

Polish Comitative Constructions
Empirical Investigation and Formal Description

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Abstract

This thesis deals with expressions consisting of two noun phrases connected by a comitative preposition, referred to as comitative constructions (CCs). It focuses on CCs in Polish, with some comparisons to other languages, and provides an analysis at the morphosyntax-semantics-pragmatics interface in the paradigm of Head-Driven Phrase Structure Grammar with the integrated model-theoretic semantic framework of Lexicalized Flexible Ty2.

After postulating three different readings of Polish CCs: accompanitive, conjunctive and (open and closed) inclusive, a number of semantic phenomena are discussed which provide evidence for this classification. Further examination of the data shows that all CC types behave uniformly with regard to their syntactic properties but exhibit differences regarding agreement and person, number and gender resolution. These differences have previously been explained by syntactic stipulations.

This thesis argues that a syntactic approach to CCs lacks real empirical motivation and it demonstrates that some of the existing analyses are problematic for a number of empirical and / or theoretical reasons. It further offers an alternative analysis based on the assumption that all CC types have a uniform, adjunction-based syntactic structure, and that the crucial differences between them are semantic in nature, being triggered by the meaning of the comitative preposition. The core of the proposed semantic analysis are three different logical representations of the comitative preposition, whose truth conditions allow us to make the right predictions about the different behavior of the three CC types. All other lexical components of CCs, including plural pronouns, bear in each type of CC their customary forms and meanings.

Implementing this idea in a constraint-based framework whose description language incorporates a formal semantic representation language, and modeling the morphosyntactic, semantic, pragmatic and referential properties of CCs within a single grammatical paradigm, we arrive at an analysis that accounts for these expressions in a very natural way.

Keywords: Comitative Construction, Comitative Preposition, Polish, Head-Driven Phrase Structure Grammar, Compositional Semantics

Zusammenfassung

Die vorliegende Dissertation befasst sich mit sprachlichen Ausdrücken bestehend aus zwei Nominalphrasen und einer komitativen Präposition, die als Komitativkonstruktionen (engl. *comitative constructions*, CCs) bezeichnet werden. Der Hauptuntersuchungsgegenstand der Arbeit sind CCs im Polnischen, zu Vergleichszwecken werden aber ähnliche Konstruktionen in anderen Sprachen herangezogen. Die Arbeit schlägt eine Analyse von CCs an der Schnittstelle zwischen Morphosyntax, Semantik und Pragmatik im Rahmen der Head-Driven Phrase Structure Grammar mit einem integrierten modelltheoretisch-semantischen Modul der Lexicalized Flexible Ty2 vor.

Ausgehend von drei verschiedenen Lesarten von CCs im Polnischen: akkompanitiven, konjunktiven sowie (offenen und geschlossenen) inklusiven, wird eine Reihe von semantischen Phänomenen diskutiert, die die postulierte Ambiguität und die vorgeschlagene semantische Typologie von CCs bestätigen. Die weitere Datenanalyse ergibt, dass sich die drei Typen von CCs im Hinblick auf ihre syntaktischen Eigenschaften relativ einheitlich verhalten, dass sie aber deutliche Diskrepanzen in Bezug auf Kongruenz sowie Person-, Numerus- und Genusauflösung aufzeigen. Diese Diskrepanzen wurden in früheren Ansätzen anhand von syntaktischen Stipulationen erklärt.

In dieser Doktorarbeit wird argumentiert, dass der syntaktische Ansatz empirisch unmotiviert ist, und es wird auf eine Reihe von datenbezogenen und theoretischen Problemen der existierenden syntaktischen Arbeiten zu CCs hingewiesen. Es wird eine alternative Analyse vorgeschlagen, in der von einer einheitlichen, adjunktionsbasierten syntaktischen Struktur ausgegangen wird. Sie erklärt die Unterschiede zwischen den drei CC-Typen semantisch als aufgelöst durch die Bedeutung der komitativen Präposition. Den Kern der vorgeschlagenen semantischen Analyse bilden drei verschiedene logische Repräsentationen der komitativen Präposition, deren Wahrheitsbedingungen korrekte Vorhersagen zum unterschiedlichen Verhalten von akkompanitiven, konjunktiven und inklusiven CCs ermöglichen. Für alle nichtpräpositionalen Komponenten von CCs, einschließlich pluraler Personalpronomen, wird stets ihre herkömmliche Form und Bedeutung angenommen.

Durch die Implementierung dieser Idee in einer beschränkungsbasierten Grammatiktheorie, deren Beschreibungssprache eine semantische Repräsentationssprache inkorporiert, und durch die Modellierung der morphosyntaktischen, semantisch-pragmatischen und referentiellen Eigenschaften von CCs in einem einzigen theoretischen Paradigma kann eine Analyse angeboten werden, in der diese Konstruktionen auf eine natürliche Art und Weise lizenziert werden können.

Schlagwörter: Komitativkonstruktion, komitative Präposition, Polnisch, Head-Driven Phrase Structure Grammar, kompositionelle Semantik

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Chapter 1

Introduction

1.1 Scope

The term *comitativity* as it is used in linguistic literature is associated with the concept of a joint participation in a situation (with various types or degrees of involvement) and it applies to a variety of linguistic categories and constructions:

- the comitative case, which appears in the Uralic, Altaic, Nakh-Dagestanian, Dravidian and Finno-Ugrian languages, as well as in Yukaghir, Chukot and Osetin;
- the comitative verbal aspect – a verbal morphological category that indicates the accompaniment of an action by something or somebody; exists in many American Indian and Turkic languages;
- nouns and verbs which contain affixes indicating comitativity such as English *co-* (*coauthor*, *cooperate*), German *mit-* (*mitmachen* ‘to take part’, *Mitverfasser* ‘coauthor’) or *zusammen-* (*zusammenspielen* ‘conspire’, *Zusammenarbeit* ‘collaboration’), Russian *so-* (*souchastvovat* ‘to take part’, *sonaslednik* ‘coheir’), Polish *współ-* (*współpracować* ‘collaborate’, *współżycie* ‘cohabitation’);
- verbs describing a joint action of two agents or their joint being such as *to meet*, *to border*, *to compete* etc.;
- subordinate comitative clauses, i.e. clauses that indicate an accompanying circumstance, mainly introduced by subordinate conjunctions such as *when*;
- expressions containing comitative prepositions such as the English *with*, Polish *z*, German *mit*, French *avec*, Portuguese *com*, Spanish *con* or Russian *s*.

