the differences between the four annotators, I consider it to be enough to illustrate the Subject Context and the Object Context. I therefore refrained from additionally supporting comparison data for the Neutral Context.

[50] In these figures, prosodic disambiguation (PD, green bars with horizontal lines) means that the antecedent NP was judged to be stronger than the non-antecedent NP. For example, in the Subject Context, this means that the subject NP was judged to be stronger than the object NP and vice versa. PD open (blue dotted bars) means that both NPs were judged to be equally strong. No PD (red solid bars) means that the antecedent NP was judged to be weaker than the non-antecedent NP.

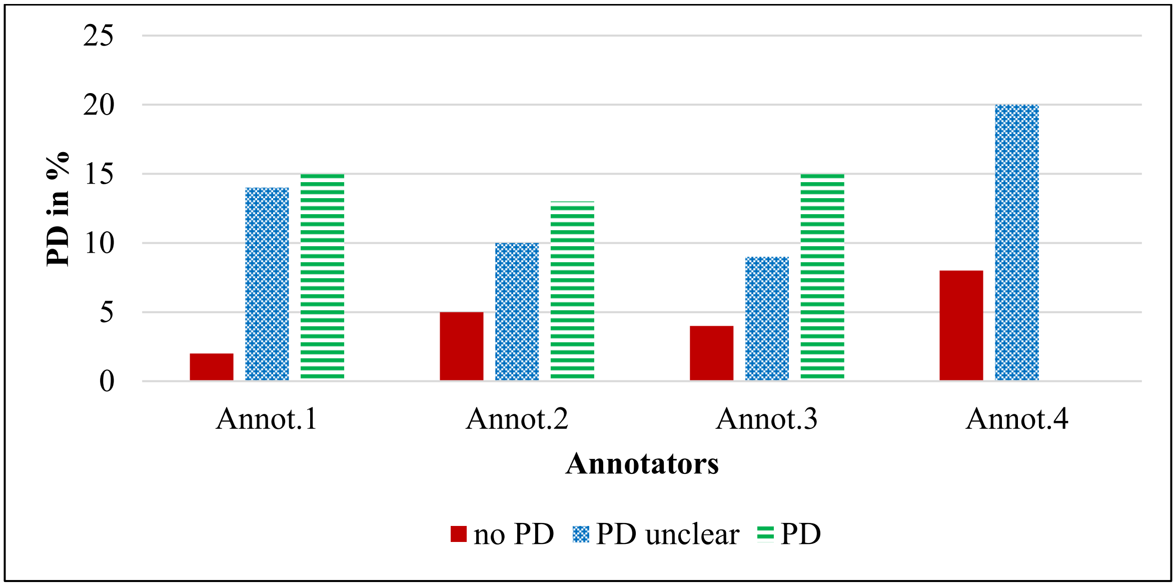


Figure 6. Differences between Four Annotators, Object Context

Results and Discussion of Perceptual Analysis

The results of the perceptual ToBI analysis show that speakers use prosody to further emphasize the antecedent of a globally ambiguous simple sluicing structure that has already been disambiguated by context, thus supporting hypotheses H(1) and H(3). In order to illustrate the distribution of pitch accents per subject NP and object NP for the three different Context Types, I used the averaged ToBI annotations of the two annotators with most agreement, annotators 2 and 3, who also happened to be the ones with the most intensive training background. The averaged accent types were calculated as follows: If both annotators agreed in one accent type, e.g., H*, the averaged annotation was given the label H*. If, for example, three annotations varied between H* and L*, two averaged annotations were given the label that reached an overall higher number in the respective condition, e.g., H* and one was given to the label that reached an overall lower number in the respective condition, e.g., L*. Figure 7 illustrates the distribution of accent types on NP1 in the three conditions. Figure 8 illustrates the distribution of accent types on NP2 in the three conditions. Additionally, Figure 9 illustrates the distribution of accent types on the *wh*-remnant *who else*, more specifically, on *else* exclusively[51], illustrating that the *wh*-remnant was accented throughout all conditions.

[51] Note that, in the case of the *wh*-remnant *who else*, *else* rather than *who* usually receives prosodic prominence (Romero, 1998).

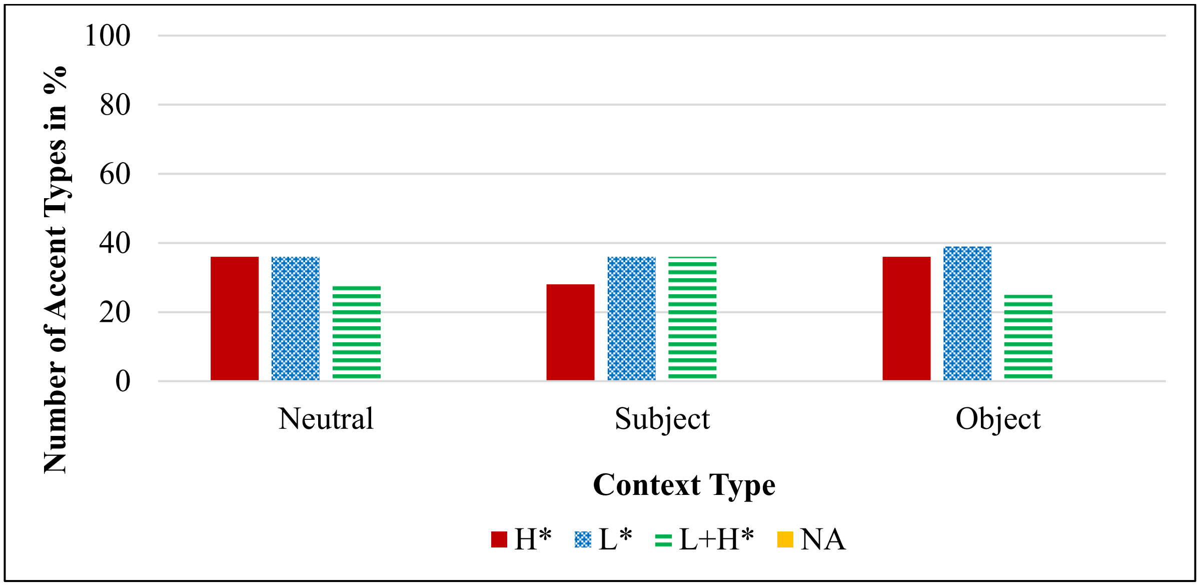


Figure 7. Distribution of Averaged Accent Types on Subject NP per Context Type

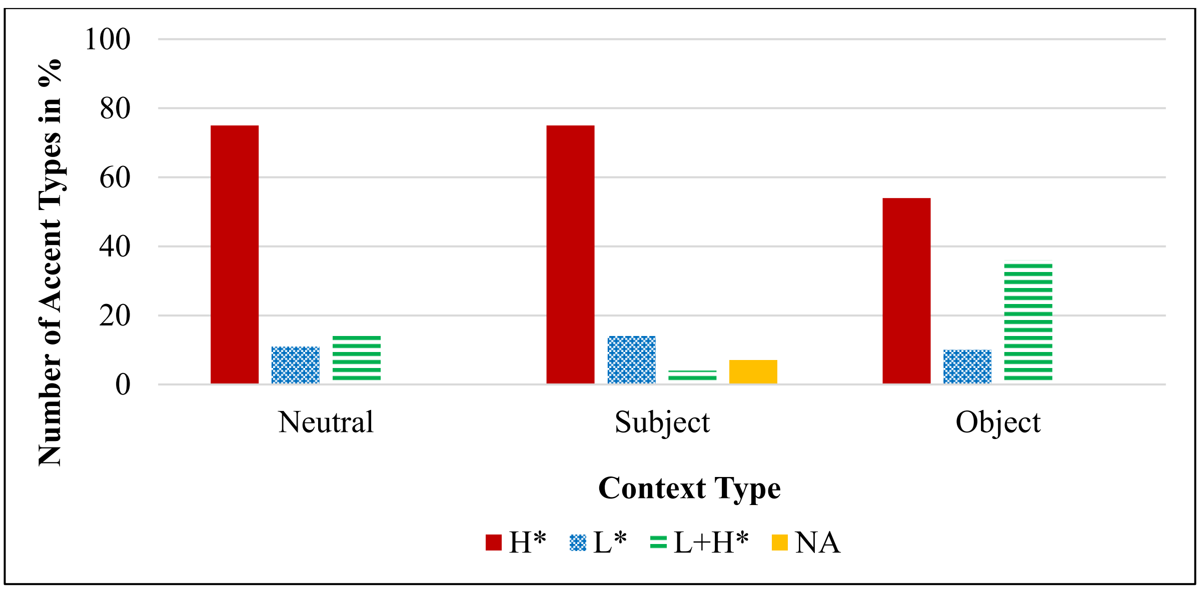


Figure 8. Distribution of Averaged Accent Types on Object NP per Context Type

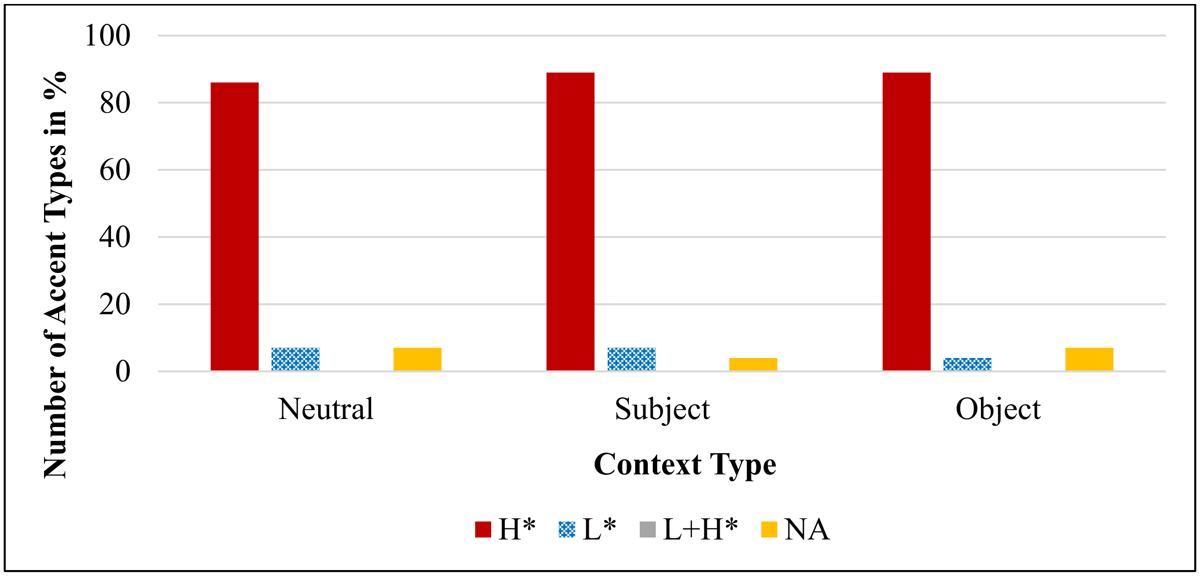


Figure 9. Distribution of Averaged Accent Types on *(who) else* per Context Type

In Figure 7, NP1 is accented throughout the three conditions with H*, L* or L+H* accents. In the Subject Context, there is a higher number of contrastive L+H* accents as compared to the Neutral Context and the Object Context. Moreover, NP1 is produced almost identically in the Neutral and the Object Context. The comparison to Figure 8 illustrates that the two NP types differ strongly with respect to accent type distribution: In Figure 8, NP2 also receives an accent throughout all three conditions. As opposed to NP1, however, where there was a similar distribution of H* and L* (also L+H*) accents, NP2 consists of mostly H* accents and only few L* accents. In the Object Context, there is an increase of contrastive L+H* accents, as it was the case for NP1 in the Subject Context. Moreover, Figure 8 also illustrates that NP2 is produced similarly in the Neutral Context and the Object Context, as it was the case for NP1 as well. There is merely a higher number of contrastive L+H* accents in the Object Context, which indicates the antecedent status of NP2.

The perceptual analysis illustrates three important points: First, the antecedent of the *wh*-remnant is prosodically emphasized, thus supporting H(1). Second, the preferred antecedent of an ambiguous sluicing structure is the object NP, thus supporting H(2). Third, an already contextually disambiguated structure is further disambiguated by prosody, thus supporting H(3). Regarding H(1), the perceptual analysis shows that both NPs receive more L+H* accents when they serve as the antecedent of the *wh*-remnant, which marks the respective constituents as carrying a contrastive focus (Pierrehumbert & Hirschberg, 1990, p. 296). This contrastive focus highlights its status as the antecedent of the sluicing structure, thus supporting H(1). However, there seems to be less prosodic variation on NP1 as evident by the relatively high number of L+H* accents in the Object Context as compared to the Subject Context. Regarding H(2), the perceptual analysis shows that both NP1 and NP2 of the target items following a Neutral Context are produced similarly to those following an Object Context. This suggests that the two conditions result in similar prosodic contours, supporting the assumption that NP2, by virtue of being the final and hence focused argument of the sluicing structure, is the preferred antecedent of the ambiguous *wh*-remnant in the Neutral Context, thus supporting H(2). Regarding H(3), the perceptual analysis shows that the productions following a Subject Context differ from those following an Object Context, illustrating that speakers produced different prosodic contours despite the presence of already disambiguating context, thus supporting H(3). Furthermore, the perceptual analysis shows that NP2 carries an accent in all conditions (with the exception of a few deaccented NPs in the Subject Context). It carries mostly H* accents, which marks NP2 as being focused (Pierrehumbert & Hirschberg, 1990, p. 289). The fact that there is little deaccentuation or L* accents on NP2 adds to the assumption that it is specifically focused in the Object Context, and focused by default due to its sentence-final position in the Neutral Context. NP1 is also accented (with different types of accents) throughout all conditions, even more so than NP2, which can be attributed to its location at the very beginning of the sentence. In contrast to NP2, NP1 receives an almost equal distribution of H* and L* accents. An L* "mark[s] items [...] to be salient but not to form part of what [the speaker] is predicating in the utterance." (Pierrehumbert & Hirschberg, 1990, p. 291). It therefore marks a constituent as being given in the discourse, which is often the case for subjects (see discussion of the *Centering Theory* and the deaccentuation of pronouns, Grosz et al., 1995; Hirschberg, 2006; Wagner, 2012, also chapter 2.2.3.2).[52]

[52] One of the reviewers criticized that the perceptual analysis of accent types was not followed up with a statistical analysis. I specifically decided against conducting such an analysis because of the different training backgrounds of the four Tobi annotators. The reviewer is correct in noting that there are descriptive differences at NP2 between the object and the neutral condition. However, there is a bigger difference between the subject and the neutral condition, which is why I conclude that the object condition is closer to the neutral condition than the subject condition is. Moreover, the statistical analysis of the acoustical data (to be discussed in the next paragraph) resulted in a significant difference between subject and neutral condition only.

Acoustic Analysis

Statistical Analysis[53]

For the statistical analysis of the acoustic data, I conducted several *t*-Tests comparing the productions of NP1 and NP2, as well as the *wh*-remnant *who else*, in the three different conditions Subject Context, Object Context and Neutral Context. The *t*-Tests separately compared the differences of the five prosodic parameters max F0 (Hz), min F0 (HZ), duration (ms), intensity (dB) and excursion size (st) on NP1 and NP2. *T*-Tests calculate whether there is a significant difference between the mean values of two conditions, using the mean values of all items, averaged either over all lexicalizations per participant (t_1 analysis) or over all participants per lexicalization (t_2 analysis). With respect to max F0, for example, this means that the *t*-Test t_1 compares the mean max F0 values of all lexicalizations per participant as produced in the Subject Context to those from the Neutral Context.

With respect to NP1, the *t*-Tests yielded the following results: For the comparison of Neutral Context vs. Object Context, there was a marginally significant effect in the analysis of t_1 of min F0 [t_1 (13) = 2.003, p = 0.066; t_2 (5) = 1.347, p = 0.236] and in the analysis of t_1 of duration [t_1 (13) = 2.030, p = 0.063; t_2 (5) = 1.266, p = 0.261], as well as a significant effect in the analysis of t_1 and a marginally significant effect in the analysis of t_2 of intensity [t_1 (13) = 2.952, p = 0.011; t_2 (5) = 2.258, p = 0.074].

With respect to NP2, the *t*-Tests yielded the following results: For the comparison of Neutral Context vs. Subject Context, there was a significant effect of max F0 [t_1 (13) = 3.041, p = 0.009; t_2 (5) = 3.506, p = 0.017] and excursion size [t_1 (13) = 2.520, p = 0.026; t_2 (5) = 3.799, p = 0.013] and a marginally significant effect in the analysis of t_2 of min F0 [t_1 (13) =

[53] One of the reviewers commented that the comparisons of multiple individual datasets could result in false positives and that therefore, a method like the Bonferroni correction (Jaccard & Wan 1996) should be adopted. In the case of five comparisons, the maximally acceptable value of *p* would decrease from 0.05 to 0.01. For the analysis of N1, this would mean that the marginally significant effects would turn into insignificant effects. In case of NP2, the significant effects would mostly turn into marginally significant effects and the marginally significant effects would turn into insignificant effects. Although the application of the Bonferroni correction would indeed lower the significance levels of the present Chicago study, there are still significant effects between the neutral and the subject condition. I conclude that such an outcome is still acceptable since the Chicago study is a pre-study that serves as a test-bed for the following more large scale studies.

1.680, p = 0.117; t_2 (5) = 2.391, p = 0.062].[54] For the comparison of Neutral Context vs. Object Context, there was a marginally significant effect in the analysis of t_2 of duration [t_1 (13) = 1.598, p = 0.134; t_2 (5) = 2.503, p = 0.054]. For the comparison of Subject vs. Object Context, there was a significant effect of max F0 [t_1 (13) = 3.235, p = 0.007; t_2 (5) = 3.398, p = 0.019], intensity [t_1 (13) = 2.217, p = 0.045; t_2 (5) = 2.715, p = 0.042] and excursion size [t_1 (13) = 3.171, p = 0.007; t_2 (5) = 4.634, p = 0.006] and also for the analysis of t_2 of duration [t_1 (13) = 1.242, p = 0.236; t_2 (5) = 2.980, p = 0.031].

With respect to the *wh*-remnant *who else*, the *t*-Tests yielded the following results:[55] For the comparison of Neutral Context vs. Subject Context, there was a marginally significant effect on *else* of max F0 in the analysis of t_1 [t_1 (8) = 2.204, p = 0.059; t_2 (4) = 0.469, p = 0.663]. For the comparison of Neutral Context vs. Object Context, there was also a marginally significant effect on *else* of max F0 in the analysis of t_1 [t_1 (9) = 1.827, p = 0.101; t_2 (4) = 0.456, p = 0.672] and of min F0 in the analysis of t_1 [t_1 (9) = 1.941, p = 0.084, t_2 (4) = 0.780, p = 0.479]. For the comparison of Subject Context vs. Object Context, there was a significant effect on *who* of max F0 [t_1 (13) = 2.155, p = 0.050; t_2 (5) = 2.915, p = 0.033] and excursion size [t_1 (13) = 2.610, p = 0.022; t_2 (5) = 3.491, p = 0.017] and a marginally significant effect on *else* of duration in the analysis of t_2 [t_1 (12) = 0.453, p = 0.659; t_2 (4) = 2.125, p = 0.101].

Discussion of Acoustic Analysis

The results of the statistical analysis of the acoustic data suggest that there is less prosodic variation between the three conditions on NP1 than on NP2.

On NP1, there was only significant prosodic variation between the Neutral Context and the Object Context and even there, only intensity differed in both the analyses of t_1 and of t_2, whereas min F0 and duration reached only marginally significant effects in the analysis of t_1. These findings suggest that NP1 is produced with a similar prosody in the three conditions, only varying to some degree between the Neutral Context and the Object Context. This is illustrated in Figure 13 below concerning intensity values, and Figure 11 and Figure 12

[54] Note that, if I do not mention F_1 or F_2 analyses specifically, this means that the respective prosodic parameter resulted in significant effects in both analyses.
[55] Note that there was a significant loss of data points due to the sentence final position of *who else*, which suffers from certain challenges like creaky voice or speakers running out of breath. This thus led to a lack of five averaged data points in the analysis of F_1 and two in the analysis of F_2 for *who else.*

concerning min F0 and duration values. This lack of significant prosodic differences on NP1 can be attributed to the fact that NP1 coincides with being the first word of the sentence, therefore being accented by default. Moreover, the lack of significant effects on NP1 especially in the t_2 analyses suggests that the six lexicalizations differed from each other, thus leading to inconsistent prosodic contours.

With respect to NP2, the picture looks different: there seems to be a lot of prosodic variation, especially between the Neutral Context and the Subject Context on the one hand and between the Object Context and the Subject Context on the other hand. There is only a marginally significant effect of duration between the Neutral Context and the Object Context, see Figure 12, which suggests that these two conditions do not differ from each other prosodically. This finding adds support to the previous assumptions (see Frazier & Clifton, 1998; Carlson et al., 2009) that there is a strong preference of an ambiguous sluicing structure to take the final argument – here the object NP – as the antecedent, thus supporting hypothesis H(2). Regarding the differences between Neutral Context vs. Subject Context and Object Context vs. Subject Context, the results show that NP2 has a significantly lower max F0 (see Figure 10) and a significantly lower excursion size (see Figure 14) in the Subject Context than in both the Neutral Context and the Object Context. Moreover, NP2 has a significantly lower min F0 (see Figure 11) in the Subject Context than in the Neutral Context and a significantly lower intensity (see Figure 13) in the Subject Context than in the Object Context. Finally, NP2 has a marginally significantly shorter duration (see Figure 12) in the Subject Context than in the Object Context. These findings all suggest that speakers produce NP2 with more prosodic prominence when the object NP serves as the antecedent, as it is the case in the Object Context, thus supporting hypothesis H(1), or when it is focused by default, as it is the case in the Neutral Context, adding further support to hypothesis H(2).

With respect to the *wh*-remnant *who else,* the acoustic analysis shows that the speakers accented the *wh*-remnant throughout all conditions. The mean values of *who* and *else* are illustrated in Table 9. Especially the max F0 values illustrate that *who else*, specifically *else*, is accented in all conditions. The long duration values of *else* result partly from the pronunciation of the final -s and partly from its position at the very end of the sluicing structure. Intensity values are overall lower than those of e.g., NP1 and NP2, which can be explained with the sentence-final status of *who else*, where speakers are running out of breath and speak with creaky voice. Following from the ANOVA, there was a significant difference on *who* of max F0 between the Subject Context and the Object Context, which suggests that *who* is pronounced with a higher F0 when the subject NP serves as the antecedent. With respect to *else*, there was a significant difference of max F0 between the Neutral Context and the Subject Context, suggesting that *else* is produced with a lower F0 when the subject NP serves as the antecedent. Moreover, there was a significant difference on *who* of excursion size between the Subject Context and the Object Context, which suggests that besides a higher max F0, *who* is also produced with a higher excursion size when the subject NP serves as the antecedent. These findings suggest that *who* rather than *else* is emphasized when the subject NP serves as the antecedent of the *wh*-remnant. However, additional experiments would have to be conducted for a more in-depth discussion of this finding, which goes beyond the scope of this thesis. In the Neutral Context and the Object Context, it seems that *else* is emphasized, as expected. Moreover, the findings of the sentence-final constituents *who* and *else* have to be interpreted with care since especially the last words of an English sentence tend to be affected by speakers running out of breath and speaking with a creaky voice. Creaky voice especially affects the prosodic parameters whose measurements are depended on the F0 curve, thus max F0, min F0 and excursion size, as will be discussed in more detail in chapter 3.2.3.1.

	who			***else***		
	Neutral	**Subject**	**Object**	**Neutral**	**Subject**	**Object**
Max F0	234.9	260.4	210.9	344.1	275.7	281.7
Min F0	344.1	275.7	281.7	161.4	132.7	122.7
Duration	317.4	249.1	234.5	422.0	532.8	500.5
Intensity	55.2	56.2	56.2	54.7	53.7	54.0
Excursion Size	7.3	9.3	5.2	11.4	10.1	12.0

Table 9. Mean Values of *who else*

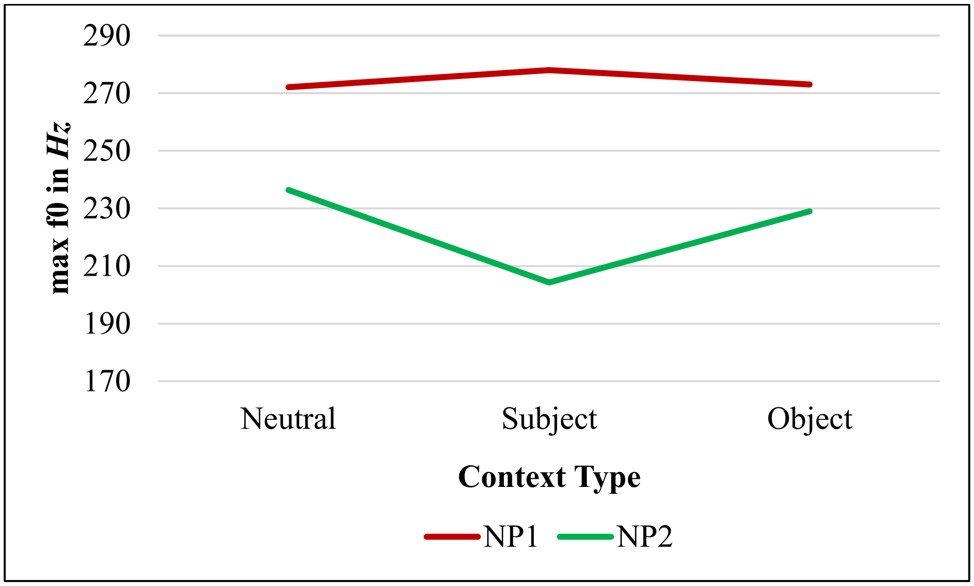


Figure 10. Max F0 as a Function of Context Type

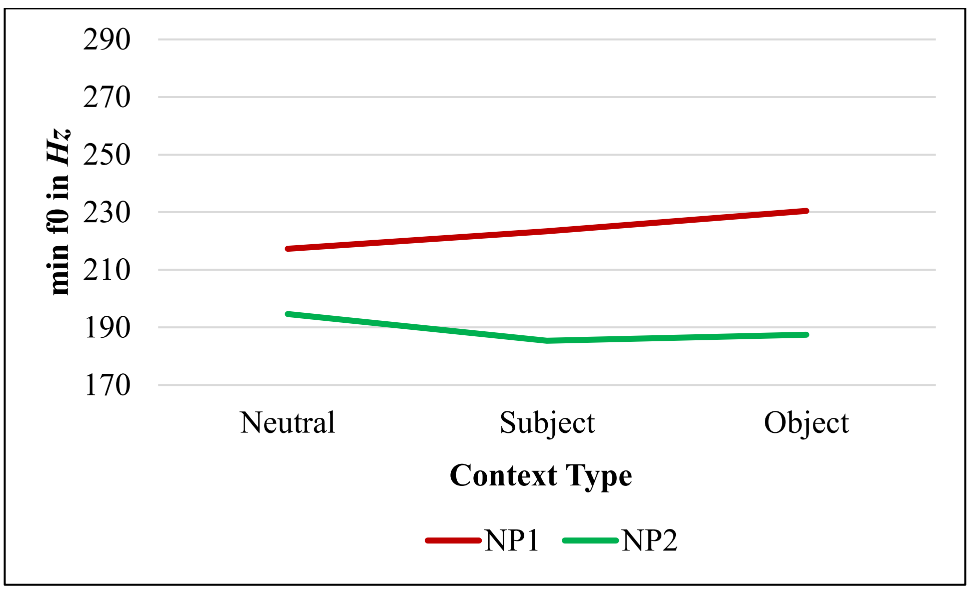


Figure 11. Min F0 as a Function of Context Type

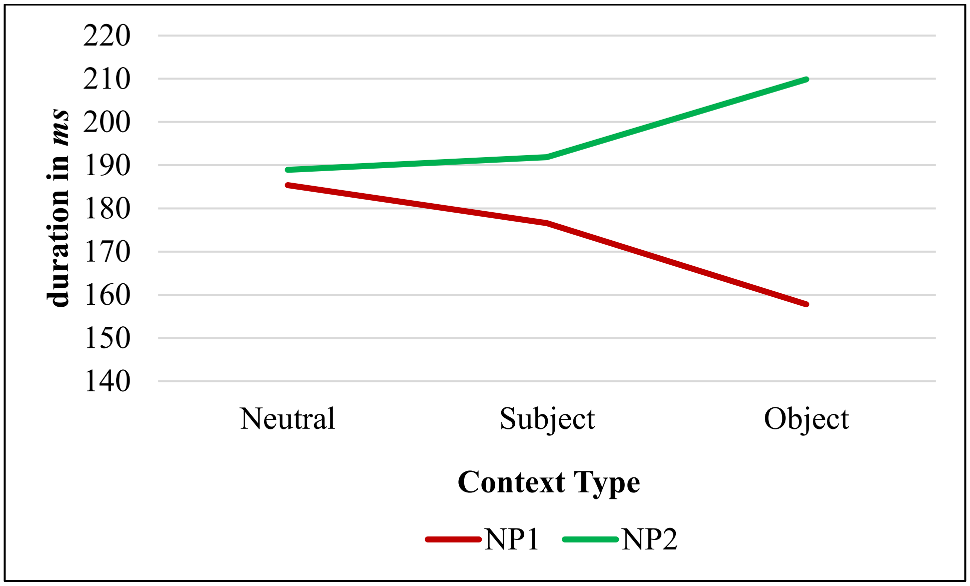


Figure 12. Duration as a Function of Context Type

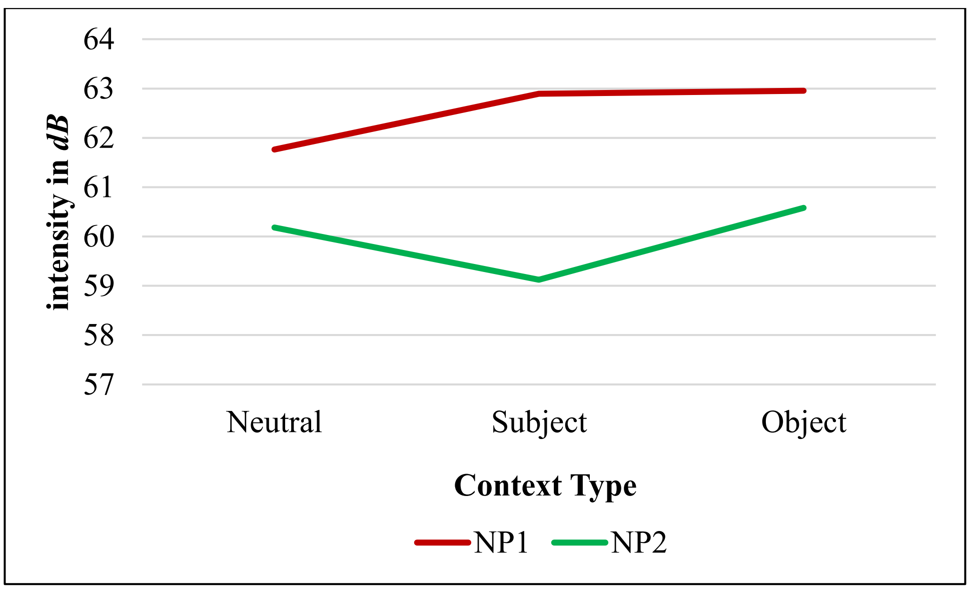


Figure 13. Intensity as a Function of Context Type

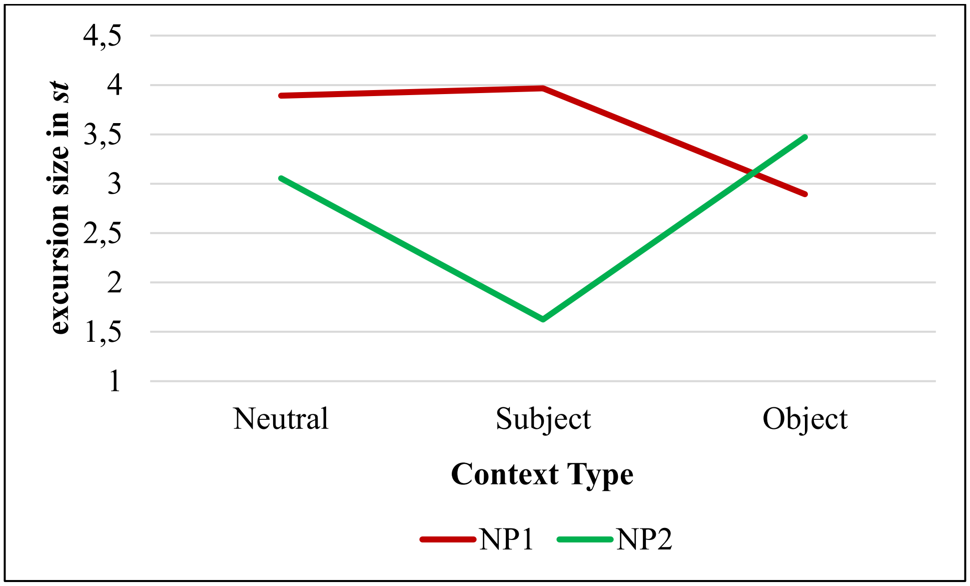


Figure 14. Excursion Size as a Function of Context Type

Analysis of Paraphrase Selection Task

The analysis of the paraphrase selection task yielded the following results: Out of the 56 items following either a Subject Context or an Object Context, 93% (52 out of 56) of all paraphrases were chosen correctly, matching with their respective contexts. Only 7% (4 out of 56) did not match. Out of the remaining 28 items following a Neutral Context, 61% (17 out of 28) of paraphrases were subject paraphrases and 39% (11 out of 28) were object paraphrases.

With respect to the participants, 71% of participants (10 out of 14) chose the correct paraphrases for the two Subject Context and the two Object Context conditions in all cases. 29% of participants (4 out of 14) made one mistake in matching either a subject paraphrase to an Object Context, or the other way around, while also producing a prosodic contour that matched with the wrong paraphrase. Only one participant (7%) made the mistake of choosing the wrong paraphrase while still producing the correct prosodic contour (pitch accent on object NP with paraphrase matching to Subject Context condition).

The high percentage of correctly chosen paraphrases indicates that participants understood the meaning of the sentences while making their productions. This adds support to the representativity of the prosodic data. From the results of the paraphrases following a Neutral Context, it seems that the majority of ambiguous items were paired with a Subject Context rather than an Object Context paraphrase, which would suggest that the subject NP rather than the object NP is the preferred antecedent of an ambiguous structure. This would argue against the object preference found by Frazier and Clifton (1998) and Carlson et al. (2009). However, the distribution of Subject vs. Object Context paraphrases is 61% to 39%, which suggests that these findings might be due to chance. Moreover, the perceptual and the acoustic analyses suggest that the productions following a Neutral Context are similar to those following an Object Context, thus supporting the findings by Frazier and Clifton (1998) and Carlson et al. (2009).

Discussion of Perceptual and Acoustic Analysis

Together, the results of the perceptual ToBI analysis and the acoustic analysis support all hypotheses. They suggest that the *wh*-remnant of the globally ambiguous sluicing structures is accented (and thus focused), from which follows the requirement that it must contrast with its antecedent (Romero, 1998). The two analyses illustrate that speakers use prosody to disambiguate the contextually triggered meaning of a simple sluicing structure, thus supporting hypotheses H(1) and H(3). Both analyses show that NP2 is produced with similar prosody in the Neutral Context and the Object Context, thus supporting H(2) that the object NP is the preferred antecedent of an ambiguous *wh*-remnant. Furthermore, the fact that this production study resulted in different prosodic contours that reflect the meaning of the respective conditions, suggests that this design, the method and the procedure of conducting production studies is adequate to investigate prosodic contours as produced in spoken language, thus supporting H(4).

The perceptual analysis alone shows that NP1 and especially NP2 are produced with different accent types to prosodically represent the meaning of a contextually disambiguated sluicing structure, thus supporting H(1) and H(3). The results of two annotators with high agreement show that both NP types receive more contrastive L+H* accents when they serve as the antecedents of the *wh*-remnant. Moreover, the perceptual analysis shows that NP1 is generally produced with more L* accents, whereas NP2 is generally produced with more H* accents, indicating the different distribution of given vs. focused constituents and thus illustrating the different default information structures of the beginning of a clause vs. the end of a clause. The perceptual analysis further shows that the Neutral Context and the Object

Context are produced similarly, thus supporting H(2) that the object NP is indeed the preferred antecedent of an ambiguous *wh*-remnant.

The acoustic analysis adds further support to the findings of the perceptual analysis. It suggests that speakers use prosody mostly on NP2 to differentiate between the Subject Context and the Object Context reading as well as between the Subject Context and the Neutral Context reading. The significant differences of max F0, intensity and excursion size illustrate that NP2 is produced with more prosodic prominence when the object NP serves as the antecedent of the *wh*-remnant *who else*, as it is the case in the Object Context, supporting H(1), or when it is the default focus of the structure, as it is the case in the Neutral Context. The acoustic analysis further shows that the Neutral Context condition is produced similarly to the Object Context condition, supporting the assumption that NP2 is the preferred antecedent when the structure remains ambiguous, supporting H(2). These findings are illustrated in the following intonation contours, exemplary for one speaker and all three conditions.

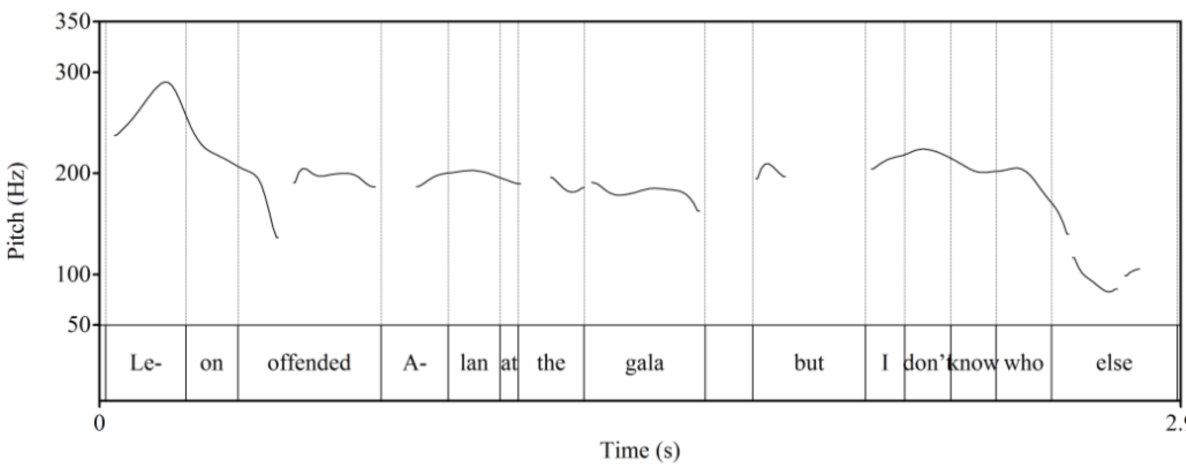


Figure 15. Intonation Contour of Chicago, Subject Context, Participant 2

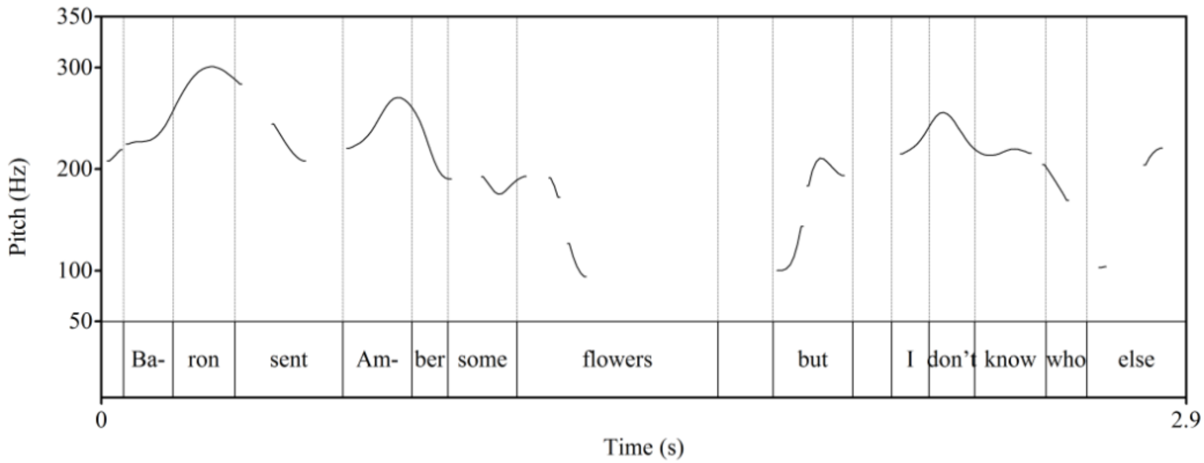


Figure 16. Intonation Contour of Chicago, Object Context, Participant 2

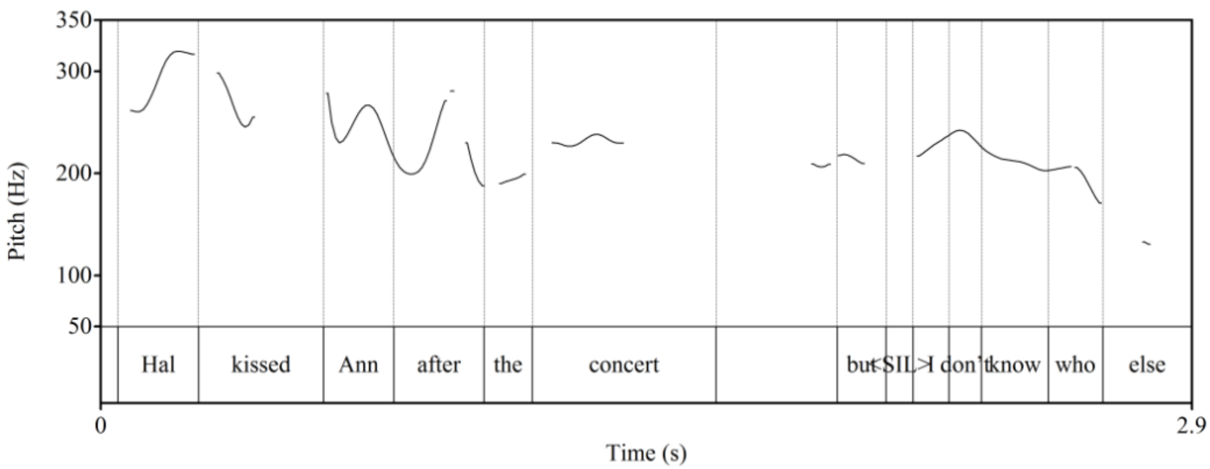


Figure 17. Intonation Contour of Chicago, Neutral Context, Participant 2

Figure 15 illustrates that participant 2 produced the subject NP with a stronger pitch accent than the object NP in the Subject Context condition. Figure 16 illustrates that participant 2 produced the object NP with a stronger pitch accent in the Object Context condition than in the Subject Context condition. However, it also illustrates that the object NP is nevertheless somewhat less prominent (that is, has a lower F0) than the subject NP although it is contrastively focused. This effect is due to the downstep within one sentence (see discussion of Féry, 2010a, chapter 2.2.2.2). Figure 17 illustrates that the subject NP and the object NP of the Neutral Context condition are produced similarly to those of the Object Context condition: both NPs are accented. Finally, all three figures illustrate that the subject NP is mandatorily accented throughout all conditions, due to being the first word of the sentence.

A comparison of the perceptual and the acoustic analysis helps to explain the lack of significant effects on NP1 between the Subject Context and the Object Context or Neutral Context in the acoustic analysis. Due to its sentence-initial position as the first word of the sentence, NP1 necessarily required an accent throughout all conditions. There was a relatively equal distribution of different accent types on NP1, whereas NP2 was produced with mostly H* accents. On both NP types, there was an increased number of contrastive L+H* accents to emphasize when it served as the antecedent. Due to the equal distribution of different accent types on NP1, the increased number of L+H* accents might not have shown up as a significant effect between the Subject Context and the other two conditions. However, this was not the case on NP2 where the increase of L+H* accents in the Object Context indicated a noticeable deviation from the H* pattern of the other two conditions.

To sum up, both the results of the perceptual analysis and the acoustic analysis support the hypothesis that speakers emphasize the antecedent of a *wh*-remnant. There were significant effects on NP2 in the acoustic analysis and correspondingly, a high number of H* and L+H* accents on NP2 in the perceptual analysis. The findings of this pilot production study therefore support the claims made by Romero (1998) and support the findings of Frazier and Clifton (1998) and Carlson et al. (2009). Consequently, all hypotheses have been supported:

Hypotheses:

(1) Speakers use prosody to emphasize the antecedent of a *wh*-remnant in globally ambiguous simple sluicing. (H(1) supported)

(2) An all-new neutral context triggers similar prosodic contours as an object context. (H(2) supported)

(3) Speakers use prosody as a disambiguating factor to mark the information structure of sluicing, despite disambiguating context. (H(3) supported)

(4) The design, method and procedure of this production study trigger different prosodic contours that reflect the information structure of sluicing with different antecedents. (H(4) supported)

Consequences

There are four main results of this pilot production study. First, the pilot production study suggests that speakers use prosody to indicate the contextually triggered information structure of an ambiguous sluicing structure by using prosodic prominence to highlight which NP serves as the antecedent of the *wh*-remnant. Second, speakers do so in the Subject Context as well as the Object Context condition by varying mostly the degree of prosodic prominence on NP2: less prosodic prominence on NP2 is used in the Subject Context, more prosodic prominence is used on NP2 in the Object Context. Third, the results support the assumption that NP2 is the preferred antecedent, as suggested by the similarities between the Neutral Context and the Object Context productions. Fourth, the pilot production study shows that this type of study is appropriate to investigate the prosodic contours of speakers in spoken language.

However, there are a few challenges that this pilot production study made clear and which should be considered for the next production study. First, one should either test an equal number of male and female participants or decide for one gender exclusively in order to avoid an unwanted effect of gender bias. Second, every participant should ideally produce every lexicalization in every condition to enhance the comparability of the different conditions and therefore the representativity of the entire data set. This would also lead to a higher number of productions per participant, thus improving the statistical power of the results. Third, using a head set microphone increases the consistency of intensity measures since participants are not at risk of subconsciously changing the distance between the microphone and their mouth. Fourth, it is important to have the best possible set of items. This means that a constituent whose prosodic realizations I am interested in should not be located at the very beginning of a sentence, as it was the case for NP1. Adding a PP like “On Tuesday” before NP1 would already help to get rid of prosodic cues that are typical to the beginning of a sentence. Fifth, the different lexicalizations should be as similar to each other as possible to increase the number of significant t_2 analyses and hence the overall representativity of the results. This means that there should be no variations of PP vs. NP, syllable lengths of NPs and VPs, etc. Sixth, it is not clear whether the results of this pilot production study merely represent the information structural influence of a preceding context, which would have a similar effect upon any non-sluicing structure as well, or whether the prosodic findings of this study represent the specific relationship between a *wh*-remnant and its antecedent NP. I therefore suggest to eliminate context as a factor for a subsequent production study. To sum up, whereas this pilot production study showed that the method of eliciting spoken language productions used for this study works, it also emphasized the importance of conducting a pilot prior to a large-scale study. A pilot study helps to expose hidden challenges and consequently improves the overall design and thus the representativity of the results and conclusions of a subsequent production study.

3.2.2 Acceptability Judgment Studies: A Pretest for Production Study *Quarterback*

Production studies are a complex method of collecting empirical data for linguistic research: First, finding participants who speak clearly and who are willing to be recorded is difficult, especially among unprofessional speakers. Second, conducting a production study is time consuming: every participant has to be tested individually in a lab. Third, the acoustic and perceptual analysis of speech data is time and labor intensive. Therefore, it is crucial to have a carefully thought out experimental design prior to conducting a production study. I thus decided to run a series of acceptability judgment studies before conducting the production study Quarterback. My goal was to answer questions about the acceptability differences of various sluicing structures and to eliminate as many mistakes and confounding factors as possible from the linguistic material and the experimental design. The overall set of research questions of the entire series of four acceptability judgment studies is listed below.

Research Questions of Acceptability Judgment Studies

(1) Sluicing Type:

- Which type(s) of sluicing should be investigated?
  - Simple Sluicing: *A lawyer defended some dealers. Do you know which one?*
  - Simple Embedded Sluicing: *They said that a lawyer defended some dealers. Do you know which one?*
  - Complicated Simple Sluicing: *They informed a lawyer that he had defended some dealers. Do you know which one?*
  - Complex Sluicing: *They hired a lawyer that had defended some dealers. Do you know which one?*

(2) *Wh*-Remnant Type:

- Which type of *wh*-remnant should be investigated?
  - Contrastive: *who else*
  - Non-contrastive:
    - Not contentful: *which one*
    - Contentful: *which NP*

(3) Ambiguity Type:

- Should both ambiguous and unambiguous sluicing structures be investigated?
    - Ambiguous: *A lawyer* defended *a dealer.* Do you know **which one**?
    - Unambiguous: *A lawyer* defended some dealers. Do you know **which one**?

(4) NP/QP Type:

- Which type of NP/QP should be used for the antecedent NPs?
    - Contrastive:
        - "the NP": *the lawyer*
        - explicit names: *Paul*
    - Non-contrastive:
        - "a(n) NP": *a lawyer*
        - "some NP": *some lawyer*

(5) RC Position in Complex Sluicing:

- Where should the RC of a complex sluicing structure be positioned: after the subject NP or after the object NP?
    - After the subject NP: *A lawyer [that had defended some dealers]$_{RC}$ has been fired. Do you know which one?*
    - After the object NP: *A lawyer defended some dealers [that have sold drugs]$_{RC}$. Do you know which one?*

(6) Extraposition

- Should the RC of complex sluicing be extraposed?
    - Intraposed: *A lawyer that had defended some dealers has been fired. Do you know which one?*
    - Extraposed: *A lawyer has been fired that had defended some dealers. Do you know which one?*

In order to answer these questions, I conducted four acceptability judgment studies prior to the production study Quarterback: one pilot study (study 1) and three full studies (studies 2, 3 and 4). The participants of all four studies were self-proclaimed native speakers of American English who were recruited via *Amazon Mechanical Turk©*.[56] Pilot study 1 serves to narrow down the set of research questions concerning which types of sluicing structures I should focus on. It thus compares the acceptability of several different types of sluicing: ambiguous contrastive simple sluicing, ambiguous non-contrastive simple sluicing, unambiguous non-contrastive simple sluicing and unambiguous non-contrastive complex sluicing with an RC positioned after the subject NP (henceforth *complex subject sluicing*). For all of the unambiguous sluicing structures, pilot study 1 investigates the acceptability of two different types of antecedents for the *wh*-remnant *which one*, namely NP1 and NP2. For simple sluicing, NP1 refers to the subject NP and NP2 refers to the object NP. For complex sluicing, NP1 refers to the NP of the matrix clause (henceforth *matrix NP*), NP2 refers to the NP of the embedded clause (henceforth *embedded NP*). As a consequence of the results of this pilot study 1, studies 2 through 4 exclusively compare non-contrastive and unambiguous sluicing. More specifically, study 2 investigates the differences between simple sluicing, simple embedded sluicing, complicated simple sluicing and complex sluicing with an RC positioned after the object NP (henceforth *complex object sluicing*).[57] Study 3 picks up some of the conditions from study 2, thus exploring the differences between complicated simple sluicing, complex object sluicing, complex subject sluicing with the RC in its canonical intraposed position (henceforth *complex intraposed subject sluicing*) and complex subject sluicing with the RC in its non-canonical extraposed position (henceforth *complex extraposed subject sluicing*). Study 4 re-investigates some of the conditions from studies 2 and 3, comparing simple embedded sluicing, complicated

[56] Amazon Mechanical Turk© is a web application provided by *Amazon Web Services*. It is a crowdsourcing web service that brings together researchers and participants for different types of online experiments, such as acceptability judgment studies, questionnaires, etc. It is widely used in linguistic research, mostly due to its fast and easy supply of participants. Sprouse (2011) compared the judgment data of a study whose participants were recruited online via Amazon Mechanical Turk to an identical study with a laboratory setting. He concludes that there are no noteworthy differences between the two groups and that data elicited via Amazon Mechanical Turk is thus a valid method for collecting data in linguistic research (Sprouse, 2011).

[57] The term complicated simple sluicing refers to an embedded simple sluicing structure whose underlying syntactic structure is similar in complexity to complex sluicing. However, rather than a relative clause, complicated simple sluicing contains a complement clause. Moreover, it ensures comparability since NP1 of both complicated simple sluicing and complex object sluicing is an object NP (rather than a subject NP, as it is the case in regular simple sluicing), and NP2 of both structures is an embedded object NP. The exact structure will be explained in more detail in study 2.

simple sluicing, complex object sluicing and complex intraposed subject sluicing. The exact experimental designs of the four studies as well as the respective hypotheses, results and discussions will be presented in the following four subchapters.

3.2.2.1 Pilot Acceptability Judgment Study 1

The goal of this pilot study is to narrow down the set of research questions concerning which types of simple and complex sluicing structures I should focus on in the following production study. This pilot study therefore consists of five sub-studies (which will be referred to as studies 1.1., 1.2., 1.3., 1.4. and 1.5.), addressing the following different sluicing structures: ambiguous contrastive simple sluicing (ACSimS), ambiguous non-contrastive simple sluicing (ASimS), unambiguous non-contrastive simple sluicing with *which NP* (SimS_wNP), ambiguous non-contrastive complex subject sluicing (AComxSS), unambiguous non-contrastive complex subject sluicing with *which NP* (ComxSS_wNP) and unambiguous non-contrastive complex subject sluicing with *which one* (ComxSS_wone).

Research Questions and Hypotheses

In this pilot acceptability judgment study and its five sub-studies, I will investigate the following research questions:

1) How does ACSimS (with the *wh*-remnant *who else*) compare to ASimS (with the *wh*-remnant *which one*)? Contrastive sluicing, as opposed to non-contrastive sluicing, is island sensitive (Merchant, 2001, 2008; Winkler, 2013; Griffiths & Lipták, 2014). Usually, an effect of island sensitivity is only apparent in unambiguous structures in which the antecedent of the *wh*-remnant is located within an island. Although ACSimS and ASimS are both ambiguous structures, I am nevertheless wondering whether any effect of this island sensitivity in contrastive structures will show up. For example, if participants take NP2 to be the antecedent of the ambiguous *wh*-remnant *who else* in ACSimS, they encounter an island violation since extraction from contrastive sluicing leads to an unacceptable structure. This would result in an increased processing load and thus worse judgments for ACSimS. However, besides this difference of contrastivity, the NPs of ASimS are combined with the indefinite QP *some* which predicts the occurrence of the upcoming question *Do you know which one?* whereas the NPs of ACSimS are combined with definite NPs in the form of explicit names which does not predict the occurrence of an upcoming question but rather mark the respective constituent as being given information. The occurrence of the question *Do you know who else?* hence comes as a surprise, which might also lead to decreased judgements. (Study 1.1.)

2) How do ASimS and AComxSS compare? Complex sluicing contains an RC which, in contrast to simple clauses, increases the processing effort of a parser (Just, Carpenter, Keller, Eddy, & Thulborn, 1996) and might consequently decrease the acceptability of AComxSS. In contrast to object RCs, the subject RCs that are part of the AComxSS structures do not lead to nested structures and should therefore be easy to understand (as noted in Warren & Gibson, 2002, p. 80; see also Gibson, 1998; Traxler, Williams, Blozis, & Morris, 2005 for a comparison of subject and object RC processing). The addition of a subject RC might thus result in only slightly degraded judgments for AComxSS as compared to ASimS. (Study 1.2.)

3) Which NP is the preferred antecedent of a *wh*-remnant of SimS_wNP and ComxSS? Sluicing structures may contain several NPs which can serve as possible antecedents of a *wh*-remnant (given that different grammatical category agreements such as number agreement are satisfied). For simple sluicing, it has been noted that there is a strong preference for the object NP to be the antecedent (Frazier & Clifton, 1998; Carlson et al., 2009). For complex sluicing, the matrix NP is generally preferred over the embedded NP (Konietzko et al., submitted; Ross, 1969; also see Frazier & Clifton, 2011 for a comparison of extraction out of RCs vs. complement clauses). In this pilot study, I want to investigate whether these previously found preferences can be sustained. (Study 1.3.)

4) Is ambiguous sluicing generally more acceptable than unambiguous sluicing? Or is ambiguous sluicing only more acceptable than unambiguous sluicing with a dispreferred antecedent? With respect to reading time differences, Frazier and Clifton (1998) showed that ambiguous sluicing is read faster than unambiguous sluicing with a dispreferred antecedent (here the subject NP) but read slower than unambiguous sluicing with a preferred antecedent (here the object NP). I am now investigating whether these reading differences also show up in acceptability judgment differences. (Study 1.4.)

5) What role does the structure of the *wh*-remnant play? Does a structure with a contentful *wh*-remnant (e.g., *which boy*) lead to more acceptable judgments than a structure with a non-contentful *wh*-remnant (e.g., *which one*)? Although both *wh*-remnants are d-linked, *which NP* is contentful, which means that it contains the same lexical material as its antecedent and therefore might make the antecedent of the preceding clause more salient, thus improving

judgments.[58] With respect to bare *wh*-phrases, Frazier and Clifton (2011) have conducted an acceptability judgment study comparing sluicing with *which NP* remnants to sluicing with bare *wh*-phrases like *what*. They found that *which NP* significantly improves the acceptability of sluicing structures with an antecedent of either a complement clause or an RC.[59] They account this effect to the fact that *which NP* phrases "immediately receive a discourse representation in addition to their syntactic representation" (Frazier & Clifton, 2011, p. 46), whereas bare *wh*-phrases must rely exclusively on a syntactic representation. They argue contrary to Pesetsky (1987) who attributes the higher acceptability of *which NP* remnants to a memory retrieval advantage. Goodall (2014) conducted an acceptability judgment study investigating the effects of d-linking on island and non-island structures. He argues contrary to Frazier and Clifton (2011) and therefore in support of Pesetsky (1987) in claiming that the ameliorating effect of d-linking affects both islands and non-island equally and must thus be due to memory retrieval benefits. In this acceptability judgment study, I want to find out whether an even stronger ameliorating effect of contentful d-linked *which NP* remnants can be found in comparison to non-contentful but also d-linked *which one*. (Study 1.5.)

I thus investigate the following hypotheses with respect to the pilot acceptability judgment study 1:

Hypotheses

(1) ASimS receives better judgments than ACSimS. (H(1); Study 1.1.)
(2) ASimS receives better judgments than AComxSS (H(2); Study 1.2.)
(3) In SimS_wNP, structures with NP2 as antecedent (object NP) receive better judgments than with NP1 as antecedent (subject NP). (H(3a).; Study 1.3). In ComxSS, structures with NP1 as antecedent (matrix NP) receive better judgments than with NP2 as antecedent (embedded NP). (H(3b).; Study 1.3.)

[58] *Wh*-remnants like *which one* or *which boy* are called *d-linked wh-remnants* (Pesetsky, 1987; Frazier & Clifton, 2011). To set the two types further apart, scholars also refer to the latter as "a remnant with an NP" (Barros, 2013), "which-NP phrases" (Nykiel, 2013) or "*wh*-correlate with a contentful head noun" (Dayal & Schwarzschild, 2010). I will use the description used by Dayal and Schwarzschild (2010).
[59] Note that I will also compare sluicing structures with either an embedded complement clause or a relative clause in studies 2 through 4, see chapters 3.2.2.2, 3.2.2.3 and.3.2.2.4

(4) AComxSS receives better judgments than ComxSS_wNP with NP2 as antecedent (embedded NP) but worse judgments than ComxSS_wNP with NP1 as antecedent (matrix NP). (H(4); Study 1.4.)
(5) ComxSS_wNP receives better judgments than ComxSS_wone. (H(5); Study 1.5.)

Method

Design and Predictions

Pilot study 1 combines five sub-studies, each consisting of either a one factorial or a 2x2 factorial design. The single factor of study 1.1. is *Contrastivity* (*which one* vs. *who else*). Study 1.1. investigates the differences between ACSimS and ASimS by looking at structures with either the *wh*-remnant *who else* (condition (1)) or *which one* (condition (2)). The single factor of study 1.2. is *Sluicing Type* (simple sluicing vs. complex sluicing). Study 1.2. investigates the differences between ASimS (condition (2)) and AComxSS (condition (5)). The two within subjects factors of study 1.3. are *Sluicing Type* and *Antecedent Type* (NP1 vs. NP2). Study 1.3. investigates the differences between SimS_wNP with either NP1 (condition (3)) or NP2 (condition (4)) as antecedent, ComxSS_wNP with either NP1 (condition (6)) or NP2 (condition (7)) as antecedent. The two within subjects factors of study 1.4. are *Ambiguity Type* (ambiguous vs. unambiguous) and *Antecedent Type,* although the latter only affects unambiguous conditions. Study 1.4. investigates the differences between AComxSS (condition (5)) and ComxSS_wone with NP1 (condition (8)) or NP2 (condition (9)) as antecedent. The two within subjects factors of study 1.5. are *Antecedent Type* and *Wh-remnant Type* (*which NP* vs. *which one*). Study 1.5. investigates the differences between ComxSS_wone with either NP1 (condition (8)) or NP2 (condition (9)) as antecedent and ComxSS_wNP with either NP1 (condition (6)) or NP2 (condition (7)) as antecedent. Pilot study 1 thus results in nine conditions, see Table 10. Most conditions simultaneously occur in several sub-studies. The factor *Sluicing Type* describes whether the respective structure is a simple sluicing structure or a complex sluicing structure with an RC positioned after the subject NP. The factor *Ambiguity Type* describes whether the sluicing structure has an ambiguous *wh*-remnant, which can take either NP1 or NP2 as its antecedent, or whether the sluicing structure has an unambiguous *wh*-remnant, which can only take one of the two NPs as its antecedent. The factor *Antecedent Type* describes whether the *wh*-remnant of the unambiguous structures takes NP1 or NP2 as its antecedent. For simple sluicing structures, NP1 means subject NP and NP2 means object NP. For complex sluicing structure, NP1 means matrix NP and NP2 means embedded NP. The factor *Contrastivity* describes whether the *wh*-remnant is contrastive (*who else*) or not (*which one*). The factor *Wh-remnant Type* describes whether the *wh*-remnant is contentful (*which NP1/which NP2*) or not (*which one/which ones*).

Cond.	**Simple Sluicing**	**Cond.**	**Complex Sluicing**
(1)	**ACSimS** Leon offended Alan at the gala. Do you know who else?		
(2)	**ASimS** Some waiters offended some guests at the gala. Do you know which ones?	(5)	**AComxSS** A quarterback that dated a cheerleader became quite popular. Do you know which one?
(3)	**SimS_wNP (NP1)** Some waiters offended some guests at the gala. Do you know which waiters?	(6)	**ComxSS_wNP (NP1)** A quarterback that dated a cheerleader became quite popular. Do you know which quarterback?
(4)	**SimS_wNP (NP2)** Some waiters offended some guests at the gala. Do you know which guests?	(7)	**ComxSS_wNP (NP2)** A quarterback that dated a cheerleader became quite popular. Do you know which cheerleader?
		(8)	**ComxSS_wone (NP1)** A quarterback that dated some cheerleaders became quite popular. Do you know *which one*?
		(9)	**ComxSS_wone (NP2)** A quarterback that dated some cheerleaders became quite popular. Do you know which ones?

Table 10. Conditions of Pilot Acceptability Judgment Study 1

My predictions for pilot study 1 are as follows: 1) With respect to H(1), I predict that ASimS will receive better judgments than ACSimS: condition (2) > condition (1).[60] 2) With respect to H(2), I predict that ASimS will receive better judgments than AComxSS: condition (2) > condition (5). 3) With respect to H(3a.), I predict that SimS_wNP with NP2 as antecedent will receive better judgments than SimS_wNP with NP1 as antecedent: condition (4) > condition (3). With respect to H(3b.), I predict that ComxSS_wNP with NP1 as antecedent will

[60] I will use the </> signs to indicate *better/worse*.

receive better judgements than ComxSS_wNP with NP2 as antecedent: condition (7) > condition (6). 4) With respect to H(4), I predict that AComxSS will receive better judgments than ComxSS_wone with NP2 as antecedent and worse judgments than ComxSS_wone with NP1 as antecedent: condition (5) > condition (9); condition (5) < condition (8). 5) With respect to H(5), I predict that ComxSS_wNP will receive better judgments than ComxSS_wone: conditions (6) and (7) > conditions (8) and (9).

Participants

The participants of the pilot study were recruited via Amazon Mechanical Turk©. Fifty-five native speakers of American English participated in the study (which consisted of the five sub-studies) who were all naïve as to the purpose of the study. There were 33 males and 22 females, aged between 22 and 64 years old with a mean age of 35.1 years. An additional 15 participants had to be excluded from the study: although explicitly stated in the description of the study that intuitions of native speakers of American English are requested, 14 participants stated in a personal information survey that their mother tongue was something else than English, such as Ukrainian, Russian or Tamil. One additional participant had to be excluded from the analysis because of clearly insufficient attention to the study from which follows that he did not fulfil the task conscientiously. The study lasted about 15 minutes and participants received $ 2.50 for participation.

Material

The pilot study contained 66 items out of which 36 were target items and 30 were filler items.[61] Of the 36 target items, 16 items were simple sluicing structures (conditions (1) through (4), Table 10) and 20 items were complex sluicing structures (conditions (5) through (9), Table 10). All target and filler items can be found in the appendix, section 4. All sluicing structures consisted of two parts: a declarative clause and a sluiced interrogative clause. The sluiced interrogative clause consisted of the question *Do you know*…? plus the respective *wh*-remnant.

[61] All filler and target items of all four acceptability judgment studies were checked by an unbiased native speaker of American English to make sure that there are no language or grammar mistakes that would influence the judgments.

The declarative clauses of the simple sluicing and complex sluicing structures differed from each other, which resulted in a different number of lexicalizations: simple sluicing had 16 lexicalizations; complex sluicing had 20 lexicalizations. This was due to the fact that the lexicalizations of simple sluicing were restricted to a specific pattern that was not compatible with complex sluicing. The restriction resulted from the structure of the target items used in the pilot production study Chicago (see chapter 3.2.1) from which I included six target items in this pilot acceptability judgment study. To guarantee comparability, the remaining lexicalizations thus had to have the same pattern.

The exact pattern of the simple sluicing items is illustrated Table 11. The structures always started with a subject NP, were followed by either a transitive or a ditransitive VP, then an object NP, and ended with either a PP or an NP.

Subject NP	**VP**	**Object NP**	**PP/NP**
Elmer	helped	Leanne	with the cleanup

Table 11. Structure of Declarative Clause of Simple Sluicing Target Items

In condition (1), NP1 and NP2 were definite names because the *wh*-remnant *who else* only takes a definite NP as its antecedent (Romero, 1998; Carlson et al., 2009; van Craenenbroeck, 2010; Barros, 2012, see discussion chapter 2.1.3.2). In conditions (2) through (4), NP1 and NP2 were singular or plural indefinite NPs because of the *wh*-remnants *which one/which ones* and *which NP1/NP2,* which require an indefinite NP as their antecedents.[62] Examples of the different simple sluicing conditions with either a transitive or an intransitive VP are given in Table 12 and Table 13 below.

Cond.	**Declarative Clause**	**Sluiced Interrogative Clause**
(1)	[Barry]$_{\text{NP1\_def.name}}$ [insulted]$_{\text{VP\_transitive}}$ [Lane]$_{\text{NP2\_def.name}}$ [at the office]$_{\text{PP}}$.	Do you know [who else]$_{\text{who else\_ambiguous}}$?

[62] The variation of singular and plural NPs follows from the number of the sentence final PPs. In order to avoid ambiguity between the antecedent NPs and the PP as a possible antecedent, I had to make sure that they differed in their number agreement. For example, the question „Do you know *which ones*?“ does not take a PP with a singular NP as its antecedent but only one of the plural NPs.

(2)	[Some managers]$_{\text{NP1\_indef.NP}}$ [insulted]$_{\text{VP\_transitive}}$ [some secretaries]$_{\text{NP2\_indef.NP}}$ [at the office]$_{\text{PP}}$.	Do you know [which ones]$_{\text{which ones\_ambiguous}}$?
(3)	[Some managers]$_{\text{NP1\_indef.NP}}$ [insulted]$_{\text{VP\_transitive}}$ [some secretaries]$_{\text{NP2\_indef.NP}}$ [at the office]$_{\text{PP}}$.	Do you know [which managers]$_{\text{which NP1\_unambiguous}}$?
(4)	[Some managers]$_{\text{NP1\_indef.NP}}$ [insulted]$_{\text{VP\_transitive}}$ [some secretaries]$_{\text{NP2\_indef.NP}}$ [at the office]$_{\text{PP}}$.	Do you know [which secretaries]$_{\text{which NP2\_unambiguous}}$?

Table 12. Simple Sluicing - Transitive

Cond.	**Declarative Clause**	**Sluiced Interrogative Clause**
(1)	[Alvin]$_{\text{NP1\_def.name}}$ [baked]$_{\text{VP\_ditransitive}}$ [Hailey]$_{\text{NP2\_def.name}}$ [a wedding cake]$_{\text{NP}}$.	Do you know [who else]$_{\text{who else\_ambiguous}}$?
(2)	[Some confectioners]$_{\text{NP1\_indef.NP}}$ [baked]$_{\text{VP\_ditransitive}}$ [some friends]$_{\text{NP2\_indef.NP}}$ [a wedding cake]$_{\text{NP}}$.	Do you know [which ones]$_{\text{which ones\_ambiguous}}$?
(3)	[Some confectioners]$_{\text{NP1\_indef.NP}}$ [baked]$_{\text{VP\_ditransitive}}$ [some friends]$_{\text{NP2\_indef.NP}}$ [a wedding cake]$_{\text{NP}}$.	Do you know [which confectioners]$_{\text{which NP1\_unambiguous}}$?
(4)	[Some confectioners]$_{\text{NP1\_indef.NP}}$ [baked]$_{\text{VP\_ditransitive}}$ [some friends]$_{\text{NP2\_indef.NP}}$ [a wedding cake]$_{\text{NP}}$.	Do you know [which friends]$_{\text{which NP2\_unambiguous}}$?

Table 13. Simple Sluicing - Ditransitive

The exact pattern of the declarative clauses of complex sluicing is illustrated in Table 14. The structures always started with a subject NP, were followed by the relative PRN *that* an embedded VP, an embedded object NP, a linking VP, an ADV and an ADJ. See Table 15 for an illustration of all complex sluicing structures. In conditions (5) through (7), the structure of the declarative clause was identical throughout all lexicalizations. In conditions (8) and (9), the embedded NP2 changed from singular to plural to allow for an unambiguous reading of the sluiced question *Do you know which one/s?* throughout all lexicalizations.

Subject NP	***that***	**VP**	**Emb. Object NP**	**Linking VP**	**ADV**	**ADJ**
A mascot	that	represented	an animal	was	quite	entertaining.

Table 14. Structure of Declarative Clause of Complex Sluicing Target Items

Cond.	**Declarative Clause**	**Sluiced Interrogative Clause**
(5)	[A mascot]$_{\text{NP1\_indef.NP\_singular}}$ [that]$_{\text{RC\_PRN}}$ [represented]$_{\text{VP}}$ [an animal]$_{\text{NP2\_indef.NP\_singular}}$ [was]$_{\text{linkingVP}}$ [quite]$_{\text{ADV}}$ [entertaining]$_{\text{ADJ}}$.	Do you know [which one]$_{\text{which one\_ambiguous}}$?
(6)	[A mascot]$_{\text{NP1\_indef.NP\_singular}}$ [that]$_{\text{RC\_PRN}}$ [represented]$_{\text{VP}}$ [an animal]$_{\text{NP2\_indef.NP\_singular}}$ [was]$_{\text{linkingVP}}$ [quite]$_{\text{ADV}}$ [entertaining]$_{\text{ADJ}}$.	Do you know [which mascot]$_{\text{which NP1\_unambiguous}}$?
(7)	[A mascot]$_{\text{NP1\_indef.NP\_singular}}$ [that]$_{\text{RC\_PRN}}$ [represented]$_{\text{VP}}$ [an animal]$_{\text{NP2\_indef.NP\_singular}}$ [was]$_{\text{linkingVP}}$ [quite]$_{\text{ADV}}$ [entertaining]$_{\text{ADJ}}$.	Do you know [which animal]$_{\text{which NP2\_unambiguous}}$?

(8)	[A mascot]$_{\text{NP1\_indef.NP\_singular}}$ [that]$_{\text{RC\_PRN}}$ [represented]$_{\text{VP}}$ [some animals]$_{\text{NP2\_indef.NP\_plural}}$ [was]$_{\text{linkingVP}}$ [quite]$_{\text{ADV}}$ [entertaining]$_{\text{ADJ}}$.	Do you know [which one]$_{\text{which one\_NP1\_unambiguous}}$?
(9)	[A mascot]$_{\text{NP1\_indef.NP\_singular}}$ [that]$_{\text{RC\_PRN}}$ [represented]$_{\text{VP}}$ [some animals]$_{\text{NP2\_indef.NP\_plural}}$ [was]$_{\text{linkingVP}}$ [quite]$_{\text{ADV}}$ [entertaining]$_{\text{ADJ}}$.	Do you know[which ones]$_{\text{which one\_NP2\_unambiguous}}$?

Table 15. Complex Sluicing Structure

The filler items consisted of different types of unambiguous structures. They were all followed by an interrogative clause, which mostly were different types of sluiced interrogatives. A few examples are given in (220) through (223) below. There were, among others, contrastive and non-contrastive complex sluicing structures with an antecedent within an RC positioned after the subject NP ((220) and (221)), complex sluicing structures with an RC positioned after the object NP ((222)) or stripping structures with a regular non-sluiced *wh*-question ((223)). The filler items ranged from being very unnatural (e.g., (220), where the contrastive antecedent of the *wh*-remnant was located within an RC island and (222), where the *wh*-remnant *who* did not have an appropriate antecedent of the preceding clause), to being very natural (e.g., (223)). The filler items served to distract participants from the structure of the target items which helps to avoid adaptation towards one specific structure and also to keep participants from guessing the purpose of the study.

(220) The chocolates that pleased the customers were expensive. Can you tell me who else?

(221) The discussions that impressed some professor were sophisticated. Can you tell me which one?

(222) Sharon spotted the newcomers who were screaming something. Will you tell me who?

(223) Jessica bakes cakes and cookies, too. What about pies?

All target and filler items were distributed across five experimental lists. They were presented following a Latin Square so that each participant saw each of the 16 simple sluicing and each of the 20 complex sluicing lexicalizations in only one of the nine conditions. [63]

Procedure

The framework of the study was written in HTML and JavaScript. The five experimental lists were uploaded to the server of OnExp©, provided by the SFB833 *Bedeutungskonstitution - Dynamik und Adaptivität sprachlicher Strukturen* at the University of Tübingen. OnExp© automatically randomizes all items within one experimental list. There was no time pressure for the participants. The study started with a description of the procedure, followed by instructions about the experimental task. Here, participants were informed that they will have to read short text passages consisting of two sentences. Their task would be to rate the naturalness of these text passages (that is, the combination of the two sentences, not the single sentences individually). They were asked to indicate their assessment by choosing a value on a seven-point Likert scale. A judgment of one indicates that the text passage sounds very unnatural, a judgment of seven that it sounds very natural. The use of this scale was illustrated with three sample items, see examples (224) through (226). (224) served as an example for a very natural text passage, (225) for a neutral text passage and (226) for a very unnatural text passage.

(224) The butler that served Queen Elizabeth II. was very attentive. Did he serve Prince Phillip, too?

(225) Martin wonders whether the guy who moved next door is friendly. Can you guess who?

[63] Since simple and complex sluicing structures had a different number of lexicalizations but were combined in one study, experimental list five repeated the target items of the simple sluicing structures from experimental list one.

(226) The factors that influenced John Miller were numerous. Can you tell me who?

Participants were informed that they can leave a comment after each item, if desired. On the second page of the study, participants were asked to provide some personal information about their age, occupation, mother tongue, dialect and gender. Participants were informed that all data will be treated anonymously. Before the start of the study, there was a short practice phase consisting of six practice items so that participants could familiarize themselves with the task. The actual study consisted of 66 items.

Results

I conducted the statistical analysis with SPSS. I computed two analyses of variance (*ANOVAs*) and additional *t*-Tests to investigate the significance of certain differences. The mean values of all conditions are illustrated in Table 16 and in Figure 18. I will start with the statistical analysis of study 1.1., investigating hypothesis H(1), followed by study 1.2., investigating hypothesis H(2), study 1.3., investigating hypotheses H(3a) and H(3b), study 1.4., investigating hypothesis H(4) and study 1.5., investigating hypothesis H(5).

Cond.	**Structure**	**Mean**
(1)	ACSimS	3.70
(2)	ASimS	5.07
(3)	SimS_wNP (NP1)	6.13
(4)	SimS_wNP (NP2)	6.05
(5)	AComxSS	5.18
(6)	ComxSS_wNP (NP1)	6.22
(7)	ComxSS_wNP (NP2)	5.87
(8)	ComxSS_wone (NP1)	5.38
(9)	ComxSS_wone (NP2)	4.04

Table 16. Mean Judgments of Pilot Acceptability Judgment Study 1 per Condition

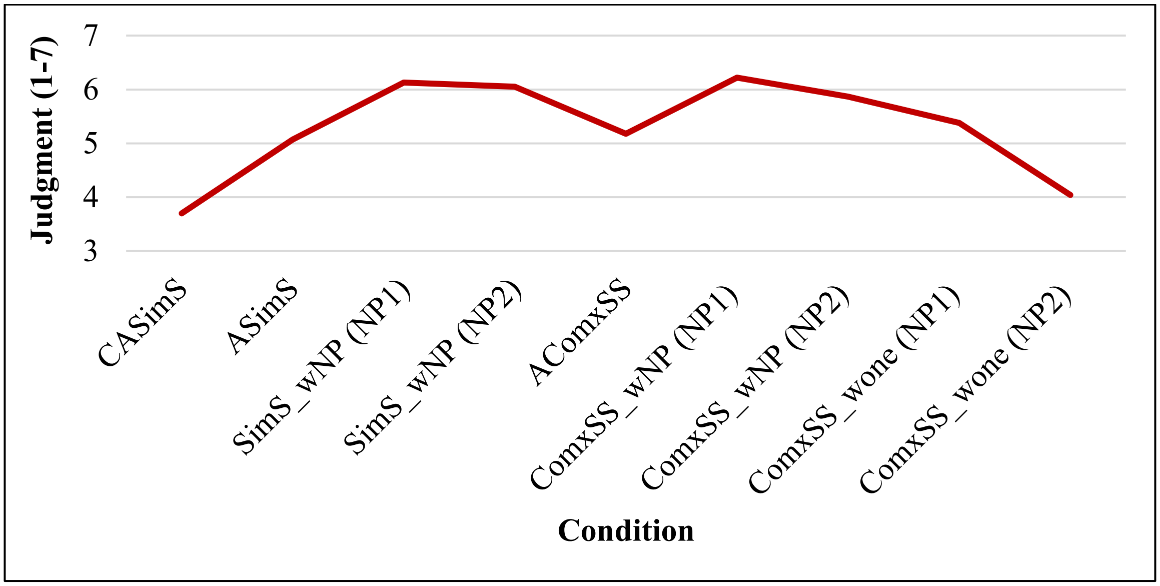


Figure 18. Mean Judgments of Pilot Acceptability Judgment Study 1 per Condition

Study 1.1. investigates hypothesis H(1), which refers to the question how ACSimS and ASimS compare. I computed a paired *t*-Test comparing condition (1) to condition (2). The *t*-Test yielded a highly significant effect between the two conditions [t_1 (52) = 6.45, $p < 0.001$; t_2 (15) = 6.905, $p < 0.001$]. Condition (2) is thus significantly better than condition (1), as illustrated by the mean values in Table 16.

Study 1.2. investigates hypothesis H(2), which refers to the question how ASimS compares to AComxSS. I computed a paired *t*-Test comparing condition (2) to condition (5). The *t*-Test yielded no significant effect between the two conditions [t_1 (52) = 0.913, $p = 0.366$, t_2 (34) = 0.641, $p = 0.526$]. This suggests that there is no difference in acceptability between condition (2) and condition (5).

