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2022

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in

Robin Hörnig, Sophie von Wietersheim, Andreas Konietzko & Sam Featherston (eds.),4

Proceedings of Linguistic Evidence 2020: Linguistic Theory Enriched by Experimental Data

pp. 399–419

Tübingen: University of Tübingen

https://publikationen.uni-tuebingen.de/xmlui/handle/10900/119301

In R. Hörnig, S. von Wietersheim, A. Konietzko & S. Featherston (eds.) (2022), *Proceedings of Linguistic Evidence 2020: Linguistic Theory Enriched by Experimental Data*. Tübingen: University of Tübingen. https://publikationen.uni-tuebingen.de/xmlui/handle/10900/119301

Semantic Bias in the Interpretation of German Personal and Demonstrative Pronouns

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1 Introduction

In addition to personal pronouns, German has several types of demonstrative pronouns that can be used anaphorically. The most common two are demonstrative pronouns of the *der* paradigm (often called d-pronouns) and demonstrative pronouns of the *dieser* paradigm. Whereas *der* demonstratives are considered to be more colloquial, *dieser* demonstratives are assumed to belong to a more formal language style. A large body of research on pronoun resolution in German has been concerned with the contrast between personal pronouns and *der* demonstratives (summarized in Ellert, 2013; Bader & Portele, 2019), whereas only few studies looked at *dieser* (Ahrenholz, 2007; Ehrmantraut, 2020; Patil et al., 2020).

Across languages, the production and comprehension of pronouns has been shown to depend on two kinds of factors: semantic influences including verb semantics, coherence relations and world knowledge (e.g. Hobbs, 1979), and structural factors including grammatical function, order of mention and topicality (e.g. Fukumura & van Gompel, 2015). With regard to structural factors, personal pronouns prefer prominent antecedents, with subjecthood being the main determinant of prominence. Demonstratives, in contrast, show a preference for non-prominent antecedents, where being an object, being last mentioned, and being a non-topic reduce prominence. The existence of two different demonstrative pronouns in German raises the question of whether the two differ in other respects than formality. A strong claim in this regard was made by Zifonun et al. (1997: 558) based on the example in (1).

(1) *Peter*$_{\text{i}}$ *will einen Benz*$_{\text{j}}$ *kaufen.*
P. wants a Benz buy
'Peter wants to buy a Mercedes Benz.'
a. *Er*$_{\text{i}}$*/Der*$_{\text{i}}$*/Dieser*$_{*\text{i}}$ *hat wohl zuviel Geld.*
He/der.DEM/dieser.DEM has probably too-much money
'He probably has too much money.'
b. *Er*$_{\text{j}}$*/Der*$_{\text{j}}$*/Dieser*$_{\text{j}}$ *soll aber nicht zu teuer sein.*
He/der.DEM/dieser.DEM shall but not too expensive be
'It shouldn't be too expensive, though.'

Zifonun et al. (1997) make two observations. First, the personal pronoun *er* and the demonstrative pronoun *der* can refer to either the subject or the object referent, as required in order to arrive at a sensible interpretation. Second, the demonstrative pronoun *dieser* allows only an interpretation in which it is co-referent with the final NP of the preceding clause. Based on these observations, with which we are in full agreement, Zifonun et al. advance two claims. First, personal pronouns and *der* demonstratives are open to semantic biases. Second, the demonstrative pronoun *dieser* is constrained to take an NP in clause-final position as antecedent. As discussed in more

detail below, Patil et al. (2020) have shown that the second claim is incorrect in that *dieser* demonstratives can also be co-referential with sentence-initial NPs, namely when the preceding context sentence occurs with object-before-subject order. Patil et al. (2020) therefore propose that *dieser* demonstratives are object-biased.

The findings of Patil et al.' are still compatible with the first claim of Zifonun et al. (1997), namely that *der* demonstratives are open to semantic influences whereas *dieser* demonstratives are not. In order to test this claim, we ran two experiments testing the interpretation of referentially ambiguous *der* and *dieser* demonstratives in the context of subject- and object-experiencer verbs, which have been shown before to strongly affect the interpretation of pronouns. Before we present the experiments, we review the relevant linguistic and psycholinguistic literature concerned with the interpretation of personal and demonstrative pronouns.

2 *dieser* Demonstratives versus *der* Demonstratives

Dieser and *der* demonstratives share certain functions other than establishing reference. They can be used adnominally as well as pronominally, and besides their anaphoric function, they can be used deictically and function as identifiers if combined with a pointing gesture:

(2) *Ich habe meine Söhne mitgebracht. Dieser/Der (pointing gesture) ist Linguist.*
I have my sons with-brought. dieser.DEM/der.DEM is linguist
'I brought my sons. This one is a linguist.'

As shown in the example above, both *dieser* and *der* demonstratives are capable of indicating contrast—although for *der* it is presumed that this only holds if realized with stress.[1] In addition, they can shift attention from one referent to another (Zifonun et al., 1997). However, there are substantial productive and interpretative differences between *dieser* and *der* demonstratives and their application is bound to specific conditions.

2.1 Quantitative Differences Depending on the Usage Context of *dieser* and *der* Demonstratives

Der demonstratives are far more frequent than *dieser* demonstratives in spoken language (Ahrenholz, 2007; Thurmair, 2000). As a consequence, the usage of *dieser* is rather marked in colloquial communication and might serve to signal the need for more indicativeness and explicitness.

If used as a demonstrative article, *dieser* is also an effective speaker method to indicate that the status of the sufficiency of the referential form is unclear (see example (3)). In this case, the hearer is implicitly requested to signal uncertainties with respect to the resumpted entities (Auer, 1981: 306; see also Ahrenholz, 2007: 56).

(3) *A: was (hastn) dann gelesen – B: (ja) **diesen** Aufsatz von Olson*
what have-you-then then read – (well) this essay from Olson
'What did you read then?' 'That essay from Olson.'

The adnominal usage of *dieser* demonstratives can also lead attention toward the potential of a misunderstanding in the sense that a certain referent needs to be recoded but the referential form which is used gives rise to the assumption that a new referent is introduced (see Weinrich & Thurmair, 2003). This, for example, is the case when a generic noun is unexpectedly used for a referent which has formerly been referred to by its proper noun (e.g., *Amsterdam – diese große Stadt* 'this big city'). The adnominal usage of *dieser* demonstratives is more common than the pronominal one in spoken language (Himmelmann, 2014; Schreiber, 1999), since the resumptive scope of the pronoun *dieser* seems to be more limited if compared with other pronominal forms.

[1] Ahrenholz's (2007) corpus study points out that a stressed pronounciation of *der* demonstratives is rather unusual.