This thesis is devoted to comitative expressions of the last type, i.e., to expressions in which the comitative content is provided by a comitative preposition. These expressions can be schematically represented as in (1), where NP1 and NP2

stand for noun phrases, P stands for a comitative preposition, and V.SG/PL for a verb in the singular or plural form.

- (1) NP1 P NP2 V.SG/PL

I will refer to this kind of comitative expression as *comitative construction* (CC). In this thesis, I investigate Polish CCs.

Consider the Polish sentence involving the CC *oni z Janem* (literal translation: *they with Jan*) in (2). This sentence can receive at least three different English translations.

- (2) Oni z Janem wyjechali.
 they with Jan left
 T1: ‘They and Jan left.’
 T2: ‘They left with Jan.’
 T3: ‘He and Jan left.’

What situation does (2) describe? If we assume that the domain of individuals contains just three boys: Jan, Marek and Piotr, then there are at least three different answers to this question. The first one, reflected by T1, is that this sentence describes a situation where all three boys left. Possibility T2 is that only Marek and Piotr left. In this case, the participation of Jan in the event of leaving has a secondary, accompanitive character. Finally, sentence (2) can also be true in the situations where only Marek and Jan left or where only Piotr and Jan left. This is expressed by T3.

The question that I deal with in this thesis is what triggers the ambiguity in sentences like (2) and what is the number and the nature of the available readings. At the theoretical level, I am particularly interested in how this ambiguity and the properties associated with the particular readings can be captured within a strict-lexicalist, non-derivational, constraint-based grammar framework at the morphosyntax-semantics-pragmatics interface. Thereby, I assume that the ambiguity observed in sentences like (2) is semantically rather than structurally driven. Given that the majority of previous approaches to this phenomenon were in search of a syntactic explanation, which resulted in a large number of derivational, rather unsatisfactory syntactic analyses, this thesis opens a new theoretical perspective on this issue.

1.2 Motivation and Goal

Since the 1970s, the description of CCs has occupied researchers in syntax, semantics, and pragmatics alike. CCs have been investigated in a vast number of languages, often typologically unrelated, including Acholi, Bari, Bulgarian, Catalan, Cherokee, Chilean Spanish, Czech, Dakota, Diola-Fogny, Ewe, Fijian, Finnish, Hausa, Hawaiian, Hungarian, Kanuri, Kirundi, Kpelle, Latvian, Logbara, Mende,

Mokilese, Navajo, Nuer, Russian, Spanish, Tagalog, Temne, Tera, Toqabaqita, Tzotzil, Yapese, and a range of Australian languages. There are also typological studies of comitativity (expressed in various ways) as related to other concepts such as manner or instrumentality (Stolz et al. (2006)) or plurality and thematicity (Archipov (2009)). Works on CCs frequently focus on one particular CC type in either a single language or in various languages. There are also attempts to capture all types of CCs in a given language in a coherent way, especially some approaches proposed for Russian. Polish CCs have been subject to linguistic investigations as well. However, a comprehensive description of these constructions is still lacking. This thesis attempts to fill this gap. It offers a uniform classification of Polish CCs based on coherent, semantic criteria. By describing and classifying Polish CCs, this thesis may also contribute to the cross-linguistic research on these constructions.

A detailed description of Polish CCs also seems reasonable in view of the very limited attention drawn to CCs in the polonistic descriptive literature. Many traditional grammars of contemporary Polish address the issue of CCs in a fragmentary and unsystematic way, others do not even mention these constructions (cf. the summary of references to CCs in the Polish traditional grammars in Kopcińska (1995)). CCs have not drawn attention in formal approaches to Polish, either. In recent years, a number of important analyses, especially within the framework of Head-Driven Phrase Structure Grammar (HPSG), have been developed for Polish. The set of linguistic phenomena treated so far includes agreement, case assignment, clitics, negation, coreference phenomena, coordination, and relative constructions (cf. Przepiórkowski et al. (2002), which unifies many of these analyses into a single grammar). The issue of CCs, however, has not been addressed so far. By this thesis, I hope to contribute to the grammatical coverage of contemporary Polish, on the one hand, and to the extension of HPSG-based grammar fragments of Polish, on the other hand.

I also hope to make a contribution to the research on (Polish) prepositions. For several years now, there has been a growing interest in prepositions, not only in the cognitive and the theoretical linguistic communities, but also in the computational linguistic community. This interest is reflected in the scientific events devoted exclusively to prepositions (cf. the workshops of SIGSEM working group on the syntax and semantics of prepositions),¹ publications concerning various aspects of prepositions (cf. Saint-Dizier (2006), Arsenijević et al. (2006), Villavicencio and Kordoni (2005), Baldwin et al. (2009b)), and new resources on prepositions (such as PrepNet, developed at the Institut de Recherche en Informatique de Toulouse, cf. Saint-Dizier (2008), or the resources developed within the *Preposition Project* at the CL Research, cf. Litkowski and Hargraves (2005)). For an overview of the current research on prepositions within the fields of theoretical and computational

¹SIGSEM stands for Special Interest Group on Computational Semantics, which is one of the special interest groups of the Association for Computational Linguistics (ACL). The official web site of the SIGSEM working group on prepositions can be found under http://www.sigsem.org/wiki/SIGSEM_WG_on_the_Syntax_and_Semantics_of_Prepositions.

linguistics, see Baldwin et al. (2009a).