Study 1.3. investigates hypothesis H(3), which refers to the question which antecedents are preferred in SimS_wNP and ComxSS_wNP. I computed an ANOVA with participants (F_1) and items (F_2) as random factors, comparing conditions (3) and (4) to conditions (6) and (7). The factor *Sluicing Type* was crossed with the factor *Antecedent Type*. The analysis yielded a significant effect of Antecedent Type in the analysis of F_1 and a marginally significant interaction between the two factors in the analysis of F_1 [*Sluicing Type:* F_1 (1,52) = 0.322, p = 0.573; *Antecedent Type*: F_1 (1,52) = 4.433, $p = 0.040$; F_2 (1, 34) = 0.888, $p = 0.353$; *Sluicing*

Type x Antecedent Type: F_1 (1,52) = 3.512, p = 0.067; F_2 (1, 34) = 2.052, p = 0.161], as illustrated in Figure 19.[64]

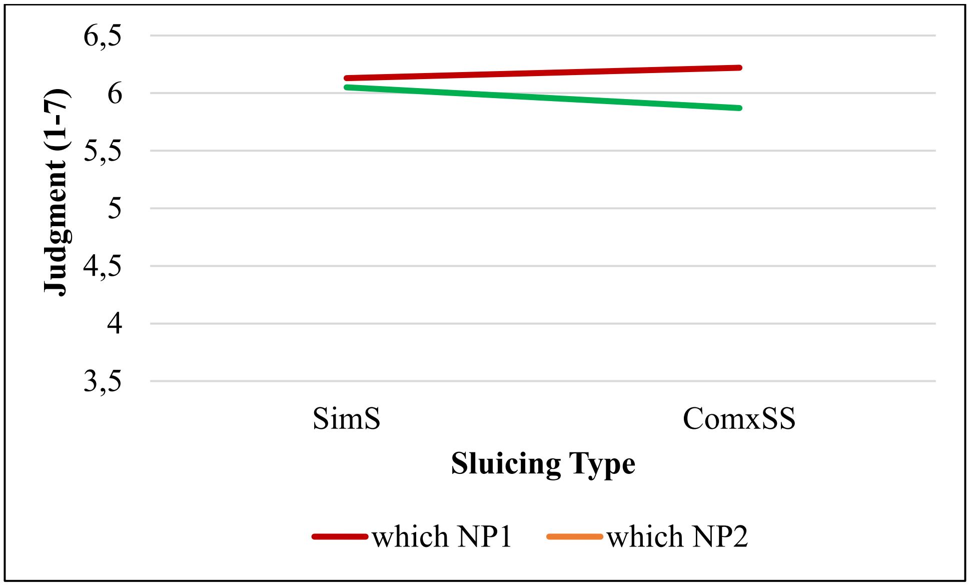


Figure 19. Mean Judgment as a Function of ST and AT

Figure 19 clearly shows that there is a difference between NP1 and NP2 of ComxSS_wNP. It also illustrates that the judgments of SimS_wNP are contrary to prediction: NP1 is judged to be more acceptable than NP2. I therefore computed a paired *t*-Test separately for the two Sluicing Types to see whether the differences between NP1 and NP2 of SimS_wNP and ComxSS_wNP are significant. The *t*-Test yielded no significant effect for SimS_wNP, showing that the reversed judgments are not representative for the structure in general [t_1 (52) = 0.568, p = 0.573; t_2 (15) = 0.261, p = 0.798]. The difference between NP1 and NP2 of ComxSS_wNP, however, is significant [t_1 (52) = 3.309, p = 0.002; t_2 (19) = 2.337, p = 0.031]. This finding shows that NP1 is the preferred antecedent of ComxSS_wNP.

Study 1.4. investigates hypothesis H(4), which refers to the question how AComxSS compares to ComxSS_wone with either NP1 or NP2 as antecedent. I thus computed three paired *t*-Tests comparing conditions (5), (8) and (9). The paired *t*-Tests yielded the following results: There is a marginally significant difference between conditions (5) and (8) in the analysis of F_2 [t_1 (52) = 1.599, p = 0.116; t_2 (19) = 2.010, p = 0.059]. There is a highly significant difference between conditions (5) and (9) [t_1 (52) = 5.501, $p < 0.001$; t_2 (19) = 6.588, $p < 0.001$] as well as

[64] Note that Sluicing Type served as a between subjects factor in the F_2 analysis.

between conditions (8) and (9) [t_1 (52) = 8.287, $p < 0.001$; t_2 (19) = 7.631, $p < 0.001$]. This illustrates that AComxSS is better than ComxSS_wone with a dispreferred antecedent, namely NP2: condition (5) is better than condition (9). AComxSS is worse than ComxSS_wone with a preferred antecedent, namely NP1: condition (5) is worse than condition (8). The significant difference between the two unambiguous structures, conditions (8) and (9), illustrates that NP1 is clearly more acceptable than NP2.

Study 1.5. investigates hypothesis H(5), which refers to the question how ComxSS_wNP compares to ComxSS_wone. I computed an ANOVA with participants (F_1) and items (F_2) as random factors, comparing conditions (6) and (7) to conditions (8) and (9). The factor *Wh-remnant Type* was crossed with the factor *Antecedent Type*. The analysis yielded a highly significant effect for both factors as well as for the interaction [*Wh-remnant Type*: F_1 (1,52) = 90.731, $p < 0.001$; F_2 (1,19) = 193.746, $p < 0.001$; *Antecedent Type:* F_1 (1,52) = 69.944, $p < 0.001$; F_2 (1,19) = 62.032, $p < 0.001$; *Wh-remnant Type x Antecedent Type*: F_1 (1,52) = 29.079, $p < 0.001$; F_2 (1,19) = 18.302, $p < 0.001$]. These results are illustrated in Figure 20.

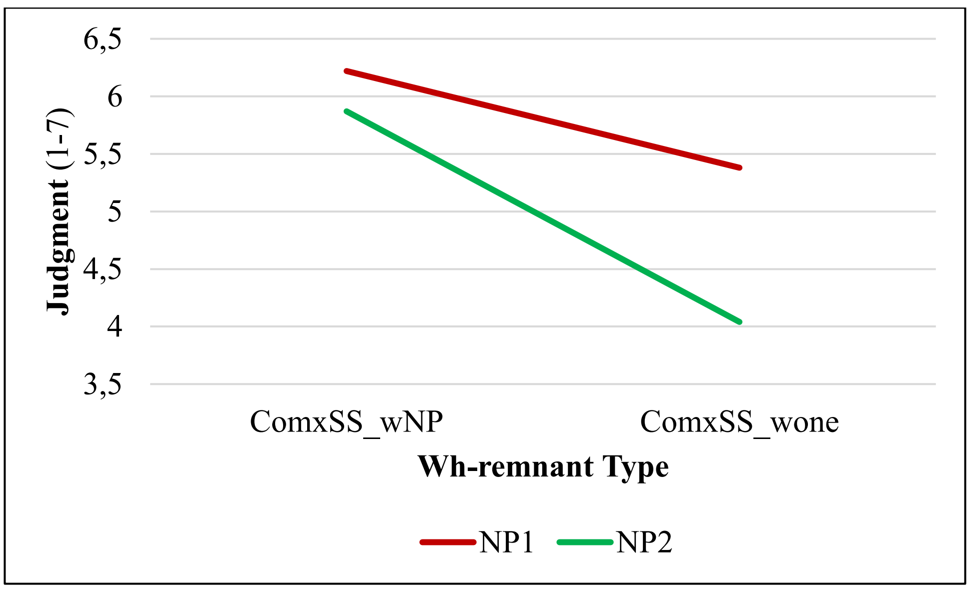


Figure 20. Mean Judgment as a Function of *Wh*-remnant Type and AT

It shows that both NP1 and NP2 are judged better when they serve as antecedent of ComxSS_wNP rather than ComxSS_wone. Especially the acceptability of NP2 is significantly improved between the two Sluicing Types. This difference can also be supported with the results of paired *t*-Tests comparing condition (6) to (8) as well as condition (7) to (9) [Condition

(6) vs. (8): t_1 (52) = 5.902, $p < 0.001$; t_2 (19) = 6.909, $p < 0.001$; Condition (7) vs. (9): t_1 (52) = 9.676, $p < 0.001$; t_2 (19) = 10.260, $p < 0.001$].

Discussion

The results of pilot acceptability judgment study 1 answer a variety of questions. Hypotheses H(1), H(3b), H(4) and H(5) have been supported. Hypotheses H(2) and H(3a) could not be supported.

With respect to study 1.1., the judgments of conditions (1) and (2) illustrate that there is a difference between ACSimS and ASimS: ACSimS is much less acceptable. Whether this decreased acceptability has to do with the underlying island sensitivity of contrastive sluicing structures or whether it is related to the different types of NPs (definite NPs vs. indefinite NPs), though, cannot be answered since contrastive sluicing with *who else* and definite NPs are impossible to separate from each other: The definite NPs of condition (1) are mandatory for contrastive structures if they want to serve as possible antecedents of *who else*. However, definite NPs do not trigger a subsequent question. The indefinite NPs of (2) are appropriate antecedents of the non-contrastive *which one.* Due to their indefiniteness, these NPs trigger a subsequent question. This might explain why ACSimS receives worse judgments than ASimS. Note though, that the results do not depict ACSimS as an unacceptable or unnatural structure: it still received an average rating of 3.7 which lies in the middle of the scale and consequently counts as a neutral structure. Only in comparison to a non-contrastive but similar structure, whose judgment is 5.07, does it seem degraded. Hypothesis H(1) has thus been supported: ASimS receives better judgments than ACSimS.

With respect to study 1.2., the judgments for conditions (2) and (5) illustrate that ASimS and AComxSS are very similar to each other. The small difference of 0.11 (5.07 for condition (2) and 5.18 for condition (5)) did not reach statistical significance. Interestingly, the presumably easier ASimS were judged to be slightly worse than AComxSS for which increased processing effort should have decreased the judgments. I suspect that this has to do with the lexicalizations and the general structure of the simple sluicing items, which occasionally sounded odd due to the requirement that they must be comparable to the target items of the production study Chicago (which were presented following a context and therefore sounded more natural). The lexicalizations and the structure of the complex sluicing items were not restricted to a specific pattern and might thus have led to more natural sounding structures and consequently better judgments. A comparison of equally natural sounding simple and complex sluicing structures would deliver more representative results and should be kept in mind for future studies. For now, hypothesis H(2) can thus not be supported: ASimS does not receive slightly better judgments than AComxSS.

With respect to study 1.3., there was no significant difference between conditions (3), (4), (6) and (7), illustrating that NP1 and NP2 as antecedents of either SimS_wNP or ComxSS_wNP do not differ from each other. Only a comparison of the different Antecedent Types separately for the two sluicing structures showed that NP1 differs significantly from NP2 of ComxSS_wNP. These results demonstrate that from a statistical point of view, NP1 and NP2 are equally acceptable as antecedents of a *wh*-remnant in SimS_wNP. In ComxSS_wNP, however, there is a significant difference between NP1 and NP2, with the latter being less acceptable than the former: the mean judgment of condition (8) was 5.87 as compared to 6.22 of condition (7). This supports findings from Konietzko, Radó, and Winkler (submitted) who showed for German complex sluicing that the island antecedent is somewhat less acceptable than the matrix antecedent, as long as the RC of the complex sluicing structure has not been extraposed. The fact that the judgment difference is not huge but significant supports the general assumption that sluicing is island insensitive (as argued by Ross, 1969; Lasnik, 2001; Merchant, 2001, 2008 and others). Hypothesis (3) has thus partly been supported: contrary to the predictions, SimS_wNP with an NP2 as antecedent receives worse (rather than better) judgments than SimS_wNP with NP1 as antecedent. Although this difference was not significant, the result does not support H(3)a. ComxSS_wNP with NP1 as antecedent, however, does receive better judgments than ComxSS_wNP with NP2 as antecedent, thus supporting H(3)b.

With respect to study 1.4., there are highly significant differences between conditions (5) and (9), illustrating that AComxSS is better than ComxSS_wNP with NP2 as antecedent. Compare the mean of condition (5), which is 5.18, with the mean of condition (9), which is 4.04. Although condition (5) is worse than condition (8), the difference between AComxSS and ComxSS_wNP with NP1 as antecedent is not significant: compare 5.18 of condition (5) to 5.38 of condition (8). This results further supports Frazier and Clifton's (1998) findings. With respect to the comparison of conditions (8) and (9), ComxSS_wNP with NP2 as antecedent is highly dispreferred. Hypothesis H(4) has therefore been supported: AComxSS receives better judgments than ComxSS_wNP with NP2 as antecedent.

With respect to study 1.5., the analysis of the differences between conditions (6), (7), (8) and (9) yielded highly significant results, which means that the acceptability of ComxSS changes tremendously depending on which NP is the antecedent of the sluicing structure and whether or not the *wh*-remnant is contentful. The interaction of the two factors *Wh-remnant Type* and *Antecedent Type* shows that the judgments of structures with NP1 or NP2 as antecedents interact with how contentful the *wh*-remnant is: The addition of a contentful NP to the *wh*-remnant significantly improves the judgments of both Antecedent Types but the effect is greater for NP2: The mean values are 6.22 for condition (6), 5.87 for condition (7), 5.38 for condition (8) and 4.04 for condition (9). This illustrates that there is a tremendous difference between NP1 and NP2 as antecedents when the *wh*-remnant is not contentful (*which one/which ones*). This difference, however, is diminished (mostly due to a significant increase of NP2) when a contentful NP is added to the *wh*-remnant. This shows that readers prefer contentful *which NP* remnants over mere *which one* remnants, thus supporting previous findings about the difference between *which NP* and bare *wh*-phrases by Frazier and Clifton (2011). These findings also add further insight to the results by Goodall (2014) who found that d-linking generally has an ameliorating effect upon island extractions. In this study, I showed that contentful d-linking, as a further step from d-linking alone, additionally improves the acceptability of an island antecedent. Hypothesis (5) has therefore been supported: ComxSS_wNP receives better judgments than ComxSS_wone.

Consequences

Pilot study 1 has answered a variety of questions. First, it has shown that it is difficult to compare contrastive (ACSimS) to non-contrastive (ASimS) sluicing structures. These two types of sluicing structures have different, mutually exclusive requirements for their *wh*-remnants, namely *who else* and *which one.* This results also in different requirements for the structure of their respective antecedents: Whereas *who else* requires a definite NP to be its antecedent, the opposite is true for *which one,* which requires an indefinite NP. Furthermore, definite NPs do not foreshadow the appearance of a question since no constituent in the structure is undefined or leaves otherwise room for uncertainty. This is different with indefinite

NPs where one might automatically wonder who exactly the speaker is talking about. Moreover, the specific pattern of the target items taken from the pilot production study Chicago contain structures that sound odd without context. For example, a dative construction (see (227)) would sound more natural without a context than the double object construction which was used for the pilot production study Chicago (see (228)).

(227) Aaron bought a new bible for Lily.

(228) Aaron bought Lily a new bible.

All these differences affect the reader before he even gets to the *wh*-remnant at the end of the structure. The contrastiveness of the *wh*-remnant *who else* might then further add to the unacceptability of condition (1), since contrastive sluicing structures are island sensitive and do therefore not allow an antecedent within the RC. As a result, I refrain from including this comparison in further studies – be it acceptability judgment or production studies. Since ACSimS received only neutral, or even unnatural, judgments, and I need to eliminate as many confounding factors from my items as possible, I will exclusively investigate non-contrastive sluicing with the *wh*-remnant *which one* in future studies. To conclude, H(1) has been supported. Consequently condition (1) will be excluded from future studies.

Second, it has been shown that the differences between ASimS and AComxSS, conditions (2) vs. (5), did not yield a significant effect, thus not supporting H(2). Since this is probably due to the structure of the lexicalizations and not due to an inherent difference between the two sluicing structures, I will re-investigate H(2) in study 2, however, this time with unambiguous structures.

Third, the comparison of conditions (3) and (4) has shown that SimS_wNP does not exhibit a tremendous difference in acceptability between NP1 and NP2 as antecedents, thus not supporting H(3a). This is surprising, since it is clearly stated in the literature that NP2, the object NP, is the preferred antecedent of a simple sluicing structures (Frazier & Clifton, 1998; Carlson et al., 2009). However, it may be that the results of this comparison are also affected by the lexicalizations of the simple sluicing structures. I will therefore re-investigate H(3a) in study 2 with improved lexicalizations.

Fourth, the significant difference between ComxSS_wNP with NP1 and NP2 as antecedents (conditions (6) and (7)) has shown that although sluicing structures are assumed to be island insensitive, condition (7) is nevertheless slightly dispreferred. It would be interesting to see whether these differences persist under slight modifications to the complex structures (such as moving the subject RC from after the subject NP to after the object NP to make it more comparable to Merchant (2001) original complex sluicing structure discussed in chapter 2.1.3.1) and whether such differences in acceptability would be reflected in prosody. It might be that a dispreferred antecedent is produced with weaker prosodic cues since it is less acceptable as an antecedent. Consequently, I will re-investigate H(3b) in study 2.

Fifth, it has been revealed that it is difficult to control which reading a participant has in mind when processing an ambiguous structure and to therefore draw conclusions regarding acceptability judgments. Consequently, I will exclude any sort of globally ambiguous sluicing structures in future studies. Although H(4) has been supported, I will exclude conditions (1), (2) and (5).

Finally, the comparison of ComxSS_wNP with ComxSS_wone has shown that the differences between NP1 and NP2 can be closely approximated with contentful *wh*-remnants. Since I am ultimately interested in the prosodic realizations of different sluicing structures that are not influenced by any ameliorating or degrading factors, I will not include contentful *wh*-remnants in future studies. Since H(5) has been supported, all structures with contentful *wh*-remnants, that is, conditions (6) and (7), will be excluded from future studies.

From this pilot acceptability judgment study thus results a set of new research questions which are summarized below. These new research questions will be addressed in the next chapter, discussing acceptability judgment study 2.

New Research Questions

(1) Is there a difference in acceptability between simple sluicing and complex sluicing?
(2) Which NPs are the preferred antecedents of simple and complex sluicing?
(3) Is there a difference between complex sluicing with an RC positioned after the subject NP vs. after the object NP?

3.2.2.2 Acceptability Judgment Study 2

This study is a follow up to pilot acceptability judgment study 1. As a direct consequence of pilot study 1, this study 2 will look exclusively at non-contrastive and unambiguous sluicing structures. The main goal of this study is thus to answer questions regarding the preferred antecedents and the influence of certain structural modifications by comparing complex sluicing to different types of simple sluicing. This study therefore consists of two sub-studies (studies 2.1. and 2.2.), addressing the different structures simple sluicing (SimS), simple embedded sluicing (SimES), complicated simple sluicing (ComSimS) and complex object sluicing (ComxOS).[65]

Research Questions and Hypotheses

In this study and its two sub-studies, I will investigate the following research questions:

1) Is there a difference in acceptability between SimS and ComxOS? In pilot study 1, I compared ambiguous simple sluicing (ASimS) to ambiguous complex sluicing (AComxSS) to answer this question. However, ambiguous structures turned out to be unsuitable for an investigation of acceptability differences. In study 2, I will exclusively look at unambiguous sluicing structures. I will therefore compare SimS with either NP1 or NP2 as antecedent to ComxOS with either NP1 or NP2 as antecedent. I assume that the increased processing effort of a subject RC might result in slightly degraded judgments for ComxOS as compared to SimS. (Studies 2.1. and 2.2.)

2) Which NP is the preferred antecedent of a *wh*-remnant in SimS? I repeat this question from pilot study 1, since the judgments for SimS did not deliver conclusive results due to odd lexicalizations. I expect NP2 to be the preferred antecedent of SimS. This has also been noted by Frazier and Clifton (1998) and Carlson et al. (2009) who found that the object NP (or the last argument NP) of a simple sluicing structure constitutes the preferred antecedent. The lexicalizations have been revised for study 2 and should thus lead to more representative results. (Study 2.2.)

[65] The exact syntactic structures of the four sluicing types were developed together with Prof. Dr. Sophie Repp (Universität zu Köln, Institut für Deutsche Sprache und Literatur/Sprachwissenschaft) who served as a consultant to this project.

3) Which NP is the preferred antecedent of a *wh*-remnant in ComxOS? The results for ComxSS from pilot study 1 suggest that NP1 is the preferred antecedent. Is this still the case when the RC of complex sluicing is moved to a position after the object NP rather than after the subject NP? I expect that NP2 is the dispreferred antecedent of both structures. However, it should be more acceptable as an antecedent of ComxOS (with the RC after the object NP) than ComxSS (with the RC after the subject NP) since the latter combines two island structures rather than one in its un-elliptical version (*Complex NP Constraint* and *Subject Constraint*, see Ross, 1967, 1969; Cantor, 2013, as discussed in chapter 2.1.5.2).[66] Compare the structure in (229) to the one in (230). In (229), the NP *cheerleaders* has to be extracted out of an RC that is part of a complex subject, thus violating two island constraints: the Complex NP Constraint and the Subject Constraint. In (230), though, the NP *cheerleaders* only has to be extracted out of an RC, thus only violating one island constraint, namely the Complex NP Constraint.

(229) **[A quarterback that had dated some cheerleaders]$_{\text{Subject}}$ has been expelled. Do you know which [*cheerleaders* [a quarterback [that had dated _]$_{\text{Complex NP Constraint}}$]$_{\text{Subject Constraint}}$ has been expelled]?

(230) *They expelled [a quarterback that had dated some cheerleaders]$_{\text{Object}}$. Do you know which [*cheerleaders* they expelled a quarterback that had dated _]$_{\text{Complex NP Constraint}}$?

I therefore expect ComxOS with NP2 as antecedent to receive better judgments than ComxSS with NP2 as antecedent of pilot study 1 did. Moreover, I want to investigate the acceptability of ComxOS since the RC of the original complex sluicing structure by Merchant (2001) is also positioned after the object, as illustrated in (231) and (232). This modification will make the results of my study more comparable to examples discussed in the literature. (Study 2.1.)

(231) They want to hire someone who speaks a Balkan language but I don't know which.

[66] It is not possible to directly compare the results of pilot study 1 and study 2 since different lexical material has been used. I therefore refrain from discussing any differences between complex sluicing with different types of RC positions here by comparing the results of the pilot study with the results of the present study. However, this comparison will be picked up in study 3.

(232) They want to hire someone who speaks a Balkan language but I don't know which [~~they want to hire someone who speaks a Balkan language~~]

(Merchant, 2001, p. 148)

4) How does the acceptability of NP2 as an antecedent differ between ComSimS and ComxOS? These two types of sluicing are structurally similarly complicated but differ in whether the underlying un-elliptical structure constitutes an island or not. Both structures have an embedded clause: In ComSimS, the embedded clause is a complement clause which does not constitute an island to extraction. There is consequently no island in its un-elliptical version and extraction out of the complement clause is unproblematic. In ComxOS, however, the embedded clause is an RC which constitutes an island to extraction. There is therefore an island in its un-elliptical version and extraction out of the RC is not allowed (Ross, 1969; Merchant, 2001). A comparison of ComxOS to a structure that is as similar as possible to it while not containing a structure that is an island to extraction shows whether the judgments of NP2 as an antecedent of ComxOS are due to its embeddedness in general, or whether they are due to the underlying island. (Study 2.1.)

5) Does embedding have an effect upon the acceptability of SimS? Answering this question is important for the analysis of complex sluicing. It needs to be assured that whichever effects will be found for ComxOS are due to the RC structure, and not merely due to the embeddedness of NP2. In addition to research question 4, I also want to explore whether embedding has an effect upon the acceptability of SimS. If NP2 would receive worse judgments in SimES than in SimS, this would suggest that embedding already has a negative effect upon the acceptability of NP2 of simple sluicing structures. (Study 2.2.)

I thus investigate the following hypotheses with respect to acceptability judgment study 2:

Hypotheses

(1) SimS receives better judgments than ComxOS. (H(1); Studies 2.1. and 2.2.)

(2) In SimS, structures with NP2 as antecedent (object NP) receive better judgments than with NP1 as antecedent (subject NP). (H(2); Study 2.2.)

(3) In ComxOS, structures with NP1 as antecedent (matrix NP) receive better judgments than with NP2 as antecedent (embedded NP). (H(3); Study 2.1.)

(4) NP2 receives better judgments in ComSimS than in ComxOS. (H(4); Study 2.1.)

(5) There is no difference between SimS and SimES. (H(5); Study 2.2.)

Method

Design and Predictions

Study 2 combines two sub-studies, each consisting of a 2x2 factorial design. The two within subject factors of study 2.1. are *Complex Structure Type* (ComSimS vs. ComxOS) and *Antecedent Type* (NP1 vs NP2). The two within subject factors of study 2.2. are *Embeddedness* (not embedded vs. embedded) and *Antecedent Type*. Study 2 thus results in eight conditions, which are illustrated in Table 17. The factor *Complex Structure Type* describes two different sluicing structures who both have a similarly complex underlying syntactic structure, while one is still a simple sluicing structure and the other one a complex sluicing structure (ComSimS vs. ComxOS). The factor *Embeddedness* describes two simple sluicing structures, one not being embedded (SimS), the other one being embedded (SimES). The factor *Antecedent Type* describes whether the sluicing structures take NP1 or NP2 as their respective antecedents. For SimS and SimES, NP1 means subject NP and NP2 means object NP. For ComSimS and ComxOS, NP1 means matrix NP and NP2 means embedded NP.

Cond.	**Simple Sluicing**	**Cond.**	**Complex Sluicing**
(1)	**SimS (NP1)** On Tuesday a lawyer defended some dealers. Do you know which one?		
(2)	**SimS (NP2)** On Tuesday a lawyer defended some dealers. Do you know which ones?		
(3)	**SimES (NP1)** They said that a lawyer defended some dealers. Do you know which one?		

(4)	**SimES (NP2)** They said that a lawyer defended some dealers. Do you know which ones?		
(5)	**ComSimS (NP1)** They informed a lawyer that he had defended some dealers. Do you know which one?		
(6)	**ComSimS (NP2)** They informed a lawyer that he had defended some dealers. Do you know which ones?		
		(7)	**ComxOS (NP1)** They hired a lawyer that had defended some dealers. Do you know which one?
		(8)	**ComxOS (NP2)** They hired a lawyer that had defended some dealers. Do you know which ones?

Table 17. Eight Conditions of Acceptability Judgment Study 2

My predictions for study 2 are as follows: 1) With respect to H(1), I predict that SimS will receive better judgments than ComxOS: conditions (1), (2) > conditions (7), (8). 2) With respect to H(2), I predict that SimS with NP2 as antecedent will receive better judgments than with NP1 as antecedent: conditions (2), (4) > conditions (1), (3). 3) With respect to H(3), I predict that ComxOS with NP1 as antecedent will receive better judgments than with NP2 as antecedent: condition (7) > condition (8). 4) With respect to H(4), I predict that NP2 will receive better judgments in ComSimS than in ComxOS: condition (6) > condition (8). 5) With respect to H(5), I predict that SimS and SimES will receive similar judgments: conditions (1), (2) = conditions (3), (4).

Participants

Participants were recruited via Amazon Mechanical Turk©. Sixty-six native speakers of American English participated in the study who were all naïve as to the purpose of the study. None of them took part in pilot study 1. There were 42 males and 24 females, aged between 20 and 68 years old with a mean age of 38.06 years. An additional eleven participants had to be excluded from the study for the same reasons as before: they stated in the personal information survey that their mother tongue was something else than English. The entire study lasted about 15 minutes and participants received $ 2.50 for participation.

Material

The study contained 62 items out of which 32 were target items and 30 were filler items. The 32 target items consisted of eight items per Sluicing Type, each of which had 16 lexicalizations.[67] All target and filler items can be found in the appendix, section 5. The structures of the four different Sluicing Types are illustrated in Table 18 through Table 21. All sluicing structures consisted of two parts: a declarative clause and a sluiced interrogative clause. The declarative clauses of SimS were a standard SVO clause consisting of a subject NP (NP1), a VP and an object NP (NP2). The declarative clauses of SimES were the same SVO clauses as for SimS but embedded into another clause consisting of a PRN, a VP and the complementizer *that*. The declarative clauses of ComSimS began with a standard SVO clause consisting of a PRN, a VP and an object NP (NP1), followed by the complementizer *that* and another standard SVO clause, consisting of a PRN, a VP and an embedded object NP (NP2). This structure is called *complicated simple sluicing* since it is a simple sluicing structure that is similarly complex in its underlying syntactic structure to a complex sluicing structure without being one. ComSimS does not constitute a complex sluicing structure since the embedded clause is a complement clause rather than an RC. Finally, the declarative clauses of ComxOS began similarly to ComSimS with a standard SVO clause, consisting of a PRN, a VP and an object NP (NP1). They were then followed by the relative PRN *that* a VP and an embedded

[67] Finding lexical material to create minimal pairs for SimS and ComxOS (that also fulfill the requirements for prosodic analysis) is extremely labor-intensive. I therefore created 16 rather than 32 lexicalizations. To make sure that no lexicalization occurs twice in a row in the study, target and filler items were presented to the participants in two blocks.

object NP (NP2). Note that in SimS and SimES, NP1 was always a subject NP and NP2 was always an object NP. In ComSimS and ComxOS, both NP1 and NP2 were object NPs, once the matrix object NP and once the embedded object NP. This similarity between the respective conditions is important with respect to later prosodic analysis.

PP	***a* NP1**	**VP**	***some* NP2.**	***Do you know which one/s?***
On Tuesday	a lawyer	defended	some dealers.	Do you know which one/s?

Table 18. Structure of SimS

They* VP *that	***a* NP1**	**VP**	***some* NP2.**	***Do you know which one/s?***
They said that	a lawyer	defended	some dealers.	Do you know which one/s?

Table 19. Structure of SimES

***They* VP**	***a* NP1**	***that***	**PRN**	**VP**	***some* NP2.**	***Do you know which one/s?***
They informed	a lawyer	that	he	had defended	some dealers.	Do you know which one/s?

Table 20. Structure of ComSimS

***They* VP**	***a* NP1**	***that***	**VP**	***some* NP2.**	***Do you know which one/s?***
They hired	a lawyer	that	had defended	some dealers.	Do you know which one/s?

Table 21. Structure of ComxOS

In contrast to pilot study 1, I differentiated in study 2 between *a* and *some* as an indefinite QP for singular and plural NPs (alternating between NP1 and NP2). There are several reasons for this modification: First, the alternating use of *a* and *some* guarantees that the singular/plural distinction of the sluiced interrogatives is noticed by the participants. It ensures that a singular NP is read as such and a singular/plural ambiguity of *some* is thus avoided. Second, the structures sound more natural if there is some variation within the single sentences. This is important since I need to exclude as many factors as possible from the structures that may lead to an unacceptable rating. Third, singular *some* is ambiguous between an epistemic reading and a non-epistemic reading (Alonso-Ovalle & Menéndez-Benito, 2003, 2013; Aloni & Port, 2015).

Alternating between *a* and *some* hence helps to avoid additional ambiguity caused by the use of singular *some* as an indefinite QP.[68]

Since this acceptability judgment study served as a pre-test for the subsequent production study Quarterback, the items also needed to be controlled for certain phonological factors that are important concerning speech analysis. First, conditions that will be compared prosodically must have the same number of syllables. Therefore, SimS and SimES have an identical or nearly identical number of syllables, as do ComSimS and ComxOS. The first part of all four structures is always three syllables long: the PP of conditions (1) and (2) (SimS) consists of the preposition *on* and a day, resulting in e.g., *On Tuesday*, *On Tuesday* etc.[69] VP_1 of conditions (3) and (4) (SimES) varies between *said*, *claimed* and *thought.* VP_1 of conditions (5) and (6) (ComSimS) is always *informed*. The VP_1 of conditions (7) and (8), (ComxOS) varies between *hired, fired, honored* and *scolded.* The underlined parts in Table 18 through Table 21 represent those regions of the sentences that I am planning to compare prosodically in the production study and share thus an equal number of syllables (nine for SimS and SimES, 11/12 for ComSimS and ComxOS). The difference of syllable length between ComSimS and ComxOS has to do with the fact that ComSimS requires an additional PRN to be similar in its complexity to ComxOS while still being a simple sluicing structure. Second, the constituents that are of special prosodic interest must have the exact same number of syllables to ensure comparability. From this follows that all NPs throughout all conditions are exactly two syllables long. Third, said NPs should consist of as many sonorant sounds as possible. Sonorants tend to be voiced and are therefore more likely to show up on an F0 curve, which is vital for pitch measurements. Sonorants are, for example, nasals (e.g., *m, n*), liquids (e.g., *l*) or vowels (*a, e, i, o, u*). Voiceless consonants such as certain stops (*p,t,k*) or fricatives (*v, z*) do not show up on the F0 curve of a prosodic analysis which thus leads to erroneous or missing pitch measurements.

[68] There has also been the claim that singular *a* is ambiguous between a referential and a quantificational reading, as argued by Fodor and Sag (1982). However, a quantificational (or generic) reading as in *each student* or *few students* is unlikely for the items of this study (??*On Monday, each lawyer/few lawyers defended some dealers. Do you know which one?*). The referential reading is the only logical reading here (*On Monday, a (particular) lawyer (whom I do not identify) defended some dealers. Do you know which one?*). I therefore do not consider this ambiguity an excluding factor for my study.

[69] *Saturday* was excluded because of a different number of syllables.

The filler items were the same as for pilot study 1. All target and filler items were distributed across eight experimental lists. They were presented following a Latin Square so that each participant saw each of the eight conditions in only one of the 16 lexicalizations per block.

Procedure

The procedure was the same as for pilot study 1, the only difference being that this study consisted of 62 trials.

Results

I conducted the statistical analysis with SPSS. I computed two ANOVAs and additional *t*-Tests to investigate the significance of certain differences. The mean values of all conditions are represented in Table 22 and in Figure 21. I will start with the statistical analysis of study 2.1., investigating hypotheses H(3) and H(4), followed by study 2.2., investigating hypotheses H(2) and H(5). Hypothesis H(1) will be investigated by comparing the results of H(2) and H(3).

Cond.	**Structure**	**Mean**
(1)	SimS (NP1)	4.93
(2)	SimS (NP2)	5.81
(3)	SimES (NP1)	4.95
(4)	SimES (NP2)	5.71
(5)	ComSimS (NP1)	4.62
(6)	ComSimS (NP2)	5.38
(7)	ComxOS (NP1)	5.14
(8)	ComxOS (NP2)	5.35

Table 22. Mean Judgment of Acceptability Judgment Study 2 per Condition

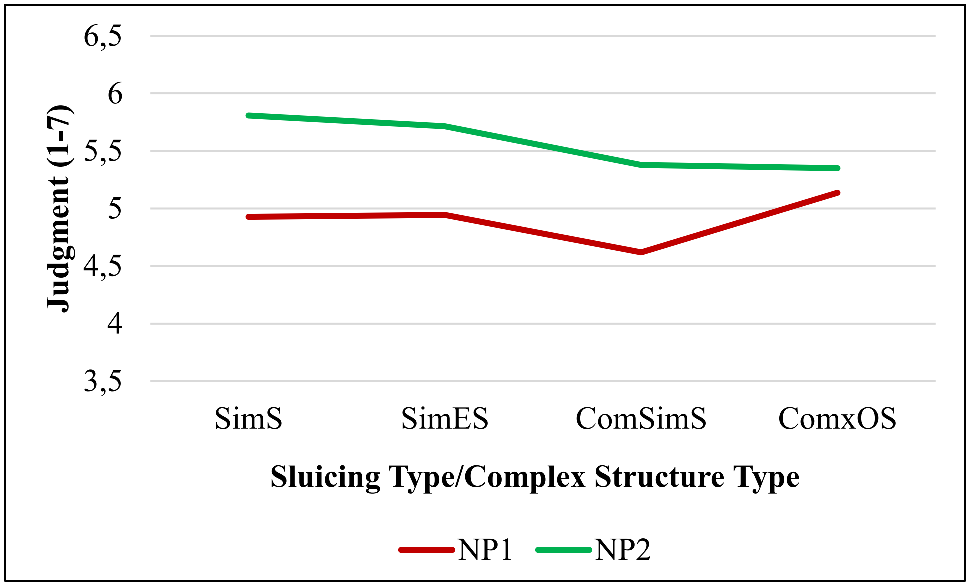


Figure 21. Mean Judgments of Acceptability Judgment Study 2 per Condition

Study 2.1. investigates hypotheses H(3) and H(4). Hypothesis H(3) refers to the question which NP is the preferred antecedent of ComxOS. Hypothesis H(4) refers to the question whether the unacceptability of an RC antecedent comes from the fact that it is located inside an underlying island to extraction (as it is the case in ComxOS) or whether it has to do with complex embedding in general (as it is the case in ComSimS). I computed an ANOVA with participants (F_1) and items (F_2) as random factors, comparing ComSimS with either NP1 (condition (5)) or NP2 (condition (6)) as antecedent with ComxOS with either NP1 (condition (7)) or NP2 (condition (8)) as antecedent. The factor *Complex Structure Type* was crossed with the factor *Antecedent Type*. The analysis yielded significant effects for both factors (Antecedent Type only in the analysis of F_1) as well as for the interaction [*Complex Structure Type*: F_1 (1,63) = 9.662, p = 0.003; F_2 (1,15) = 6.497, p = 0.022; *Antecedent Type:* F_1 (1,63) = 17.609, p < 0.001; F_2 (1,15) =23.000, p = 0.681; *Complex Structure Type x Antecedent Type*: F_1 (1,63) = 12.276, p = 0.001; F_2 (1,15) = 9.457, p = 0.008]. The results indicate that there is a significant difference between ComSimS and ComxOS as well as between the two Antecedent Types. The interaction between the two factors shows that the two NPs are judged differently depending on which Sluicing Type they are in. This is illustrated in Figure 22 which shows that the two judgments for NP2 are close to each other.

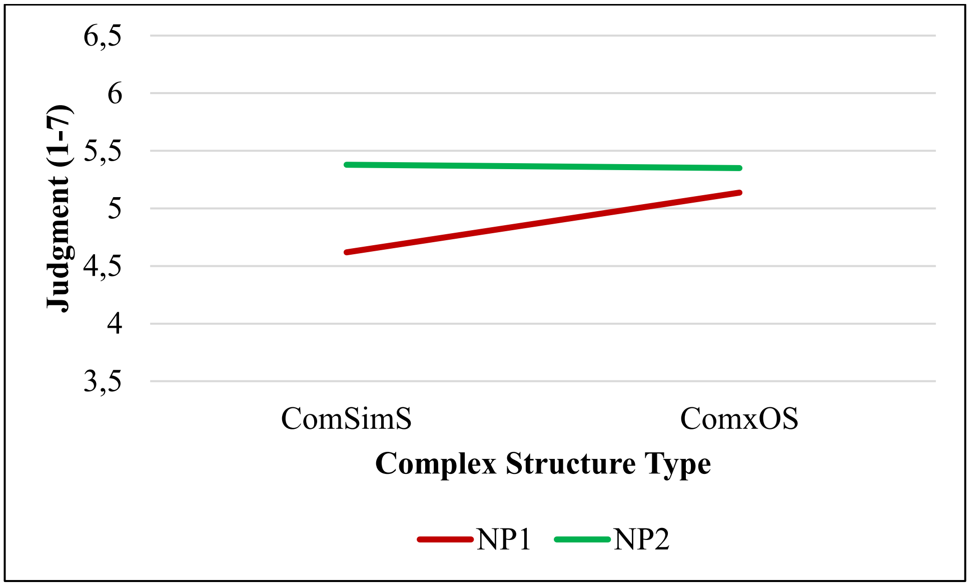


Figure 22. Mean Judgment as a Function of CST and AT

This also becomes apparent by having a look at the mean values of these two conditions: 5.38 for condition (6) and 5.35 for condition (8). The two judgments for NP1 vary tremendously: 4.62 for condition (5) and 5.14 for condition (7). I thus conducted additional paired *t*-Tests to investigate whether these differences are significant. The *t*-Tests support the assumption that the difference between the two NP2 judgments is not significant, whereas the difference between the two NP1 judgments is significant [Condition (5) vs. (7): t_1 (63) = 4.354, $p < 0.001$; $t2$ (15) = 3.989, $p = 0.001$; Condition (6) vs. (8): t_1 (63) = 0.283, $p = 0.778$, $t2$ (15) = 0.228, $p = 0.823$]. These results are surprising, especially the ones for ComxOS, where the theoretically dispreferred NP2 has been judged to be better than the theoretically preferred NP1. However, further *t*-Tests showed that the difference between conditions (7) and (8) is not significant [t_1 (63) = 1.616, $p = 0.111$; $t2$ (15) 1.602, $p = 0.130$].

Study 2.2. investigates hypotheses H(2) and H(5). Hypothesis H(2) refers to the question which NP is the preferred antecedent of SimS. Hypothesis H(5) refers to the question whether embedding has an effect upon the acceptability of SimS. I computed an ANOVA with participants (F_1) and items (F_2) as random factors, comparing SimS with either NP1 (condition (1)) or NP2 (condition (2)) as antecedent with SimES with either NP1 (condition (3)) or NP2 (condition (4)) as antecedent. The factor *Embeddedness* was crossed with the factor *Antecedent Type*. The analysis yielded the following results: There was a significant effect of *Antecedent Type* [*Embeddedness*: F_1 (1,63) = 0.249, $p = 0.619$; F_2 (1,15) =0.175, $p = 0.681$; *Antecedent*

Type: F_1 (1,63) = 37.561, $p < 0.001$; F_2 (1,15) = 22.945, $p < 0.001$; *Embeddedness x Antecedent Type*: F_1 (1,63) = 0.595, $p = 0.443$; F_2 (1,15) = 0.315, $p = 0.583$]. The results indicate that there is no difference in judgments between SimS and SimES, thus suggesting that there is no effect of embedding. There was, however, a difference between NP1 and NP2 as antecedent of both Sluicing Types, see Figure 23. It illustrates that NP1 is less acceptable as an antecedent than NP2: compare the mean values of NP1 (4.93 for condition (1) and 4.95 for condition (3)) to the mean values of NP2 (5.80 for condition (2) and 5.71 for condition (4)).

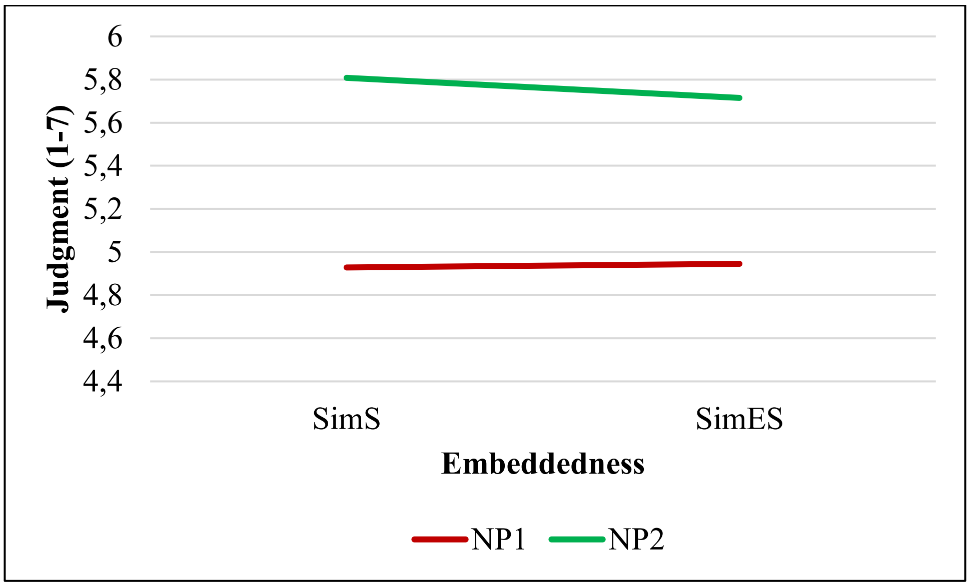


Figure 23. Mean Judgment as a Function of Embeddedness and AT

Discussion

The results of study 2 answer a variety of questions. Hypotheses H(2) and H(5) have been supported. Hypotheses H(1), H(3) and H(4) could not be investigated due to questionable results of conditions (7) and (8).

With respect to study 2.1., the comparison of conditions (5) and (6) to conditions (7) and (8) yielded surprising results. The judgments of ComSimS (conditions (5) and (6)) are as predicted and easy to explain: NP2 receives much better judgments than NP1, showing that the object NP is the preferred antecedent of simple sluicing structures, even if NP2 is part of an embedded complement clause. Consequently, it seems that mere structural complexity does not decrease the acceptability of NP2. The results for ComxOS (conditions (7) and (8)), however, are contrary to predictions: NP2, condition (8), receives better judgments than NP1, condition (7). There is a difference of 0.21. Whereas this difference is not significant, as shown with additional *t*-Tests, it is nevertheless surprising. How come that a theoretically dispreferred island antecedent is judged to be more acceptable than a theoretically preferred matrix antecedent? I suspect that these results are due to an adaptation effect. Participants might have gotten used to structures in which NP2 is more acceptable than NP1 because the distribution of simple and complex sluicing structures was not equal: simple sluicing dominated the study with three quarters of all target items.[70] The judgments can thus not be taken to be representative for the acceptability of ComxOS. This might also explain why the difference between NP2 in the two sluicing structures is not significant. It is therefore not possible to draw conclusions about any hypotheses concerning complex sluicing. Consequently, hypotheses H(1), H(3) and H(4) cannot be investigated with this study.

With respect to study 2.2., the comparison of conditions (1) and (2) to conditions (3) and (4) clearly shows that embedding has no effect upon the acceptability of simple sluicing. In Figure 23, it seems that that the judgments of SimES improve slightly for NP1 and decrease slightly for NP2. However, this difference is not significant as evident by the lack of a significant interaction. Hypothesis H(5) has thus been supported: embedding has no effect upon the acceptability of simple sluicing structures. Figure 23 furthermore illustrates that both structures with NP2 as antecedent were judged to be natural, whereas both structures with NP1 as antecedent were judged to be worse. This does not mean that simple sluicing (embedded or not) with a subject antecedent is regarded to be unacceptable. Both structures received an average rating of 4.9, which is still in the upper third of the scale and hence describes the structure to be natural. Only in comparison to object antecedents does its acceptability decrease. Hypothesis H(2) has thus been supported: in both SimS and SimES, NP2 receives better judgments than NP1.

[70] The adaptation effect discussed here is similar to the *satiation effect* discussed in Snyder (2000), Crawford (2012), Chaves and Dery (2014) and Do and Kaiser (2017). The satiation effect states that ungrammaticality judgments of certain structures improve significantly after repeated exposures. This is especially the case for structures containing a complex NP constraint violation (Do & Kaiser, 2017; Snyder, 2000). The difference between said satiation effect and the adaptation effect discussed here is that the former results out of repeated exposure of a singular structure and a subsequent improvement of said structure, whereas the latter results from an imbalance of acceptable and unacceptable structures and a subsequent improvement of the unacceptable structures due to an adaptation towards the acceptable structures.

Consequences

Study 2 has answered some questions while leaving others open. It has supported hypotheses H(5) and H(2), which means that the questions about an effect of embedding and about which NP is the preferred antecedent of SimS have been fully answered. What remains to be investigated are the questions how SimS and ComxOS compare (H(1)), which NP is the preferred antecedent of ComxOS (H(3)) and how acceptable NP2 as an antecedent is in ComSimS vs. ComxOS (H(4)).

Due to an imbalance of simple and complex sluicing structures, I argue that the judgments of conditions (7) and (8) have been affected by an adaptation effect. This leads to the problem that hypotheses H(1), H(3) and H(4) cannot be investigated with this study. To find out whether there really was an adaptation effect at work, I will reverse the imbalance of simple and complex sluicing structures in study 3. This means that study 3 will consist of three complex and one simple sluicing structure (namely ComSimS). Since there will thus again be an imbalance of Sluicing Types in study 3, I expect a similar adaptation effect but this time towards complex sluicing. I will therefore defer the re-investigation of hypothesis H(1) for later analysis in study 4. Hypothesis H(4) will be re-investigated in study 3, however, expecting that the judgments for ComSimS with NP2 as antecedent will decrease, due to the discussed adaptation effect. Hypothesis H(3) will also be re-investigated in study 3. If the present results of ComxOS have really been due to an adaptation effect, the judgments for conditions (7) and (8) should be reversed in study 3. If there was no adaptation effect and the results are representative for ComxOS after all, the judgments for conditions (7) and (8) of study 3 will be similar to those of study 2.

From this acceptability judgment study 2 thus results a set of new research questions, which are summarized below. These new research questions will be addressed in the next chapter, discussing study 3.

New Research Questions

(1) Are the results of conditions (7) and (8) of study 2 due to an adaptation effect towards simple sluicing?
(2) Which NP is the preferred antecedent of ComxOS? (H(3) from study 2)
(3) How does NP2 of ComSimS compare to NP2 of ComxOS? (H(4) from study 2)

3.2.2.3 Acceptability Judgment Study 3

This study is a follow up to study 2. It has four main goals: First, study 3 investigates whether the results of complex object sluicing from study 2 are due to an adaptation effect or not. Second, study 3 re-investigates hypotheses H(1), H(3) and H(4) from study 2, addressing questions about the differences between simple and complex sluicing, about which NP is the preferred antecedent of complex object sluicing and about the acceptability of NP2 of complicated simple sluicing vs. complex object sluicing. Third, study 3 examines differences between complex subject sluicing and complex object sluicing. Fourth, study 3 investigates whether extraposition affects the acceptability of NP2 as an antecedent of complex subject sluicing. This study thus consists of three sub-studies (studies 3.1., 3.2. and 3.3.) addressing the different structures complicated simple sluicing (ComSimS), complex object sluicing (ComxOS), complex intraposed subject sluicing (ComxISS) and complex extraposed subject sluicing (ComxESS).[71]

Research Questions and Hypotheses

In this study and its three sub-studies, I will investigate the following research questions:

1) Are the judgments of ComxOS, conditions (7) and (8), from study 2 due to an adaptation effect that resulted from an imbalance of simple sluicing and complex sluicing structures or are the judgments representative for complex sluicing? In order to investigate this question, I will retest the exact same items of conditions (7) and (8) from study 2 in study 3. This time, though, there will be a different type of imbalance: the study will consist of only one simple sluicing and three complex sluicing structures. If the results from study 2 were due to an adaptation effect, conditions (7) and (8) should now adapt to the judgments of complex sluicing structures, thus showing decreased judgments for condition (8) and improved judgments for condition (7). (Studies 3.1. and 3.2.)

2) Which NP is the preferred antecedent of a *wh*-remnant in ComxOS? I repeat this question from study 2, since the judgments for ComxOS did not deliver conclusive results. I expect NP1 to be the preferred antecedent. (Study 3.1.)

[71] Complex intraposed subject sluicing will also be referred to as ComxSS rather than ComxISS when the position of the RC is not specifically addressed.

3) How does the acceptability of NP2 as an antecedent differ between ComSimS and ComxOS? I repeat this question from study 2, since the judgments for ComxOS did not deliver conclusive results. I expect NP2 to be more acceptable in ComSimS than in ComxOS. (Study 3.2.)

4) Is there a difference between the acceptability of NP2 as an antecedent of ComxSS vs. ComxOS? ComxSS has been investigated in pilot study 1; ComxOS in study 2. However, these two structures cannot be directly compared to each other due to different lexical materials. Study 3 therefore compares ComxSS to ComxOS with identical lexical material. Since ComxSS is assumed to have two rather than one underlying island, I am especially interested in the judgments of ComxSS with NP2 as antecedent. I expect NP2 as an antecedent of ComxSS to be less acceptable than of ComxOS. (Study 3.3.)

5) What is the effect of extraposition of the RC upon ComxSS? Konietzko, Radó, and Winkler (submitted) found an ameliorating effect upon the acceptability of an island antecedent when the RC has been extraposed for German complex sluicing structures. I want to investigate whether such an effect can be replicated for English as well. Since extraposition of the RC in English is only possible with ComxSS structures, I will focus this investigation on ComxSS rather than ComxOS. (Study 3.3.)

I thus investigate the following hypotheses with respect to acceptability judgment study 3:

Hypotheses

(1) The judgments for ComxOS are as predicted in H(2). (H(1); Study 3.1.)

(2) In ComxOS, structures with NP1 as antecedent (matrix NP) receive better judgments than with NP2 as antecedent (embedded NP). (H(2); Study 3.1.)

(3) NP2 receives better judgments in ComSimS than in ComxOS. (H(3); Study 3.1.)

(4) ComxOS structures with NP2 as antecedent (embedded NP) receive better judgments than ComxSS structures with NP2 as antecedent (embedded NP). (H(4); Study 3.2.)

(5) ComxESS structures with NP2 as antecedent (embedded NP) receive better judgments than ComxISS structures with NP2 as antecedent (embedded NP). (H(5); Study 3.3.)

Method

Design and Predictions

Study 3 combines three sub-studies each consisting of a 2x2 factorial design. The two within subjects factors of study 3.1. are *Complex Structure Type* (ComSimS vs. ComxOS) and *Antecedent Type* (NP1 vs NP2). The two within subjects factors of study 3.2. are *Complex Sluicing Type* (ComxOS vs. ComxSS) and *Antecedent Type.* The two within subjects factors of study 3.3. are *RC Position* (intraposed vs. extraposed) and *Antecedent Type*. Study 3 thus results in eight conditions, illustrated in Table 23 below.[72] The factors *Complex Structure Type* and *Antecedent Type* are identical to study 2. The factor *Complex Sluicing Type* describes two different complex sluicing structures in which the RC is either positioned after the subject or after the object NP (ComxSS vs. ComxOS). The factor *RC Position* describes whether the RC of a ComxSS structure has been left in its canonical intraposed position or whether it has been extraposed (ComxISS vs ComxESS).

Cond.	Simple Sluicing	Cond.	Complex Sluicing
(5)	**ComSimS (NP1)** They informed a lawyer that he had defended some dealers. Do you know which one?		
(6)	**ComSimS (NP1)** They informed a lawyer that he had defended some dealers. Do you know which ones?		
		(7)	**ComxOS (NP1)** They hired a lawyer that had defended some dealers. Do you know which one?
		(8)	**ComxOS (NP2)** They hired a lawyer that had defended some dealers. Do you know which ones?

[72] To facilitate comparison of studies 2 and 3, I labeled the conditions according to study 2. Identical conditions are given the same numbers in both studies (conditions (5) through (8)). New conditions are labeled starting from number (9).

		(9)	**ComxISS (NP1)** A lawyer that defended some dealers has been hired. Do you know which one?
		(10)	**ComxISS (NP2)** A lawyer that defended some dealers has been hired. Do you know which ones?
		(11)	**ComxESS (NP1)** A lawyer has been hired that defended some dealers. Do you know which one?
		(12)	**ComxESS (NP2)** A lawyer has been hired that defended some dealers. Do you know which ones?

Table 23. Eight Conditions of Acceptability Judgment Study 3

My predictions for study 3 are as follows: 1) With respect to H(1), I predict that the results of ComxOS from study 2 are due to an adaptation effect and will therefore reverse in study 3: ComxOS with NP1 as antecedent will receive better judgments than with NP2 as antecedent: condition (7) > condition (8). Moreover, ComSimS with NP2 as antecedent will receive worse judgments than in study 2, thus adapting towards the judgments for NP2 as antecedent of complex sluicing and thereby illustrating that the results of conditions (7) and (8) of study 2 were due to an adaptation effect. 2) With respect to H(2), I predict that ComxOS with NP1 as antecedent will receive better judgments than with NP2 as antecedent: condition (7) > condition (8). 3) With respect to H(3), I predict that NP2 will receive better judgments as antecedent of ComSimS than of ComxOS: condition (6) > condition (8). 4) With respect to H(4), I predict that ComxOS with NP2 as antecedent will receive better judgments than ComxISS with NP2 as antecedent: condition (8) > condition (10). 5) With respect to H(5), I predict that ComxESS with NP2 as antecedent will receive better judgments than ComxISS with NP2 as antecedent: condition (12) > condition (10).

Participants

Participants were recruited via Amazon Mechanical Turk©. Sixty-four native speakers of American English participated in the production study who were all naïve as to the purpose of the experiment. None of them took part in pilot study 1 or study 2. There were 31 males and 33 females, aged between 23 and 68 years old with a mean age of 36.56 years. An additional eleven participants had to be excluded from the production study since they were not native speakers of American English. The entire production study lasted about 15 minutes and participants received $ 2.50 for participation.

Material

The design of the material was identical to that of study 2. There were again 62 items out of which 32 were target items and 30 are filler items. All target and filler items can be found in the appendix, section 6. The major differences between studies 2 and 3 are the different sluicing structures. The structures ComSimS (conditions (5) and (6)) and ComxOS (conditions (7) and (8)) have been adapted from study 2 without any modifications. The structures ComxISS (conditions (9) and (10)) and ComxESS (conditions (11) and (12)) were new and are thus illustrated in Table 24 and Table 25 below. The declarative clause of ComxISS began with a subject NP (NP1) and was directly followed by the relative PRN *that* a VP, an object NP (NP2) and a VP in present perfect passive. The declarative clause of ComxESS began with a subject NP (NP1) as well, however, it was then followed by the VP in present perfect passive before the relative PRN *that* the VP and the object NP (NP2).

***A* NP1**	***that***	**VP**	***some* NP2**	**$\mathbf{VP_{passive}}$**	***Do you know which one/s?***
A lawyer	that	defended	some dealers	has been hired.	Do you know which one/s?

Table 24. Structure of ComxISS

***A* NP1**	**$\mathbf{VP_{passive}}$**	***that***	**VP**	***some* NP2**	***Do you know which one/s?***
A lawyer	has been hired	that	defended	some dealers.	Do you know which one/s?

Table 25. Structure of ComxESS

I included the factors RC Position and Extraposition to find out which complex sluicing structures I should focus on in my production study. For the production study, it is important to have a complex sluicing structure in which any degradation of the acceptability of NP2 can only be attributed to the underlying island structure. I thus need to find out which complex sluicing structure is the most natural one, without being additionally improved or decreased by any other factor. Moreover, I again differentiated between *a* and *some* as an indefinite QP for singular and plural NPs (alternating between NP1 and NP2). The items of conditions (5) through (8) were identical to those of study 2. The items of conditions (9) through (12) were new but constituted minimal pairs (as far as possible) to the remaining conditions.

The filler items were the same as for the pilot study 1 and study 2. All target and filler items were distributed across eight experimental lists. They were presented following a Latin Square so that each participant saw each of the eight conditions in only one of the 16 lexicalizations per block.

Procedure

The procedure was the same as for study 2.

Results

I conducted the statistical analysis with SPSS. I computed three ANOVAs and additional *t*-Tests to investigate the significance of certain differences. The mean values of all conditions are represented in Table 26 and in Figure 24. I will start with the statistical analysis of study 3.1., investigating hypotheses H(1), H(2) and H(3), followed by study 3.2., investigating hypothesis H(4) and study 3.3., investigating hypothesis H(5).

Cond.	Structure	Mean
(5)	ComSimS (NP1)	4.62
(6)	ComSimS (NP2)	5.07
(7)	ComxOS (NP1)	5.28
(8)	ComxOS (NP2)	5.00
(9)	ComxISS (NP1)	5.29
(10)	ComxISS (NP2)	4.32
(11)	ComxESS (NP1)	4.72
(12)	ComxESS (NP2)	4.60

Table 26. Mean Judgment of Acceptability Judgment Study 3 per Condition

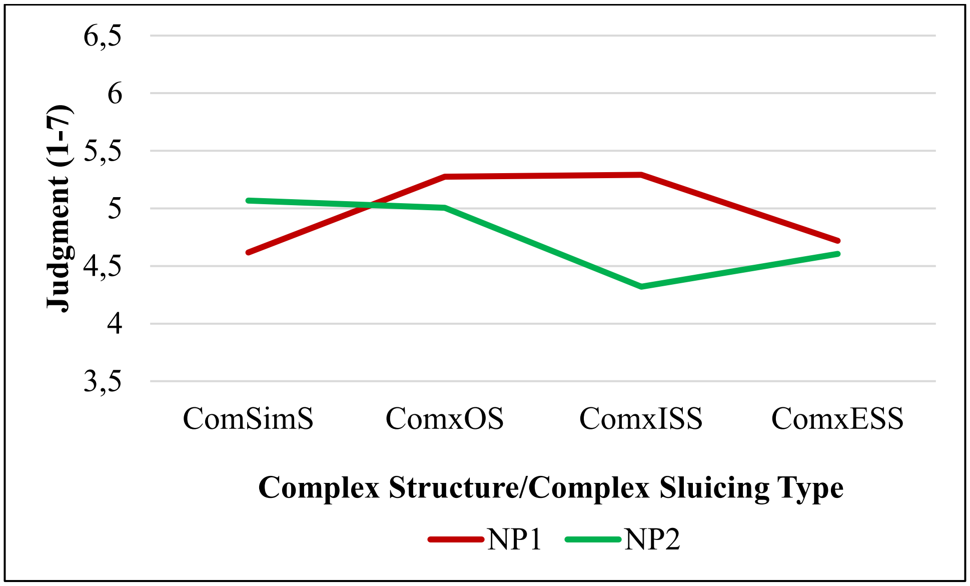


Figure 24. Mean Judgments of Acceptability Judgment Study 3 per Condition

Study 3.1. investigates hypotheses H(1), H(2) and H(3). Hypothesis H(1) refers to the question whether the results of ComxOS from study 2 have been due to an adaptation effect. Hypothesis H(2) refers to the question which NP is the preferred antecedent of ComxOS. H(3) refers to the question whether the acceptability of NP2 as an antecedent differs between ComSimS and ComxOS. I computed an ANOVA with participants (F_1) and items (F_2) as random factors, comparing ComSimS with either NP1 (condition (5)) or NP2 (condition (6)) as antecedent with ComxOS with either NP1 (condition (7)) or NP2 (condition (8)) as antecedent. The factor *Complex Structure Type* was crossed with the factor *Antecedent Type*. The analysis yielded significant effects of the factor *Complex Structure Type* as well as for the interaction *Complex Structure Type* x *Antecedent Type*. [*Complex Structure Type*: F_1 (1,63) = 5.665, $p = 0.001$; F_2 (1,15) = 1.452, $p = 0.001$; *Antecedent Type:* F_1 (1,63) = 0.521, $p = 0.445$; F_2 (1,15) = 0.137, $p = 0.350$; *Complex Structure Type x Antecedent Type*: F_1 (1,63) = 18.308, $p < 0.001$; F_2 (1,15) = 2.122, $p < 0.001$]. The results indicate that there is a significant difference between ComSimS and ComxOS but not between NP1 and NP2. As evident from the interaction, participants judged the two sluicing structures differently depending which NP served as the antecedent. Figure 25 illustrates the different judgments for NP1 and NP2 of the two sluicing structures.

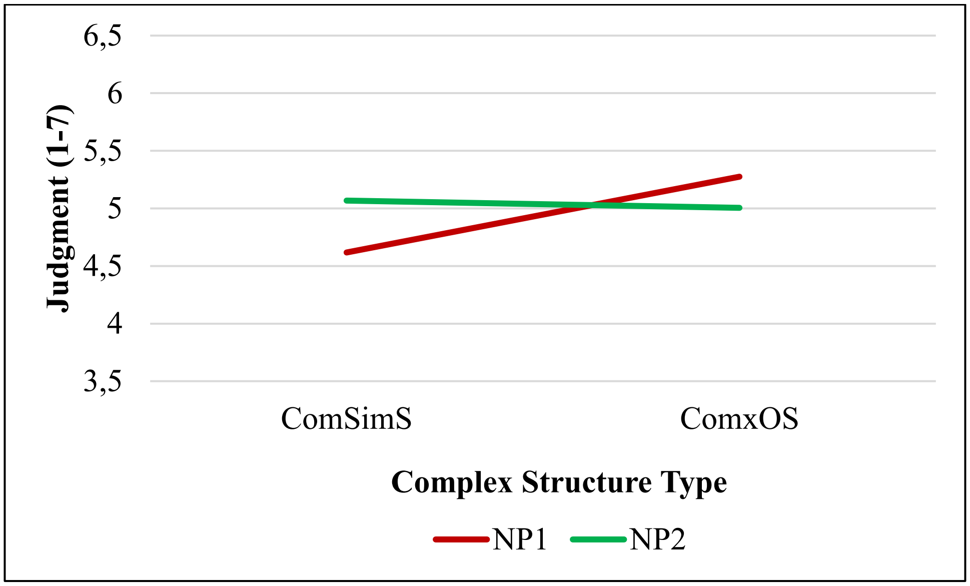


Figure 25. Mean Judgment as a Function of CST and AT

Whereas condition (5) has a mean value of 4,62, condition (6) has a mean value of 5,07, clearly illustrating that NP2 is the preferred antecedent of ComSimS. Vice versa are the judgments for condition (7) (mean value of 5,28) and condition (8) (mean value of 5,00), which illustrates that NP1 is the preferred antecedent of ComxOS. To examine whether the differences between conditions (5) and (6) and between conditions (7) and (8) are significant, I computed additional paired *t*-Tests separately for the two sluicing structures. The *t*-Tests showed that the difference between the two NPs is significant in both sluicing structures, although the difference is bigger between conditions (5) and (6) [Condition (5) vs. (6): t_1 (63) = 3.255, p = 0.002; t_2 (15) = 3.730, p = 0.002; Condition (7) vs. (8): t_1 (63) = 2.082, p = 0.041; t_2 (15) = 2.177, p = 0.046]. To investigate whether the difference between conditions (6) and (8) is significant, I computed an additional paired *t*-Test. It showed that the difference is not significant [t_1 (63) = 0.588. p = 0.559; t_2 (15) = 0.554, p = 0.588]. With respect to H(1), a look at the mean values of conditions (7) and (8) reveals that their acceptability judgments have been reversed, as compared to study 2: condition (7) is now judged to be more acceptable than condition (8), showing that NP1 is preferred. The mean value of condition (7) is 5.28, whereas that of condition (8) is 5.00, which is a difference of 0.28. The *t*-Test above comparing these two conditions demonstrates that this difference is significant [t_1 (63) = 2.082, p = 0.041; t_2 (15) = 2.177, p = 0.046]. These results also serve as an answer to H(2), illustrating that NP1 is the preferred antecedent of ComxOS.

Study 3.2. investigates hypothesis H(4), which refers to the question whether ComxSS differs from ComxOS. I computed an ANOVA, with participants (F_1) and items (F_2) as random factors, comparing ComxOS with either NP1 (condition (7)) or NP2 (condition (8)) as antecedent with ComxSS with either NP1 (condition (9)) or NP2 (condition (10)) as antecedent. The factor *Complex Sluicing Type* was crossed with the factor *Antecedent Type*. The analysis yielded highly significant effects for both factors as well as the interaction [*Complex Sluicing Type*: F_1 (1,63) = 15.696, $p < 0.001$; F_2 (1,15) = 10.662, $p = 0.005$; *Antecedent Type:* F_1 (1,63) = 24.645, $p < 0.001$; F_2 (1,15) = 27.495, $p < 0.001$; *Complex Sluicing Type x Antecedent Type*: F_1 (1,63) = 11.617, $p = 0.001$; F_2 (1,15) = 32.662, p < 0.001]. The results indicate that there is a significant difference between ComxOS and ComxSS on the one hand, and between NP1 and NP2 as antecedents on the other hand. The interaction between the two factors shows that participants judged the two sluicing structures differently depending on which NP served as the antecedent. Figure 26 illustrates that NP2 is much less acceptable in ComxSS.

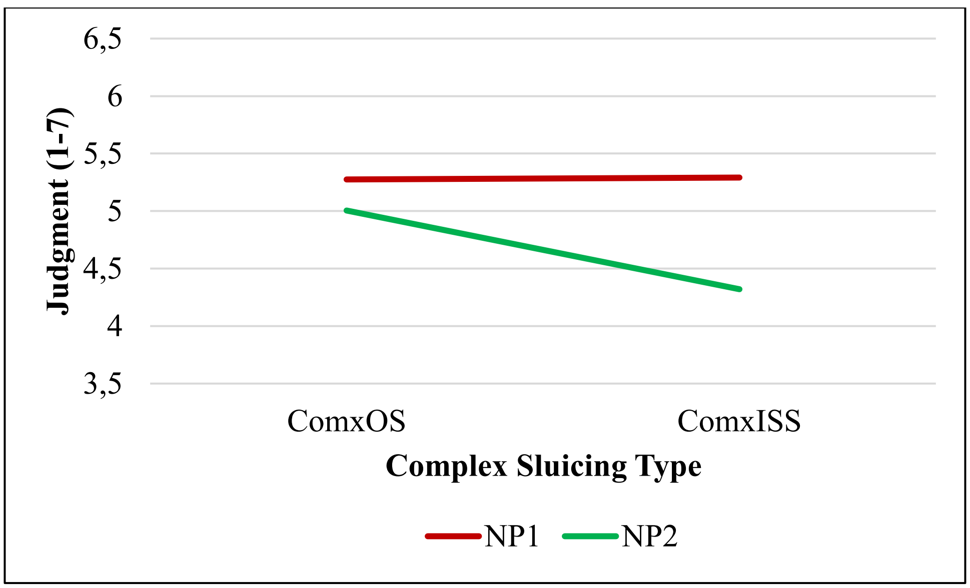


Figure 26. Mean Judgment as a Function of CST and AT

I computed additional paired *t*-Tests to investigate whether the differences between conditions (7) and (8) and between (9) and (10) are significant. The *t*-Tests showed that the difference between NP1 and NP2 of ComxOS is not significant, whereas the difference between NP1 and NP2 of ComxSS is highly significant [Condition (7) vs. (8): t_1 (63) = 2.082, $p = 0.041$; t_2 (15) = 2.177, $p = 0.046$; Condition (9) vs. (10): t_1 (63) = 5.148, p < 0.001; *t2* (15) 6.863, $p < 0.001$].

Study 3.3. investigates hypothesis H(5), which refers to the question whether extraposition has an effect upon ComxSS. I computed an ANOVA with participants (F_1) and items (F_2) as random factors, comparing ComxISS with either NP1 (condition (9)) or NP2 (condition (10)) as antecedent with ComxESS with either NP1 (condition (11)) or NP2 (condition (12)) as antecedent. The factor *RC Position* was crossed with the factor *Antecedent Type*. The analysis yielded significant effects of the factor *Antecedent Type* as well as for the interaction [*RC Position*: F_1 (1,63) = 1.753, $p = 0.190$; F_2 (1,15) = 1.119, $p = 0.307$, *Antecedent Type:* F_1 (1,63) = 15.436, $p < 0.001$; F_2 (1,15) = 14.887, $p = 0.002$; *RC Position x Antecedent Type*: F_1 (1,63) = 16.801, $p < 0.001$; F_2 (1,15) = 28.321, p < 0.001]. The results indicate that there is a significant difference between the two Antecedent Types but not between intraposed and extraposed structures. The interaction between the two factors shows that the two Antecedent Types were judged differently depending on whether they were extraposed or not. Figure 27 illustrates that the judgments for NP1 and NP2 of ComxISS diverge tremendously.

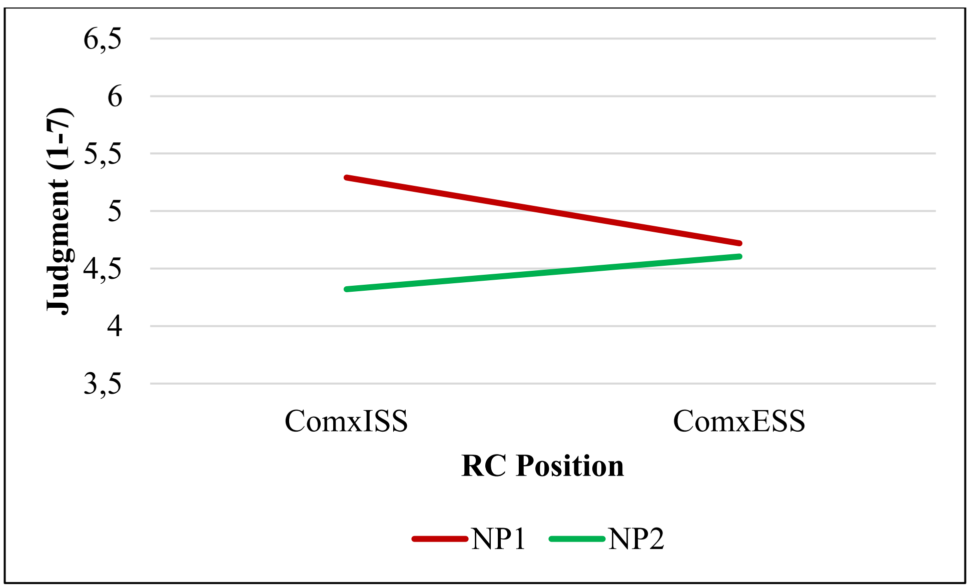


Figure 27. Mean Judgment as a Function of RC Position and AT

Condition (9) has a mean value of 5.29, whereas condition (10) has a mean value of 4.32. This is a difference of around 1.0. In ComxESS, this difference almost vanishes by diminishing to 0.11 between 4.72 for condition (11) and 4.60 for condition (12). I computed additional paired *t*-Test comparing conditions (9) and (10) as well as conditions (11) and (12) separately to investigate whether the differences between the respective conditions are significant. The *t*-Tests reveal that the difference between the two Antecedent Types is significant for ComxISS but not for ComxESS [Condition (9) vs. (10): t_1 (63) = 5.148, p < 0.001; t_2 (15) = 6.863, p < 0.001; Condition (11) vs. (12): t_1 (63) = 0.734, p = 0.466; t_2 (15) = 0.530, p = 0.604]. To further investigate the effect of extraposition, I computed an additional paired *t*-Test to see how the judgments of the two Antecedent Types change depending on whether they are intraposed or extraposed. I thus compared condition (9) to (11) (NP1) and condition (10) to (12) (NP2) separately. The *t*-Tests show that there is a significant difference between the judgments of NP1, whereas there is no significant difference between the judgments of NP2 [NP1: t_1 (63) = 4.011, p < 0.001; t_2 (15) = 6.098, p < 0.001; NP2: t_1 (63) = 1.799, p = 0.077; t_2 (15) = 1.693, p = 0.111].

Discussion

Study 3 answers a variety of questions. Hypotheses H(1), H(2) and H(4) have been supported. Hypothesis H(5) has been partly supported. H(3) cannot be investigated due to questionable results of conditions (5) and (6).

With respect to study 3.1., the comparison of conditions (5) and (6) to conditions (7) and (8) reveals three points: First, the judgments of conditions (7) and (8) from study 2 must have been due to an adaptation effect, supporting H(1). Second, in ComxOS, NP2 is in fact less acceptable than NP1, supporting H(2). Third, the judgments suggest that NP2 does not differ between ComSimS and ComxOS; however, since I have to assume an adaptation effect influencing the judgments of ComSimS, these results may not be conclusive. H(3) can thus not be investigated. Conditions (7) and (8) have been judged quite differently in studies 2 and 3: in contrast to study 2, the dispreferred NP2 (condition (8)) received worse judgments than the preferred NP1 (condition (7)). This supports the claim that the judgments from study 2 have been due to an adaptation effect as well as the claim that NP2 is dispreferred in ComxOS. Moreover, the difference between the two Antecedent Types of ComxOS is significant. These results show that NP2 is less acceptable than NP1 which supports the theory that sluicing is indeed island insensitive (as argued by Ross, 1969; Lasnik, 2001; Merchant, 2001, 2008 and others), while at the same time demonstrating that the underlying island has to have some remnant effect upon the acceptability of island antecedents. Furthermore, the ANOVA comparing ComSimS and ComxOS reveals that there is a significant difference between the two Antecedent Types in the respective structures. Note that there was no significant difference between conditions (6) and (8). This result at a first glance speaks against H(3) which assumes that NP2 should be judged better in ComSimS than in ComxOS. One has to note though that in this study, condition (5) has been judged relatively bad, as illustrated in Figure 25. The mean value for condition (5) is 4.62; the mean value for condition (6) is 5.07. Both values show a noticeable decrease in acceptability from the SimS structures tested in study 2. Especially the mean value of 4.62 for condition (5) contrasts with the mean value of 4.93 for condition (1) in study 2 (the mean value for condition (2) in study 2 was 5.81). There is thus a difference of 0.31 between condition (5) in study 3 and condition (1) in study 2. The difference between condition (6) from study 3 and condition (2) from study 2 is even more extreme: condition (6) is by 0.74 worse than condition (2). Such a decrease of acceptability from SimS to ComSimS was not expected and might negatively affect the investigation of H(3). I will therefore refrain from drawing any conclusions about H(3) and will re-investigate this hypothesis in study 4. The surprising results of conditions (5) and (6) can, however, be taken as further evidence to support hypothesis H(1).

With respect to study 3.2., the comparison of conditions (8) and (9) to conditions (10) and (11) shows that NP2 as an antecedent is in fact less acceptable in ComxSS than in ComxOS. Whereas the judgments of NP1 as an antecedent are almost identical in the two sluicing structures (compare 5.28 of condition (7) to 5.29 of condition (9)), the judgments for NP2 as an antecedent differ tremendously: compare 5.00 of condition (8) to 4.32 of condition (10). Condition (8) is judged to be quite natural; only in comparison to condition (7) does it seem slightly degraded. Condition (10) is significantly less acceptable than condition (9) and hence only gets a neutral judgment. I suppose that this degradation is due to the type of the underlying island in the un-elliptical version of ComxSS, as discussed in chapter 3.2.2.2. Therefore, hypothesis H(4) has been supported.

With respect to study 3.3., the comparison of conditions (9) and (10) to conditions (11) and (12) shows that extraposition has an effect upon the acceptability of ComxSS. Whereas condition (9) is judged to be acceptable, condition (10) is judged to be only neutral and, keeping in mind that this difference is significant, it even seems somewhat unnatural. With extraposition, the acceptability of NP1 decreases, whereas NP2 improves. The two Antecedent Types therefore almost meet at a mean judgment of around 4.6 when the RC is extraposed, which is further supported by the lack of a significant difference between condition (11) and condition (12). At first, it seems that distance effects may play a role here. In conditions (11) and (12), NP2 is directly adjacent to the sluiced interrogative and might consequently improve the acceptability of NP2 as an antecedent. In conditions (9) and (10), NP2 is separated from the sluiced interrogative by the second part of the matrix clause, thus decreasing its acceptability as an antecedent. However, Carlson et al. (2009) found that distance does not play a role in acceptability judgment differences of elliptical structures and Martin and McElree (2008) found that distance does not affect processing of VP ellipsis. Both studies concluded that the predominant factor for improving the acceptability of an antecedent is focus. This claim has been further supported by specifically testing the focusing effects of extraposition by Konietzko et al. (submitted). I argue that focus is the decisive factor to explain the findings here as well. For ComxISS, the results hence demonstrate that there is a significant difference in acceptability between NP1 and NP2 as antecedents. For ComxESS, the results show that there is no significant difference between NP1 and NP2 as antecedents. The fact that the degradation of NP1 is significant, whereas the improvement of NP2 is not significant suggests that the assimilation of the two Antecedent Types in the extraposed structures is mainly due to the changes of NP1, the matrix antecedent. For German complex sluicing, Konietzko et al. (submitted) found that extraposition improves the acceptability of an island antecedent by adding additional prominence onto it. The results of acceptability judgment study 3 suggests that for English complex sluicing, extraposition decreases the acceptability of a matrix antecedent by taking prominence away from it. In any case, the results show that NP2 is more acceptable as an antecedent of ComxESS although it is somewhat unacceptable in both intraposed and extraposed sluicing. Hypothesis H(5) could thus be supported. Nevertheless, the result that NP1 is significantly more unacceptable when extraposed, remains to be discussed in future work.

Consequences

Study 3 has answered a variety of questions. Hypotheses H(1), H(2) and H(4) could be supported; H(5) could be partly supported. This means that the following issues have been settled: First, the results of conditions (7) and (8) from study 2 were due to an adaptation effect (H(1)). Second, NP1 is the preferred antecedent of ComxOS (H(2)). Third, ComxSS is more island sensitive than ComxOS (H(4)). And fourth, extraposition improves the acceptability of

NP2 as an antecedent of ComxSS (although it is not clear whether extraposition adds prominence onto the island antecedent or takes away prominence from the matrix antecedent) (H(5)).

What remains to be answered, however, is hypothesis H(3): how does the acceptability of NP2 as an antecedent compare between ComSimS and ComxOS? Moreover, hypothesis H(1) from study 2 also remains to be answered: How do SimS and ComxOS compare? As already mentioned, I have to assume that there has been an adaptation effect at work for conditions (5) and (6). To support this assumption, I will re-investigate hypothesis H(1) but with respect to conditions (5) and (6), in study 4.

From this acceptability judgment study 3 thus results yet another set of new research questions, which are summarized below. These new research questions will be addressed in the next chapter, discussing the final study 4.

New Research Questions

(1) How does NP2 of ComSimS compare to NP2 of ComxOS? (H(3) from study 3)
(2) How do SimS and ComxOS compare? (H(1) from study 2)
(3) Are the results of conditions (5) and (6) from study 3 due to an adaptation effect towards complex sluicing? (resulting from H(1) from study 3)

3.2.2.4 Acceptability Judgment Study 4

This final acceptability judgment study is a follow-up to study 3. It has three main goals: First, study 4 investigates whether the results of the complicated simple sluicing structures from study 3 have been due to an adaptation effect, as it was the case for the complex sluicing structures in study 2. Second, study 4 re-investigates hypotheses H(1) and H(3) from study 3, addressing the question how simple sluicing and complex sluicing compare and whether the acceptability of NP2 changes between complicated simple sluicing and complex object sluicing. Third, study 4 investigates whether there is a difference between *a* and *some* as QP for the two antecedent NPs. This study thus consists of two sub-studies (studies 4.1. and 4.2.) addressing the different structures simple embedded sluicing (SimES), complicated simple sluicing (ComSimS), complex object sluicing (ComxOS), and complex (intraposed) subject sluicing (ComxSS).