2.2 Pragmatic Connotations of Demonstratives

According to prescriptive grammar, it is "impolite" to use d-pronouns for referring to human referents (Dudenredaktion, 1997). Experimental evidence that *der* demonstratives can mark a negative attitude toward the referent has been provided by Ehrmantraut (2020). In a forced-choice task, Ehrmantraut (2020) found that in written colloquial language—like text messages—, *der* demonstratives are preferred over personal pronouns in pejorative statements (4b) —but not in neutrally (4a) or positively connotated contexts (4c).[2]

(4) *Gestern Abend war ich bei Kerstin eingeladen.*
Yesterday evening was I at Kerstin invited.
'Last night, I was invited to Kerstin's.'
a. *Sie/Die hat Nudeln gekocht.*
She/die.DEM has noodles cooked.
'She cooked noodles.'
b. *Sie/Die ist so unordentlich.*
She/die.DEM is so chaotic.
'She is so chaotic.'
c. *Sie/Die kocht einfach super.*
She/die.DEM cooks just great.
'She is a great cook.'

Ehrmantraut's finding is particularly notable since there is an observable avoidance of *der* demonstratives in the written modality which inherently entails a more formal register than spoken language (e.g., Patil et al., 2020; Portele & Bader, 2016; Weinert, 2011). An expressive pragmatic usage, however, is not bound to *der* demonstratives themselves. *Dieser* demonstratives can also be used in a pejorative way (see Ahrenholz, 2007, who refers to Zifonun et al., 1997: 323, Footnote 6). And still, both demonstrative forms can be used without expressing subjective evaluations.

The interpretation and choice of demonstrative pronominal forms is substantially influenced by *any* contextual circumstances, including formality restrictions. In their Experiment 1, Patil et al. (2020) have shown that if participants are forced to choose between *der* and *dieser* demonstratives in formal written language, the latter is the preferred form, and vice versa in informal written language. This observation holds regardless of the referent's grammatical role. However, Patil et al. found that formality interacts with structural conditions in so far as the strength of the register effect is modulated by the antecedent's grammatical function.

2.3 Structural Biases in the Interpretation of Demonstratives

When a sentence contains two referents with the same number and gender features, reference by personal and demonstrative pronouns becomes ambiguous. In many cases, pronouns show preferences regarding their antecedent. For example, in (5) *Peter* is the intuitively preferred antecedent of the personal pronoun whereas *seinen Onkel* 'his uncle' is the intuitively preferred antecedent of the *der* pronoun:

(5) *Peter*$_{\text{i}}$ *will seinen Onkel*$_{\text{j}}$ *besuchen.* ***Er***$_{\boldsymbol{i/\text{j}}}$***/ Der***$_{\text{i}/\boldsymbol{j}}$ [...].
P. wants his uncle visit he/der.DEM
'Peter wants to visit his uncle. He [...]'

This intuition has been confirmed in a large number of experimental investigations of the interpretation of personal and *der* pronouns in German (summarized in Ellert, 2013, and Bader & Portele, 2019). These experiments found that in canonical subject-before-object (SO) contexts

[2] Ehrmantraut additionally contrasted male and female antecedents. For reasons of space, only sentences with female references are shown in this example.

involving nominative-accusative action verbs and including two human referents, personal pronouns show a preference to take up the subject NP as antecedent, whereas *der* pronouns show the opposite pattern with their preferred antecedents being object NPs. This finding is supported by corpus investigations of written language in German (e.g., Bosch et al., 2003; Portele & Bader, 2016). Note that in examples including SO sentences, the grammatical function of subject coincides with the first linear position. The linear position of antecedents has been shown to influence pronoun interpretation, with personal pronouns showing a preference toward the first mentioned NP and *der* pronouns toward the last mentioned NP. Studies investigating object-before-subject (OS) contexts in German (e.g., Bouma & Hopp, 2007; Schumacher et al., 2016) suggest that the grammatical function of the antecedent exerts stronger influences on the personal pronoun than its linear position, with personal pronouns being resolved toward the last mentioned subject. For *der* pronouns, a mixed pattern emerges from experimental studies investigating OS contexts. Whereas in some studies, they show a preference toward the first mentioned object (e.g., Bosch & Umbach, 2007; Schumacher et al., 2016 for active accusative verbs), some studies found *der* pronouns referring back to the last mentioned subject (e.g., Wilson, 2009; Schumacher et al., 2016 for dative experiencer verbs).

Based on a number of on-line as well as off-line studies investigating the interpretation of personal and *der* demonstratives in German, Schumacher and colleagues (e.g. Schumacher et al., 2016; Schumacher et al., 2017) argue that the thematic roles of the referents preceding the pronoun establish a further factor in the resolution of ambiguous pronouns. They found once again complementary preferences for the two pronouns. Whereas personal pronouns prefer the proto-agent, *der* pronouns are preferentially resolved toward the proto-patient.

Complementary antecedent preferences have also been proposed in terms of topichood for personal vs. *der* pronouns (e.g., Wiemer, 1996; Zifonun et al., 1997; Abraham, 2002; Bosch & Umbach, 2007). In two experiments investigating the interpretation of personal and *der* pronouns in German, Bader & Portele (2019) manipulated topichood by varying the preceding context instead of relying on the standard association of the subject being the topic of the sentence (analogous to Kaiser & Trueswell, 2008, for Finnish). The authors found that neither (anti-)topichood nor syntactic function alone can capture the antecedent preferences of German *der* pronouns. Topichood, therefore, may add to or even explain the mixed pattern found in studies investigating non-canonical contexts (discussed above).

In sum, four major structural factors have been proposed to determine the interpretation of pronouns in German; grammatical function, linear position, information structure, and thematic role. Although accounts of pronoun resolution differ in their evaluation of the main determinant influencing the interpretation of personal and *der* pronouns, they agree that all factors cause complementary preferences. Note that this does not mean that both pronouns are influenced by the same factor(s) to the same degree. In line with the *form-specific approach* of Kaiser & Trueswell (2008), different anaphoric expressions seem to be sensitive to different properties of potential antecedents. Personal pronouns prefer the more salient, accessible, or prominent antecedent, with the properties of being the subject, in first position, the topic, and the proto-agent increasing the respective status. *Der* pronouns, on the other hand, prefer the less prominent antecedent, where the prominence of a referent is lowered when it is the object, in last position, a non-topic or a proto-patient..

2.4 *der* versus *dieser* Demonstrative Pronouns

In contrast to Zifonun et al. (1997), other linguists working on German (e.g., Abraham, 2002, Wiemer, 1996) do not distinguish the interpretive preferences of *der* and *dieser* demonstratives explicitly. More recently, this issue has begun to be investigated experimentally. Fuchs & Schumacher (2019) had participants continue examples such as the one shown in (6).

(6) *Jeden Morgen hat der Pfleger den Heimbewohner gekämmt. Dabei hat*
every morning has the nurse the resident combed at-this has
er/der/dieser oft [. . .]
he/der.DEM/dieser.DEM often
'Every morning, the nurse combed the resident. While doing so, he often [. . .]'