The goal of this thesis is to provide a detailed empirical description of Polish CCs, including their typology, and to develop a formal analysis of these constructions within the paradigm of Head-Driven Phrase Structure Grammar that would be (at least in part) implementable in one of the available systems for HPSG grammar development. By this, I hope to contribute to the linguistic description of contemporary Polish as well as to the cross-linguistic research on CCs and related phenomena at the syntax-semantics-pragmatics interface.

As this thesis consists of an empirical and a theoretical part, it might be of potential interest to (i) Slavicists dealing with various aspects of Polish grammar, (2) typologists interested in cross-linguistic research on CCs, (3) formal linguists working within the HPSG grammar framework or other constraint-based formalisms, (4) semanticists concerned with plurality, inclusiveness, distributivity and collectivity, and, finally, (5) to computational linguists and computer scientists interested in the development of machine-readable grammar resources.

1.3 Empirical Basis and Method

The discussion on CCs in this thesis is based both on naturally occurring and on constructed linguistic data. To acquire naturally occurring data, I used the IPI PAN Corpus of Polish as well as the Internet via Google. The IPI PAN Corpus is a large, morphosyntactically annotated corpus of Polish, including over 250 million segments, developed by the Linguistic Engineering Group at the Institute of Computer Science, Polish Academy of Sciences. It is publicly available at <http://korpus.pl>, and it is described in Przepiórkowski (2004b, 2006b). Together with the PWN Corpus of Polish (<http://korpus.pwn.pl>) and the PELCRA Corpus (<http://korpus.ia.uni.lodz.pl>), the IPI PAN Corpus has been incorporated in the National Corpus of Polish, recently made available at <http://nkjp.pl/> (cf. Przepiórkowski et al. (2012)).

However, the majority of the data in this thesis are examples constructed by the author, for two reasons. Firstly, it is crucial to present Polish CCs and apply various tests to them in line with corresponding discussions in the literature, in order to facilitate setting this study in a cross-linguistic context. Secondly, as I will demonstrate later, CCs are strongly related to meaning and context, and none of the available corpora of Polish provides semantic annotation and, consequently, offers a meaning-related search. Given this, word strings of the form as in (1) can only be disambiguated as CCs or non-CCs manually, by analyzing broader contexts.

Each example provided in this thesis, whether found in the corpus, Internet or constructed, was evaluated by native speakers of Polish. Up to ten adult native speakers coming from five different regions of Poland were asked to judge and / or comment on the examples. A large part of the data was also discussed with Polish linguists from the Department of Polish Studies at the University of Warsaw and with Slavicists from the Department of Slavic Studies at the University of

Tübingen.

On the basis of my own introspective judgments and the evaluation by the other native speakers, I indicate each example's degree of grammaticality using the following symbols:²

- no mark for *Completely grammatical and natural*
- ? for *Grammatical, but perhaps somewhat unnatural*
- ?? for *Doubtful, but perhaps grammatical*
- ??/* for *Worse, but not totally ungrammatical*
- * for *Thoroughly ungrammatical*
- # for *Syntactically and semantically well-formed, but unacceptable for pragmatic, stylistic, or other non-syntactic and non-semantic reasons*

Data marked by ?? or ??/* in this thesis was either judged by all interviewed native speakers as indicated above, or there was no agreement between the native speakers with respect to its grammaticality.³

Besides the term *grammaticality*, linguists also use the term *acceptability*. The distinction between these two notions goes back to the distinction between competence and performance in terms of Chomsky (1965), or I-language and E-language in terms of Chomsky (1986b). Here, I will not go into the details of these dichotomies, adopting instead Schütze's (1996) approach, who puts acceptability on a par with grammaticality. Thus, in this work, the terms *grammaticality* and *acceptability* will be used synonymously.

To formalize the empirical generalizations, I will use the framework of HPSG, a highly lexicalized, constraint-based theory of grammar. The choice of HPSG is motivated by the possibility to capture all linguistic representation levels simultaneously and to encode the interaction between the particular levels. The high degree of formalization makes the developed analysis immediately computer-implementable.

As indicated above, a number of HPSG-based approaches to various phenomena in Polish have been developed in recent years. Formalizing the grammar of CCs elaborated in this thesis within the same paradigm will guarantee an extensive compatibility of this grammar with the existing analyses, and make possible the potential incorporation of this grammar into a larger grammar fragment of Polish.

²For other systems for indicating the degree of grammaticality, see Labov (1972), Householder (1973), Lakoff (1973), Andrews (1990). See also Schütze (1996) and Featherston (2005) for a related discussion.

³For a discussion of possible reasons for discrepancies in grammaticality judgments, see Sternefeld (2000).

1.4 Organization

This thesis consists of two main parts. Part I investigates CCs from the empirical point of view, and might be of particular interest for Slavic studies scholars. In Part II, a theoretical description of the observations of Part I is provided. This part is primarily addressed to (formal) theoretical and computational linguists.

I first provide a general characterization of Polish CCs and contrast them with non-comitative expressions of the same form (Chapter 2). I show that there is a number of properties that are common for all CCs, but I argue that CCs can have at least three different interpretations. Based on this observation, I propose a semantic typology of CCs which establishes the ground for the discussion in the remaining chapters of Part I. I then discuss a number of semantic phenomena which provide evidence for this typology (Chapter 3), including presuppositional effects, contrastive focus assignment, plural denotation and coreferential properties. I also examine CCs with respect to other semantic properties mentioned in the literature on CCs, such as the realization of the NPs involved in CCs as pronouns or (non)referential expressions and symmetry requirements with regard to definiteness, restrictiveness, animacy and humanness (Chapter 4), and argue that these properties are not crucial for distinguishing between the CC types proposed in Chapter 2.

Next, I focus on syntactic aspects of CCs, such as the syntactic functions they may fulfill, the ability of the constituents to iterate, to appear discontinuously and to be extracted (Chapter 5). My results show that all CCs behave by and large uniformly with regard to their internal syntactic structure. However, they exhibit differences regarding agreement and person, number and gender resolution. This is demonstrated in Chapter 6, where I also show that these differences correlate with the semantic generalizations in Chapter 3. Chapter 6 closes the empirical Part I. An overview of all observations of this part is provided in Appendix A.