Research Questions and Hypotheses

In this study and its two sub-studies, I will investigate the following research questions:

1) Is there a difference in acceptability between SimES and ComxOS?[73] I repeat this question from study 2, since the judgments for ComxOS from study 2 did not deliver conclusive results due to an adaptation effect. (Study 4.2.)

2) How does the acceptability of NP2 as an antecedent differ between ComSimS and ComxOS? I repeat this question from studies 2 and 3, since the judgments for ComxOS, conditions (7) and (8), from study 2 and the judgments for ComSimS, conditions (5) and (6), from study 3 did not deliver conclusive results. (Study 4.1.)

3) Are the judgments for ComSimS, conditions (5) and (6), from study 3 due to an adaptation effect that resulted from an imbalance of simple sluicing and complex sluicing structures or are the judgments representative for ComSimS? In order to investigate this question, I will retest the exact same items of conditions (5) and (6) from study 3, however, this time with a balanced distribution of simple and complex sluicing structures. If the results from study 3 have been affected by an adaptation effect, conditions (5) and (6) should now show judgments between those of studies 2 and 3. (Studies 4.1. and 4.2.)

[73] Study 4 only investigates simple embedded, rather than unembedded sluicing as a structure. Since study 2 found no effect of embedding, I assume that SimES is as representative for simple sluicing as SimS would be.

4) Is there a difference in acceptability between NPs with the QP *a* vs. the QP *some*? In studies 2 and 3, I alternated between *a NP* and *some NP* for the two Antecedent Types. So far, I have only considered the advantages that come with such an approach, as described in 3.2.2.2. However, there may also be certain disadvantages: Plural *some*, for example, only allows for a specific reading where the speaker has a certain set of individuals in mind but does not reveal which ones. This characteristic of *some* might increase the likelihood of its NP to be the antecedent of the *wh*-remnant since it introduces a set of specific individuals, about which further information is missing. If plural *some* has the effect that it increases the likelihood of its NP to be the antecedent of the *wh*-remnant, this would clearly speak against an alternation of *a* and *some* and for a simultaneous use of *some* for both singular and plural NPs. Such a simultaneous use of *some* (although used singularly) has already been used successfully in the past, for example by Carlson, Frazier, Clifton, and Dickey (2005), who investigated the effects of contrastive pitch accents on antecedent preferences (subject NP vs. object NP) in sentences like (233) below. This suggests that a simultaneous use of the QP *some* does not lead to odd sounding structures or an unwanted ambiguity, as previously assumed.

(233) Some salesman recognized some secretary but it's not clear who.

(Carlson et al., 2005, p. 1)

To find out whether there is an effect of QP type upon the acceptability of an NP to be the antecedent of a *wh*-remnant, I will include this factor in this final study. (Study 4.1.)

I thus investigate the following hypotheses with respect to acceptability judgment study 4:

Hypotheses

(1) SimS receives better judgments than ComxOS. (H(1); Study 4.2.)
(2) NP2 receives better judgments in ComSimS than in ComxOS. (H(2); Study 4.1.)
(3) In ComSimS, structures with NP2 as antecedent (embedded NP) receive better judgments than with NP1 as antecedent (matrix NP). the judgments are in between the judgments for the same conditions from studies 2 and 3. (H(3); Study 4.1.)

(4) NP1 and NP2 as antecedents of ComSimS or ComxOS improve with the QP *some* as compared to the QP *a*. (H(4); Studies 4.1. and 4.2.)

Method

Design and Predictions

Study 4 combines two sub-studies each consisting of a 2x2x2 factorial design. The three within subject factors of study 4.1. are *Complex Structure Type* (ComSimS vs. ComxOS), *Antecedent Type* (NP1 vs. NP2) and *QP Type* (*a* vs. *some*). The three within subject factors of study 4.2. are *Sluicing Type (SimES vs. ComxOS)*, *Antecedent Type* and *QP Type*. Study 4 thus results in sixteen conditions, which are illustrated in Table 27. The factors *Complex Structure Type* and *Antecedent Type* are identical to study 3. The factor *QP Type* describes whether the antecedent of the *wh*-remnant is combined with the QP *a* or the QP *some* (*a* vs. *some*). The factor *Sluicing Type* describes whether the structure is simple sluicing or complex sluicing (SimES vs. ComxOS). In contrast to studies 2 and 3, study 4 investigates an equal number of simple and complex sluicing structures to avoid any effect of adaptation.

Cond.	Simple Sluicing	Cond.	Complex Sluicing
(3.1.)	**SimES (a NP1)** They said that a lawyer defended some dealers. Do you know which one?		
(3.2.)	**SimES (some NP1)** They said that some lawyers defended a dealer. Do you know which ones?		
(4.1.)	**SimES (some NP2)** They said that a lawyer defended some dealers. Do you know which ones?		
(4.2.)	**SimES (a NP2)** They said that some lawyers defended a dealer. Do you know which one?		

(5.1.)	**ComSimS (a NP1)** They informed a lawyer that he had defended some dealers. Do you know which one?		
(5.2.)	**ComSimS (some NP1)** They informed some lawyers that he had defended a dealer. Do you know which ones?		
(6.1.)	**ComSimS (some NP2)** They informed a lawyer that he had defended some dealers. Do you know which ones?		
(6.2.)	**ComSimS (a NP2)** They informed some lawyers that he had defended a dealer. Do you know which one?		
		(7.1.)	**ComxOS (a NP1)** They hired a lawyer that had defended some dealers. Do you know which one?
		(7.2.)	**ComxOS (some NP1)** They hired some lawyers that had defended a dealer. Do you know which ones?
		(8.1.)	**ComxOS (some NP2)** They hired a lawyer that had defended some dealers. Do you know which ones?
		(8.2.)	**ComxOS (a NP2)** They hired some lawyers that had defended a dealer. Do you know which one?
		(9.1.)	**ComxSS (a NP1)** A lawyer that defended some dealers has been hired. Do you know which one?

		(9.2.)	**ComxSS (some NP1)** Some lawyers that defended a dealer has been hired. Do you know which ones?
		(10.1.)	**ComxSS (some NP2)** A lawyer that defended some dealers has been hired. Do you know which ones?
		(10.2.)	**ComxSS (a NP2)** Some lawyers that defended a dealer has been hired. Do you know which one?

Table 27. Conditions of Acceptability Judgment Study 4

My predictions for study 4 are as follows: 1) With respect to H(1), I predict that SimES will receive better judgments than ComxOS: conditions (3), (4) > conditions (7), (8). 2) With respect to H(2), I predict that NP2 will receive better judgments as antecedent of ComSimS than as antecedent of ComxOS: condition (6) > condition (8). 3) With respect to H(3), I predict that the results of conditions (5) and (6) from study 3 have been due to an adaptation effect. The judgments of condition (6) will be slightly worse than in study 2 but slightly better than in study 3, thus illustrating the adaptation effect of studies 2 and 3. Therefore, in study 4, condition (6) > condition (5). 4) With respect to H(4), I predict that the QP *some* increases the likelihood of both NP1 and NP2 to be the antecedent of ComSimS and ComxOS, hence improving the acceptability of the respective structures. The respective conditions with *some* NP will therefore receive better judgments than their counterparts with *a* NP, e.g., condition (8.1.) > condition (8.2.)

Participants

Participants were recruited via Amazon Mechanical Turk©. Sixty-three native speakers of American English participated in the study who were all naïve as to the purpose of the study. None of them took part in pilot study 1 or studies 2 or 3. An additional three participants had to be excluded from the study since they were not native speakers of American English. There were 40 males and 23 females, aged between 21 and 61 years old with a mean age of 33.07 years. The study lasted about 15 minutes and participants received \$ 2.50 for participation.

Material

The design of the material was identical to that of studies 2 and 3. There were again 62 items out of which 32 were target items and 30 were filler items. Study 4 investigated conditions (3) through (8) who were originally used in study 2 and conditions (9) and (10) who were originally used in study 4. I included the factor QP Type in this study to investigate whether the type of QP has an effect upon the acceptability of its NP as an antecedent.

The filler items were the same as for the pilot study 1, and studies 2 and 3. All target and filler items were distributed across eight experimental lists. They were presented following a Latin Square so that each participant saw each of the 16 conditions in only one of the 16 lexicalizations per block.

Procedure

The procedure was the same as for studies 2 and 3.

Results

I conducted the statistical analysis with SPSS. I computed two ANOVAs and additional *t*-Tests to investigate the significance of certain differences. The mean values of all conditions are represented in Table 28, Figure 28 and Figure 29. I will start with the analysis of study 4.1., investigating hypotheses H(2), H(3) and H(4), followed by study 4.2., investigating hypotheses H(1) and again H(4). Note that conditions (9) and (10) will not be included in any parts of the statistical analysis since ComxSS was only part of this study to guarantee an equal distribution of simple and complex sluicing structures.

Cond.	Structure	Mean
(3.1.)	SimES (a NP1)	5.02
(3.2.)	SimES (some NP1)	5.15
(4.1.)	SimES (some NP2)	5.70
(4.2.)	SimES (a NP2)	5.36
(5.1.)	ComSimS (a NP1)	4.76
(5.2.)	ComSimS (some NP1)	4.88
(6.1.)	ComSimS (some NP2)	5.11
(6.2.)	ComSimS (a NP2)	5.18
(7.1.)	ComxOS (a NP1)	5.26
(7.2.)	ComxOS (some NP1)	5.05
(8.1.)	ComxOS (some NP2)	5.27
(8.2.)	ComxOS (a NP2)	4.76
(9.1.)	ComxSS (a NP1)	5.21
(9.2.)	ComxSS (some NP1)	5.49
(10.1.)	ComxSS (some NP2)	4.33
(10.2.)	ComxSS (a NP2)	4.45

Table 28. Mean Judgments of Acceptability Judgment Study 3 per Condition

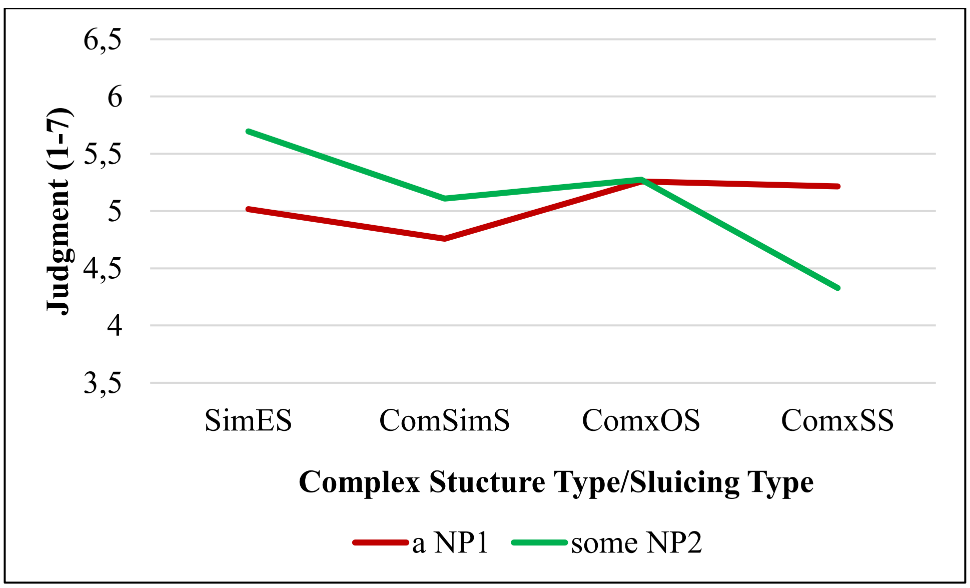


Figure 28. Mean Judgments of Acc. Judg. Study 3 per Condition for the *QP Type a-some*

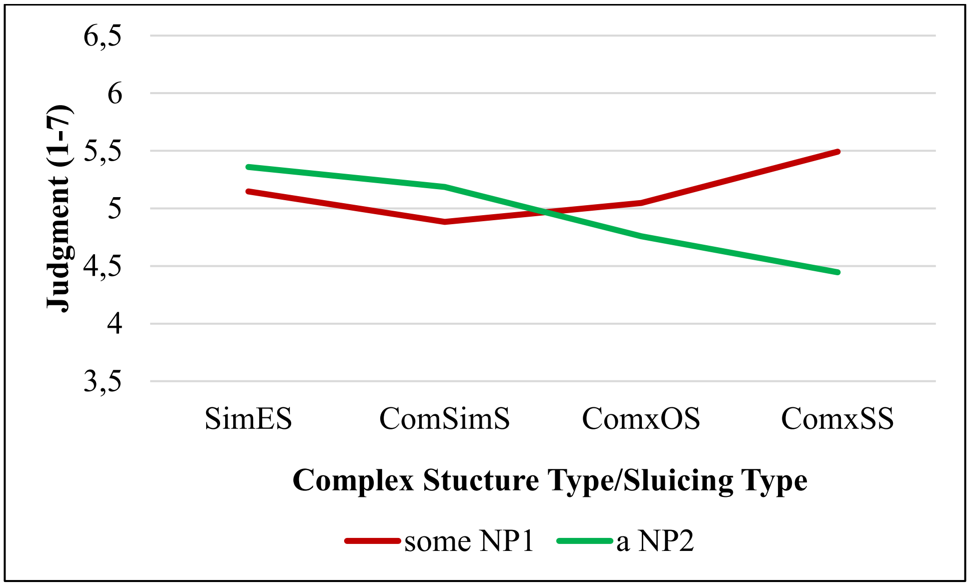


Figure 29. Mean Judgments of Acc. Judg. Study 3 per Condition for the *QP Type some-a*

Study (4.1.) investigates hypotheses H(2), H(3) and H(4). H(2) refers to the question whether the acceptability of NP2 as an antecedent differs between ComSimS and ComxOS. H(3) refers to the question whether the results of ComSimS, conditions (5) and (6), from study 3 have been due to an adaptation effect or not. H(4) refers to the question whether the type of QP has an effect upon the acceptability of its antecedent. I computed an ANOVA with participants (F_1) and items (F_2) as random factors, comparing ComSimS with either NP1 (condition (5)) or NP2 (condition (6)) as antecedent with ComxOS with either NP1 (condition (7)) or NP2 (condition (8)) as antecedent. The factor *Complex Structure Type* was crossed with the factors *Antecedent Type* and *QP Type*. The analysis yielded the following results: There was no significant effect of any of the single factors but a significant interaction of the factors *Complex Structure Type* x *Antecedent Type* and *Complex Structure Type* x *QP Type* [*Complex Structure Type*: F_1 (1,63) = 0.645, p = 0.425; F_2 (1,15) = 1.561, p = 0.231;*; Antecedent Type:* F_1 (1,63) = 1.375, p = 0.245; F_2 (1,15) = 1.064, p = 0.319; *QP Type:* F_1 (1,63) = 2.976, p = 0.099; F_2 (1,15) = 0.745, p = 0.402; *Complex Structure Type x Antecedent Type*: F_1 (1,63) = 6.604 p = 0.013; F_2 (1,15) = 4.040, p = 0.063; *Complex Structure Type x QP Type*: F_1 (1,63) = 8.430, p = 0.005; F_2 (1,15) = 7.328, p = 0.016; *Antecedent Type x QP Type*: F_1 (1,63) = 1.358, p = 0.248; F_2 (1,15) = 0.327, p = 0.576; *Complex Structure Type x Antecedent Type x QP Type*: F_1 (1,63) = 0.608, p = 0.439; F_2 (1,15) = 0.325, p = 0.577]. The interaction between *Complex Structure Type* and *Antecedent Type* shows that the acceptability of NP1 and NP2 differed significantly between the two Sluicing Types. To further investigate the differences between NP2 of the two structures, I computed paired *t*-Tests comparing condition (6.1.) to (8.1.), which had *some NP2* as antecedent, and condition (6.2.) to (8.2.), which had *a NP2* as antecedent. The *t*-Tests yielded no significant effect for *some NP2,* but a significant effect for *a NP2*, though, only for the t_1 analysis [Condition (6.1.) vs. (8.1.): t_1 (63) = 0.859, p = 0.394; t_2 (15) = 0.917, p = 0.374; Condition (6.2.) vs. (8.2.): t_1 (63) = 2.097, p = 0.040; t_2 (15) = 1.739, p = 0.103]. This analysis shows that there is a difference of NP2 with the QP *a* between the two Complex Structure Types. The fact that it is only significant in the F_1 analysis but not in the F_2 analysis suggests that there was variation between the different lexicalizations. The analysis thus partly supports hypothesis H(2). This is illustrated in Figure 30 and Figure 31 which show that the judgments for ComSimS with either NP1 or NP2 as antecedent do not change when the QP Type changes except that both structures get a little better if the structure contains *some NP1* and *a NP2*.[74] However, the judgments for ComxOS with either NP1 or NP2 as antecedent change tremendously, from being almost equally acceptable in Figure 30 to being less acceptable and different from each other in Figure 31.

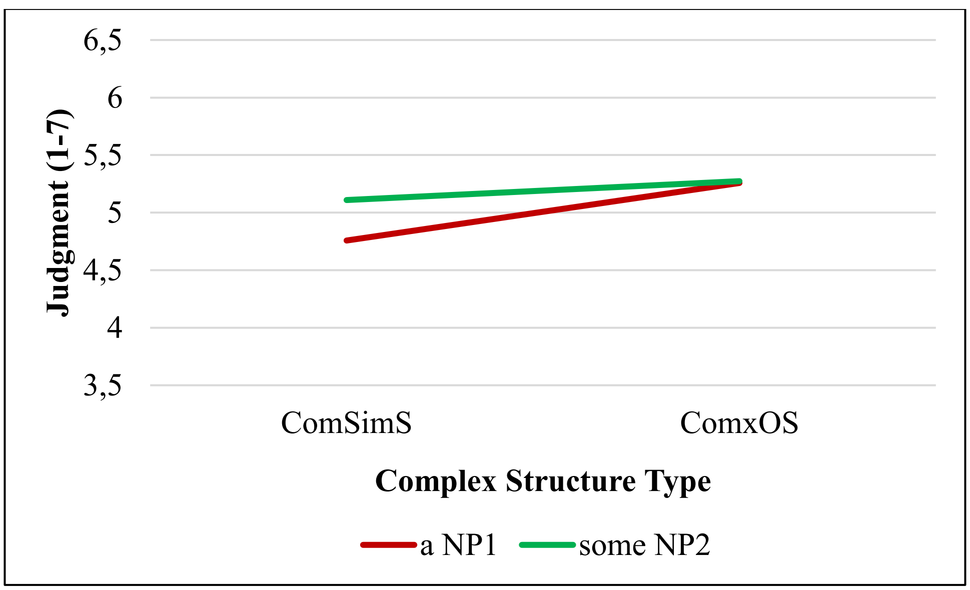


Figure 30. Mean Judgment as a Function of *CST* and *AT* for the *QP Type a-some*

[74] CST means *Complex Structure Type* and AT means *Antecedent Type*.

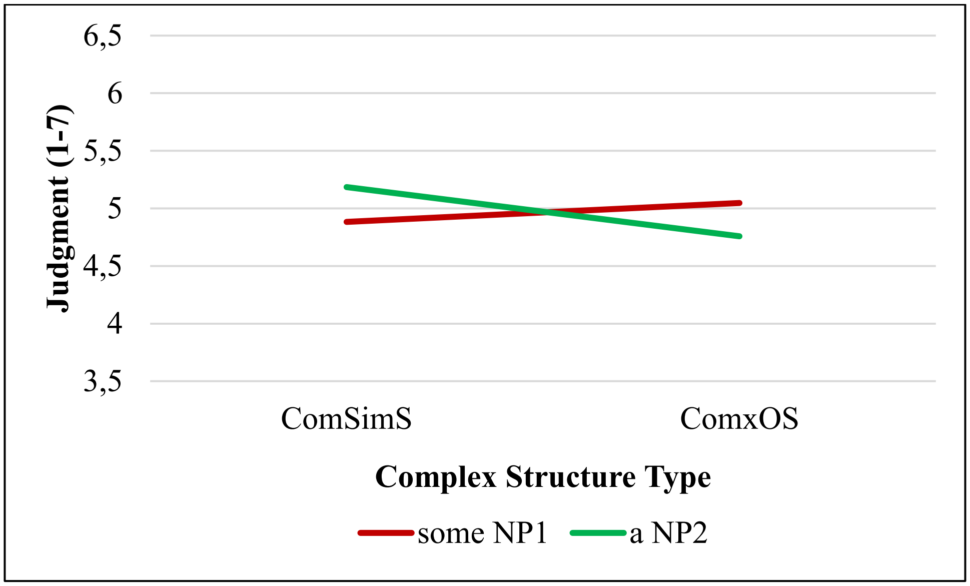


Figure 31. Mean Judgment as a Function of *CST* and *AT* for the *QP Type some-a*

I computed additional paired *t*-Tests separately for the two Antecedent Types and the two QP Types to further investigate whether, for ComxOS, the differences between conditions (7.1.) and (7.2.) as well as between (8.1.) and (8.2.) are significant. The *t*-Tests yielded the following results: There is only a significant difference between conditions (8.1.) and (8.2.): the change from *a NP2* to *some NP2* leads to a significant increase in acceptability of NP2 as antecedent. The mean judgment of *some NP2* is 5.27 as compared to 4.76 for *a NP2*. This result indicates that the QP *some* improves the acceptability of NP2 as an antecedent, whereas the QP *a* decreases it. However, the picture looks different for NP1: although the difference between *a NP1* and *some NP1* is not significant, *some* seems to decrease the acceptability of NP1 by 0.21. [Condition (7.1.) vs. (7.2.): t_1 (63) = 1.206, p = 0.232; t_2 (15) = 0.896, p = 0.384; Condition (8.1.) vs. (8.2.): t_1 (63) = 3.638, p = 0.001; t_2 (15) = 2.893, p = 0.011]. There is no significant effect of QP Type for the ComSimS structures, conditions (5) and (6) [Condition (5.1.) vs. (5.2.): t_1 (63) = 0.858, p = 0.394; t_2 (15) = 0.479, p = 0.374; Condition (6.1.) vs. (6.2.): t_1 (63) = 0.449, p = 0.655; t_2 (15) = 0.465, p = 0.649]. In order to investigate H(3), I compared the results of conditions (5) and (6) from the current study to the results of the same conditions from studies 2 and 3. The different mean judgments are listed in Table 29. They show that the present judgments for condition (6) lie between those of study 2 and 3, as predicted. Throughout all three studies, though, NP2 of ComSimS was always preferred over NP1, which supports the assumption that the decreased judgments of NP2 of ComxOS must be due to the underlying island constraint.

	Condition (5)		Condition (6)	
Study 2	4,62		5,38	
Study 3	4,62		5,07	
	Condition (5.1.) (a NP1)	**Condition (5.2.)** (some NP1)	**Condition (6.1.)** (some NP2)	**Condition (6.2.)** (a NP2)
Study 4	4,76	4,88	5,11	5,18

Table 29. Judgments for Conditions (5) and (6) from Studies 2, 3 and 4

Study (4.2.) investigates hypotheses H(1) and again H(4). H(1) refers to the question how SimES and ComxOS generally compare in acceptability. H(4) refers to the question whether the choice of QP has an effect upon the acceptability of its antecedent. I computed an ANOVA with participants (F_1) and items (F_2) as random factors, comparing SimES with either NP1 (condition (3)) or NP2 (condition (4)) as antecedent with ComxOS with either NP1 (condition (7)) or NP2 (condition (8)) as antecedent. The factor *Sluicing Type* was crossed with the factors *Antecedent Type* and *QP Type*. The analysis yielded significant effects for the factors *Sluicing Type* and *QP Type*, a marginally significant effect in the analysis of F_1 for the factor *Antecedent Type* and a significant effect for the interactions *Sluicing Type* x *Antecedent Type* and *Antecedent Type* x *QP Type* [*Sluicing Type*: F_1 (1,63) = 7.218, p = 0.009; F_2 (1,15) = 5.503, p = 0.033;*; Antecedent Type:* F_1 (1,63) = 3.276, p = 0.075; F_2 (1,15) = 1.210, p = 0.289; *QP Type:* F_1 (1,63) = 6.442, p = 0.014; F_2 (1,15) = 4.793, p = 0.045; *Sluicing Type x Antecedent Type*: F_1 (1,63) = 9.979, p = 0.002; F_2 (1,15) = 6.669, p = 0.021; *Sluicing Type x QP Type*: F_1 (1,63) = 2.632, p = 0.110; F_2 (1,15) = 2.772, p = 0.117; *Antecedent Type x QP Type*: F_1 (1,63) = 4.795, p = 0.032; F_2 (1,15) = 5.969, p = 0.027; *Sluicing Type x Antecedent Type x QP Type*: F_1 (1,63) = 0.437, p = 0.511; F_2 (1,15) = 0.180, p = 0.678]. The significant effects of *Sluicing Type* and the interaction *Sluicing Type x Antecedent Type* show that the acceptability of the two Antecedent Types of SimES and ComxOS differ. In order to find out which structure is more acceptable, I compared the mean values of the preferred antecedents of the two Sluicing Types. Since the analysis of H(4) above has revealed that the choice of QP seems to have an effect upon the acceptability of different Antecedent Types, I compared the mean values of SimES with *some NP1* as antecedent and ComxOS with *some NP2* as antecedent. Paired *t*-Tests showed that regarding the preferred antecedents, condition (4.1.) is judged significantly better than condition (7.2.). Regarding the comparison of dispreferred antecedents, there is no significant difference between condition (3.2.) and condition (8.1.) [Condition (4.1.) vs. (7.2.): t_1 (63) = 3.920, p < 0.001; t_2 (15) = 2.855, p = 0.012; Condition (3.2.) vs. (8.1.): t_1 (63) = 0.966, p = 0.338; t_2 (15) = 0.577, p = 0.572]. Due to the highly significant effect of the comparison of preferred antecedents of SimES vs. ComxOS, H(1) has been supported, at least regarding preferred antecedents. Moreover, the significant effects of QP Type and the interaction *Antecedent Typ*e x *QP Type* demonstrate that the type of QP chosen for the two NPs plays an important role with respect to the acceptability of the two Antecedent Types, thus supporting H(4). This is illustrated in Figure 32 and Figure 33.[75] For ComxOS, *some NP1* was judged worse than *a NP1* and *some NP2* was judged better than *a NP2.* For SimES, *some NP1* was judged better than *a NP1* and *some NP2* was judged much better than *a NP2.* The QP *some* therefore generally seems to have an ameliorating effect upon its antecedent.

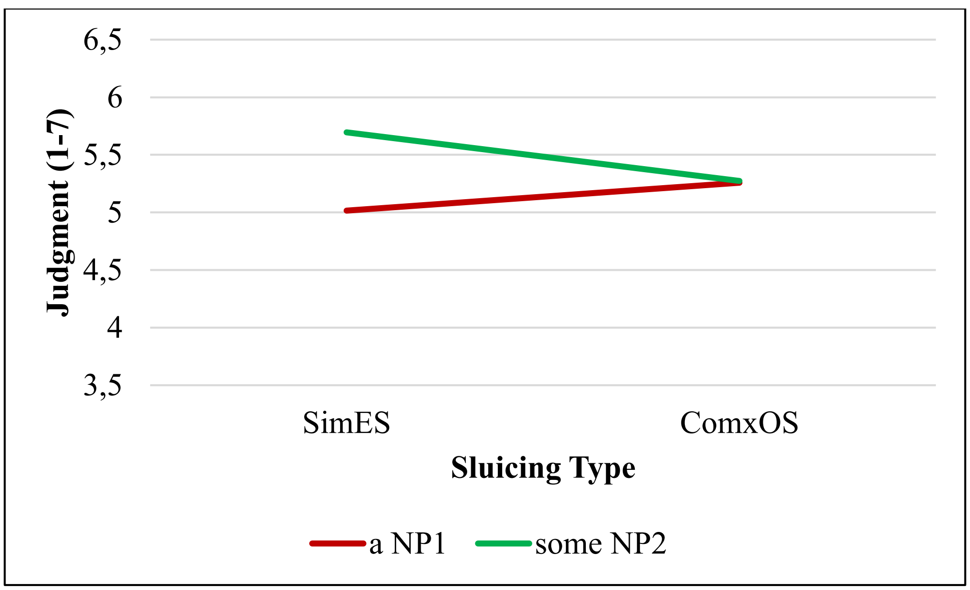


Figure 32. Mean Judgment as a Function of *ST* and *AT* for the *QP Type some-a*

[75] ST means *Sluicing Type*.

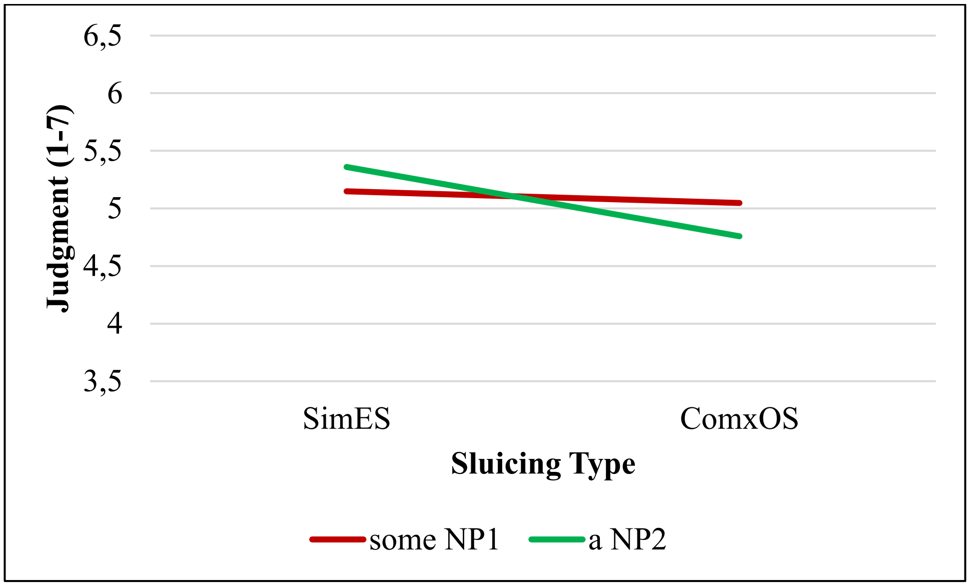


Figure 33. Mean Judgment as a Function of *ST* and *AT* for the *QP Type a-some*

With respect to SimES, I computed additional paired *t*-Tests separately for the two Antecedent Types and the two QP Types to further investigate whether the differences between conditions (3.1.), (3.2.), (4.1.) and (4.2.) are significant. *T*-Tests for ComxOS have already been computed in study 4.1, which showed that only NP2 was significantly affected by the different QP Types. The *t*-Tests for SimES yielded the following results: There is a significant difference between conditions (4.1.) and (4.2.), thus for NP2 as well: The change from *a NP2* to *some NP2* leads to a significant increase in acceptability of NP2 as antecedent: The mean judgment of condition (4.1.) is 5.7 as compared to 5.36 for condition (4.2.). This result indicates that the QP *some* improves the acceptability of NP2, whereas the QP *a* decreases it. Although the difference between *a NP1* and *some NP1* is not significant, the QP *some* also improves the acceptability of NP1 by 0.13 [*a* NP1 vs. *some* NP1: t_1 (63) = 0.716, p = 0.476; t_2 (15) = 0.752, p = 0.464; *some* NP2 vs. *a* NP2: t_1 (63) = 2.313, p = 0.024; t_2 (15) = 2.658, p = 0.018]. Consequently, for both SimES and ComxOS, the choice of QP only has a significant effect upon the acceptability of NP2 but not of NP1: in both conditions, the QP *some* significantly increases the acceptability of NP2. For SimES, this means that the already preferred NP2 gets even better. For ComxOS, this means that the dispreferred NP2 gets more acceptable. Moreover, for ComxOS, this means that there is no more difference in acceptability between NP1 as antecedent when it is paired with the QP *a* and NP2 as antecedent when it is paired with the QP *some*. It seems that the preference of a matrix NP over an embedded NP can thus be eliminated by a preference for the

QP *some* over the QP *a*. Why did the choice of QP not have an effect upon the dispreferred NP1 antecedent of SimES and the preferred NP1 of ComxOS? I suggest that this result is connected to the shorter distance between NP2 and the *wh*-remnant: NP2 is always more recent and might therefore be more easily affected by a change of QP than NP1. However, for a more detailed discussion of the different effects on NP1 and NP2, further experimental investigations would be required which, for now, goes beyond the scope of this thesis.

Discussion

The results of study 4 give final answers to a series of questions that had to be asked in order to obtain a carefully developed design for the production study Quarterback that will be discussed in the following chapter 3.2.3. Study 4 supports hypotheses H(1), H(3), H(4) and H(5). H(2) has been partly supported. Regarding H(2), the analysis showed that the lexicalizations were not uniform. Some final modifications must be made to the lexicalizations, which will be made directly in the production study. Therefore, no further acceptability judgment study is needed.

With respect to study 4.1., the comparison of conditions (5) and (6) to conditions (7) and (8) (with both QP Types) reveals three major findings: First, there is a difference between NP2 as an antecedent of ComSimS vs. ComxOS, however, only when it is combined with the QP *a* (rather than the QP *some*) and only when the lexical material is carefully controlled, thus partly supporting H(2). I therefore reviewed the judgments and the lexicalizations of the ComSimS conditions throughout the different studies which yielded that NP1 of ComSimS received especially bad judgments in comparison to NP1 of SimS and SimES throughout the three studies. This suggests that there is a strong preference for the embedded object NP, NP2, to be the focus of the sluiced question, rather than the matrix object NP, NP1. The reason for this becomes clear when having a look at the different lexicalizations. For example, in the ComSimS structure in (234), asking for the NP1 *lawyer* is odd, whereas there is no such dislike for the NP1 *lawyer* in the SimS structure (235): In (234), it does not make sense to inform a lawyer about his own client.

(234) ?They informed a lawyer that he had defended some dealers. Do you know which one?

(235) On Tuesday, a lawyer defended some dealers. Do you know which one?

Consequently, the strong dispreference for NP1 as the antecedent of the *wh*-remnant seems to be a result of an overall absurdity of the resulting structure. This absurdity has to be eliminated for the production study Quarterback to obtain representative prosodic contours. One possible solution to do so is to change the VP of the matrix clause to something more reasonable like, e.g., *reproach*, see (236).

(236) They reproached a lawyer that he had defended some dealers. Do you know which one?

Second, a comparison of the ComSimS conditions (5) and (6) across the three studies has shown that there must have been an adaptation effect at work in study 3, thus supporting H(3). Table 29 illustrates that condition (5) has been judged similarly in studies 2 and 3. In study 4, however, condition (5) has been judged slightly better. Condition (6) has been judged best in study 2, where there were three simple sluicing structures and only one complex sluicing structure. It has been judged worst in study 3, where it was affected by the bad judgments for NP2 of the three complex sluicing structures. The judgments for condition (6) in study 4 lie between the judgments of studies 2 and 3. This illustrates the representative judgments for condition (6) when there is an equal number of simple and complex sluicing structures. Third, the type of QP has an effect upon the acceptability of NP2 as an antecedent of ComxOS but not on any Antecedent Type of ComSimS, thus partly supporting H(4). In ComSimS, NP1 improved slightly (but not significantly) with the QP *some*, NP2 decreased slightly (also not significantly) with the QP *some*. In other words, the QP *some* improved the dispreferred NP1, whereas it degraded the preferred NP2. With respect to ComxOS, NP1 degraded (not significantly) with the QP *some*, whereas NP2 improved significantly with the QP *some,* In other words, the QP *some* significantly improved the dispreferred NP2, whereas it degraded the preferred NP1. This shows that there is an effect of QP Type for NP2 of ComxOS but not for either Antecedent Type of ComSimS. This suggests that NP1 and NP2 of ComSimS are not affected by a change of QP. The strongly preferred NP2 of ComSimS is always better than the strongly dispreferred NP1. Nevertheless, the fact that NP2 of SimES also improved significantly with the QP *some* illustrates that the lack of an effect for ComSimS must again be due to the absurdity of NP1 as the antecedent of the structure.

With respect to study 4.2., the comparison of conditions (3) and (4) to conditions (7) an (8) demonstrates two points: First, NP1 is the dispreferred antecedent of SimES but the preferred antecedent of ComxOS, whereas it is the other way around for NP2. A comparison of preferred vs dispreferred antecedents (both combined with the QP *some* to guarantee comparability) showed that the preferred antecedent of SimES is significantly better than the preferred antecedent of ComxOS. However, the comparison also showed that the dispreferred antecedent of SimES is worse than that of ComxOS. This result might be explainable with the fact that sluicing is island insensitive and NP2 of ComxOS is thus only slightly degraded. For simple sluicing, it has been frequently noted and empirically investigated that the object NP is the preferred antecedent, e.g., by Frazier and Clifton (1998) and Carlson et al. (2009). From the results of this study, it seems that there is a stronger dislike for the subject NP of simple sluicing than for the embedded NP of complex sluicing. There was only a significant effect for the comparison of preferred antecedents but not for the comparison of the dispreferred antecedents. With respect to the preferred antecedents, H(1) has been supported: simple sluicing is more acceptable than complex sluicing. Second, the type of QP has a significant effect upon the acceptability of NP2 antecedents in both SimES and ComxOS, thus supporting H(4). Interestingly, it affects the preferred antecedent of SimES and the dispreferred antecedent of ComxOS which suggests that antecedent preference is not related to any influence of QP Types. Study 4.1. showed that in ComSimS, the choice of QP has no effect; though, this result might have been affected by the lexicalizations of said structure. In the production study, I need to be able to distinguish between singular and plural NPs which is why I will exclusively use the QP *some* in order not to affect the results of the study.

3.2.2.5 Discussion of Acceptability Judgment Studies 1 through 4

Discussion

The four acceptability judgment studies explored how the acceptability of various types of sluicing structures, *wh*-remnants, NPs/QPs and RCs differ, while at the same time investigating the effects of ambiguity and extraposition. They thus yielded a number of important results that answered a variety of questions regarding the design of the sluicing structures to be investigated in the production study Quarterback. The most relevant findings were:

First, simple sluicing with a preferred object NP as antecedent is more acceptable than complex sluicing with a preferred matrix NP as antecedent. From this follows that already the embedding of a complex structure like a subject RC after an object NP leads to an increased processing effort which in turn decreases the acceptability of the overall sluicing structure. Note that in general, subject RCs require less processing effort than object RCs (see, for example, Traxler et al., 2005) since no filler has to be kept in working memory while the remainder of the structure is processed. Consequently, already an easy processable subject RC leads to decreased acceptability judgments. I relate this result to the fact that any type of RC constitutes an island to extraction which subsequently affects the processing of the entire structure.

Second, simple sluicing with a dispreferred subject NP as antecedent is less acceptable than complex sluicing with a dispreferred embedded NP as antecedent. It seems that an underlying island to extraction has a weaker degrading effect upon the acceptability of an antecedent than the lack of a default focus. Consequently, focus seems to be one of the crucial requirements for the antecedent of a *wh*-remnant.

Third, embedding does not decrease the acceptability of simple sluicing structures, which suggests that the decreased acceptability of complex sluicing structures is not due to the embedded clause itself but rather due to the island character of the RC. This claim is further supported by the fact that in complicated simple sluicing, NP2 is preferred over NP1.

Fourth, the object NP is the preferred antecedent of a simple sluicing structure, supporting previous findings by Frazier and Clifton (1998) and Carlson et al. (2009). However, due to the underlying island structure of the RC, the embedded object NP is the dispreferred antecedent of a complex sluicing structure, despite being in a final argument position, thus supporting the findings by Frazier and Clifton (2011) and Konietzko et al. (submitted).

Fifth, the choice of article preceding an antecedent NP is crucial with respect to its antecedent preferences. Acceptability judgment study 4 showed that the QP *some* significantly increases the acceptability of simple sluicing structures with an object NP and complex sluicing structures with and embedded object NP as antecedent. It is therefore not possible to alternate between the QP *a* and the QP *some* within one sluicing structure without affecting the respective results.

Sixth, the dispreferred embedded object NP antecedent is significantly worse (and thus even more dispreferred) in complex subject sluicing than in complex object sluicing.[76] I suggest that this decreased acceptability stems from the fact that complex subject sluicing has two underlying island structures out of which NP2 has to be extracted, rather than just one, as it is the case for the complex object sluicing structures.

Seventh, extraposition improves the acceptability of the dispreferred embedded object NP of complex subject sluicing while at the same time decreasing the acceptability of the preferred matrix object NP. This is an important finding that supports the results by Konietzko et al. (submitted) who found an ameliorating effect of extraposition on an RC antecedent of German complex sluicing structures.

In sum, the four acceptability judgment studies demonstrated that there are crucial differences between different sluicing types, *wh*-remnant types, antecedent types, etc. All these differences could have majorly affected the outcome of a production study, examining and comparing the prosodic contours of different sluicing structures.

Four findings of the four acceptability judgment studies are therefore especially important with respect to the production study Quarterback:

First, finding two, that embedding does not affect the acceptability of simple sluicing structures.

Second, finding two, that focus seems to play a crucial role in the antecedent selection of sluicing.

Third, finding four, that the object NP is indeed the preferred antecedent of a simple sluicing structure and that the matrix NP is indeed the preferred antecedent of a complex sluicing structure. Any prosodic peculiarities that might show up on NP1 of simple sluicing and

[76] Note that complex subject sluicing does not mean that the respective RC was a subject RC. It rather means that the RC was inserted after the subject NP, thus taking the subject NP as its head.

on NP2 of complex sluicing simultaneously would thus suggest that these findings are related to antecedent preferences.

Fourth, finding five, that the type of QP chosen for the two antecedent NPs of a sluicing structure plays an important role. Varying between the QP *some* and the QP *a* within one sluicing structure tremendously affects the acceptability of the respective NPs and thus suggests that a similar effect might show up in an investigation of prosodic contours (e.g., in the form of more prosodic prominence on an NP with the QP *some*, in case antecedent preferences play a role). I will therefore only use the QP *some* for the target items of the production study Quarterback since I need to be able to vary between singular and plural NPs without affecting the acceptability of the respective antecedents.

These four major findings of the four acceptability judgment studies are crucial for the development and the subsequent analysis of the target items of the production study Quarterback.

Moreover, there are a few additional factors, resulting from the pilot production study Chicago, that need to be addressed with respect to the production study Quarterback as well.

First, in the pilot production study Chicago, the target items were globally ambiguous and therefore contextually disambiguated in order to trigger one of the two readings. It is known that context has a strong effect upon subsequent material (see discussion regarding the *question answer congruence* approach, as mentioned in chapter 3.2.1). It would be interesting to find out whether similar prosodic results (that is, prosodic disambiguation of the sluicing structures towards one reading by emphasizing the contrastively focused antecedent NP) can be obtained by disambiguating the structures morphologically rather than contextually.

Second, the pilot production study Chicago showed that one should test an equal number of male and female participants or decide for one gender exclusively in order to avoid an unwanted gender effect.

Third, every participant should produce every lexicalization in every condition to enhance comparability of the different conditions.

Fourth, it is important to exclude any factors from the structure of the target items that might trigger an unwanted prosodic effect, as it was the case with NP1 of the pilot production study Chicago which coincided with being the first word of the sentence, thus being accented by default. Adding a PP like “On Tuesday” before NP1 already helps to get rid of prosodic cues that are typical for the beginning of a sentence.

Fifth, the target items should be as similar to each other as possible to obtain significant F_1 and F_2 analyses. In combination, the findings of the four acceptability judgment studies and the pilot production study Chicago will help to create a well thought out design for the subsequent production study Quarterback and to obtain representative prosodic findings.

Consequences

Following from the results of the series of four acceptability judgment studies and the pilot production study Chicago, the production study Quarterback can now be designed and conducted. A variety of sluicing structures could be excluded for the subsequent production study on the basis of the results of the four acceptability judgment studies. Others could be supported or successfully modified to obtain an optimal set of structures to be analyzed. This series of four acceptability judgment studies and one pilot production study thus leads to the following observations and conclusions regarding the production study Quarterback:

Observations

(1) In simple sluicing, NP1 is the dispreferred antecedent; NP2 is the preferred antecedent (following from H(2), study 2)

(2) Simple embedding does not affect the acceptability of simple sluicing (following from H(5), study 2)

(3) In complex sluicing, NP1 is the preferred antecedent; NP2 is the dispreferred antecedent (following from H(2), study 3)

(4) Simple sluicing is more acceptable than complex sluicing (following from H(1), study 4)

(5) The unacceptability of NP2 of complex sluicing is due to its underlying island, and not due to complex embedding (following from H(2), study 4)

Conclusions

(1) Do not investigate globally ambiguous sluicing (following from H(4), study 1)

(2) Do not investigate contrastive sluicing (following from H(1), study 1)

(3) Do not investigate sluicing with contentful *wh*-remnants (following from H(5), study 1)
(4) Do not investigate complex subject sluicing (following from H(4), study 3)
(5) Do not investigate extraposed sluicing (following from H(5), study 3)
(6) Do not alternate between the QPs *a* and *some*; only use the QP *some* (following from H(4), study 4)
(7) Do not use contextual disambiguation (following from the pilot Chicago)
(8) Investigate an equal number of male and female participants or only one gender exclusively (following from the pilot Chicago)
(9) Make sure that every participant produces every lexicalization in every condition (following from the pilot Chicago)
(10) Create the best possible set of lexicalizations (following from the pilot Chicago and the four acceptability judgment studies in general)

The exact set of sluicing structures to be analyzed in the production study Quarterback is thus given in Table 30 and will be discussed in more detail in the following chapter 3.2.3.

Cond.	**Structure**	**Ant.**	**Declarative**	**Sluiced Interrogative**
(1)	**SimS**	NP1	On Tuesday some lawyer defended some dealers.	Do you know which one?
(2)	**SimS**	NP2	On Tuesday some lawyer defended some dealers.	Do you know which ones?
(3)	**SimES**	NP1	They knew that some lawyer defended some dealers.	Do you know which one?
(4)	**SimES**	NP2	They knew that some lawyer defended some dealers.	Do you know which ones?
(5)	**ComSimS**	NP1	They reproached some lawyer that he had defended some dealers.	Do you know which one?

(6)	**ComSimS**	NP2	They reproached some lawyer that he had defended some dealers.	Do you know which ones?
(7)	**ComxOS**	NP1	They questioned some lawyer that had defended some dealers	Do you know which one?
(8)	**ComxOS**	NP2	They questioned some lawyer that had defended some dealers	Do you know which ones?

Table 30. Sluicing Structures for Production Study Quarterback

3.2.3 Production Study 2: *Quarterback* (Simple vs. Complex Sluicing)

This production study, named *Quarterback*, investigates the prosodic contours of temporarily ambiguous sluicing structures of different complexities. The respective structures are a consequence of the pilot production study Chicago discussed in chapter 3.2.1 and the four acceptability judgment studies discussed in chapter 3.2.2. The pilot production study Chicago explored the prosody of globally ambiguous contrastive simple sluicing structures with the *wh*-remnant *who else*. The sluicing structures were embedded in either a disambiguating or a neutral (non-disambiguating) context.

This production study showed that the respective design, the method and the procedure are adequate to elicit different prosodic contours, representing the different meanings of the respective sluicing structures. The main result of the production study Chicago was that there is a prosodic difference between sluicing structures following a subject vs. an object context: participants placed special emphasize on the object NP if the sluicing structure was embedded in an object context and withdrew emphasize from it if the sluicing structure was embedded in a subject context.

The four acceptability judgment studies investigated different types of sluicing structures: ambiguous vs. unambiguous sluicing, contrastive vs. non-contrastive sluicing, simple vs. complex sluicing and complex object sluicing vs complex subject sluicing, with different types of *wh*-remnants, articles and RC positions. The main results of these four acceptability judgment studies were the following:

First, simple sluicing is more acceptable than complex sluicing.

Second, embedding does not have an effect upon the acceptability of simple sluicing.

Third, the object NP is the preferred antecedent of simple sluicing and the matrix NP is the preferred antecedent of complex sluicing.

Fourth, globally ambiguous sluicing structures are difficult to investigate with acceptability judgment studies since the results do not yield any information about which reading was parsed.

Fifth, without context, contrastive sluicing with the *wh*-remnant *who else* and therefore definite NPs is less acceptable than non-contrastive sluicing.

Sixth, an antecedent within an island structure is less acceptable in complex subject sluicing (both intraposed and extraposed) than in complex object sluicing. However, extraposition improves the acceptability of an island antecedent in complex subject sluicing.

Seventh, there is a difference between the QPs *a* and *some* regarding antecedent preferences. With the production study Quarterback*,* I will thus continue the investigation of the prosodic disambiguation of sluicing by looking at non-contrastive rather than contrastive and temporarily rather than globally ambiguous sluicing. Moreover, I will compare sluicing structures with the non-contrastive *wh*-remnant *which one* of different types of complexity, namely simple and complex sluicing structures. In this production study, the sluicing structures will be morphologically disambiguated by varying the number assignment of the *wh*-remnant *which one,* which can consequently only be the antecedent of one of the NPs of the preceding clause (either the singular subject or matrix object NP or the plural object or embedded object NP).

The main differences between the pilot production study Chicago and the production study Quarterback, which will be split into two parts to accommodate the different sluicing structures, are summarized in Table 31.

	Pilot Production Study ***Chicago***	**Production Study** ***Quarterback***	
		Part 1	**Part 2**
Contrastivity	contrastive	non-contrastive	
***Wh*-remnant**	*who else*	*which one*	
Ambiguity	globally ambiguous	temporarily ambiguous	
Sluicing Type	simple	simple	complex
Antecedent NPs	subject NP → explicit names, e.g., *Barry*	subject NP → some $NP_{singular}$, e.g., *some lawyer*	matrix object NP →some $NP_{singular}$ e.g., *some lawyer*
	object NP → explicit names, e.g., *Amber*	object NP → some NP_{plural}, e.g., *some dealers*	embedded object NP →some NP_{plural}, e.g., *some dealers*
Disambiguation	contextually	morphologically	
Speaker Types	no specific training	+Trained vs. -Trained speakers	
Speaker Nationality	native speakers of American, British and Australian English	native speakers of American English	
Gender	females and males (analysis of females only)	females only	

Table 31. Differences between Chicago and Quarterback

The main goal of the production study Quarterback is to answer the question whether native speakers of American English use prosody in the form of prosodic prominence in order to prosodically disambiguate different types of already morphologically disambiguated sluicing structures. Following from the results of the pilot production study Chicago, this study thus investigates the following questions:

First, do speakers use prosodic prominence to emphasize the antecedent of a *wh*-remnant (RQ(1))?

Second, is there a difference regarding the prosodic disambiguation techniques of sluicing structures of different complexities (RQ(2))?

Third, does the strength and the frequency of certain prosodic parameters depend on the knowledge (or awareness) of its speakers regarding different factors such as ambiguity or prosody (RQ(3))?

The production study Quarterback therefore consists of two parts to accommodate the different sluicing structures simple and complex sluicing. Part 1 investigates the prosodic disambiguation of simple sluicing structures. Part 2 investigates the prosodic disambiguation of complex sluicing structures.

3.2.3.1 Production Study *Quarterback*, Part 1

Research Questions and Hypotheses

In this production study part 1, I will investigate the following research questions:

1) Do native speakers of American English use prosodic prominence to emphasize the antecedent of a *wh*-remnant in a temporarily ambiguous simple sluicing structure? The literature claims that a focused *wh*-remnant must contrast with its antecedent in order to result in an acceptable sluicing structure (Romero, 1998) , and that a prosodic focus on a specific constituent affects the antecedent preferences of simple sluicing structures (Frazier & Clifton, 1998; Carlson et al., 2009). However, whether this contrastively focused constituent in sluicing also has a prosodic reflex in spoken language, as argued by Romero (1998) for sluicing specifically, and as argued for focused constituents in general (see e.g., Selkirk, 1984; Rooth, 1992; Selkirk, 1995; Krifka, 2008; Büring, 2013), has not been examined to date. With the pilot production study Chicago, I have shown that speakers use prosodic prominence to emphasize the antecedent of a globally ambiguous simple sluicing structure that has been embedded in a disambiguating context. This production study Quarterback part 1 now investigates whether such prosodic disambiguation also takes place when the simple sluicing structures are temporarily ambiguous and not disambiguated by context but rather by the morphology of the *wh*-remnant.

2) Is there a difference in the strength of prosodic disambiguation regarding the different antecedent types, NP1, the subject NP vs. NP2, the object NP? There are two major reasons why NP1 should be more frequently prosodically disambiguated to indicate that the subject NP serves as the antecedent of the *wh*-remnant than NP2 to indicate that the object NP does:[77] First, the subject NP represents the more distant antecedent from the *wh*-remnant, which is located at the very end of the structure. It may thus require stronger prosodic prominence in order to be made salient as the antecedent of the *wh*-remnant. Second, the subject NP is not by default focused, as opposed to the object NP, which is located in sentence-final position. Whereas the object NP therefore already carries prosodic prominence by default, the subject NP is not

[77] NP1 refers to the first NP of the sentence, thus the subject NP. NP2 refers to the second NP of the sentence, thus the object NP. Whenever I write NP1/NP2, I refer to the actual NPs within the sentence. Whenever I write subject/object NP, I refer to the antecedent type which is indicated by either the singular *wh*-remnant *which one*, referring to NP1, or the plural *wh*-remnant *which ones*, referring to NP2.

prosodically emphasized unless it serves as the antecedent of the *wh*-remnant. These two factors argue for more prosodic prominence on the subject NP in order to make it salient as the antecedent of the sluicing structure. The object NP, however, is located at the end of the first phrase. It is closer to the *wh*-remnant and furthermore in the default position of a focus in English. From this follows that it naturally receives prosodic prominence. In the pilot production study Chicago, I surprisingly found that NP1 received less prosodic prominence than NP2. In this study, NP1 was located in sentence-initial position as the first word of the sentence. Consequently, NP1 obligatorily carried an accent no matter the condition or information structure of the sentence. I thus concluded that NP1 could not exhibit strong prosodic differences to additionally indicate its status as being the focus of the overall structure in the condition triggering a subject focus, whereas NP2 could, despite being focused by default.

3) Is there a difference in the frequency or the strength of prosodic prominence as used by specifically trained vs. untrained speakers? Previous research has shown that specifically trained speakers produce stronger prosodic cues than untrained ones (e.g., Allbritton et al., 1996, see discussion chapter 2.2.3.4). Moreover, providing speakers with information regarding different prosodic disambiguation techniques as well as informing them about the ambiguity of the target items has proven to have an effect upon the strength of prosodic boundaries as a disambiguating prosodic cue to indicate syntactic phrasing in Remmele et al. (forthcoming 2019). Prosodic boundaries are generally used to indicate the end of an IPh, which is influenced by the syntax of the overall structure. In ambiguous sluicing, however, the different readings are not triggered by different syntactic structures but by differences of the information structure, which are prosodically realized by varying the type and/or the location of a pitch accent, as discussed in chapter 2.2.3.3. Whether the degree of prosodic prominence also increases as a result of a specific speaker training, as it was the case for prosodic boundaries in Remmele et al. (forthcoming 2019), has not been examined so far.

I thus investigate the following hypotheses with respect to the production study Quarterback part 1:

Hypotheses

(1) Speakers use prosodic prominence to emphasize the antecedent of a temporarily ambiguous *wh*-remnant in simple sluicing. (H(1))
(2) NP1 is more frequently disambiguated by prosody than NP2. (H(2))

(3) Specifically trained speakers i) make more frequent use of prosodic prominence and ii) produce stronger pitch accents to emphasize the antecedent of a *wh*-remnant in simple sluicing than untrained speakers. (H(3))

Method

Design and Predictions

Production study part 1 consists of a 2x2x2 factorial design with the two within subjects factors *Sluicing Type* (SimS vs. SimES) and *Antecedent Type* (object NP vs. subject NP), and one between subjects factor *Group Type* (+Trained vs. -Trained). Production study part 1 thus results in eight conditions, which are illustrated in Table 32.

Condition Nr.	Condition Description	Target/Control Item
(1)	SimS, object NP → preferred antecedent	On Tuesday some lawyer defended some dealers. Do you know which ones?
(2)	SimS, subject NP → dispreferred antecedent	On Tuesday some lawyer defended some dealers. Do you know which one?
(3)	SimES, object NP → preferred antecedent	They knew that some lawyer defended some dealers. Do you know which ones?
(4)	SimES, subject NP → dispreferred antecedent	They knew that some lawyer defended some dealers. Do you know which one?

Table 32. Conditions (1) through (4) of Production Study Part 1[78]

The factor *Sluicing Type* contains the different types of simple sluicing structures whose prosody will be investigated: SimS refers to the simple sluicing target items, SimES refers to a control group of similar simple sluicing structures that are additionally embedded. SimES serves as a control since it constitutes an almost identical simple sluicing structure, however, with the adjustment of embedding, to make sure that any effects found for SimS are not due to the specific sentence structure, but due to its status as being a simple sluicing structure in general. The factor *Antecedent Type* describes which of the two NPs serves as the antecedent

[78] Note that condition (1) refers to SimS with NP2 rather than NP1 as antecedent since I ordered the conditions not numerically but according to antecedent preferences. Therefore, NP2 as the preferred object antecedent of a simple sluicing structure forms part of condition (1) and NP1 as the dispreferred subject antecedent of a simple sluicing structure forms part of condition (2), etc.

of the morphologically disambiguated *wh*-remnant, the preferred object NP or the dispreferred subject NP. The object NP is considered to be the preferred antecedent since it coincides with being the last argument of the structure and therefore in the same position as the default focus of the sentence. Frazier and Clifton (1998) and Carlson et al. (2009) found in several studies that a final argument tends to be the preferred antecedent of an ambiguous *wh*-remnant due to this default focus position (see discussion chapter 2.1.5). The factor *Group Type* describes whether the participants were part of a group that received a short training phase prior to the production study (+Trained) or a group that did not receive any specific training (-Trained). In the short training phase, the participants of +Trained learned about some general prosodic disambiguation methods and were implicitly made aware of the temporary ambiguity of the target items.[79]

My predictions for production study part 1 are as follows: 1) With respect to H(1), I predict that speakers will use prosodic prominence to emphasize the antecedent of a *wh*-remnant in simple sluicing. 2) With respect to H(2), I predict that NP1 will be more strongly disambiguated by prosody than NP2. 3) With respect to H(3), I predict that +Trained will use prosody as a disambiguating factor more frequently and more strongly than -Trained, to emphasize the antecedent of a *wh*-remnant in simple sluicing.

Participants

Participants were recruited with fliers posted around the University of Tübingen. Nineteen female native speakers of American English took part in production study part 1. They were all randomly assigned to either Group Type. All participants were either exchange, undergraduate, graduate or PhD students at the Eberhard Karls University Tübingen. They were aged between 19 and 41 years with a mean age of 26 years. All participants indicated that they grew up in the US, although some participants had spent considerable parts of their lives abroad (mostly in Germany). Thirteen participants indicated that both of their parents are native speakers of American English. Six participants indicated that one or both of their parents have a mother

[79] Note that the training phase did not contain any of the target or control items to indicate the general prosodic disambiguation methods, see also appendix, section 7. Moreover, I did not use the word *ambiguity* to specifically inform the participants of the ambiguous character of the target items. Participants were merely informed that some of the items differ in only one or two words and that it is therefore important to pay attention to the meaning of the items.

tongue other than English. Out of these six, one participant had to be excluded due to having a strong foreign accent. Production study part 1 lasted about 15-20 minutes for which each participant received 15 €.

Material

Production study part 1 consisted of overall 40 items out of which 16 were target items (SimS structures), 16 were control items (SimES structures) and eight were filler items. A list of all target and filler items can be found in the appendix, section 8. Out of the 32 target and control items, half ended with the singular *wh*-remnant *which one*, thus taking the subject NP as the antecedent, and half ended with the plural *wh*-remnant *which ones*, thus taking the object NP as the antecedent. Each Sluicing Type (SimS and SimES) consisted of the same eight lexicalizations to create minimal pairs that allow comparability. The structures and lexicalizations of SimS and SimES were designed as a result of the previous four acceptability judgment studies, as discussed in chapter 3.2.2. All sluicing structures consisted of two parts: a declarative clause and a sluiced interrogative clause with either a singular or a plural non-contrastive *wh*-remnant. The exact structures are illustrated in Table 33 and Table 34.

PP	***some* NP$_{singular}$**	**VP**	***some* NP$_{plural}$**	***Do you know which one/s?***
On Tuesday	*some lawyer*	*defended*	*some dealers.*	*Do you know which one/s?*

Table 33. Structure of SimS

They* VP *that	***some* NP$_{singular}$**	**VP**	***some* NP$_{plural}$**	***Do you know which one/s?***
They said that	*some lawyer*	*defended*	*some dealers.*	*Do you know which one/s?*

Table 34. Structure of SimES

In contrast to the four acceptability judgment studies, I now used the QP *some* as the sole determiner for both NPs (NP1 and NP2). This follows as a consequence of acceptability judgment study 4 which showed that the QP *some* is the preferred determiner for an antecedent and should therefore not be combined with the DP *a* within one item to avoid a biasing effect towards NPs with the QP *some*.

All items were manually randomized in four blocks so that each participant produced each lexicalization in each of the four conditions and so that no lexicalization occurred twice in a row or in close proximity. Filler items were inserted randomly after every third to fifth target or control item. The four blocks were then again randomized, which resulted in overall four different lists to control for priming effects.

The filler items consisted of a declarative clause and a regular interrogative clause. One constituent of the interrogative clause always contrasted with one constituent of the declarative clause, as illustrated in (237) through (239). As before, capital letters are used to indicate the contrasting constituents. Note though that capital letters were not used in the study itself.

(237) I think it was BOB who failed Professor Johnson's class. Or was it JAKE?

(238) I heard that Mary bought a BOOK about planes. Or was it a DVD?

(239) Johnny only invited his AUNT to his birthday. What about his UNCLE?

The filler items served to keep participants from getting used to the specific structure of the target items which might have resulted in less informative productions.

Procedure

Before the start of the experiment, participants had to fill out a personal information sheet. They were asked to provide information about their gender, age, whether they are native speakers of American English, where they grew up, whether they consider themselves speaking an accent, whether their parents are both native speakers of American English and if not, which mother tongues their parents speak, whether they had ever lived outside of the US for more than 12 months (and if so, where and for how long) and finally, what they are/were studying (if so). Participants were informed that all data will be treated confidentially and that it will be analyzed for scientific reasons only. They were then placed in front of a computer and were set up with a headset microphone to ensure a continuous distance between mouth and microphone.

The participants then started with the production study. All items were presented in a randomized order in a power point presentation. There was no time pressure: Participants clicked through the slides at their own pace and were allowed to take as much time as they needed to complete the study. The study started with a short informed consent form (where participants had to agree that they are native speakers of American English, over 18 years old, that they understand that their sentences will be recorded, that their participation is voluntary and they have the right to withdraw from the study at any time without penalty) and some information about the general procedure. Participants then saw a sample item, illustrating the representation of the items, the point in time when they would be asked to make their production and a sample of a set of comprehension questions that were added after various items. Afterwards, participants were given different types of instructions, depending on which Group Type they were part of. After the instructions, there was a short practice phase with three trials so that the participants could familiarize themselves with the task. The task was to first read the text passage carefully and to make sure that they understand what it means. The text passage was illustrated in the middle of the screen, consisting of the declarative and the interrogative clause. They were then asked to press a *Next* button once they were ready to read the text passage out loud. A new slide appeared with the text passage still in the middle of the screen and the request to please start speaking.

With respect to the instructions, both Group Types, +Trained and -Trained, received the following information: First, they were asked not to rush through the production study and that they could take as many breaks as they wanted. Second, they were informed that some text passages will be followed by a short task such as a quick comprehension question or an easy arithmetical problem, which should help them to take a break from speaking and to relax. Third, they were asked to repeat any text passage if they had to cough, made a mistake, hesitated or were overall not happy with their pronunciation. Furthermore, +Trained received the following additional information: They were informed that first, it is really important that they understand the meaning of the text passages before reading them out loud. Second, they were informed that some text passages may sound similar to them, which is due to the fact that some items only differ in a few words. These differences, however, may lead to a change of meaning, thus implicitly pointing the participants of +Trained towards the temporary ambiguity of the target items. Third, they were specifically asked to pronounce the text passages well. Fourth, the participants of +Trained were given a specific training regarding the use of prosodic prominence as a prosodic disambiguation technique: They were told that the meaning of a text passage can be supported by prosodically emphasizing certain words, as illustrated in (240).

They then heard a recorded version of this example with clear contrastive prosody on the NPs *John* and *Peter*.[80]

(240) I think John invited Mary to the ball. Or was it Peter?

They were informed that such prosodic emphasis could be very helpful for a listener who needs to decode the message and were asked to keep that information in mind when making their productions. Additionally, participants of +Trained then listened to four more recorded examples that illustrated the use of prosodic prominence as a disambiguating factor. None of the examples was identical to the target items used in the study itself.

The recordings of the participants' productions were conducted in a lab with a stereo headset microphone with 96 kHz/24bit recording. Up until the end of the practice session, the experimenter was present to answer any questions the participant may have. With the beginning of the actual production study, the participant was left alone to ensure that he/she felt comfortable while speaking and was not influenced by the presence of the experimenter.

Analysis of Recordings

Each of the 18 participants produced all eight lexicalizations in each of the four conditions, resulting in 32 recordings per participant and overall 576 recordings for production study part 1. These 576 sound files were manually extracted from the individual participants' voice recordings with the help of Audacity®, version 2.1.2. For the perceptual analysis, two annotators listened to two thirds of the single recordings. The acoustic analysis was conducted with Praat (Boersma & Weenink, 2017) and the help of several Praat scripts provided by Sophie Repp as well as the open source Praat script *ProsodyPro* (Xu, 2017), version 5.7.0. For the acoustic analysis, I first created a *TextGrid* file for each sound file with the help of the Praat scripts by Sophie Repp. In a second step, three research assistants took care of syllable by syllable segmentation so that each segment of a TextGrid corresponded to a single syllable of a recording. As a third step, I used the Praat script ProsodyPro which automatically extracts max F0 and min F0 values in Hz, excursion size values in st, mean intensity values in dB and duration values in ms from each labeled segment of all sound files. These extracted values can

[80] Special thanks to Kari Griffin-Madeja from the *Sprachpraxis* department of the University of Tübingen for recording the examples of the training phase for the production study *Quarterback.*

then subsequently be statistically analyzed. I was specifically interested in the prosodic information of the following labels: the first (stressed) syllable of NP1 (henceforth referred to as NP1) and the first (stressed) syllable of NP2 (henceforth referred to as NP2). I additionally analyzed the QPs *some*, and the two parts of the *wh*-remnant *which one,* to make sure that participants focused the *wh*-remnant. The respective segments are illustrated in Table 35.

Item	*On Tuesday/ They said that*	*some*	*LAW yer*	*defended*	*some*	*DEA lers.*	*Do you know*	*which*	*one/s?*
Segment		***some₁***	**NP1**		***some₂***	**NP2**		***which***	***one/s***

Table 35. Prosodically Analyzed Segments of SimS and SimES

Perceptual Analysis

Analysis of Annotations and Agreement Calculations

For the perceptual analysis, one neutral annotator and the author listened to an exemplary part of target items, that is, 192 sound files of SimS (12 speakers x 8 target item lexicalizations x 2 conditions). Ideally, two more neutral annotators would have labeled the sound files. At the present time, however, this approach was not feasible due to a lack of time and work force but will be implemented for a future publication. The two annotators thus annotated for each sound file the accent strength of the subject NP and the object NP. This means that they indicated whether the two NPs carried an accent and if so, which one was stronger, or whether they both were equally strong. Annotator one additionally annotated whether the two parts of the *wh*-remnant *which one* and the QPs *some* preceding NP1 and NP2 were accented or not.

As opposed to the pilot production study Chicago (see chapter 3.2.1), I decided against traditional ToBI annotations (that is, a differentiation of the different accent types H*, L*, L+H*, etc.) for this perceptual analysis because experience has shown that ToBI labels are only reliable if thorough and identical training of the various annotators can be ensured (Pitrelli, Beckmann, & Hirschberg, 1994; Syrdal, Hirschberg, & McGory, 1999; Aguilar, L., &

Escudero-Mancebo, D., 2010).[81] However, this was not the case for the two annotators here who came from two different institutions. Instead, both the neutral annotator, a native speaker of American English from Boston (henceforth referred to as *annotator one*), and the author (henceforth referred to as *annotator two*) listened to an exemplary proportion of the target items (SimS structures).[82] Afterwards, the author manually checked the annotations of both annotators and decided on the basis of the annotations for each sound file whether prosodic disambiguation has taken place or not. For example, *x* meant that there was an accent, *xx* meant that this accent was stronger than the one on the other constituent and no label meant that there was no accent on the respective constituent. For the decision whether prosodic disambiguation has taken place or not, a ternary labeling method was used in which 0 meant that no prosodic disambiguation has taken place (i.e. if the focused antecedent NP was labeled to be weaker than the unfocused non-antecedent NP, e.g., focused NP: x vs. unfocused NP: xx), 1 meant that the question whether prosodic disambiguation has taken place or not cannot be answered, that is, prosodic disambiguation was open (i.e., if both NPs were labeled equally, e.g., focused NP: x vs. unfocused NP: x) and 2 meant that prosodic disambiguation has definitely taken place (i.e. if the focused antecedent NP was labeled to be stronger than the unfocused non-antecedent NP, e.g., focused NP: xx vs. unfocused NP: x). However, following from Féry's (2010a) model of downstep and recursion, this ternary labeling method has to be interpreted with care. Whereas the labels 2 and 1 clearly speak either for or against prosodic disambiguation, items with the label 0 are ambiguous. The label 0 indicates that both NP types were judged to be equally accented. On the one hand, this can mean that speakers did indeed not emphasize either NP specifically. On the other hand, an equally strong accent on both the subject NP and the object NP can also be interpreted as an object focus: In Féry’s approach, p-phrases are scaled relative

[81] For example, the ToBI annotations of the Chicago pilot production study lacked high agreement rates due to the different training backgrounds of the four annotators, as discussed in chapter 3.2.1.

[82] Due to the high amount of data (over 1000 sound files for production part 1 and 2 combined), it was not possible for one annotator to listen to all sound files in all conditions within the given time frame. The annotators thus labeled only conditions (1) and (2) from twelve out of eighteen speakers. This amount of data gives a representative overview of the overall pitch accent distributions between the two Antecedent Types. Note that the twelve chosen speakers are the ones with the clearest prosodic realizations. The following speakers were therefore excluded: Speaker 4, who suffered from a cold which made her productions sound nasally, speaker 8, who spoke unnaturally, almost like a robot, speaker 9, who played with different accents, thus not taking the production study seriously, speaker 12, who sounded bored and could thus not be considered to have taken the production study seriously either, speaker 15, who invented words that were not part of the target items and speaker 16 who swallowed significant parts of each sentence. Consequently, three +Trained and three -Trained participants had to be excluded from the perceptual analysis.

to each other and accents are consistently downstepped. From this follows that even when the object NP is contrastively focused, its max F0 may not be significantly higher than that of the subject NP, which is accented as well by virtue of being the head of its p-phrase, see the discussion chapter 2.2.2.2. Consequently, items that are given the label 0 could theoretically be counted towards object disambiguation. However, due to this ambiguity, I cannot be sure whether speakers actually intended to prosodically disambiguate the structures towards the object NP when both NPs are equally strongly accented, as opposed to when the object NP is more accented than the subject NP. I therefore refrain from further interpreting the results of the label 0 here.

Regarding the agreement between the two annotators, there was 53% (101 out of 192 items) absolute agreement, meaning that they agreed completely in more than half of the items regarding the question whether prosodic disambiguation has taken place or not. Out of the remaining 47% (91 out of 192 items) disagreement, in 36% (70 out of 192 items), the two annotators disagreed between whether both NP types carried an equally strong accent or whether one was slightly more accented than the other (that is, one annotator labeled the sound file with 1, the other with 0 or 2). In only 11% (21 out of 192 items), the two annotators chose completely contrary annotations (that is, one sound file was labeled 0, the other 2), thus exhibiting complete disagreement in only about one tenth of the items, which suggests an overall high degree of agreement. I averaged the annotations of the two annotators to be able to compare the different conditions. Averaging means that when the two annotators disagreed, for example, on six items of one condition (meaning that annotator one chose, for example, label 0, whereas annotator two chose label 1), I counted three items towards label 0 and three items towards label 1. In case of uneven disagreement, I averaged one time in favor of annotator one and the next time in favor of annotator two. The exact annotations of annotators one and two and the ternary labeling method of whether prosodic disambiguation has taken place or not can be found in the appendix, section 9.

Results of Perceptual Analysis

Regarding the annotation of pitch accents on the *wh*-remnant *which one,* annotator one found that there was a pitch accent on *one* in 372 out of 384 items (97%) (based on the annotations of all four conditions of twelve speakers), suggesting that the *wh*-remnant was indeed focused throughout all items. Following Romero (1998), the antecedent of the *wh*-remnant thus has to be contrastively focused as well by means of a pitch accent.

The perceptual analysis yielded the following averaged results, combining the annotations of both annotators: Out of overall 192 SimS structures, there was no prosodic disambiguation (label 0) in 46 items (24%), prosodic disambiguation was open (label 1) in 54 items (28%) and there definitely was prosodic disambiguation (label 2) in 92 items (48%). Out of overall 96 items, 52 items (54%) were prosodically disambiguated by +Trained as opposed to 40 items (42%) by -Trained. Prosodic disambiguation was open in 27 items (28%) by both +Trained and -Trained. Finally, there was definitely no disambiguation in 17 items (18%) by +Trained and 29 items (30%) by -Trained. With respect to the two conditions, in condition (1), there was no prosodic disambiguation in 34 items (35%), prosodic disambiguation was open in 22 items (23%) and there definitely was prosodic disambiguation in 40 items (42%). In condition (2), there was no prosodic disambiguation in 12 items (13%), prosodic disambiguation was open in 32 items (33%) and there definitely was prosodic disambiguation in 52 items (54%). All values are summarized again in Table 36 and Table 37 and illustrated in Figure 34 and Figure 35.[83]

	no PD	**PD open**	**PD**
+Trained	18	28	54
-Trained	30	28	42

Table 36. Averaged Results of Perceptual Analysis in% per GT

[83] GT means *Group Type*.

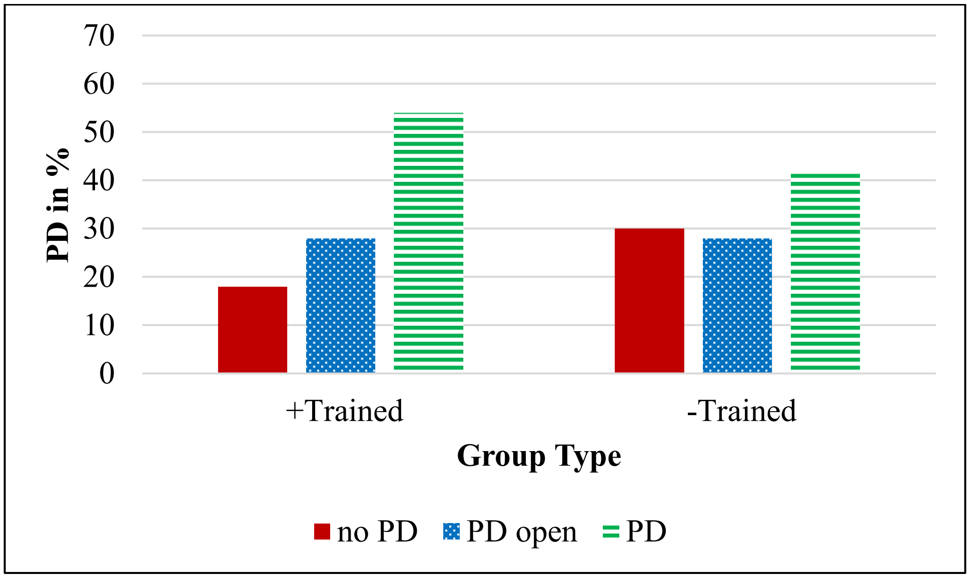


Figure 34. Averaged Results of Perceptual Analysis in% per GT

	no PD	PD open	PD
"which ones"	35	23	42
"which one"	13	33	54

Table 37. Averaged Results of Perceptual Analysis in% per AT

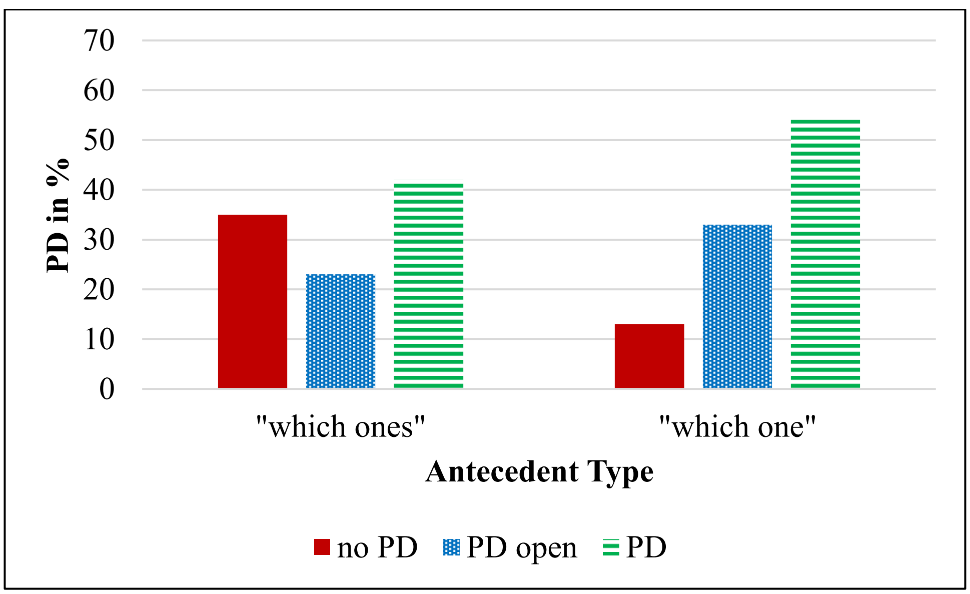


Figure 35. Averaged Results of Perceptual Analysis in% per AT

Out of overall 96 items, +Trained prosodically disambiguated 24 items (25%) in condition (1) and 28 items (29%) in condition (2). There were less cases of definitely no prosodic disambiguation in condition (2) than (1): compare 5 items (5%) to 12 items (13%). -Trained prosodically disambiguated only 16 items (17%) in condition (1) and 24 items (25%) in condition (2). As opposed to +Trained, there were noticeably more cases of definitely no prosodic disambiguation in condition (1) rather than (2): compare 22 items (23%) to 7 items (7%). All values are summarized again in Table 38 and Table 39 and illustrated in Figure 36 and Figure 37.[84]

	no PD	**PD open**	**PD**
"which ones"	25	25	50
"which one"	10	32	58

Table 38. Averaged Results of Perceptual Analysis in% per AT, +Trained only

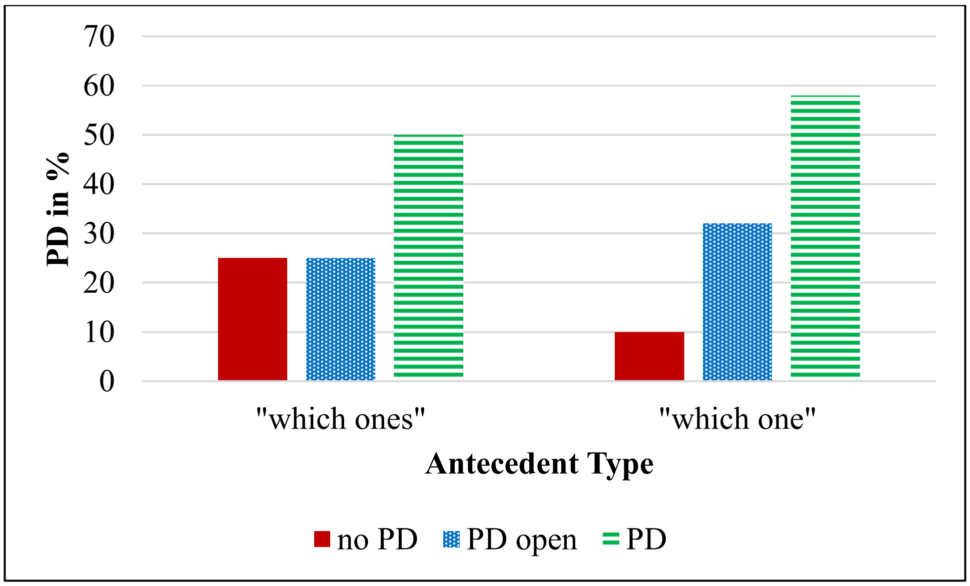


Figure 36. Averaged Results of Perceptual Analysis in% per AT, +Trained only

	no PD	**PD open**	**PD**
"which ones"	46	21	33
"which one"	15	35	50

Table 39. Averaged Results of Perc. Anal. in% per AT, -Trained only

[84] AT means *Antecedent Type*.