Whereas the personal pronoun *er* was resolved more frequently toward the first mentioned NP, the subject of the first sentence, participants preferred the last mentioned NP, the object, for both demonstratives, with no significant difference between *der* and *dieser*.

In a rating task, Patterson & Schumacher (2019) had participants judge pronouns in ditransitive contexts. The sentence to be rated followed the ditransitive context sentence and started with a personal pronoun, a *der* pronoun, or a *dieser* pronoun, which was unambiguously resolved toward the agent (Ag), recipient (Rec), or patient (Pat). In their first experiment, the order of thematic roles was canonical in the ditransitive sentence, with the agent being followed by the recipient which was in turn followed by the patient, as in (7).

(7) *Ag > Rec > Pat: Der Student stahl der Dozentin den Laptop.*
the.NOM student stole the.DAT lecturer the.ACC laptop

Results showed that the personal pronoun *er* was rated better than both *der* and *dieser* demonstratives for agents as well as recipients. For last mentioned patients, the *dieser* pronoun was rated better than the personal or *der* pronoun. In general, the rating of both *der* and *dieser* increased sequentially across the arguments, which is argued by Patterson & Schumacher (2019) to show their graded sensitivity to thematic prominence. The less prominent the antecedent, the better the ratings for *der* and *dieser* demonstratives.

When the context sentence had non-canonical word order, with the patient preceding the recipient as shown in (8), *der* and *dieser* showed a last mentioned preference, with both pronouns being rated best when referring to the last mentioned recipient.

(8) *Ag > Pat > Rec: Die Künstlerin vererbte den Besitz dem Musiker.*
the.NOM artist bequeathed the.ACC belongings the.DAT musician

Since this referent is not least prominent in terms of semantic roles, the finding argues against a strict orientation of pronouns in terms of thematic prominence.

Patil et al. (2020) tested the claim of Zifonun et al. (1997) that *dieser* demonstratives prefer the last mentioned entity as their antecedent in their second experiment. The participants' task was to read a context sentence such as (9), followed either by a canonical (9a) or a non-canonical (9b) continuation including a *dieser* demonstrative pronoun. The interpretation of this pronoun was probed by using a comprehension question (10) participants had to answer.

(9) *Am obersten Gerichtshof gab es zurzeit überdurchschnittlich viele Fälle zu*
at the supreme Court of Justice there were currently exceptionally many cases to
bearbeiten.
deal with
'At the supreme court there were currently more than a fair amount of cases to deal with.'
a. *Der Richter informierte den Staatsanwalt, dass dieser einen weiteren Fall*
the judge informed the public prosecutor that dieser.DEM one more case
annehmen müsse.
take must

b. *Den Staatsanwalt informierte der Richter, dass dieser einen weiteren Fall annehmen müsse.*
the public prosecutor informed the judge that dieser.DEM one more case take must
'The judge informed the public prosecutor that he must take on another case.'

(10) Comprehension question:
Wer muss einen weiteren Fall annehmen? (i) *Der Richter* (ii) *Der Staatsanwalt*
'Who has to take on another case?' (i) The judge (ii) The public prosecutor

The results of Patil et al. (2020) show that *dieser* was resolved toward the object more often than toward the subject. The object preference was weaker following non-canonical compared to canonical sentences. Thus, the referent of the object NP was preferred as antecedent independent of the linear position of the antecedent. Patil et al. therefore conclude that the interpretive preferences of *dieser* demonstratives, analogous to *der* demonstratives, are better captured in terms of a preference toward the object (or a *subject-avoidance strategy*) instead of a preference toward the last mentioned referent.

2.5 Semantic Biases in the Interpretation of Demonstratives

In addition to structural factors, semantic factors influence pronoun resolution. Research related to the implicit causality (IC) of verbs, in particular, has shown that coherence relations may contribute strongly to pronoun interpretation. For example, in psych verb contexts, the stimulus is usually assumed to be responsible for the psychological state of the experiencer denoted by the verb. When participants are presented with continuation prompts including *because* and subsequent pronouns as in (11), taken from Stevenson et al. (1994), the preferred antecedent of the pronoun is the stimulus in both (11a) and (11b) (e.g. Garvey et al., 1975; Stevenson et al., 1994; Kehler & Rohde, 2013; Holler & Suckow, 2016).

(11) a. Ken admired Geoff because he _____ [subject-experiencer verb]
b. Ken impressed Geoff because he _____ [object-experiencer verb]

Thus, in cases involving strong semantic associations, the preferences of potentially ambiguous personal pronouns seem to be independent of structural factors, such as the syntactic function (or the linear position) of the antecedent.

Two studies investigated the resolution of demonstrative pronouns in terms of semantic biases. Kaiser (2011) investigated the question whether the two types of German pronouns, personal and *der* pronouns as shown in (12), influence the coherence relations established by participants in a sentence continuation task involving action events. The connective *dann* can introduce a *result* or *narration* (non-result) relation.

(12) *Die Schauspielerin hat die Schneiderin gekitzelt und dann hat sie/die* ...
the actress has the seamstress tickled and then has she/die.DEM.
'The actress tickled the seamstress and then she ...'

The results of Kaiser (2011) show that with personal pronouns participants produced more continuations referring back to the subject than to the object. When the personal pronoun was resolved toward the preceding subject, participants produced mostly non-result relations. When the personal pronoun was resolved toward the object, on the other hand, result relations were favoured. The *der* demonstrative showed the opposite pattern, with more continuations referring back to the object than to the subject. Object interpretations always introduced result relations, whereas subject interpretations only resulted in non-result coherence relations. The findings of Kaiser (2011) therefore suggest that the *der* demonstrative is structurally associated with the object and induces a semantic bias toward an upcoming result relation.

Järvikivi et al. (2017) investigated the effect of semantic biases on pronoun interpretation in Finnish by looking at implicit causality verbs (subject- versus object-experiencer verbs) together with the explicit causal coherence marker *because*, as shown in (13).

(13) a. *Vladimir Putin pelotti/pelkäsi George Bushia Valkoisessa talossa.*
'Vladimir Putin frightened/feared George Bush at the White House.'
b. *Koska hän/tämä oli kuluneen viikon aikana antanut useaan otteeseen ymmärtää, ettei maiden Irakin suhteissa olisi näkemyseroja.*
'Because he had during the past week given many times the impression that there would be no differences of opinion concerning the countries' relations with Iraq.'

In their visual world eye tracking study, participants looked more often at the stimulus than at the experiencer for both the personal pronoun *hän* and the demonstrative pronoun *tämä*. Whereas the semantic bias due to implicit causality influenced the interpretation of the two pronouns in the same direction, the linear position of the referents had opposite effects. The personal pronoun was resolved preferentially toward the first mentioned referent, whereas the *der* pronoun preferred the last mentioned referent as its antecedent.