The second, theoretical part of this thesis starts with the theoretical background for my analysis of CCs (Chapter 7). I discuss various issues related to the semantic representation of individual terms, verbal predicates and prepositions. I also specify the semantic representation language used to represent the meaning of the expressions I analyze, introduce the formal and linguistic foundations of HPSG, and propose its modified version with the integrated model-theoretic semantic framework. After providing the theoretical background, I provide an overview of the existing approaches to CCs, classifying them into adjunction-, complementation- and coordination-based approaches (Chapter 8). As we will see, the majority of these approaches explain the differences between the particular CC types by different syntactic structures. I argue against this view as empirically and theoretically problematic. Based on the discussion in Chapter 8 and using the theoretical machinery introduced in Chapter 7, I develop my analysis of CCs in Chapter 9. The core of this analysis is anchored in the semantic representation, but it offers an explanation of the syntactic and pragmatic properties of CCs as well. An overview of the developed grammar is provided in Appendix B. Chapter 10 concludes the thesis,

summarizes all results and describes implications this work may have for the research on other linguistic phenomena such as coordination, plurality, distributivity and collectivity, (mixed) agreement and resolution, partial and split antecedence. This chapter also presents suggestions for future work.

1.5 Abbreviations and Notations

Below, all abbreviations, notations and symbols used in this thesis are provided.

Abbreviations in the text:

ACC	Accompanitive Comitative Construction
AdvP	Adverbial Phrase
AP	Adjectival Phrase
AVM	Attribute-Value Matrix
cICC	closed Inclusive Comitative Construction
CC	Comitative Construction
CCC	Conjunctive Comitative Construction
CG	Categorial Grammar
CP	Complementizer Phrase
D	Determiner
DP	Determiner Phrase
DRT	Discourse Representation Theory
GB	Government and Binding Theory
GPSG	Generalized Phrase Structure Grammar
HPSG	Head-Driven Phrase Structure Grammar
ICC	Inclusive Comitative Construction
LE	Lexical Entry
LFG	Lexical Functional Grammar
LF-Ty2	Lexicalized Flexible Ty2
LRS	Lexical Resource Semantics
LTAG	Lexicalized Tree Adjoining Grammar
MRS	Minimal Recursion Semantics
N	Noun
NP	Noun Phrase
oICC	open Inclusive Comitative Construction
OVS	Object-Verb-Subject (language)
P	Preposition
PP	Prepositional Phrase
PPC	Plural Pronoun Construction
RSRL	Relational Speciate Re-entrant Language

SPC	Singular Pronoun Construction
SRL	Speciate Re-entrant Logic
SVO	Subject-Verb-Object (language)
Ty2	Two-sorted Type Theory
V	Verb
VCC	Verb-coded Coordination
VP	Verb Phrase

Abbreviations in the glosses:

1ST	First person
2ND	Second person
3RD	Third person
ACC	Accusative
AUX	Auxiliary
DAT	Dative
FEM	Feminine
GEN	Genitive
INSTR	Instrumental
LOC	Locative
M1	Masculine human
M2	Masculine animate
M3	Masculine inanimate
MASC	Masculine
NEUT	Neuter
NOM	Nominative
NON-M1	Non-masculine human
PL	Plural
POSS	Possessive
POSS.REFL	Possessive reflexive
PP+	Postprepositional
PP-	Non-postprepositional
PRN	Pronoun
REFL	Reflexive
RM	Reflexive marker
SG	Singular

Symbols:

<i>e</i>	Semantic type for individual entities
<i>f</i>	Semantic type for falsity
<i>s</i>	Semantic type for possible worlds
<i>t</i>	Semantic type for truth

v	Semantic type for events
w	Semantic type for possible worlds
I	Semantic interpretation function
$\llbracket \cdot \rrbracket$	Semantic interpretation function
\neg	Negation
$=$	Equation
\neq	Inequation
\vee	Disjunction
\wedge	Conjunction
\rightarrow	Implication
\forall	Universal quantifier
\exists	Existential quantifier
$\exists!_1$	Cardinality quantifier
$\exists_{>1}$	Cardinality quantifier
\cup	Set union
\cap	Set intersection
\supset	Superset relation
\subset	Subset relation
$>$	Greater-than relation
$<$	Smaller-than relation
\in	Membership relation
\ni	Membership relation
$\{\}$	Set
$\langle \rangle$	List
\rightsquigarrow	Function mapping basic translations into terms of Ty2
\dashrightarrow	Function mapping pragmatic contents into terms of Ty2
$\ $	Cardinality
\emptyset	Empty set
λ	Lambda operator
\oplus	Sum operator / Append relation
\circ	Binary operation
\gg	Presupposition
$\ $	Prosodic break
$/$	Rising accent
\backslash	Falling accent

Labels of the HPSG attributes:⁴

ADJ(UNCT)-D(AUGH)T(E)R
 ARG(UMENT)
 ARG(UMENT)1
 ARG(UMENT)2
 ARG(UMENT)-STR(UCTURE)
 B(ACK)GR(OUND)
 BEARER
 CASE
 CAT(EGORY)
 COMP(LEMENT)-D(AUGH)T(E)R
 COMP(LEMENT)S
 CONT(ENT)
 CON(TE)X(T)
 D(AUGH)T(E)RS
 FIRST
 FUNCTOR
 GEN(DER)
 GROUP
 HEAD
 HEAD-D(AUGH)T(E)R
 IN
 INDEX
 INST(ANCE)
 LOC(AL)
 L(OGICAL-)F(ORM)
 MAIN
 MEMBER
 MOD(IFIED)
 NAME
 NON-LOC(AL)
 NUM(BER)
 NUM(ERICAL)-INDEX
 OUT
 PER(SON)
 PHI
 PHON(OLOGY)
 PRE(DECESSOR)
 PR(E)D(ICATIVE)

⁴Parentheses indicate how the particular labels can be abbreviated.