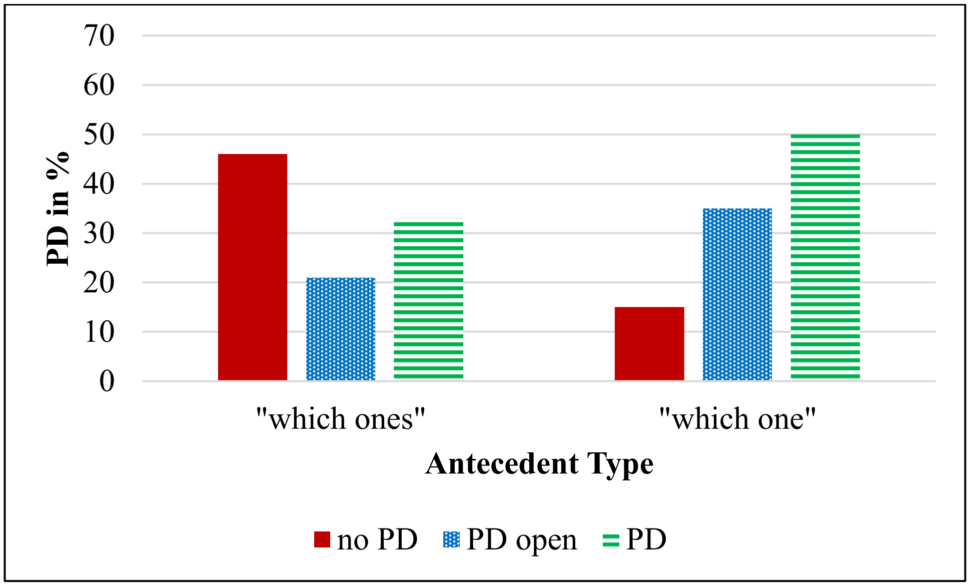


Figure 37. Averaged Results of Perceptual Analysis in% per AT, -Trained only

Moreover, Table 40 and Figure 38 illustrate that some speakers consistently disambiguated the structures (e.g., speakers 2, 3, 19, +Trained), whereas other speakers seemed to not use any consistent prosodic disambiguation techniques (e.g., speakers 5 and 17, -Trained). This illustrates that there is quite some speaker variation regarding the degree of prosodic disambiguation.

Participant	Group Type	no PD	PD open	PD
5	-Trained	8	2	6
6	-Trained	1	7	8
11	-Trained	6	1	9
13	-Trained	1	9	6
14	-Trained	3	6	7
17	-Trained	10	2	4
1	+Trained	4	4	9
2	+Trained	2	5	9
3	+Trained	3	4	9
7	+Trained	6	3	7
10	+Trained	2	6	7
19	+Trained	0	5	11

Table 40. Averaged Results of Perceptual Analysis per Participant (per GT)

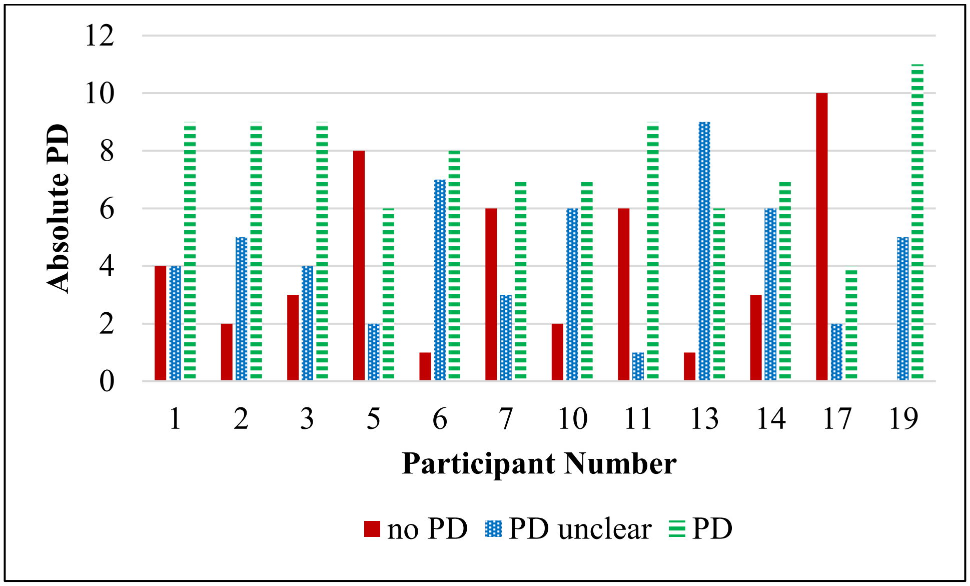


Figure 38. Averaged Results of Perceptual Analysis per Participant

Discussion of Perceptual Analysis

The results of the perceptual analysis support all three hypotheses. Both Group Types used prosody to emphasize the antecedent of a *wh*-remnant, as evident by the comparison of the percentages for PD vs. no PD: 48% vs. 24%, thus supporting H(1). SimS with the subject NP as the antecedent was more strongly prosodically disambiguated than SimS with the object NP as the antecedent, as evident by the comparison of the percentages: 54% vs. 42%, thus supporting H(2). +Trained used prosody to disambiguate SimS more frequently than -Trained, as evident by the comparison of the percentages for PD of +Trained vs. -Trained: 54% vs. 42%, thus supporting H(3). Moreover, the perceptual analysis yields an important finding regarding the different behavior of the two Group Types: +Trained used prosody to disambiguate SimS with the object NP as the antecedent in 50% and SimS with the subject NP as the antecedent in 58%, whereas -Trained used prosody to disambiguate SimS with the object NP as the antecedent in only 33% and SimS with the subject NP as the antecedent in 50%. -Trained did not use prosody to disambiguate SimS with the object NP as the antecedent in 46%, whereas +Trained did not in only 25%. This illustrates that the overall high number of no PD for SimS with the object NP as the antecedent is mostly a result of the productions by -Trained. Consequently, the perceptual analysis shows that -Trained only used prosody to disambiguate SimS with the subject NP as the antecedent but not SimS with the object NP as the antecedent.

In order to further investigate the degree of prosodic disambiguation of +Trained and -Trained for simple sluicing, I conducted an acoustic analysis that will be discussed in the following chapter.

Acoustic Analysis

Statistical Analysis

The statistical analysis of production study part 1 served to answer three main questions: First, do both Group Types use prosody to disambiguate simple sluicing structures? Second, is SimS with the subject NP as antecedent more strongly disambiguated by prosody than SimS with the object NP as antecedent? Third, is the degree of prosodic prominence greater for +Trained than for -Trained? To answer these questions, I conducted two ANOVAs with participants (F_1) and items (F_2) as random factors to analyze whether, first, there is a stronger degree of prosodic prominence on NP1 when the subject NP serves as the antecedent of the *wh*-remnant and second, whether there is a stronger degree of prosodic prominence on NP2 when the object NP serves as the antecedent of the *wh*-remnant, separately for the two Group Types. The first ANOVA served to analyze the degree of prosodic variation on NP1, thus comparing the mean values of the differences between the five prosodic parameters max F0 (Hz), min F0 (Hz), duration (ms), intensity (dB) and excursion size (st) on the stressed syllable of NP1 (henceforth simply called NP1). The second ANOVA served to analyze the degree of prosodic variation on NP2, thus comparing the mean values of the differences between the same five prosodic parameters on the stressed syllable of NP2 (henceforth simply called NP2). I additionally conducted several *t*-Tests to further investigate the significance of certain differences. The *t*-Tests determine whether there is a significant difference between the mean value of two conditions, using the mean values of all items, averaged either over all lexicalizations per participant (t_1 analysis) or over all participants per lexicalization (t_2 analysis).[85]

The first ANOVA with participants (F_1) and items (F_2) as random factors compared the differences of the mean values between the five prosodic parameters as produced on NP1 of SimS with either the object NP (condition (1)) or the subject NP (condition (2)) as antecedent

[85] For ease of readability, I will only report significant effects of the statistical analysis of the production study Quarterback parts 1 and 2. An overview of all *F*- and *p*-values (significant and non-significant ones) of NP1 and NP2 of the production study Quarterback part 1 and part 2 is provided in the attachments to this thesis.

to the values of the five prosodic parameters as produced on NP1 of the control SimES with either the object NP (condition (3)) or the subject NP (condition (4)) as antecedent, separately for the two Group Types +Trained and -Trained. The within subjects factor *Sluicing Type* (SimS vs. SimES) was crossed with the within subjects factor *Antecedent Type* (object NP vs. subject NP) as well as the between subjects factor *Group Type* (+Trained vs. -Trained). The analysis yielded the following results: There was a marginally significant effect of Antecedent Type in the analysis of max F0 [F_1 (1,16) = 4.334, p = 0.054; F_2 (1,14) = 3.977, p = 0.066], and a significant effect in the analysis of duration [F_1 (1,16) = 9.775, p = 0.007; F_2 (1,14) = 25.871, p < 0.001] and excursion size [F_1 (1,16) = 7.110, p = 0.017; F_2 (1,14) = 6.145, p = 0.027]. There was a significant effect of Sluicing Type in the analysis of min F0 [F_1 (1,16) = 6.808, p = 0.019; F_2 (1,14) = 22.596, p < 0.001], duration [F_1 (1,16) = 5.315, p = 0.035; F_2 (1,14) = 26.213, p < 0.001] and excursion size [F_1 (1,16) = 10.112, p = 0.006; F_2 (1,14) = 7.309, p = 0.017]. There was a marginally significant interaction of Antecedent Type x Group Type in the analysis of max F0 [F_1 (1,16) = 3.630, p = 0.075; F_2 (1,14) = 3.331, p = 0.089], a marginally significant effect in the analysis of F_1 and a significant effect in the analysis of F_2 of duration [F_1 (1,16) = 3.736, p = 0.071; F_2 (1,14) = 9.888, p = 0.007], and a significant effect in the analysis of F_1 and a marginally significant effect in the analysis of F_2 of excursion size [F_1 (1,16) = 4.520, p = 0.049; F_2 (1,14) = 3.907, p = 0.068]. There was a marginally significant interaction of Sluicing Type x Antecedent Type in the analysis of F1 of min F0 [F_1 (1,16) = 3.543, p = 0.078; F_2 (1,14) = 1.853, p = 0.195]. There was a marginally significant interaction of Sluicing Type x Group Type in the analysis of F_1 of excursion size [F_1 (1,16) = 3.137, p = 0.096; F_2 (1,14) = 2.268, p = 0.154]. How exactly the two Sluicing Types with the two Antecedent Types differ from each other, and also how the respective productions on NP1 differ between the two Group Types will be discussed in more detail below.

The second ANOVA with participants (F_1) and items (F_2) as random factors compared the differences of the mean values of the five prosodic parameters as produced on NP2 of SimS with either the object NP (condition (1)) or the subject NP (condition (2)) as antecedent with the values of the five prosodic parameters as produced on NP2 of the control SimES with either the object NP (condition (3)) or the subject NP (condition (4)) as antecedent, separately for the two Group Types +Trained and -Trained. The within subjects factor *Sluicing Type* (SimS vs. SimES) was crossed with the within subjects factor *Antecedent Type* (object NP vs. subject NP) as well as the between subjects factor *Group Type* (+Trained vs. -Trained). The analysis yielded a significant effect of Antecedent Type in the analysis of F_2 of duration [F_1 (1,16) = 2.024, p = 0.174; F_2 (1,14) = 5.238, p = 0.038] and a marginally significant interaction of the factors Sluicing Type x Group Type in the analysis of intensity [F_1 (1,16) = 4.411, p = 0.052; F_2 (1,14) = 3.255, p = 0.093]. These results suggest that there are almost no prosodic differences on the object NP between the different conditions, in contrast to the subject NP, as the previous ANOVA showed. How exactly the two Sluicing Types with the two Antecedent Types differ from each other, and also how the respective productions on NP2 differ between the two Group Types, will be discussed in more detail below.

Especially the results of the first ANOVA investigating the different productions on NP1 suggest that there are prosodic differences between the two Antecedent Types, the two Sluicing Types and the two Group Types. I will therefore analyze the results of the different prosodic parameters on both NP1 and NP2 separately and in more detail. I will start by analyzing the differences of max F0, followed by min F0, duration, intensity and excursion size. Depending on the results of the first ANOVAs (of NP1 and NP2), I will provide separate ANOVAs for the two Group Types and *t*-Tests if necessary.

Statistical Analysis per Prosodic Parameter and Discussion

a) Max F0

The ANOVA of max F0 on NP1 yielded a marginally significant effect of Antecedent Type and of the interaction Antecedent Type x Group Type. I calculated a separate ANOVA of max F0 on NP1 for the two Group Types, which yielded a significant effect of Antecedent Type for +Trained [F_1 (1,8) = 8.720, p = 0.018; F_2 (1,7) = 11.615, p = 0.011]. Figure 39 illustrates that +Trained produce NP1 of SimS with a higher max F0 when the subject NP serves as the antecedent.[86] Additional *t*-Tests show that this difference between the two Antecedent Types is significant in the analysis of t_2 of SimS for +Trained [t_1 (8) = 1.814, p = 0.107; $t2$ (7) = 2.648, p = 0.033]. It is marginally significant in SimES [t_1 (8) = 2.275, p = 0.052; $t2$ (7) = 2.340, p = 0.052].[87] Figure 39 illustrates that -Trained also produce NP1 of SimS with a higher max F0

[86] The mean values of all SimS conditions are summarized in Table 42 and Table 43 at the end of this chapter.
[87] Note that I will only provide Figures for the results of the target items *SimS*. The control items *SimES* will only be mentioned when the analysis yielded significant effects or when the results are important with respect to SimS.

when the subject NP serves as the antecedent. However, this difference did not reach statistical significance. The results hence suggest that +Trained use max F0 on NP1 to differentiate between the two Antecedent Types of SimS and SimES. -Trained make the same distinction, but not significantly. The results of the acoustic analysis thus show that only +Trained use max F0 to emphasize NP1 when the subject NP serves as the antecedent of both Sluicing Types.

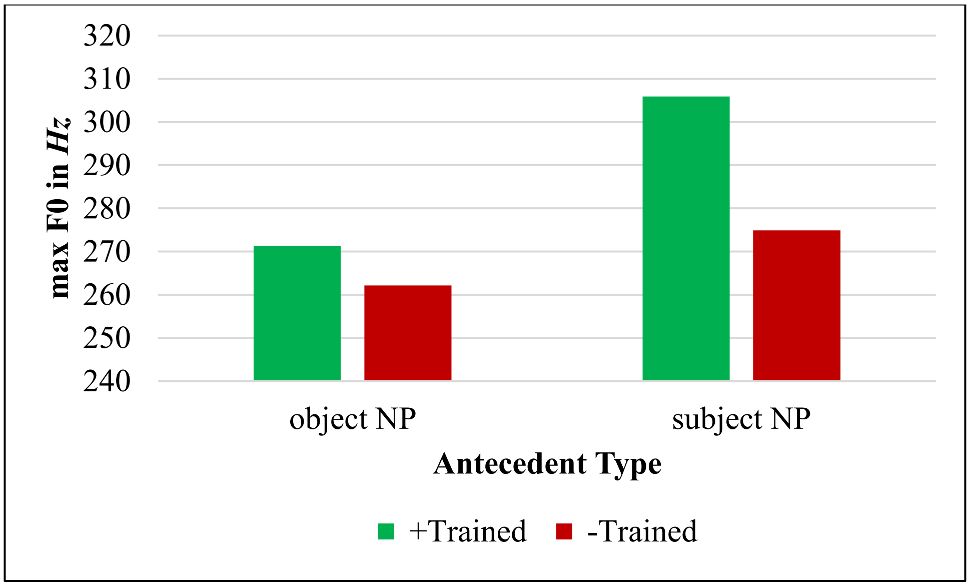


Figure 39. Max F0 on NP1 of SimS per AT and GT

The ANOVA of maxF0 on NP2 yielded no significant effects. The differences between the mean values are illustrated in Figure 40, which suggests that both Group Types produce NP2 of SimS with a lower max F0 when the object NP serves as the antecedent. The results hence suggest that neither Group Type uses max F0 on NP2 to differentiate between the two Antecedent Types. It seems that both Group Types produce NP2 with a higher max F0 when the subject NP rather than the object NP serves as the antecedent. However, this difference did not reach statistical significance. The results of the acoustic analysis thus show that neither Group Type uses max F0 to emphasize NP2 when the object NP serves as the antecedent of neither Sluicing Type.

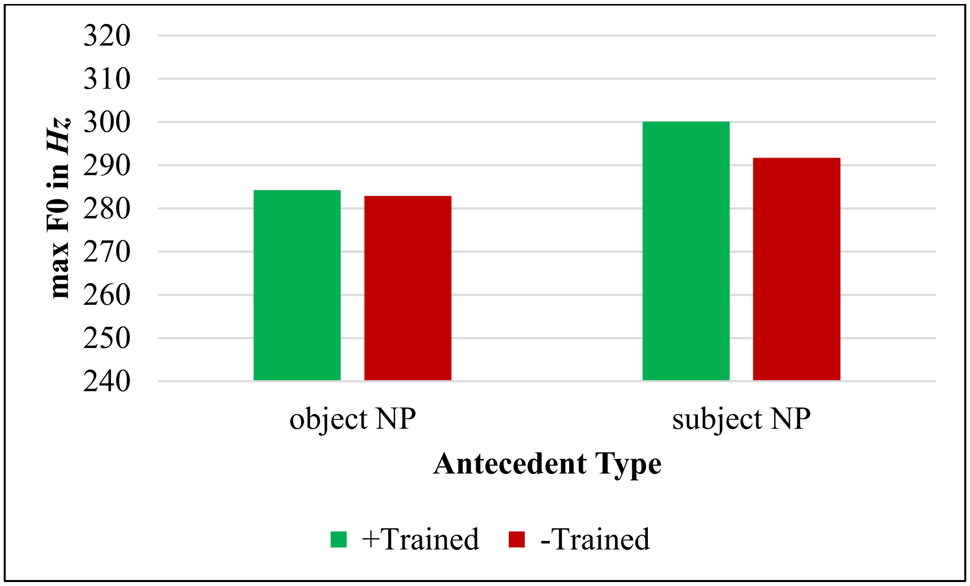


Figure 40. Max F0 on NP2 of SimS per AT and GT

b) Min F0

The ANOVA of min F0 on NP1 yielded a significant effect of Sluicing Type and a marginally significant effect of the interaction Sluicing Type x Antecedent Type. Further *t*-Tests yielded a significant difference between the two Sluicing Types when the subject NP serves as the antecedent [t_1 (17) = 3.100, p = 0.007; $t2$ (15) = 3.376, p = 0.004] and when the object NP serves as the antecedent of the analysis of F_2 [t_1 (17) = 1.478, p = 0.158; $t2$ (15) = 2.127, p = 0.050]. Figure 41 suggests that there is almost no difference between min F0 on NP1 of SimS between the two Antecedent Types. Therefore, neither Group Type uses min F0 on NP1 to differentiate between the two Antecedent Types. However, it also illustrates that both Group Types use min F0 on NP1 to differentiate between the two Sluicing Types. The results of the acoustic analysis thus show that neither Group Type uses min F0 to emphasize NP1 when the subject NP serves as the antecedent of neither Sluicing Type. Nevertheless, both Group Types use min F0 to differentiate between the two Sluicing Types when either NP serves as the antecedent.

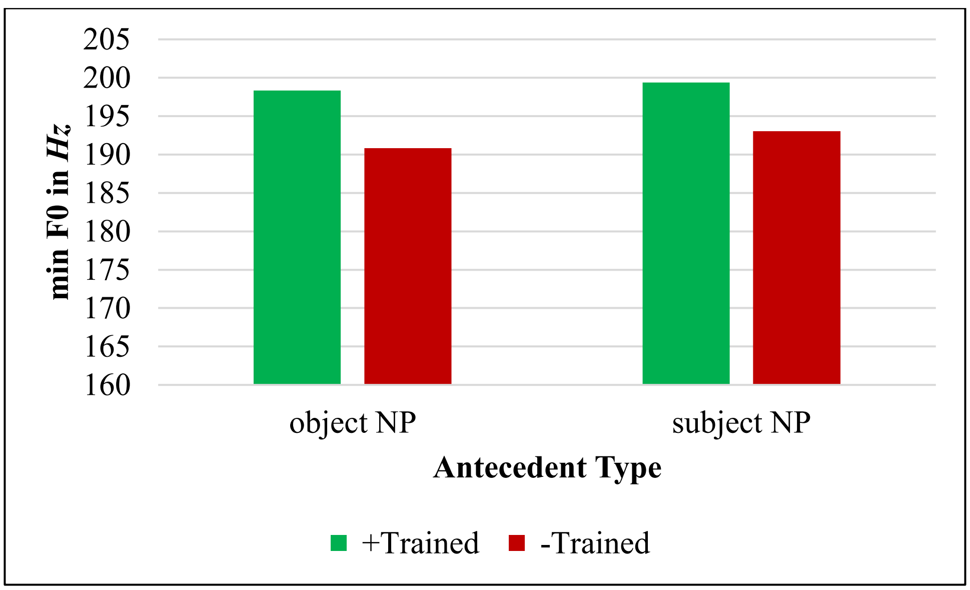


Figure 41. Min F0 on NP1 of SimS per AT and GT

The ANOVA of min F0 on NP2 yielded no significant effects. The differences between the mean values are illustrated in Figure 42, which suggests that +Trained produce NP2 of SimS with a higher min F0 when the subject NP rather than the object NP serves as the antecedent. -Trained, however, seem to produce NP2 of SimS with a higher min F0 when the object NP serves as the antecedent. The results hence suggest that neither Group Type uses min F0 on NP2 to differentiate between the two Antecedent Types. A closer look at the mean values illustrated in Figure 42 merely suggests that the speakers of the two Group Types behave quite differently. The results of the acoustic analysis thus show that neither Group Type uses min F0 to emphasize NP2 when the object NP serves as the antecedent of neither Sluicing Type.

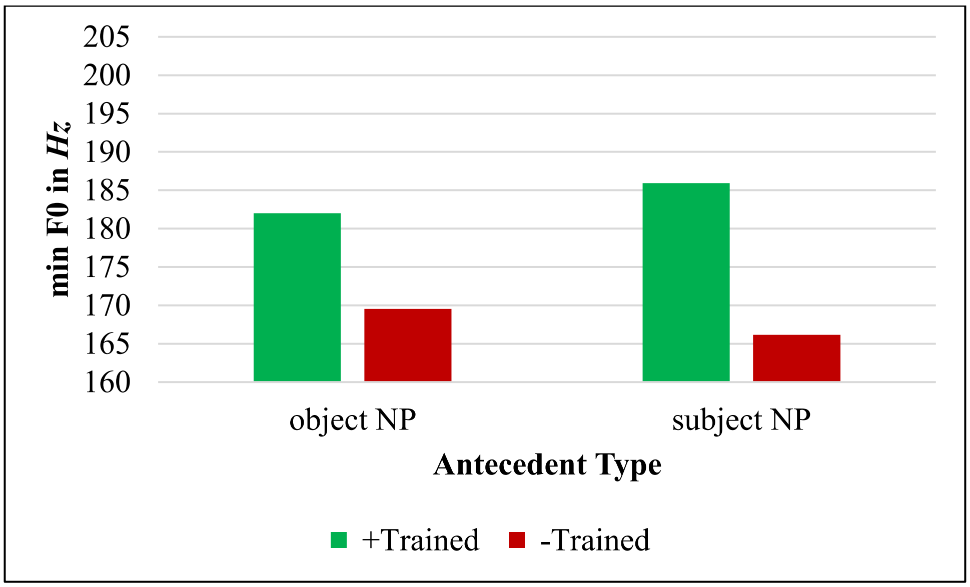


Figure 42. Min F0 on NP2 of SimS per AT and GT

c) Duration

The ANOVA of duration on NP1 yielded a significant effect of Sluicing Type and Antecedent Type and a (marginally) significant effect of the interaction Antecedent Type x Group Type. I therefore computed a separate ANOVA of duration on NP1 for the two Group Types, which yielded a significant effect of Antecedent Type for +Trained [F_1 (1,8) = 12.971, p = 0.007; F_2 (1,7) = 67.461, p < 0.001]. Additional *t*-Tests show that there is a significant difference of Antecedent Type for +Trained in SimS [t_1 (8) = 3.121, p = 0.014; *t2* (7) = 2.450, p = 0.044] and in the analysis of F_2 of SimES [t_1 (8) = 1.768, p = 0.115; *t2* (7) = 2.482, p = 0.042]. Figure 43 illustrates that both Group Types produce NP1 of SimS with a longer duration when the subject NP serves as the antecedent. Moreover, additional *t*-Tests show that there is a significant difference of Sluicing Type on NP1 when the object NP serves as the antecedent [t_1 (17) = 2.628, p = 0.018; *t2* (15) = 4.475, p < 0.001] and in the analysis of F_2 when the subject NP serves as the antecedent [t_1 (17) = 1.558, p = 0.138; *t2* (15) = 2.223, p = 0.042]. The results hence illustrate that only +Trained use duration on NP1 to differentiate between the two Antecedent Types. Moreover, both Group Types use duration to differentiate between the two Sluicing Types, mostly when the object NP serves as the antecedent. The results of the acoustic analysis thus show that only +Trained uses duration to emphasize NP1 when the subject NP serves as the antecedent of both Sluicing Types. Moreover, both Group Types use duration to differentiate between the two Sluicing Types when the either NP serves as the antecedent.

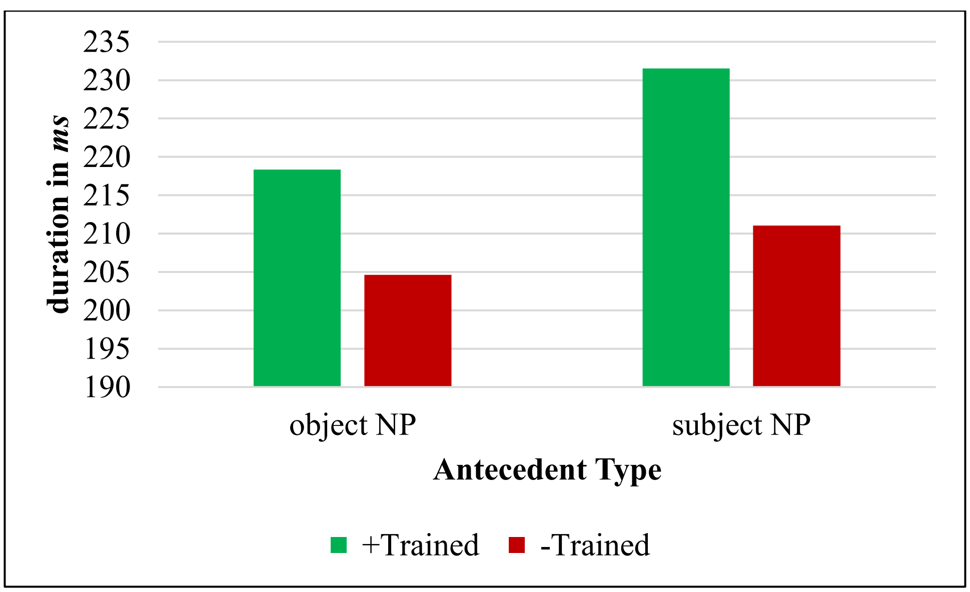


Figure 43. Duration on NP1 of SimS per AT and GT

The ANOVA of duration on NP2 yielded a significant effect of Antecedent Type in the analysis of F_2 of duration. Additional *t*-Tests show that there is a significant difference between the two Antecedent Types in SimES in the analysis of t_2 [t_1 (17) = 1.481, p = 0.157; $t2$ (15) = 2.678, p = 0.017]. The results hence suggest that neither Group Type uses duration on NP2 of SimS to differentiate between the two Antecedent Types but on SimES. Figure 44 illustrates that NP2 of SimS is produced with a slightly longer duration when the object NP serves as the antecedent by both Group Types, though not significantly. The results of the acoustic analysis thus show that neither Group Type uses duration to emphasize NP2 when the object NP serves as the antecedent of SimS.

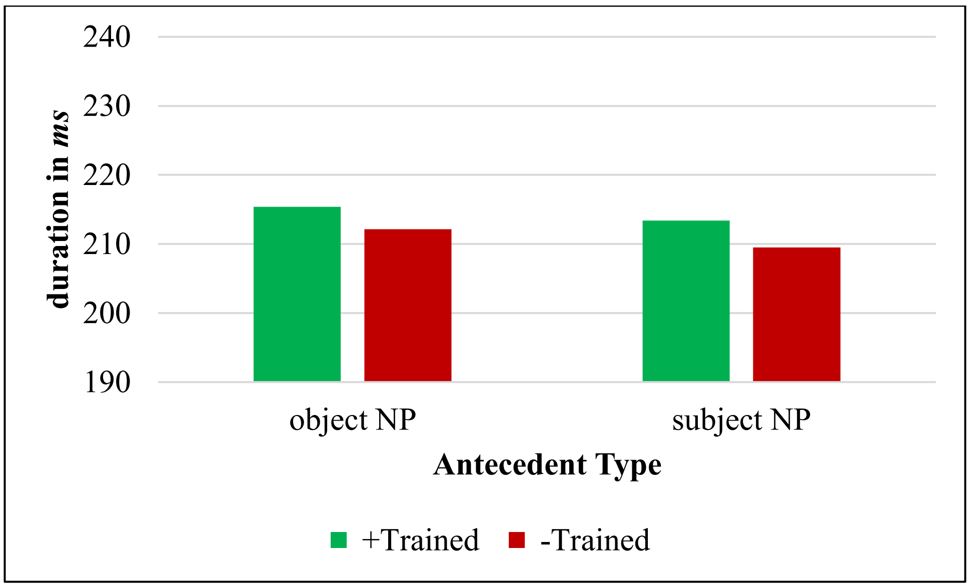


Figure 44. Duration on NP2 of SimS per AT and GT

d) Intensity

The ANOVA of intensity on NP1 yielded no significant effects. The differences between the mean values are illustrated in Figure 45, which suggests that +Trained produce NP1 of SimS with a higher intensity when the subject NP serves as the antecedent, whereas -Trained produce NP1 of SimS almost identically in the two Antecedent Types. The results, however, suggest that neither Group Type uses intensity on NP1 to differentiate between the two Antecedent Types. The results of the acoustic analysis hence show that neither Group Type uses intensity to emphasize NP1 when the subject NP serves as the antecedent of neither Sluicing Type.

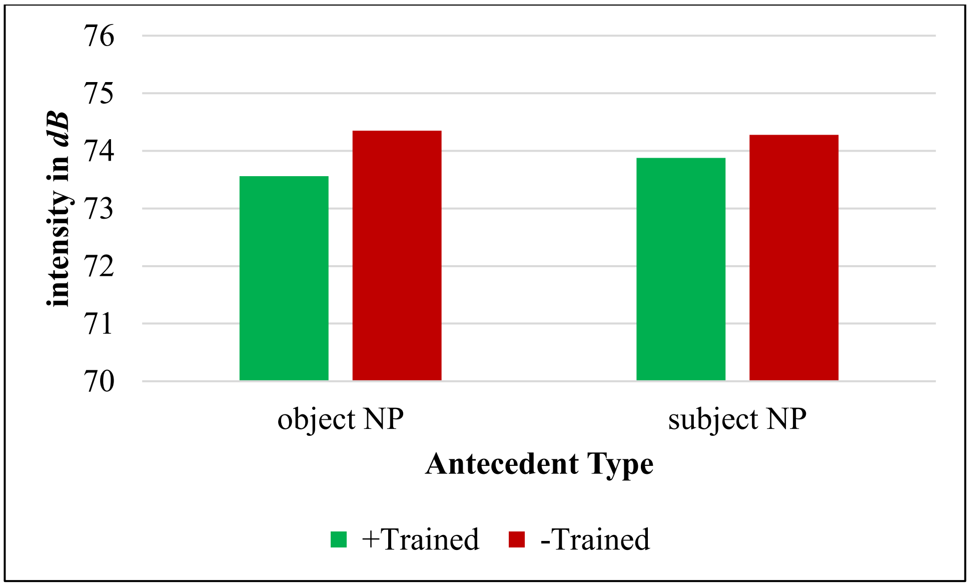


Figure 45. Intensity on NP1 of SimS per AT and GT

The ANOVA of intensity on NP2 yielded a marginally significant effect for the interaction of Sluicing Type x Group Type. I therefore computed a separate ANOVA of intensity on NP2 for the two Group Types, which yielded a marginally significant effect of Sluicing Type for -Trained in the analysis of F_1 only [F_1 (1,8) = 3.666, p = 0.092; F_2 (1,7) = 0.836, p = 0.384]. Additional *t*-Tests of -Trained show that there is a significant difference between the two Sluicing Types when the subject NP serves as the antecedent of the analysis of t_1 only [t_1 (8) = 2.401, p = 0.043; $t2$ (7) = 1.220, p = 0.262]. Figure 46 suggests that +Trained produce NP2 of SimS with a slightly higher intensity when the subject NP rather than the object NP serves as the antecedent, whereas -Trained produce NP2 of SimS with a higher intensity when the object NP serves as the antecedent. However, there was no significant effect of Antecedent Type for neither Group Type. The results hence suggest that only -Trained use intensity to differentiate between the two Sluicing Types when the subject NP serves as the antecedent. Neither Group Type uses intensity to differentiate between the two Antecedent Types. The results of the acoustic analysis thus show that neither Group Type uses intensity to emphasize NP2 when the object NP serves as the antecedent of neither Sluicing Type. Nevertheless, -Trained use intensity to differentiate between the two Sluicing Types when the subject NP serves as the antecedent.

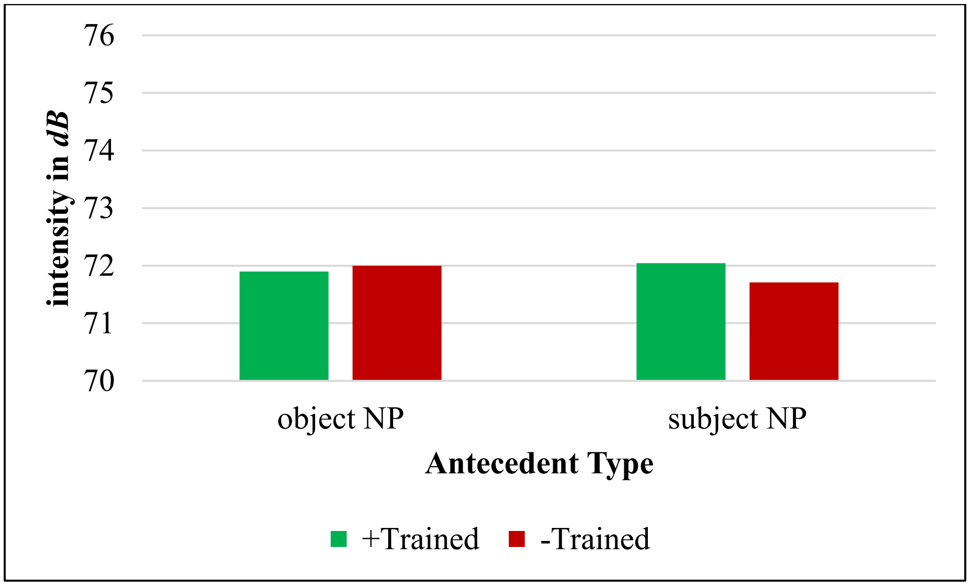


Figure 46. Intensity on NP2 of SimS per AT and GT

e) Excursion Size

The ANOVA of excursion size on NP1 yielded a significant effect of Sluicing Type and Antecedent Type as well as for the interaction Antecedent Type x Group Type. There was a marginally significant effect of the interaction Sluicing Type x Group Type. I therefore computed a separate ANOVA of excursion size on NP1 for the two Group Types, which yielded a significant effect of Antecedent Type for +Trained [F_1 (1,8) = 10.572, p = 0.012; F_2 (1,7) = 7.830, p = 0.027], and a significant effect of Sluicing Type for -Trained [F_1 (1,8) = 7.703, p = 0.024; F_2 (1,7) = 11.478, p = 0.012]. Additional *t*-Tests show that this difference of Antecedent Type for +Trained is significant in the analysis of t_2 of SimS and in the analysis of t_1 of SimES and marginally significant in the analysis of t_2 of SimES [SimS: t_1 (8) = 1.754, p = 0.118; *t2* (7) = 2.935, p = 0.022; SimES: t_1 (8) = 2.514, p = 0.036; *t2* (7) = 2.152, p = 0.068]. Figure 47 illustrates that +Trained produce NP1 of SimS with a higher excursion size when the subject NP serves as the antecedent. The difference is smaller for -Trained. Moreover, additional *t*-Tests show that -Trained use excursion size on NP1 to differentiate between the two Sluicing Types, especially if the object NP serves as the antecedent [object NP: t_1 (8) = 3.016, p = 0.017; *t2* (7) = 2.879, p = 0.024; subject NP: t_1 (8) = 1.637, p = 0.140; *t2* (7) = 2.380, p = 0.049]. The results hence suggest that +Trained uses excursion size on NP1 to differentiate between the two Antecedent Types, whereas -Trained uses excursion size on NP1 to differentiate between the two Sluicing Types. The results of the acoustic analysis thus show that only +Trained use excursion size to emphasize NP1 when the subject NP serves as the antecedent of both Sluicing Types. Moreover, -Trained use excursion size on NP1 to differentiate between the two Sluicing Types with either NP type as antecedent.

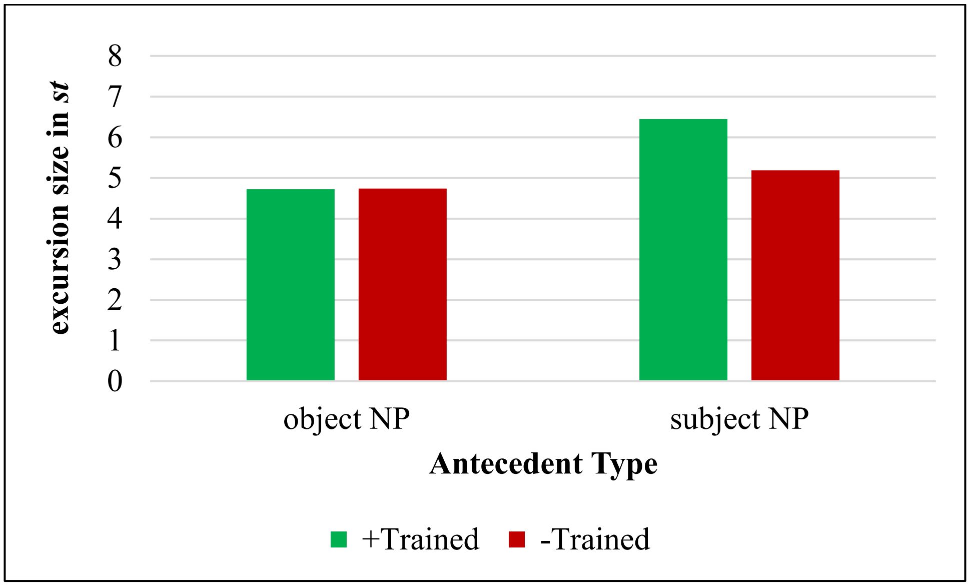


Figure 47. Excursion Size on NP1 of SimS per AT and GT

The ANOVA of excursion size on NP2 yielded no significant effects. The differences between the mean values are illustrated in Figure 48, which suggests that both Group Types produced NP2 of SimS with a higher excursion size when the subject NP rather than the object NP serves as the antecedent. However, this difference did not reach statistical significance. The results of the acoustic analysis thus show that neither Group Type uses excursion size to emphasize NP2 when the object NP serves as the antecedent of neither Sluicing Type.

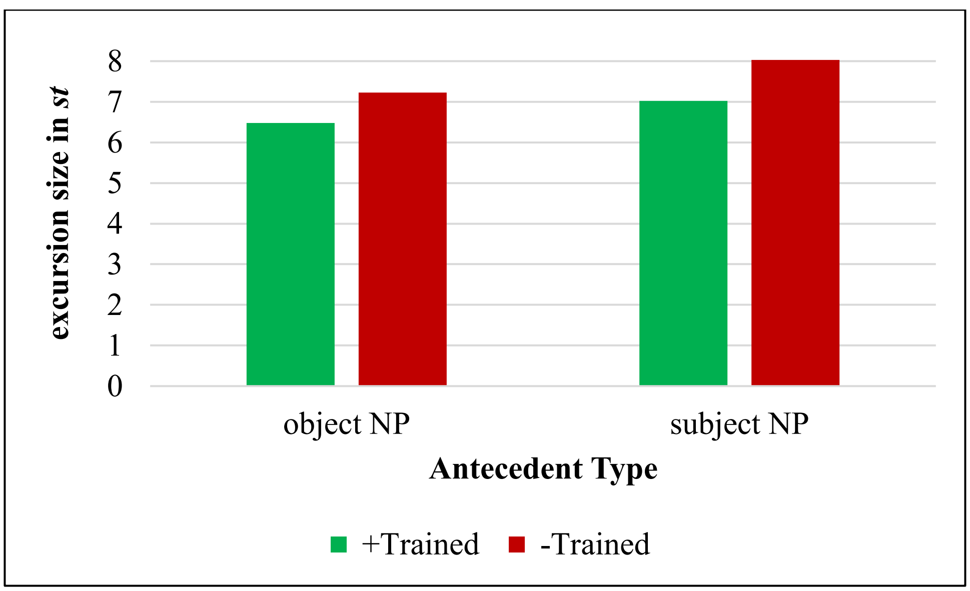


Figure 48. Excursion Size on NP2 of SimS per AT and GT

Table 41 provides an overview of the results of the entire statistical analysis for each prosodic parameter separately, including the general ANOVAs investigating the degree of prosodic variation on NP1 and NP2, the separate ANOVAs per Group Type and additional *t*-Tests. Regarding the *t*-Tests, I specifically indicated whether the comparison regards SimS or SimES. F_1/t_1 or F_2/t_2 in brackets signal whether a given effect was significant in only one analysis or in both (no brackets thus means that it was significant in both analyses, F_1/t_1 and F_2/t_2). A dash indicates that there were no significant effects. Note that I do not distinguish between significant ($p < 0.05$) and marginally significant ($p < 0.1$) effects here. Table 42 and Table 43 provide a summary of the mean values of all prosodic parameters of SimS with subject NP and object NP as antecedent, separately for +Trained and for -Trained.

Prosodic Parameter	**Statistical Analysis**	**NP1**	**NP2**
Max F0	ANOVA General	• Antecedent • Antecedent*Group	-
	ANOVA +Trained	• Antecedent	-
	ANOVA -Trained	-	-
	t-Test +Trained	• Antecedent, SimS (t_2) • Antecedent, SimES	-
	t-Test -Trained	-	-
Min F0	ANOVA General	• Sluicing*Antecedent (F_1)	-
	t-Test General	• Sluicing, subject NP • Sluicing, object NP (t_2)	-
	ANOVA +Trained	-	-
	ANOVA -Trained	-	-
	t-Test +Trained	-	-
	t-Test -Trained	-	-
Duration	ANOVA General	• Antecedent • Antecedent*Group	• Antecedent (F_2)
	t-Test General	• Sluicing, object NP	-

		• Sluicing, subject NP (t_2)	
	ANOVA + Trained	• Antecedent	-
	ANOVA -Trained	-	-
	t-Test +Trained	• Antecedent, SimS • Antecedent, SimES (t_2)	-
	t-Test -Trained	• Antecedent, SimS (t_2)	-
Intensity	ANOVA General	-	• Sluicing*Group
	ANOVA + Trained	-	-
	ANOVA -Trained	-	• Sluicing (F_1)
	t-Test +Trained	-	-
	t-Test -Trained	-	• Sluicing, subject NP (t_1)
Excursion Size	ANOVA General	• Sluicing • Antecedent • Sluicing*Group • Antecedent*Group	-
	ANOVA + Trained	• Antecedent	-
	ANOVA -Trained	• Sluicing	-
	t-Test +Trained	• Antecedent, SimS (t_2) • Antecedent, SimES	-
	t-Test -Trained	• Sluicing, object NP • Sluicing, subject NP (t_2)	-

Table 41. Summary of Statistical Analysis (significant effects only)

	Antecedent Type	NP2	NP1
Max F0 (Hz)	SimS NP2	284.21	271.27
	SimS NP1	300.11	305.93
Min F0 (Hz)	SimS NP2	182.02	198.35
	SimS NP1	185.95	199.37
Duration (ms)	SimS NP2	215.38	218.33
	SimS NP1	213.38	231.54
Intensity (dB)	SimS NP2	71.90	73.56
	SimS NP1	72.04	73.88
Excursion Size (Hz)	SimS NP2	6.48	4.72
	SimS NP1	7.02	6.45

Table 42. Mean Values for SimS, +Trained

	Antecedent Type	NP2	NP1
Max F0 (Hz)	SimS NP2	282.88	262.16
	SimS NP1	291.68	274.89
Min F0 (Hz)	SimS NP2	169.55	190.84
	SimS NP1	166.18	193.04
Duration (ms)	SimS NP2	212.14	204.62
	SimS NP1	209.52	211.06
Intensity (dB)	SimS NP2	72.00	74.35
	SimS NP1	71.71	74.28
Excursion Size (Hz)	SimS NP2	7.23	4.74
	SimS NP1	8.03	5.19

Table 43. Mean Values for SimS, -Trained

Discussion of Acoustic Analysis

In this section, I have explored the following three questions: First, do +Trained as well as -Trained use prosody to disambiguate simple sluicing structures? Second, is SimS with the subject NP as antecedent more strongly disambiguated by prosody than SimS with the object NP as antecedent? Third, is the degree of prosodic prominence greater for +Trained than for -Trained? The results of the acoustic analysis answer all these questions and thus support hypotheses H(1), H(2) and H(3). The acoustic analysis suggests that mostly +Trained but also –Trained, use prosody to differentiate between the two Antecedent Types: +Trained produce significantly higher max F0, significantly longer duration and significantly higher excursion size values on NP1 of SimS when the subject NP serves as the antecedent as opposed to when the object NP does. Judging from the descriptive differences, +Trained furthermore produce longer duration values on NP2 of SimS when the object NP serves as the antecedent. -Trained produce significantly longer duration values on NP1 of SimS when the subject NP serves as the antecedent as opposed to when the object NP dies. Judging from the descriptive differences, -Trained furthermore produce higher max F0 values, longer duration values and somewhat higher excursion size values on NP1 of SimS when the subject NP serves as the antecedent, and higher min F0 values, longer duration values and higher intensity values on NP2 of SimS when the object NP serves as the antecedent. I therefore conclude that native speakers of American English use prosody to emphasize the antecedent of a *wh*-remnant in simple sluicing, supporting hypothesis H(1). Both Group Types use more prosodic prominence on NP1 to emphasize that the subject NP serves as the antecedent than on NP2 to emphasize that the object NP serves as the antecedent, supporting hypothesis H(2). Finally, there is a clear difference between the productions of +Trained and –Trained, which is not only apparent by the distribution of significant effects per Group Type but also from the fact that +Trained generally produce higher max F0, higher min F0 and longer duration values than –Trained, thus supporting hypothesis H(3).

Regarding the two Sluicing Types, the analysis shows that both Group Types use min F0 and duration values on NP1 to differentiate between SimS and SimES: they produce higher min F0 values on NP1 of SimS than of SimES when the subject NP serves as the antecedent and shorter duration values on NP1 of SimS than of SimES when the object NP serves as the antecedent. Additionally, -Trained use excursion size on NP1 and intensity on NP2 to differentiate between the two Sluicing Types: they produce higher excursion size values on NP1 of SimS than of SimES when the object NP serves as the antecedent and higher intensity values on NP2 of SimS than of SimES when the subject NP serves as the antecedent. Rather than indicating that the prosodic patterns between SimS and SimES contrast in general, I suggest that this difference between the two Sluicing Types might be due to their different underlying syntactic (and thus prosodic) phrase structures as well as their different pragmatics: Compare the intuitive prosody of the NP *lawyer* in the SimS structure in (241) to the NP *lawyer* in the SimES structure in (242).

(241) On Tuesday, some lawyer defended some dealers.

(242) They said that some lawyer defended some dealers.

The SimS structure in (241) contains a topicalization of the PP *On Tuesday* which, syntactically, is located above the subsequent TP in a specific *Topic Phrase* (*TopP*) (Radford, 2012). Topicalizations are usually also separated from their respective main clauses by a comma which generally indicates the location of a pause. I argue that due to this peripheral position of TopP, the topicalization and the main clause are located in two separate p-phrases, as illustrated in (243), which leads to a reset of the register at the TP *some lawyer defended some dealers* (see Féry, 2010a, discussion chapter 2.2.2.2).

(243) $(\text{On Tuesday})_p$ $(\text{some lawyer defended some dealers})_p$

In (242), however, there is no topicalization, but the SVO clause is embedded into a matrix clause. It is thus the complement of the VP *say* and the second p-phrase is embedded into the first p-phrase, see (244).

(244) $(\text{They said that }(\text{some lawyer defended some dealers})_p)_p$.

Consequently, the topicalization of (241) leads to a stronger prosodic break and thus a stronger reset at the NP *some lawyer* than the matrix clause of (242). Compare the syntactic structure of the SimS in Figure 49 to the syntactic structure of the SimES in Figure 50.

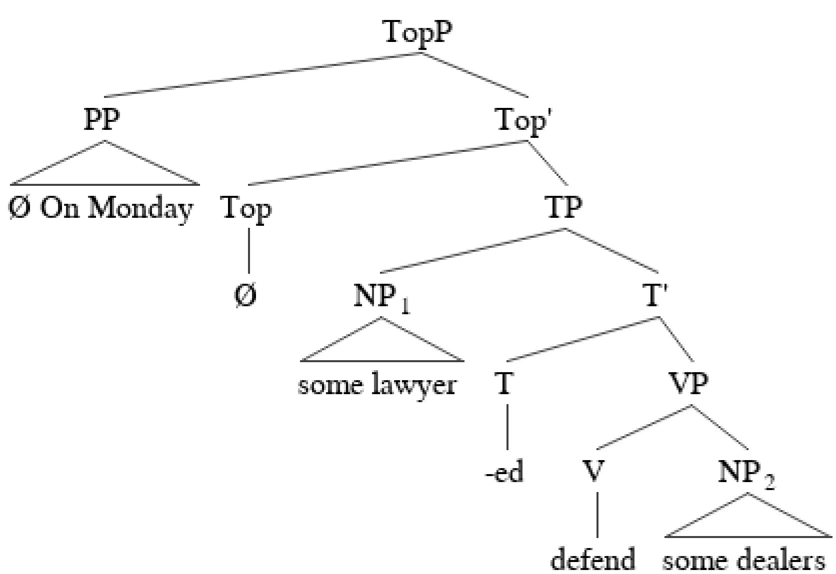


Figure 49. Tree Structure of SimS

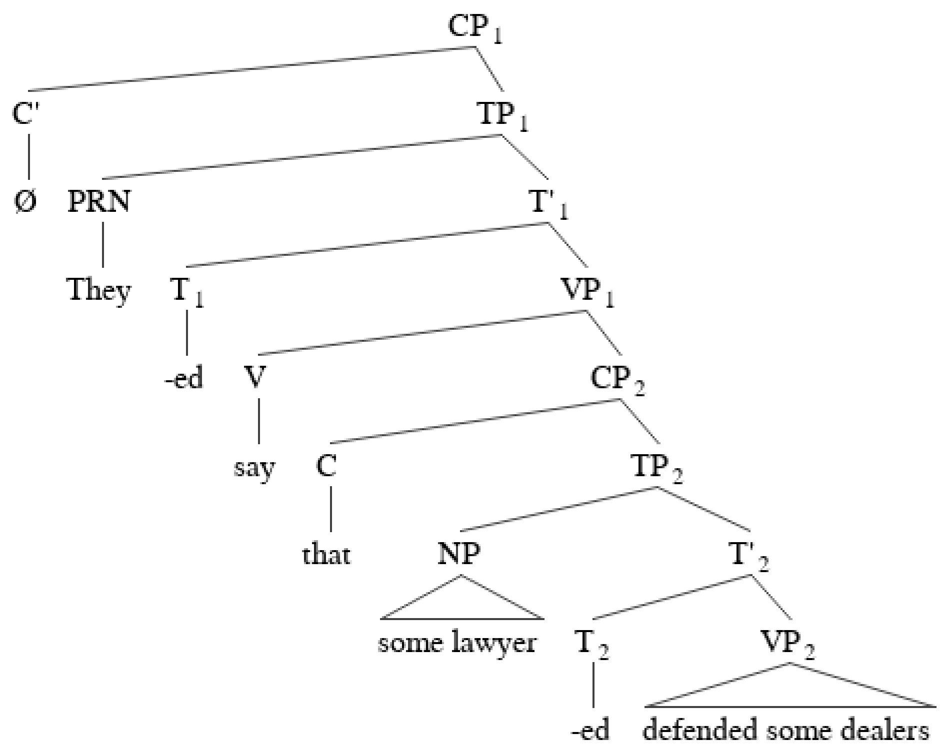


Figure 50. Tree Structure of SimES

In Figure 50, the NP *some lawyer* is therefore produced with an overall lower F0 value due to embedding and the subsequent downstep of pitch accents. From this analysis, I conclude that the syntactic structures and the information structures of the two structures differ tremendously, which leads to prosodic differences as well. Pragmatically, it furthermore seems that there is much more agitation and disbelief in the SimES structures due to the matrix clause *They said that* which suggests some sort of disbelief and which might have additionally led to lower min F0 values. The topicalization of the SimS structure, though, does not come with such a connotation. The fact that there are no significant effects for the interaction Sluicing Type x Antecedent Type, however, suggests that the prosodic differences found for the two Sluicing Types do not affect the productions of the two Antecedent Types. From this follows that the results of the prosodic parameters for NP1 and NP2 of SimS are not unique to the specific structure of the SimS target items but unique to simple sluicing structures in general.

The acoustic analysis alone suggests that there are no differences of any prosodic parameter on NP2 that depends on F0 measurements (that is, max F0, min F0 and excursion size). However, there are duration differences on NP2: two prosodic parameters that are not dependent on F0 measurements. This finding suggests that the F0 measurements on NP2 have been flawed in some way, which often happens, for example, as a result of phrase-final creak (also referred to as *creaky voice*) (Redi & Shattuck-Hufnagel, 2001; Wolk, Abdelli-Beruh, & Slavin, 2012; Garellek, 2015; Keating, Garellek, & Kreiman, 2015). Creaky voice naturally occurs in American English spoken language at the end of a sentence, among other reasons, as a result of speakers running out of breath. Acoustically, it is characterized by irregularities of the F0 curve as well as intensity changes (Garellek, 2015, p. 822). Wolk et al. (2012) found that creaky voice is a phenomenon that is especially common in female young adult Standard American English speakers: two thirds of their participants used creaky voice, mostly at the end of a sentence (see also Yuasa, 2010). Moreover, they found statistically significant differences between creaky voice and normal register, among others, for max F0 and min F0 values. It is thus likely that in the present study, the values of all prosodic parameters that are dependent on F0 measurements are not representative of the actual prosodic contours of the exclusively female speakers since F0 values with creaky voice do not depict the actual degree of prosodic prominence on a given syllable. Creaky voice rather leads to extremely high or low F0 values and wrong intensity values. To make sure that creaky voice really plays a role in the productions of this study, I checked the amount of absolute max F0 values on NP2 that are over 500 Hz: Out of 576 items, 106 items (18%) had a max F0 value of more than 500 Hz. Although creaky voice is usually characterized as carrying a lower than average F0, Keating et al. (2015), for example, argue that it is often accompanied by a squeak that comes with a higher F0, consequently supporting the assumption that max F0 values above 500 Hz are likely due to creaky voice. In order to get a representative picture of the actual prosodic disambiguation methods of native speakers of American English for SimS structures, it is therefore crucial to include the results of a perceptual analysis, as will be discussed in the following section.

Discussion of Perceptual and Acoustic Analysis

The combination of the perceptual analysis and the acoustic analysis of this production study part 1 clearly shows that native speakers of American English use prosody in order to emphasize the antecedent of the *wh*-remnant of a temporarily ambiguous simple sluicing structure, thus supporting H(1). -Trained seem to only use prosody on NP1 to disambiguate simple sluicing with a subject NP as antecedent. +Trained use prosody both on NP1 and NP2 but more frequently on NP1, to disambiguating both simple sluicing with a subject NP and an object NP as antecedent. These findings support H(2) and H(3). These findings are illustrated in the following intonation contours, exemplary representing the productions of one -Trained speaker and one +Trained speaker in both conditions.

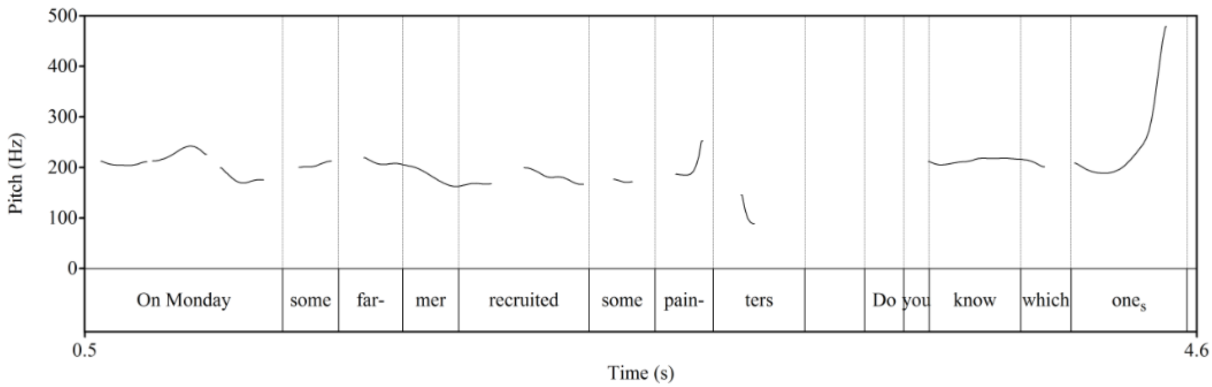


Figure 51. Intonation Contour of Quarterback 1, SimS (NP2), Participant 17 (-Trained)

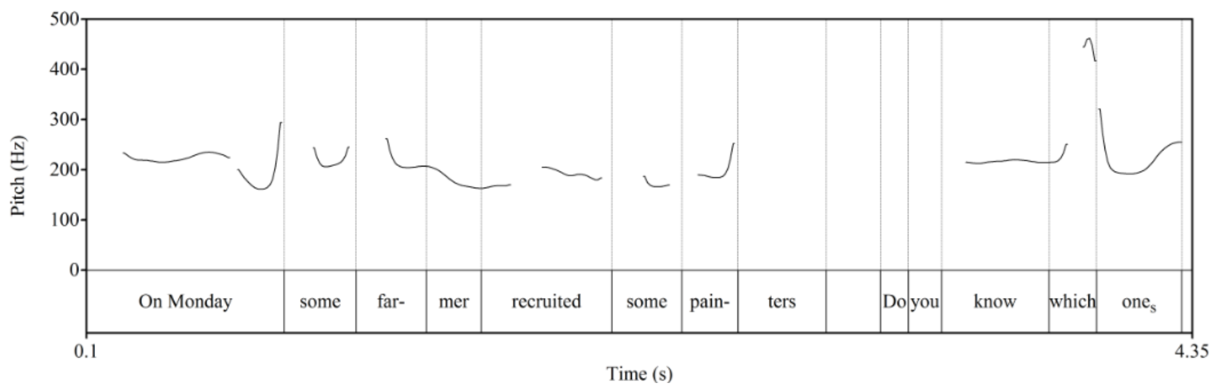


Figure 52. Intonation Contour of Quarterback 1, SimS (NP1), Participant 17 (-Trained)

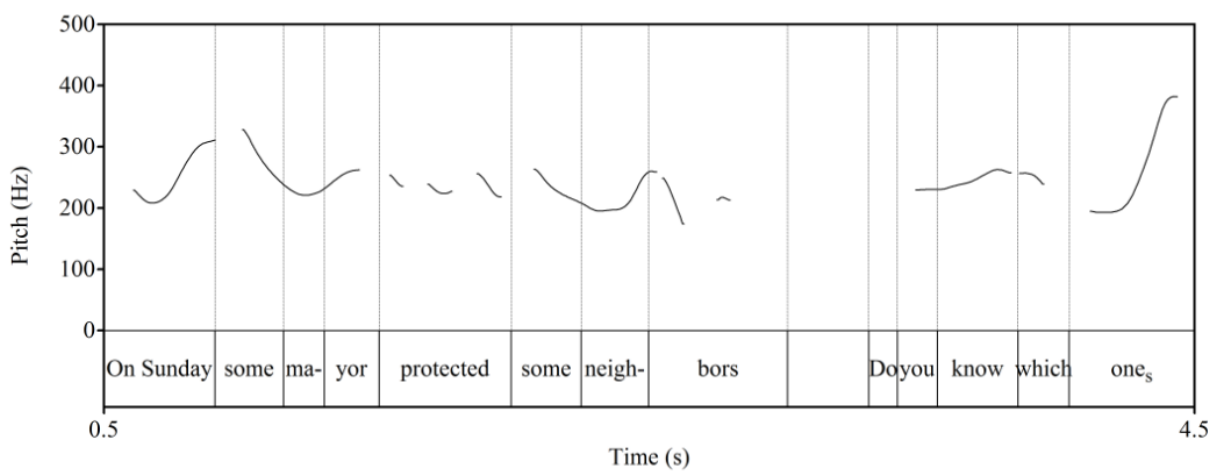


Figure 53. Intonation Contour of Quarterback 1, SimS (NP2), Participant 19 (+Trained)

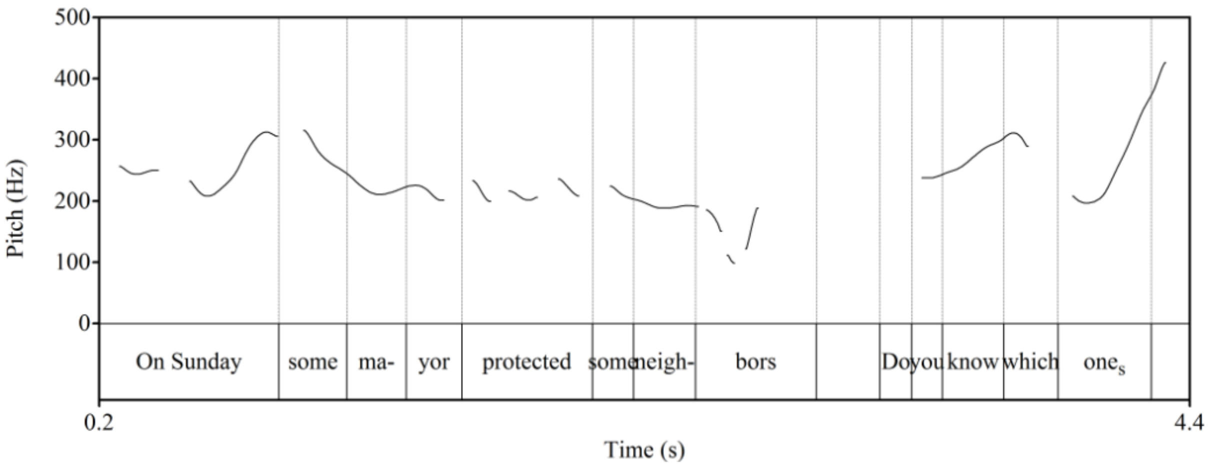


Figure 54. Intonation Contour of Quarterback 1, SimS (NP1), Participant 19 (+Trained)

Regarding the productions of a -Trained speaker, Figure 51 illustrates that NP1 *some farmer* is not specifically accented when the object NP *some painters* serves as the antecedent of the *wh*-remnant. Figure 52 illustrates that NP1 *some farmer* is slightly more accented than in *Figure 51* when the subject NP also serves as the antecedent of the *wh*-remnant. In this example, the speaker already produced a higher F0 on the QP *some* preceding NP to indicate the contrastive focus. Note though that the object NP *some painters* does not differ prosodically between the two intonation contours, thus supporting the results of the perceptual analysis and further suggesting that it is carrying a default focus in both conditions. The lack of any F0 contour on the second syllable of *painters* in Figure 52, and also the low F0 on the second syllable of *painters* in Figure 51, illustrates creaky voice at the end of a sentence. Regarding the productions of a +Trained speaker, Figure 53 illustrates that there is a clear pitch accent on the object NP *some neighbors* to indicate that the object NP serves as the antecedent of the *wh*-remnant. The subject NP *some mayor* is also accented, though less than in Figure 54, where the subject NP serves as the antecedent of the *wh*-remnant. Moreover, in Figure 54, the object NP *some neighbors* is not specifically accented, thus supporting the results of the perceptual analysis that +Trained speakers vary prosody on both NP1 and NP2. A comparison of the productions by the -Trained speaker to the +Trained speaker illustrates that there is much more movement in the productions of the +Trained speaker, whereas the intonation contour of the -

Trained speaker seems rather flat. This difference indicates that the speakers of +Trained spoke more clearly and hence produced stronger prosodic differences than the speakers of –Trained.

Regarding the role of Antecedent Type, the acoustic analysis alone suggests that mostly NP1, the subject NP, is prosodically highlighted if it serves as the antecedent of the *wh*-remnant, whereas there is almost no prosodic variation (or at least no significant differences) on NP2, the object NP. The perceptual analysis alone suggests that both SimS with the subject NP as antecedent and SimS with the object NP as antecedent are prosodically disambiguated. There is, however, a higher amount of prosodic disambiguation on NP1 to emphasize structures with the subject NP as antecedent, thus leaning towards the results of the acoustic analysis. -Trained seem to not use prosody to disambiguate structures with an object NP as antecedent, whereas +Trained do, even though to a lesser extent than those structures with a subject NP. The combination of both analyses therefore suggests that both simple sluicing structures, with the subject NP as well as the object NP as antecedent, are prosodically disambiguated by native speakers of American English. This finding supports hypotheses H(1) and H(2).

Regarding the role of Group Type, the acoustic analysis alone suggests that only +Trained prosodically emphasize the antecedent of SimS by varying especially max F0, duration and excursion size values. It further suggests that -Trained do not make frequent use of the different prosodic parameters to emphasize any antecedent of SimS. The perceptual analysis alone suggests that both +Trained and -Trained use prosody to disambiguate SimS structures and that +Trained merely do so more frequently. The combination of both analyses thus suggests that both Group Types use prosody as a disambiguating factor, although with a higher degree of prosodic disambiguation by +Trained. This finding supports hypothesis H(3).

Regarding the question whether the prosodic disambiguation results found for SimS might be unique to the specific structure of the items, the acoustic analysis suggests that, whereas there are some differences between the two Sluicing Types SimS and SimES, none of them led to increased or decreased degrees of prosodic disambiguation.[88] This becomes evident by the lack of highly significant effects for the interaction Sluicing Type x Antecedent Type.[89] Moreover, the prosodic differences between the two Sluicing Types do not exhibit any

[88] Note that the control conditions with SimES were not part of the perceptual analysis. Therefore, only acoustic results will be reported with respect to SimES.
[89] One of the reviewers mentioned that there is a significant effect. I therefore adapted the sentence to indicate that I am referring to exclusively highly significant effects in this case.

consistent patterns that would suggest that the results regarding the prosodic disambiguation of SimS are merely due to its specific structure.

The analysis of the productions of native speakers of American English thus demonstrate that both +Trained and -Trained are able to prosodically disambiguate a simple sluicing structure by emphasizing the antecedent of a morphologically disambiguated *wh*-remnant without being explicitly told to do so. Note that even +Trained was not specifically asked to emphasize the antecedent of the *wh*-remnant. They were merely given information about some general prosodic disambiguation techniques[90]. Since +Trained use prosody to disambiguate more consistently than -Trained, it can be assumed that they were aware of the temporary ambiguity of the different items and therefore applied certain prosodic strategies to distinguish the items from each other. -Trained were not given any specific information regarding prosody or ambiguity. It cannot be assured that -Trained recognized the temporary ambiguity of the items since I cannot draw conclusions about what was going on in the participants' minds from their prosodic realizations alone. They can thus be assumed to have intuitively (and non-strategically) applied the prosodic disambiguation technique of emphasizing the antecedent of a temporarily ambiguous *wh*-remnant to represent the meaning and the information structure of the sentence.

Structures with the subject NP as antecedent type were disambiguated more frequently than those with the object NP as antecedent. This means that speakers used prosody more frequently to emphasize sluicing structures with the subject NP as antecedent than structures with the object NP as antecedent. There are three factors that might explain the decreased degree of prosodic disambiguation on NP2 of SimS as opposed to NP1: In addition to the two factors mentioned at the beginning of this chapter, namely default focus and distance, I now want to add one more factor. First, as already mentioned, NP2 is, due to its sentence-final position, by default focused. This means that it naturally comes with a higher F0, stronger intensity and longer duration values than NP1. In order to produce a significant acoustic difference between the prosodic values on NP2 between the two Antecedent Types, speakers would have to use much stronger prosodic cues on NP2 than on NP1. Note, however, that a small increase of prosodic prominence might still be detected perceptually, which helps to explain the different results of the acoustic and the perceptual analysis. Second, NP2 is located

[90] See the appendix, section 7 for a representation of the instructions and the training part of +Trained.

closer to the *wh*-remnant than NP1: The only words between NP2 and *which one* is the remainder of the interrogative clause, namely *Do you know*, whereas NP1 is additionally separated from the *wh*-remnant *which one* by the VP and NP2 of the declarative clause. NP1 might thus require more prosodic prominence to make it salient as the antecedent of the *wh*-remnant, whereas NP2 requires less prosodic prominence to do the same. Third, NP2 has been found to be the preferred antecedent of a *wh*-remnant. In contrast to the dispreferred NP1, it might thus not require as much prosodic prominence in order to be made salient as the antecedent of the *wh*-remnant, since it is the preferred antecedent any way. Fourth, I additionally suggest that the lack of prosodic variation on NP2 is linked to its position at the very end of the structure, which is commonly known to come with decreased F0 and intensity values (Wagner & Watson, 2010) as well as phenomena such as creaky voice. The fact that SimS with the subject NP as antecedent was more frequently disambiguated by prosody than SimS with the object NP as antecedent indicates that at least one of the four factors plays a crucial role in the prosodic disambiguation of simple sluicing structures. Whether the third factor, antecedent preference, plays a crucial role, will be investigated in part 2 of this study where NP1 rather than NP2 is the preferred antecedent. Moreover, the first factor, whether default focus position plays an important role, will be addressed in the following production study as well since it investigates a structure where both NP1 and NP2 are by default focused.

The results of this production study part 1 revealed that the acoustic analysis of a production study comes with certain challenges: The acoustic analysis objectively looked at the descriptive prosodic differences on certain constituents, as measured by the acoustic analysis software Praat, which can then be statistically compared and interpreted. From this follows that this type of analysis is adequate to analyze the prosodic differences at the beginning of a breath unit (e.g., a single word or a constituent at the beginning of a sentence). However, especially the F0 values of constituents at the end of a breath unit are at risk of being flawed by creaky voice and speakers running out of breath. It is therefore crucial to include a perceptual analysis in addition to an acoustic analysis when investigating the prosodic productions of constituents towards the end of a sentence. However, there are two further reasons why the perceptual analysis is indispensable for a correct representation of the prosodic differences between the two Antecedent Types: speaker variation and placement of prosodic prominence. First, this production studies comes with a high amount of speaker variation, both inter-speaker as well as intra-speaker variation, due to the fact that the participants were unprofessional ones (and half of them were additionally untrained). Such a high amount of speaker variation is difficult to grasp for statistical analyses. Whereas most speakers express prosodic prominence of an NP by increasing F0, intensity and duration values on the stressed syllable of said NP, some speakers prefer to vary prosody on the QP *some* preceding NP1 (e.g., speaker 2, mostly in condition (2), speaker 14 both in condition (1) and (2), speaker 17, mostly in condition (1), speaker 19, mostly in condition (2); as evident by the annotations of the QP *some* preceding NP1 by annotator one)[91] or exhibited some other speaker specific characteristics that subsequently influence the outcome of certain prosodic values. Moreover, some speakers vary their method of indicating prosodic prominence from one item to the next: Speaker 19, for example, sometimes emphasizes both the QP *some* preceding a focused NP as well as the focused NP itself with increased duration and max F0 values for both Antecedent Types, sometimes she only emphasizes the NP. Speaker 2 increases her F0 only on the QP *some* to emphasize the subject NP, whereas she emphasizes the object NP by directly accenting the stressed syllable of the NP itself. Speaker 9 produces a combination (or variation) of accented QPs and NPs, mostly when the subject NP serves as the antecedent. Speaker 5 tends to end almost all of her sentences with a high boundary tone, which consequently leads to lower F0 values on the object NP, even when other prosodic parameters, such as intensity or excursion size, argue for emphasize of said NP.

This overview illustrates that speakers do not make consistent use of certain prosodic disambiguation technique, but rather seem to have their own strategies (which again can vary from item to item) of expressing prosodic prominence. All these different types of prosodic variation are perceptually noticeable and therefore do show up in the results of the perceptual analysis but cannot easily be expressed statistically by measuring different acoustic values. Second, the acoustic analysis exactly measures the prosodic values that are given to it, exclusively on certain parts of a sentence, e.g., the stressed first syllable of each NP. This makes sense in so far that a pitch accent is usually aligned with the stressed syllable of a constituent. However, in many cases, the prosodic prominence of a constituent is carried over onto the unstressed second syllable of an NP (referred to as *pitch delay*, Jun, 2015a). It may then be the

[91] Note that the DP *some* preceding NP1 was much more often emphasized than the DP *some* preceding NP2. Speaker 19 was one of the few who also accented the DP *some* preceding NP2, mostly in condition (2).

case that the stressed first syllable of the focused NP exhibits similar prosodic values as that of an unfocused NP, whereas the second, usually unstressed syllable differs. Another possibility is that pitch accent on a stressed syllable may only be realized as such in comparison to a subsequent syllable or another constituent within the same clause. Since the acoustic analysis measures only prosodic values on the first syllable, it would categorize these examples as not being prosodically emphasized.

The perceptual analysis, though, automatically considers the prosody of both syllables and thus notes the different prosodic information on the second syllable. This is, for example, the case in lexicalization 1 of conditions (1) and (2) by speaker 6: In both conditions, the first syllable of *waiter* is produced similarly with 246 Hz in condition (1) vs. 243 Hz in condition (2). However, the second syllable of *waiter* is produced with the same max F0 of 241 Hz. The prosodic difference of 3 Hz between the two Antecedent Types on the first syllable is not enough to indicate prosodic disambiguation. In comparison to its second syllable, prosodic disambiguation becomes clearer: The difference between syllables one and two in condition (1) is 5 Hz. In condition (2), it is only 2 Hz. Although the difference in condition (2) is small as well, it is nevertheless perceived as being more accented, as evident by the results of the perceptual analysis.[92] Consequently, the acoustic processing system automatically combines different prosodic parameters and the information on different syllables to decide whether a given NP is stressed or not, whereas the acoustic analysis only looks at one prosodic parameter at one constituent at a time. For example, the first syllable of the object NP of lexicalization 2 of conditions (1) and (2) of speaker 5 is produced with the max F0 values of 177 HZ in condition (1) and 167 Hz in condition (2). This difference of 10 Hz alone may not be enough to indicate prosodic disambiguation. However, in combination with its intensity values, it certainly does: compare 73 dB in condition (1) to 66 dB in condition (2).

Consequences

In this production study part 1, I have shown that prosodic disambiguation takes place in simple sluicing structures. +Trained use prosody to disambiguate simple sluicing structures more

[92] Consider also the values of two further prosodic parameters of lexicalization 1 by speaker 6 in condition (1) vs. (2): intensity in condition (1) = 78.41 dB, in condition (2) = 78.36 dB; duration in condition (1) =228.75 ms, in condition (2) = 240.75 ms.

frequently than -Trained and NP1 is more frequently prosodically emphasized when the subject NP serves as the antecedent of the *wh*-remnant than NP2 is when the object NP serves as the antecedent. However, the results of this study also raise a series of new questions: First, is prosodic disambiguation unique to simple sluicing structures or do native speakers of American English also use prosody to disambiguate more complicated sluicing structures like the complex sluicing structure given in (245), where one of the two possible antecedents is located within an island to extraction? Second, it is not clear yet whether the prosodic disambiguation preferences for NP1 found in production study part 1 are due to its greater distance from the *wh*-remnant, its status as being unfocused by default, its status as being the dispreferred antecedent of an ambiguous sluicing structure, or its overall earlier position within the sentence. Looking at a complex sluicing structure helps to further investigate two of these factors: default focus and antecedent preference. First, in complex sluicing, NP1 and NP2 are by default focused since they both constitute an object NP. Second, in complex sluicing, NP1 is the preferred antecedent, whereas NP2 is the dispreferred antecedent. Consequently, the distant antecedent, NP1, coincides with being a focused and preferred NP rather than an unfocused and dispreferred NP. This combination helps to further investigate which of the four factors plays a role in prosodic disambiguation and will therefore be addressed in the second part of the production study Quarterback, chapter 3.2.3.2.

(245) They fired **some lawyer** that had defended <u>some dealers</u>.
a. Do you know <u>which ones</u>?
b. Do you know **which one**?

3.2.3.2 Production Study *Quarterback*, Part 2

Research Questions and Hypotheses

In this production study part 2, I will further investigate the following research questions:

1) Do native speakers of American English use prosodic prominence to emphasize the antecedent of a *wh*-remnant in a temporarily ambiguous complex sluicing structure? Part 1 of the production study Quarterback showed that simple sluicing structures are prosodically disambiguated by varying the degree of prosodic prominence on the antecedent NP. Production study part 1 thus supported the claims made by Romero (1998), Frazier and Clifton (1998) and Carlson et al. (2009) concerning simple sluicing, who argued that a focused *wh*-remnant must contrast with its antecedent (Romero, 1998) and that a prosodically focused NP is the preferred antecedent of an ambiguous sluicing structure (Frazier & Clifton, 1998; Carlson et al., 2009). However, it is not clear yet whether the same type of prosodic disambiguation is also taking place in complex sluicing structures where one of the possible antecedents is located within an embedded clause that constitutes an island to extraction. Islands usually lead to unacceptable structures when a constituent is extracted out of it via *wh*-movement. However, in complex sluicing, the structure containing the trace that results from *wh*-movement is elided (see Merchant, 2001 and the discussion of islands in sluicing, chapter 2.1.3.1). Sluicing with an antecedent within an island structure is thus acceptable, although somewhat degraded as compared to an identical structure with an antecedent within a matrix clause (see Ross, 1969; Frazier & Clifton, 2011 and the results of the acceptability judgment study 3, chapter 3.2.2.3). Whether such a complex sluicing structure with either a fully acceptable antecedent (the matrix NP) or a slightly degraded antecedent (the embedded NP) is still disambiguated prosodically by native speakers of American English will be investigated in this production study part 2. Moreover, this production study part 2 investigates whether any prosodic effects that will be found for complex sluicing are due to the embedded structure itself or due to the island status of the embedded clause.

2) Is there a difference in the strength of prosodic disambiguation between the different NP types? Production study part 1 showed that in simple sluicing, there is more prosodic variation on NP1 to indicate that the subject NP serves as the antecedent, than on NP2 to

indicate that the object NP serves as the antecedent.[93] However, from the results of production study part 1, it was not clear which of the following four factors played a major role in this higher degree of prosodic disambiguation of NP1: longer distance from the *wh*-remnant, lack of default focus, antecedent dispreference or earlier position within the overall structure. Production study part 2 further investigate the role of these four factors: On the one hand, NP1 of complex sluicing is also the more distant NP and it is also located at an early position within the overall structure. On the other hand, NP1 of complex sluicing is the preferred (rather than the dispreferred) antecedent, as argued by Frazier and Clifton (2011), Konietzko et al. (submitted) and as suggested by the acceptability judgment study 3 of this thesis, chapter 3.2.2.3. Moreover, both NP1 and NP2 of complex sluicing are object NPs (NP1 is the object NP of the matrix clause, NP2 is the object NP of the embedded RC) and therefore focused by default. This was not the case in simple sluicing, where NP1 was a subject NP and therefore by default unfocused. If the degree of prosodic disambiguation of NP1 of complex sluicing is similar to that of NP1 of simple sluicing, it would suggest that neither default focus nor antecedent preference plays a major role in the degree of prosodic disambiguation and that rather distance from the *wh*-remnant and/or the early position within the overall structure affects the degree of prosodic variation on the two NP types.

3) Is there a difference in the frequency or the strength of the prosodic parameters used by specifically trained vs. untrained speakers? Production study part 1 showed that both trained as well as untrained speakers use prosody to emphasize the antecedent of a simple sluicing structure. As hypothesized, trained speakers did so to a larger extent than untrained speakers, suggesting that untrained speakers use not only prosodic phrasing to indicate a structural ambiguity, as Remmele et al. (forthcoming 2019) showed, but that they also use prosodic prominence to indicate an ambiguity caused by differences of information structure in a simple sluicing structure. Whether prosodic prominence is used to emphasize the focused antecedent of a complex sluicing structure as well will be explored in this production study part 2.

I thus investigate the following hypotheses with respect to the production study Quarterback part 2:

[93] NP1 refers to the first NP of the sentence, thus the matrix object NP. NP2 refers to the second NP of the sentence, thus the embedded object NP. Whenever I write NP1/NP2, I refer to the actual NPs within the sentence. Whenever I write matrix/embedded NP, I refer to the antecedent type which is indicated by either the singular *wh*-remnant *which one*, referring to NP1, or the plural *wh*-remnant *which ones*, referring to NP2.