In sum, work investigating semantic biases in implicit causality contexts suggests that personal and *der* pronouns are influenced by a stimulus bias in parallel ways. Structural factors, on the other hand, influence personal and *der* pronouns in complementary ways. In the current study, we address two main questions regarding semantic (and structural) biases in the interpretation of pronouns in German. First, we investigate the question of how structural and semantic biases are weighted relative to each other in pronoun resolution. This question is not answered in Järvikivi et al. (2017), since the authors did not present a joint analysis including semantic and structural influences. Therefore, the final interpretation of the two pronouns, when affected by both biases, remains an open question. Second, we investigate to what extent the resolution of *der* demonstrative pronouns differs from the resolution of *dieser* demonstrative pronouns in German. To our knowledge, this study is the first one to include both *der* and *dieser* pronouns within implicit causality contexts. By contrasting the two demonstrative pronouns, we can investigate whether the orientation toward the last mentioned referent is indeed as strong as postulated for *dieser*.

3 Structural and Semantic Bias in the Processing of Personal and *dieser* Demonstrative Pronouns

The experiments that are reported below are part of a more extensive research effort investigating how implicit causality affects the off- and on-line interpretation of personal and demonstrative pronouns. One strand of this research investigates the interaction of implicit causality with information structure, concentrating on demonstratives of the *der* paradigm (see Portele & Bader, 2018; Portele & Bader, 2020). Another strand focuses on on-line processes and so far has only looked at *dieser* pronouns. Here, we summarize some unpublished findings of the latter strand of research because the experiments reported below are a direct offspring of it.

All experiments, as well as the experiments reported in this paper, are based on a set of twenty pairs of subject- and object-experiencer verbs (see the appendix for the full list). As discussed above, psych verbs are known to induce a bias toward the stimulus argument in causal contexts, that is, a bias toward the object referent for subject-experiencer verbs and a bias toward the subject for object-experiencer verbs. In order to confirm that the particular verbs that we selected impose the semantic bias typical for psych verbs, we ran a production experiment which required participants to write completions for sentence fragments as in (14).[3]

[3] Ibex Farm (https://spellout.net/ibexfarm/) was used for running the experiment discussed in this section, so participants had to write their continuations into HTML text boxes.

(14) a. Subject-experiencer verb: *Sabine achtet den Fischer, weil* ☐
Sabine respects the fisherman because

b. Object-experiencer verb: *Der Fischer beeindruckt Sabine, weil* ☐
the fisherman impresses Sabine because

As expected given prior results on implicit causality, the results show a strong next-mention bias toward the stimulus argument in the *weil* clause. The stimulus (= the object) was the first mentioned referent in 80% of all continuations following a subject-experiencer verb. For object-experiencer verbs, the stimulus (= the subject) was the first mentioned referent in an even higher 90% of all continuations. In 99.4% of all continuations, references to the stimulus were made with a personal pronoun. Only 0.6% of all references to the stimulus were established with a demonstrative pronoun. All of them used a *dieser* demonstrative for referring to the object of a subject-experiencer verb.

The production study confirms that our selection of subject- and object-experiencer verbs is suited to investigate the effect of implicit causality on the on- and off-line interpretation of personal and demonstrative pronouns. A major question asked by our experiments was how readers interpret pronouns in cases where semantic and structural biases are in conflict. As discussed above, research on pronoun interpretation in the context of implicit causality verbs has revealed that personal pronouns are quite malleable by semantic biases. Thus, although personal pronouns are structurally biased toward subject antecedents, they easily refer to object referents when this is semantically favored, for example in contexts combining subject-experiencer verbs with a causal coherence relation (see (11a)). Whether demonstrative pronouns are as easily influenced by semantic biases as personal pronouns is an open question due to the sparseness of relevant research.

In order to investigate how the interplay of semantic and structural biases affects the interpretation of personal pronouns and *dieser* demonstratives, we ran an interpretation experiment which required participants to complete sentence fragments including a pronoun prompt. In order to create referential ambiguity, the feminine proper name in (14) was replaced by a masculine proper name, as shown in (15) (note that the actual prompts contained only one of the two pronouns).

(15) a. Subject-exp. verb: *Peter achtet den Fischer, weil er/dieser* ☐
Peter respects the fisherman because he/dieser.DEM

b. Object-exp. verb: *Der Fischer beeindruckt Peter, weil er/dieser* ☐
the fisherman impresses Peter because he/dieser.DEM

The results show a strong stimulus preference for both pronouns with both types of psych verbs. Overlaid on this semantic preference, a small but nevertheless significant effect of structural bias was visible too. For the personal pronoun, which is known to have a structural bias toward the subject referent, the stimulus preference is stronger for object-experiencer verbs (stimulus = subject) than for subject-experiencer verbs (stimulus = object). For *dieser* demonstratives, which are known to have a bias toward the object referent, the opposite was found. The preference was stronger for subject-experiencer verbs (stimulus = object) than for object-experiencer verbs (stimulus = subject).

The interpretation experiment thus shows that in the presence of strong semantic biases, *dieser* refers as easily to the subject as *er* refers to the object. Thus, there seems to be no strict constraints prohibiting *dieser* demonstratives to refer to the referent of a subject NP in sentence-initial position. At the same time, strong semantic biases do not eliminate structural preferences completely. The subject orientation of personal pronouns and the object orientation of *dieser* demonstratives was still visible.

One could object against these conclusions by noting that the particular experimental set-up caused participants to refer to the subject referent of an object-experiencer verb with a *dieser* demonstrative despite a grammatical constraint prohibiting *dieser* to be coreferential with subject NPs. That is, by presenting sentence fragments containing an object-experiencer verb followed by *dieser*, participants were facing a choice between two non-optimal solutions. On the one hand, participants could refer back to the subject referent by using *dieser*, in agreement with the strong semantic bias but in violation of the structural constraint on *dieser*. On the other hand, participants could follow the structural constraint by providing continuations that go against the expectation set up by the semantic bias.

Formulating continuations that are not in agreement with the semantic bias is not an unsurmountable problem, as shown by the finding that about 20% of the continuations with *dieser* were of this type. Nevertheless, coming up with continuations that contradict the semantic bias is not always easy, as we can confirm from our own experience with writing continuations of different types. This is not surprising because by their very nature implicit causality verbs attribute the cause of the psychological state to the stimulus argument, which makes it easy to write a continuation when the stimulus referent is the subject of the embedded *because* clause. When the experiencer is the subject of the *because* clause, one must provide a more indirect reason, relating to how the experiencer mentally processed and represented the event or state that is the direct cause of the state described by the verb (see example (17) below). Participants may therefore be tempted to provide continuations that are in agreement with the implicit causality bias, even if they consider them as not fully acceptable because *dieser* refers to a subject NP.

In order to address this objection, we wrote sensible continuations for the sentence fragments already tested in the interpretation experiment and had participants judge the acceptability of the complete sentences. A complete sample stimulus is provided in (16) and (17).