P(REPOSITION-)FORM
 REST
 RESTR(ITION)
 SCOPE
 SP(ECIFIE)R
 SNORER
 SUB(JECT)
 SUB(JECT)-D(AUGH)T(E)R
 SYN(TAX-)SEM(ANTICS)
 TYPE
 S VAL(ENCE)
 VAR(IABLE)
 V(ERB-)FORM

Labels of the HPSG sorts:

1st
2nd
3rd
abstraction
acc(usative)
application
atomic-type
bi(nary)-implication
boolean
case
cat(egory)
complex-type
conjunction
conj(unctive)-z
constant
const(ituent)-struc(ture)
cont(ent)
con(te)x(t)
disjunction
e(mpty)-list
e(mpty)-set
entity
equation
event
exactly-one

existential
ex(tended)-index
fem(inine)
fin(ite)
gender
gen(itive)
head
head-adj(unct)-struc(ture)
head-comp(lement)-struc(ture)
head-subj(ect)-struc(ture)
head(ed)-struc(ture)
implication
index
inst(rumental)
integer
list
loc(al)
l(ogical)-const(ant)
m1
m2
m3
male
m(eaningful-)e(xpression)
m(eaningful-)e(xpression)-none
member(ship)-rel(ation)
minus / –
mod(ified)-syn(tax-)sem(antics)
more-than-one
name
naming
negation
neut(er)
nom(inal)-obj(ect)
nom(inative)
none
n(on-)e(mpty-)list
n(on-)e(mpty-)set
non-loc(al)
non-m1
non-ref(erential)

no-phi
noun
non-zero
num(ber)
object
p(arametrized-)s(tate-)o(f-)a(ffairs)
per(son)
phi
phon(eme-)string
phrase
pl(ural)
plus / +
prep(osition)
p(reposition-)form
quantifier
ref(erential)
set
set-intersection
set-of-m(eaningful-)e(xpressions)
set-union
sign
s(in)g(ular)
snore-rel(ation)
superset-rel(ation)
syn(tax-)sem(antics)
truth
ty2
type
universal
val(ence)
var(iable)
verb
v(erb-)form
word
z
zero

Labels and arity of the HPSG relations:

append/3	conjoin/3
copy/2	equalize/2
member/2	set-union/3
subterm/2	ty2-component/2

Part I

Empirical Investigation

Chapter 2

General Characteristics and Typology of CCs

In this chapter, I will discuss general properties of CCs which, on the one hand, distinguish them from other expressions consisting of two NPs and the preposition *z* ‘with’, and, on the other hand, provide an informal syntactic, semantic and pragmatic characterization of all kinds of CCs in Polish.

Section 2.1 deals with the identification of comitative NP1 *z* NP2 expressions and discusses their basic properties, such as the assignment of instrumental case to the NPs, the comitative content, the conventional implicature of relatedness, and the ability to combine with nominal and verbal constituents. Section 2.2 characterizes the expression *z*, connecting NP1s and NP2s in CCs, with respect to its grammatical category and subcategorization frame. It will be shown that the comitative *z* is a typical preposition. Section 2.3 examines the lexicosemantic relationship between NP1 and NP2 and lays out a typology that will serve as the basis for the discussion in the remainder of this thesis. Section 2.4 provides a summary of the chapter.

2.1 Basic Properties of Polish CCs

As I have indicated in the previous chapter, there exist many strategies to express comitativity in the languages of the world. This thesis deals with only one of these strategies: expressions consisting of two NPs connected by the preposition *z* ‘with’ and occurring with singular or plural predicates. These expressions are schematically presented in (3).¹

(3) NP1 *z* NP2 V.SG/PL

¹For an overview of other types of comitatives (and related expressions), see Schlesinger (1979), Stolz (1994b), Stolz et al. (2006) and Archipov (2009). For a discussion towards the notion of *comitativity*, see Szupryczyńska (1992) and Kosek (1999) in the context of Polish, and Obst (2002) with reference to Russian. See also Stolz (1994a) and Stolz et al. (2006) for the issue of comitatives from the perspective of language change.

However, not every expression of the form NP1 *z* NP2 will be considered a CC here. Below, I provide a test as well as a number of very general syntactic and semantic properties that allow for the clear identification of CCs.

The basic indicator for the comitative character of an NP1 *z* NP2 expression is the assignment of **instrumental case** to NP2. In other, non-comitative contexts, the Polish *z* can combine with genitive and instrumental NPs. However, the comitative preposition *z* obligatorily assigns instrumental case.²

A comitative NP1 *z* NP2 expression must introduce **comitative content**. Comitative content is understood here in a very broad sense as a joint participation of the individuals referred to by NP1 and NP2 in the event referred to by the predicate. Therefore, the individuals associated with NP1 and NP2 do not have to be involved in the event in the same way. The next section will provide a more precise characterization of how NP1s and NP2s in CCs can be related to each other.

2.1.1 Relatedness

The individuals referred to by NP1 and NP2 in a CC must be related to each other. This property of CCs has already been observed by Miller (1971), who considers Russian NP1 *s* NP2 combinations (where the Russian preposition *s* ‘with’ corresponds to Polish *z* ‘with’) as a close type of coordination, in contrast to the loose type of coordination expressed by NP1 *i* NP2 combinations, where *i* ‘and’ is a proper conjunction. The interrelatedness of individuals involved in CCs has also been noticed by Comacho (1994, 2000) for Spanish, Urtz (1994) for Russian, and McNally (1993) for Russian and Polish data. Miller (1971) and McNally (1993) suggest that individuals in the denotation of CCs are in some relevant sense *together* and consider this fact to be one of the crucial differences between CCs and ordinary *and*-coordination. Kopcińska (1995) makes a similar observation with reference to Polish CCs versus nominal coordination, but she suggests treating the interrelatedness of individuals involved in CCs as a possessive relationship.