Hypotheses

(1) Speakers use prosodic prominence to emphasize the antecedent of a temporarily ambiguous *wh*-remnant in complex sluicing. (H(1))
(2) NP1 is more frequently disambiguated by prosody than NP2. (H(2))
(3) Specifically trained speakers i) make more frequent use of prosodic prominence and ii) produce stronger pitch accents to emphasize the antecedent of a *wh*-remnant in complex sluicing than untrained speakers. (H(3))

Method

Design and Predictions

Production study part 2 consists of a 2x2x2 factorial design with the two within subjects factors *Sluicing Type* (ComSimS vs. ComxOS) and *Antecedent Type* (embedded NP vs. matrix NP), and one between subjects factor *Group Type* (+Trained vs. -Trained). Production study part 2 thus results in eight conditions, which are illustrated in Table 44.

Condition Nr.	Condition Description	Target/Control Item
(5)	ComSimS, embedded NP → preferred antecedent	They reproached some lawyer that he had defended some dealers. Do you know which ones?
(6)	ComSimS, matrix NP → dispreferred antecedent	They reproached some lawyer that he had defended some dealers. Do you know which one?
(7)	ComxOS, matrix NP → preferred antecedent	They questioned some lawyer that had defended some dealers. Do you know which one?
(8)	ComxOS, embedded NP → dispreferred antecedent	They questioned some lawyer that had defended some dealers. Do you know which ones?

Table 44. Conditions (5) through (8) of Production Study Part 2[94]

[94] Since this is part 2 of the production study Quarterback, I did not restart the condition numbering but continued it from part 1. ComSimS with the embedded NP is therefore not condition (1) but (5). Moreover, note that condition (5) refers to ComSimS with the embedded NP rather than the matrix NP as antecedent since I ordered the conditions not numerically but according to antecedent preferences. Therefore, the embedded NP, due to being the

The factor *Sluicing Type* contains the different types of sluicing structures whose prosody will be investigated. ComxOS refers to the complex sluicing target items, ComSimS refers to a control group of similarly complicated sluicing structures. ComSimS serves as a control since it is similarly complex in its underlying syntactic structure to the target ComxOS structures: both contain an embedded clause. However, whereas the embedded clause of ComxOS is an RC and thus an island to extraction, the embedded clause of ComSimS is a complement clause and thus not an island to extraction.[95] The factor *Antecedent Type* describes which of the two NPs serves as the antecedent of the morphologically disambiguated *wh*-remnant, the matrix object NP (henceforth referred to as *matrix NP*) or the embedded object NP (henceforth referred to as *embedded NP*). Since both Antecedent Types are object NPs, they are both focused by default. In ComSimS, the matrix NP is the dispreferred antecedent and the embedded NP is the preferred antecedent, as it is the case for simple sluicing structures. In ComxOS, though, the embedded NP is considered to be the dispreferred antecedent although it also constitutes the final argument of the structure. However, it is located within an island to extraction. Although sluicing with an antecedent within an island is not ungrammatical, it is nevertheless considered to be less acceptable than sluicing with an antecedent within a matrix clause (see Konietzko et al., submitted; Ross, 1969; Frazier & Clifton, 2011, also discussion chapter 2.1.5.2). The factor *Group Type* is identical to production study Quarterback part 1.

My predictions for production study part 2 are as follows: 1) With respect to H(1), I predict that speakers will use prosodic prominence to emphasize the antecedent of a *wh*-remnant in complex sluicing. 2) With respect to H(2), I predict that NP1 will be more strongly disambiguated by prosody than NP2. 3) With respect to H(3), I predict that +Trained will use prosody as a disambiguating factor more frequently and more strongly than -Trained, to emphasize the antecedent of a *wh*-remnant in complex sluicing.

final argument of the structure, is the preferred antecedent of ComSimS and therefore condition (5), whereas the matrix NP is the dispreferred antecedent of ComSimS and therefore condition (6). With respect to ComxOS, the matrix NP is the preferred antecedent since it is not located within an island structure, therefore condition (7), whereas the embedded NP is the dispreferred antecedent due to its position within an island, therefore condition (8).

[95] Note that ComSimS and ComxOS are minimal pairs with respect to the words used, except for a mandatory personal PRN (*he* or *she*) following the complementizer *that* in ComSimS to indicate that the embedded clause is a *that*-clause rather than an RC.

Participants

The participants of production study part 2 are identical to those of part 1: all 19 participants of production study part 1 also took part in production study part 2. Participants were assigned to the same Group Type as before. The participant that had to be excluded from production study part 1 also had to be excluded from production study part 2. All participants again received 15 € for participation. Production study part 2 took place about three to seven days apart from production study part 1.

Material

Production study part 2 consisted of overall 40 items out of which 16 were target items (ComxOS structures), 16 were control items (ComSimS structures) and eight were filler items. A list of all target and filler items can be found in the appendix, section 10. Out of the 32 target and control items, half ended with the singular *wh*-remnant *which one*, thus taking the matrix NP as the antecedent, and half ended with the plural *wh*-remnant *which ones*, thus taking the embedded NP as the antecedent. Each Sluicing Type (ComSimS and ComxOS) consisted of the same eight lexicalizations as the two Sluicing Types of production study part 1 (SimS and SimES) to create minimal pairs that allow comparability. The structures and lexicalizations of ComSimS and ComxOS were designed as a result of the previous four acceptability judgment studies, as discussed in chapter 3.2.2. Except for the different Sluicing Types (and consequently, the different Antecedent Types), the overall structure of the material of production study part 2 was identical to that of production study part 1. All sluicing structures thus also consisted of two parts: a declarative clause and a sluiced interrogative clause with either a singular or a plural *wh*-remnant. I again used the QP *some* as the sole determiner for both NP types. The structures of ComSimS and ComxOS are illustrated in Table 45 and Table 46. Except for the PRN in Table 45, the two structures consist of an equal number of syllables.

***They* VP**	***some* NP$_{singular}$**	***that***	**PRN**	**VP**	***some* NP$_{plural}$**	***Do you know which one/s?***
They informed	*some lawyer*	*that*	*he*	*had defended*	*some dealers.*	*Do you know which one/s?*

Table 45. Structure of ComSimS

***They* VP**	***some* $\mathbf{NP_{singular}}$**	***that***		**VP**	***some* $\mathbf{NP_{plural}}$**	***Do you know which one/s?***
They fired	*some lawyer*	*that*		*had defended*	*some dealers.*	*Do you know which one/s?*

Table 46. Structure of ComxOS

The type of randomization was identical to that of production study part 1. Moreover, the filler items of production study part 1 and part 2 were identical, except for a few lexical adjustments (e.g., different names).

Procedure

The procedure, the experimental set up and the instructions for the two Group Types of production study part 2 were identical to that of production study part 1.

Analysis of Recordings

Each of the 18 participants produced all eight lexicalizations in each of the four conditions, resulting in 32 recordings per participant and overall 576 recordings for the production study part 2. The entire production study Quarterback, combining production studies part 1 and part 2, thus resulted in 64 recordings per participant and overall 1152 recordings, excluding filler items. The procedure for the analysis of the recordings of production study part 2 was identical to that of production study part 1.

Perceptual Analysis

Analysis of Annotations and Agreement Calculations

The perceptual analysis of production study part 2 was conducted in the same way as the perceptual analysis of production study part 1. Again, one neutral annotator (annotator one) and the author (annotator two) listened to an exemplary part of target items, that is, 192 sound files of ComxOS structures (12 speakers x 8 target item lexicalizations x 2 conditions). They both annotated for each sound file the accent strength of the matrix NP and the embedded NP. Annotator one additionally annotated whether the two parts of the *wh*-remnant *which one* and the QPs *some* preceding NP1 and NP2 were accented or not. Again, it would have been desirable to have two more neutral annotators who would have labeled the sound files to support the representativity of the results. This procedure will therefore be implemented in a future publication.

Regarding the agreement between the two annotators, there was 57% (110 out of 192 items) absolute agreement between the annotations of the two annotators, meaning that they agreed completely in more than half of the items regarding the question whether prosodic disambiguation has taken place or not. Out of the remaining 43% (82 out of 192 items), in 36% (68 out of 192 items), the two annotators disagreed between whether both NP types carried an equally strong accent or whether one was slightly more accented than the other (that is, one sound file was labeled 0, the other 2). In only 7% (14 out of 192 items), the two annotators chose contrary annotations (that is, one sound file was labeled 1, the other 0 or 2), thus exhibiting complete disagreement in less than 10%, which suggests an overall high degree of agreement. I averaged the annotations of the two annotators to be able to compare the different conditions. The exact annotations of annotators one and two and the ternary labeling method of whether prosodic disambiguation has taken place or not, can be found in the appendix, section 11.

Results of Perceptual Analysis

Regarding the annotation of pitch accents on the *wh*-remnant *which one,* annotator one found that there was a pitch accent on *one* in 378 out of 384 items (98%) (based on the annotations of all four conditions of twelve speakers), suggesting that the *wh*-remnant was indeed focused throughout all items. Following Romero (1998), the antecedent of the *wh*-remnant thus has to be contrastively focused by means of a pitch accent.

The perceptual analysis yielded the following averaged results, combining the annotations of both annotators: Out of overall 192 ComxOS structures, there was no prosodic disambiguation (label 0) in 41 items (21%), prosodic disambiguation was open (label 1) in 57 items (30%) and there definitely was prosodic disambiguation (label 2) in 94 items (49%). Out of overall 96 items, 52 items (55%) were prosodically disambiguated by +Trained as opposed to 42 items (44%) by -Trained. Prosodic disambiguation was open in 29 items (30%) by +Trained and in 28 items (29%) by -Trained. Finally, there was definitely no disambiguation in 15 items (16%) by +Trained and 26 items (27%) by -Trained. With respect to the two conditions, in condition (7), there was no prosodic disambiguation in 11 items (11%), prosodic disambiguation was open in 26 items (27%) and there definitely was prosodic disambiguation in 59 items (61%). In condition (8), there was no prosodic disambiguation in 30 items (31%), prosodic disambiguation was open in 31 items (32%) and there definitely was prosodic disambiguation in 35 items (36%). All values are summarized again in Table 47 and Table 48 and illustrated in Figure 55 and Figure 56.

	no PD	**PD open**	**PD**
+Trained	16	30	54
-Trained	27	29	44

Table 47. Averaged Results of Perceptual Analysis in% per GT

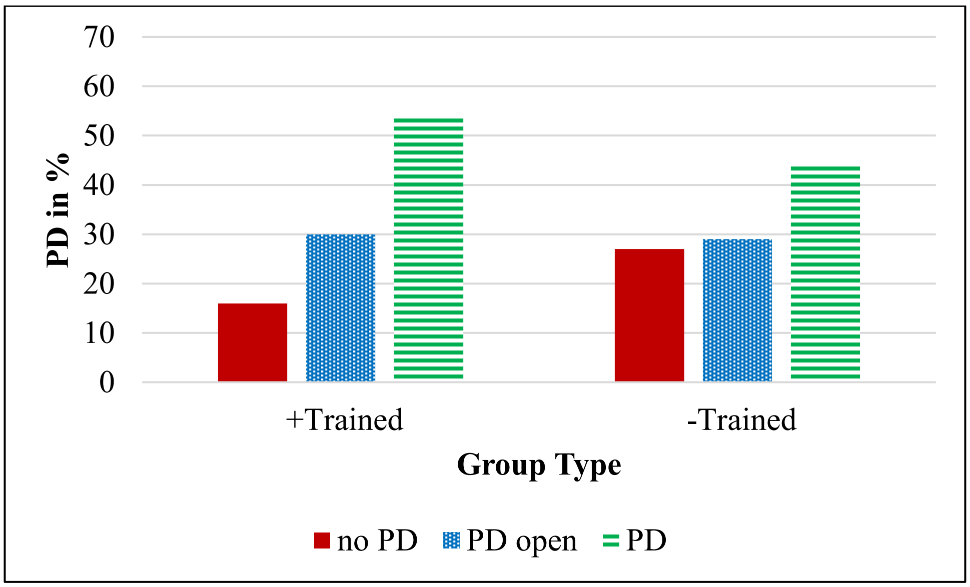


Figure 55. Averaged Results of Perceptual Analysis in% per GT

	no PD	**PD open**	**PD**
"which ones"	31	32	37
"which one"	11	27	62

Table 48. Averaged Results of Perceptual Analysis in% per AT

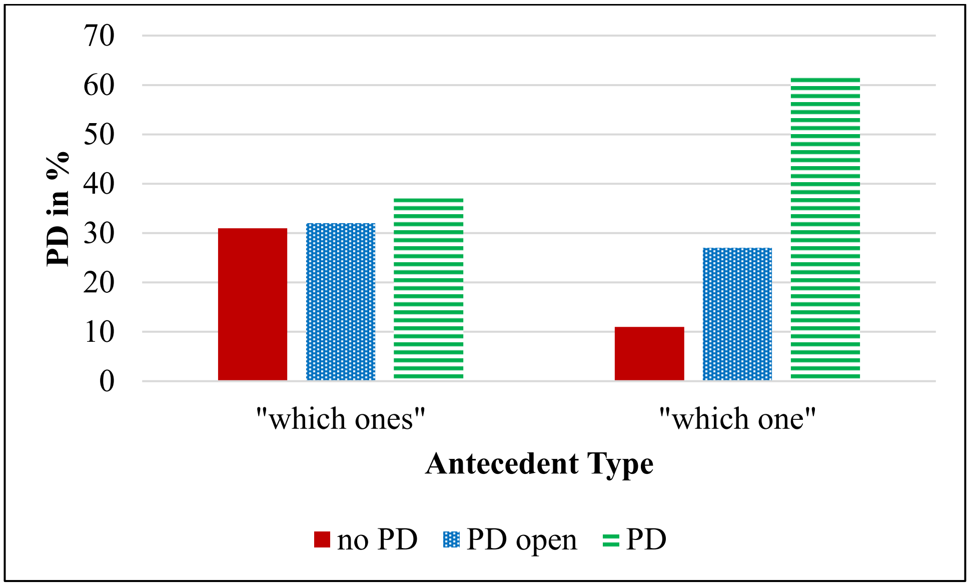


Figure 56. Averaged Results of Perceptual Analysis in% per AT

Out of overall 96 items, +Trained prosodically disambiguated 33 items (34%) in condition (7) and 19 items (20%) in condition (8). There were noticeably less cases of definitely no prosodic disambiguation in condition (7) than (8): compare 3 items (3%) to 12 items (13%). -Trained prosodically disambiguated 26 items (27%) in condition (7) and 16 items (17%) in condition (8). There were more cases of definitely no prosodic disambiguation in condition (8) than (7): compare 18 items (19%) to 8 items (8%). All values are summarized again in Table 49 and Table 50 and illustrated in Figure 57 and Figure 58.

	no PD	**PD open**	**PD**
"which ones"	25	35	40
"which one"	6	25	69

Table 49. Averaged Results of Perceptual Analysis in% per AT, +Trained only

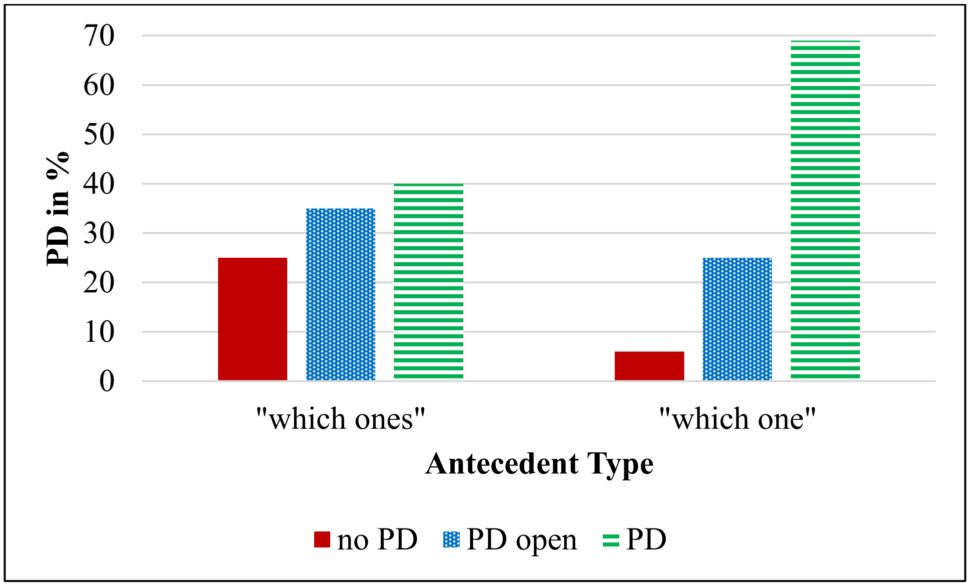


Figure 57. Averaged Results of Perceptual Analysis in% per AT, +Trained only

	no PD	**PD open**	**PD**
"which ones"	37	30	33
"which one"	16	30	54

Table 50. Averaged Results of Perceptual Analysis in% per AT, -Trained only

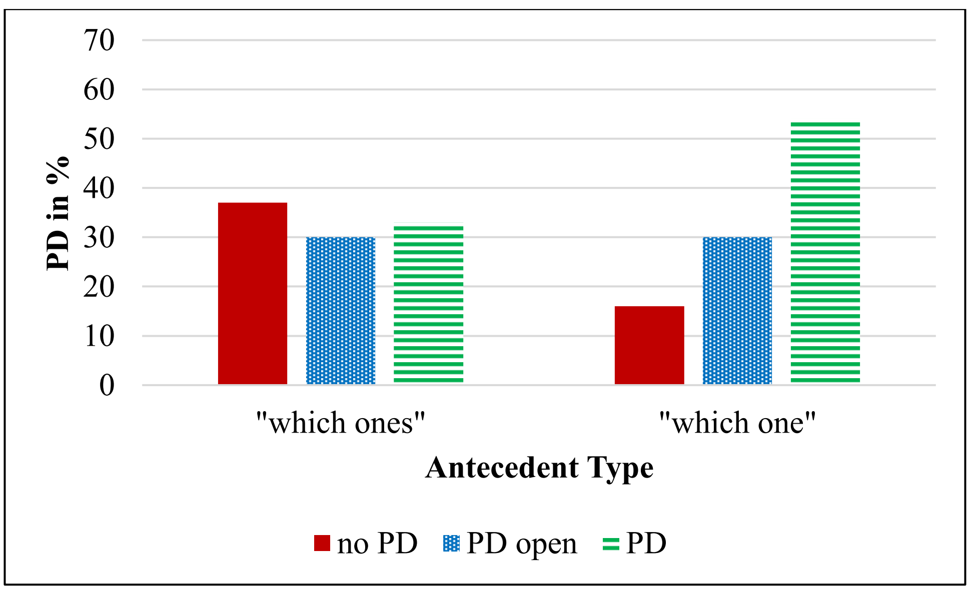


Figure 58. Averaged Results of Perceptual Analysis in% per AT, -Trained only

Moreover, Table 51 and Figure 59 illustrate that some speakers consistently disambiguate the structures (e.g., speakers 3, 13, 19, mostly +Trained), whereas other speakers seem to not use any consistent prosodic disambiguation techniques (e.g., speakers 6 and 11, -Trained). This illustrates that there is quite some speaker variation regarding the degree of prosodic disambiguation. Especially participant 13 stands out, who was part of -Trained but used prosody to disambiguate the majority of ComxOS structures (12 out of 16 items).

Participant	Group Type	no PD	PD open	PD
5	-Trained	5	4	7
6	-Trained	6	6	4
11	-Trained	2	12	2
13	-Trained	2	2	12
14	-Trained	5	3	8
17	-Trained	6	1	9
1	+Trained	7	5	6
2	+Trained	1	6	9
3	+Trained	1	4	11
7	+Trained	3	4	9
10	+Trained	3	5	6
19	+Trained	0	5	11

Table 51. Averaged Results of Perceptual Analysis per Participant

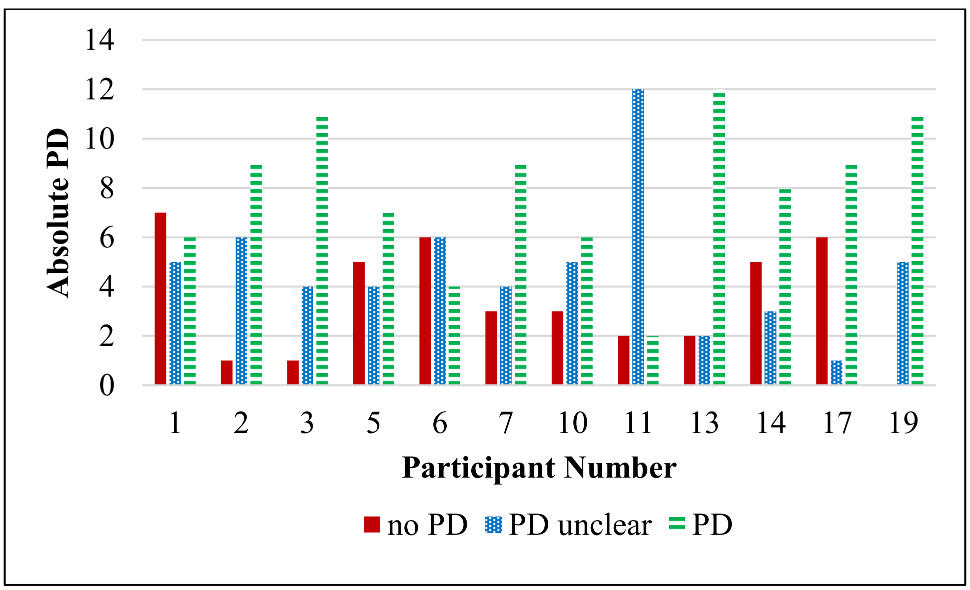


Figure 59. Averaged Results of Perceptual Analysis per Participant

Discussion of Perceptual Analysis

The results of the perceptual analysis support all three hypotheses. Both Group Types use prosody to emphasize the antecedent of a *wh*-remnant, as evident by the comparison of the percentages for PD vs. no PD: 49% vs. 21%, thus supporting H(1). ComxOS with the matrix NP as the antecedent was more strongly prosodically disambiguated than ComxOS with the embedded NP as the antecedent, as evident by the comparison of the percentages: 62% vs. 37%, thus supporting H(2). +Trained used prosody to disambiguate ComxOS more frequently than –Trained, as evident by the comparison of the percentages for PD of +Trained vs. -Trained: 54% vs. 44%, thus supporting H(3). Moreover, the perceptual analysis yields an important finding regarding the different behavior of the two Group Types: +Trained used prosody to disambiguate ComxOS with the embedded NP as antecedent in 40% and ComxOS with the matrix NP as antecedent in 69%, whereas -Trained used prosody to disambiguate ComxOS with the embedded NP as antecedent in only 33% and ComxOS with the matrix NP as antecedent in 54%. -Trained did not use prosody to disambiguate ComxOS with the embedded NP as antecedent in 37%, whereas +Trained did not in only 25%. This illustrates that both Group Types used less prosody to disambiguate ComxOS with the embedded NP as antecedent than ComxOS with the matrix NP as antecedent. However, for +Trained, the number of PD is still higher than that of no PD, whereas this is not the case for -Trained, suggesting that -Trained did not use prosody at all to disambiguate ComxOS with the embedded NP as antecedent. Consequently, the overall high number of no PD for ComxOS with the embedded NP as antecedent is a result of the productions of both Group Types but mostly by -Trained. To further investigate the degree of prosodic disambiguation of +Trained and -Trained for complex sluicing, I conducted an acoustic analysis that will be discussed in the following chapter.

Acoustic Analysis

Statistical Analysis

The statistical analysis of production study part 2 served to answer three main questions: First, do both Group Types use prosody to disambiguate complex sluicing structures? Second, is ComxOS with the matrix NP as antecedent more strongly disambiguated by prosody than ComxOS with the embedded NP as antecedent? Third, is the degree of prosodic prominence greater for +Trained than for -Trained? To answer these questions, I conducted two ANOVAs with participants (F_1) and items (F_2) as random factors to analyze whether, first, there is a stronger degree of prosodic prominence on NP1 when the matrix NP serves as the antecedent of the *wh*-remnant and second, whether there is a stronger degree of prosodic prominence on NP2 when the embedded NP serves as the antecedent of the *wh*-remnant, separately for the two Group Types. The first ANOVA served to analyze the degree of prosodic variation on NP1, thus comparing the mean values of the differences of the five prosodic parameters max F0 (Hz), min F0 (Hz), duration (ms), intensity (dB) and excursion size (st) on the stressed syllable of NP1 (henceforth simply called NP1). The second ANOVA served to analyze the degree of prosodic variation on NP2, thus comparing the mean values of the differences of the same five prosodic parameters on the stressed syllable of NP2 (henceforth simply called NP2). I additionally conducted several *t*-Tests to further investigate the significance of certain differences. The *t*-Tests determine whether there is a significant difference between the mean value of two conditions, using the mean values of all items, averaged either over all lexicalizations per participant (t_1 analysis) or over all participants per lexicalization (t_2 analysis).

The first ANOVA with participants (F_1) and items (F_2) as random factors compared the differences of the mean values of the five prosodic parameters as produced on NP1 of ComSimS with either the embedded NP (condition (5)) or the matrix NP (condition (6)) as antecedent with the productions of NP1 of ComxOS with either the embedded NP (condition (8)) or the matrix NP as antecedent (condition (7)), separately for the two Group Types +Trained and -Trained. The within subjects factor *Sluicing Type* (ComSimS vs. ComxOS) was crossed with the within subjects factor *Antecedent Type* (embedded NP vs. matrix NP) as well as the between subjects factor *Group Type* (+Trained vs. -Trained). The analysis yielded the following results: There was no significant effect for any of the single factors in neither of the five prosodic parameters. However, there was a (marginally) significant interaction of Sluicing Type x Group Type in the analysis of maxF0 [F_1 (1,16) = 3.504, p = 0.080; F_2 (1,14) = 4.630, p = 0.049]. There was a significant interaction of Sluicing Type x Antecedent Type in the analysis of F_2 of duration [F_1 (1,16) = 1.964, p = 0.180; F_2 (1,14) = 6.588, p = 0.022]. There was a significant interaction of Antecedent Type x Group Type in the analysis of F_2 of min F0

[F_1 (1,16) = 1.320, p = 0.268; F_2 (1,14) = 4.692, p = 0.048].[96] There was a significant interaction of Sluicing Type x Antecedent Type x Group Type in the analysis of F_1 of max F0 [F_1 (1,16) = 6.803, p = 0.019; F_2 (1,14) = 2.085, p = 1.171] and in the analysis of F_1 of excursion size [F_1 (1,16) = 4.746, p = 0.045; F_2 (1,14) = 1.514, p = 0.239]. How exactly the two Sluicing Types with the two Antecedent Types differ from each other, and also how the respective productions of NP1 differ between the two Group Types will be discussed in more detail below.

The second ANOVA with participants (F_1) and items (F_2) as random factors compared the differences of the mean values of the five prosodic parameters as produced on NP2 of ComSimS with the embedded NP (condition (5)) or the matrix NP (condition (6)) as antecedent with the values of the five prosodic parameters as produced on NP2 of ComxOS with either the embedded NP (condition (8)) or the matrix NP (condition (7)) as antecedent, separately for the two Group Types +Trained and -Trained. The within subjects factor *Sluicing Type* (ComSimS vs. ComxOS) was crossed with the within subjects factor *Antecedent Type* (embedded NP vs. matrix NP) as well as the between subjects factor *Group Type* (+Trained vs. -Trained). The analysis yielded the following results: In the analysis of duration, there was a highly significant effect of Antecedent Type [F_1 (1,16) = 23.700; $p < 0.001$; F_2 (1,14) = 20.278, $p < 0.001$], a (marginally) significant interaction of Sluicing Type x Group Type [F_1 (1,16) = 10.053; p = 0.006; F_2 (1,14) = 4.343, p = 0.056], and a marginally significant interaction of Antecedent Type x Group Type in the analysis of F_1 [F_1 (1,16) = 4.698; p = 0.046; F_2 (1,14) = 3.051, p = 103]. How exactly the two Sluicing Types with the two Antecedent Types differ from each other, and also how the respective productions on NP2 differ between the two Group Types, will be discussed in more detail below.

The results of these two ANOVAs suggest that there are mostly differences on NP2 between the two Sluicing Types, the two Antecedent Types and the two Group Types. I will therefore analyze the results of the different prosodic parameters on both NP1 and NP2 separately and in more detail. I will start by analyzing the differences of max F0, followed by min F0, duration, intensity and excursion size. Depending on the results of the first ANOVAs (of NP1 and NP2), I will provide separate ANOVAs for the two Group Types and *t*-Tests if

[96] One of the reviewers commented that, sometimes, additional *t*-tests are calculated although there are no significant overall ANOVA effects. However, this is not the case: individual *t*-tests are only being done as soon as either the F_1 or the F_2 analysis of the overall ANOVA resulted in significant or marginally significant effects.

necessary. Following the individual analyses of ComxOS, I will also briefly report the results for ComSimS in order to be able to draw conclusions regarding the effect of an island structure.

Statistical Analysis per Prosodic Parameter and Discussion

a) Max F0

The ANOVA of max F0 on NP1 yielded a marginally significant effect of the interaction Sluicing Type x Group Type and a significant effect of the interaction Sluicing Type x Antecedent Type x Group Type. I therefore calculated a separate ANOVA of max F0 on NP1 for the two Group Types, which yielded for -Trained a significant effect of Sluicing Type in the analysis of F_2 [F_1 (1,8) = 3.176, p = 0.113; F_2 (1,7) = 7.109, p = 0.032] and a marginally significant effect of Sluicing Type x Antecedent Type in the analysis of F_1 [F_1 (1,8) = 4.950, p = 0.057; F_2 (1,7) = 0.846, p = 0.388]. Figure 60 suggests that +Trained produce NP1 of ComxOS with a higher max F0 when the embedded NP rather than the matrix NP serves as the antecedent.[97] However, the ANOVA of +Trained did not yield any significant differences. Figure 60 further illustrates that -Trained produce NP1 of ComxOS with a higher max F0 when the matrix NP serves as the antecedent. Additional *t*-Tests show that this difference of Antecedent Type for -Trained is marginally significant in the analysis of t_1 of ComxOS [t_1 (8) = 2.284, p = 0.052; $t2$ (7) = 0.830, p = 0.434]. Moreover, -Trained use max F0 on NP1 to differentiate between the two Sluicing Types when the embedded NP serves as the antecedent, as additional *t*-Tests show for the analysis of t_1 [t_1 (8) = 2.426, p = 0.041; $t2$ (7) = 1.016, p = 0.344]. The results thus illustrate that -Trained use max F0 on NP1 to differentiate between the two Antecedent Types of ComxOS. A closer look at the mean values suggests that +Trained produce NP1 of ComxOS with a higher max F0 when the embedded NP rather than the matrix NP serves as the antecedent. Although there is a great difference between the two Antecedent Types (32.99 Hz), it did not reach statistical significance. Moreover, -Trained use max F0 to differentiate between the two Sluicing Types when the embedded NP serves as the antecedent, which illustrates that the two structures are quite different. The results of the acoustic analysis hence show that only -Trained use max F0 to emphasize NP1 when the matrix NP serves as the

[97] The mean values of all ComxOS and ComSimS conditions are summarized in 53 and Table 43 at the end of this chapter.

antecedent of ComxOS. Moreover, -Trained use max F0 to differentiate between the two Sluicing Types when the embedded NP serves as the antecedent.

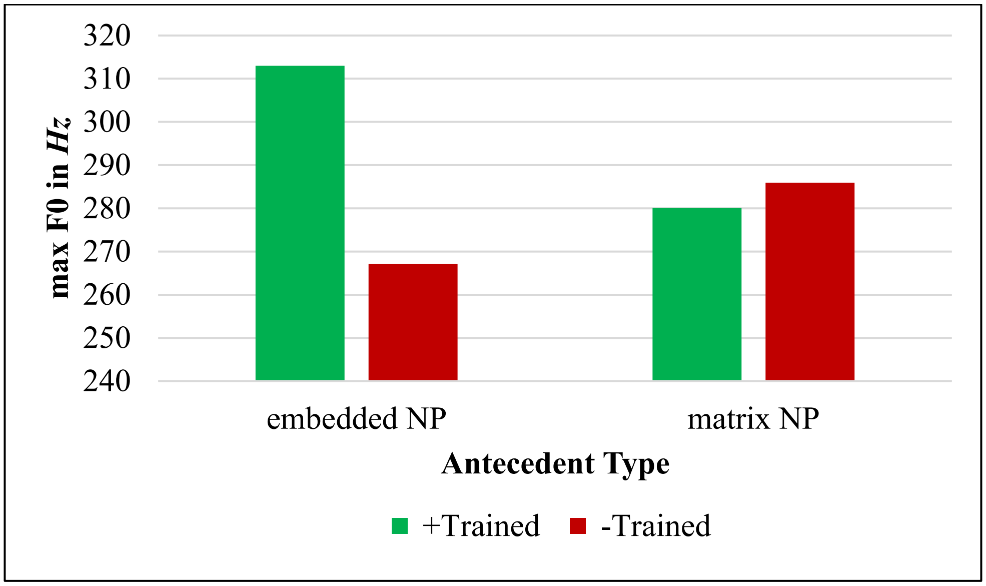


Figure 60. Max F0 on NP1 of ComxOS per AT and GT

The ANOVA of max F0 on NP2 yielded no significant effects. The differences between the mean values are illustrated in Figure 61, which suggests that +Trained produce NP2 of ComxOS with a higher max F0 when the embedded NP serves as the antecedent. However, this difference did not reach statistical significance. The results of the acoustic analysis hence show that neither Group Type uses max F0 to emphasize NP2 when the embedded NP serves as the antecedent of ComxOS.

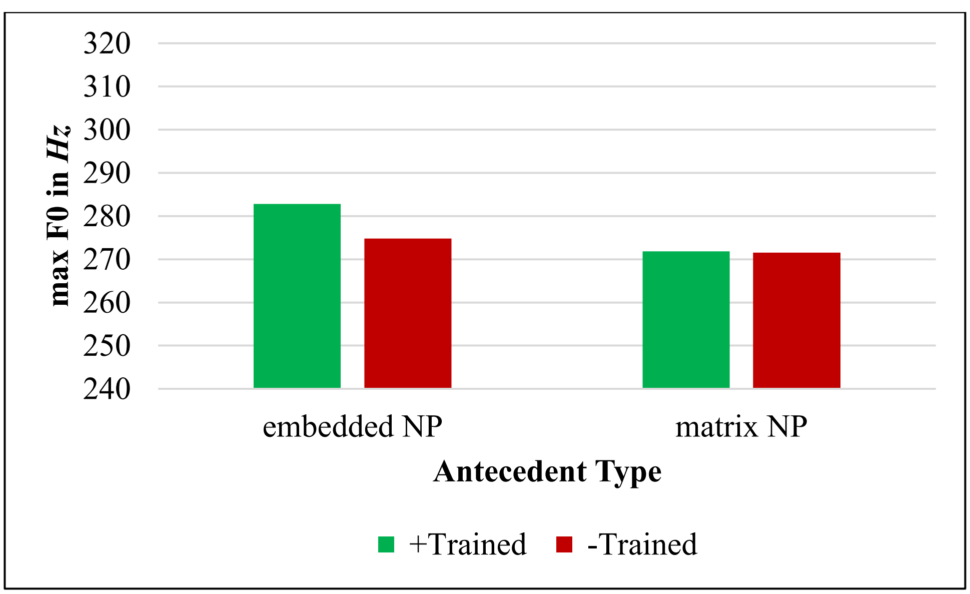


Figure 61. Max F0 on NP2 of ComxOS per AT and GT

Regarding ComSimS, the statistical analysis of max F0 on NP1 and NP2 yielded no significant effects. The differences between the mean values are illustrated in Figure 62 and Figure 63. Figure 62 suggests that -Trained produce NP1 of ComSimS with a higher max F0 when the embedded NP rather than the matrix NP serves as the antecedent. Figure 63 suggests that again -Trained produce NP2 of ComSimS with a higher max F0 when the embedded NP serves as the antecedent, whereas there is almost no difference between the two Antecedent Types for +Trained. It thus seems that -Trained produce both NP1 and NP2 of ComSimS with a higher max F0 when the embedded NP serves as the antecedent. However, none of these differences are significant. The results of the acoustic analysis hence show that neither Group Type uses max F0 to emphasize the antecedent of the *wh*-remnant in ComSimS.

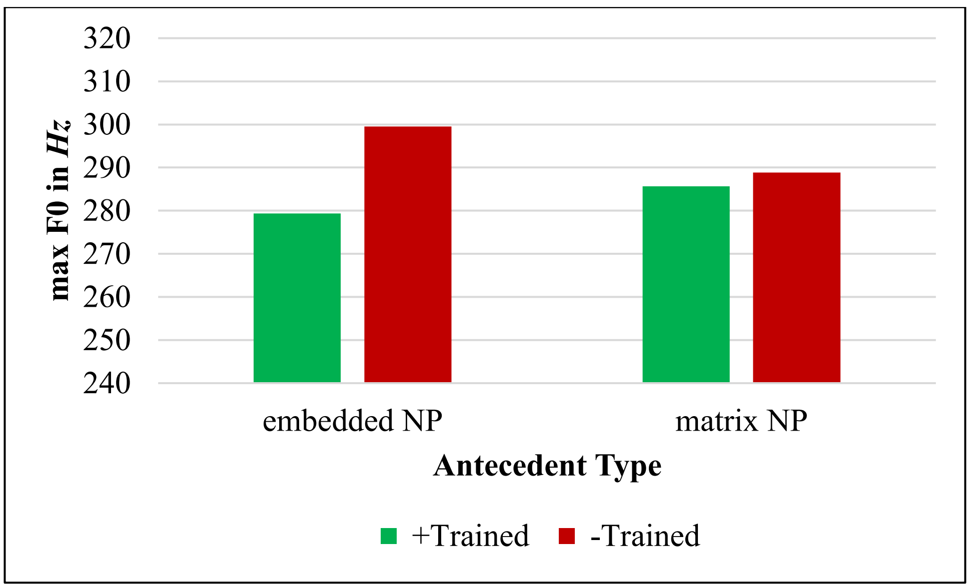


Figure 62. Max F0 on NP1 of ComSimS per AT and GT

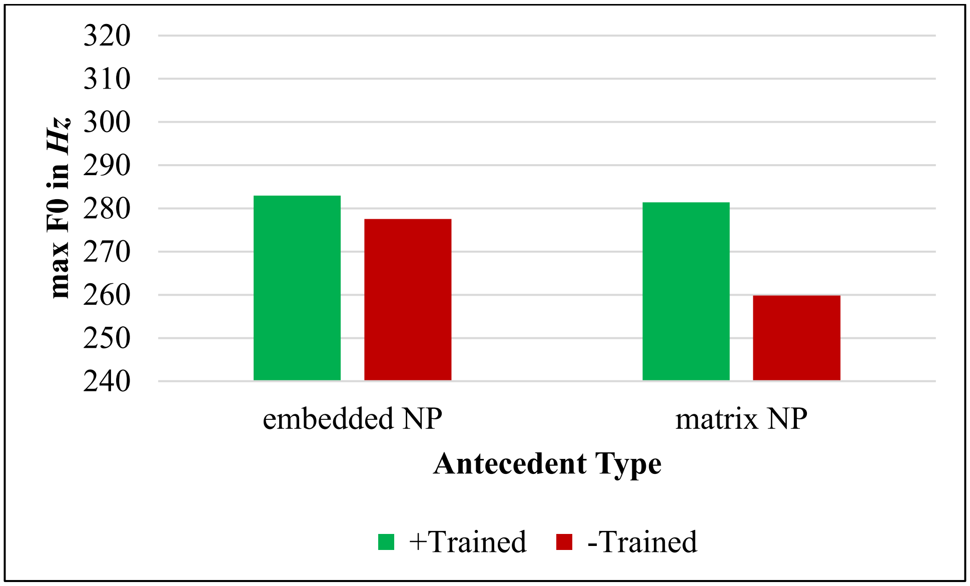


Figure 63. Max F0 on NP2 of ComSimS per AT and GT

b) Min F0

The ANOVA of min F0 on NP1 yielded a significant effect of min F0 in the analysis of F_2 of Antecedent Type x Group Type. I therefore calculated a separate ANOVA of min F0 on NP1 for the two Group Types, which yielded a significant effect of Antecedent Type in the analysis of F_2 for +Trained [F_1 (1,8) = 1.928, p = 0.202; F_2 (1,7) = 9.698, p = 0.017]. Figure 64 illustrates that +Trained produce NP1 of ComxOS with a higher min F0 when the matrix NP serves as the antecedent. However, additional *t*-Tests show that this difference of Antecedent Type for +Trained is not significant in the analysis of ComxOS. The results of the acoustic analysis hence show that neither Group Type uses min F0 to emphasize NP1 when the matrix NP serves as the antecedent of ComxOS.

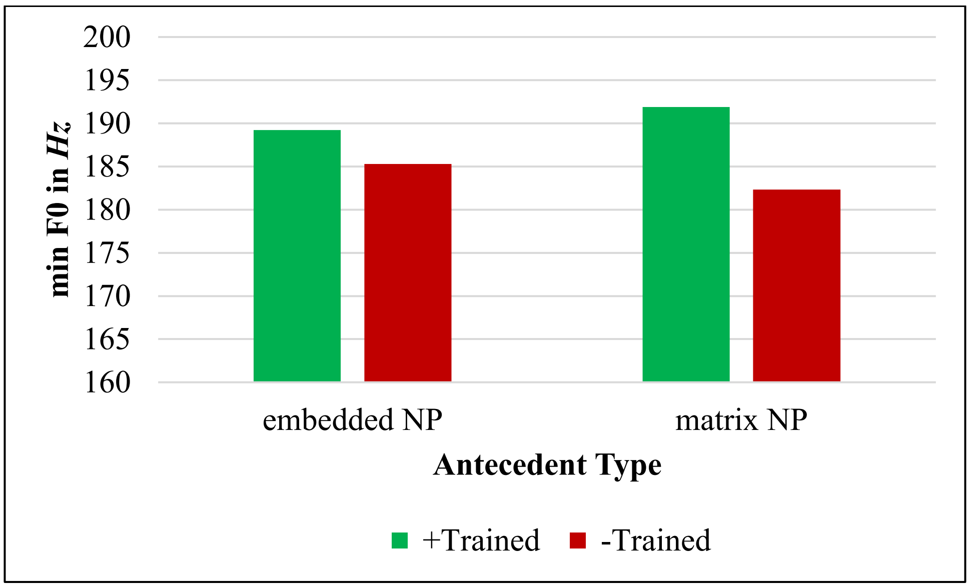


Figure 64. Min F0 on NP1 of ComxOS per AT and GT

The ANOVA of minF0 on NP2 yielded no significant effects. The differences between the mean values are illustrated in Figure 65, which suggests that +Trained produce NP2 of ComxOS with a higher min F0 when the embedded NP serves as the antecedent. It shows that +Trained produce much higher min F0 values on NP2 than -Trained. However, these differences did not reach statistical significance. The results of the acoustic analysis thus show that neither Group Type uses min F0 to emphasize NP2 when the embedded NP serves as the antecedent of ComxOS.

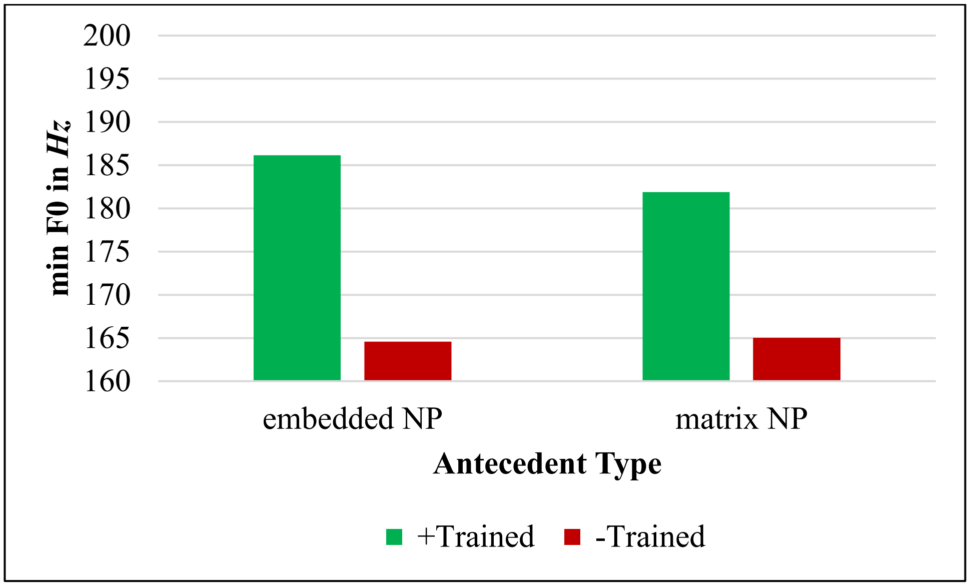


Figure 65. Min F0 on NP2 of ComxOS per AT and GT

Regarding ComSimS, +Trained use min F0 on NP1 to differentiate between the two Antecedent Types, as additional *t*-Tests show: the effect was significant in the analysis of t_2 of ComSimS [t_1 (8) = 1.302, p = 0.229; $t2$ (7) = 3.238, p = 0.014]. Figure 66 illustrates that +Trained produce NP1 of ComSimS with a higher min F0 when the matrix NP serves as the antecedent. Figure 67 suggests that the difference between the two Antecedent Types of ComSimS is somewhat smaller on NP2, for both Group Types. Moreover, as before in ComxOS, it seems that +Trained produce an overall higher min F0 on NP2 than -Trained. The results of the acoustic analysis thus show that +Trained use min F0 on NP1 of ComSimS to emphasize that the matrix NP serves as the antecedent.

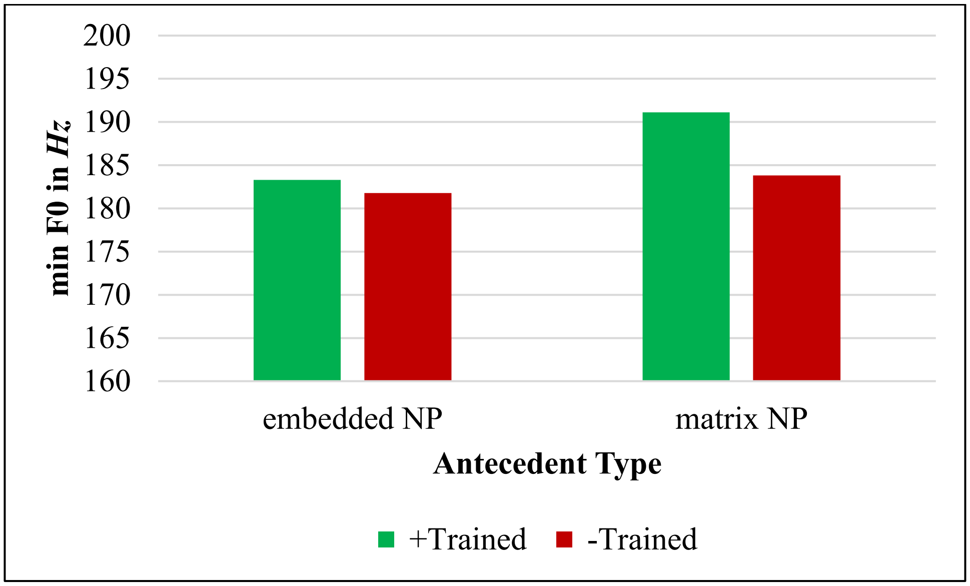


Figure 66. Min F0 on NP1 of ComSimS per AT and GT

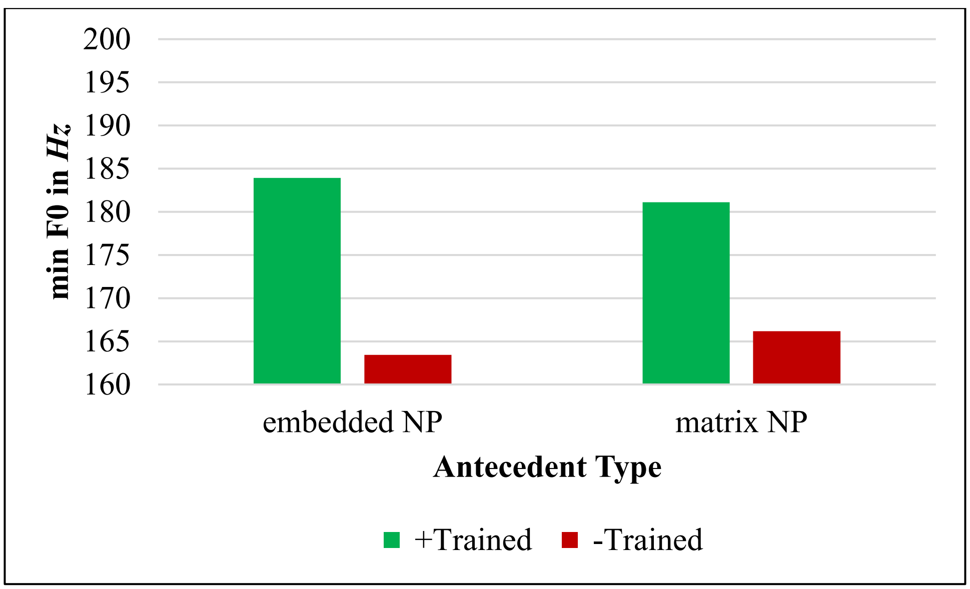


Figure 67. Min F0 on NP2 of ComSimS per AT and GT

c) Duration

The ANOVA of duration on NP1 yielded a significant effect of the interaction Sluicing Type x Antecedent Type in the analysis of F_2. Further *t*-Tests yielded a marginally significant difference in the analysis of t_2 between the two Sluicing Types when the embedded NP serves as the antecedent [t_1 (17) = 0.725, p = 0.478; $t2$ (15) = 2.123, p = 0.051]. Figure 68 suggests that +Trained produce NP1 of ComxOS with a longer duration when the matrix NP serves as the antecedent, whereas -Trained do the opposite. However, neither difference reached statistical significance. The results of the acoustic analysis thus show that neither Group Type uses duration to emphasize NP1 when the matrix NP serves as the antecedent of ComxOS. Nevertheless, both Group Types use duration to differentiate between the two Sluicing Types when the embedded NP serves as the antecedent.

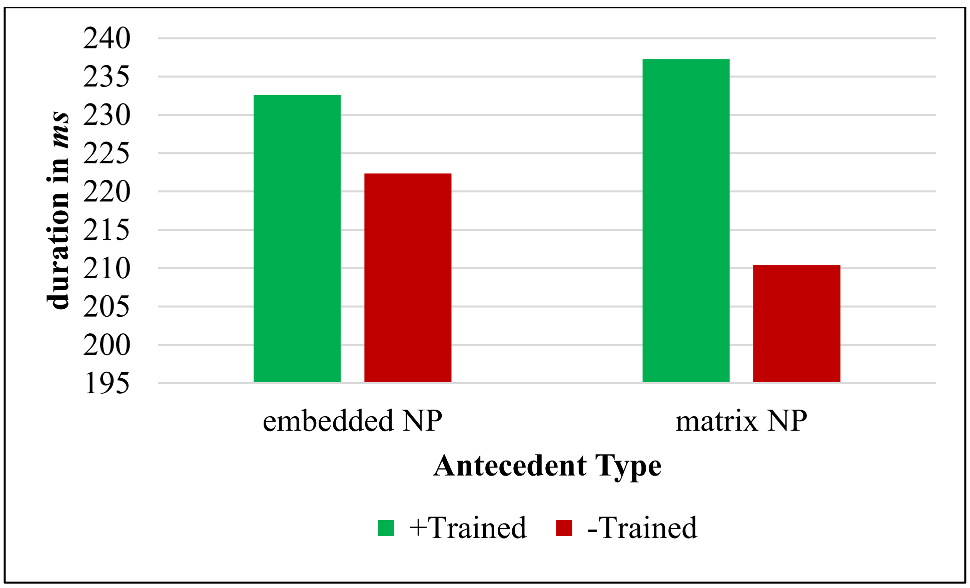


Figure 68. Duration on NP1 of ComxOS per AT and GT

The ANOVA of duration on NP2 yielded a significant effect of Antecedent Type, a significant interaction of Sluicing Type x Group Type and of Antecedent Type x Group Type. I therefore computed a separate ANOVA of duration on NP2 for the two Group Types, which yielded for +Trained a significant effect of Sluicing Type in the analysis of F_1 [F_1 (1,8) = 5.726, p = 0.044; F_2 (1,7) = 1.686, p = 0.235], for Antecedent Type [F_1 (1,8) = 26.329, p = 0.001; F_2 (1,7) = 19.221, p = 0.003], and for -Trained a marginally significant effect of Sluicing Type in the analysis of F_1 [F_1 (1,8) = 4.381, p = 0.070; F_2 (1,7) = 2.738, p = 0.142] and for Antecedent Type [F_1 (1,8) = 3.441, p = 0.101; F_2 (1,7) = 3.861, p = 0.090]. Figure 69 illustrates that both

Group Types produce NP2 of ComxOS with a longer duration when the embedded NP serves as the antecedent. Additional *t*-Tests show that the difference between the two Antecedent Types in ComxOS for +Trained is significant [t_1 (8) = 3.650, p = 0.006; $t2$ (7) = 3.009, p = 0.020]. Moreover, +Trained use duration on NP2 to differentiate between the two Sluicing Types, as additional *t*-Tests support, which yielded a marginally significant effect of Sluicing Type in the analysis of t_1 when the embedded NP serves as the antecedent [t_1 (8) = 2.195, p = 0.059; $t2$ (7) = 1.201, p = 0.269]. Moreover, -Trained use duration on NP2 to differentiate between the two Sluicing Types, as additional *t*-Tests support, which yielded a significant effect of Sluicing Type in the analysis of t_1 when the embedded NP serves as the antecedent [t_1 (8) = 2.336, p = 0.048; $t2$ (7) = 1.673, p = 0.138]. The results thus suggest that both Group Types produce NP2 with a longer duration in both Sluicing Types when the embedded NP serves as the antecedent. They further show that +Trained use duration to emphasize NP2 when the embedded NP serves as the antecedent of ComxOS. Moreover, both Group Types use duration to differentiate between the two Sluicing Types when the embedded NP serves as the antecedent.

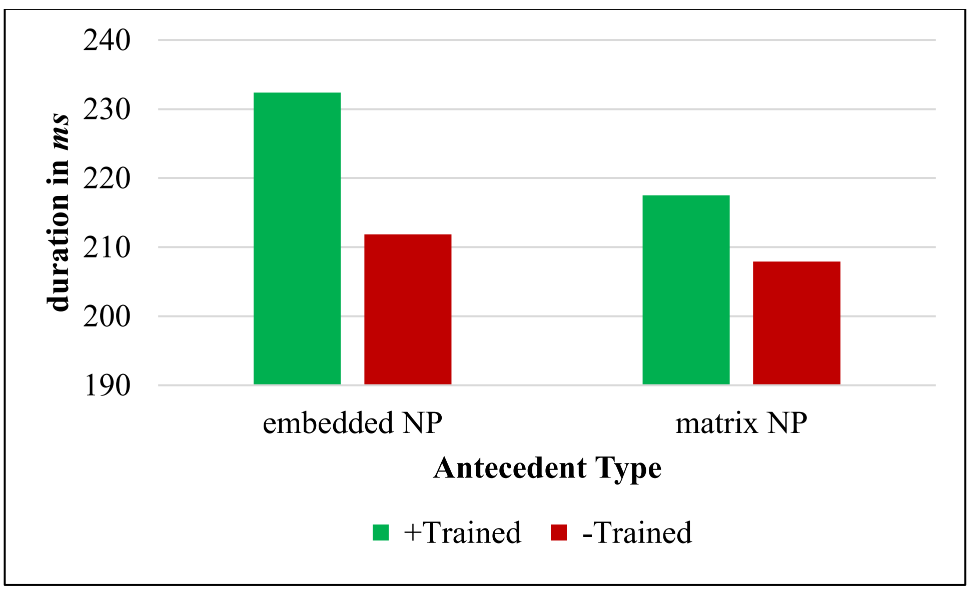


Figure 69. Duration on NP2 of ComxOS per AT and GT

Regarding ComSimS, further *t*-Tests yielded a marginally significant effect of duration on NP1 between the two Antecedet Types of ComSimS [t_1 (17) = 1.806, p = 0.089; $t2$ (15) = 1.984, p = 0.066]. Figure 70 illustrates that both Group Types produce NP1 of ComSimS with a longer duration when the matrix NP serves as the antecedent. With respect to NP2, a separate

ANOVA of duration on NP2 for the two Group Types yielded a marginally significant effect of Antecedent Type in ComSimS for +Trained in the analysis of F_2 [t_1 (8) = 1.654, p = 0.137; $t2$ (7) = 2.189, p = 0.065] and a marginally significant effect for -Trained [t_1 (8) = 2.220, p = 0.057; $t2$ (7) = 2.085, p = 0.076]. Figure 71 shows that both Group Types produce NP2 of ComSimS with a longer duration when the embedded NP serves as the antecedent. The results of the acoustic analysis thus show that both Group Types uses duration on both NPs of ComSimS to emphasize which NP serves as the antecedent of the *wh*-remnant.

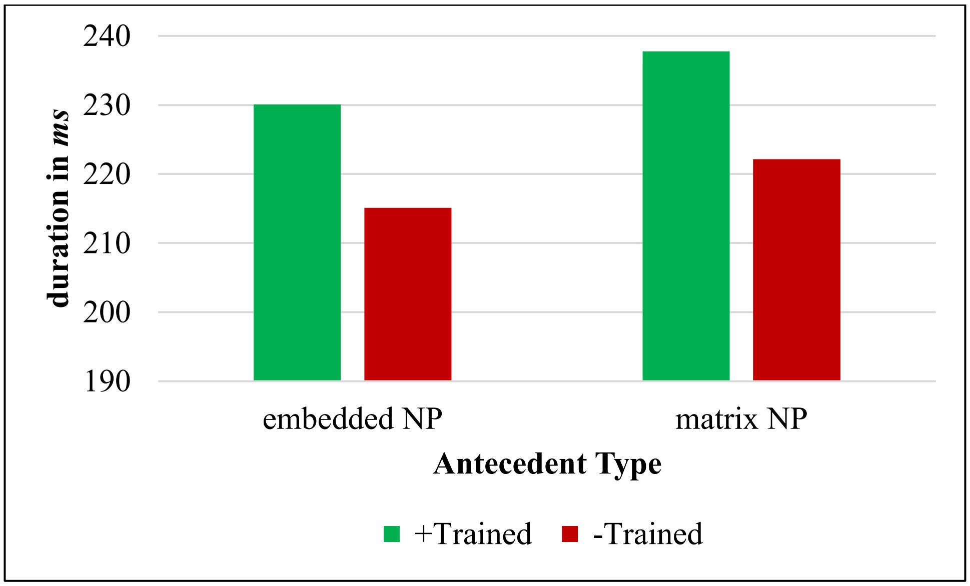


Figure 70. Duration on NP1 of ComSimS per AT and GT

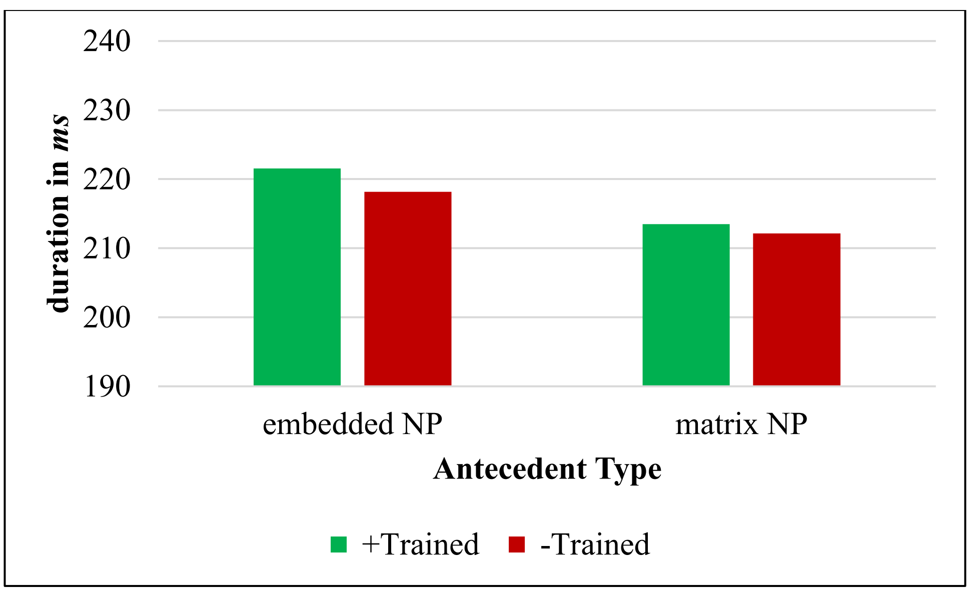


Figure 71. Duration on NP2 of ComSimS per AT and GT

d) Intensity

The ANOVA of intensity on NP1 yielded no significant effects. The differences between the mean values are illustrated in Figure 72, which suggests that both Group Types produce NP1 of ComxOS with a somewhat higher intensity when the matrix NP serves as the antecedent. However, these differences did not reach statistical significance. The results of the acoustic analysis thus show that neither Group Type uses intensity to emphasize NP1 when the matrix NP serves as the antecedent of ComxOS.

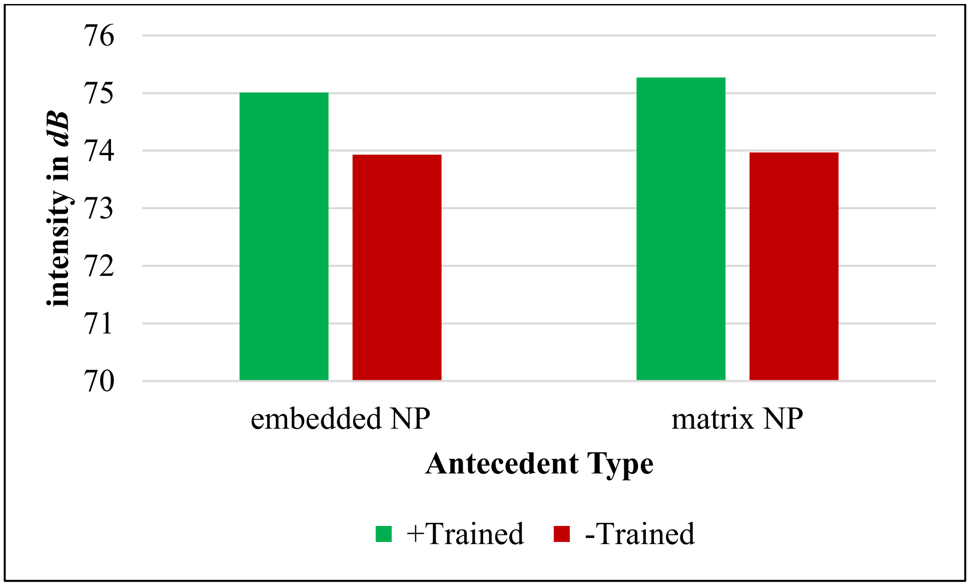


Figure 72. Intensity on NP1 of ComxOS per AT and GT

The ANOVA of intensity on NP2 yielded no significant effects. The differences between the mean values are illustrated in Figure 73, which suggests that +Trained produce NP2 of ComxOS with a somewhat higher intensity when the embedded NP serves as the antecedent, whereas -Trained produce NP2 of ComxOS with a somewhat higher intensity when the matrix NP rather than the embedded NP serves as the antecedent. However, these differences did not reach statistical significance. The results of the acoustic analysis thus show that neither Group Type uses intensity to emphasize NP2 when the embedded NP serves as the antecedent of ComxOS.

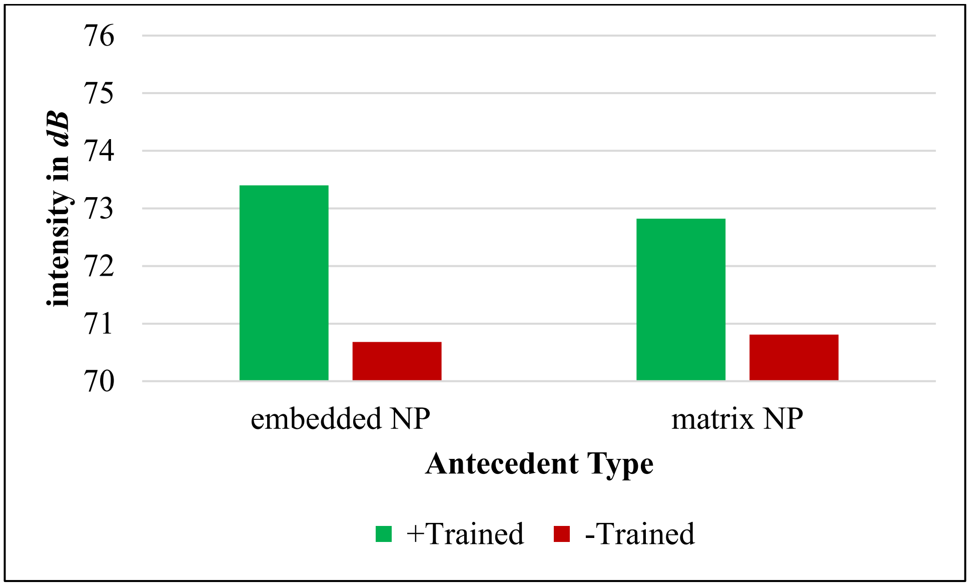


Figure 73. Intensity on NP2 of ComxOS per AT and GT

Regarding ComSimS, the statistical analysis of intensity on NP1 and NP2 yielded no significant effects. The differences between the mean values are illustrated in Figure 74 and Figure 75. Figure 74 suggests that both Group Types use similar intensity values on NP1 no matter which NP serves as the antecedent. Figure 75 suggests that both Group Types use a somewhat higher intensity on NP2 when the embedded NP serves as the antecedent. As before in min F0 of ComxOS and ComSimS, it seems that +Trained produce an overall much higher intensity on NP2 than -Trained. The results of the acoustic analysis thus show that neither Group Type uses intensity to emphasize the antecedent of the *wh*-remnant in ComSimS.

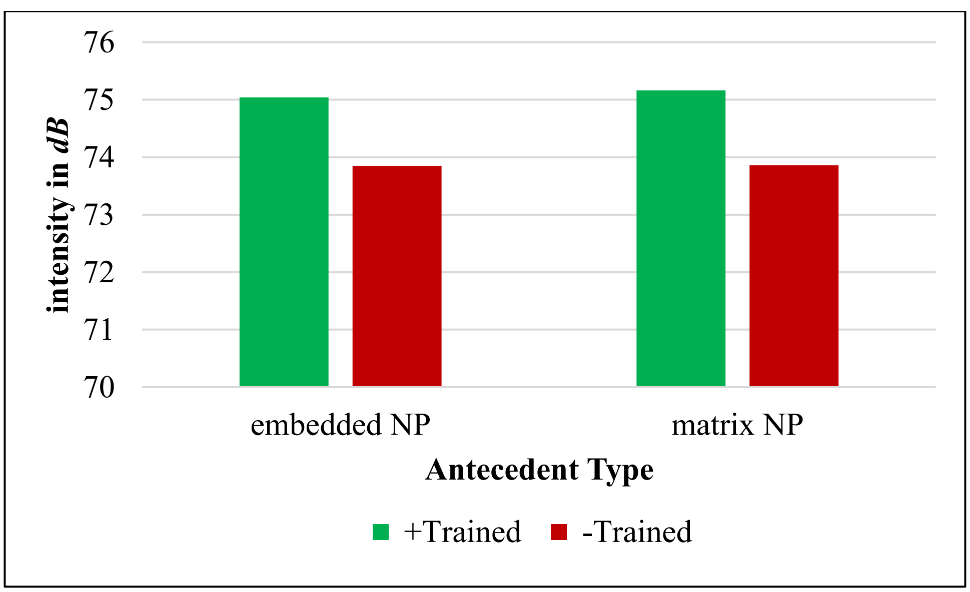


Figure 74. Intensity on NP1 of ComSimS per AT and GT

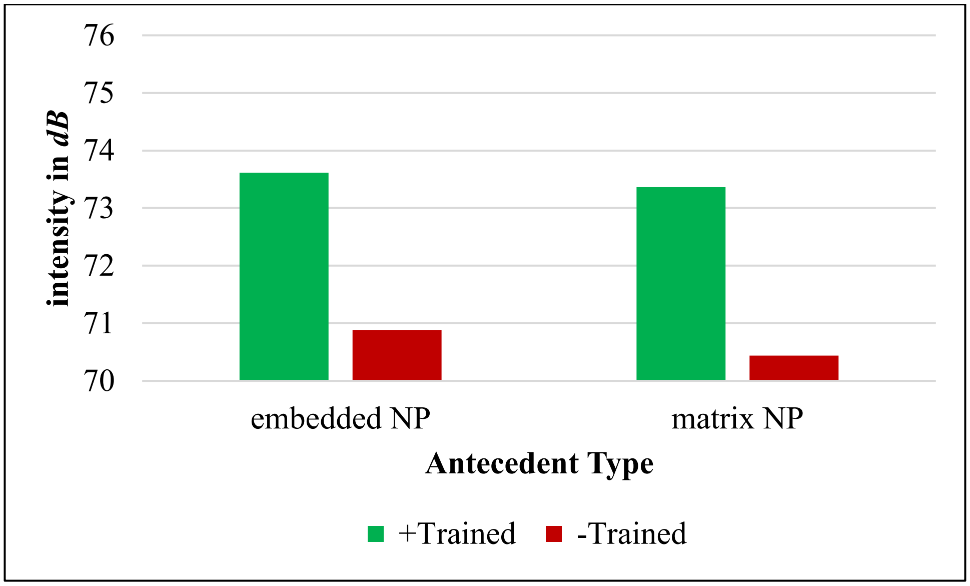


Figure 75. Intensity on NP2 of ComSimS per AT and GT

e) Excursion Size

The ANOVA of excursion size on NP1 yielded a significant interaction of Sluicing Type x Antecedent Type x Group Type in the analysis of F_1. I therefore computed a separate ANOVA of excursion size on NP1 for the two Group Types, which yielded for -Trained a marginally significant effect of Sluicing Type in the analysis of F_1 [F_1 (1,8) = 3.869, p = 0.085; F_2 (1,7) = 2.997, p = 0.127] and a significant interaction of Sluicing Type x Antecedent Type in the analysis of F_1 [F_1 (1,8) = 16.450, p = 0.004; F_2 (1,7) = 1.279, p = 0.295]. Figure 76 suggests that +Trained produce NP1 of ComxOS with a higher excursion size when the embedded NP serves as the antecedent, whereas -Trained do the opposite. However, there are no significant effects for +Trained. Additional *t*-Tests for -Trained yielded a significant effect of Antecedent Type for ComxOS in the analysis of t_1 [t_1 (8) = 3.527, p = 0.008; *t2* (7) = 1.155, p = 0.286]. Moreover, -Trained use excursion size on NP1 to differentiate between the two Sluicing Types, as additional *t*-Tests suggest when the embedded NP serves as the antecedent [t_1 (8) = 3.234, p = 0.012; *t2* (7) = 1.530, p = 0.170]. The results of the acoustic analysis thus show that +Trained use excursion size to emphasize NP1 when the matrix NP serves as the antecedent of ComxOS. Moreover, -Trained use excursion size to differentiate between the two Sluicing Types when the embedded NP serves as the antecedent.

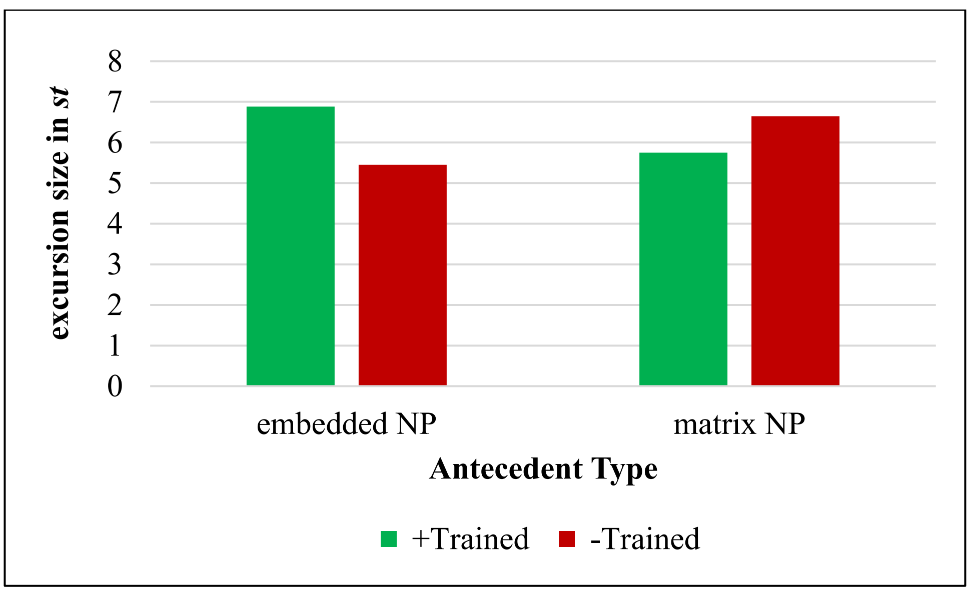


Figure 76. Excursion Size on NP1 of ComxOS per AT and GT

The ANOVA of excursion size on NP2 yielded no significant effects. The differences between the mean values are illustrated in Figure 77, which suggests that only +Trained produce

NP2 of ComxOS with a somewhat higher excursion size when the embedded NP serves as the antecedent. The results of the acoustic analysis thus show that neither Group Type uses excursion size to emphasize NP2 when the embedded serves as the antecedent of neither Sluicing Type.

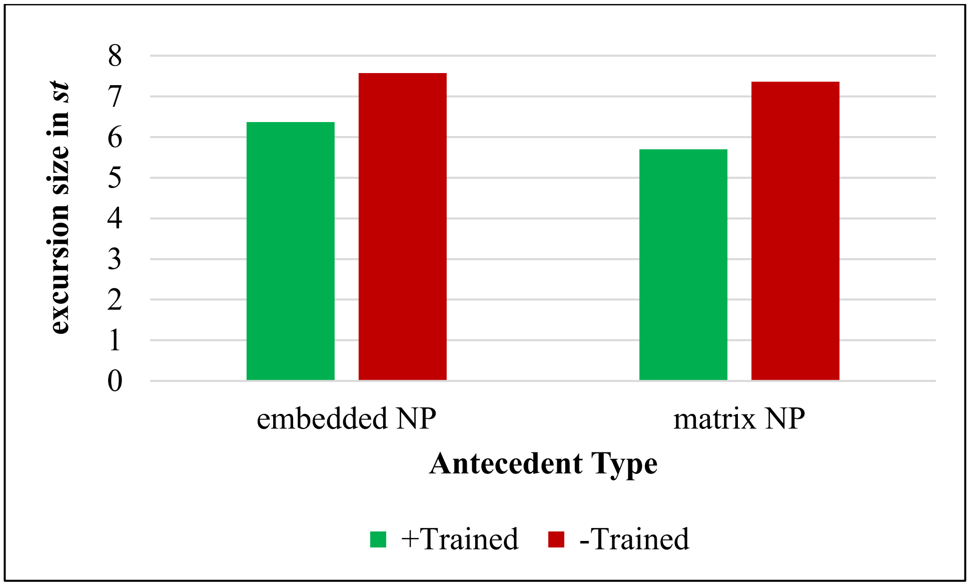


Figure 77. Excursion Size on NP2 of ComxOS per AT and GT

Regarding ComSimS, the statistical analysis of excursion size on NP1 and NP2 yielded no significant effects. The differences between the mean values are illustrated in Figure 78 and Figure 79. Figure 78 suggests that only -Trained produce a higher excursion size on NP1 of ComSimS when the matrix NP serves as the antecedent, whereas +Trained produce a higher excursion size on NP1 of ComSimS when the embedded NP rather than the matrix NP serves as the antecedent. Figure 79 suggest that both Group Types produce NP2 of ComSimS with a somewhat higher excursion size when the embedded NP serves as the antecedent. However, none of these differences reached statistical significance. The results of the acoustic analysis thus show that neither Group Type uses excursion size to emphasize the antecedent of the *wh*-remnant in ComSimS.

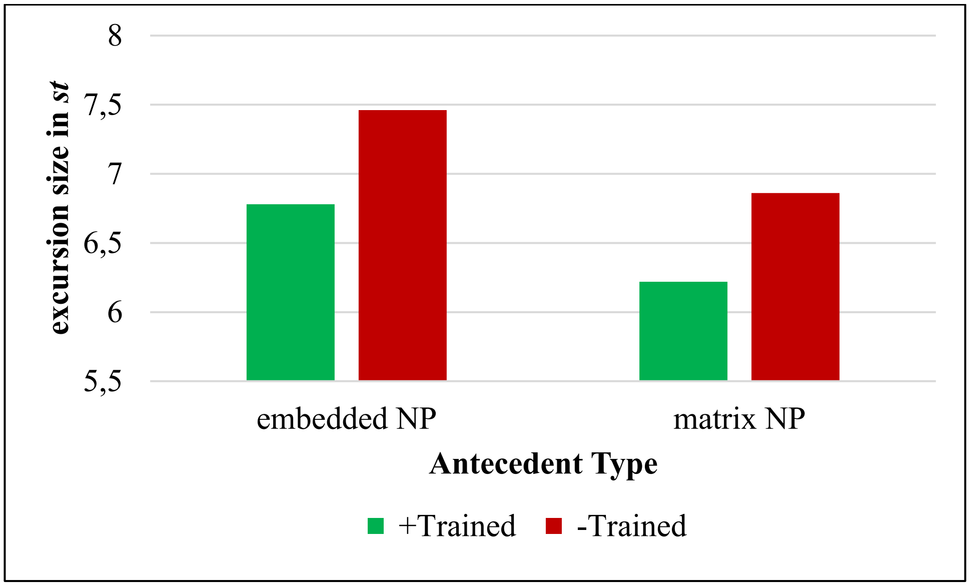


Figure 78. Excursion Size on NP1 of ComSimS per AT and GT

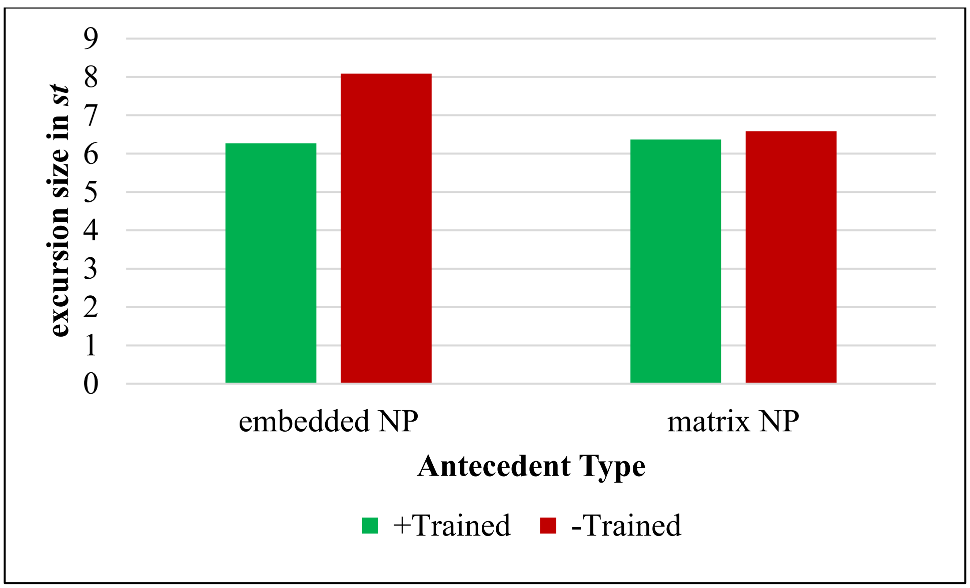


Figure 79. Excursion Size on NP2 of ComSimS per AT and GT

Table 52 provides an overview of the results of the entire statistical analysis for each prosodic parameter separately, including the ANOVAs investigating the degree of prosodic variation on NP1 and NP2, the separate ANOVAs per Group Type and additional *t*-Tests. Regarding the *t*-Tests, I specifically indicated whether the comparison regards ComxOS or ComSimS. F_1/t_1 or F_2/t_2 in brackets signal whether a given effect was significant in only one analysis or in both (no brackets thus means that it was significant in both analyses, F_1/t_1 and F_2/t_2). A dash indicates that there were no significant effects. Note that I do not distinguish between significant ($p < 0.05$) and marginally significant ($p < 0.1$) effects here. Table 53 and Table 54 provide a summary of the mean values of all prosodic parameters of ComxOS and ComSimS with matrix NP and embedded NP as antecedent, separately for +Trained and for -Trained.