(16) Stimulus continuation
   a. *Der Fischer beeindruckt Sabine, / Sabine achtet den Fischer, …*
      the fisherman impresses Sabine Sabine respects the fisherman
      'The fisherman impresses Sabine/Sabine respects the fisherman …'
   b. *… weil er/dieser in der Umgebung immer die bei weitem höchsten*
      because he/dieser.DEM in the area always the by far highest
      Fangzahlen aufweist.
      catch figures shows
      '… because he always shows by far the highest catch figures in this area.'

(17) Experiencer continuation
   a. *Sabine beeindruckt den Fischer, / Der Fischer achtet Sabine, …*
      Sabine impresses the fisherman the fisherman respects Sabine
      'Sabine impresses the fisherman/The fisherman respects Sabine …'
   b. *… weil er/dieser in der Umgebung niemand anderen mit derart viel*
      because he/dieser.DEM in the area nobody else with as much
      Erfolg kennt.
      success knows
      '… because he knows nobody else with as much success in this area.'

The main results of the acceptability experiment were as follows. First, overall acceptability was relatively high, ranging from 5.3 to 6.4 on a scale ranging from 1 ('highly unacceptable') to 7 ('highly acceptable'). Thus, all sentences can be considered as grammatical, and only the fine-grained acceptability of the sentences is at issue.[4] Second, all conditions for which

[4] According to Vogel (2019), sentences are grammatical and unmarked for ratings in the range of 6.4–7.0; sentences in the range of 4.6–5.8 are grammatical and slightly marked.

acceptability was at the lower end of the range (about 5.3–5.5) were conditions in which the continuation did not match the implicit causality bias, independent of whether the pronoun's structural preferences were met or not. Third, when the continuation was in agreement with the semantic bias, ratings ranged from 6.0–6.4. The lowest value among those ratings was indeed for *dieser* demonstratives referring to the subject NP of an object-experiencer verb. However, an absolute value of 6.0 is still quite high, and personal pronouns were rated only slightly better in this conditions, receiving a mean rating of 6.3. In sum, the results of our rating experiment do not indicate that continuations with *dieser* referring to a subject referent are unacceptable, and that the pressure resulting from the semantic bias made participants in the interpretation study produce continuations that are not fully acceptable.

4 Experiment 1: Demonstrative Pronouns in Embedded Clauses

The interpretation experiment discussed in the preceding section shows that the orientation toward the final NP of the preceding clause that has been claimed to hold for *dieser* demonstratives (Zifonun et al., 1997) is not an absolute constraint. However, it is still possible that the tendency of being interpreted as coreferential with the final object NP is greater for *dieser* demonstratives than *der* demonstratives. To test for this possibility, Experiment 1 contrasts *der* demonstratives with *dieser* demonstratives in psych-verb contexts as shown in (18).

(18) a. Subject-exp. verb: *Peter achtet den Fischer, weil der/dieser* ☐
Peter respects the fisherman because der.DEM/dieser.DEM

b. Object-exp. verb *Der Fischer beeindruckt Peter, weil der/dieser* ☐
the fisherman impresses Peter because der.DEM/dieser.DEM

4.1 Method

4.1.1 Participants

Twenty-one students of the Goethe University Frankfurt participated in Experiment 1 for course credit.

4.1.2 Materials

The same 40 sentences were tested as in the interpretation experiment discussed in the preceding section. Two sentences were included for each of the 20 verb pairs consisting of a subject- and an object-experiencer verb. Each sentences appeared in four versions according to the two factors *Verb Type* (subject- versus object-experiencer verb) and *Pronoun* (*der* versus *dieser*). As in the example shown in (18), the stimulus argument was always a definite NP and the experiencer was a proper name. The rationale for this association between semantic roles and referential expressions was as follows. First, at least one masculine definite NP was needed for unambiguously signalling which NP is the subject and which is the object. In order to avoid repeating nouns, we decided to use proper names for the second NP. The definite NP was assigned to the stimulus argument because many nouns used for referring to persons suggest reasons for the state expressed by the psych verb, making it easier for participants to come up with sensible continuations (e.g., respecting a fisherman is likely related to the hard work done by fishermen).

Both arguments were male referents in order to create referential ambiguity. The main clause with the psych verb and its arguments was followed by the complementizer *weil* 'because' and either the demonstrative *dieser* or the demonstrative *der*. A complete experimental item together with sample continuations is provided in Table 1.

The 40 sentences were distributed across four lists according to a Latin square design, that is, participants saw only one version of each sentence and an equal number of sentences in the four

Table 1. A complete stimulus item for Experiment 1 including exemplary continuations given by participants

Subject-experiencer verb:	*Bernhard*	*fürchtet*	*den Makler,*	*weil*	*der/dieser*	☐
	Bernhard	fears	the real-estate agent	because	der.DEM/dieser.DEM	
Object-experiencer verb:	*Der Makler*		*verängstigt*	*Bernhard, weil*	*der/dieser*	☐
	the	real-estate agent	frightens	Bernhard	because	der.DEM/dieser.DEM

Sample continuations

Condition	*Referent category*	*Completion*
Subject-experiencer verb	Object/Stimulus	*weil dieser einen schlechten Ruf hat*
		'because he has a bad reputation.'
	NP-external	*weil der Preis für sein Haus zu niedrig ist.*
		'because the price for his house is too low.'
Object-experiencer verb	Object/Experiencer	*weil dieser leicht einzuschüchtern ist*
		'because he is easy to intimidate'
	Subject/Stimulus	*weil dieser betrügerisch wirkt.*
		'because he makes a fraudulent impression.'
	NP-external	*weil der Quadratmeterpreis bizarr ist.*
		'because the price per square meter is bizarre.'

experimental conditions. The experimental sentences were randomized individually for each participant. Filler sentences were not included in order to restrict the time needed to write a continuation for each sentence to about 25 minutes.

4.1.3 Procedure

The experiment was run in the psycholinguistic lab of the Goethe University Frankfurt using Ibex Farm developed by Alex Drummond (http://spellout.net/ibexfarm/) for stimulus presentation. Each sentence was presented on a separate page on the screen. Following the pronoun, an empty text field was shown into which participants could write their continuation. Participants were asked to write sensible continuations without any further constraints. There was no time restriction for writing a completion, but participants were instructed to work through the questionnaire at a reasonable pace. The experiment took about 20-30 minutes.

4.1.4 Scoring

For all 840 continuations, the first author and a student assistant coded whether the pronouns were co-referent with the subject or the object of the preceding main clause. When co-reference was considered ambiguous, this was also coded. In addition to their pronominal uses, both *der* and *dieser* can be used as determiners. We therefore introduced a further scoring category NP with three subcategories according to the referent of the NP. The NP could either refer to something not mentioned in the preceding clause (NP-external) or it could refer to the subject or object of the preceding main clause (NP-subject/NP-object). Examples for the different scoring categories are provided in Table 1. The two scorers agreed on 95.8% of all continuations (Krippendorf's $\alpha = 0.927$). All non-agreeing continuations were removed, which left 805 continuations for analysis.