Linguistically, the relatedness between NP1s and NP2s in CCs can be described by means of conventional implicature in terms of Grice (1957, 1969, 1975, 1978, 1981), as proposed in McNally (1993). In this thesis, I will follow this idea and assume that the meaning of relatedness in CCs is located in conventional implicatures (understood as the hinted part of utterance content) triggered by these CCs. To show that CCs bear such conventional implicatures of relatedness, or, in her terms, *togetherness*, McNally (1993, pp. 368–369) provides the Polish examples given here in (4).

- (4) a. Marek *z* Piotrem poszli do kina.
Marek with Piotr.INSTR went.PL to cinema
‘Marek and Piotr went to the cinema.’

²Note that apart from comitativity, the Polish preposition *z* selecting instrumental NPs can express a variety of senses, such as positioning, complementation, implication, characterization, result, goal, usage etc. (cf. Dubisz (2003), Bańko (2000) and other Polish dictionaries).

- b. Marek z Piotrem poszli do kina, ale nie poszli tam
Marek with Piotr.INSTR went.PL to cinema but not went there
razem.
together
'Marek and Piotr went to the cinema, but didn't go there together.'
- c. Marek z Piotrem poszli do kina, ale przybyli tam
Marek with Piotr.INSTR went.PL to cinema but arrived.PL there
osobno.
separately
'Marek and Piotr went to the cinema, but they arrived there separately.'

Note that for some native speakers of Polish, (4b) sounds somewhat unnatural. The sentence becomes more acceptable when the main verb is substituted by another verb, such as *wybrać się* 'to set off', as in (5).

- (5) Marek z Piotrem wybrali się do kina, ale nie poszli tam
Marek with Piotr.INSTR set off.PL RM to cinema but not went there
razem.
together
'Marek and Piotr set off for the cinema, but didn't go there together.'

According to McNally (1993), (4a) clearly implicates that Marek and Piotr went to the cinema together. The grammaticality of (4b) and (4c) indicates that the togetherness associated with these sentences cannot be understood here in a strict sense.

A similar observation has been made by Urtz (1994), who has investigated Russian data. Urtz (1994) claims that the relations expressed by CCs imply a close togetherness but do not necessarily have to involve a spatiotemporal regular association. Consider (6), taken from Urtz (1994, p. 76).

- (6) Babushka s Petej rodilis' v Moskve.
grandmother with Petja.INSTR born.PL in Moscow
'Grandmother and Petja were born in Moscow.'

Togetherness still applies to examples like (6), but in a more abstract sense: the referents of the two NPs are related to each other and the predicate applies to both of them, but they complete the action of the verb at different times. For this reason, I will call the meaning implied by CCs as *relatedness* rather than togetherness.

The implied meaning of *relatedness* can be brought about or intensified in CCs by means of explicit content, in particular by collectivizing adverbs such as *wraz* 'together', *łącznie* 'conjointly', *współ* 'jointly', *wspólnie* 'together / jointly', *włącznie* 'including', *jednocześnie* 'concomitantly'. Stefan Dyla (personal communication) pointed out that the Polish comitative preposition *z* has been supported

in the course of time by many other expressions which bear the collective meaning, such as *pospolicznie*, *pospołu (i)*, *społecznie (i)*, *także*, *współek (i)*, *współ (i)*, *wraz*. In this thesis, I will consider the modifiability of *z* NP2 sequences by the adverb *razem* ‘together’ and other collectivizing adverbs as a test to identify comitative constructions among other *z* NP2 expressions.

Compare the two sentences in (7) and (8), which have the same syntactic structure.

- (7) Jan (razem) z Marią wyjechał.
 Jan together with Maria.INSTR left
 ‘Jan left together with Maria.’
- (8) Chłopak (#razem) z zezem wyjechał.
 boy together with cross-eye.INSTR left
 ‘The cross-eyed boy left.’

The usage of *razem* ‘together’ is possible only in (7). According to our knowledge of the world, the expression *z zezem* ‘cross-eyed’ in (8) restrictively characterizes the individual referred to by the NP *chłopak* ‘the boy’ rather than providing an (abstract) object accompanying that individual. For this reason, modification by the collective adverb *razem* is pragmatically unacceptable here. By contrast, *razem* may be used in (7), because (7) refers to a group of (two) individuals. Only NP1 *z* NP2 sequences as in (7) can be considered as CCs.³

2.1.2 Structural Constituency

Next I will address the issue of structural constituency and the placement of *z* NP2 strings relative to NP1s.⁴ The objective is to show that *z* NP2 strings in Polish CCs can syntactically combine both with NP1s and VPs without a change of the comitative content.⁵

Consider the sentences in (9).

- (9) a. Jan z Marią wyjechał.
 Jan with Maria.INSTR left
 ‘Jan left with Maria.’

³Note that the usage of collectivizing adverbs requires semantic plurality, but not necessarily morphosyntactic plural marking.

⁴Besides structural or syntactic constituency, linguistic expressions can also be characterized in terms of prosodic and discourse constituency (see, for instance, the discussion in Penn (1999)). Since this study predominantly deals with syntactic and semantic aspects of the grammar of CCs, the notions of *structure / structural* and *constituency* will refer to syntactic facts rather than to prosodic or discourse circumstances.

⁵Section 5.3.1 will show that *z* NP2 strings cannot combine with VPs in all types of Polish CCs. At present, I merely intend to indicate the potential ability of *z* NP2 sequences to form a constituent with both nominal and verbal categories. Further details on what kind of CCs have this property will be discussed later in this thesis.

- b. [Jan z Marią] wyjechał.
 Jan with Maria.INSTR left
 ‘Jan left with Maria.’
- c. Jan [z Marią wyjechał].
 Jan with Maria.INSTR left
 ‘Jan left with Maria.’
- d. Jan wyjechał z Marią.
 Jan left with Maria.INSTR
 ‘Jan left with Maria.’