Prosodic Parameter	**Statistical Analysis**	**NP1**	**NP2**
Max F0	ANOVA General	• Sluicing*Group • Sluicing*Antecedent*Group (F_1)	-
	ANOVA + Trained	-	-
	ANOVA -Trained	• Sluicing (F_2) • Sluicing*Antecedent (F_1)	-
	t-Test +Trained	-	-
	t-Test -Trained	• Antecedent, ComxOS (t_1)	-
Min F0	ANOVA General	• Antecedent*Group (F_2)	-
	ANOVA + Trained	• Antecedent (F_2)	-
	ANOVA -Trained	-	-
	t-Test +Trained	• Antecedent, ComSimS (t_2)	-
	t-Test -Trained	-	-
Duration	ANOVA General	• Sluicing*Antecedent (F_2)	• Antecedent • Sluicing*Group

			• Antecedent*Group (F_1)
	t-Test General	• Antecedent, ComSimS • Sluicing, embedded NP (t_2)	-
	ANOVA + Trained	-	• Sluicing (F_1) • Antecedent
	ANOVA -Trained	-	• Sluicing (F_1) • Antecedent
	t-Test +Trained	-	• Antecedent, ComxOS • Antecedent, ComSimS • Sluicing, embedded NP (t_1)
	t-Test -Trained	-	• Sluicing, embedded NP (t_1)
Intensity	ANOVA General	-	-
	ANOVA + Trained	-	-
	ANOVA -Trained	-	-
	t-Test +Trained	-	-
	t-Test -Trained	-	-
Excursion Size	ANOVA General	• Sluicing*Antecedent*Group (F_1)	-
	ANOVA + Trained		-
	ANOVA -Trained	• Sluicing (F_1) • Sluicing*Antecedent (F_1)	-
	t-Test +Trained	•	-
	t-Test -Trained	• Antecedent, ComxOS (t_1) • Sluicing, embedded NP	-

Table 52. Summary of Statistical Analysis

Max F0 (Hz)	ComSimS embedded NP	282.96	279.32
	ComSimS matrix NP	281.39	285.63
	ComxOS matrix NP	271.86	280.06
	ComxOS embedded NP	282.83	312.96
Min F0 (Hz)	ComSimS embedded NP	183.92	183.31
	ComSimS matrix NP	181.11	191.11
	ComxOS matrix NP	181.88	191.91
	ComxOS embedded NP	186.14	189.22
Duration (ms)	ComSimS embedded NP	221.55	230.09
	ComSimS matrix NP	213.47	237.76
	ComxOS matrix NP	214.52	237.29
	ComxOS embedded NP	232.37	232.60
Intensity (dB)	ComSimS embedded NP	73.61	75.04
	ComSimS matrix NP	73.36	75.16
	ComxOS matrix NP	72.82	75.27
	ComxOS embedded NP	73.40	75.01
Excursion Size (Hz)	ComSimS embedded NP	6.27	6.78
	ComSimS matrix NP	6.37	6.22
	ComxOS matrix NP	5.70	5.75
	ComxOS embedded NP	6.37	6.88

Table 53. Mean Values for +Trained

Max F0 (Hz)	ComSimS embedded NP	277.53	299.51
	ComSimS matrix NP	259.80	288.86
	ComxOS matrix NP	271.51	285.93
	ComxOS embedded NP	274.78	267.08
Min F0 (Hz)	ComSimS embedded NP	163.43	181.78
	ComSimS matrix NP	166.17	183.80
	ComxOS matrix NP	165.03	182.31
	ComxOS embedded NP	164.58	185.43
Duration (ms)	ComSimS embedded NP	218.18	215.09
	ComSimS matrix NP	212.15	222.16
	ComxOS matrix NP	207.94	210.43
	ComxOS embedded NP	211.87	222.33
Intensity (dB)	ComSimS embedded NP	70.88	73.85
	ComSimS matrix NP	70.44	73.86
	ComxOS matrix NP	70.81	73.97

	ComxOS embedded NP	70.68	73.93
Excursion Size (Hz)	ComSimS embedded NP	8.09	7.46
	ComSimS matrix NP	6.59	6.86
	ComxOS matrix NP	7.36	6.65
	ComxOS embedded NP	7.57	5.45

Table 54. Mean Values for -Trained

Discussion of Acoustic Analysis

In this section, I have investigated the following three questions: First, do +Trained as well as -Trained use prosody to disambiguate complex sluicing structures? Second, is ComxOS with the matrix NP as antecedent more strongly disambiguated by prosody than ComxOS with the embedded NP as antecedent? Third, is the degree of prosodic prominence greater for +Trained than for -Trained? The results of the acoustic analysis alone do not answer these three questions and can thus not support hypotheses H(1), H(2) and H(3). The statistical analysis of the acoustic measurements yielded few significant effects regarding the prosodic disambiguation of ComxOS: On NP1, there was a significant effect of Antecedent Type of max F0 and excursion size for -Trained, however, only in the analyses of F_1. On NP2, there was a significant effect of duration for +Trained. The results of the acoustic analysis alone thus suggest that -Trained use max F0 and excursion size differences on NP1 to differentiate between the two Antecedent Types of ComxOS, whereas +Trained use duration differences on NP2 to differentiate between the two Antecedent Types of ComxOS. Judging from the descriptive differences, it seems that +Trained produce higher min F0, longer duration and higher intensity values on NP1 and higher max F0, higher min F0, longer duration, higher intensity and higher excursion size values on NP2 to differentiate between the two Antecedent Types. -Trained, though, only produce higher max F0 and excursion size values on NP1 and only longer duration values on NP2 to differentiate between the two Antecedent Types. The descriptive differences thus suggest that +Trained use the different prosodic parameters to disambiguate ComxOS, whereas -Trained do so to a much smaller degree, thus supporting hypothesis H(3). The descriptive analysis further suggests that -Trained use more prosodic variation on NP1, whereas +Trained use more prosodic variation on NP2. Hypotheses H(1) and H(2) can thus not be supported by the results of the acoustic analysis alone. Especially the fact that there are strong durational differences on

NP2 but no differences of F0 or intensity, suggests that the acoustic analysis alone cannot grasp the entire scope of prosodic disambiguation of such long and complex structures.

Regarding the differences between the two Sluicing Types, the acoustic analysis shows that both Group Types use duration differences on NP1 and NP2 to differentiate between ComSimS and ComxOS when the embedded NP serves as the antecedent. -Trained additionally use max F0 and excursion size on NP2 when the embedded NP serves as the antecedent. The fact that there is a significant effect of duration for the interaction Sluicing Type x Antecedent Type and of max F0 and excursion size for the interaction Sluicing Type x Antecedent Type x Group Type suggests that the prosodic differences found for the two Sluicing Types affect the productions of the two Antecedent Types, though to a different degree for the two Group Types. Moreover, the results of the acoustic analysis suggest that both Group Types produce a different max F0 on NP1 of ComxOS than of ComSimS and that -Trained produce a different min F0 and a different duration on NP1 of ComxOS than of ComSimS (e.g., whereas +Trained produce NP1 of ComSimS with a higher max F0 when the matrix NP serves as the antecedent, they produce NP1 of ComxOS with a lower max F0 when the matrix NP serves as the antecedent). There is furthermore some variation between the two Sluicing Types in min F0 and intensity values on NP2 for -Trained. All these results thus suggest that there are crucial prosodic differences between ComSimS and ComxOS. However, based on the results of the present acoustic analysis, I cannot conclude whether these prosodic differences are due to the differences of the embedded clauses (RC of ComxOS vs. complement clause of ComSimS) or due to the different pragmatics of the two Sluicing Types.[98] Although the ComSimS structure lexically only differs from the ComxOS structure in one PRN, it seems that the addition of this PRN has a tremendous effect upon the overall tone of the structure. Compare the ComSimS structure in (246) to the ComxOS structure in (247).

[98] Moreover, the fact that the majority of significant effects is only significant in either the F_1 or the F_2 analysis suggests that there is quite some variation between the different speakers (as evident by the lack of significant F_1 effects when the F_2 analysis yielded significant effects) and between the different lexicalizations (as evident by the lack of significant F_2 effects when the F_1 analysis yielded significant effects). The lack of F_1 effects could be eliminated by increasing the number of participants per Group Type. The lack of F_2 effects could be eliminated by revising the different lexicalizations. However, due to the requirements for target items that come with prosodic analyses, see chapter 3.2.2.2, it is difficult to create an ideal set of lexicalizations.

(246) They informed some lawyer that he had defended some dealers.

(247) The fired some lawyer that had defended some dealers.

Although lexically, the only differences is the PRN *he*, structurally, the two Sluicing Types differ tremendously: In (246), there are two main clauses (with an SVO structure) that are linked with the complementizer *that* as illustrated in Figure 80. In (247), though, there is one main clause and one RC that are linked with the relative PRN *that*. Furthermore, the RC contains a gap in subject position that has to be kept in working memory until the entire structure has been processed, as illustrated in Figure 81.

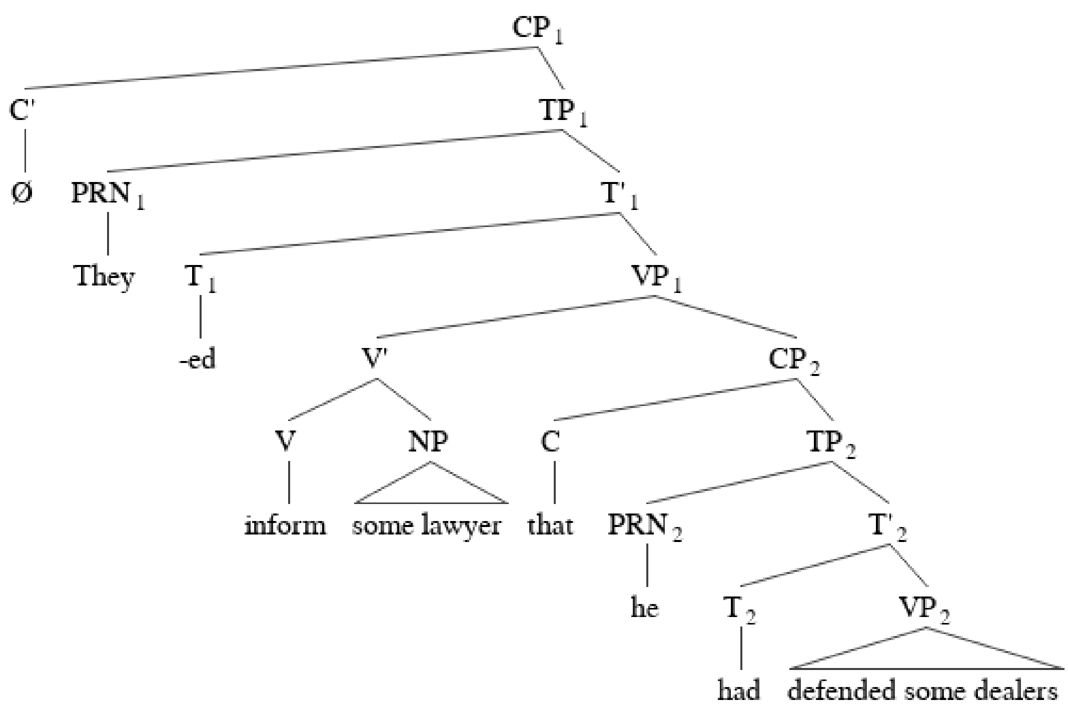


Figure 80. Tree Structure of ComSimS

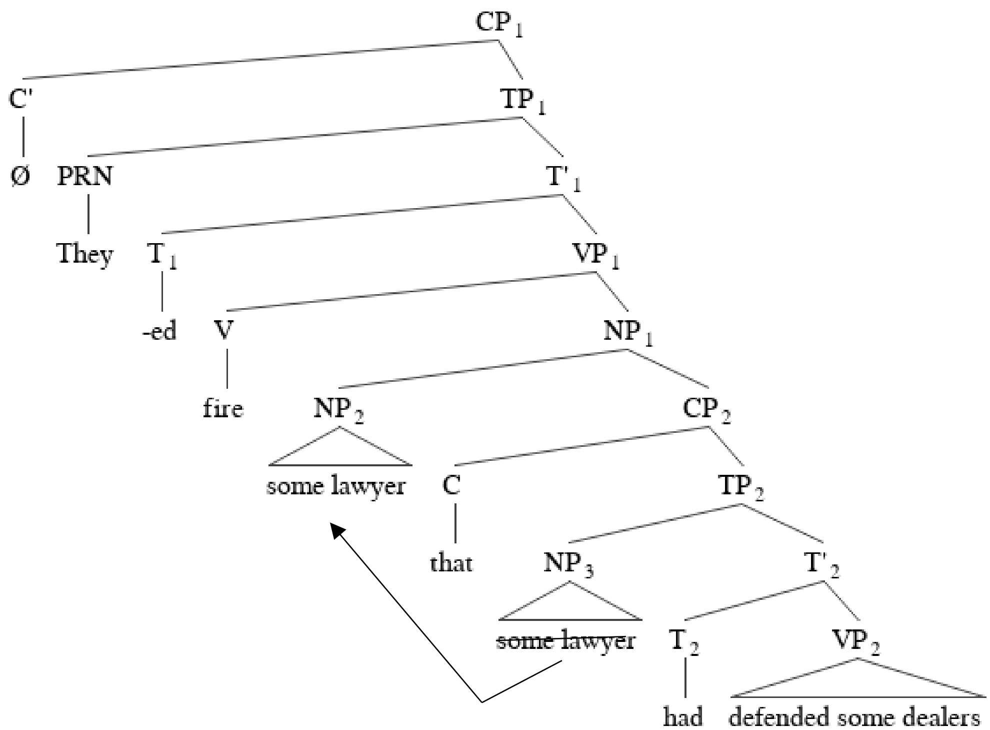


Figure 81. Tree Structure of ComxOS

I suggest that therefore, as it was the case with SimS and SimES in production study part 1, the two structures exhibit a different distribution of p-phrases which subsequently leads to different prosodic structures. Since the ComSimS structure consists of two full SVO clauses that are linked by a complementizer, they constitute two separate p-phrases, see (248). In ComxOS, however, the p-phrase of the RC is embedded into the p-phrase of the main clause, see (249).

(248) (They informed some lawyer)p (that he had defended some dealers)p.

(249) (The fired some lawyer (that had defended some dealers)p)p.

Consequently, the complement clause of ComSimS is prosodically set apart from its main clause, thus leading to a stronger prosodic reset at the second clause, whereas the RC of ComxOS is embedded into its main clause and therefore leads to a weaker prosodic reset at the second clause.

Based on the present results of the acoustic analysis, I claim that the prosodic values of the production study part 2 have been flawed: The acoustic analysis alone suggests that there are no differences of +Trained for any prosodic parameter on neither NP1 nor NP2 that is dependent on F0 measurements (that is, max F0, min F0 and excursion size), neither to distinguish between Antecedent Types nor between Sluicing Types.[99] There is somewhat more prosodic variation of F0-dependent values for -Trained, though, only on NP1 and only in the analysis of F_1. The fact that there are duration differences on NP2 for +Trained (where all the other prosodic parameters did not exhibit any differences) suggests that there is some degree of prosodic disambiguation between the two Antecedent Types of ComxOS. As argued for production study part 1 in chapter 3.2.3.1, I claim that the F0 measurements of NP2 of production study part 2 have also been flawed. Due to the increased complexity and length of the target items (compare the SimS structure *On Tuesday, some lawyer defended some dealers* to the ComxOS structure *They fired some lawyer that had defended some dealers*), I assume that acoustic measurements are less reliable for these structures, which consequently leads to fewer significant effects. In order to get a representative picture of the actual prosodic disambiguation methods of both Group Types regarding ComxOS, it is therefore crucial to include the perceptual analysis in the discussion of production study part 2.

Discussion of Perceptual and Acoustic Analysis

The combination of the perceptual analysis and the acoustic analysis of this production study part 2 shows that native speakers of American English use prosody in order to emphasize the antecedent of the *wh*-remnant of a temporarily ambiguous complex sluicing structure, thus supporting H(1). Both Group Types mostly use prosody on NP1 to disambiguate complex sluicing with a matrix NP as antecedent, thus supporting H(2). +Trained disambiguate NP1 of complex sluicing more frequently than –Trained, thus supporting H(3). These findings are illustrated in the following intonation contours, exemplary representing the productions of one -Trained speaker and one +Trained speaker in both conditions.

[99] Note that there was one significant difference of a parameter dependent on F0: The effect of Antecedent Type for the parameter min F0 on NP1 reached a significant effect in the analysis of F_2

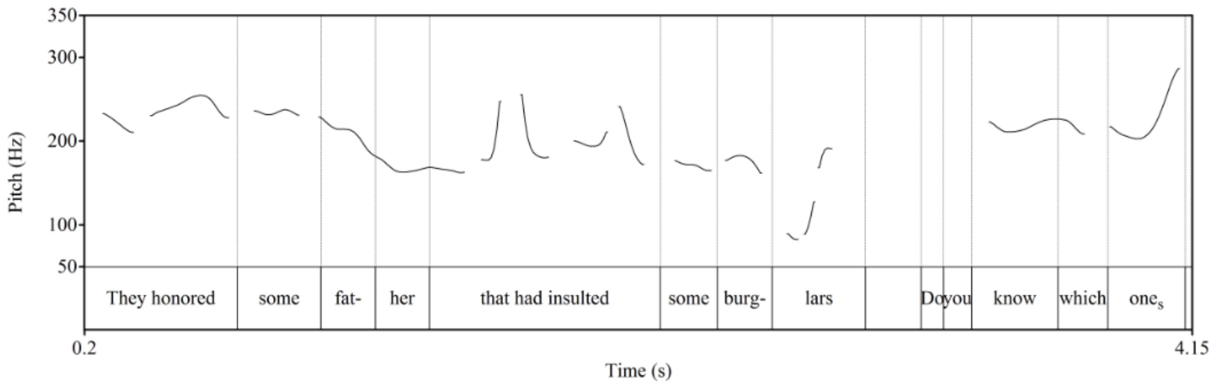


Figure 82. Intonation Contour of Quarterback 2, ComxOS (NP1), Part.17 (-Trained)

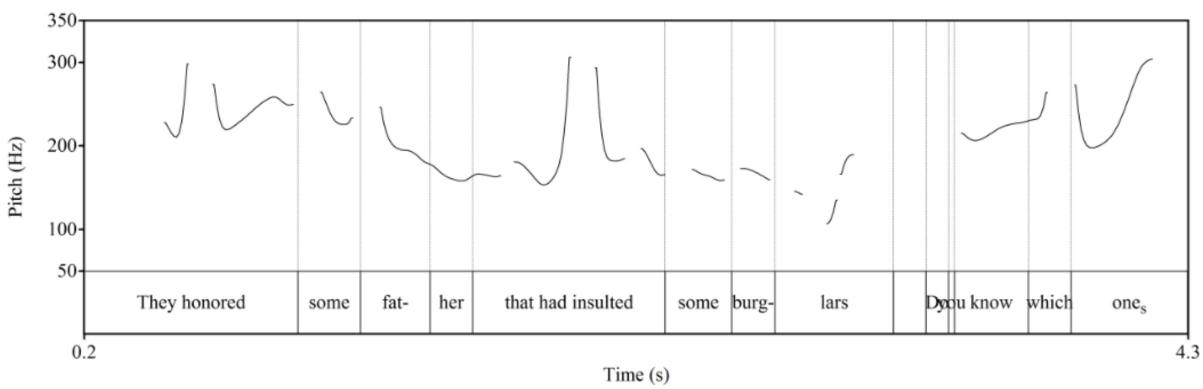


Figure 83. Intonation Contour of Quarterback 2, ComxOS (NP2), Part. 17 (-Trained)

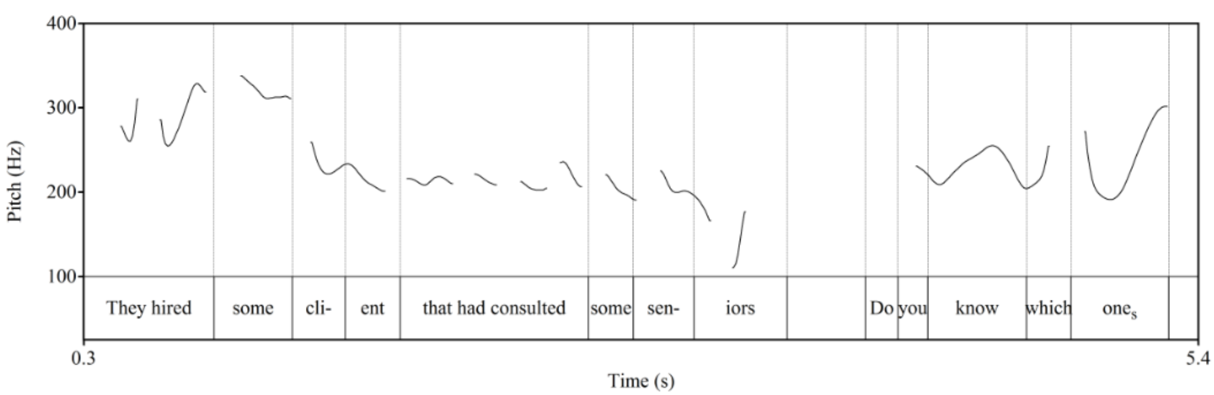


Figure 84. Intonation Contour of Quarterback 2, ComxOS (NP1), Part .19 (+Trained)

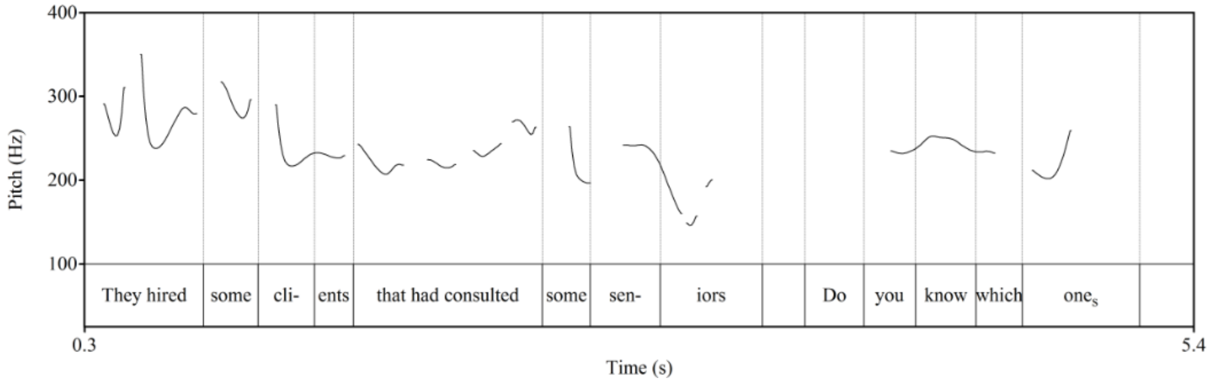


Figure 85. Intonation Contour of Quarterback 2, ComxOS (NP2), Part. 19 (+Trained)

Regarding the productions of a -Trained speaker, Figure 82 and Figure 83 illustrate that NP1 *some client* is more accented when the subject NP also serves as the antecedent of the *wh*-remnant: In Figure 83, the speaker produces a higher F0 at the beginning of the NP *clients*, whereas in Figure 82, the NP *client* is produced with a lower F0 than the preceding QP *some*. Regarding the productions of a +Trained speaker, Figure 84 illustrates that there is a higher pitch excursion from the QP *some* to the second syllable of the NP *clients* when the subject NP also serves as the antecedent than when it does not, see Figure 85. This speaker also seems to make a prosodic distinction on NP2, as indicated by the slightly higher F0 on the first syllable of NP2 *seniors* in Figure 85 than Figure 84. These four intonation contours illustrate, though, that the prosodic patterns are not as clear concerning antecedent types as it was the case for the SimS structures of the Quarterback study part 1.

Regarding the role of Group Type, the acoustic analysis alone suggests that -Trained prosodically emphasize NP1 of ComxOS by varying max F0 and excursion size values, whereas +Trained prosodically emphasize NP2 of ComxOS by varying duration values. The perceptual analysis alone suggests that both Group Types use prosody to disambiguate NP1 of ComxOS and that +Trained merely do so more frequently. The combination of both analyses thus suggests that both Group Types use prosody as a disambiguating factor. Whereas the acoustic analysis suggests that the two Group Types use different prosodic parameters on different NP types to prosodically disambiguate the structures, the perceptual analysis suggests that +Trained makes more frequent use of prosody as a disambiguating factor than -Trained and that both Group Types only disambiguate ComxOS with the matrix NP as antecedent.

The question whether the lack of prosodic variation on NP2 of ComxOS can be attributed to its underlying island structure cannot be answered with this production study. The acoustic analysis suggests that speakers use max F0, duration and excursion size values to differentiate between the two Sluicing Types, thus illustrating that there are prosodic differences between ComxOS and ComSimS. However, they do not indicate whether these differences are due to the underlying island structure or due to the general structural and hence pragmatic differences of the two structures.[100]

The discussion of the acoustic analysis so far has shown that the acoustic analysis is lacking a consistent pattern of prosodic disambiguation regarding the two Group Types, the two Antecedent Types, the two Sluicing Types and the five different prosodic parameters. I thus argue that the acoustic analysis alone does not yield representative results. I suspect that this is related to the length and the complexity of the structures (both ComxOS and ComSimS). This leads to speakers running out of breath towards the end of the sentences which results in less distinct prosodic differences and phrase final creak. Consequently, the F0 values, especially on NP2, are flawed which in turn affects the measurements of max F0, min F0 and excursion size values. The results of the acoustic analysis of this production study therefore reveal the limits of acoustic analyses in general: constituents that are part of long and complex structures are not fit to be measured with acoustic tools since especially F0 values are flawed. The inclusion of a perceptual analysis is vital in the discussion of the results of this production study part 2. I even suggest to concentrate on the results of the perceptual analysis, not only because of the lack of acoustic results due to flawed F0 values but also due to the challenges of acoustic analyses in general which have been addressed in the discussion of chapter 3.2.3.1.

The combination of the acoustic and the perceptual analysis of production study part 2, with a focus on the perceptual analysis, thus suggests that both +Trained and -Trained use prosody to disambiguate a complex sluicing structure when the reading is morphologically disambiguated towards the matrix NP as the antecedent. A complex sluicing structure with an embedded NP as the antecedent of the *wh*-remnant is not prosodically disambiguated by neither Group Type.[101] Regarding the Group Types, +Trained use prosody more consistently than -

[100] The perceptual analysis of ComSimS was not possible at this time due to a personal shortage of work capacity of the neutral annotator.
[101] Note that the acoustic analysis alone suggests some prosodic variation in the form of duration differences on NP2 of ComxOS.

Trained. Note that even +Trained were not specifically asked to emphasize the antecedent of the *wh*-remnant; they were merely given information about some general prosodic disambiguation techniques. It can therefore be assumed that they were aware of the temporary ambiguity of the target items and consequently applied certain prosodic strategies to emphasize the matrix NP reading. -Trained were not given any specific information regarding prosody or ambiguity. They can thus be assumed to have intuitively (thus non-strategically) applied the prosodic disambiguation technique of emphasizing the matrix NP antecedent of a temporarily ambiguous *wh*-remnant.

Regarding the Antecedent Types, the different degrees of prosodic disambiguation for ComxOS with matrix NP vs embedded NP as antecedent can be explained as follows: First, NP1 has a longer distance from the *wh*-remnant than NP2 and might consequently require a stronger degree of prosodic disambiguation in order to be realized as the antecedent of the *wh*-remnant. Second, both NP1 and NP2 are by default focused due to their object positions. They thus both exhibit already some sort of prosodic prominence. If focused, both NPs therefore require a stronger degree of prosodic prominence in order to yield significant acoustic differences. This helps to explain why there are also almost no significant effects on NP1 in the acoustic analysis, as opposed to NP1 of the SimS structures of the production study part 1. Third, NP1 is the overall preferred antecedent of a ComxOS structure. On the one hand, one might argue that this characteristic speaks for less prosodic prominence since the matrix NP is already the preferred and therefore the salient antecedent of the complex sluicing structure. On the other hand, however, depending on how dispreferred the embedded NP is, this status as the preferred antecedent may turn the matrix NP into the only possible antecedent of the structure, thus naturally exhibiting a stronger degree of prosodic disambiguation on NP1 than NP2. Fourth, NP1 is located at a position much earlier in the overall structure than NP2. Speakers still have a lot of breath and can easily vary the degree of the five different prosodic parameters max F0, min F0, duration, intensity and excursion size to indicate a contrastive focus. This is not the case – or at least to a much smaller extent – in the phrase final position of NP2. The lack of significant effects on NP2 in the acoustic analysis as well as the lack of prosodic disambiguation of NP2 in the perceptual analysis can be explained with the effects of phrase final creak, with its position within an island structure and with the fact that it is focused by default. In the subsequent general discussion, I will compare the results of all three production studies conducted for this thesis, with a focus on the two parts of production study Quarterback. In doing so, I will present a clearer picture of the results regarding the prosodic disambiguation of different sluicing structures.

4 General Discussion

I conducted three production studies and four acceptability judgment studies to investigate the following three central research questions: First, do native speakers of English use prosody to emphasize the antecedent of a *wh*-remnant in simple and complex sluicing (RQ(1))? Second, do native speakers of English use stronger prosodic cues to emphasize a specific antecedent of simple and complex sluicing (RQ(2))? Third, is there a difference in the strength or the frequency of prosodic cues used by trained vs. untrained speakers (RQ(3))? The results of the four acceptability judgment studies suggest that there are crucial differences between various sluicing structures and antecedent types. The results of the pilot production study Chicago (henceforth referred to as *Chicago*), the production study Quarterback part 1 (henceforth referred to as *Quarterback 1*) and the production study Quarterback part 2 (henceforth referred to as *Quarterback 2*) suggest that native speakers of English use prosody to emphasize the different antecedent types of different sluicing structures to varying degrees. There are two factors that contribute substantially to the degree and the location of prosodic disambiguation: prior speaker training and the position of an antecedent NP within the overall structure.

In the following, I will therefore discuss the major results that the empirical investigations of this thesis yielded. In chapter 4.1, I will discuss the results of the four acceptability judgments studies and the implications they had on the production study Quarterback.[102] In chapter 4.2, I will discuss the results of the three production studies Chicago, Quarterback 1 and Quarterback 2, as well as their relevance regarding the research on prosodic disambiguation in general. In chapter 4.3, I will discuss the role of the island status of NP2 of complex sluicing structures on the prosody of said NP. In chapter 4.4, I will discuss the challenges that production studies, especially those investigating long and complex structures, are facing. In chapter 4.5, I will discuss whether the present results argue for or against ambiguity avoidance in spoken language. In chapter 4.6, I will discuss the differences between prosodic phrasing and prosodic prominence as a disambiguating factor in spoken language. In chapter 4.7, I will provide a conclusion of this chapter.

[102] Whenever I write about the Quarterback study without mentioning specifically part 1or part 2, I refer to the production study in its entirety, that is, parts 1 and 2.

4.1 Acceptability Judgment Studies

The series of four acceptability judgment studies yielded a variety of important results regarding the differences between several types of sluicing structures and the relationship between various *wh*-remnants and their various antecedent types. In the following, I will summarize the most relevant findings:

First, simple sluicing is more acceptable than complex sluicing, at least when the antecedents of the *wh*-remnants are the respective preferred antecedents (object NP for simple sluicing, matrix NP for complex sluicing). This finding suggests that the addition of a complex structure like an RC leads to an increased processing effort which in turn decreases the acceptability of the overall sluicing structure.

Second, embedding does not decrease the acceptability of simple sluicing structures, which suggests that the complex sluicing structures are not less acceptable because of the embedded clause itself but rather because of the island character of said embedded clause.

Third, the object NP is the preferred antecedent of a simple sluicing structure, supporting previous findings by Frazier and Clifton (1998) and Carlson et al. (2009). However, the embedded object NP is the dispreferred antecedent of a complex sluicing structure despite being the final argument, as argued by Ross (1969), thus supporting previous findings by Frazier and Clifton (2011) and Konietzko et al. (submitted). Consequently, any prosodic differences that would have been found on NP2 of the simple sluicing structures and simultaneously on NP1 of the complex sluicing structure might be related to antecedent preferences. Nevertheless, the production studies did not yield any such commonalities, indicating that antecedent preferences do not play a role in the degree of prosodic disambiguation of different types of sluicing structures.

Fourth, the choice which article is used to precede an antecedent NP is crucial with respect to antecedent preferences. Acceptability judgment study 4 showed that the QP *some* significantly increases the acceptability of complex sluicing structures with the dispreferred embedded object NP as antecedent. It is therefore not possible to alternate between the QPs *a* and *some* within one sluicing structure without affecting the respective antecedent preferences.

Fifth, the four acceptability judgment studies found that there is a greater dislike for the dispreferred antecedent of a simple sluicing structure (the subject NP) than for the dispreferred antecedent of a complex sluicing structure (the embedded object NP). This finding suggests that a by default focused antecedent that is located within an underlying island to extraction is more acceptable than a by default unfocused antecedent that is not part of an island. Moreover, one has to keep in mind that sluicing is said to be island in-sensitive, so the degrading effect of the underlying island is not substantial. This finding thus seems to support the assumption that readers strongly prefer a constituent to be the antecedent of a *wh*-remnant that carries a focus, which in turn supports the claim that speakers should also produce this focus in spoken language by means of a pitch accent. These are the five major findings of the four acceptability judgment studies that were crucial for the development and the subsequent analysis of the target items of the production study Quarterback.

Moreover, the four acceptability judgment studies yielded important results regarding the comparability of different types of complex sluicing structures, which, however, were not included in the production study at this point. For example, the dispreferred embedded object NP antecedent is significantly worse (and thus even more dispreferred) in complex subject sluicing than in complex object sluicing. I suggest that this decreased acceptability stems from the fact that complex subject sluicing has two underlying island structures (Subject Constraint and Complex NP Constraint) out of which NP2 has to be extracted, rather than just one, as it is the case for the complex object sluicing structures (Complex NP Constraint), see discussion chapter 2.1.5.2. Moreover, the results of the four acceptability judgment studies showed that extraposition improves the acceptability of the dispreferred embedded object NP of complex subject sluicing while at the same time decreasing the acceptability of the preferred matrix object NP. This is an important finding that draws on the investigations by Konietzko et al. (submitted) who found an ameliorating effect of extraposition on an RC antecedent of German complex sluicing structures. However, a more in-depth analysis of these findings demands further experimental investigations and thus goes beyond the scope of this thesis. In sum, the results of the four acceptability judgment studies uncovered some major differences between the various investigated sluicing structures and therefore substantially affected the design, the conduct and the data analysis of the subsequent production study Quarterback.

4.2 Production Studies

The findings of the three production studies Chicago, Quarterback 1 and Quarterback 2 contribute significantly to the research about the production side of prosodic disambiguation of various sluicing structures. It adds to the investigation of different prosodic parameters (prosodic phrasing vs. prosodic prominence) as a disambiguating factor as well as contributing to the question whether prosodic disambiguation is already used by untrained and unprofessional speakers despite additional disambiguating cues like context or morphology. Moreover, the production studies address the relationship between structural complexity and prosody while at the same time revealing some of the challenges that production studies face. In the following, I will first discuss the results of the pilot production study Chicago in chapter 4.2.1, followed by the production studies Quarterback 1 in chapter 4.2.2 and Quarterback 2 in chapter 4.2.3. I will conclude with a discussion of the similarities and differences between the three production studies in chapter 4.2.4.

4.2.1 Pilot Production Study Chicago

The pilot production study Chicago investigated globally ambiguous contrastive simple sluicing structures that were disambiguated by a preceding context towards either a subject focus reading, an object focus reading, or a neutral, non-disambiguating reading. Both the acoustic as well as the perceptual analysis yielded no differences between the object reading and the neutral reading. This supports the results of Frazier and Clifton (1998) and Carlson et al. (2009) who claimed that the final argument is the preferred antecedent of ambiguous sluicing due to its default focus. The acoustic and the perceptual analysis yielded clear prosodic differences between the subject reading and the object reading. Both analyses found a high degree of prosodic variation on NP2. The acoustic analysis showed no prosodic variation on NP1; the perceptual analysis found some prosodic variation on NP1. I suspect that the reason for this decrease of prosodic variation on NP1 is the fact that it coincided with being the first word of the sentence. NP1 of Chicago was thus, due to its sentence-initial position, obligatorily accented throughout all conditions. This assumption is supported by the prosodic concept of recursion and downstep as proposed by Féry (2010a), see discussion chapter 2.2.2.2, who argues that the beginning of an utterance coincides with the highest amount of prosodic prominence.[103] NP2 of Chicago, though, was the third word of the sentence and accordingly still in an early but not sentence-initial position, which is ideal for expressing prosodic differences. Moreover, the simple sluicing structures of Chicago were globally ambiguous and thus disambiguated towards one reading by a preceding context. This means that the structures were already disambiguated by the context before the speaker read the sentences for the first time, which might have strengthened the information structural influence and therefore the degree of prosodic disambiguation of the respective target items. Although NP2, as the most deeply embedded constituent of the structure, was by default focused (following the NSR, (Chomsky & Halle, 1968; Cinque, 1993)) and thus also by default accented (Jackendoff, 1972; Selkirk, 1995; Truckenbrodt, 1995; Krifka, 2008), it was nevertheless in a sentence early position where the strong disambiguation of the preceding context might still have led to a strong degree of prosodic variation on NP2. I conclude that the degree of prosodic variation on NP2 of the simple sluicing structures of Chicago is a consequence of the strong information structural influence of the preceding context. Prosodic disambiguation was realized on the focused NP2 rather than the given NP1 because of the sentence-initial position of NP1 (which led to an obligatory accent) and the still rather sentence early position of NP2 (which was not affected by sentence-final speech phenomena that flaw the respective prosodic values).

The results of the Chicago study support all of its hypotheses: First, speakers use prosody to emphasize the antecedent of a *wh*-remnant in globally ambiguous simple sluicing (H(1)). Second, an all-new neutral context triggers similar prosodic realizations as an object context (H(2)), thus adding further support to the claim that the object NP is the preferred antecedent of an ambiguous simple sluicing structure (Frazier & Clifton, 1998; Carlson et al., 2009). Third, speakers use prosody as a disambiguating factor to mark the information structure of simple sluicing, despite disambiguating context (H(3)), thus weakening the claims made by Kraljic and Brennan (2005), Piantadosi et al. (2012) and Wasow (2015) that context is enough to disambiguate meaning and that therefore further disambiguation is superfluous. Note though that the globally ambiguous structures investigated in this study may not necessarily illustrate

[103] The first word of the Quarterback study part 1 was either *On* from *On Monday* or *They* from *They said* that. Although *on* and *they* thus also coincided with being the first words of the sentences, they were not accented by default since *on* is the head of a PP and therefore a function word, which is generally deaccented (Selkirk, 1984, 1995; Bader, 1998) and *they* is a PRN which is also generally deaccented (see discussion chapter 2.2.3.2).

a typical case of prosodic disambiguation but rather one of typical information structural influence. However, a more in-depth analysis of the differences between prosodic disambiguation and information structural influence goes beyond the scope of this thesis but should be addressed in the future. Fourth, this study showed that the experimental design, the method, the procedure and the type of data analysis are adequate to yield and explore the prosodic contours of native speakers (H(4)), thus lending further support to previous findings by Allbritton et al. (1996), Breen et al. (2010) and Katz and Selkirk (2011) who showed that a laboratory setting does not hamper prosodic realizations, and to Katz and Selkirk (2011), Repp (2015) and Repp and Rosin (2015) that their method of analyzing prosodic data is suitable to investigate prosodic disambiguation.

4.2.2 Production Study *Quarterback 1*

The production study Quarterback 1 investigated whether even untrained speakers use prosody to disambiguate a temporarily ambiguous non-contrastive simple sluicing structure that was morphologically disambiguated towards either a subject focus reading or an object focus reading. Both the acoustic as well as the perceptual analysis yielded clear prosodic differences between the subject reading and the object reading as well as clear prosodic differences between trained and untrained speakers: Both analyses yielded more prosodic variation on NP1 than NP2 and more prosodic variation by trained speakers than by untrained ones. Trained speakers not only produced an overall higher number of correctly disambiguated structures, but they also produced stronger prosodic cues. Moreover, they used prosodic variation on both NP1 and NP2 to indicate that the respective NP serves as the antecedent. Untrained speakers produced less and weaker prosodic cues and they only used prosodic variation on NP1 to indicate that the subject NP serves as the antecedent. The fact that there was generally more prosodic variation on NP1 than NP2 clashes with the results of Chicago, which also investigated simple sluicing structures but found a higher degree of prosodic variation on NP2 than NP1. I suspect that these different findings are, for the most part, related to the sentence-initial position of NP1 of Chicago and the relatively late sentence-final position of NP2 of Quarterback 1: Whereas NP2 of Quarterback 1 was located at the seventh or eighth position of the sentence, NP2 of Chicago was located at the third position. NP2 of Quarterback 1 may thus have been affected by sentence-final speech phenomena such as phrase final creak or speakers running out of breath.

Moreover, there is a common downtrend for pitch and intensity values towards the end of a sentence, see the discussion of the perceptual and the acoustic analysis in chapter 3.2.3.1. It is not surprising that duration, as the only prosodic parameter that is generally not affected by a phrase final position, was the only prosodic parameter that resulted in a significant difference.[104] Phrase final lengthening is commonly used at the end of a sentence to indicate the end of an IPh. The increased duration values on NP2 of Quarterback 1 can thus either be interpreted to signal a subsequent pause or to signal a contrastive focus on NP2. Since increased duration values only showed up on NP2 of the object reading, I consider the latter explanation to be applicable here.[105] Moreover, NP2 of Quarterback 1 was, due to its sentence-final position, the most deeply embedded constituent of the structure and, therefore, by default focused. Consequently, NP2 carried prosodic prominence by default, which means that it required more prosodic variation to result in a perceivable and measurable prosodic difference. Besides, a constituent that is already by default accented is perceived to be much less contrastive when it is contrastively focused than a naturally unfocused constituent (Calhoun, 2009). As a result, prosodic variation on NP1 is not only more easily realized because of its sentence early and thus unfocused position but because of this unfocused status, an accent on NP1 is also more easily perceived as such than an accent on NP2. Finally, the simple sluicing structures of Quarterback 1 were temporarily ambiguous and only morphologically disambiguated by the number assignment of the sentence-final *wh*-remnant. The simple sluicing structures of Quarterback 1 were only disambiguated once the speaker had reached the end of the sentence, which might have resulted in an overall smaller degree of prosodic disambiguation due to weaker information structural priming than it was the case in the contextual disambiguation of Chicago. A preceding context ensures disambiguation of the target item, whereas a sentence-final morphological disambiguation cannot guarantee the same. With respect to morphological disambiguation, one cannot be sure that speakers have silently read and understood the target items before reading them out loud (although they were specifically asked to do so in the instructions). I thus conclude that the strong degree of prosodic variation on NP1 and the lack

[104] F0 is affected by phrase final creak, which results in irregular F0 contours (mostly very low F0 values or occasionally very high squeaks), thus falsifying the F0 measurements of a sentence final constituent. Intensity decreases towards the end of a sentence since speakers are running out of breath.

[105] NP2 was followed by a phrase break in both the subject reading and the object reading. It would thus not make sense to indicate the end of one phrase and the beginning of a new phrase in only the object reading.

of prosodic variation on NP2 of the simple sluicing structures of Quarterback 1 is a consequence of the weak influence of the morphological disambiguation. Prosodic disambiguation was realized on NP1 rather than NP2 because of the sentence-final position of NP2 as opposed to the sentence early position of NP1. NP2 was focused and therefore accented by default as well as affected by sentence-final speech phenomena that flaw the prosodic values of the respective constituents. NP1, however, was in a sentence early position where it was not focused but rather given and thus deaccented by default, which makes it easier to add additional prominence onto it when it receives a contrastive focus.

The results of this Quarterback 1 study support all of its hypotheses: First, speakers use prosody to emphasize the antecedent of an ambiguous *wh*-remnant in temporarily ambiguous non-contrastive simple sluicing (H(1)). Second, NP1 is more frequently disambiguated by prosody than NP2 (H(2)). Third, specifically trained speakers use prosodic prominence more frequently and produce stronger prosodic cues to emphasize the antecedent of a *wh*-remnant in simple sluicing than untrained speakers (H(3)).

4.2.3 Production Study *Quarterback 2*

The production study Quarterback 2 investigated whether even untrained speakers use prosody to disambiguate a temporarily ambiguous non-contrastive complex sluicing structure that was morphologically disambiguated towards either a matrix object focus reading or an embedded object focus reading. Only the perceptual analysis yielded clear prosodic differences between the matrix object reading and the embedded object reading as well as clear prosodic differences between trained and untrained speakers: There was prosodic variation on NP1 but not on NP2 and an overall higher degree of prosodic variation by trained speakers than by untrained ones. Both trained and untrained speakers used prosody to disambiguate complex sluicing with the matrix NP (NP1) as antecedent. Neither group used prosody to disambiguate complex sluicing with the embedded NP (NP2) as antecedent. The acoustic analysis yielded only a significant effect of duration on NP2. Due to this discrepancy between perceptual and acoustic analysis, I suspect that acoustic analyses face considerable challenges when investigating long and complex structures, which consequently leads to unanalyzable results. The results of the perceptual analysis of Quarterback 2, however, are similar to the results of the perceptual analysis of Quarterback 1, which examined simple rather than complex sluicing structures and which found a higher degree of prosodic variation on NP1 and an overall higher degree of prosodic variation by trained speakers. I suspect that the reason for these similar findings is the sentence-final position of NP2 of both Quarterback 1 and Quarterback 2: In complex sluicing, NP2 was located at the ninth position of the sentence. As discussed with respect to Quarterback 1, such a low position might have been affected by sentence-final speech phenomena that flaw the prosodic values of the respective constituents. Both in Quarterback 1 and Quarterback 2, duration, the only prosodic parameter that is generally not affected by sentence-final speech phenomena, was the only prosodic parameter that resulted in a significant difference in the acoustic analysis. In complex sluicing, both NP1 and NP2 were, due to their statuses as being the most deeply embedded constituents of their respective phrases, focused by default. Consequently, both NPs were accented by default which means that speakers had to produce stronger prosodic cues to yield a perceivable and measurable prosodic difference between the two conditions (Calhoun, 2009). This default focus position thus explains the lack of acoustic differences on both NP1 and NP2, as it was the case for NP2 of Quarterback 1 as well. Moreover, the complex sluicing structures of Quarterback 2 were again temporarily ambiguous and only morphologically disambiguated by the number assignment of the sentence-final *wh*-remnant, which might not have triggered strong enough prosodic values to yield significant effects in the acoustic analysis on an already by default focused NP. Finally, a crucial difference between NP2 of Quarterback 1 and NP2 of Quarterback 2 is that the latter was located within an RC which constitutes an island to extraction. The acceptability of the embedded NP as an antecedent is therefore slightly decreased as compared to that of the matrix NP. This decreased acceptability resulted from an increased processing effort which might have also led to weaker prosodic differences (or the lack thereof) on NP2. I thus conclude that the strong degree of prosodic variation on NP1 (both by trained and by untrained speakers) and the lack of prosodic variation on NP2 (both by trained and by untrained speakers) of the complex sluicing structures of Quarterback 2 are a consequence of the weak influence of the morphological disambiguation. Prosodic disambiguation was realized on NP1 rather than NP2 because of the sentence-final position of NP2 and its location within an island to extraction. Both NP1 and NP2 were focused and therefore accented by default, which explains the lack of acoustic effects for both NP types. Moreover, NP2 was affected by sentence-final speech phenomena and was located within an island to extraction, further explaining the missing prosodic differences on NP2. Besides being focused by default, NP1, though, was in a sentence-initial position within a matrix clause, which makes it easier to express additional prominence onto it when it receives a contrastive focus, explaining the results of the perceptual analysis.

The results of this study support all of its hypotheses: First, speakers use prosody to emphasize the antecedent of an ambiguous *wh*-remnant in temporarily ambiguous non-contrastive complex sluicing (H(1)). Second, NP1 is more frequently disambiguated by prosody than NP2 (H(2)). Third, specifically trained speakers make more frequent use of prosodic prominence and produce stronger prosodic cues to emphasize the antecedent of a *wh*-remnant in simple sluicing than untrained speakers (H(3)).

4.2.4 Comparison: *Chicago* vs. *Quarterback* (1 and 2)

A comparison of the three production studies Chicago, Quarterback 1 and Quarterback 2 demonstrates that the three main research questions of this thesis have been answered. First, native speakers of English use prosodic prominence to disambiguate different types of sluicing structures, namely contrastive simple sluicing as well as non-contrastive simple and complex sluicing (RQ(1)). Second, NP1 is more strongly disambiguated by prosody than NP2 (RQ(2)). However, when NP1 is located in a sentence-initial position, prosodic variation is blocked and must switch to another available constituent, as it was the case in Chicago. Moreover, the exact reasons why NP1 is more frequently disambiguated than NP2 require further discussion and investigation since several possibilities have been discussed in this thesis: default focus of NP2, sentence-final position of NP2 and position within an island to extraction of NP2. Third, even untrained speakers use prosody to disambiguate sluicing, but trained speakers do so to a larger extent (RQ(3)). Consequently, the three production studies share a number of similarities. However, there are also certain differences that need to be addressed. I suggest that the respective prosodic differences between the three studies are a consequence of certain methodological and structural differences which will therefore be discussed in the following. First, I will address the prosodic differences between Chicago and Quarterback 1 which both investigated simple sluicing structures. Second, I will discuss the prosodic differences of Quarterback 1 and Quarterback 2 which looked at different types of sluicing structures but due to the identical experimental design, shared a lot of other similarities.

While both Chicago and Quarterback 1 investigated the prosodic disambiguation of simple sluicing structures, there were two major structural differences between the two studies: First, the target items of Chicago were contextually disambiguated, whereas the target items of Quarterback 1 were morphologically disambiguated. The target items of Chicago were thus globally ambiguous, whereas the target items of Quarterback 1 were temporarily ambiguous. Second, although both structures were cases of simple sluicing, the exact structures of the target items differed tremendously which consequently led to different prosodic contours. Chicago consisted of an SVO clause with definite NPs plus an additional adjunct or complement, followed by the interrogative sluice. Quarterback 1 consisted of an SVO clause with indefinite NPs and a subsequent interrogative sluice as well, though the SVO clause was preceded by a short PP. NP1 of Chicago was in a sentence-initial position, constituting the first word of the sentence, whereas NP1 of Quarterback 1 was also in a sentence-initial position but only the fourth word of the sentence.

Despite these differences, both studies found that even untrained speakers use prosodic prominence to disambiguate the antecedent of a simple sluicing structure. However, the results of the two studies yielded one major prosodic difference: Whereas in Chicago, speakers mostly used prosody to disambiguate NP2, the opposite was the case in Quarterback 1, where speakers mostly used prosody to disambiguate NP1. I suggest that this difference can be explained as follows:

First, the preceding context of Chicago played an important role in the overall strong degree of prosodic disambiguation since context places a sentence within a specific situation which triggers strong information structural cues. Even an already by default focused, and thus accented constituent like NP2 of Chicago could receive additional prominence.

Second, NP1 of Chicago lacked prosodic variation due to its status as being the first word of the sentence, whereas NP1 of Quarterback 1 exhibited prosodic variation due to being not in a sentence-initial position but at the fourth position of the sentence.

Third, NP2 of Chicago exhibited prosodic variation since it was only the third word of the sentence and not in a sentence-final position, whereas NP2 of Quarterback 1 lacked prosodic variation since it was the seventh word of the sentence and in a sentence-final position. Consequently, despite its grammatical role as the subject and thus the unfocused constituent of the structure, NP1 of Chicago was mandatorily accented throughout all conditions, as discussed in chapter 3.2.1. It had a max F0 of at least 270 Hz throughout all conditions. Moreover, it exhibited almost identical intensity values in the subject reading and the object reading condition.

From this follows that the information structural differences between the two conditions could not be expressed by varying prosody on NP1 of Chicago. With respect to Quarterback 1, speakers could easily vary prosodic prominence on NP1. NP1 of Quarterback 1 was also the subject NP of the structure. However, it was located in an early but not sentence-initial position within the overall structure. NP1 was therefore not focused by default, since a subject NP is usually the topic of a sentence, which is often carried over from previous discourse, thus containing given information (see *Centering Theory,* Grosz et al., 1995). Since NP1 was preceded by a PP, it did not constitute the first word of the sentence and was consequently also not mandatorily accented. Speakers did not have to produce very strong prosodic values in order to mark NP1 with a contrastive focus. NP2 of Chicago, though, was still in an overall early position, which is why participants could easily vary its prosody. Moreover, NP2 of Chicago was not affected by sentence-final speech phenomena since NP2 was followed by an adjunct or a complement. NP2 of Quarterback 1, though, was deeply embedded in a sentence-final position. Both NP2 of Chicago and NP2 of Quarterback 1 were the last arguments of their respective structures and therefore focused and accented by default. Both new-information focus and contrastive focus tend to be realized with an H* accent.[106] From this follows that the prosodic differences between these two types of foci are subtle and difficult to express: they lie in longer duration, higher intensity and greater F0 movement values rather than different accent types. In contrast, the difference between a given and thus deaccented constituent and a contrastive focus is much greater and hence easier to realize. Nevertheless, I suggest that in Chicago, speakers reverted to the by default focused NP2 to express prosodic differences since the by default given NP1 was not available due to its sentence-initial position.

The results indicated that NP2 of Chicago was produced with a higher max F0 and a stronger intensity in the object reading than in the subject reading. Furthermore, the results supported the assumption that NP2 was indeed by default focused, as evident from the similar

[106] See the discussion of Katz and Selkirk (2011) in chapter 3.1.2. I am aware that contrastive focus is usually claimed to be realized with an L+H* accent (Pierrehumbert & Hirschberg, 1990). However, more recent research claims that both new information and contrastive foci are realized with H* accents (Katz & Selkirk, 2011), see also literature cited in Carlson et al. (2009).

max F0 and intensity values of NP2 in the neutral reading vs. the object reading. Speakers thus had to produce strong prosodic differences on NP2 in order for them to show up in statistical analyses. Since speakers could not withdraw too much prosodic prominence from NP1 to indicate object focus, they did the opposite and withdrew prosodic prominence from NP2 to indicate subject focus. This indicates that a constituent with an information-structurally induced default focus seems not to be as strongly prosodically marked as a constituent that is located at the beginning of a sentence. Moreover, the extremely late and sentence-final position of NP2 of Quarterback 1 in the overall structure led to sentence-final speech phenomena that flawed the respective F0 and intensity values on NP2 which helps to explain the missing acoustic effects on NP2. I thus suggest that the prosodic differences between Chicago and Quarterback 1 are due to the methodological differences of the experimental design and due to the structural differences between the two simple sluicing structures which resulted in different positions of NP1 and NP2 within the respective structures.

Quarterback 1 and Quarterback 2 shared the same experimental setup and therefore the same method and procedure. Nevertheless, there was one major structural difference between the two studies: Quarterback 1 investigated simple sluicing structures and Quarterback 2 investigated complex sluicing structures. Despite this difference of structural complexity, both studies found that first, even untrained speakers use prosodic prominence to disambiguate the antecedent of a sluicing structure and that second, trained speakers make an overall more frequent and stronger use of prosodic cues than untrained speakers.

However, there were two major prosodic differences between the two studies: First, the acoustic analysis only yielded significant effects for Quarterback 1. With respect to Quarterback 2, the acoustic analysis yielded no significant effects, except for duration values on NP2. Second, based on the perceptual analyses, in Quarterback 1, only trained speakers used prosodic prominence to disambiguate NP2. In Quarterback 2, though, neither trained nor untrained speakers used prosodic prominence to disambiguate NP2. From the lack of acoustic differences in Quarterback 2 follows that there is a discrepancy between the results of the acoustic and the perceptual analyses. In Quarterback 2, the perceptual analysis yielded prosodic disambiguation of complex sluicing with the matrix NP (NP1) as antecedent, whereas the acoustic analysis yielded no such effects.

I suggest that acoustic analyses of long and complex structures face certain challenges which result in unrepresentative results and which will therefore be discussed in more detail in chapter 4.4. For now, it suffices to note that it is difficult, if not impossible, to interpret the results of the acoustic analysis of Quarterback 2. As a result, I will focus the present discussion of the entire Quarterback study (parts 1 and 2) exclusively on the results of the perceptual analyses. Regarding the prosodic disambiguation of NP2, the two parts of the Quarterback study yielded that NP2 was only disambiguated if the sluicing structure was simple and if the speakers knew about prosody as a disambiguating factor and about the temporary ambiguity of the items. The fact that speakers did not vary prosody on NP2 of complex sluicing, neither trained nor untrained speakers, suggests that there is a difference between NP2 of simple sluicing and NP2 of complex sluicing. In fact, these two constituents differed in one crucial aspect: NP2 of simple sluicing was located at the end of a simple SVO clause. NP2 of complex sluicing, though, was located at the end of a complex clause, more precisely, within an RC. In addition to the complexity of an RC itself, an RC also constitutes an island to extraction. The prosodic differences between NP2 of simple sluicing and NP2 of complex sluicing can thus be explained as follows: The complexity of the RC and the resulting unacceptability of the island antecedent either led to a lack of prosodic variation on NP2 because speakers did not wish to emphasize such an unacceptable antecedent which would consequently result in an unacceptable (or less acceptable) structure, or they were not sure how to pronounce such an unacceptable antecedent which might have led to the lack of a clear prosodic pattern.[107] The overall decreased degree of prosodic disambiguation of both NP2 of simple and NP2 of complex sluicing can be explained as follows: First, in both Quarterback 1 and Quarterback 2, NP2 was not as distant from the *wh*-remnant as NP1 which is why it might not have required as much prosodic information in order to be considered as an antecedent of the *wh*-remnant. However, Carlson et al. (2009) excluded distance as an explanation for why the final argument tends to be the preferred antecedent. If distance does not play a role in antecedent preferences, I also expect it not to play a major role in prosodic disambiguation degrees. Besides, I exclude antecedent preference in itself as a factor for different prosodic realizations since NP1 was the dispreferred antecedent of the simple sluicing structures but the preferred antecedent of the complex sluicing structures.

[107] A further explanation would be that the antecedent within an RC is not expected due to the RC being a presupposition. However, further consideration of this explanation goes beyond the scope of this thesis.

Second, in both Quarterback 1 and Quarterback 2, NP2 was by default focused and therefore by default accented which makes it difficult to add further prominence onto it in case it is the contrastively focused antecedent of the *wh*-remnant. Third, in both Quarterback 1 and Quarterback 2, NP 2 was located at a low sentence-final position which is easily affected by speech phenomena that flaw acoustic values. There are thus various factors that equally affect the prosodic realizations of NP2 of Quarterback 1 and NP2 of Quarterback 2. However, there is only one factor that distinguishes the two NP types from each other and which can therefore be considered to be the reason for the complete lack of prosodic variation on NP2 of Quarterback 2 as opposed to NP2 of Quarterback 1: the differences of structural complexity between the two sluicing structures. Whereas NP2 of Quarterback 1 was merely the object of a regular SVO clause, NP2 of Quarterback 2 was the object of an embedded RC which constitutes an island to extraction.

4.3 The Prosody of an Island Antecedent

The discussion of the two production studies Quarterback 1 and Quarterback 2 yielded that only trained speakers used prosodic variation on NP2 to indicate that the object NP of simple sluicing, respectively the embedded NP of complex sluicing, was the antecedent of the sluicing structure. I argued that the decreased degree of prosodic prominence on NP2 of both the simple and the complex sluicing structures is related to its sentence-final position within the overall structure. There is less prosodic variation on NP2 of both simple and complex sluicing structures, indicating that the island status of NP2 of Quarterback 2 cannot be the sole reason for the decreased prosodic variation on NP2 of complex sluicing. However, there is one striking difference between the productions of NP2 of Quarterback 1 vs. Quarterback 2: Whereas trained speakers produced NP2 of simple sluicing in 50% of all cases with higher prosodic prominence and in only 25% of all cases with lower prosodic prominence when the object NP served as the antecedent, they produced NP2 of complex sluicing in only 40% of all cases with higher prosodic prominence but also in only 25% of all cases with lower prosodic prominence when the embedded NP served as the antecedent. Trained speakers hence varied prosody on NP2 of simple sluicing, but they did not show a similarly consistent pattern of varying prosody on NP2 of complex sluicing. There is thus a decline of prosodic variation on NP2 from the simple to the complex sluicing structures for trained speakers, whereas untrained speakers did not prosodically disambiguate NP2 of either sluicing structure. This decline can be explained with the complexity of the embedded RC which is an island to extraction (Ross, 1969; Merchant, 2001).

The relationship between sluicing and islands has been frequently discussed in the past (Konietzko et al., submitted; Ross, 1969; Chung et al., 1995; Merchant, 2001; Frazier & Clifton, 2005; Frazier & Clifton, 2011; Cantor, 2013), see chapter 2.1.3.1 and chapter 2.1.5.2. Moreover, the results of the acceptability judgment studies in chapter 3.2.2 showed that sluicing is indeed island insensitive, but that the underlying island nevertheless has some deteriorating effect upon the acceptability of an island antecedent. Based on the results of her experiments, Carlson (2001) argued that listeners prefer structural simplicity when processing language, but that prosody can be helpful when processing more complex structures, see chapter 2.2.3.2. Konietzko et al. (submitted) and Frazier and Clifton (2011) showed that focusing an island antecedent indeed improves its acceptability. In Quarterback 2, though, apart from the information structure triggered by the morphological disambiguation of the sluicing structures, NP2 of complex sluicing was not specifically focused. I thus conclude that the decreased acceptability of NP2 of complex sluicing structures remains in Quarterback 2. This decreased acceptability of NP2 led to the inconsistent pattern of prosodic disambiguation by trained speakers. The perceptual analysis of NP2 of complex sluicing suggests that even trained speakers did not use prosody in a way that would indicate that they knew how to correctly pronounce the items, as evident by the comparison of *no PD* to *PD open* to *PD* of 24% to 35% to 40%, see chapter 3.2.3.2.

In Quarterback 1, however, trained speakers clearly disambiguated the simple sluicing structures with NP2 as antecedent in half of all cases and probably in even more, considering the percentages of *PD open*. I therefore argue that the island status of NP2 of Quarterback 2 had an effect upon the degree of prosodic disambiguation of complex sluicing. This finding illustrates that an island antecedent is not only slightly less preferred than a matrix antecedent, but that this decrease in acceptability is also prosodically realized by native speakers of American English. Moreover, these results indicate that speakers indeed do not seem to use prosody as a disambiguating factor in order to decrease the processing effort of a listener, since listeners would benefit from a prosodic focus on the island antecedent. It rather seems that speakers use prosody to cater to their own needs as a result of planning and producing an utterance, thus adding support to previous findings by Kraljic and Brennan (2005).

In the theoretical literature, the concept of island repair in sluicing has been frequently discussed (Ross, 1969; Chung et al., 1995; Merchant, 2001). The results of the present studies, however, cannot add profound evidence or counter-evidence to the claim that an island is being repaired in sluicing because of the missing perceptual analysis of ComSimS structures.[108] However, the acoustical analyses of both structures indicate that there is a difference of duration on NP2 between ComxOS and ComSimS for both +Trained and –Trained speakers: NP2 is produced with a longer duration in ComxOS structures than ComSimS ones. This difference is a first indication that the underlying island might indeed be repaired in sluicing structures. Nevertheless, for a more detailed analysis of island repair via the analysis of perceptual prosodic data, the conduction of further production studies is inevitable. One first step would be to compare island vs. non-island structures in shorter sentences to control for phenomena that occur mostly in long sentences, such as speakers running out of breath.

4.4 Challenges of Production Studies

Whereas the perceptual analyses yielded clear prosodic differences on both NP1 and NP2 of the simple sluicing structures of Quarterback 1 and on NP1 of the complex sluicing structures of Quarterback 2, the acoustic analyses did not yield corresponding significant acoustic effects on NP2 of Quarterback 1 and on neither NP type of Quarterback 2.[109] This discrepancy between the acoustic and the perceptual analyses visualizes the challenges that acoustic analyses face once the examined material gets either too long or the structure too complex.

In Chicago, NP2 was located at a rather sentence early position as the third word of the sentence. It was thus in a similar position than NP1 of Quarterback 1, which was the fourth word of the sentence. Both NP2 of Chicago and NP1 of Quarterback 1 yielded significant acoustic effects for various prosodic parameters. NP1 of Quarterback 2 was in the exact same

[108] Since perceptual analyses take a lot of effort, especially in the case of such large datasets, the perceptual analysis of ComSimS could unfortunately not be conducted in the frame of this thesis due to time and labor restrictions.
[109] Note that I will not include a discussion of the differences between the perceptual and the acoustic analyses of Chicago since the method of the perception study of Chicago differed from that of the Quarterback study. Moreover, the most striking differences between the two types of analyses were found in the Quarterback study.

position as NP1 of Quarterback 1: by virtue of being an object NP rather than a subject NP, though, NP1 of Quarterback 2 was focused, and hence accented by default. NP1 of Quarterback 2 thus required a higher degree of prosodic prominence than NP1 of Quarterback 1 in order to result in significant differences in the acoustic analysis. Moreover, usually deaccented constituents (that is, NP1 of Quarterback 1) are perceived to be much more contrastive than generally accented constituents (Calhoun, 2009, see discussion chapter 2.2.2) which further helps to explain the high degree of prosodic disambiguation on NP1 of Quarterback 1 and the low degree of prosodic disambiguation on NP1 of Quarterback 2. NP2 of Quarterback 1 and NP2 of Quarterback 2 were located at the seventh and ninth position of the sentence, that is, at the very end of the sentence. Such sentence-final constituents are often affected by phenomena like phrase final creak and overall lower intensity and F0 values (see discussion of perceptual and acoustic analysis, chapter 3.2.3.1). I thus assume that all prosodic parameters depending on F0 and intensity measures (max F0, min F0, excursion size and intensity values) of NP2 of Quarterback 1 and NP2 of Quarterback 2 have been flawed and can hence not depict a representative degree of prosodic disambiguation for the respective constituents.

There were two factors that implied the existence of some sort of prosodic variation on NP2 of Quarterback 1 and NP2 of Quarterback 2: First, the fact that there were significant effects of the parameter duration on NP2 of both studies. Second, the fact that the perceptual analyses yielded some degree of prosodic variation on NP2, at least by trained speakers, and mostly for Quarterback 1. It is thus striking that there seems to be prosodic variation of some sort on NP2, but that it does not show up at all in the statistical analysis of the acoustic measurements.

Several researchers have noted that there is a certain discrepancy between acoustic and perceptual measurements, such as Poschmann and Wagner (2016), Winkler (1996) and Hirst and Di Cristo (1998). Poschmann and Wagner, for example, argue that in one of their analyses, the "perceptual annotation and acoustic measures diverge" (2016, p. 21). Moreover, Hirst and Di Cristo claim that there is an "asymmetry between production and perception", meaning that "while duration and intensity differences are the most systematic correlates of stress in speech production, the dominant perpetual cue is fundamental frequency" (1998, p. 6). They clearly state that there is a difference in how the various perceptual cues are processed by speakers in language production and listeners in language perception to indicate prosodic prominence. The duration differences found in the acoustic analysis on NP2 of Quarterback 2 thus indicate that speakers did produce NP2 of complex sluicing with more prominence when the embedded NP served as the antecedent. However, it does not necessarily mean that NP2 of complex sluicing also has to be perceived as carrying more prosodic prominence by listeners, that is, in the perceptual analysis, since mostly F0 values but not duration or intensity values, are perceived as prosodic prominence. Nevertheless, Hirst and Di Cristo claim that listeners pay a great amount of attention to different "prosodic cues in the process of perceiving and understanding spoken language" (1998, p. 2).

This supports the assumption that the perceptual analysis provides a more representative view of the degree of prosodic disambiguation than the acoustic analysis does. Moreover, Hirst and Di Cristo specifically distinguish between spectographic analyses, which refers to the physical, and thus the acoustic analysis of spoken language, and phonological transcriptions, which are based on auditory perception (1998, p. 4). They emphasize that a one-on-one mapping of acoustic and perceptual data is difficult: "In recent years […] it has been demonstrated that the correspondence between abstract prosodic characteristics and acoustic features is far from simple" (Hirst & Di Cristo, 1998, p. 5) and that auditory perception is "determined not only by the physical characteristics of the speech signal but also by the speaker's linguistic knowledge" (Hirst & Di Cristo, 1998, p. 6). Hirst and Di Cristo (1998) thus demonstrate that it is impossible to provide an absolutely objective, universally valid analysis of prosodic data since acoustic measurements cannot be exactly mapped onto perceptual cues and since perceptual cues vary from listener to listener and from speaker to speaker. Therefore, a subsequent large scale perception study with untrained participants would be desirable in order to get a more representative picture of the degree of prosodic disambiguation in the various simple and complex conditions.[110]

4.5 Do Speakers Avoid Ambiguity?

Piantadosi et al. claim that "ambiguity is rarely harmful to communication in practice thanks to the comprehender's ability to effectively disambiguate between possible meanings" (2012, p. 4 also see chapter 2.2.3.1). It follows that listeners process and hence automatically disambiguate

[110] Such a perception study with at least 20 participants is planned for the publication of this thesis.

structures, for example, in relation to the context they come in or by including world knowledge. Consequently, ambiguity may go unnoticed and does thus not have a negative effect upon communication, as stated by Chomsky (2002). Piantadosi et al. even go as far as claiming that "hearers are good at disambiguating in context, and as a result, any effort the speaker makes to express a distinction that could have been inferred is wasted effort" (2012, p. 8). Prosodic disambiguation of a structure that has already been contextually, or by any other means, disambiguated, is redundant. They conclude that "language users do not appear to go to great lengths to avoid linguistic ambiguities" (Piantadosi et al., 2012, p. 17). Although they specifically state that prosody, like context, counts as one of the factors that may disambiguate a given structure, thus eliminating ambiguity before it arises, they clearly state that one source of disambiguation suffices. A combination of contextual and prosodic disambiguation is therefore superfluous.

Based on Grice's (1975) *maxim of manner*, which postulates ambiguity avoidance, Wasow (2015) similarly to Piantadosi et al. (2012) argues that "ambiguity avoidance is overrated". Kraljic and Brennan (2005) found that prosody is only used as an additional disambiguating factor when context does not provide enough disambiguating cues, supporting the claims by Piantadosi et al. (2012) and Wasow (2015). However, these additional disambiguating cues are mostly produced in order to facilitate language production for the speaker rather than language comprehension for the listener. Moreover, Wasow (2015) discusses a number of studies conducted by Victor Ferreira and colleagues who investigated the degree of ambiguity avoidance in language processing (Ferreira, 2003; Ferreira, 2006; Roland et al., 2006; Ferreira, 2008). He concludes that there is little evidence that ambiguity is actively avoided by speakers in language use.

The results of the production study Chicago argue against these claims by Piantadosi et al. (2012) and Wasow (2015): Even though the globally ambiguous simple sluicing structures were contextually clearly disambiguated towards one reading, speakers, who were not specifically asked to use prosody as a disambiguating factor, used prosodic prominence to emphasize which NP serves as the antecedent of the ambiguous *wh*-remnant. Similar results were found by Remmele et al. (forthcoming 2019) with respect to prosodic phrasing and a structurally ambiguous word sequence. Contextual and prosodic information can thus be combined in order to disambiguate certain structures.

Moreover, in the production studies Quarterback 1 and Quarterback 2, the temporarily ambiguous simple and complex sluicing structures were morphologically disambiguated towards one reading as well before the speakers had to produce the structures but still, both trained and untrained speakers used prosodic prominence to emphasize the antecedent NP of the structure. Consequently, morphological and prosodic information interacted in disambiguating the sluicing structures. The findings of this thesis' empirical investigations provide evidence against Piantadosi et al. (2012) and Wasow's (2015) claim that additional disambiguation is redundant if the respective ambiguity has already been resolved by some other source of disambiguation.

The distinction of trained vs. untrained speakers that I included in Quarterback 1 and Quarterback 2 allows to draw further conclusions regarding ambiguity avoidance in natural language use. I assume that untrained speakers, in contrast to trained speakers, represent natural language production since untrained speakers were not influenced by any information regarding the existence of ambiguity or prosody as a disambiguation factor (see Fox Tree & Meijer, 2000). All speakers of Chicago and the untrained speakers of Quarterback 1 and Quarterback 2 did not receive any information that would have pointed them towards the temporary ambiguity of the target items. Neither did they receive any information that would have told them to use prosody, let alone prosodic prominence, to disambiguate the structures. From this follows that whatever these untrained speakers did prosodically, resulted from their own intuitions about the meaning of the sentences: Untrained speakers prosodically disambiguated simple sluicing with the subject NP as antecedent and complex sluicing with the matrix NP as antecedent. Trained speakers additionally disambiguated simple sluicing with the object NP as antecedent. Consequently, untrained speakers behaved similarly to trained speakers with respect to simple sluicing and complex sluicing with NP1 as antecedent. That is, an NP that is located at an early position within the overall structure, in either a main or a matrix clause, is prosodically disambiguated to similar degrees by trained and untrained speakers. Since only structures with NP1 as antecedent were prosodically disambiguated by untrained speakers, I conclude that they did not recognize and were thus not aware of the temporary ambiguity of the target items. If they had been aware, they would have prosodically disambiguated simple sluicing with NP2 as well, as the trained speakers did.

I conclude that ambiguity awareness is not a necessary factor for the use of prosodic disambiguation, despite the presence of further sources of disambiguation like context or morphology: Information-structurally induced ambiguities that can be prosodically resolved by varying prosodic prominence are intuitively disambiguated by untrained (that is, naïve and uninformed) speakers. This result yields further support to the findings of Remmele et al. (forthcoming 2019) who claimed that untrained speakers use pauses to indicate prosodic phrasing in structural ambiguities, despite the presence of a disambiguating context. This finding of the Quarterback study is especially important since it illustrates that untrained speakers are able to produce an information-structurally correct prosody of an ambiguous structure although the use of an incorrect prosody would not have resulted in an unacceptable structure or a wrong interpretation (e.g., a pitch accent on NP1 would not have overridden the morphologically disambiguated reading of an object sluice towards a subject sluice). This contrasts with the structures investigated by Remmele et al. (forthcoming 2019) where an incorrect prosody would have led to a wrong interpretation (e.g., the placement of a pause after the VP in the SVO reading would have triggered the stripping reading). From this follows that untrained speakers not only use correct prosody to exclude one of two possible interpretations but also to indicate a preference for one interpretation. Moreover, the results of these studies provide evidence against the claim by Piantadosi et al. (2012) and Wasow (2015) who argued that ambiguity avoidance is overrated since trained as well as untrained speakers clearly use prosody as an additional disambiguating factor in spoken language.

Nevertheless, the question remains whether the results of the present production studies are able to add further insights to the processing of simple and complex sluicing structures. As discussed in chapter 2.1.2.3, there are two major processing accounts providing possible explanations of how ambiguity is processed, namely the *garden path model* (GPM), introduced by Frazier and Rayner (1982), and the *constraint based model* (CBM), introduced by Tanenhaus, Carlson, and Trueswell (1989) (Harley, 2008, 2014, p. 298). Both processing accounts predict processing difficulties for simple and complex sluicing with their respective dispreferred antecedents (NP1 for simple sluicing and NP2 for complex sluicing). However, the two models predict these processing difficulties at different times: For a temporarily ambiguous simple sluicing structure that resolves towards the subject NP, the GPM predicts processing difficulties at the second stage where discourse information is added. It consequently leads to a temporary ambiguity because the discourse processor prefers to take the object NP as the antecedent of the *wh*-remnant rather than the required subject NP (see Frazier & Clifton, 1998; Carlson et al., 2009). For the same structure, the CBM predicts immediate processing difficulties, since syntactic as well as discourse information are processed at the same time. Although the outcome is the same for both processing accounts, the timing is different. I assume that reanalysis of complex sluicing structures would be slower than for simple structures because of increased length and complexity. The results of the present production studies could theoretically further add to this discussion if the experimental material would be analyzed with respect to delays in speaking, stutter, pronunciation mistakes, etc. However, the present material has not been analyzed with respect to these categories, which is why I refrain from drawing any conclusions regarding the processing differences of simple and complex sluicing structures based on the present production studies.

4.6 Prosodic Disambiguation: Prosodic Prominence vs. Prosodic Phrasing

Remmele et al. (forthcoming 2019) showed that even untrained speakers use duration differences to indicate the different prosodic phrasings of a structurally ambiguous word sequence, despite the presence of disambiguating context. They thus provide evidence against Allbritton et al. (1996) and Fox Tree and Meijer (2000) who claimed that only professional and trained speakers produce enough prosodic differences in order to distinguish between the two meanings of an ambiguous structure. Keeping in mind the findings by Lehiste (1973), it is not surprising that durational differences are produced to indicate the end of a prosodic phrase: Lehiste (1973) argues that duration is the strongest factor in the disambiguation of structural ambiguities.

The results of the three production studies Chicago, Quarterback 1 and Quarterback 2, conducted for this thesis thus provide evidence that not only durational differences are used to reflect phrase structure ambiguities, but also that prosodic prominence is used to reflect the information structure of referential ambiguities. The information structure of a sentence is not only prosodically realized when preceding context triggers a focus on a given NP, but also when the information structure is indicated by the morphological disambiguation of a plural –s at the very end of a structure. However, the results of the production study Quarterback 1, for example, did not yield as strong prosodic differences between the two possible readings (subject vs. object reading) as the results of the production study by Remmele et al. (forthcoming 2019) did.

This comparison suggests that the degree of prosodic disambiguation is smaller when the ambiguity is triggered by information structural differences which lead to differences of prosodic prominence rather than when the ambiguity is triggered by structural differences which lead to differences of prosodic phrasing. As noted before though, one important difference between ambiguities caused by information structure and ambiguities caused by structural differences is the fact that the former merely affects the intonation of a sentence, whereas the latter affects the prosodic and hence the syntactic phrase structure of a sentence. An intonational difference may at times lead to an odd sounding structure if a wrong prosodic contour is chosen. A durational difference, however, can lead to structural differences which obligatorily lead to different interpretations. Compare the information-structurally triggered ambiguity in (250) to the syntactically triggered ambiguity in (251).

(250) On Tuesday, some LAWyer defended some dealers. Do you know which ones?

(251) Janina badet // Nadine nicht.
Janina baths Nadine not
**'Janina doesn't bath Nadine'*
'Janina baths. Nadine doesn't'

In (250), a pitch accent on the subject NP *some lawyer* does not change the meaning of the entire structure: the antecedent of the plural *wh*-remnant *which ones* will always be the object NP *some dealers*. In (251), however, a prosodic break after the VP *badet* will always lead to an interpretation of the ambiguous word sequence as *Janina baths. Nadine doesn't*. since the prosodic break after the VP indicates that one IPh and thus one syntactic phrase ends and another one begins. In sum, the empirical investigations of this thesis prove that even untrained speakers use prosodic prominence in sluicing structures of various complexities to indicate the information structure of a target item even if prosodic information is not obligatory in order to indicate one specific reading, thus adding further support to Remmele et al. (forthcoming 2019).

4.7 Conclusion

This chapter discussed the findings and the relevance of the four acceptability judgment studies as well as the three production studies conducted within the realms of this thesis. In chapter 4.1, I have discussed the results and the implications of the four acceptability judgments studies, suggesting that there are substantial differences between certain sluicing structures and antecedent types. In chapter 4.2, I have discussed the results and the relevance of the three production studies Chicago, Quarterback 1 and Quarterback 2, showing that both trained and untrained native speakers of English use prosody in the form of prosodic prominence to disambiguate different sluicing structures with different antecedent types to different degrees. In chapter 4.3, I have discussed the role of the embedded clause of complex sluicing structures on the prosody of NP2, suggesting that the decreased degree of prosodic variation on NP2 of Quarterback 2 might be due to the complexity of the RC and the underlying island structure. In chapter 4.4, I have discussed the challenges that production studies, especially those investigating long and complex structures, are facing, showing that there is a tremendous difference between perceptual and acoustic analyses. In chapter 4.5, I have discussed Wasow's (2015) concept of ambiguity avoidance and shown that prosodic disambiguation is used on top of further disambiguating information. In chapter 4.6, I have discussed the differences between information structure and syntactic structure as a trigger for ambiguity and consequently prosodic prominence vs. prosodic phrasing as a disambiguating factor in spoken language, showing that both prosodic factors are used already by untrained speakers to resolve an ambiguous structure. With this thesis, I have thus provided answers to a variety of questions that had not yet been tackled with empirical investigations in the past. At the same time, this thesis revealed new issues that require further research in the future.