Table 2. Percentages of referents from the context in the continuations of Experiment 1. Raw counts are given in parentheses.

	subject-experiencer verb		object-experiencer verb	
Referent	*dieser*	*der*	*dieser*	*der*
subject	0 (0)	1 (2)	83 (162)	65 (129)
object	100 (207)	88 (179)	17 (33)	10 (19)
NP-external	0 (0)	8 (17)	0 (0)	23 (46)
NP-subject	0 (0)	0 (0)	0 (0)	2 (4)
NP-object	0 (0)	3 (6)	0 (0)	1 (1)

4.2 Results

All statistical analyses reported in this paper were conducted using the statistics software R (R Core Team, 2020). For the inferential statistics, we computed generalized mixed models using the R package lme4 (Bates et al., 2015). The main factors and the interaction term were entered as fixed effects into the model, using effect coding (i.e., the intercept represents the unweighted grand mean, fixed effects compare factor levels to each other). In addition, we included random effects for items and subjects with maximal random slopes supported by the data, following the strategy proposed in Bates et al. (2015). Where necessary, we report planned comparisons using simple contrasts.

Table 2 shows the percentages and raw counts in the different scoring categories for each combination of the two factors Verb Type and Pronoun. For *dieser* demonstratives, there were no NP continuations. With a subject-experiencer verb, all references with *dieser* were to the object referent, that is, the stimulus argument. With an object-experiencer verb, in contrast, the large majority of references were to the subject referent, which is again the stimulus argument. References to the object referent—the experiencer—also occurred, making up about 17% of all references for *dieser* following an object-experiencer verb.

The picture for *der* demonstratives is more complicated. When *der* was used as a demonstrative pronoun, the same pattern is observed as for *dieser*. With a subject-experiencer verb, almost all references are to the object. With an object-experiencer verb, most references are to the subject but some are also to the object. Uses of *der* as a determiner (definite article) occurred in about 26% of all cases with a preceding object-experiencer verb and in about 11% of all cases with a preceding subject-experiencer verb. In most of these cases, the resulting NP referred to something outside of the preceding main clause.

To make the results for *der* and *dieser* demonstratives comparable and to create a binary response variable for statistical analysis, all NP continuations were removed. The results for the remaining continuations are shown in Figure 1 as percentages of references to the stimulus. The graph on the left side of Figure 1 shows the results for all 21 participants. The right graph in Figure 1 shows the results of the nine participants who only produced pronominal continuations. The two graphs in Figure 1 show almost exactly the same results: For subject-experiencer verbs, almost all references are to the the stimulus argument. For object-experiencer verbs, the majority of references also goes to the stimulus, but about 17% go the experiencer, that is, the verb's object. With regard to the factor Pronoun, Figure 1 reveals only minimal differences between the two demonstratives *der* and *dieser*. A generalized mixed-effects model with reference to the stimulus as the dependent variable is summarized in Table 3. The effect of Verb Type is significant, reflecting the stronger stimulus bias for subject-experiencer than object-experiencer

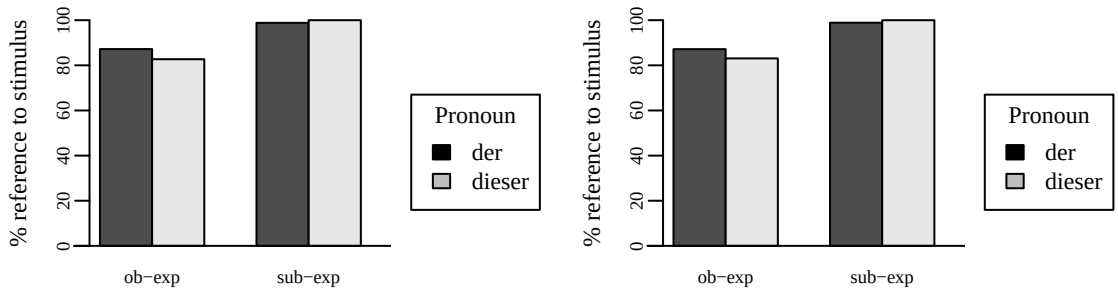

Figure 1. Percentages of continuations referencing the stimulus argument of the preceding psych verb in Experiment 1.
Left: all participants; right: participants without non-pronominal continuations.

Table 3. Generalized mixed model fitted by maximum likelihood estimation for Experiment 1.
Formula: stimulusRef $\sim$ Pronoun * Verbtype + (Verbtype || subject) + (Verbtype || sentence)

	Estimate	Std. Error	z value	$Pr(>\|z\|)$
Intercept	4.4986	0.5482	8.206	< 0.01
Pronoun	0.3771	0.6708	0.562	0.57
Verb Type	3.8081	1.1383	3.345	< 0.01
Pronoun $\times$ Verb Type	1.2445	1.3432	0.926	0.35

verbs. The effect of Pronoun and the interaction between Pronoun and Verb Type, in contrast, were not significant.

4.3 Discussion

Experiment 1 has yielded three major findings. First, the interpretive preferences for *der* and *dieser* were determined by the implicit causality of the verbs included in the context clause—as expected in the presence of a causal connector, the stimulus argument was the preferred referent of the demontratives. Second, the stimulus preference was almost exceptionless when the stimulus was the object (subject-experiencer verbs) whereas about 15% of all continuations contained a reference to the experiencer when the experiencer was the object (object-experiencer verbs). Thus, despite the strong semantic bias, the structural bias of demonstratives toward clause-final object antecedents still had a residual effect. Third, there was no significant difference between *der* and *dieser* demonstratives. Thus, the results of Experiment 1 do not support earlier claims that *dieser* is subject to a stronger—or even exclusive—object bias whereas *der* is less constrained in this regard.

For *der*, there is a certain complication, because participants also produced a number of continuations in which *der* figured as definite article. Corresponding examples for *dieser* did not occur, probably because demonstrative NPs cannot be used for external reference like a definite NP. The finding that NP continuations with external reference occurred more than twice as often following an object- than a subject-experiencer verb suggests that NP continuations were mainly used in order to avoid the conflict arising from a clash between semantic bias and structural bias – semantically, the preferred antecedent of an object-experiencer verb is the stimulus subject, but structurally the demonstrative prefers an object antecedent. In order to corroborate the finding of no difference between pronominal *der* and *dieser* without the complication of NP continuations, we ran a second experiment.

5 Experiment 2: Demonstrative Pronouns in Main Clauses

The aim of Experiment 2 was to compare *der* and *dieser* demonstratives without the complication that arose in Experiment 1 because participants produced a number of continuations in which *der* acted as definite article. Continuations of this type were possible because participants had to complete embedded clauses in Experiment 1, without any restrictions besides producing grammatical and sensible sentences. To prevent participants from taking *der* as a definite article, Experiment 2 differs from Experiment 1 in a crucial way: The demonstrative is no longer contained within a causal subordinate clause but is the first element in a separate main clause. This change is illustrated in (19).