Sentences as in (9a) are structurally ambiguous between the syntactic interpretations given in (9b) and (9c). While the expression *z Marią* ‘with Mary’ is syntactically associated with the NP *Jan* ‘Jan’ in (9b), in (9c) it combines with the verb. The sentence in (9d) can, in turn, be interpreted as either involving a verbal modifier following the verb or a discontinuous NP: *Jan z Marią* ‘Jan with Mary’ split up by the verb *wyjechał* ‘left’. These ambiguities result from specific linearization facts in Polish.

Polish has relatively free word order: The basic constituents of a simple clause may appear in any order, and various kinds of discontinuous constituents are also possible. However, the linear position of conjuncts, the placement of clitics, extraction out of constituents, as well as the word order within NPs and PPs do underlie specific linear restrictions. Different linearizations in Polish usually correspond to different information structures in the sense that the segmentation of a given proposition into topic-focus or into theme-rheme parts is determined by word order in the sentence which expresses this proposition. Since with neutral context and neutral intonation, preverbal NPs tend to be interpreted as subjects, and postverbal NPs as objects, Polish is usually regarded as an SVO (Subject-Verb-Object) language (cf. Stieber (1972), Bartmiński (1973) and Wierzbicka and Wierzbicki (1969)). In addition, Świdziński (1996) shows that in Polish, the SVO order is more frequent than the OVS (Object-Verb-Subject) order. Klemensiewicz (1949) clearly demonstrates a preference for the initial position of subjects in Polish as well. In this thesis, I will follow these approaches and assume that in neutral contexts, the subject precedes the predicate, while the object follows it.⁶

Furthermore, different linearizations in Polish may not only have information structural but also semantic effects, as shown by the sentences in (10), which differ in the placement of subjects.

- (10) a. Mężczyzna wszedł do pokoju.
 man got in room
 ‘The man got in the room.’

⁶For a detailed discussion on word order in Polish and further references, see Derwojedowa (2000).

- b. Do pokoju wszedł mężczyzna.
 in room got man
 'A man got in the room.'

The subject NP *mężczyzna* 'man' precedes the predicate in (10a) and follows it in (10b). As the English translations indicate, the preverbal NP in (10a) is interpreted as definite, while the postverbal NP in (10b) is indefinite.

Different linearizations can also have an impact on agreement. As (11a) shows, the preverbal subject NP *Jan i Piotr* 'Jan and Piotr' can only combine with a plural predicate, while the corresponding postverbal subject NP in (11b) can combine with a singular or a plural predicate.

- (11) a. Jan i Piotr *wszedł / weszli do pokoju.
 Jan and Piotr got.SG / got.PL in room
 'Jan and Piotr got in the room.'
- b. Do pokoju wszedł / weszli Jan i Piotr.
 in room got.SG / got.PL Jan and Piotr
 'Jan and Piotr got in the room.'

As I mentioned above, the linearization within Polish NPs is much stricter. While adjectival modifiers usually precede the noun,⁷ nominal and prepositional complements as well as prepositional modifiers follow it. The examples in (12) present two complex NPs with a typical word order.

- (12) a. najmłodsza córka mojego sąsiada
 youngest daughter my neighbor
 'the youngest daughter of my neighbor'
- b. chuda dziewczyna o rudych włosach
 thin girl with red hair
 'the thin girl with red hair'

Prepositional VP-modifiers can appear in Polish both to the left and to the right of the VPs, as (13) illustrates.

- (13) a. Ewa do północy oglądała telewizję.
 Ewa until midnight watched TV
 'Ewa watched TV until midnight.'
- b. Ewa oglądała do północy telewizję.
 Ewa watched until midnight TV
 'Ewa watched TV until midnight.'

⁷In fact, both prenominal and postnominal adjectival modification is possible in Polish. However, they are not equivalent: while the prenominal modification is associated with restrictive meaning, the postnominal modification usually relates to classifying properties. For more details on this issue, see Rutkowski (2006).

- c. Ewa oglądała telewizję do północy.
Ewa watched TV until midnight
'Ewa watched TV until midnight.'

The PP *do północy* 'until midnight' can immediately precede or follow the verb, and it can also occur after the verbal complement, as in (13c). Due to its temporal semantics, the PP *do północy* is an event-modifier, and hence, structurally associated with the predicate. An interpretation where it is analyzed as a semantic and syntactic modifier of the subject NP *Ewa* is excluded by virtue of pragmatics.

The sentence in (14) provides an example where it is reasonable to assume that a PP is an NP-modifier rather than a VP-modifier, both in a semantic and a syntactic sense.

- (14) Mężczyzna w czerwonym kapeluszu uśmiechnął się znacząco.
man in red hat smiled RM meaningfully
'The man in the red hat smiled meaningfully.'

Here, the PP *w czerwonym kapeluszu* 'in the red hat' is clearly related to the NP *mężczyzna* 'man'.

If by virtue of its lexicosemantic properties, a PP is able to modify both events and individuals, sentences involving a linearization such as that in (13a) or (14) are structurally ambiguous: The PP may be interpreted as syntactically associated with the preceding NP or with the following VP. This is the case in (9), where the two possible syntactic interpretations are indicated in (9b) and (9c), respectively. It should, however, be emphasized that (9b) differs from (9c) prosodically. While the sequence *Jan z Marią* forms a prosodic unit in (9b) (= 15a), it does not in (9c) (= 15b). The symbol || in (15b) indicates a prosodic break immediately after the word *Jan*.

- (15) a. [Jan z Marią] wyjechał.
Jan with Maria.INSTR left
'Jan left with Maria.'
- b. Jan || [z Marią wyjechał].
Jan with Maria.INSTR left
'Jan left with Maria.'

Next we move to syntactic evidence that Polish CCs allow for a structural interpretation such as (9b), where the *z* NP2 expression attaches to the NP1. Consider (16).

- (16) Jan z Marią albo Piotr wyjedzie do USA.
Jan with Maria.INSTR or Piotr.NOM will go to USA
'Jan will go with Maria to the USA or Piotr will.'