5 Conclusion and Outlook

With this thesis, I have investigated how native speakers of English produce different types of sluicing structures in spoken language. I have explored the relationship between sluicing, ambiguity and prosody, addressing different types of structural complexity, differences of speaker training and different prior disambiguation methods. I was thus the first to empirically investigate the prosodic realizations of sluicing from a production side. At the beginning, I posed the following three central research questions:

Central Research Questions

(1) Do native speakers of English use prosody to emphasize the antecedent of an ambiguous *wh*-remnant in simple and complex sluicing? (RQ(1))
(2) Do native speakers of English use stronger prosodic cues to emphasize a specific antecedent of simple and complex sluicing? (RQ(2))
(3) Is there a difference in the strength or the frequency of prosodic cues used by trained vs. untrained speakers? (RQ(3))

With the results of the three production studies that I have conducted, I answered all three of these central research questions. First, native speakers of English use prosody in the form of prosodic prominence to emphasize the antecedent of either a globally or a temporarily ambiguous simple or complex sluicing structure, thus answering RQ(1). Second, native speakers of English primarily use prosodic prominence on NP1 to emphasize that the subject NP of a simple sluicing structure or the matrix NP of a complex sluicing structure serves as the antecedent of the *wh*-remnant, thus answering RQ(2). Third, even untrained speakers use prosodic prominence on NP1 to emphasize that the subject NP of simple sluicing or the matrix NP of complex sluicing serves as the antecedent of the *wh*-remnant. Trained speakers additionally use prosodic prominence on NP2 to emphasize that the object NP of simple sluicing serves as the antecedent of the *wh*-remnant, thus answering RQ(3). Neither trained nor untrained speakers use prosodic prominence on NP2 to emphasize that the embedded NP of complex sluicing serves as the antecedent of the *wh*-remnant. The central research questions of this thesis have therefore been answered by means of conducting several production studies. The results of the three production studies, however, also raised new questions. In the following, I will first provide a summary of the findings of each chapter, discussing important implications for future research. Second, I will discuss some of the newly raised questions and their relevance regarding future research.

5.1 Summary

In chapter 2, I have discussed the relationship between sluicing and prosody in order to provide the necessary background for an investigation of the prosodic realizations of different sluicing structures. I therefore divided chapter 2 into two major parts:

In chapter 2.1, I have discussed the origins of sluicing, which different types of sluicing exist and how they are related to ambiguity. I provided an overview of the current state of the art regarding the acceptability of different sluicing types as well as the question why certain antecedent types are preferred over others. The most important findings of chapter 2.1 were that first, ambiguous sluicing is a referential ambiguity that can either be globally (*wh*-remnant can take several NPs as antecedents) or temporarily ambiguous (*wh*-remnant can only take one NP as antecedent). This has important implications concerning the processing of ambiguous sluicing, which helps to explain, for example, why a simple sluicing structure with a subject NP as the antecedent is less acceptable than one with an object NP as the antecedent. However, antecedent preferences seemed to have no effect upon the prosodic realizations of sluicing structures, as the production studies conducted in chapter 3 have shown. Second, complex sluicing is island insensitive, which means that an antecedent within an embedded island structure, like an RC, does not lead to unacceptability but merely to a slight decrease in acceptability as compared to an antecedent within a matrix clause. The extraction site out of the island is deleted in sluicing and does thus not lead to an unacceptable structure: the island is repaired (Ross, 1969; Chung et al., 1995; Merchant, 2001). Third, different types of *wh*-remnants have strong implications upon their respective antecedent NPs, ambiguity and hence the acceptability of the overall structure. The *wh*-remnant *who else*, for example, is contrastive and therefore requires a definite NP as its antecedent. The acceptability judgment study conducted in chapter 3.2.2.1 showed that such sluicing structures are less acceptable than other non-contrastive sluicing structures when presented out of context. Contentful *wh*-remnants like *which boy*, for example, improve the acceptability of an antecedent within an island structure, as the discussion in chapter 2.1.2.1 has shown. In chapter 2.1, I have thus provided an overview of the theoretical background regarding sluicing and ambiguity.

In chapter 2.2, I have provided a definition of prosody and its different parameters. I have discussed different models, trying to explain the relationship between prosody and information structure. I have provided an overview of the current state of the art regarding prosodic disambiguation, especially with respect to sluicing, and have shown that earlier production experiments on prosodic disambiguation have exhibited tremendous differences depending on whether their speakers were trained or not. The most important findings of chapter 2.2 were, that first, information structure affects the prosodic prominence distribution of a sentence, whereas syntax affects prosodic phrasing (Féry, 2010a). From this follows that the information structural influence of a preceding context or of a sentence-internal morphological disambiguation should affect the prosody of a sluicing structure. Second, there has been a number of production and perception studies investigating the prosodic disambiguation of structural ambiguities that are prosodically disambiguated by durational differences. Recently, the research regarding prosodic prominence as a disambiguating factor has increased, showing that information structural differences can be expressed prosodically as well. Third, it plays an important role what kind of information participants of a production study receive prior to taking part. Informing participants of the ambiguity of the target items and explicitly asking them to use prosody to disambiguate the structures has already yielded strong prosodic differences in the past. In chapter 2.2, I have thus provided the required background knowledge about prosody and prosodic disambiguation, especially with respect to sluicing and ambiguity. To sum up, with chapter 2, I have offered a detailed insight into the relationship between sluicing and prosody, as well as various closely related issues which is essential for an empirical investigation of the prosody of sluicing.

In chapters 3 and 4, I have provided the empirical investigation and its general discussion, thus the main contribution of this thesis. Chapter 3 consisted of two main parts: In chapter 3.1, I have provided an overview of previous production studies exploring the prosodic realizations of various elliptical structures as well as production studies investigating the effect of prosodic prominence as a disambiguating factor in spoken language. The most important findings of chapter 3.1 were: First, various elliptical structures have been prosodically analyzed in the past from the production side, but an investigation of the prosody of sluicing has been missing so far. Second, the study by Remmele et al. (forthcoming 2019) showed that the productions of trained and untrained speakers differ tremendously, suggesting that prior training heavily influences the productions of speakers. Third, besides duration, prosodic prominence has been proven to be a prosodic parameter that is varied by speakers in order to yield different meanings.

In chapter 3.2, I have provided empirical investigations of three production studies and four acceptability judgment studies, exploring the prosodic productions and the acceptability judgments of different sluicing structures. The central findings of chapter 3.2 were: First, the subject NP of simple sluicing and the embedded NP of complex sluicing are indeed the dispreferred antecedents. Whereas the pilot production study Chicago supported the claim that the object NP is by default focused (as evident by the productions following the neutral context), the production studies in general did not reveal a prosodic effect of antecedent preferences. A dispreferred antecedent was, for example, not less strongly prosodically emphasized than a preferred antecedent to indicate this dispreference. Second, complex sluicing with antecedent NPs within subject RCs are less acceptable than complex sluicing with antecedent NPs within object RCs. I argued that this decrease in acceptability is related to the co-occurrence of two island constraints. Third, the type of QP affects the antecedent preferences of its NP. It is vital to use only one QP type if one wants to compare the acceptably or the prosodic realizations of an ambiguous sluicing structure. Fourth, speakers use prosody to disambiguate both globally ambiguous sluicing structures that have been contextually disambiguated towards one reading and temporarily ambiguous sluicing structures that have been morphologically disambiguated towards one reading. Speakers actively avoid ambiguity by emphasizing the antecedent NP of the *wh*-remnant, thus contradicting the claims by Piantadosi et al. (2012) and Wasow (2015) that more than one source of disambiguation is redundant and therefore avoided by speakers. Fifth, in both simple and complex sluicing, NP1 was more frequently disambiguated by prosody than NP2, although, from the results of the current production studies, it is not clear where this discrepancy is coming from. Sixth, trained speakers produce not only more but also stronger prosodic cues than untrained speakers. This difference is especially apparent in the complex sluicing structures where only trained speakers used prosody to disambiguate NP2. From this follows that seventh, simple sluicing is more strongly disambiguated by prosody than complex sluicing. I argue that both the length and the complexity of the complex sluicing structures contribute to this lack of stronger prosodic cues on NP2: in both simple and complex sluicing, NP2 was located at a sentence-final position that is often affected by speech phenomena that flaw the prosodic values of the respective constituents. Additionally, NP2 of the complex sluicing structures was located within an island to extraction which leads to a decrease in acceptability and which might therefore also lead to a decrease of prosodic disambiguation. Chapter 3 thus yielded important results regarding the acceptability and the prosody of different sluicing structures.

Besides the central results of the empirical investigations, chapter 4 also discussed the following implications of these results: First, the exact reasons for the different prosodic realizations of NP1 and NP2 of simple and complex sluicing are not clear yet. Both sentence length as well as structural complexity are possible explanations. Second, especially the results of the acoustic analyses of NP2 illustrated that production studies face certain challenges when investigating long and complex structures. Third, the results of the three production studies illustrated that speakers do not specifically try to avoid ambiguity, even though the respective structures were already disambiguated either by context or by morphology. Instead of just one form of disambiguation, speakers specifically used prosody to additionally disambiguate certain structures (especially those with NP1 as antecedent), even when they were not trained to do so. Fourth, besides prosodic phrasing, both trained and untrained speakers also use prosodic prominence to mirror the meaning of an ambiguous structure.

With this summary of the individual chapters, I have thus revealed the major contributions of this thesis and have shown that with the results of the empirical investigations, I can contribute to the general research about prosodic disambiguation, the research about the role of prosodic prominence in prosodic disambiguation, the research about the effects of specific speaker training and the degree to which even untrained speakers use prosody as a disambiguating factor, and the research about the prosody of sluicing. In the following, I will concentrate on the new questions that this thesis has raised and why they are relevant for future research.

5.2 Outlook

There are three new research questions that the empirical investigations of this thesis have raised. First, why are both simple and complex sluicing structures with NP2 as antecedent less frequently disambiguated by prosody than those with NP1 as antecedent? Second, why is NP2 of complex sluicing not prosodically disambiguated at least by trained speakers? Third, why is there such a discrepancy between the results of the acoustic analyses and the results of the perceptual analyses? These three questions are related in that they evolve around the lack of prosodic variation on NP2 of both simple and complex sluicing structures but especially regarding the latter.

The first question, why there is less prosodic variation on NP2 than NP1 in both simple and complex sluicing structures, cannot be related to antecedent preferences: NP1 is the dispreferred antecedent of simple sluicing but the preferred antecedent of complex sluicing. There are three characteristics that NP2 of simple and complex sluicing share: First, they are both focused by default, by virtue of being the most deeply embedded constituents of their respective phrases. They are both prosodically accented by default. Second, they are both located in sentence-final position, at the end of a relatively long structure (as compared to the position of NP1 of both structures). Third, they are thus both closer to the *wh*-remnant than NP1. However, since Carlson et al. (2009) excluded distance as a factor for different antecedent preferences (which usually result as a consequence of increased processing efforts), I argue that it can also be excluded as an explanation for different prosodic realizations. As a result, only the default focus position and the overall late position within the sentence remain as possible explanations for why there is less prosodic variation on NP2 than on NP1 in both simple and complex sluicing structures.

Although NP1 of complex sluicing is also by default focused but nevertheless prosodically disambiguated, I do not want to exclude default focus as an explanation for a decrease in prosodic variation yet. The acoustic analysis of NP1 of complex sluicing exhibited almost no significant effects. I still argue that default focus might play a role in decreased prosodic effects. In order to further investigate the different effects of default focus and overall position, I suggest to conduct further production studies. However, separating the effects of default focus from the effects of sentence position is a difficult task and may be impossible to overcome. At least in English, default focus is inextricably linked to a sentence-final position (by virtue of being located on the most deeply embedded constituent). A production study with it-clefts may be fit to examine the effects of default focus and sentence position separately from each other, see (252) (cf. Carlson et al., 2009). Still, such an empirical investigation requires much more consideration and should therefore only be taken as a tentative suggestion.

(252) It was some lawyer who some dealers had defended. Do you know which one?

The question whether the position at the end of a long sentence is responsible for the lack of prosodic variation on NP2 of simple sluicing could be explored by means of a production study looking at simple sluicing structures of various lengths. If NPs that are at a later position within the overall structure exhibit less prosodic variation, sentence length and NP position seem to play a role.

With respect to question two, the decrease of prosodic variation through trained speakers from NP2 of simple sluicing to NP2 of complex sluicing can be explained in two ways: On the one hand, NP2 of complex sluicing is in an even later position than NP2 of simple sluicing (compare seventh to ninth position). On the other hand, NP2 of complex sluicing is located within an island to extraction which leads to less acceptable structures. In order to find out which of these two factors (or whether a combination of the two) plays the most important role in these prosodic differences, I consider it necessary to conduct further production studies.

In order to investigate the question whether the decrease of prosodic variation on NP2 of complex sluicing is related to the island status of NP2 or to the overall late position within the sentence, I suggest to first extend the perceptual analysis of the production study Quarterback part 2 to include the productions of the control items ComSimS.[111] This could either be done by asking the same two annotators who have already labeled the ComxOS structures to extend their analysis to the ComSimS structures or, and this is to be preferred, by conducting a perception study with 20 or more participants. The task could be to listen to the declarative parts of the recordings of both the ComxOS as well as the ComSimS structures and then to indicate whether the structure sounds like it was followed by the sluice *Do you know which one?* or the sluice *Do you know which ones?* If the perceptual analysis of the ComSimS structures yields a much stronger degree of prosodic variation on NP2 than on NP2 of ComxOS, it would suggest that the lack of prosodic variation on NP2 of the complex sluicing structures is indeed due to the underlying island. Additionally, I suggest to conduct several further production studies, e.g. comparing a minimal pair of sluicing structures in which one contains an island and one does not. Since relative clauses tend to result in long structures, I would rather investigate a different type of island structure such as adjuncts vs. arguments (see Frazier & Clifton, 2005), resulting in structures such as “Some dealers were impressed after/with some

[111] The perceptual analysis of ComSimS was not possible at this time due to a personal shortage of work capacity of the neutral annotator.

trial, but I don't know which". A further production study could be done on comparing minimal pairs of ComxOS and ComSimS structures with the same verb such as "thanked", resulting in "They thanked some lawyer that (he) had defended some dealers. Do you know which one/s?".

Finally, the question why there is such a discrepancy between acoustic and perceptual analyses requires extensive further research. The perceptual analyses of both simple and complex sluicing of the production study Quarterback yielded clear prosodic patterns for both sluicing structures with both antecedent types and for both speaker types. The acoustic analyses, however, only yielded prosodic differences for simple sluicing with NP1 as antecedent and only for trained speakers. From this follows that the listeners of the perceptual analyses perceived prosodic differences that could not be supported with acoustic data. This is especially intriguing with respect to the complex sluicing structures, where the acoustic analysis did not yield any prosodic differences, except for duration on NP2, but where the perceptual analysis resulted in prosodic disambiguation of NP1 through trained speakers. A more in-depth analysis of the current data is required in order to extract prime examples where the acoustic measurements exhibit no prosodic variation, but the perceptual analysis argues for a clear prosodic disambiguation pattern. Once the roots of these diverging results are detected, ensuing production studies can be conducted that investigate the relationship between certain subtle acoustic cues and perceptual representations.

In this outlook, I have revealed several options for follow-up studies and new research topics that should be tackled in the future. I have suggested various perception and production studies that should be conducted to get to the bottom of some of these issues. From the results of these various studies, I expect interesting and important results, shedding further light on the research about prosodic disambiguation of complex structures by various speaker types.

With this thesis, I have investigated whether even untrained native speakers of English use prosody in the form of prosodic prominence to emphasize different types of antecedents of different types of sluicing structures that were already either contextually or morphologically disambiguated towards one reading. The three production studies yielded that even untrained speakers use prosodic prominence to disambiguate simple sluicing structures with the subject NP and complex sluicing structures with the matrix NP as antecedent. Specifically trained speakers additionally use prosodic prominence to disambiguate simple sluicing structures with the object NP as antecedent. Neither untrained nor trained speakers disambiguated complex sluicing structures with the embedded NP as an antecedent, which, I argue, is related to the length and the complexity of the complex sluicing structure. I have thus contributed new insights to the research about prosodic prominence as a parameter for prosodic disambiguation of different sluicing structures and about the question under which conditions speakers use prosodic disambiguation. Naturally, this series of empirical investigations also yielded a new set of research questions which need to be addressed in future research.

References

Aguilar, L., & Escudero-Mancebo, D. (2010). Procedure for assessing the reliability of prosodic judgements using Sp-TOBI labeling system. *Proceedings of Prosody*.

Allbritton, D. W., McKoon, G., & Ratcliff, R. (1996). Reliability of prosodic cues for resolving syntactic ambiguity. *Journal of experimental psychology. Learning, memory, and cognition*, *22*(3), 714–735.

Aloni, M., & Port, A. (2015). Epistemic indefinites and methods of identification. In L. Alonso-Ovalle & P. Menendez-Benito (Eds.), *Oxford linguistics. Epistemic indefinites. Exploring modality beyond the verbal domain* (pp. 116–140). New York, NY: Oxford University Press.

Alonso-Ovalle, L., & Menéndez-Benito, P. (2003). Some epistemic indefinites. In M. Kadowaki & S. Kawahara (Eds.), *Proceedings of NELS 33* (pp. 1–12). Amherst, MA: GLSA Publications.

Alonso-Ovalle, L., & Menéndez-Benito, P. (2013). Two Views on Epistemic Indefinites. *Language and Linguistics Compass*, *7*(2), 105–122.

Anderson, C., & Carlson, K. (2010). Syntactic structure guides prosody in temporarily ambiguous sentences. *Language and Speech*, *53*(4), 472–493.

Bader, M. (1998). Prosodic Influences on Reading Syntactically Ambiguous Sentences. In L. Frazier, T. Roeper, K. Wexler, J. D. Fodor, & F. Ferreira (Eds.), *Studies in Theoretical Psycholinguistics. Reanalysis in Sentence Processing* (Vol. 21, pp. 1–46). Dordrecht: Springer Netherlands.

Barros, M. (2012). *Else-modification as a diagnosis for pseudosluicing*. NELS 43, Rutgers University.

Barros, M. (2013). Harmonic sluicing: Which remnant/correlate pairs work and why. In T. Snider (Ed.), *Proceedings of SALT 23* (pp. 295–315). Santa Cruz, CA.

Barros, M. (2014). *Sluicing and Identity in Ellipsis* (PhD Thesis). Rutgers University.

Baumann, S., Grice, M., & Steindamm, S. (2006). Prosodic marking of focus domains-categorical or gradient? In *Proceedings of Speech Prosody 2006* (pp. 301–304).

Baumann, S. (2006). Information Structure and Prosody: Linguistic Categories for Spoken Language Annotation. In P. Augurzky, D. Lenertova, R. Meyer, I. Mleinek, S. Pappert, N.

Richter,. . . S. Sudhoff (Eds.), *Language, Context and Cognition: Vol. 3. Methods in Empirical Prosody Research.* Berlin, Boston: De Gruyter.

Baumann, S., & Heusinger, K. von (2016). *The role of accent types in referent tracking*, Stuttgart.

Baumann, S., & Rathcke, T. (2013). Disambiguating the scope of negation by prosodic cues in three varieties of German. *Lingua*, *131*, 29–48.

Beckman, M. E., & Elam, G. A. (1994). *Guidelines for ToBI Labelling.*, Ohio State University.

Beckman, M. E., & Pierrehumbert, J. B. (1986). Intonational structure in Japanese and English. *Phonology Yearbook*, *3*, 255.

Bever, T. G. (1970). The cognitive basis for linguistic structures. In J. R. Hayes (Ed.), *Cognition and the development of language* (279–352). New York, NY: Wiley.

Bever, T.G., Sanz, M. & Townsend, D.J. J. (1998). The Emperor's Psycholinguistics. *Journal of Psycholinguistic Research*, *27*(2), 261–284.

Birch, S., & Clifton, C. J. (1995). Focus, accent, and argument structure: Effects on language comprehension. *Language and Speech*. (38), 365–391.

Boersma, P., & Weenink, D. (2017). Praat: doing phonetics by computer [Computer program]. Retrieved from http://www.praat.org/

Boland, J. E., Tanenhaus, M. K., & Garnsey, S. M. (1990). Evidence for the immediate use of verb control information in sentence processing. *Journal of Memory and Language*, *29*, 413–432.

Breen, M., Fedorenko, E., Wagner, M., & Gibson, E. (2010). Acoustic correlates of information structure. *Language and cognitive processes*, *25*(7-9), 1044–1098.

Büring, D. (2005). *Binding theory*. *Cambridge textbooks in linguistics*. Cambridge: Cambridge University Press.

Büring, D. (2013). Syntax, information structure, and prosody. In M. d. Dikken (Ed.), *Cambridge handbooks in language and linguistics. The Cambridge handbook of generative syntax* (pp. 860–896). Cambridge, Mass.: Cambridge Univ. Press.

Büring, D. (2016). *Intonation and meaning*. *Oxford surveys in semantics and pragmatics: Vol. 3*. Oxford: Oxford University Press.

Calhoun, S. (2009). What makes a word contrastive? Prosodic, semantic, and pragmatic perspectives. *Studies in Pragmatics*, *8*, 53–78.

Calhoun, S. (2016). *Intransitives: the interplay of information structure, semantics, syntax and prosody*, Stuttgart.

Cantor, S. (2013). *Ungrammatical island sluicing as a diagnostic of left-branch positioning* (Master's thesis). University of California, Santa Cruz.

Carlson, K. (2001). The effects of parallelism and prosody in the processing of gapping structures. *Language and Speech*, *44*, 1–26.

Carlson, K., Clifton, C., & Frazier, L. (2001). Prosodic Boundaries in Adjunct Attachment. *Journal of Memory and Language*, *45*(1), 58–81.

Carlson, K., Dickey, M. W., Frazier, L., & Clifton, C. (2009). Information structure expectations in sentence comprehension. *Quarterly journal of experimental psychology*, *62*(1), 114–139.

Carlson, K., Frazier, L., Clifton, C. J., & Dickey, M. W. (2005). *How contrastive is contrastive focus?* 18th Annual CUNY Conference on Human Sentence Processing, Tucson, AZ.

Carlson, K., & Horn, L. (2002). *Parallelism and Prosody in the Processing of Ellipsis Sentences*. *Outstanding Dissertations in Linguistics*. Hoboken: Taylor and Francis.

Chafe, W. L. (1976). Givenness, contrastiveness, definiteness, subjects, topic, and points of view. In C. N. Li (Ed.), *Subject and topic* (pp. 25–56). London: Academic Press.

Chaves, R. P., & Dery, J. E. (2014). Which subject islands will the acceptability of improve with repeated exposure? In Santana-LaBarge & Robert E. (Eds.), *Proceedings of the 31st West Coast Conference on Formal Linguistics* (pp. 96–106). Somerville, MA: Cascadilla Proceedings Project.

Chomsky, N. (1982). *Some concepts and consequences of the theory of government and binding*. *Linguistic inquiry monographs: Vol. 6*. Cambridge, Mass.: MIT Press.

Chomsky, N. (1995). *The Minimalist program* (20. Anniversary edition). Cambridge, Mass.: The MIT Press.

Chomsky, N. (2002). *Syntactic Structures*: Mouton de Gruyter.

Chomsky, N., Belletti, A., & Rizzi, L. (2002). *On nature and language: With an essay on "The secular priesthood and the perils of democracy"*. New York: Cambridge University Press.

Chomsky, N., & Halle, M. (1968). *The sound pattern of English*. New York: Harper & Row.

Chung, S., Ladusaw, W. A., & McCloskey, J. (1995). Sluicing and logical form. *Natural Language Semantics*, *3*(3), 239–282.

Cinque, G. (1993). A Null Theory of Phrase and Compound Stress. *Linguistic Inquiry*, *24*, 239–297.

Cohen, J. (1960). A Coefficient of Agreement for Nominal Scales. *Educational and Psychological Measurement*, *20*(1), 37–46.

Collins, J. N., Popova, D., Sag, I. A., & Wasow, T. (2014). Sluicing and the inquisitive potential of appositives. In M. Kluck, D. Ott, & M. de Vries (Eds.), *Parenthesis and ellipsis* (pp. 47–73). Berlin: De Gruyter.

Cooper, W. E., Eady, S. J., & Mueller, P. R. (1985). Acoustical aspects of contrastive stress in question–answer contexts. *The Journal of the Acoustical Society of America*, *77*(6), 2142–2156.

Crawford, J. (2012). Using syntactic satiation to investigate subject islands. In J. Choi, E. A. Hogue, J. Punske, D. Tat, J. Schertz, & A. Trueman (Eds.), *Proceedings of the 29th West Coast Conference on Formal Linguistics* (pp. 38–45). Somerville, MA: Cascadilla Proceedings Project.

Crawley, R. A., Stevenson, R. J., & Kleinman, D. (1990). The use of heuristic strategies in the interpretation of pronouns. *Journal of Psycholinguistic Research*, *19*(4), 245–264.

Culicover, P. W., & Jackendoff, R. (1995). Something else for the binding theory. *Linguistic Inquiry*, *26*, 249–275.

Culicover, P. W., & Jackendoff, R. (2005). *Simpler syntax*. Oxford, New York: Oxford University Press.

Culicover, P. W., & Jackendoff, R. (2012). Same-except: A domain-general cognitive relation and how language expresses it. *Language*, *88*(2), 305–340. https://doi.org/10.1353/lan.2012.0031

Cutler, A., Dahan, D., & van Donselaar, W. (1997). Prosody in the comprehension of spoken language: a literature review. *Language and Speech*, *40 (Pt 2)*, 141–201.

Dayal, V., & Schwarzschild, R. (2010). Definite inner antecedents and wh-correlates in sluices. In Staverov, Altshuler, Braver, Fasola, & Murray (Eds.), *Rutgers Working Papers in Linguistics* (Vol. 3, pp. 92–114). New Brunswick, NJ: LGSA.

Do, M., & Kaiser, E. (2017). A Closer Look: Investigating the Mechanisms of Syntactic Satiation. In A. Kaplan, A. Kaplan, M. K. McCarvel, & E. J. Rubin (Eds.), *Proceedings of the 34th West Coast Conference on Formal Linguistics* (pp. 187–194). Cascadilla Proceedings Project.

Ferreira, F., Bailey, K. G.D., & Ferraro, V. (2002). Good-Enough Representations in Language Comprehension. *Current Directions in Psychological Science*, *11*(1), 11–15.

Ferreira, F., & Patson, N. D. (2007). The good enough approach to language comprehension. *Language and Linguistics Compass*, *1*(1-2), 71–83.

Ferreira, V. (2006). Avoid ambiguity! (If you can). In *Center for Research in Language Technical Reports* (pp. 1–13).

Ferreira, V. S. (2003). The persistence of optional complementizer production: Why saying “that” is not saying “that” at all. *Journal of Memory and Language*, *48*(2), 379–398.

Ferreira, V. S. (2008). Ambiguity, Accessibility, and a Division of Labor for Communicative Success. In B. H. Ross (Ed.), *Psychology of Learning and Motivation: v. 49. Advances in research and theory* (Vol. 49, pp. 209–246). Burlington, Mass.: Elsevier Science & Technology.

Féry, C. (1994). Prosodische und tonale Faktoren bei der Disambiguierung syntaktischer Strukturen. In K. H. Ramers, H. Vater, & H. Wode (Eds.), *Linguistische Arbeiten: Vol. 310. Universale phonologische Strukturen und Prozesse* (pp. 97–114). Tübingen: M. Niemeyer.

Féry, C. (2010a). Recursion in prosodic structure. *Phonological Studies*, *13*, 51–60.

Féry, C. (2010b). Syntax, information structure, embedded prosodic phrasing, and the relational scaling of pitch accents. In N. Erteschik-Shir & L. Rochman (Eds.), *The Sound Patterns of Syntax* (pp. 271–290). Oxford University Press.

Féry, C. (2016). *Prosody and information structure in "phrase languages"*, Stuttgart.

Féry, C., & Ishihara, S. (2009). How focus and givenness shape prosody. In C. Féry & M. Zimmermann (Eds.), *Information Structure: Theoretical, Typological, and Experimental Perspectives* (pp. 36–63). Oxford: Oxford University Press.

Féry, C., & Kügler, F. (2008). Pitch accent scaling on given, new and focused constituents in German. *Journal of Phonetics*, *36*(4), 680–703. https://doi.org/10.1016/j.wocn.2008.05.001

Fiengo, R., & May, R. (1994). *Indices and Identity*. Cambridge, Mass.: MIT Press.

Fodor, J. D. (2002a). Prosodic Disambiguation in Silent Reading. *NELS*, 113–132.

Fodor, J. D. (2002b). Psycholinguistics cannot escape prosody. *Speech Prosody*, 83–90.

Fodor, J. D., & Sag, I. A. (1982). Referential and quantificational indefinites. *Linguistics and Philosophy*, *5*(3), 355–398.

Fox Tree, J. E., & Meijer, P. J. A. (2000). Untrained speakers' use of prosody in syntactic disambiguation and listeners' interpretations. *Psychological Research Psychologische Forschung*, *63*(1), 1–13.

Frazier, L., & Clifton, C. J. (2011). D-linking and memory retrieval: the annoying case of sluicing. In J. A. Harris & M. Grant (Eds.), *University of Massachusetts Occasional Papers in Linguistics: Processing Linguistic Structure* (Vol. 38, pp. 37–52). Amherst, MA: GLSA Publications.

Frazier, L. (1987). Sentence processing: A tutorial review. In M. Coltheart (Ed.), *Attention and performance: Vol. 12. The psychology of reading* (pp. 559–586). Hove etc: Lawrence Erlbaum Associates, Publishers.

Frazier, L., & Clifton, C. (1998). Comprehension of Sluiced Sentences. *Language and Cognitive Processes*, *13*(4), 499–520.

Frazier, L., & Clifton, C. (2005). The syntax-discourse divide: processing ellipsis. *Syntax*, *8*(2), 121–174.

Frazier, L., Clifton, C., JR, & Carlson, K. (2007). Focus and VP ellipsis. *Language and Speech*, *50*, 1–21.

Frazier, L., Gibson, E., & Fodor, J. D. (Eds.). (2015). *Explicit and implicit prosody in sentence processing: Studies in honor of Janet Dean Fodor*. *Studies in Theoretical Psycholinguistics: volume 46*. Cham: Springer.

Frazier, L., & Rayner, K. (1982). Making and correcting errors during sentence comprehension: Eye movements in the analysis of structurally ambiguous sentences. *Cognitive psychology*, *14*(2), 178–210.

Garellek, M. (2015). Perception of glottalization and phrase-final creak. *The Journal of the Acoustical Society of America*, *137*(2), 822–831.

Gernsbacher, M. A., & Hargreaves, D. J. (1988). Accessing sentence participants: The advantage of first mention. *Journal of Memory and Language*, *27*(6), 699–717. https://doi.org/10.1016/0749-596X(88)90016-2

Gibson, E. (1998). Linguistic complexity: locality of syntactic dependencies. *Cognition*, *68*(1), 1–76.

Ginzburg, J., & Sag, I. A. (2000). *Interrogative investigations: The form, meaning and use of interrogatives*. *CSLI lecture notes: Vol. 123*. Stanford, Calif.: CSLI.

Goodall, G. (2014). The D-linking effect on extraction from islands and non-islands. *Frontiers in psychology*, *5*, 1493. https://doi.org/10.3389/fpsyg.2014.01493

Gordon, P. C., Hendrick, R., & Johnson, M. (2001). Memory interference during language processing. *Journal of experimental psychology. Learning, memory, and cognition*, *27*(6), 1411–1423.

Greene, R., Cushman, S., Cavanagh, C., Ramazani, J., Rouzer, P. F., Feinsod, H.,. . . Slessarev, A. (2012). *The Princeton encyclopedia of poetry and poetics* (4th ed.). Princeton [N.J.]: Princeton University Press.

Grice, H. P. (1975). *Logic and conversation*. *The William James Lectures*.

Grice, M., & Baumann, S. (2002). Deutsche Intonation und GToBI. *Linguistische Berichte*, *191*, 267–298.

Grice, M., Baumann, S., & Benzmüller, R. (2005). German intonation in autosegmental-metrical phonology. In S.-A. Jun (Ed.), *Prosodic Typology: The Phonology of Intonation and Phrasing.* (pp. 55–83). Oxford: Oxford University Press.

Griffiths, J., & Lipták, A. (2014). Contrast and island sensitivity in clausal ellipsis. *Syntax*, *17*(3), 189–234.

Grosz, B. J., Joshi, A. K., & Weinstein, S. (1995). Centering: A framework for modeling the local coherence of discourse. *Computational Linguistics*, *21*, 203–226.

Gussenhoven, C. (1983). Focus, mode, and the nucleus. *Journal of Linguistics*, *19*, 377.

Gussenhoven, C. (2007). Types of Focus in English. In C. Lee, M. Gordon, & D. Büring (Eds.), *Studies in linguistics and philosophy. Topic and Focus* (Vol. 82, pp. 83–100). Dordrecht: Springer Netherlands.

Halliday, M. A. K. (1967). Notes on transitivity and theme in English: Part 2. *Journal of Linguistics*, *3*(02), 199.

Hankamer, J., & Sag, I. (1976). Deep and Surface Anaphora. *Linguistic Inquiry*, *7*(3), 391–428.

Harley, T. A. (2008, 2014). *The psychology of language: From data to theory* (Fourth edition). New York: Psychology Press.

Harris, J. A. (2014). Who else but Sarah? In Schütze, Carson, & Linnaea Stockall (Eds.), *Connectedness: Papers in Celebration of Sarah VanWagenen.* (Vol. 18, pp. 175–187). Los Angeles, CA: UCLA Working Papers in Linguistics.

Harris, J. A. (2015). Structure Modulates Similarity-Based Interference in Sluicing: An Eye Tracking study. *Frontiers in psychology*, *6*, 1839. https://doi.org/10.3389/fpsyg.2015.01839

Hartmann, K. (2000). *Right node raising and gapping: Interface conditions on prosodic deletion*. Philadelphia, PA: J. Benjamins.

Hirschberg, J. (2006). Pragmatics and Intonation. In L. R. Horn & G. Ward (Eds.), *The Handbook of Pragmatics* (pp. 515–537). Oxford, UK: Blackwell Publishing Ltd.

Hirschberg, J., & Avesani, C. (1997). The role of prosody in disambiguating potentially ambiguous utterances in English and Italian. *Intonation: Theory, Models and Applications*, 189–192.

Hirst, D., & Di Cristo, A. (1998). A survey of intonation systems. In D. Hirst & A. Di Cristo (Eds.), *Intonation Systems. A survey of twenty languages* (pp. 1–44). Cambridge: Cambridge University Press.

Hoeks, J. C. J., Redeker, G., & Hendriks, P. (2009). Fill the gap! Combining pragmatic and prosodic information to make gapping easy. *Journal of Psycholinguistic Research*, *38*(3), 221–235.

Hoop, H. de. (2016). On the Interpretation of Stressed Pronouns. In R. Blutner & H. Zeevat (Eds.), *Optimality theory and pragmatics. Palgrave Studies in Pragmatics, Language and Cognition* (pp. 25–41). London: Palgrave Macmillan.

Hwang, H., Lieberman, M., Goad, H., & White, L. (2011). Syntactic ambiguity resolution: Effects of prosodic breaks and prosodic length. In M. Byram Washburn (Ed.), *Proceedings of the 28th West Coast Conference on Formal Linguistics* (267-274.). Somerville, MA: Cascadilla Press.

Ito, K., Speer, S. R., & Beckman, M. E. (2004). Informational status and pitch accent distribution in spontaneous dialogues in English. *Proceedings of the International Conference on Spoken Language Processing*, 279–282.

Jackendoff, R. (1972). *Semantic interpretation in generative grammar*. Cambridge, Mass.: MIT Press.

Jaeger, T. F. (2006). *Redundancy and syntactic reduction in spontaneous speech* (PhD thesis). Stanford University, Stanford.

Jaeger, T. F. (2010). Redundancy and reduction: speakers manage syntactic information density. *Cognitive psychology*, *61*(1), 23–62.

Johnson, K. (2008). What VP Ellipsis Can Do, and What it Can't, But Not Why. In M. R. Baltin & C. Collins (Eds.), *Blackwell handbooks in linguistics. The handbook of contemporary syntactic theory* (pp. 439–479). Malden, MA: Blackwell. https://doi.org/10.1002/9780470756416.ch14

Jun, S.-A. (2009). Prosody in Sentence Processing. In C. Lee, G. B. Simpson, Y. Kim, & P. Li (Eds.), *The Handbook of East Asian Psycholinguistics* (pp. 423–432). Cambridge: Cambridge University Press.

Jun, S.-A. (2010). The implicit prosody hypothesis and overt prosody in English. *Language and Cognitive Processes*, *25*(7-9), 1201–1233.

Jun, S.-A. (2015a). *Autosegmental-Metrical Model of Intonational Phonology*. LSA Summer Institute 2015: Intonational Phonology and Prosodic Typology, Chicago.

Jun, S.-A. (2015b). *Intonational Phonology of English*. LSA Summer Institute 2015: Intonational Phonology and Prosodic Typology, Chicago.

Jun, S.-A. (2015c). *ToBI (TOnes and Break Indices): A standard for labelling prosody*. LSA Summer Institute 2015: Intonational Phonology and Prosodic Typology, Chicago.

Just, M. A., Carpenter, P. A., Keller, T. A., Eddy, W. F., & Thulborn, K. R. (1996). Brain activation modulated by sentence comprehension. *Science*, *274*(5284), 114–116.

Kameyama, M. (1998). Stressed and unstressed pronouns: Complementary preferences. In P. Bosch & R. A. van der Sandt (Eds.), *Focus: Linguistic, cognitive, and computational perspectives. Studies in natural language processing* (pp. 309–321). Cambridge: Cambridge University Press.

Kanerva, J. M. (1989). *Focus and phrasing in chicheˆwa phonology* (PhD Thesis). Stanford University, Palo Alto.

Kang, S., & Speer, S. R. (2004). Prosodic disambiguation of participle constructions in English. In B. Bel & I. Marlien (Eds.), *Proceedings of speech prosody 2004.* Nara, Japan.

Katz, J., & Selkirk, E. (2011). Contrastive focus vs. discourse-new: Evidence from phonetic prominence in English. *Language*, *87*(4), 771–816.

Keating, P., Garellek, M., & Kreiman, J. (2015). Acoustic properties of different kinds of creaky voice. *Proceedings of the 18th International Congress of Phonetic Sciences.*

Kehler, A. (2002). *Coherence, reference, and the theory of grammar*. *CSLI lecture notes: Vol. 104*. Stanford (Calif.): CSLI Publications.

Kehler, A., Kertz, L., Rohde, H., & Elman, J. L. (2008). Coherence and Coreference Revisited. *Journal of Semantics*, *25*(1), 1–44. https://doi.org/10.1093/jos/ffm018

Kentner, G. (2007). *Prosodic Phrasing in Elliptic and Non-elliptic Coordinations.* Proceedings of the XVI. International Congress of Phonetic Sciences, Saarbrücken.

Kentner, G., Féry, C., & Alter, K. (2008). Prosody in Speech Production and Perception: The Case of Right Node Raising in English. In A. Steube (Ed.), *The discourse potential of underspecified structures: Event structures and information structures* (pp. 207–226). Berlin, New York: Mouton de Gruyter.

Kiss, K. É. (1998). Identificational focus versus information focus. *Language*, *74*(2), 245–273.

Kitagawa, Y., & Ishihara, S. (2016). *Phonetic properties of nuclear prominence in Japanese*. PINS, Stuttgart.

Kjelgaard, M. M., & Speer, S. R. (1999). Prosodic Facilitation and Interference in the Resolution of Temporary Syntactic Closure Ambiguity. *Journal of Memory and Language*, *40*(2), 153–194.

Konietzko, A., Radó, J., & Winkler, S. (to appear). Focus constraints on relative clause antecedents in sluicing. In S. Featherston, R. Hörnig, S. von Wietersheim, & S. Winkler (Eds.), *Information Structure and Semantic Processing.* Berlin: Mouton de Gruyter.

Konietzko, A. (2017). *Bare argument ellipsis and focus*. *Linguistik aktuell: Volume 233*. Amsterdam, Philadelphia: John Benjamins Publishing Company.

Kraljic, T., & Brennan, S. E. (2005). Prosodic disambiguation of syntactic structure: For the speaker or for the addressee? *Cognitive psychology*, *50*(2), 194–231.

Krifka. (2008). Basic Notions of Information Structure. *Acta Linguistica Hungaria*, *55*(3-4), 243–276.

Krifka, M. (2006). Association with focus phrases. In V. Molnár & S. Winkler (Eds.), *Studies in Generative Grammar: Vol. 82. The Architecture of Focus* (pp. 105–136). Berlin, Boston: De Gruyter Mouton.

Kügler, F., & Féry, C. (2017). Postfocal Downstep in German. *Language and Speech*, *60*(2), 260–288. https://doi.org/10.1177/0023830916647204

Kuno, S. (1976). Gapping: A functional analysis. *Linguistic Inquiry*, *7*(2), 300–318.

Ladd, D. R. (1996). *Intonational phonology*. *Cambridge studies in linguistics*. Cambridge: Cambridge University Press.

Lakoff, G. (1971). Presupposition and relative well-formedness. In D. D. Steinberg & L. A. Jakobovits (Eds.), *Semantics. An interdisciplinary reader in philosophy, linguistics and psychology* (pp. 329–340). Cambridge.

Lasnik, H. (2001). When can you save a structure by destroying it? In J. Minjoo & U. Strauss (Eds.), *Proceedings of the North East Linguistic Society* (Vol. 31, pp. 301–320). Georgetown University: GLSA Publications.

Lehiste, I. (1973). Phonetic disambiguation of syntactic ambiguity. *The Journal of the Acoustical Society of America*, *53*(1), 380.

Lehiste, I., Olive, J. P., & Streeter, L. A. (1976). Role of duration in disambiguating syntactically ambiguous sentences. *The Journal of the Acoustical Society of America*, *60*(5), 1199–1202.

Levin, N. (1986). *Main-Verb Ellipsis in Spoken English*. New York: Garland Publishing, Inc.

Levinson, S. C. (2001). *Presumptive meanings: The theory of generalized conversational implicature*. Cambridge, London: MIT Press.

Liberman, M., & Kuang, J. (2016). Pitch-range perception: the dynamic interaction between voice quality and fundamental frequency. *InterSpeech 2016*.

Liberman, M., & Pierrehumbert, J. (1984). Intonational invariance under changes in pitch range and length. In M. Aronoff & R. Oehrle (Eds.), *Language Sound Structure* (pp. 157–233). Cambridge (Mass.): MIT Press.

Liberman, M., & Prince, A. (1977). On stress and linguistic rhythm. *Linguistic Inquiry*, *8*, 249–336.

Liberman, M. Y. (1975). *The intonational system of English.* (PhD Thesis). Massachusetts Institute of Technology, Boston, Mass.

Lieberman, P. (1966). *Intonation, perception, and language.* Massachusetts Institute of Technology.

Lieberman, P. (1984). *The biology and evolution of language*. Cambridge, MA: Harvard University Press.

MacDonald, M. C. (1994). Probabilistic constraints and syntactic ambiguity resolution. *Language and Cognitive Processes*, *9*(2), 157–201.

MacDonald, M. C., Pearlmutter, N. J., & Seidenberg, M. S. (1994). The lexical nature of syntactic ambiguity resolution. *Psychological Review*, *101*(4), 676–703.

Martin, A. E., & McElree, B. (2008). A content-addressable pointer mechanism underlies comprehension of verb-phrase ellipsis☆. *Journal of Memory and Language*, *58*(3), 879–906. https://doi.org/10.1016/j.jml.2007.06.010

McKoon, G., & Ratcliff, R. (2003). Meaning through syntax: Language comprehension and the reduced relative clause construction. *Psychological Review*, *110*(3), 490–525.

Merchant, J. (2018). Ellipsis: A survey of analytical approaches. In J. van Craenenbroeck & T. Temmerman (Eds.), *Handbook of ellipsis.* Oxford: Oxford University Press. 19-45.

Merchant, J. (2001). *The syntax of silence: Sluicing, islands, and identity in ellipsis*. Oxford: Oxford University Press.

Merchant, J. (2005). Fragments and ellipsis. *Linguistics and Philosophy*, *27*(6), 661–738.

Merchant, J. (2006). Sluicing. In M. Everaert & H. van Riemsdijk (Eds.), *The Syntax Companion* (pp. 269–289). London: Blackwell.

Merchant, J. (2008). Variable island repair under ellipsis. In K. Johnson (Ed.), *Topics in ellipsis* (pp. 132–153). Cambridge: Cambridge University Press.

Merchant, J., & Simpson, A. (2012). *Sluicing: Cross-linguistic perspective*. *Oxford linguistics: Vol. 38*. Oxford: Oxford University Press.

Nagel, H. N., Shapiro, L. P., & Nawy, R. (1994). Prosody and the processing of filler-gap dependencies. *Journal of Psycholinguistic Research*, *23*, 473–485.

Nicol, J. L. (1996). What can prosody tell a parser? *Journal of Psycholinguistic Research*, *25*(2), 179–192.

Nieuwland, M. S., & van Berkum, J. J. A. (2008). The neurocognition of referential ambiguity in language comprehension. *Language and Linguistics Compass*, *2*(4), 603–630.

Nykiel, J. (2013). Wh-phrases in sluicing: an interaction of the remnant and the correlate. In P. Hofmeister & E. Norcliffe (Eds.), *The core and the periphery. Data-driven perspectives on syntax inspired by Ivan A. Sag.* Stanford, CA: CSLI Publications.

Nykiel, J., & Sag, I. (2011). Remarks on Sluicing. In S. Mueller (Ed.), *Proceedings of the HPSG11 Conference* (pp. 188–208). Stanford: CSLI Publications.

Pesetsky, D. (1982). *Paths and categories* (PhD Thesis). Massachusetts Institute of Technology, Cambridge (Mass.).

Pesetsky, D. (1987). Wh-in-situ: Movement and unselective binding. In E. Reuland & A. T. Meulen (Eds.), *The representation of indefiniteness* (pp. 98–129). Cambridge, Mass.: MIT Press.

Piantadosi, S. T., Tily, H., & Gibson, E. (2012). The communicative function of ambiguity in language. *Cognition*, *122*(3), 280–291.

Pierrehumbert, J. (1980). *The phonology and phonetics of English intonation* (PhD Thesis). Massachusetts Institute of Technology, Cambridge, Mass.

Pierrehumbert, J., & Hirschberg, J. (1990). The meaning of intonational contours in the interpretation of discourse. In P. R. Cohen, J. Morgan, & M. E. Pollack (Eds.), *Intentions in communication* (pp. 271–311). Cambridge, Mass.: MIT Press.

Pinkal, M. (1991). Vagheit und Ambiguität. In A. v. Stechow & D. Wunderlich (Eds.), *Semantik. Ein internationales Handbuch der zeitgenössischen Forschung.* (250-269.). Berlin/Boston: De Gruyter.

Pitrelli, J. F., Beckmann, M. E., & Hirschberg, J. (1994). Evaluation of Prosodic Transcription Labeling Reliability in the ToBI Framework. *ICSLP*, 123–126.

Poschmann, C., & Wagner, M. (2016). Relative clause extraposition and prosody in German. *Natural Language & Linguistic Theory*, *34*(3), 1021–1066.

Prevost, S. A. (1996). *A Semantics of Contrast and Information Structure for Specifying Intonation in Spoken Language Generation* (PhD Thesis). University of Pennsylvania, Pennsylvania.

Price, P. J., Ostendorf, M., Shattuck-Hufnagel, S., & Fong, C. (1991). The use of prosody in syntactic disambiguation. *Journal of the Acoustical Society of America*, *90*(6), 2956–2970.

Prince, E. (1981). Toward a taxonomy of given-new information. In P. Cole (Ed.), *Radical pragmatics.* London: Academic Press.

Radford, A. (2012). *An introduction to English sentence structure*. Cambridge: Cambridge University Press.

Rayner, K., Carlson, M., & Frazier, L. (1983). The interaction of syntax and semantics during sentence processing: Eye movements in the analysis of semantically biased sentences. *Journal of Verbal Learning and Verbal Behavior*, *22*, 358–374.

Redi, L., & Shattuck-Hufnagel, S. (2001). Variation in the realization of glottalization in normal speakers. *Journal of Phonetics*, *29*(4), 407–429.

Reich, I. (2002). Question/answer congruence and the semantics of wh-phrases. *Theoretical Linguistics*, *28*(1), 73–94.

Remmele, B. (2013). *Prosodic Realization of Ambiguities in English: State of the Art* (Wissenschaftliche Arbeit). Eberhard Karls Universität Tübingen, Tübingen.

Remmele, B. (2014). *Prosodic Disambiguation of Linguistic Ambiguities: An Empirical Investigation of Typographic Factors* (Masterarbeit). Eberhard Karls Universität Tübingen, Tübingen.

Remmele, B., Schopper, S., Winkler, S., & Hörnig, R. (forthcoming 2019). (Non)Strategic Production Planning and Ambiguity: Experimental Evidence. In M. Bauer (Ed.), *Strategy and Ambiguity.*

Repp, S. (2009). *Negation in gapping*. Oxford, New York: Oxford University Press.

Repp, S. (2015). On the acoustics of wh-exclamatives and wh-interrogatives: Effects of information structure and sex of speaker. In The Scottish Consortium for ICPhS 2015 (Ed.), *Proceedings of the 18th International Congress of Phonetic Sciences.* Glasgow, UK.

Repp, S. (2016). *On the semantics and prosody of contrast*. PINS, Stuttgart.

Repp, S., & Rosin, L. (2015). The intonation of echo wh-questions. *Proceedings of the 16th Annual Conference of the International Speech Communication Association*, 938–942.

Rochemont, M. (2013). Discourse new, F- marking, and normal stress. *Lingua*, *136*, 38–62.

Rochemont, M. S. (2011). *Question answer congruence and focus phrase*, University of British Columbia.

Rohde, H. (2008). *Coherence-Driven Effects in Sentence and Discourse Processing* (PhD Thesis). University of California, San Diego, San Diego.

Roland, D., Elman, J. L., & Ferreira, V. S. (2006). Why is that? Structural prediction and ambiguity resolution in a very large corpus of English sentences. *Cognition*, *98*(3), 245–272.

Romero, M. (1998). *Focus and reconstruction effects in wh-phrases.* (Ph.D.). University of Massachusetts, Amherst, MA.

Romero, M. (2000). Antecedentless sluiced wh-phrases and islands. In K. Schwabe & N. Zhang (Eds.), *Linguistische Arbeiten: Vol. 418. Ellipsis in conjunction* (pp. 195–220). Tübingen: Niemeyer.

Rooth, M. (1992). Ellipsis redundancy and reduction redundancy. In S. Berman & A. Hestvik (Eds.), *Proceedings of the Stuttgart Ellipsis Workshop.*

Rooth, M. (1996). Focus. In S. Lappin & C. Fox (Eds.), *Blackwell handbooks in linguistics. The Handbook of Contemporary semantic theory* (pp. 271–297). London: Blackwell.

Ross, J. R. (1967). *Constraints on variables in syntax* (Ph.D. Thesis). Massachusetts Institute of Technology, Cambridge, Mass.

Ross, J. R. (1969). Guess who? In R. Binnick, A. Davison, G. Green, & J. L. Morgan (Eds.), *Papers from the Fifth Regional Meeting of the Chicago Linguistic Society* (pp. 252–286). Chicago: Chicago Linguistic Society.

Rudolph, U., & Forsterling, F. (1997). The psychological causality implicit in verbs: A review. *Psychological Bulletin*, *121*(2), 192–218. https://doi.org/10.1037/0033-2909.121.2.192

Sag, I. (1976). *Deletion and logical form* (Ph.D. Thesis). Massachusetts Institute of Technology, Cambridge, Mass.

Schafer, A., Carlson, K., Clifton, H., & Frazier, L. (2000). Focus and the interpretation of pitch accent: Disambiguating embedded questions. *Language and Speech*, *43*(1), 75–105.

Schafer, A. (1996). Focus in relative clause construal. *Language and cognitive processes*, *11*(1-2), 135–164.

Schafer, Speer, S. R., Warren, P., & White, S. D. (2000). Intonational disambiguation in sentence production and comprehension. *Journal of Psycholinguistic Research*, *29*(2), 169–182.

Schwarzschild, R. (1997a). *Givenness and Optimal Focus*, Rutgers University.

Schwarzschild, R. (1997b). *Interpreting Accent*, Rutgers University.

Schwarzschild, R. (1999). GIVENness, Avoid F and other constraints on the placement of focus. *Natural Language Semantics*, *7*, 141–177.

Selkirk, E. O. (1984). *Phonology and syntax: The relation between sound and structure*. Cambridge, Mass.: MIT Press.

Selkirk, E. O. (1995). Sentence prosody: Intonation, stress, and phrasing. In J. A. Goldsmith, J. Riggle, & A. C.L. Yu (Eds.), *The handbook of phonological theory* (pp. 550–569).

Sheldon, A. (1974). The role of parallel function in the acquisition of relative clauses in English. *Journal of Verbal Learning and Verbal Behavior*, *13*(3), 272–281.

Shport, I. A., & Redford, M. A. (2014). Lexical and phrasal prominence patterns in school-aged children's speech. *Journal of child language*, *41*(4), 890–912.

Silverman, K., Beckman, M. E., Pitrelli, J. F., Ostendorf, M., Wightman, C., Price, P.,. . . Hirschberg, J. (1992). ToBI: A standard scheme for labeling prosody. *Proceedings of the 2nd International Conference on Spoken Language Processing*, 867–879.

Smyth, R. (1994). Grammatical determinants of ambiguous pronoun resolution. *Journal of Psycholinguistic Research*, *23*(3), 197–229.

Snedeker, J., & Trueswell, J. C. (2003). Using prosody to avoid ambiguity: Effects of speaker awareness and referential context. *Journal of Memory and Language*, *48*, 103–130.

Snyder, W. (2000). An experimental investigation of syntactic satiation effects. *Linguistic Inquiry*, *31*, 575–582.

Sprouse, J. (2011). A validation of Amazon Mechanical Turk for the collection of acceptability judgments in linguistic theory. *Behavior research methods*, *43*(1), 155–167.

Steedman, M. (1991). Structure and Intonation. *Language*, *67*(2), 260–296.

Stevenson, R. J., Crawley, R. A., & Kleinman, D. (1994). Thematic roles, focus and the representation of events. *Language and Cognitive Processes*, *9*(4), 519–548.

Straub, K., Wilson, C., McCollum, C., & Badecker, W. (2001). Prosodic structure and wh-questions. *Journal of Psycholinguistic Research*, *30*(4), 379–394.

Syrdal, A. K., Hirschberg, J., & McGory, J. T. (1999). Automatic ToBI prediction and alignment to speed manual labeling of prosody. *The Journal of the Acoustical Society of America*, *106*(4), 2181.

Tancredi, C. (1992). *Deletion, De-Accenting, and Presupposition* (Ph.D. Thesis). Massachusetts Institute of Technology, Cambridge, Mass.

Tanenhaus, M. K., Carlson, G., & Trueswell, J. C. (1989). The role of thematic structures in interpretation and parsing. *Language and Cognitive Processes*, *4*(3-4), SI211-SI234.

Traxler, M. J., Pickering, M. J., & Clifton, C. (1998). Adjunct attachment is not a form of lexical ambiguity resolution. *Journal of Memory and Language*, *39*(4), 558–592.

Traxler, M. J., Williams, R. S., Blozis, S. A., & Morris, R. K. (2005). Working memory, animacy, and verb class in the processing of relative clauses☆. *Journal of Memory and Language*, *53*(2), 204–224.

Truckenbrodt, H. (1995). *Phonological Phrases: Their relation to syntax, focus, and prominence* (Ph.D. Thesis). Massachusetts Institute of Technology, Cambridge, Mass.

Välimaa-Blum, R. (2001). On nominal and intonational frame anaphora in English. In J.-C. Souesme (Ed.), *Anaphores Nominale et Verbale* (Vol. 18, pp. 31–44). Nice, France: Cycnos.

van Craenenbroeck, J. (2010). Invisible last resort. *Lingua*, *120*(7), 1714–1726.

Velleman, L., & Beaver, D. (2015). Question-based Models of Information Structure. In C. Féry & S. Ishihara (Eds.), *Oxford Handbook of Information Structure,* 86–107.

Vicente, L. (2018). Sluicing and its subtypes. In T. Temmerman & J. van Craenenbroeck (Eds.), *The Oxford Handbook of Ellipsis.* Oxford: Oxford University Press, 479-503.

Wagner, M. (2012). A givenness illusion. *Language and Cognitive Processes*, *27*(10), 1433–1458.

Wagner, M., & Watson, D. G. (2010). Experimental and theoretical advances in prosody: A review. *Language and cognitive processes*, *25*(7-9), 905–945.

Wagner, M. (2015). Phonological Evidence in Syntax. In T. Kiss & A. Alexiadou (Eds.), *Syntax - Theory and Analysis: An international handbook.* (pp. 1154-1198). Berlin: de Gruyter.

Wales, R., & Toner, H. (1979). Intonation and ambiguity. In W. E. Cooper & E. C. T. Walker (Eds.), *Sentence Processing. Psycholinguistic studies presented to Merrill Garrett* (pp. 135–158). Hillsdale, NJ: Lawrence Erlbaum Associates.

Walters, M. (1996). *The dark room*. London: Pan.

Ward, G., & Hirschberg, J. (1985). Implicating uncertainty: The pragmatics of fall-rise intonation. *Language*, *61*(4), 747.

Warren, P. (1985). *The temporal organization and perception of speech* (Unpublished Ph.D. Thesis). University of Cambridge, Cambridge.

Warren, T., & Gibson, E. (2002). The influence of referential processing on sentence complexity. *Cognition*, *85*(1), 79–112.

Warren, T., & Gibson, E. (2005). Effects of NP type in reading cleft sentences in English. *Language and cognitive processes*, *20*(6), 751–767.

Wasow, T. (2015). Ambiguity avoidance is overrated. In S. Winkler (Ed.), *Ambiguity* (pp. 29–47). Berlin, München, Boston: De Gruyter.

Wasow, T., & Arnold, J. (2003). Post-verbal constituent ordering in English. In G. Rohdenburg & B. Mondorf (Eds.), *Determinants of grammatical variation in English.* Berlin, New York: Mouton de Gruyter.

Wasow, T., Perfors, A., & Beaver, D. (2005). The Puzzle of Ambiguity. In C. O. Orgun, P. Sells, & S. Lapointe (Eds.), *Morphology and the web of grammar. Essays in memory of Steven G. Lapointe* (pp. 265–282). Stanford, CA: CSLI Publications.

Wiedmann, N., & Winkler, S. (2015). The influence of prosody on children's processing of ambiguous sentences. In S. Winkler (Ed.), *Ambiguity*. Berlin, München, Boston: De Gruyter.

Williams, E. (1977). Discourse and logical form. *Linguistic Inquiry*, *8*(3), 101–139.

Winkler, S. (2018). Chapter 15: Ellipsis and Prosody. In: J. van Craenenbroeck and T. Temmerman. The (Oxford) Handbook of Ellipsis. Oxford: Oxford University Press, 359-382.

Winkler, S. (1996). *Focus and secondary predication*. Berlin, New York: Mouton de Gruyter.

Winkler, S. (2013). Syntactic diagnostics for extraction of focus from ellipsis site. In L. L. Cheng & N. Corver (Eds.), *Diagnosing Syntax* (pp. 463–484). Oxford: Oxford University Press.

Winkler, S. (2014). *Exploring ambiguity and the ambiguity model from a transdisciplinary perspective*, Tübingen.

Winkler, S. (2015a). *Ambiguity: Language and communication*. Berlin, Boston: De Gruyter.

Winkler, S. (2016). Ellipsis and Information Structure. In: Caroline Féry and Shinichiro Ishihara (eds) The (Oxford) Handbook of Information Structure. Oxford: Oxford University Press, 359-382.

Winkler, S., & Hartmann, J. (2013). Investigating the role of information structure triggers. *Lingua*, *136*, 1–15.

Wolk, L., Abdelli-Beruh, N. B., & Slavin, D. (2012). Habitual use of vocal fry in young adult female speakers. *Journal of voice: official journal of the Voice Foundation*, *26*(3), e111-6.

Xu, Y. (2013). ProsodyPro - A tool for large-scale systematic prosody analysis. *Proceedings of Tools and Resources for the Analysis of Speech Prosody (TRASP 2013), Aix-en-Provence, France*, 7–10.

Xu, Y. (2017). ProsodyPro: A Praat script for large-scale systematic analysis of continuous prosodic events. Retrieved from http://www.homepages.ucl.ac.uk/~uclyyix/ProsodyPro/

Yuasa, I. P. (2010). Creaky Voice: A new feminine voice quality for young urban-oriented upwardly mobile american women? *American Speech*, *85*(3), 315–337.

Yule, G. (2010). *Pragmatics*. Oxford: Oxford University Press.

Appendix

1. SVO vs. Stripping: Items and Filler

1.1 Items

1. CHRISTOPH MALT PAUL NICHT
   a. Im Kindergarten ist heute Aktionstag. Betreuerin Susi will zusammen mit den Kindern Bilder malen. Christoph ist gerne kreativ, aber Paul spielt lieber mit Autos.
   b. Immer freitags findet in der VHS ein Porträt-Malkurs statt. Christoph und Paul sollen sich gegenseitig malen. Aber Christoph hätte lieber einen weiblichen Partner gehabt.

2. JANINA BADET NADINE NICHT
   a. Am Strand von Mallorca ist immer viel los. Janina und Nadine liegen in der Sonne und genießen ihren Sommerurlaub. Während Janina ab und zu ins Meer springt, hat Nadine Angst vor Haien.
   b. Kleinkinder brauchen noch viel Hilfestellung bei alltäglichen Dingen. So ist die kleine Nadine beim Baden noch auf die Unterstützung ihrer Mutter angewiesen. Aber Janina hat heute leider kaum Zeit und überlegt, wo sie Abstriche machen kann.

3. ANNETTE LOBT CHRISTINA NICHT
   a. Bei Maren steht wie jedes Jahr ein wunderschöner Weihnachtsbaum im Wohnzimmer. Annette und Christina haben nur eine kleine Tanne in ihrer WG. Während Annette sich an dem schönen Baum erfreut, kann Christina ihren Neid kaum zurückhalten.
   b. Die Musikschule lädt zum alljährlichen Sommerkonzert ein. Christina hat ihre beste Freundin Annette zu ihrem Auftritt eingeladen. Annette ist jedoch alles andere als begeistert von Christinas schiefem Geigensolo.

4. LOUIS ANTWORTET BENNY NICHT
   a. Herr Schubel hat die Nachbarskinder Louis und Benny beim Grasrauchen erwischt. Natürlich will er wissen, wer den beiden die Droge verkauft hat. Benny stellt sich taub, aber Louis gesteht unter Tränen.
   b. Manuela hat zwei Söhne im Teenageralter. Louis ist älter und hat daher mehr Lebenserfahrung als der jüngere Benny. Als Benny mehr über Louis‘ ersten Kuss erfahren will, wird dieser ganz rot und versucht das Thema zu umgehen.

5. SEBASTIAN GEHORCHT ALEX NICHT
   a. Stabsoffizier Mayer ist bekannt dafür, besonders rigoros zu sein. Die zwei Soldaten Sebastian und Alex treiben immer gerne Schabernack. Aber bei Herrn Mayer wird Sebastian ehrfürchtig, ganz im Gegensatz zu Alex.
   b. Herr und Frau Braun sind heute Abend in der Oper. Um den kleinen Sebastian kümmert sich der Nachbarsjunge Alex. Aber Sebastian hat keine Lust, sich an die Regeln des Babysitters zu halten.

6. STEFFI GRATULIERT MARTINA NICHT
   a. Xaver veranstaltet eine große Geburtstagsparty. Steffi und Martina sind auch eingeladen, obwohl sie sich letztes Wochenende sehr mit Xaver gestritten haben. Steffi ist nicht nachtragend, aber Martina bleibt stur.
   b. In der kleinen Dorfkapelle findet heute eine Hochzeit statt. Die Braut Martina hat auch ihre alte Schulfreundin Steffi eingeladen. Steffi ist jedoch schon lange single und daher ziemlich verbittert.

7. LISA WIDERSPRICHT BIANCA NICHT
   a. Herr und Frau Müller wollen, dass ihre Töchter Lisa und Bianca mehr im Haushalt mithelfen. Um die Aufgaben gerecht zu verteilen, hat Frau Müller einen Putzplan entworfen. Lisa hat keine Lust sich an den Putzplan zu halten, während Bianca die Idee gut findet.
   b. In Toms Clique gibt's immer viel Zündstoff für Diskussionen. Besonders Lisa und Bianca liegen sich regelmäßig in den Haaren. Aber diesmal bleibt Lisa ganz ruhig als Bianca ihr wieder Vorwürfe macht.

8. ANNE HEIRATET BABARA NICHT
   a. Letzte Woche fand in der Schule ein 10-jähriges Klassentreffen statt. Anne und Barbara haben sich lange nicht gesehen und fallen sich freudig in die Arme. Während Anne stolz von ihrer anstehenden Hochzeit erzählt, denkt Barbara traurig an die Auflösung ihrer Verlobung.
   b. Die Gay-Community freut sich, dass gleichgeschlechtliche Ehen nun in den ganzen USA legalisiert wurden. Barbara und Anne sind schon lange ein Paar, daher stellt Barbara nun endlich die Frage aller Fragen. Aber Anne liebt Barbara nicht mehr und lehnt den Antrag ab.

9. SUSI WÄSCHT ANDREA NICHT
   a. Im Luise Wohnheim gibt es einen großen Wäscheraum. Susi und Andrea treffen sich dort jeden Sonntagmorgen um Wäsche zu waschen. Eines Morgens verschläft Andrea aber leider, weil sie Samstag zu lange auf der Party war.
   b. Im Pflegeheim arbeiten viele freiwillige Helfer. Seit ein paar Wochen ist Susi für Bewohnerin Andrea zuständig. Susi darf aber bisher nur einfache Aufgaben übernehmen, wie z.B. beim Essen helfen.

10. ANTON BETRÜGT MARIA NICHT
    a. Die Geschwister Maria und Anton treffen sich regelmäßig zum Pokern in ihrer Lieblingskneipe. Oft wird dabei auch um Geld gespielt. Während es Maria wichtig ist, fair zu spielen, versucht Anton immer zu tricksen.
    b. Bei Maria und Anton läuft es schon länger nicht mehr so richtig in der Beziehung. Als sie ihn mit einer anderen Frau in einem Restaurant sieht, ist sie überzeugt, dass Alex eine Affäre hat. Im Nachhinein stellte sich aber heraus, dass es sich bei der Frau nur um seine Schwester handelte.

11. ELIAS HILFT LUKAS NICHT
    a. Auf dem Nachhauseweg werden Elias und Lukas Zeugen eines Zusammenstoßes zwischen einem Auto und einem Radfahrer. Der am Boden liegende Radfahrer schreit vor Schmerzen. Während Elias sofort losrennt, ist Lukas vor Schock wie gelähmt.
    b. Um versetzt zu werden, muss Lukas mindestens eine 3 in Mathe schreiben. Verzweifelt richtet er sich an seinen älteren Bruder Elias. Dieser hat jedoch keine Zeit ihm Nachhilfe zu geben, da er sich lieber mit seiner neuen Freundin trifft.

12. TINE BERÄT OLGA NICHT
    a. Tine und Olga arbeiten beide für Mercedes, jedoch in unterschiedlichen Bereichen. Tine ist im Verkauf beschäftigt und hilft den Kunden das passende Auto zu finden. Olga hingegen arbeitet in der Produktion und überwacht dort die Arbeitsabläufe.
    b. Am Ende des Jahres will Olga ihre Steuererklärung machen. Da ihre Freundin Tine in einer Steuerberatungskanzlei arbeitet, bittet sie diese um Unterstützung. Jedoch hat sich Tine vorgenommen, Privates und Berufliches strikt zu trennen.

1.2 Filler

1. Max kauft den Laden leer
    a. Bei H&M ist heute Sommerschlussverkauf. Die Studenten haben sich darauf schon seit Wochen gefreut. Die Männerabteilung ist aber leider schon sehr ausgesucht, da Max kurz nach Ladenöffnung bereits dort war.
    b. Der Immobilienmarkt in Tübingen ist hart umkämpft. Max und Susi sind auf der Suche nach einem kleinen Lokal für ihr eigenes Café. Um Geld zu sparen, hat Max eine Immobilie ohne Küche und Verkaufstresen gepachtet.

2. Eva hat nur ein Drama von Goethe gelesen
    a. Nächste Woche sind an der Uni wieder Abschlussprüfungen. Der Literaturkurs von Professor Schimpf behandelte dieses Semester die wichtigsten Werke von Goethe. Leider besteht Eva die Prüfung nicht, da sie sich bei der Vorbereitung nur auf *Faust* konzentriert hat.
    b. Im Literaturclub des Jugendvereins wird immer viel diskutiert. Diesen Monat ist das Thema „Die wichtigsten Dichter und Denker der USA“. Leider kann Eva nicht viel zur Diskussion beitragen, da sie sich nur mit deutscher Literatur auskennt.

3. Annika berührt die Taube mit dem Zweig
    a. Annika ist mit ihrem Hund Mucksi im Bollstädter Wald spazieren. Plötzlich bleibt Mucksi stehen und schnuppert an einer reglosen Taube. Da Annika das Tier nicht mit bloßen Händen anfassen will, sucht sie nach einem kleinen Stöckchen.
    b. Annika ist zu Besuch im großen Landhaus ihrer Eltern. Zum ersten Mal seit Langem schaut sie dort mal wieder auf den Dachboden. Dort trifft sie der Schlag, als sie mehrere Vögel sieht, die sich aus kleinen Ästen ein Nest bauen.

4. Phillip liest das Buch seiner Schwester vor
   a. Anne ist nach langem Warten zum zweiten Mal Mutter geworden. Ihr erster Sohn Phillip ist im Grundschulalter und lernt gerade Lesen und Schreiben. Heute möchte er sich um sein Schwesterchen kümmern und packt sein Lieblingsbuch aus.
   b. Der Buchhändler *Goetheander* ehrt jedes Jahr lokale Schriftsteller mit dem Goethepreis. Wie jedes Jahr ist auch Phillip vor Ort, um den Vorträgen der besten Schriftsteller zu lauschen. Heute hat er jedoch eine ganz besondere Aufgabe, da seine Schwester unter den Nominierten ist.

5. Anja hat den Vortrag sicher gehalten
   a. Die Stiftung „Rettung der Orchidee“ lädt wieder zum großen Sommernachtsball ein. Die PR-Sprecherin Anja hat jedoch leider all ihre Notizen für die Begrüßungsrede daheim vergessen. Nichtsdestotrotz wirkt sie sehr souverän und erlaubt sich keinen einzigen Patzer.
   b. Letzte Woche fand die große Mathematiker Konferenz im Audimax statt. Anja sollte dort einen Vortrag halten, obwohl sie gar nicht gut vor großem Publikum spricht. Benjamin ist sich jedoch sicher, dass sie sich diese Chance nicht hat entgehen lassen.

6. David findet die Ausstellungsstücke modern
   a. Das Möbelhaus *Holzmeyer* feiert 10-jähriges Jubiläum. David und seine Verlobte Jana hoffen auf ein paar gute Schnäppchen. Während Jana die Möbel altbacken findet, gefällt David sehr gut was er sieht.
   b. Im Antiquariat *Büchler* ist heute eine Ausstellung zu antiken Werken der Nachkriegszeit. Als großer Literaturliebhaber lässt sich David dieses Event nicht entgehen. Als er dort ankommt, ist er jedoch erst einmal schockiert von dem unangenehmen Geruch im Antiquariat.

7. Anna hat Tom betrunken kennengelernt
   a. Auf der Semesterabschlußparty im *Kucks* wird immer viel geflirtet. Für Anna war es Liebe auf den ersten Blick, als sie dort ihren späteren Ehemann Tom kennengelernt hat. Tom erinnerte sich anfangs leider nicht groß an Anna, da er an dem Abend etwas zu tief ins Glas geschaut hatte.
   b. Die Weihnachtsfeier der Firma *Malz* ist berühmt berüchtigt für den süffigen Glühwein. Anna ist dieses Jahr für die Zubereitung dieses beliebten Getränks zuständig. Da sie regelmäßig die Qualität des Glühweins überprüfen musste, war sie leider schon blau, als ihr der neue Kollege vorgestellt wurde.

8. Tom soll das Hindernis umfahren
   a. Die Bauwagen-Jungs erfinden immer wieder neue außergewöhnliche Spiele, damit es nicht langweilig wird. Heute haben Tom und Lars für ihre Motorräder eine Art Hindernis-Parkour gebaut. Der Kniff hierbei ist jedoch, dass die Jungs nicht um die aufgestellten Kartons herum fahren sollen, sondern eher darüber.
   b. In der Fahrschule *Braun* gibt es oft was zu erzählen. Herr Braun beschwert sich z.B., dass er immer wieder genau die gleichen Dinge erklären muss. Als Fahrschüler Tom vor einem umgestürzten Baum stehen bleibt, muss er wiedermal erklärend eingreifen.

9. Der Polizist verfolgt den Dieb mit dem Fahrrad
    a. In Annis Damenmodengeschäft wurde wiederholt mitten in der Nacht eingebrochen, um die neuesten Diamant-Dessous zu stehlen. Natürlich verständigt Anni sofort die Polizei. Der Täter ist jedoch nicht so leicht zu fassen, da er sich auf der Flucht auch noch ein Rad geklaut hat.
    b. In manchen Stadtteilen Berlins ist die Kriminalitätsrate sehr hoch. Um alle Fälle bearbeiten zu können, ist die Polizei dort nicht nur mit dem Streifenwagen oder zu Fuß unterwegs.

10. Oliver mag Petra aber Jill nicht
    a. Die englischen Nachbarn der Familie Weiß haben eine kleine Tochter, Jill. Oliver und Petra Weiß spielen am liebsten draußen im Sandkasten. Oliver freut sich wenn Jill mitspielt, während Petra die neue Spielkameradin nicht leiden kann.
    b. In der Klasse 7c des Hilde-Gymnasiums gibt es erste verliebte Schüler. Oliver, der beliebteste Junge der ganzen Schule, ist aber sehr wählerisch. Er mag nur Mädchen mit deutschen Namen, während er Mädchen mit englischen Namen zu exotisch findet.

11. Der Kapitän muss übersetzen
    a. Das *Summer Cruise* Kreuzfahrtschiff legt heute in Nizza ab und fährt Richtung Venedig. Yui und Takashi Nakamura verbringen ihre Flitterwochen auf dem Schiff. Leider spricht das japanische Pärchen weder Französisch noch Italienisch und kann daher den Sicherheitsanweisungen nicht folgen.
    b. Die Nordsee ist heute sehr stürmisch und hat sehr hohen Wellengang. Der Kapitän Blaubart ist ein erfahrener Seemann und hat daher keinerlei Sicherheitsbedenken. Er muss sich nur darum kümmern, dass er das Schiff sicher vom Festland nach Sylt manövriert.

12. Martin schlägt den Jungen mit der Gitarre
    a. Die Rockergang *B.Rocks* ist wieder in der Stadt unterwegs und macht die Straßen unsicher. Der gewalttätige Martin ist das neueste Mitglied und denkt, er müsse sich noch behaupten. Immer wieder verliert er die Kontrolle und schlägt mit allem um sich, was nicht Niet- und Nagelfest ist.
    b. Die Popgruppe *Unik* arbeitet gerade an ihrem ersten Studioalbum und es kommt schnell zu ersten Reibereien. Da Martin für den Gesang zuständig ist, versteht er nicht warum sich die anderen in die Songtexte einmischen wollen. Er wird plötzlich böse und greift seine Bandkollegen mit bloßen Fäusten an.

13. Julia verdächtigt Beate aber Eva nicht
    a. In Julias Grundschulklasse ist heute etwas Ungewöhnliches passiert. Die kleine Eva kann ihr Handy nicht mehr finden und alle glauben, dass sie es absichtlich verlegt hat. Julia ist sich aber sicher, dass die gemeine Beate das Handy verschwinden hat lassen, und nicht Eva.
    b. Im Fitnessstudio *Move* wurden, seit Beate dort Mitglied ist, vermehrt Diebstähle gemeldet.

Obwohl Beate sehr sympathisch ist, diskutieren die Angestellten ob sie nicht doch die Diebin sein könnte. Während Julia misstrauisch bleibt, ist sich Eva jedoch sicher, dass Beate nichts mit der Sache zu tun hat.

14. Sophie mag nur grüne Tomaten
    a. In den Südstaaten, Sophies Heimat, sind frittierte grüne Tomaten eine Spezialität. Ihre deutsche Freundin Vanessa findet die Vorstellung unreifes Gemüse zu essen eklig und warnt vor den darin enthaltenen Giftstoffen. Sophie dagegen findet rote Tomaten zu matschig.
    b. Sophie und Vanessa kochen heute Abend in ihrer WG Ratatouille. Zusammen überlegen sie welche Gemüsesorten sie dafür verwenden sollen. Vanessa würde gerne grüne Paprika als Basis nehmen, aber damit ist Sophie gar nicht einverstanden.