(19) a. *Context sentence:*
(i) Subject-experiencer verb*: Peter achtet den Fischer*
Peter respects the fisherman.
(ii) Object-experiencer verb*: Der Fischer beeindruckt Peter.*
the fisherman impresses Peter.

b. *Prompt:* Der/Dieser [ ] nämlich [ ]
'This was for the reason that der.DEM/dieser.DEM . . . '

In addition to the sentence-initial demonstrative pronoun, the prompt in (19b) contains the causal discourse marker *nämlich* ('namely'). This discourse marker cannot start a sentence. In Experiment 2, a short text box was inserted between the demonstrative pronoun and *nämlich* for participants to fill in a finite verb. For the rest of the continuation, a long text box was provided. In this way, participants were prevented from writing NP continuations as in Experiment 1. Because *nämlich* imposes a causal relationship between the context sentence and the prompt, the same predictions hold for Experiment 2 as for Experiment 1: Due to the implicit causality bias, the stimulus argument should be the preferred antecedent for the demonstratives. Due to the structural bias toward an object antecedent, the observed preference for the stimulus argument should be stronger following subject-experiencer verbs than object-experiencer verbs.

5.1 Method

5.1.1 Participants

Twenty students of the Goethe University Frankfurt participated in Experiment 2 either as volunteers or for course credit.

5.1.2 Materials

Experiment 2 investigated the same 40 sentences as Experiment 1, with one change as explained above. The embedded *weil* clause was replaced with an independent main clause starting with either one of the two demonstratives, followed by a short text box for inserting a finite verb, the causal coherence marker *nämlich*, and a long text box for writing a completion of the sentence. A complete experimental item together with sample continuations is provided in Table 4.

5.1.3 Procedure

The same procedure was used as for Experiment 1, with one exception. Instead of completing the questionnaire in the psycholinguistic lab, participants were sent a link to the Ibex page of the experiment so that they could complete the questionnaire wherever they wanted.

5.1.4 Scoring

All 800 continuations were scored independently by the first author and a student assistant. Because NP continuations were no longer produced, there were only three scoring categories: reference to the subject referent, reference to the object referent, and ambiguous reference.

Table 4. A complete stimulus item for Experiment 2 including exemplary continuations given by participants.

Subject-experiencer verb:	*Bernhard*	*fürchtet*	*den*	*Makler.*	Der/Dieser ☐	nämlich ☐
	Bernhard	fears	the	real-estate agent	der.DEM/dieser.DEM	namely
Object-experiencer verb:	*Der*	*Makler*	*verängstigt*	*Bernhard.*	Der/Dieser ☐	nämlich ☐
	the	real-estate agent	frightens	Bernhard	der.DEM/dieser.DEM	namely

Sample continuations

Condition	*Referent category*	*Completion*
Subject-experiencer verb	Object/Stimulus	*Der hat nämlich nur teure Wohnungen im Angebot.*
		''Cause, he has only expensive apartments on offer.'
Object-experiencer verb	Object/Experiencer	*Der hat nämlich vor den meisten Fremden Angst.*
		''Cause, he is afraid of most foreigners.'
	Subject/Stimulus	*Dieser nennt nämlich einen viel zu hohen Preis für das Haus.*
		''Cause, he names a price that is way to high for the house.'

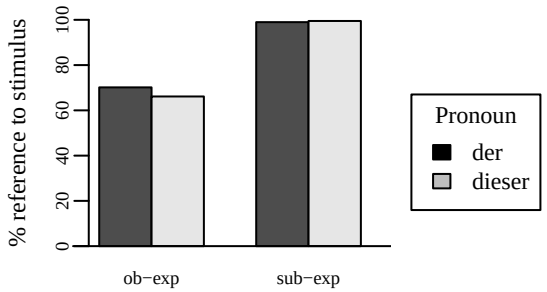

Figure 2. Percentages of continuations referencing the stimulus argument in Experiment 2.

Examples for the different scoring categories are provided in Table 4. The two scorers agreed on 96.3% of all continuations (Krippendorf's $\alpha = 0.918$), which left 770 continuations for analysis after removal of continuations for which the two scorers did not agree.

5.2 Results

The same statistical analysis was run as for Experiment 1. The percentages of references to the stimulus argument are shown in Figure 2. The corresponding generalized mixed-effects model with references to the stimulus argument as dependent variable is summarized in Table 5. The same pattern is visible as for Experiment 1. The effect of Verb Type is significant whereas the effect of Pronoun and the interaction between Pronoun and Verb Type are not.

5.3 Discussion

Experiment 2 has yielded results that are very similar to those of Experiment 1. As before, the stimulus argument was the preferred antecedent of the two demonstratives, in accordance with the implicit causality set up by the preceding clause in combination with the causal discourse marker *nämlich*, and no difference between *der* and *dieser* showed up. Also as before, the stimulus bias was less strong for object-experiencer verbs, which realize the stimulus as subject, in conflict with the demonstratives' structural object bias. In Experiment 2, the number of

Table 5. Generalized mixed model fitted by maximum likelihood estimation for Experiment 2.
Formula: stimulusRef ∼ Pronoun * Verbtype + (Verbtype || subject) + (1 | sentence)

	Estimate	Std. Error	z value	$Pr(>\|z\|)$
Intercept	4.2313	0.6636	6.376	0.40
Pronoun	0.1933	0.6414	0.301	0.76
Verb Type	5.3307	1.2471	4.275	0.40
Pronoun × Verb Type	1.0753	1.2847	0.837	0.40

experiencer references with object-experiencer verbs reached about 32% and was thus somewhat higher than in Experiment 1, where only 15% experiencer references were observed. However, with about 68% stimulus references, the semantic bias toward the stimulus (the subject) clearly outweighed the structural bias toward the object (the experiencer). In sum, the results of Experiment 2 replicate those of Experiment 1 very closely.

6 General Discussion

The major finding yielded by Experiments 1 and 2 is that strong semantic biases can override the structural object preference of the two anaphoric demonstrative pronouns *der* and *dieser*. In all conditions, the stimulus argument was the preferred antecedent due to the joint work of the verb's implicit causality and a causal coherence marker. Thus, despite the documented object bias of demonstrative pronouns, the demonstratives referred preferentially to the subject in the case of object-experiencer verbs, which realize the semantically preferred stimulus antecedent as subject. Neither of the two experiments found a difference between the two demonstrative pronouns.