2. SVO vs. Stripping: Perceptual VP Analysis

Legend:
Agreement: 1 = agreement, 0 = no agreement

File Name			Neutral Annot.	Author		
Part.	Item	Condition	VP Accent	VP Accent	VP Boundary Tone	Agreement
1	F	SVO	L*	L*		1
1	H	SVO	L*	L*	H-	1
1	N	SVO	L*+H	L*+H		1
1	P	SVO	H*	H*		1
1	V	SVO	NA	NA		1
1	Y	SVO	NA	NA		1
1	A	Stripping	L*	L*	H-H%	1
1	D	Stripping	L*	L*	H-H%	1
1	J	Stripping	L*	L*	H-H%	1
1	L	Stripping	L*	L*	L-L%	1
1	S	Stripping	L*	L*	H-H%	1
1	Z	Stripping	L*	L*	H-L%	1
2	F	SVO	L*	L*		1
2	H	SVO	H*	H*		1
2	N	SVO	L*	L*		1
2	P	SVO	L+H*	L+H*		1
2	V	SVO	L*+H	L*+H		1
2	Y	SVO	H*	H*		1
2	A	Stripping	L*	L*	H-H%	1
2	D	Stripping	L*	L*	H-H%	1
2	J	Stripping	L*	L*	H-H%	1
2	L	Stripping	L*	L*	L-L%	1
2	S	Stripping	L*	L*	H-H%	1
2	Z	Stripping	L*	L*	H-H%	1
3	A	SVO	L*	L*		1
3	D	SVO	NA	NA		1
3	J	SVO	L*	L*		1
3	L	SVO	!H*	!H*		1
3	S	SVO	NA	NA		1
3	Z	SVO	L*+H	L*+H		1
3	F	Stripping	L*	L*	H-H%	1
3	H	Stripping	L*	L*	H-H%	1
3	N	Stripping	L*	L*	H-L%	0
3	P	Stripping	L*	L*	H-H%	1
3	V	Stripping	L*	L*	H-H%	1

3	Y	Stripping	L*	L*		1
4	F	SVO	L*	L*		1
4	H	SVO	L*+H	L*+H		1
4	N	SVO	L*+H	L*+H		1
4	P	SVO	L*+H	L*+H		1
4	V	SVO	L*+H	L*+H		1
4	Y	SVO	L*+H	L*+H		1
4	A	Stripping	L*	L*	H-H%	1
4	D	Stripping	L*+H	L*+H	H-L%	1
4	J	Stripping	L*	L*	H-H%	1
4	L	Stripping	L*	L*	H-H%	1
4	S	Stripping	L*	L*	L-L%	1
4	Z	Stripping	L*	L*	H-H%	1
5	A	SVO	L*	L*		1
5	D	SVO	L*	L*		1
5	J	SVO	L*	H+L*		0
5	L	SVO	L*	L*		1
5	S	SVO	L*	L*		1
5	Z	SVO	L*	L*		1
5	F	Stripping	L*	L*+H	H-H%	0
5	H	Stripping	L*	L*	H-H%	1
5	N	Stripping	L*	L*	H-L%	0
5	P	Stripping	L*	L*		1
5	V	Stripping	L*	L*	H-H%	1
5	Y	Stripping	L*	L*	H-H%	1
6	A	SVO	!H*	!H*	L-	1
6	D	SVO	L*+H	L*+H	H-	1
6	J	SVO	L*+H	L*+H		1
6	L	SVO	!H*	!H*		1
6	S	SVO	L*+H	L*+H		1
6	Z	SVO	L*+H	L*+H		1
6	F	Stripping	L+H*	L+H*	L-H%	1
6	H	Stripping	L*+H	L*+H	H-H%	1
6	N	Stripping	L*+H	L*+H	H-L%	1
6	P	Stripping	L*	H+L*	L-L%	0
6	V	Stripping	L*	H+L*	L-L%	0
6	Y	Stripping	L*	L*	L-L%	1
7	F	SVO	H*	L*		0
7	H	SVO	L+H*	L+H*		1
7	N	SVO	?	NA		1
7	P	SVO	H*	H*		1

7	V	SVO	L+H*	L+H*		1
7	Y	SVO	H*	H*		1
7	A	Stripping	L*	L*	H-H%	1
7	D	Stripping	L*	L*	H-H%	1
7	J	Stripping	L*	L*	H-H%	1
7	L	Stripping	L*	L*	H-H%	1
7	S	Stripping	L*	L*	H-H%	1
7	Z	Stripping	L*	L*	H-H%	1
8	A	SVO	L*	L*		1
8	D	SVO	H*	H*		0
8	J	SVO	L*+H	L*+H		1
8	L	SVO	H*	H*+L	L-	0
8	S	SVO	L- NA	NA		1
8	Z	SVO	L*	L*		1
8	F	Stripping	L*	L*	H-H%	1
8	H	Stripping	L*	L*	H-H%	1
8	N	Stripping	L*	L*	H-H%	1
8	P	Stripping	L*	L*	H-H%	1
8	V	Stripping	L*	L*	H-H%	1
8	Y	Stripping	L*	L*	H-H%	1
9	F	SVO	L*	L*	L-	1
9	H	SVO	L*	L*	H-	1
9	N	SVO	L*	L*	L-	1
9	P	SVO	L+H*	L+H*		1
9	V	SVO	NA	L+H*		0
9	Y	SVO	NA	NA		1
9	A	Stripping	L*	L*	L-L%	1
9	D	Stripping	L*	L*	H-L%	0
9	J	Stripping	L*	L*		1
9	L	Stripping	L*+H	L*+H	H-L%	1
9	S	Stripping	L*	L*	H-H%	1
9	Z	Stripping	L*	H*		0
10	F	SVO	H*	H*	L-	1
10	H	SVO	L+H*	L+H*		1
10	N	SVO	NA	L*		0
10	P	SVO	H*	H*		1
10	V	SVO	L+H*	L+H*		1
10	Y	SVO	H*	H*		1
10	A	Stripping	L*	L*	L-L%	1
10	D	Stripping	L*	L*	H-H%	1
10	J	Stripping	L*	L*	H-H%	1
10	L	Stripping	L*	L*		1

10	S	Stripping	L*	L*		1
10	Z	Stripping	L*	L*	L-L%	0
11	A	SVO	NA	NA		1
11	D	SVO	NA	NA		1
11	J	SVO	NA	L*		0
11	L	SVO	H*	H*	L-	1
11	S	SVO	!H*	!H*		0
11	Z	SVO	!H*	!H*		0
11	F	Stripping	NA	NA		1
11	H	Stripping	H*	H+L*		0
11	N	Stripping	L*+H	L*+H	H-L%	1
11	P	Stripping	H*	H*	H-L%	1
11	V	Stripping	L+H*	L+H*	H-L%	1
11	Y	Stripping	L+H*	L+H*	H-L%	1
12	A	SVO	L*	L*		1
12	D	SVO	L+H*	L+H*		1
12	J	SVO	H*	H*		1
12	L	SVO	L*	L*		1
12	S	SVO	L+H*	L+H*		1
12	Z	SVO	L*	H*		0
12	F	Stripping	L*	L*	H-H%	1
12	H	Stripping	L*	L*	H-H%	1
12	N	Stripping	L*	L*		1
12	P	Stripping	L*+H	L*+H		1
12	V	Stripping	L*+H	L*+H	H-H%	1
12	Y	Stripping	L*	L*		1
13	F	SVO	L*	L*		1
13	H	SVO	L*	L*		1
13	N	SVO	L*	L*		1
13	P	SVO	L*	L*		0
13	V	SVO	H*	H*		0
13	Y	SVO	H*	NA		0
13	A	Stripping	L+H* !H*	H*	L-L%	0
13	D	Stripping	L+H*	L+H*	H-L%	1
13	J	Stripping	L*	H*	L-L%	0
13	L	Stripping	H*	H*	L-L%	1
13	S	Stripping	L+H*	L+H*	H-L%	1
13	Z	Stripping	!H*	H*	L-L%	0
14	A	SVO	L*	L*	H-	1
14	D	SVO	L*+H	H*+L		0
14	J	SVO	L*	L*		1

14	L	SVO	!H*	!H*		1
14	S	SVO	NA	NA		1
14	Z	SVO	NA	L*	L-	0
14	F	Stripping	L*	L*	L-L%	1
14	H	Stripping	H*	H*		1
14	N	Stripping	!H*	!H*	H-L%	1
14	P	Stripping	L*	!H*	H-L%	0
14	V	Stripping	L*	L*	H-H%	1
14	Y	Stripping	L*	L*	H-H%	1
16	A	SVO	L*	L*	L-L%	1
16	D	SVO	!H*	L*		0
16	J	SVO	!H*	L*		0
16	L	SVO	H*	H*	L-	0
16	S	SVO	L*	L*		1
16	Z	SVO	L*	L*		1
16	F	Stripping	L*	L*		1
16	H	Stripping	H*	H*		1
16	N	Stripping	NA	L*	H-H%	0
16	P	Stripping	H*	L*	H-H%	0
16	V	Stripping	L+H*	L*	H-H%	0
16	Y	Stripping	H*	H*	H-L%	1
17	F	SVO	H*	H*		1
17	H	SVO	L*	L*+H		0
17	N	SVO	L*	L*	L-L%	1
17	P	SVO	H*	H*		1
17	V	SVO	L*	L*		0
17	Y	SVO	L*	L*		1
17	A	Stripping	L*	L*	H-H%	1
17	D	Stripping	L*	L*	H-	1
17	J	Stripping	L*	L*		1
17	L	Stripping	!H*	!H*	L-L%	0
17	S	Stripping	!H*	H*	L-L%	0
17	Z	Stripping	!H*	H+L*	H-L%	0

Table 55. SVO vs. Stripping VP Analysis

3. Pilot Production Study Chicago: Items and Filler

The target and filler items of the pilot production study Chicago were created together with Anja-Denise Seitz.

3.1 Target Items

1. Leon offended Alan at the gala, but I don’t know who else.
   a. Neutral: I didn't go to the gala last night – can you tell me what happened?
   b. Subject: Alan didn’t dress appropriately for the gala last week – did anybody offend him?
   c. Object: Leon tends to offend others in public – what did he do at the gala last night?

2. Barry insulted Lane at the office, but I don’t know who else.
   a. Neutral: Because I was ill, I couldn’t come to work for some days - did I miss anything?
   b. Subject: Lane said something offensive at work – did anyone insult him because of that?
   c. Object: Barry is a very temperamental person – did he insult anybody at work?

3. Hal kissed Ann after the concert, but I don’t know who else.
   a. Neutral: I didn't go to the festival last week - what happened there?
   b. Subject: Many guys admire Ann and her music – what happened after the concert?
   c. Object: Hal is quite the casanova – what did he do after the concert last night?

4. Elmer helped Leanne with the cleanup, but I don’t know who else.
   a. Neutral: I couldn’t stay until the end of the party – do you know what happened?
   b. Subject: Leanne already spent hours organizing the party – who helped her with the cleanup?
   c. Object: Elmer was at several parties last night – did he help anybody with the cleanup?

5. Baron sent Amber some flowers, but I don't know who else.
   a. Neutral: There were a lot of birthdays last week – did anything special happen?
   b. Subject: Amber is a popular colleague who loves gifts - did she get anything special for her birthday?
   c. Object: Baron is a florist who always meets nice girls at his shop – who did he send flowers today?

6. Ella showed Lorena the town hall, but I don't know who else.
   a. Neutral: The Millers moved to Little Rock recently - what’s new with them?
   b. Subject: Lorena is new in town and loves sightseeing - did anyone show her around?
   c. Object: Ella is the proud architect of the new town hall - did she show it to anyone?

3.2 Filler Items

1. Colin likes cats and Lena, too
   a. I haven't been to school for some time – what's new?
   b. The grandchildren are really animal friendly – which one is their favorite animal?
   c. Colin is famous for never liking anything for too long – who or what does he like at the moment?

2. Aaron left school and Minnie, too
   a. I heard something unusual happened at school last week – do you know what?
   b. Aaron and Minnie are best friends and they tend to do everything together – what's the latest thing they did together?
   c. Aaron has never committed himself to anyone or anything – what has he been up to recently?

3. Earl hit Lee and Norman, too
   a. I feel like there has been an increase of violence recently – what's the latest scoop?
   b. Lee, the new kid, experiences a lot of bullying at school – was it the same bullies yesterday?
   c. Our neighbor Earl is such a violent kid – do you know what he did last night?

4. Elena likes Logan and Harmony, too
   a. What's new in the neighborhood - who likes who?
   b. Logan is the new room-mate here in the house – who likes him?
   c. Elena is a complicated woman who does not have a lot of friends - who does she like?

5. Conan betrayed Ellen and Melanie, too
   a. There have been some rumors recently about betrayals in the company - what happened?
   b. Ellen's colleagues know that she has fudged the numbers - who betrayed her?
   c. Conan is a dishonest person and a swindler - who did he betray?

6. Lilly hates Homer and Carl, too
   a. There are some problems with the boys and girls at school - who hates who?
   b. Homer might not be the most popular boy at school - do his friends hate him?
   c. There are some ex-boyfriends who cheated on Lilly - who does she hate?

7. Ryan invited Hale to dinner and Leah to lunch
   a. Yesterday was a very chaotic day at work - what happened?
   b. Hale is the new colleague at the office – do you know if anyone has invited him out yet?
   c. I know that Ryan is very generous - who did he invite to what?

8. Manny gave Herman a present and Naomi a surprise
   a. There was a huge party last night – did anything special happen?
   b. It was Herman's birthday party last night - who gave him what?
   c. Manny got a special payment last month – what did he do with it?

9. Lionel sold Eli a book and Carol a journal
   a. Last week, there was a state sale – what happened there?
   b. Eli doesn't have enough money to buy expensive school materials– what did his friends sell him?
   c. Lionel's neighbors are avid readers – what did he sell them?

10. Honey met Neal at the restaurant and Emma at the zoo
    a. The weather was very nice yesterday - what did the kids do?
    b. Honey likes to meet her friends whenever she can – what did she do yesterday?
    c. Neal is on leave and is excited about meeting his sisters – where did they meet him?

11. Erwin drove Lara to the doctor and Molly to the studio
    a. There's always something going on at the Miller's – what happened last night?
    b. Erwin is very proud of his new car and needs driving practice – where did he drive his sisters?
    c. A: Lara had an accident and cannot drive - who helped her today?

12. Ian visited Nina in Chicago and Coleman in Seattle
    a. The Miller kids are spread all over the US – what's new with them?
    b. Ian is very sad that his siblings live really far away - who did he visit where?
    c. Nina has two apartments in different cities - who visited her where?

13. I think Leo meditates. Annie does too
    a. Yoga is a great way to relax - do you think people know about it?
    b. Leo knows a lot about relaxation techniques - who thinks that he meditates?
    c. A lot of people meditate regularly – do you know anybody who does?

14. I think Connor sleeps with a teddy bear. Lynn does too
    a. Some kids never grow up – what about the Williams' kids?
    b. Connor doesn't behave appropriately for his age – what is your opinion?
    c. Connor and Lynn do not behave like grown-ups - what do they need to fall asleep at night?

15. I think Morgan cheats during exams. Emily does too
    a. I heard you started working as a teacher – what's going on in your class?
    b. Morgan is not a bright student - who thinks that he cheats during exams?
    c. Most students are too lazy to study – which ones cheat during exams?

16. I think Connell prays for more rain. Carrie does too
    a. There has been a severe draught in California – what are people doing about it?
    b. Connell is a priest from California - who thinks that he prays for more rain?
    c. Connell and Mary meet every Sunday at church – what do they do there?

17. I believe Clay drinks too much, Roy does too
    a. There are some people who have a drinking problem – what about your friends?
    b. Clay has recently bought a lot of Scotch - who believes that he drinks too much?
    c. Some of my friends have a serious drinking problem - which of them drinks too much?

18. I think Riley has a new girlfriend. Hamlin does too
    a. I have been on vacation for two weeks - what's new with your friends?
    b. Riley likes to date a lot of girls - who thinks that he has a new girlfriend?
    c. I heard that there have been some changes in your friends' love lives - who has a new girlfriend?

19. Owen washed his car and Claire did, too
    a. Yesterday there was a car wash event on our street - what happened there?
    b. Claire loves Owen and would do anything for him – what did she help him with last night?
    c. Owen and Claire met up at the car wash last night - what did they do there?

20. Hanley invited his mother and holly, too
    a. Last Sunday was Mother's Day - what happened?
    b. Hanley and Holly are planning a surprise birthday party for their brother – who will be the special guest?
    c. Hanley and Holly have been dating for almost a year now – will their parents finally meet today?

21. Marlon destroyed his picture and Alina did, too
    a. There was an opening event at the art gallery - what happened there?
    b. Marlon got an awful painting of himself that everybody hated - what did he do with it?
    c. Marlon and Alina have secretly been photographed by different paparazzi – what happened once they caught them?

22. Ramona watered her palm tree and Hayley did, too
    a. Ramona and Hayley love plants – what did they do on Wednesday night?
    b. Before going away for the long weekend, Ramona and Hayley remembered to water their plants – which one did they both water?
    c. Ramona and Hayley both own a lot of plants but agreed to take care of them on their own – what did they do last night?

23. Camille fed her dog and Hanna did, too
    a. Camille and Hanna live together and both of them love animals - what did they do yesterday in the morning?
    b. Sometimes, Camille forgets to tell Hanna which of her duties she already did - what happened yesterday?
    c. Camille and Hanna both have a collie and they met yesterday to take them for a walk - what did they do afterwards?

24. Lillian hugged her boyfriend and Nola did, too
    a. Lillian and Nola met up with some people last night - what happened before they entered the bar?
    b. Nola admires Lillian's boyfriend and tries everything to show him her affection - what happened at the party last night?
    c. c. Lillian and Nola were happy to see their boyfriends after four long weeks - what happened at the station yesterday?

4. Pilot Acceptability Judgment Study: Items and Filler

4.1 Items

Condition (1): ACSimS

1. Leon offended Alan at the gala. Do you know who else?
2. Barry insulted Lane at the office. Do you know who else?
3. Hal kissed Ann after the concert. Do you know who else?
4. Elmer helped Leanne with the cleanup. Do you know who else?
5. Owen instructed Emily after work. Do you know who else?
6. Ella showed Lorena the town hall. Do you know who else?
7. Baron sent Amber some flowers. Do you know who else?
8. Alvin baked Hailey a wedding cake. Do you know who else?
9. Noah told Marianne the latest gossip. Do you remember who else?
10. Dylan wrote Maureen romantic letters. Do you remember who else?
11. Morgan caught Diane in the act. Do you remember who else?
12. Brad promised Amy protection. Do you remember who else?
13. Brian lent Ellen a lot of money. Do you remember who else?
14. Andy wished Briana a good start. Do you remember who else?
15. Armani gave Mary documents. Do you remember who else?
16. Aaron bought Lilly a new bible. Do you remember who else?

Condition (2): ASimS

1. Some waiters offended some guests at the gala. Do you know which ones?
2. Some managers insulted some secretaries at the office. Do you know which ones?
3. Some boys kissed some girls after the concert. Do you know which ones?
4. Some guests helped some maids with the cleanup. Do you know which ones?
5. Some architects instructed some mechanics after work. Do you know which ones?
6. Some residents showed some visitors the town hall. Do you know which ones?
7. A pupil sent a teacher some flowers. Do you know which ones?
8. Some confectioners baked some friends a wedding cake. Do you know which ones?
9. An executive told a journalist the latest gossip. Do you remember which one?
10. A poet wrote a woman romantic letters. Do you remember which one?
11. An officer caught a dealer in the act. Do you remember which one?
12. A security promised a banker protection. Do you remember which one?
13. An accountant lent a customer a lot of money. Do you remember which one?
14. A senior wished a freshman a good start. Do you remember which one?
15. A culprit gave a lawyer documents. Do you remember which one?
16. Some pastors bought some monks a new bible. Do you remember which one?

Condition (3): SimS_wNP (NP1)

1. Some waiters offended some guests at the gala. Do you know which waiters?
2. Some managers insulted some secretaries at the office. Do you know which managers?
3. Some boys kissed some girls after the concert. Do you know which boys?
4. Some guests helped some maids with the cleanup. Do you know which guests?
5. Some architects instructed some mechanics after work. Do you know which architects?

6. Some residents showed some visitors the town hall. Do you know which residents?
7. A pupil sent a teacher some flowers. Do you know which pupil?
8. Some confectioners baked some friends a wedding cake. Do you know which confectioners?
9. An executive told a journalist the latest gossip. Do you remember which executive?
10. A poet wrote a woman romantic letters. Do you remember which poet?
11. An officer caught a dealer in the act. Do you remember which officer?
12. A security promised a banker protection. Do you remember which security?
13. An accountant lent a customer a lot of money. Do you remember which accountant?
14. A senior wished a freshman a good start. Do you remember which senior?
15. A culprit gave a lawyer documents. Do you remember which culprit?
16. Some pastors bought some monks a new bible. Do you remember which pastors?

Condition (4): SimS_wNP (NP2)

1. Some waiters offended some guests at the gala. Do you know which guests?
2. Some managers insulted some secretaries at the office. Do you know which secretaries?
3. Some boys kissed some girls after the concert. Do you know which girls?
4. Some guests helped some maids with the cleanup. Do you know which maids?
5. Some architects instructed some mechanics after work. Do you know which mechanics?
6. Some residents showed some visitors the town hall. Do you know which visitors?
7. A pupil sent a teacher some flowers. Do you know which teacher?
8. Some confectioners baked some friends a wedding cake. Do you know which friends?
9. An executive told a journalist the latest gossip. Do you remember which journalist?
10. A poet wrote a woman romantic letters. Do you remember which woman?
11. An officer caught a dealer in the act. Do you remember which dealer?
12. A security promised a banker protection. Do you remember which banker?
13. An accountant lent a customer a lot of money. Do you remember which customer?
14. A senior wished a freshman a good start. Do you remember which freshman?
15. A culprit gave a lawyer documents. Do you remember which lawyer?
16. Some pastors bought some monks a new bible. Do you remember which monks?

Condition (5): AComxSS

1. An actress that played a villain was very pretty. Do you know which one?
2. A dancer that instructed a student was quite talented. Do you know which one?
3. A singer that trained a newbie was very patient. Do you know which one?
4. A mascot that represented an animal was quite entertaining. Do you know which one?
5. A robot that belonged to an engineer went crazy. Do you know which one?
6. A ranger that hired a farmer seemed to be quite wealthy. Do you know which one?
7. A nurse that befriended an addict became quite sick. Do you know which one?
8. A soldier that fought for a woman was badly injured. Do you know which one?
9. A hermit that lived with a doctor has died. Do you know which one?
10. A pilot that detested a steward has been fired. Do you know which one?
11. A retiree that looked after an infant has fainted. Do you remember which one?

12. A consultant that bargained with a client turned out to be corrupt. Do you remember which one?
13. A reporter that interviewed a swindler has been honored. Do you remember which one?
14. A criminal that deceived a cashier has been caught. Do you remember which one?
15. A quarterback that dated a cheerleader became very popular. Do you remember which one?
16. A hooligan that injured a keeper has been convicted. Do you remember which one?
17. A vocalist that sang with a pianist sounded phenomenal. Do you remember which one?
18. A refugee that fled with a stranger was very grateful. Do you remember which one?
19. A physicist that worked for a contractor was extremely smart. Do you remember which one?
20. A bartender that attended a minor was very inexperienced. Do you remember which one?

Condition (6): ComxSS_wNP (NP1)

1. An actress that played a villain was very pretty. Do you know which actress?
2. A dancer that instructed a student was quite talented. Do you know which dancer?
3. A singer that trained a newbie was very patient. Do you know which singer?
4. A mascot that represented an animal was quite entertaining. Do you know which mascot?
5. A robot that belonged to an engineer went crazy. Do you know which robot?
6. A ranger that hired a farmer seemed to be quite wealthy. Do you know which ranger?
7. A nurse that befriended an addict became quite sick. Do you know which nurse?
8. A soldier that fought for a woman was badly injured. Do you know which soldier?
9. A hermit that lived with a doctor has died. Do you know which hermit?
10. A pilot that detested a steward has been fired. Do you know which pilot?
11. A retiree that looked after an infant has fainted. Do you remember which retiree?
12. A consultant that bargained with a client turned out to be corrupt. Do you remember which consultant?
13. A reporter that interviewed a swindler has been honored. Do you remember which reporter?
14. A criminal that deceived a cashier has been caught. Do you remember which criminal?
15. A quarterback that dated a cheerleader became very popular. Do you remember which quarterback?
16. A hooligan that injured a keeper has been convicted. Do you remember which hooligan?
17. A vocalist that sang with a pianist sounded phenomenal. Do you remember which vocalist?
18. A refugee that fled with a stranger was very grateful. Do you remember which refugee?
19. A physicist that worked for a contractor was extremely smart. Do you remember which physicist?
20. A bartender that attended a minor was very inexperienced. Do you remember which bartender?

Condition (7): ComxSS_wNP (NP2)

1. An actress that played a villain was very pretty. Do you know which villain?
2. A dancer that instructed a student was quite talented. Do you know which student?
3. A singer that trained a newbie was very patient. Do you know which newbie?
4. A mascot that represented an animal was quite entertaining. Do you know which animal?
5. A robot that belonged to an engineer went crazy. Do you know which engineer?

6. A ranger that hired a farmer seemed to be quite wealthy. Do you know which farmer?
7. A nurse that befriended an addict became quite sick. Do you know which addict?
8. A soldier that fought for a woman was badly injured. Do you know which woman?
9. A hermit that lived with a doctor has died. Do you know which doctor?
10. A pilot that detested a steward has been fired. Do you know which steward?
11. A retiree that looked after an infant has fainted. Do you remember which infant?
12. A consultant that bargained with a client turned out to be corrupt. Do you remember which client?
13. A reporter that interviewed a swindler has been honored. Do you remember which swindler?
14. A criminal that deceived a cashier has been caught. Do you remember which cashier?
15. A quarterback that dated a cheerleader became very popular. Do you remember which cheerleader?
16. A hooligan that injured a keeper has been convicted. Do you remember which keeper?
17. A vocalist that sang with a pianist sounded phenomenal. Do you remember which pianist?
18. A refugee that fled with a stranger was very grateful. Do you remember which stranger?
19. A physicist that worked for a contractor was extremely smart. Do you remember which contractor?
20. A bartender that attended a minor was very inexperienced. Do you remember which minor?

Condition (8): ComxSS_wone (NP1)

1. An actress that played some villains was very pretty. Do you know which one?
2. A dancer that instructed some students was quite talented. Do you know which one?
3. A singer that trained some newbies was very patient. Do you know which one?
4. A mascot that represented some animals was quite entertaining. Do you know which one?
5. A robot that belonged to some engineers went crazy. Do you know which one?
6. A ranger that hired some farmers seemed to be quite wealthy. Do you know which one?
7. A nurse that befriended some addicts became quite sick. Do you know which one?
8. A soldier that fought for some women was badly injured. Do you know which one?
9. A hermit that lived with some doctors has died. Do you know which one?
10. A pilot that detested some stewards has been fired. Do you know which one?
11. A retiree that looked after some infants has fainted. Do you remember which one?
12. A consultant that bargained with some clients turned out to be corrupt. Do you remember which one?
13. A reporter that interviewed some swindlers has been honored. Do you remember which one?
14. A criminal that deceived some cashiers has been caught. Do you remember which one?
15. A quarterback that dated some cheerleaders became very popular. Do you remember which one?
16. A hooligan that injured some keepers has been convicted. Do you remember which one?
17. A vocalist that sang with some pianists sounded phenomenal. Do you remember which one?
18. A refugee that fled with some strangers was very grateful. Do you remember which one?
19. A physicist that worked for some contractors was extremely smart. Do you remember which one?

20. A bartender that attended some minors was very inexperienced. Do you remember which one?

Condition (9): ComxSS_wone (NP2)

1. An actress that played some villains was very pretty. Do you know which ones?
2. A dancer that instructed some students was quite talented. Do you know which ones?
3. A singer that trained some newbies was very patient. Do you know which ones?
4. A mascot that represented some animals was quite entertaining. Do you know which ones?
5. A robot that belonged to some engineers went crazy. Do you know which ones?
6. A ranger that hired some farmers seemed to be quite wealthy. Do you know which ones?
7. A nurse that befriended some addicts became quite sick. Do you know which ones?
8. A soldier that fought for some women was badly injured. Do you know which ones?
9. A hermit that lived with some doctors has died. Do you know which ones?
10. A pilot that detested some stewards has been fired. Do you know which ones?
11. A retiree that looked after some infants has fainted. Do you remember which ones?
12. A consultant that bargained with some clients turned out to be corrupt. Do you remember which ones?
13. A reporter that interviewed some swindlers has been honored. Do you remember which ones?
14. A criminal that deceived some cashiers has been caught. Do you remember which ones?
15. A quarterback that dated some cheerleaders became very popular. Do you remember which ones?
16. A hooligan that injured some keepers has been convicted. Do you remember which ones?
17. A vocalist that sang with some pianists sounded phenomenal. Do you remember which ones?
18. A refugee that fled with some strangers was very grateful. Do you remember which ones?
19. A physicist that worked for some contractors was extremely smart. Do you remember which ones?
20. A bartender that attended some minors was very inexperienced. Do you remember which ones?

4.1 Filler

1. The problems that affected some student were huge. Do you know which one?
2. The services that convinced some visitor were extraordinary. Do you remember which one?
3. The chocolates that pleased the customers were expensive. Can you tell me who else?
4. The products that convinced the testers were high-quality. Do you know who else?
5. The arguments that influenced some teacher were convincing. Do you remember which one?
6. The issues that affected the voters were well-known. Can you tell me who else?
7. The technologies that empowered the users were copyrighted. Do you remember who else?
8. Donald consoled Jacky, who is very sensitive. Do you know whom else?
9. Paula admired Bart for writing a bestseller. Do you remember whom else?
10. Sharon spotted the newcomers who were screaming something. Will you tell me who?
11. Homer complains about his mother who is always knitting. Do you know which one?
12. Claire fell in love with the bartender who was singing something. Will you tell me who?
13. Aimee helped a colleague who has an eating disorder. Can I ask what?
14. Sally visited her husband who works in a bakery. Can I ask what?
15. Sandra trusted Kathy with her life. Do you know whom else?
16. Although Susanna is one of the best students, she curses a lot. And at home, too?
17. Barbara comforted her mother who was mourning her cat. Will you tell me who?
18. Andrew skipped school and Minnie, too. And Jeffrey?
19. Colin adores cats and dogs, too. And bunnies?
20. Rose hates vegetables and fruits, too. And meat?
21. Jessica bakes cakes and cookies, too. What about pies?
22. Conan freaked out and Melanie, too. What about Dan?
23. Earl likes chocolate ice cream and vanilla ice cream, too. What about strawberry ice cream?
24. Some janitor destroyed someone's washing machine while cleaning. Can you guess whose?
25. Some editor rejected some author's book. Do you recall whose?
26. Jimmy criticized Alex for his poor preparation. Do you remember whom else?
27. Britney kissed Alex, who saved some of her friends. Did she tell you which one?
28. The patient fooled the dentist by pretending to be in pain. Do you recall whose?
29. The money in the bank is for the members of the secret society. Do you remember who?

5. Acceptability Judgment Study 2: Items and Filler

5.1 Items

Condition (1): SimS (NP1)

1. On Monday a woman invited some singers. Do you know which one?
2. On Tuesday a lawyer defended some dealers. Do you know which one?
3. On Wednesday a poet encouraged some students. Do you know which one?
4. On Thursday a senior protected some minors. Do you know which one?
5. On Friday a lawman arrested some burglars. Do you know which one?
6. On Sunday a father insulted some lenders. Do you know which one?
7. On Monday a model admired some babies. Do you know which one?
8. On Tuesday a client consulted some newbies. Do you know which one?
9. On Wednesday a leader promoted some waiters. Do you know which one?
10. On Thursday a mother embarrassed some daughters. Do you know which one?
11. On Friday a farmer recruited some drivers. Do you know which one?
12. On Sunday a drawer instructed some painters. Do you know which one?
13. On Monday a vendor supported some widows. Do you know which one?
14. On Tuesday a mayor befriended some neighbors. Do you know which one?
15. On Wednesday a diver challenged some swimmers. Do you know which one?
16. On Thursday a robot delighted some learners. Do you know which one?

Condition (2): SimS (NP2)

1. On Monday a woman invited some singers. Do you know which ones?
2. On Tuesday a lawyer defended some dealers. Do you know which ones?
3. On Wednesday a poet encouraged some students. Do you know which ones?
4. On Thursday a senior protected some minors. Do you know which ones?
5. On Friday a lawman arrested some burglars. Do you know which ones?
6. On Sunday a father insulted some lenders. Do you know which ones?
7. On Monday a model admired some babies. Do you know which ones?
8. On Tuesday a client consulted some newbies. Do you know which ones?
9. On Wednesday a leader promoted some waiters. Do you know which ones?
10. On Thursday a mother embarrassed some daughters. Do you know which ones?
11. On Friday a farmer recruited some drivers. Do you know which ones?
12. On Sunday a drawer instructed some painters. Do you know which ones?
13. On Monday a vendor supported some widows. Do you know which ones?
14. On Tuesday a mayor befriended some neighbors. Do you know which ones?
15. On Wednesday a diver challenged some swimmers. Do you know which ones?
16. On Thursday a robot delighted some learners. Do you know which ones?

Condition (3): SimES (NP1)

1. They said that a woman invited some singers. Do you know which one?
2. They claimed that a lawyer defended some dealers. Do you know which one?
3. They thought that a poet encouraged some students. Do you know which one?
4. They said that a senior protected some minors. Do you know which one?
5. They claimed that a lawman arrested some burglars. Do you know which one?

6. They thought that a father insulted some lenders. Do you know which one?
7. They said that a model admired some babies. Do you know which one?
8. They claimed that a client consulted some newbies. Do you know which one?
9. They thought that a leader promoted some waiters. Do you know which one?
10. They said that a mother embarrassed some daughters. Do you know which one?
11. They claimed that a farmer recruited some drivers. Do you know which one?
12. They thought that a drawer instructed some painters. Do you know which one?
13. They said that a vendor supported some widows. Do you know which one?
14. They claimed that a mayor befriended some neighbors. Do you know which one?
15. They thought that a diver challenged some swimmers. Do you know which one?
16. They said that a robot delighted some learners. Do you know which one?

Condition (4): SimES (NP2)

1. They said that a woman invited some singers. Do you know which ones?
2. They claimed that a lawyer defended some dealers. Do you know which ones?
3. They thought that a poet encouraged some students. Do you know which ones?
4. They said that a senior protected some minors. Do you know which ones?
5. They claimed that a lawman arrested some burglars. Do you know which ones?
6. They thought that a father insulted some lenders. Do you know which ones?
7. They said that a model admired some babies. Do you know which ones?
8. They claimed that a client consulted some newbies. Do you know which ones?
9. They thought that a leader promoted some waiters. Do you know which ones?
10. They said that a mother embarrassed some daughters. Do you know which ones?
11. They claimed that a farmer recruited some drivers. Do you know which ones?
12. They thought that a drawer instructed some painters. Do you know which ones?
13. They said that a vendor supported some widows. Do you know which ones?
14. They claimed that a mayor befriended some neighbors. Do you know which ones?
15. They thought that a diver challenged some swimmers. Do you know which ones?
16. They said that a robot delighted some learners. Do you know which ones?

Condition (5): ComSimS (NP1)

1. They informed a woman that she had invited some singers. Do you know which one?
2. They informed a lawyer that he had defended some dealers. Do you know which one?
3. They informed a poet that he had encouraged some students. Do you know which one?
4. They informed a senior that she had protected some minors. Do you know which one?
5. They informed a lawman that he had arrested some burglars. Do you know which one?
6. They informed a father that he had insulted some lenders. Do you know which one?
7. They informed a model that she had admired some babies. Do you know which one?
8. They informed a client that she had consulted some newbies. Do you know which one?
9. They informed a leader that he had promoted some waiters. Do you know which one?
10. They informed a mother that she had embarrassed some daughters. Do you know which one?
11. They informed a farmer that he had recruited some drivers. Do you know which one?
12. They informed a drawer that he had instructed some painters. Do you know which one?

13. They informed a vendor that she had supported some widows. Do you know which one?
14. They informed a mayor that she had befriended some neighbors. Do you know which one?
15. They informed a diver that he had challenged some swimmers. Do you know which one?
16. They informed a robot that it had delighted some learners. Do you know which one?

Condition (6): ComSimS (NP2)

1. They informed a woman that she had invited some singers. Do you know which ones?
2. They informed a lawyer that he had defended some dealers. Do you know which ones?
3. They informed a poet that he had encouraged some students. Do you know which ones?
4. They informed a senior that she had protected some minors. Do you know which ones?
5. They informed a lawman that he had arrested some burglars. Do you know which ones?
6. They informed a father that he had insulted some lenders. Do you know which ones?
7. They informed a model that she had admired some babies. Do you know which ones?
8. They informed a client that she had consulted some newbies. Do you know which ones?
9. They informed a leader that he had promoted some waiters. Do you know which ones?
10. They informed a mother that she had embarrassed some daughters. Do you know which ones?
11. They informed a farmer that he had recruited some drivers. Do you know which ones?
12. They informed a drawer that he had instructed some painters. Do you know which ones?
13. They informed a vendor that she had supported some widows. Do you know which ones?
14. They informed a mayor that she had befriended some neighbors. Do you know which ones?
15. They informed a diver that he had challenged some swimmers. Do you know which ones?
16. They informed a robot that it had delighted some learners. Do you know which ones?

Condition (7): ComxOS (NP1)

1. They hired a woman that had invited some singers. Do you know which one?
2. They fired a lawyer that had defended some dealers. Do you know which one?
3. They honored a poet that had encouraged some students. Do you know which one?
4. They honored a senior that had protected some minors. Do you know which one?
5. They hired a lawman that had arrested some burglars. Do you know which one?
6. They scolded a father that had insulted some lenders. Do you know which one?
7. They hired a model that had admired some babies. Do you know which one?
8. They honored a client that had consulted some newbies. Do you know which one?
9. They fired a leader that had promoted some waiters. Do you know which one?
10. They scolded a mother that had embarrassed some daughters. Do you know which one?
11. They fired a farmer that had recruited some drivers. Do you know which one?
12. They hired a drawer that had instructed some painters. Do you know which one?
13. They hired a vendor that had supported some widows. Do you know which one?
14. They honored a mayor that had befriended some neighbors. Do you know which one?
15. They hired a diver that had challenged some swimmers. Do you know which one?
16. They honored a robot that had delighted some learners. Do you know which one?

Condition (8): ComxOS (NP2)

1. They hired a woman that had invited some singers. Do you know which ones?
2. They fired a lawyer that had defended some dealers. Do you know which ones?
3. They honored a poet that had encouraged some students. Do you know which ones?
4. They honored a senior that had protected some minors. Do you know which ones?
5. They hired a lawman that had arrested some burglars. Do you know which ones?
6. They scolded a father that had insulted some lenders. Do you know which ones?
7. They hired a model that had admired some babies. Do you know which ones?
8. They honored a client that had consulted some newbies. Do you know which ones?
9. They fired a leader that had promoted some waiters. Do you know which ones?
10. They scolded a mother that had embarrassed some daughters. Do you know which ones?
11. They fired a farmer that had recruited some drivers. Do you know which ones?
12. They hired a drawer that had instructed some painters. Do you know which ones?
13. They hired a vendor that had supported some widows. Do you know which ones?
14. They honored a mayor that had befriended some neighbors. Do you know which ones?
15. They hired a diver that had challenged some swimmers. Do you know which ones?
16. They honored a robot that had delighted some learners. Do you know which ones?

5.1 Filler

1. The discussions that impressed some professor were sophisticated. Can you tell me which one?
2. The arguments that influenced some teacher were convincing. Do you remember which teacher?
3. The issues that affected the voters were well-known. Can you tell me who else?
4. The technologies that empowered the users were copyrighted. Do you remember who else?
5. Aimee helped a colleague who has an eating disorder. Can I ask what?
6. Sally visited her husband who works in a bakery. Can I ask what?
7. Sandra trusted Kathy with her life. Do you know whom else?
8. Although Susanna is one of the best students, she curses a lot. And at home, too?
9. Barbara comforted her mother who was mourning her cat. Will you tell me who?
10. Jessica bakes cakes and cookies, too. What about pies?
11. Conan freaked out and Melanie, too. What about Dan?
12. Earl likes chocolate ice cream and vanilla ice cream, too. What about strawberry ice cream?
13. Britney kissed Alex, who saved some of her friends. Did she tell you who?
14. The patient fooled the dentist by pretending to be in pain. Do you recall whose?
15. The money in the bank is for the members of the secret society. Do you remember who?
16. Andrew skipped school and Minnie, too. And Jeffrey?
17. Colin adores cats and dogs, too. And bunnies?
18. Rose hates vegetables and fruits, too. And meat?
19. Some janitor destroyed someone's washing machine while cleaning. Can you guess whose?
20. Some editor rejected some author's book. Do you recall whose?
21. Jimmy criticized Alex for his poor preparation. Do you remember whom else?
22. Donald consoled Jacky, who is very sensitive. Do you know whom else?
23. Paula admired Bart for writing a bestseller. Do you remember whom else?
24. Sharon spotted the newcomers who were screaming something. Will you tell me who?
25. Homer complains about his mother who is always knitting. Do you know who?
26. Claire fell in love with the bartender who was singing something. Will you tell me who?
27. The problems that affected some student were huge. Do you know which student?
28. The services that convinced some visitor were extraordinary. Do you remember which visitor?
29. The chocolates that pleased the customers were expensive. Can you tell me who else?
30. The products that convinced the testers were high-quality. Do you know who else?

6. Acceptability Judgment Study 3: Items and Filler

6.1 Items

Conditions (5), (6), (7) and (8) from Acceptability Judgment Study 2

Condition (9): ComxISS (NP1)

1. A woman that invited some singers has been hired. Do you know which one?
2. A lawyer that defended some dealers has been fired. Do you know which one?
3. A poet that encouraged some students has been honored. Do you know which one?
4. A senior that protected some minors has been honored. Do you know which one?
5. A lawman that arrested some burglars has been hired. Do you know which one?
6. A father that insulted some lenders has been scolded. Do you know which one?
7. A model that admired some babies has been scolded. Do you know which one?
8. A client that consulted some newbies has been honored. Do you know which one?
9. A leader that promoted some waiters has been fired. Do you know which one?
10. A mother that embarrassed some daughters has been scolded. Do you know which one?
11. A farmer that recruited some drivers has been fired. Do you know which one?
12. A drawer that instructed some painters has been hired. Do you know which one?
13. A vendor that supported some widows has been hired. Do you know which one?
14. A mayor that befriended some neighbors has been honored. Do you know which one?
15. A diver that challenged some swimmers has been hired. Do you know which one?
16. A robot that delighted some learners has been honored. Do you know which one?

Condition (10): ComxISS (NP2)

1. A woman that invited some singers has been hired. Do you know which ones?
2. A lawyer that defended some dealers has been fired. Do you know which ones?
3. A poet that encouraged some students has been honored. Do you know which ones?
4. A senior that protected some minors has been honored. Do you know which ones?
5. A lawman that arrested some burglars has been hired. Do you know which ones?
6. A father that insulted some lenders has been scolded. Do you know which ones?
7. A model that admired some babies has been scolded. Do you know which ones?
8. A client that consulted some newbies has been honored. Do you know which ones?
9. A leader that promoted some waiters has been fired. Do you know which ones?
10. A mother that embarrassed some daughters has been scolded. Do you know which ones?
11. A farmer that recruited some drivers has been fired. Do you know which ones?
12. A drawer that instructed some painters has been hired. Do you know which ones?
13. A vendor that supported some widows has been hired. Do you know which ones?
14. A mayor that befriended some neighbors has been honored. Do you know which ones?
15. A diver that challenged some swimmers has been hired. Do you know which ones?
16. A robot that delighted some learners has been honored. Do you know which ones?

Condition (11): ComxESS (NP1)

1. A woman has been hired that invited some singers. Do you know which one?
2. A lawyer has been fired that defended some dealers. Do you know which one?

3. A poet has been honored that encouraged some students. Do you know which one?
4. A senior has been honored that protected some minors. Do you know which one?
5. A lawman has been hired that arrested some burglars. Do you know which one?
6. A father has been scolded that insulted some lenders. Do you know which one?
7. A model has been scolded that admired some babies. Do you know which one?
8. A client has been honored that consulted some newbies. Do you know which one?
9. A leader has been fired that promoted some waiters. Do you know which one?
10. A mother has been scolded that embarrassed some daughters. Do you know which one?
11. A farmer has been fired that recruited some drivers. Do you know which one?
12. A drawer has been hired that instructed some painters. Do you know which one?
13. A vendor has been hired that supported some widows. Do you know which one?
14. A mayor has been honored that befriended some neighbors. Do you know which one?
15. A diver has been hired that challenged some swimmers. Do you know which one?
16. A robot has been honored that delighted some learners. Do you know which one?

Condition (12): ComxESS (NP2)

1. A woman has been hired that invited some singers. Do you know which ones?
2. A lawyer has been fired that defended some dealers. Do you know which ones?
3. A poet has been honored that encouraged some students. Do you know which ones?
4. A senior has been honored that protected some minors. Do you know which ones?
5. A lawman has been hired that arrested some burglars. Do you know which ones?
6. A father has been scolded that insulted some lenders. Do you know which ones?
7. A model has been scolded that admired some babies. Do you know which ones?
8. A client has been honored that consulted some newbies. Do you know which ones?
9. A leader has been fired that promoted some waiters. Do you know which ones?
10. A mother has been scolded that embarrassed some daughters. Do you know which ones?
11. A farmer has been fired that recruited some drivers. Do you know which ones?
12. A drawer has been hired that instructed some painters. Do you know which ones?
13. A vendor has been hired that supported some widows. Do you know which ones?
14. A mayor has been honored that befriended some neighbors. Do you know which ones?
15. A diver has been hired that challenged some swimmers. Do you know which ones?
16. A robot has been honored that delighted some learners. Do you know which ones?

6.2 Filler

Filler from Acceptability Judgment Study 2

7. Production Study Quarterback: Instructions

	+Trained	-Trained
General Information	• The entire experiment will last about 30 minutes. • You will be compensated for this experiment with 15 €. • Your task will be to read out loud around 45 short text passages. • Your data will be treated anonymously and will be analyzed only for scientific reasons.	• The entire experiment will last about 30 minutes. • You will be compensated for this experiment with 15 €. • Your task will be to read out loud around 45 short text passages. • Your data will be treated anonymously and will be analyzed only for scientific reasons.
Procedure	• On the next page, you will see a **sample** of the experimental task. • There will be a short **practice phase** preceding the actual experiment. This will give you time to familiarize yourself with the task. During and after the practice phase, you can ask as many questions as you want. • After the practice phase, the **experimenter will leave you alone** and the experiment will start.	1) On the next page, you will see a **sample** of the experimental task. 2) There will be a short **practice phase** preceding the actual experiment. This will give you time to familiarize yourself with the task. During and after the practice phase, you can ask as many questions as you want. 3) After the practice phase, the **experimenter will leave you alone** and the experiment will start.
Sample Item	(SAMPLE)	(SAMPLE)
Important Information	• Please do **not rush** through the experiment. You can take as much time and as many breaks as you need! • It is **really important** that you **understand the meaning** of the text passages before reading them out loud. • Some text passages **may sound similar** to you. This is because some of them	• Please do **not rush** through the experiment. You can take as much time and as many breaks as you need! • **Please note:** Some of the text passages will be followed by a **short task** such as a quick comprehension question or an easy arithmetical problem. This should help you to **take a break** from speaking and to relax.

	only differ in a few words. These differences, however, may lead to a **change of meaning**. • **Please note:** Some of the text passages will be followed by a **short task** such as a quick comprehension question or an easy arithmetical problem. This should help you to **take a break** from speaking and to relax. • Please make sure that you **pronounce the text passages well**. • Feel free to **repeat** any text passage, e.g. if you had to cough, made a mistake, hesitated, aren't happy with your pronunciation, etc.	• Feel free to **repeat** any text passage, e.g. if you had to cough, made a mistake, hesitated, aren't happy with your pronunciation, etc.
Some helpful information	• Please note that it is possible to support the meaning of a text passage by **emphasizing certain words**. An example of this is illustrated below: **(1) I think John invited Mary to the ball. Or was it Peter?** (sound file with recording) • As you could hear, this text passage can be pronounced with **special emphasis** on *John* and *Peter* in order to support the meaning that it wasn't <u>John</u> but <u>Peter</u> who invited Mary. • Such **prosodic emphasis** can be **very helpful** for a listener who needs to decode your message. Keep that in mind when reading out loud your sentences.	-

	Please listen to some more examples: • Last night, my brother went to a party. Can you guess who else did? • I think Sam loves Italy. Or does he prefer France? • Brian moved to some city in France. Did he tell you which one? • James won't drink wine in the morning. What about at night?	
Last remarks	If there are any questions, feel free to ask the experimenter now or after the practice phase. When you feel confident to start the practice phase, please press *Next*	If there are any questions, feel free to ask the experimenter now or after the practice phase. When you feel confident to start the practice phase, please press *Next*.
Practice Phase	(PRACTICE PHASE)	(PRACTICE PHASE)

Table 56. Instructions of Production Study Quarterback

8. Production Study Quarterback Part 1: Items and Filler

8.1 Items

Condition 1: (SimS (NP2)

1. On Monday some waiter invited some women. Do you know which ones?
2. On Tuesday some lawyer defended some dealers. Do you know which ones?
3. On Wednesday some poet encouraged some students. Do you know which ones?
4. On Thursday some father insulted some burglars. Do you know which ones?
5. On Friday some client consulted some seniors. Do you know which ones?
6. On Monday some farmer recruited some painters. Do you know which ones?
7. On Sunday some mayor protected some neighbors. Do you know which ones?
8. On Tuesday some diver challenged some swimmers. Do you know which ones?

Condition 2: (SimS (NP1))

1. On Monday some waiter invited some women. Do you know which one?
2. On Tuesday some lawyer defended some dealers. Do you know which one?
3. On Wednesday some poet encouraged some students. Do you know which one?
4. On Thursday some father insulted some burglars. Do you know which one?
5. On Friday some client consulted some seniors. Do you know which one?
6. On Monday some farmer recruited some painters. Do you know which one?
7. On Sunday some mayor protected some neighbors. Do you know which one?
8. On Tuesday some diver challenged some swimmers. Do you know which one?

Condition 3: (SimES (NP2))

1. They thought that some waiter invited some women. Do you know which ones?
2. They knew that some lawyer defended some dealers. Do you know which ones?
3. They said that some poet encouraged some students. Do you know which ones?
4. They claimed that some father insulted some burglars. Do you know which ones?
5. They said that some client consulted some seniors. Do you know which ones?
6. They claimed that some farmer recruited some painters. Do you know which ones?
7. They knew that some mayor protected some neighbors. Do you know which ones?
8. They thought that some diver challenged some swimmers. Do you know which ones?

Condition 4: (SimES (NP1))

1. They thought that some waiter invited some women. Do you know which one?
2. They knew that some lawyer defended some dealers. Do you know which one?
3. They said that some poet encouraged some students. Do you know which one?
4. They claimed that some father insulted some burglars. Do you know which one?
5. They said that some client consulted some seniors. Do you know which one?
6. They claimed that some farmer recruited some painters. Do you know which one?
7. They knew that some mayor protected some neighbors. Do you know which one?
8. They thought that some diver challenged some swimmers. Do you know which one?

8.1 Filler

1. I think it was Bob who failed Professor Johnson's class. Or was it Jake?
2. I heard that Mary bought a book about planes. Or was it a DVD?
3. I saw how Berry read an article about cats. Or was it about dogs?
4. Johnny only invited his aunt to his birthday. What about his uncle?
5. Maria and her father went camping. Did they go hunting, too?
6. I'm pretty sure that Jamie is a coffee lover. So why doesn't he like Steve's coffee?
7. I assumed that Sally started dancing Salsa. Or was it Linda?
8. James is a great actor. Is it true that he also works as a stuntman?

9. Production Study Quarterback Part 1: Perceptual Analysis

Legend:

- (nothing) = no accent
- x = weak accent
- xx = strong accent
- 0 = no prosodic disambiguation (focused NP weaker than unfocused NP)
- 1 = prosodic disambiguation open (both NPs strong)
- 2 = prosodic disambiguation (focused NP stronger than unfocused NP)
- 3 = no agreement
- 4 = agreement

			Annotator One							**Annotator Two**				**Prosodic Disambiguation**		
Group Type	**Part.**	**Cond.**	***some***	***NP1***	***VP***	***some***	***NP2***	***which***	***one_s***	***some***	***NP1***	***some***	***NP2***	**Annot. 1**	**Annot. 2**	**Agreem.**
+Trained	1	1		x	x		xx		x		x		xx	2	2	4
+Trained	1	1		x			xx		x		x		xx	2	2	4
+Trained	1	1		x	x		xx		x		x		xx	2	2	4
+Trained	1	1		x			xx		x		x		xx	2	2	4
+Trained	1	1		x	x		xx		x		x		xx	2	2	4
+Trained	1	1		x			xx		x		x		xx	2	2	4
+Trained	1	1		x			xx		x		x		x	2	1	3
+Trained	1	1		x	x		xx		x		x		xx	2	2	4
+Trained	1	2		xx	x		x		x		xx		xx	2	1	3
+Trained	1	2		xx			xx		x		xx		xx	1	1	4
+Trained	1	2		x	x		xx		x		x		xx	0	0	4
+Trained	1	2		x			xx		x		xx		x	0	2	3
+Trained	1	2		x			xx		x		x		xx	0	0	4
+Trained	1	2		xx	x		xx		x		xx		x	1	2	3

+Trained	1	2		xx			xx		x		xx		x	1	2	3
+Trained	1	2		x	x		xx		x		x		x	0	1	3
+Trained	10	1		xx	x		xx		x		x		xx	1	2	3
+Trained	10	1		x	x		xx		x		x		xx	2	2	4
+Trained	10	1		x	x		xx		x		x		xx	2	2	4
+Trained	10	1		xx	x		xx	x	x		x		xx	1	2	3
+Trained	10	1		x			xx		x		x		xx	2	2	4
+Trained	10	1		xx	x		x	x	x		x		x	0	1	3
+Trained	10	1		xx			xx	x	x		x		xx	1	2	3
+Trained	10	1		xx	x		x		x		xx		x	0	0	4
+Trained	10	2		xx	x		xx		x		xx		xx	1	1	4
+Trained	10	2		xx			xx		x		xx		x	1	2	3
+Trained	10	2		xx	x		x	x	x		xx		x	2	2	4
+Trained	10	2		xx	x		x		x		xx		x	2	2	4
+Trained	10	2		xx	x		xx	x	x		x		x	1	1	4
+Trained	10	2		xx			xx		x		x		xx	1	0	3
+Trained	10	2		xx			x	x	x		xx		x	2	2	4
+Trained	10	2		xx	x		x		x		xx		x	2	2	4
+Trained	19	1		x			xx				x	xx	xx	2	2	4
+Trained	19	1		x			xx				x		xx	2	2	4
+Trained	19	1		x			xx				x	xx	xx	2	2	4
+Trained	19	1		x			xx				x	xx	xx	2	2	4
+Trained	19	1		x			x				x	xx	xx	1	2	3
+Trained	19	1		xx			xx				x		xx	1	2	3
+Trained	19	1		x			xx				x	x	xx	2	2	4
+Trained	19	1		x			xx				x	xx	x	2	2	4

+Trained	19	2		x			x			xx	xx		x	1	2	3
+Trained	19	2		x			x			xx	xx		x	1	2	3
+Trained	19	2		xx			x				xx		x	2	2	4
+Trained	19	2		xx			x				xx		x	2	2	4
+Trained	19	2		xx			xx			xx	xx		x	1	2	3
+Trained	19	2		xx			x			xx	xx		x	2	2	4
+Trained	19	2		xx			x				xx		x	2	2	4
+Trained	19	2		xx			x				xx		x	2	2	4
+Trained	2	1		x	x		xx		x		x		x	2	2	4
+Trained	2	1		x			xx		x		xx		x	2	0	3
+Trained	2	1		x			xx		x		xx		x	2	0	3
+Trained	2	1		x			xx		x	x	x		x	2	1	3
+Trained	2	1		x			xx		x		x		x	2	1	3
+Trained	2	1		xx			xx		x		x		x	1	1	4
+Trained	2	1	x	xx	x		x		x		x		x	0	1	3
+Trained	2	1	x	xx	x		x		x	xx	xx		x	0	0	4
+Trained	2	2	xx	x	x		x		x	xx	xx		x	1	2	3
+Trained	2	2	x	xx	x		x		x	xx	xx		x	2	2	4
+Trained	2	2	x	xx	x		x		x	xx	xx		x	2	2	4
+Trained	2	2	xx	x	x		x		x	xx	xx		x	1	2	3
+Trained	2	2	xx	x			x		x	xx	xx		x	1	2	3
+Trained	2	2	xx	x	x		x		x	xx	xx		x	1	2	3
+Trained	2	2	x	xx			x		x	xx	xx		x	2	2	4
+Trained	2	2	x	xx	x		x		x	xx	xx		x	2	2	4
+Trained	3	1		xx	x		x		x		xx		xx	0	1	3
+Trained	3	1		xx			xx		x		x		xx	1	2	3

+Trained	3	1		xx	xx		x	x	x		xx			0	0	4
+Trained	3	1		xx	x		xx	x	x		xx		xx	1	1	4
+Trained	3	1		x			xx		x		x		xx	2	2	4
+Trained	3	1		xx	xx		xx	x	x		x		xx	1	2	3
+Trained	3	1		xx			x	x			xx		x	0	0	4
+Trained	3	1		xx	x		xx		x		x		x	1	1	4
+Trained	3	2		xx	x		x		x		xx		xx	2	1	3
+Trained	3	2		xx			x		x		xx		x	2	2	4
+Trained	3	2		xx	x		x	x	x		xx		x	2	2	4
+Trained	3	2		xx	x		x		x		xx		x	2	2	4
+Trained	3	2		xx	x		x		x		xx		x	2	2	4
+Trained	3	2		xx	xx		x		x		xx		x	2	2	4
+Trained	3	2		xx	x		x				xx		xx	2	1	3
+Trained	3	2		xx	x		x		x		xx		xx	2	1	3
+Trained	7	1		x	x		x		x		x		x	1	1	4
+Trained	7	1		x	xx		x		x		xx		x	1	0	3
+Trained	7	1		xx	x		x		x		x		x	0	1	3
+Trained	7	1		xx	x		x		x		xx			0	0	4
+Trained	7	1		xx	x		x		x		x		x	0	1	3
+Trained	7	1		x	x		xx		x		x		xx	2	2	4
+Trained	7	1		xx			x		x		xx		xx	0	1	3
+Trained	7	1		xx	x		x		x		x			0	0	4
+Trained	7	2		xx							xx		x	2	2	4
+Trained	7	2		xx			x		x		xx			2	2	4
+Trained	7	2		x	xx		x		x		x		x	1	1	4
+Trained	7	2		xx			x		x		xx		x	2	2	4

+Trained	7	2		xx	x		x		x		x		x	2	1	3
+Trained	7	2		xx	x		x		x		x		x	2	1	3
+Trained	7	2		x	x		xx		x		xx		xx	0	1	3
+Trained	7	2		xx	x		x		x		xx		xx	2	1	3
-Trained	11	1		xx	x		x		x		x		x	0	1	3
-Trained	11	1		x			xx		x		x			2	0	3
-Trained	11	1		xx	x				x		xx			0	0	4
-Trained	11	1		xx	x				x		xx			0	0	4
-Trained	11	1	x	x	xx		x		x		xx		x	1	0	3
-Trained	11	1		xx	xx		x		x		x			0	0	4
-Trained	11	1		xx	x		x		x		x			0	0	4
-Trained	11	1		xx	x		x		x		x			0	0	4
-Trained	11	2		xx	x				x		x			2	2	4
-Trained	11	2		x	x		xx		x		x			0	2	3
-Trained	11	2		xx	xx				x		x			2	2	4
-Trained	11	2		xx	x		x		x		x			2	2	4
-Trained	11	2		xx	x		x		x		x			2	2	4
-Trained	11	2		xx	x		x		x		x			2	2	4
-Trained	11	2		xx	x		xx		x		x			1	2	3
-Trained	11	2		xx	xx				x		x			2	2	4
-Trained	13	1		x			xx				x		xx	2	2	4
-Trained	13	1		x			xx				x		xx	2	2	4
-Trained	13	1		x			xx				xx		xx	2	1	3
-Trained	13	1		xx			xx				x		x	1	1	4
-Trained	13	1		xx			xx				x		x	1	1	4
-Trained	13	1					xx				x		x	2	1	3

-Trained	13	1		xx			xx				x		x	1	1	4
-Trained	13	1		xx			x				xx		x	0	0	4
-Trained	13	2		x			x				x			1	2	3
-Trained	13	2		xx			xx				xx		xx	1	1	4
-Trained	13	2		x			xx				xx		xx	0	1	3
-Trained	13	2		xx			x				x		x	2	1	3
-Trained	13	2		xx			x				x		x	2	1	3
-Trained	13	2		x			xx				x		x	0	1	3
-Trained	13	2		xx			x				x		x	2	1	3
-Trained	13	2		xx			x				x		x	2	1	3
-Trained	14	1		xx			x			x	x		xx	0	2	3
-Trained	14	1		x			xx			xx	x		x	2	1	3
-Trained	14	1		xx			x				xx		x	0	0	4
-Trained	14	1		xx			xx			x	x		xx	1	2	3
-Trained	14	1		x			xx				x		xx	2	2	4
-Trained	14	1		xx			xx				x		x	1	1	4
-Trained	14	1		x			xx			xx	xx		xx	2	1	3
-Trained	14	1		xx			x				xx		xx	0	1	3
-Trained	14	2		xx			x				xx		xx	2	1	3
-Trained	14	2		xx			x				xx		xx	2	1	3
-Trained	14	2		xx			xx				x		x	1	1	4
-Trained	14	2		xx			xx			xx	xx		x	1	2	3
-Trained	14	2		xx			xx			xx	xx		x	1	2	3
-Trained	14	2		x			xx				x		x	0	1	3
-Trained	14	2		xx			x			xx	xx		xx	2	1	3
-Trained	14	2		xx			x			xx	xx		x	2	2	4

-Trained	17	1		x			x			xx	xx		x	1	0	3
-Trained	17	1		xx			x				xx		x	0	0	4
-Trained	17	1		xx			x			xx	xx	x	xx	0	1	3
-Trained	17	1		xx			xx			xx	xx		x	1	0	3
-Trained	17	1		xx			x			xx	xx		x	0	0	4
-Trained	17	1		xx			x			xx	xx		xx	0	1	3
-Trained	17	1		xx			x			xx	xx	x	xx	0	1	3
-Trained	17	1		xx			x			xx	xx	x	x	0	0	4
-Trained	17	2		xx			x			xx	xx		x	2	2	4
-Trained	17	2		xx			xx				xx		x	1	2	3
-Trained	17	2		xx			x				xx	x	x	2	0	3
-Trained	17	2		xx			x			xx	xx		x	2	0	3
-Trained	17	2		xx			xx			xx	xx		x	1	0	3
-Trained	17	2		xx			x			xx	xx		xx	2	1	3
-Trained	17	2		xx			x			xx	xx	x	xx	2	1	3
-Trained	17	2		xx			x			xx	xx	x	x	2	2	4
-Trained	5	1		x	x		x		x		xx		xx	1	1	4
-Trained	5	1		x			xx		x		x		xx	2	2	4
-Trained	5	1		x	x		xx		x		x	x	xx	2	2	4
-Trained	5	1		xx			x		x		xx		x	0	0	4
-Trained	5	1		xx			x		x		x			0	0	4
-Trained	5	1		x			x		x		x		xx	1	2	3
-Trained	5	1		xx			x		x		x		x	0	1	3
-Trained	5	1		xx	x		x		x		x		x	0	1	3
-Trained	5	2		xx	x		x				x		xx	2	0	3
-Trained	5	2		xx			x		x		xx			2	2	4

-Trained	5	2		xx	x		xx		x		xx		x	1	2	3
-Trained	5	2	x	xx	x		x		x	x	xx		xx	2	2	4
-Trained	5	2		xx			x				x		x	2	1	3
-Trained	5	2		x			xx		x		x		xx	0	0	4
-Trained	5	2		x			xx		x		x		xx	0	0	4
-Trained	5	2		xx	x		xx		x		x		xx	1	0	3
-Trained	6	1		x	x		xx		x		x		xx	2	2	4
-Trained	6	1		x	x		xx		x		x		xx	2	2	4
-Trained	6	1		x	xx		x		x		xx		xx	1	1	4
-Trained	6	1		x	xx		x		x		xx		xx	1	1	4
-Trained	6	1		xx	x		x		x		xx		xx	0	1	3
-Trained	6	1		x	x		xx		x		xx		xx	2	1	3
-Trained	6	1		x	xx		x		x	x	xx		xx	1	1	3
-Trained	6	1		x	x		xx		x		xx		xx	2	1	3
-Trained	6	2		xx	x		x		x		xx		x	2	2	4
-Trained	6	2		xx	x		xx		x		xx		xx	1	1	4
-Trained	6	2		xx	x		x		x		xx		xx	2	2	4
-Trained	6	2		xx	x		x		x		xx		x	2	0	3
-Trained	6	2		x	xx		x		x		xx		x	1	2	3
-Trained	6	2		xx	x		x		x	xx	xx		xx	2	2	4
-Trained	6	2		xx	x		x		x		xx		xx	2	1	3
-Trained	6	2		x	xx		x		x		xx		xx	1	1	4

10. Production Study Quarterback Part 2: Items and Filler

10.1 Items

Condition 5: (ComSimS (NP2))

1. They believed some waiter that he had invited some women. Do you know which ones?
2. They reproached some lawyer that he had defended some dealers. Do you know which ones?
3. They informed some poet that he had encouraged some students. Do you know which ones?
4. They thanked some father that he had insulted some burglars. Do you know which ones?
5. They informed some client that he had consulted some seniors. Do you know which ones?
6. They reproached some farmer that he had recruited some painters. Do you know which ones?
7. They thanked some mayor that he had protected some neighbors. Do you know which ones?
8. They believed some diver that he had challenged some swimmers. Do you know which ones?

Condition 6: (ComSimS (NP1))

1. They believed some waiter that he had invited some women. Do you know which one?
2. They reproached some lawyer that he had defended some dealers. Do you know which one?
3. They informed some poet that he had encouraged some students. Do you know which one?
4. They thanked some father that he had insulted some burglars. Do you know which one?
5. They informed some client that he had consulted some seniors. Do you know which one?
6. They reproached some farmer that he had recruited some painters. Do you know which one?
7. They thanked some mayor that he had protected some neighbors. Do you know which one?
8. They believed some diver that he had challenged some swimmers. Do you know which one?

Condition 7: (ComxOS (NP1))

1. They fired some waiter that had invited some women. Do you know which one?
2. They questioned some lawyer that had defended some dealers. Do you know which one?
3. They hired some poet that had encouraged some students. Do you know which one?
4. They honored some father that had insulted some burglars. Do you know which one?
5. They hired some client that had consulted some seniors. Do you know which one?
6. They fired some farmer that had recruited some painters. Do you know which one?
7. They honored some mayor that had protected some neighbors. Do you know which one?
8. They questioned some diver that had challenged some swimmers. Do you know which one?

Condition 8: (ComxOS (NP2))

1. They fired some waiter that had invited some women. Do you know which ones?
2. They questioned some lawyer that had defended some dealers. Do you know which ones?
3. They hired some poet that had encouraged some students. Do you know which ones?
4. They honored some father that had insulted some burglars. Do you know which ones?
5. They hired some client that had consulted some seniors. Do you know which ones?
6. They fired some farmer that had recruited some painters. Do you know which ones?
7. They honored some mayor that had protected some neighbors. Do you know which ones?
8. They questioned some diver that had challenged some swimmers. Do you know which ones?

10.1 Filler

1. I think it was James who failed Professor Smith's class. Or was it John?
2. I heard that Angela bought a book about coffee. Or was it tea?
3. I saw how Aaron read an article about cars. Or was it about bikes?
4. Jake only invited his sister to his birthday. What about his brother?
5. Marissa and her father went swimming. Did they go snorkling, too?
6. I'm pretty sure that Ron is a honey lover. So why doesn't he like Christian's honey?
7. I assumed that Kelsey started singing. Or was it Patricia?
8. Tom is a great actor. Is it true that he also works as a producer?

11. Perceptual Analysis Quarterback 2

Legend: see *Production Study Quarterback Part 1: Perceptual Analysis*

			Annotator One							Annotator Two				Prosodic Disambiguation		
Group Type	**Part.**	**Cond.**	***some***	***NP1***	***VP***	***some***	***NP2***	***which***	***one_s***	***some***	***NP1***	***some***	***NP2***	**Annot.1**	**Annot.2**	**Agreem.**
+Trained	1	7		xx	x		xx		x		xx		xx	1	1	4
+Trained	1	7		x			xx		x		x		xx	0	0	4
+Trained	1	7		xx	x		x		x		xx		x	2	2	4
+Trained	1	7		xx	x		x		x		xx			2	2	4
+Trained	1	7		xx	x		xx		x		x		xx	1	0	3
+Trained	1	7		xx	x		x		x		x			2	2	4
+Trained	1	7		xx	x		x		x		xx		x	2	2	4
+Trained	1	7		x	x		xx		x		x		xx	0	0	4
+Trained	1	8		xx	x		xx		x		x		xx	1	2	3
+Trained	1	8		xx	x		xx		x		x		x	1	1	4
+Trained	1	8		xx	x		x		x		x		xx	0	2	3
+Trained	1	8		xx	x		xx		x		xx		xx	1	2	3
+Trained	1	8		x	x		xx		x		x		xx	2	2	4
+Trained	1	8		xx	x		x		x		x			0	0	4
+Trained	1	8		xx			x		x		x		xx	0	2	3
+Trained	1	8		xx	x		x		x		x			0	0	4
+Trained	10	7			?		xx		x				xx	0	0	4
+Trained	10	7		xx	x		xx	x	x		x		xx	1	0	3
+Trained	10	7		xx	x		x	x			xx		x	2	2	4
+Trained	10	7		xx	?		x		x		xx		x	2	2	4

+Trained	10	7		xx			x		x		xx		x	2	2	4
+Trained	10	7		xx	x		x		x		x		x	2	1	3
+Trained	10	7		xx	x		xx		x		xx		xx	1	1	3
+Trained	10	7		xx	x		xx		x		x		xx	1	0	3
+Trained	10	8		x	x		xx		x		x		xx	2	2	4
+Trained	10	8		xx	x		x		x		xx		xx	0	2	3
+Trained	10	8		xx	x		xx		x		xx		x	1	0	3
+Trained	10	8		x	x		xx				x		xx	2	2	4
+Trained	10	8		x	?		xx		x		x		xx	2	2	4
+Trained	10	8		xx	x		x	x	x		xx		x	0	0	4
+Trained	10	8		xx	x		x		x		x		xx	0	2	3
+Trained	10	8		xx	x		xx		x		x		xx	1	2	3
+Trained	19	7		xx			x				xx		x	2	2	4
+Trained	19	7		xx			x				xx		x	2	2	4
+Trained	19	7		xx			x				xx		x	2	2	4
+Trained	19	7		xx			x				xx		x	2	2	4
+Trained	19	7		xx			x			x	xx		x	2	2	4
+Trained	19	7		xx			x				xx		x	2	2	4
+Trained	19	7		xx			x				xx		x	2	2	4
+Trained	19	7		xx			x				xx		x	2	2	4
+Trained	19	8		xx			xx				x		x	1	1	4
+Trained	19	8		xx			xx				x		xx	1	2	3
+Trained	19	8		x			xx				x		x	2	2	4
+Trained	19	8		xx			xx				xx		x	1	0	3
+Trained	19	8		x			xx				x		xx	2	2	4
+Trained	19	8		xx			xx				x	x	xx	1	2	3

+Trained	19	8		xx			xx				xx		x	1	0	3
+Trained	19	8		x			xx				xx		x	2	0	3
+Trained	2	7	x	xx	x		x		x		xx		x	2	2	4
+Trained	2	7	xx	x	x		x		x	xx	x		x	1	2	3
+Trained	2	7	xx	xx	x		x		x	xx	xx		x	2	2	4
+Trained	2	7	x	xx	x		x		x	xx	xx		x	2	2	4
+Trained	2	7	x	xx	x		x		x	xx	xx		x	2	2	4
+Trained	2	7	x	xx	x		x		x	xx	xx		x	2	2	4
+Trained	2	7	xx	x	x		x		x	xx	x		x	1	2	3
+Trained	2	7	x	xx	x		x		x	xx	xx		x	2	2	4
+Trained	2	8	x	xx	xx		xx		x		x		xx	1	2	3
+Trained	2	8	x	xx	x		x		x	x	x		x	0	2	3
+Trained	2	8		x	x		xx		x				xx	2	2	4
+Trained	2	8	x	x	x		xx		x	x	x		xx	2	2	4
+Trained	2	8		xx	x		xx		x	x	x		xx	1	2	3
+Trained	2	8		xx	xx		xx		x		x		xx	1	2	3
+Trained	2	8	x	xx	x		xx		x	x	x		xx	1	2	3
+Trained	2	8		xx	xx		xx		x		x		xx	1	2	3
+Trained	3	7		xx	x		x		x		xx		x	2	2	4
+Trained	3	7		xx	x		x	x	x		xx		x	2	2	4
+Trained	3	7		xx	x		x		x		xx		x	2	2	4
+Trained	3	7		xx	x		x	x	x		xx		x	2	2	4
+Trained	3	7		xx	x		x		x		xx		x	2	2	4
+Trained	3	7		x	xx		x		x		x		x	1	2	3
+Trained	3	7		xx	x		x		x		xx		x	2	2	4
+Trained	3	7		x	xx		x		x		x		x	1	1	4

+Trained	3	8		xx	x		xx	x	x		xx		xx	1	2	3
+Trained	3	8		xx	x		xx		x		xx		xx	1	1	4
+Trained	3	8		x	x		xx	x	x		xx		xx	1	2	3
+Trained	3	8		xx	x		x	x	x		xx		x	0	0	4
+Trained	3	8		xx	xx		xx		x		xx		xx	1	2	3
+Trained	3	8		x	x		xx		x		xx		xx	2	2	4
+Trained	3	8		x	x		xx	x	x		x		xx	2	2	4
+Trained	3	8		xx	xx		xx		x		x		x	1	1	4
+Trained	7	7		xx	xx		xx		x		xx		xx	1	1	4
+Trained	7	7		xx	x		x		x		xx		x	2	2	4
+Trained	7	7		xx	x		x		x		xx		x	2	2	4
+Trained	7	7		xx	xx		xx		x		xx		xx	1	1	4
+Trained	7	7		xx	x		x		x		xx		x	2	2	4
+Trained	7	7		xx	xx		xx		x		xx		x	1	2	3
+Trained	7	7		xx	x		x		x		xx		x	2	2	4
+Trained	7	7		xx	x		x		x		xx			2	2	4
+Trained	7	8		xx	xx		xx		x		xx		xx	1	1	4
+Trained	7	8		xx	x		x		x		xx		x	0	0	4
+Trained	7	8		xx	x				x		xx		x	0	0	4
+Trained	7	8		xx	xx		xx		x		x		xx	1	2	3
+Trained	7	8		xx	x		xx		x		x		xx	1	2	3
+Trained	7	8		xx	xx		x		x		xx		xx	0	1	3
+Trained	7	8		xx	x		xx		x		x		xx	1	2	3
+Trained	7	8		xx	xx		xx		x		x		xx	1	2	3
-Trained	11	7		x	xx		x		x		x		x	1	1	4
-Trained	11	7		xx	x		x		x		x		x	2	1	3

-Trained	11	7		xx	x		x		x		xx		x	2	2	4
-Trained	11	7		xx			x		x		xx		x	2	2	4
-Trained	11	7		xx	x		x		x		x		x	2	1	3
-Trained	11	7		xx	xx		x		x		x		x	2	1	3
-Trained	11	7		xx	x		x		x		x		x	2	1	3
-Trained	11	7		xx	xx		x		x		x		x	2	1	3
-Trained	11	8		xx	x		x		x		x		x	0	1	3
-Trained	11	8		xx			x		x		x		x	0	1	3
-Trained	11	8	?	xx	x				x		xx		x	0	0	4
-Trained	11	8		xx			x		x		xx		x	0	0	4
-Trained	11	8		xx	x		x		x		x		x	0	1	3
-Trained	11	8	?	xx	x		x		x		x		x	0	1	3
-Trained	11	8	?	xx	x		x		x		x		x	0	1	3
-Trained	11	8		xx	x		x		x		x		x	0	1	3
-Trained	13	7		xx			xx				xx		x	1	2	3
-Trained	13	7		xx			x				xx		x	2	2	4
-Trained	13	7		xx			x				xx		x	2	2	4
-Trained	13	7		xx			x				xx		x	2	2	4
-Trained	13	7		xx			xx				xx		x	1	2	3
-Trained	13	7		xx			x				xx		x	2	2	4
-Trained	13	7		xx			xx				xx		x	1	2	3
-Trained	13	7		xx			x				xx		xx	2	1	3
-Trained	13	8		xx			x				x		xx	0	2	3
-Trained	13	8		xx			x				x		x	0	0	4
-Trained	13	8		xx			x				xx		x	0	0	4
-Trained	13	8		xx			x				xx		xx	0	2	3

-Trained	13	8		xx			xx				xx		xx	1	2	3
-Trained	13	8		xx			x				xx		xx	0	2	3
-Trained	13	8		x			x				xx		xx	1	2	3
-Trained	13	8		x			x				xx		xx	1	1	4
-Trained	14	7		x			xx				x		xx	0	0	4
-Trained	14	7		xx			xx				xx		xx	1	1	4
-Trained	14	7		xx			x				xx		x	2	2	4
-Trained	14	7		xx			xx				x		xx	1	0	3
-Trained	14	7		xx			xx				xx		x	1	2	3
-Trained	14	7		xx			xx				xx		x	1	2	3
-Trained	14	7		xx			x				x		x	2	1	3
-Trained	14	7		x			xx				x		xx	0	0	4
-Trained	14	8		x			xx				xx		xx	2	2	4
-Trained	14	8		xx			x				xx		x	0	0	4
-Trained	14	8		xx			xx				x		xx	1	2	3
-Trained	14	8		xx			xx				xx		xx	1	2	3
-Trained	14	8		xx			xx				x		xx	1	2	3
-Trained	14	8		xx			x				xx			0	0	4
-Trained	14	8		x			xx				x		xx	2	2	4
-Trained	14	8		xx			x			x	xx		xx	0	1	3
-Trained	17	7		xx			x				xx			2	2	4
-Trained	17	7		xx			x				xx		x	2	2	4
-Trained	17	7		xx			x				xx		x	2	0	3
-Trained	17	7		xx			x			x	xx		x	2	2	3
-Trained	17	7		xx			x				xx		x	2	0	3
-Trained	17	7		xx			x			x	xx		x	2	2	4

-Trained	17	7		xx			x				xx		xx	2	2	4
-Trained	17	7		xx			x			x	xx		x	2	2	4
-Trained	17	8		xx			x				xx		x	0	0	4
-Trained	17	8		xx			xx				x		xx	1	2	3
-Trained	17	8		xx			x				xx		x	0	0	4
-Trained	17	8		xx			x				xx		xx	0	2	3
-Trained	17	8		xx			x				xx	x	xx	0	2	3
-Trained	17	8		xx			x				xx		x	0	0	3
-Trained	17	8		xx			x				xx		xx	0	1	3
-Trained	17	8		xx			x				xx		x	0	0	4
-Trained	5	7		xx	x		x		x		xx		x	2	2	4
-Trained	5	7		x	xx		x	x			x		x	1	1	4
-Trained	5	7		xx	xx		x		x		xx		x	2	2	4
-Trained	5	7		x	xx		x		x		x		xx	1	0	3
-Trained	5	7		xx			x		x		xx		x	2	2	4
-Trained	5	7		xx	xx		x		x		xx		x	2	2	4
-Trained	5	7	x	x	xx		x	x	?		x		x	1	1	4
-Trained	5	7		xx	xx		x		x		x		x	2	1	3
-Trained	5	8		x	xx		x		x		xx		x	1	0	3
-Trained	5	8		xx	x		x		x		xx		x	0	0	4
-Trained	5	8		xx	xx		x		x		x		x	0	1	3
-Trained	5	8		xx	x		xx		x		x		xx	1	2	3
-Trained	5	8		xx	x		x		x		xx		x	0	0	4
-Trained	5	8		xx	xx		x		x		xx		x	0	0	4
-Trained	5	8			xx		x		x		x		xx	2	2	4
-Trained	5	8		xx	x		x		x		x		xx	0	2	3

-Trained	6	7			x		xx		x		x		xx	0	0	4
-Trained	6	7		xx	x		x		x		xx		x	2	2	4
-Trained	6	7		xx	xx		x		x		xx		x	2	2	4
-Trained	6	7		x	xx		x		x		xx		x	1	2	3
-Trained	6	7		x			xx		x		x		x	0	1	3
-Trained	6	7		x	x		xx		x		xx		xx	0	1	3
-Trained	6	7		xx	xx		xx		x		x		xx	1	0	3
-Trained	6	7		xx	xx		x		x		xx		x	2	2	3
-Trained	6	8		xx	xx		xx		x		xx		xx	1	1	4
-Trained	6	8		x	xx		x		x		xx		xx	1	1	4
-Trained	6	8		xx	x		x		x		xx		x	0	0	4
-Trained	6	8		xx	x		x		x		xx		x	0	0	4
-Trained	6	8		xx	x		x		x		xx		x	0	0	4
-Trained	6	8		x	xx		x		x		xx		x	1	0	3
-Trained	6	8		xx	x		x		x		x		x	0	1	3
-Trained	6	8		xx	xx		x		x		xx		xx	0	1	3

Acknowledgments

There are many people who supported me both academically and morally throughout this journey of writing my thesis. My greatest thanks go to my supervisor Susanne Winkler who supported me not only throughout the three years of my PhD but who already discovered my interest for the English language back in 2011 and who promoted my academic career ever since. This thesis would not have been possible without her support, our numerous meetings and discussions (in her office or an ice cream shop), and most of all, her infinite enthusiasm for linguistics. Her advice and her expertise have been crucial for the completion of this thesis and I am incredibly thankful for her support. Moreover, I want to express my special thanks to my second adviser, Britta Stolterfoht, who supported me with experimental and psycholinguistic advice. Finally, I would like to thank Matthias Bauer, the entire board of the GRK 1808, the SFB 833 and the DFG for giving me the chance to write my PhD thesis in such a great environment and with all the (financial and academic) support I could have hoped for.

I am grateful to Sam Featherston, Jutta Hartmann, Andreas Konietzko and Marion Knecht for discussing various versions of my experiments in the *Oberseminar* and for general support. I am especially grateful to Sam Featherston for helping me with his native speaker intuitions and to Marion Knecht, who helped me with my experimental designs and any other PhD-related problems, and who also became a really good friend in the last few years.

I would like to thank Robin Hörnig for guiding me through the unfathomable depths of statistical analyses with lots of patience and tranquility. I am grateful to Sophie Repp for coming to Tübingen as my *tandem partner* and for helping me with the development and conduction of my final production study.

I want to thank Giuliano Armenante, Alejna Brugos, Alvaro Cortez Rodriguez, Jens Maier and Melissa Pressler for helping me with the data analysis of my production studies. Thank you to Anja-Denise Seitz and Kristen Skinner for working with me on the experimental items of the pilot production study *Chicago*. I want to thank several people for proofreading either experimental items or parts of this thesis: Anna Benzin, Kari Griffin-Madeja, Christine Leopold, Achim Skuta and especially Nicola Winter.

There are several linguists that have advised me in the past three years and that I want to thank for their time and helpful comments. I am incredibly grateful to Lyn Frazier. She gently pushed me with her straightforward advice towards a research topic that I really enjoyed working on. I would like to thank Peter Culicover, Shin Ishihara, Caroline Féry, Sun-Ah Jun, Jason Merchant, Valéria Molnár, Teresa Parodi, Michael Rochemont, Hannah Rohde, Maribel Romero, Luis Vicente, Michael Wagner and anybody I might have forgotten. I would also like to thank the participants and organizers of the LSA Linguistic Summer Institute 2015 in Chicago for reminding me of why I fell in love with linguistics in the first place.

Moreover, I am grateful to Inken Armbrust and all the members of the GRK 1808 who never ceased to discuss ambiguity and who were always open to interdisciplinary discussions, which considerably shaped the outcome of my thesis. Special thanks to Wiltrud Wagner and Xinxin Zhao.

My time in Tübingen was a memorable and wonderful time that has tremendously shaped me as an academic researcher but also as a person in general. I am incredibly thankful to all my friends for being part of my life.

However, my greatest thanks go to my family, especially my parents Renate and Erich Remmele: You have always believed in me and supported me, both financially and morally.

You even supported me when I told you that I want to go study in the-middle-of-nowhere-Missouri for a year, for which I am really grateful. Without you, I would not be the person I am today and I would not have accomplished that much. I am incredibly grateful for everything you have done for me. Thank you so much!

Finally, I would like to express my special gratitude to my boyfriend Marius Hertfelder. Although his own research area couldn't be farther away from linguistics, he always encouraged me to talk about my problems and believed in me and my odd sentence structures, even when I myself was in doubt. Despite all the stress, together with Nutmeg and Pancake, you added lots and lots of beautiful memories to my final PhD year and I am looking forward to many more of those to come!