Although the semantic bias—the verb's implicit causality together with explicit causal coherence markers—outweighed any structural biases, the results of both Experiments 1 and 2 still showed a structural effect. In both Experiment 1 and Experiment 2, the stimulus bias was stronger for subject-experiencer verbs than for object-experiencer verbs. For subject-experiencer verbs, semantic and structural biases jointly favored the resolution of the pronoun toward the stimulus object, resulting in an almost exceptionless preference. For object-experiencer verbs, there is a conflict between the semantic bias towards the stimulus subject and the structural bias towards objects and last mentioned referents. The semantic bias turned out to be stronger than the structural bias, resulting in a stimulus preference. However, with about 80% (Experiment 1) and 70% (Experiment 2) references to the stimulus subject, the preference was less strong than for subject experiencer verbs, were the preference was close to 100%. Thus, with object experiencer verbs there were also a number of continuations associating the demonstrative pronoun with the object experiencer, in accordance with the structural bias but contradicting the semantic bias.

The starting point of our investigation was the claim of Zifonun et al. (1997) that *der* and *dieser* demonstratives differ with regard to semantic biases, in that *der* is liable to semantic influences whereas *dieser* is not. Zifonun et al. (1997) made this claim on the basis of example (1), which was introduced in the introduction of this article and is partially repeated in (20).

(20) *Peter*$_{\text{i}}$ *will einen Benz*$_{\text{j}}$ *kaufen.*
P. wants a Benz buy
'Peter wants to buy a Mercedes Benz.'
a. *Er*$_{\text{i}}$*/Der*$_{\text{i}}$*/Dieser*$_{*\text{i}}$ *hat wohl zuviel Geld.*
He/der.DEM/dieser.DEM has probably too-much money

'He probably has too much money.'

Zifonun et al. note that *der*, but not *dieser*, can refer to *Peter*, a judgment that we share. However, given the results presented in this paper, the reason of this difference cannot be the one proposed by Zifonun et al., namely that the interpretation of *der* is malleable to semantic and structural factors whereas *dieser* is constrained to be co-referent with the sentence-final NP. Instead, our results suggest that *der* and *dieser* demonstratives do not differ with regard to semantic and structural biases. For structural biases, the same conclusion was reached by other recent studies (Fuchs & Schumacher, 2019; Patil et al., 2020; Patterson & Schumacher, 2019).

This leaves us with the question of what differences there are between *der* and *dieser* demonstratives. As far as example (20) is concerned, we hypothesize that the demonstratives *der* and *dieser* differ with regard to their potential of being used in what we may call "evaluative" statements. That is, the continuation in (20) provides an evaluation of the speaker about *Peter*. This suggestion fits the findings of Ehrmantraut (2020) comparing personal and *der* demonstrative pronouns. It is furthermore in line with the reasoning proposed by Patil et al. (2020), who discuss potential differences between *der* and *dieser* in terms of perspective-taking (see also Hinterwimmer & Bosch, 2016; Hinterwimmer & Bosch, 2018).

Next to perspective, prior studies suggest that a main determinant for choosing between *der* and *dieser* is language register. The findings of Patil et al. (2020) support the hypothesis "that *diese*-demonstratives require the formal language register to license their use". A similar requirement does not seem to hold for *der* demonstratives. Note, however, that while *der* may be more common in colloquial settings, it is not banned from more formal registers.

Consider example (21), which is taken from the online presence of *Der Spiegel*, a prestigious German newspaper which can be assumed to adhere to a more formal writing style.

(21) *Soldaten greifen Arzt bei Behandlung an*
Weil ein Arzt zunächst ***seinen Patienten*** *behandeln wollte, bevor* ***der*** *verhört werden sollte, griffen zwei Soldaten ihn an.*
(spiegel.de – May 20, 2020)
'Soldiers attack physician giving treatment – Because a physician wanted to treat his patient before he is interrogated, he was attacked by two soldiers.'

In this example, the demonstrative *der* was used for referring back to the object, the physician's *patient*. It is likely that the author used a demonstrative pronoun instead of a personal pronoun for reasons of ambiguity avoidance, since the use of a personal pronoun would have caused an interpretive preference according to which the NP *the physician*, which bears matching number and gender features, is the subject of the embedded temporal clause. The question then is why the author used *der* and not *dieser*. Our intuitions suggest that *dieser* could have been used as easily to refer to the preceding object as *der*, especially since this example occurred in the context of formal language use. We suspect that individual preferences play an important role for this choice, but must leave a further exploration of this issue as a task for future research.

In sum, we propose that two groups of factors govern the choice between a personal pronoun, a *dieser* demonstrative, or a *der* demonstrative. The first group contains factors that result in structural and semantic biases. These factors affect the decision whether to use a personal pronoun or a demonstrative pronoun, but do not affect the decision between the two demonstratives. The second group contains factors related to the situative usage context, modality and language register, as well as individual preferences. These factors interact with the factors of the first group in a way that has not been explored so far. In written language, factors of the second group govern the choice between the two demonstratives *der* and *dieser*, but they are not restricted to this choice. In particular, both corpus studies and experimental investigations show that, although structural factors favor the use of a personal or a demonstrative pronoun, in many cases writers still have a range of alternative forms. For example, whereas only a personal

pronoun seems possible in (22), all three pronouns under consideration can be used in (23). Thus, non-structural factors must lead to a final decision in (23).

(22) *Ein Kollege hat mir mitgeteilt, dass er/*der/*dieser in Quarantäne muss.*
a colleague has me told that he/der.DEM/dieser.DEM in quarantine must
'A colleague told me that he had to go in quarantine.'

(23) *Maria hat einen Kollegen besucht, obwohl er/der/dieser in Quarantäne war.*
Maria has a colleague visited although he/der.DEM/dieser.DEM in quarantine was
'Maria visited a colleague although he was in quarantine.'

In spoken language, *der* demonstratives are often used in structural contexts where a personal pronoun would be used in written language, as witnessed by the high percentage of *der* demonstratives found by Bosch et al. (2003) in a corpus of spoken language. Thus, structural factors seem to differ across modalities. In what ways they differ is not known, however, mainly because the production and interpretation of different pronouns in spoken language has only barely been investigated so far.

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Appendix

Table 6. List of the 20 pairs of subject- and object-experiencer verb included in Experiment 1 and 2

subject-experiencer verb		object-experiencer verb	
achten	respect	beeindrucken	impress
bedauern	regret	betrüben	sadden
bemerken	notice	irritieren	irritate
bemitleiden	pity	frustieren	frustrate
beneiden	envy	langweilen	bore
bewundern	admire	bezaubern	charm
durchschauen	to see through	verwirren	confuse
entdecken	detect	erstaunen	astonish
fürchten	fear	verängstigen	frighten
hassen	hate	empören	appall
mögen	like	entzücken	delight
respektieren	respect	inspirieren	inspire
schätzen	value	amüsieren	amuse
verabscheuen	abhor	entsetzen	scare
verachten	despise	enttäuschen	disappoint
verdächtigen	suspect	beunruhigen	worry
verehren	worship	erheiteren	amuse
vergöttern	adore	faszinieren	fascinate
vermissen	miss	erfreuen	please
verteufeln	demonize	verstören	unsettle