In Polish, chains of several constituents can be coordinated. However, a coordination involving multiple constituents requires some symmetry with respect to the number of constituents in each conjunct, as well as to the syntactic relationship between the coordinated constituents and constituents in the sentence, e.g., the predicate. Consider the sentences in (17) and (18), uttered in unmarked contexts, i.e., without any contrastive focus, longer intervals etc.

- (17) a. Piotr umówi się z Ewą w kinie albo z
Piotr will meet RM with Ewa.INSTR in cinema.LOC or with
Anną w parku.
Anna.INSTR in park.LOC
'Piotr will meet Ewa at the cinema or Anna in the park.'
- b. ??Piotr umówi się z Ewą w kinie albo z
Piotr will meet RM with Ewa.INSTR in cinema.LOC or with
Anną.
Anna.INSTR
- c. *Piotr umówi się w kinie albo z Anną w parku.
Piotr will meet RM in cinema.LOC or with Anna.INSTR in park.LOC
- (18) a. Piotr dzisiaj, a Jan wczoraj zdawał egzamin z matematyki.
Piotr today and Jan yesterday took exam of mathematics
'Piotr took the mathematics exam today and Jan took it yesterday.'
- b. *Piotr dzisiaj, a Jan zdawał egzamin z matematyki.
Piotr today and Jan took exam of mathematics
- c. *Piotr, a Jan wczoraj zdawał egzamin z matematyki.
Piotr and Jan yesterday took exam of mathematics

On the basis of the fact that the sentence in (16) is fully grammatical, one can conclude that (i) the sentence does not involve a multi-constituent coordination, (ii) the expression *z Marią* does not act as a VP-modifier, since the conjunct *Piotr* 'Piotr' would have to contain an appropriate component as well, and finally, (iii) the expression *Jan z Marią* forms a constituent.

The feasibility of interpreting sentences like (9a) as (9b) is shown by the examples in (19).

- (19) a. Jan z Marią wyjechał z synem.
Jan with Maria.INSTR left with son.INSTR
'Jan left with Maria and his / their son.'
- b. Jan wyjechał z synem (#z Marią).
Jan left with son.INSTR with Maria.INSTR
'Jan left with his son and Maria.' [intended]

- c. Jan wyjechał (#z Marią) z synem.
 Jan left with Maria.INSTR with son.INSTR
 ‘Jan left with Maria and his son.’ [intended]
- d. Jan || [(#z Marią) wyjechał z synem].
 Jan with Maria.INSTR left with son.INSTR
 ‘Jan left with Maria and his son.’ [intended]

The sentences in (19) each involve multiple *z* NP expressions. Both *z Marią* ‘with Maria’ and *z synem* ‘with son’ act as postverbal modifiers in (19b) and (19c). The expression *z Marią* in (19d) functions as a preverbal modifier, which is indicated by the prosodic break after the sentence initial NP *Jan* ‘Jan’. In all three sentences, the appearance of *z Marią* results in pragmatic failure due to the occurrence of more than one adjunct of the same lexicosemantic type in a non-coordinate relationship modifying the same constituent.⁸ Since (19a), which contains multiple *z* NP expressions as well, is perfectly acceptable in syntactic, semantic and pragmatic terms, it is plausible to interpret the phrase *z Marią* in this sentence as associated with the NP *Jan* rather than with the predicate.

However, while sentences like those in (19) containing two *z* NPs attached to a verb and no further modifiers are pragmatically unacceptable, corresponding sentences which involve more lexical material seem much better in Polish. This is illustrated by (20).

- (20) Jan wyjechał z Marią wczoraj wieczorem z synem
 Jan left with Maria.INSTR yesterday evening with son.INSTR
 do USA.
 to USA
 ‘Jan left with Maria and his / their son yesterday evening for the USA.’

Given this, an additional *z* NP expression modifying a verb cannot always be considered as clear evidence for interpreting a nominative NP and an adjacent *z* NP string in a CC as one constituent. Nevertheless, this test might be useful for examining simple sentences, such as those in (19).

Linear properties of Polish are responsible for the structural ambiguity in (9d) as well: As indicated above, the sentence in (9d) can either be interpreted as involving a postverbal prepositional modifier or the discontinuous NP *Jan z Marią*. The sentences in (21) illustrate the fact that complex NPs in Polish can be split by predicates.

- (21) a. Walka z terroryzmem trwa od dawna.
 war with terrorism takes for a long time
 ‘The war with terrorism takes a long time.’

⁸For more details on particular restrictions on the distribution of adjuncts, see Steinitz (1988), for instance. See also Bresnan (1982) on the iterability of adjuncts, and Przepiórkowski (1999) for a general discussion on the distribution of adjuncts versus complements.

- b. Walka trwa z terroryzmem od dawna.
 war takes with terrorism for a long time
 ‘The war with terrorism takes a long time.’

Both in (21a) and (21b), the PP *z terroryzmem* ‘with terrorism’ can only be interpreted as associated with the NP *walka* ‘war’ (as a complement or, possibly, a modifier). Since the verb *trwać* ‘to take’ refers to an event of duration and combines with expressions denoting periods of time, and since the PP *z terroryzmem* does not provide any temporal reference, the sequence *trwa z terroryzmem* ‘takes with terrorism’ in (21b) cannot be interpreted as one constituent. The only option is to analyze the NP *walka* ‘war’ and the PP *z terroryzmem* ‘with terrorism’ as one discontinuous constituent. (21a) and (21b) differ with respect to prosody and information structure. While (21a) can be considered as prosodically and information structurally unmarked, the word order in (21b) enforces focus on the NP *walka* and a prosodic break after it. Given that the different word orders in the sentences in (21) affect information structure, I consider them as a syntactic rather than a purely linear phenomenon. That means that the sentence in (21b) should probably be treated as an instance of extraction out of an NP.

Summing up, I have shown that the *z* NP2 sequences in Polish CCs can semantically and syntactically be associated with both nominal and verbal constituents. CCs can be syntactically ambiguous in two ways: (1) a given NP1 *z* NP2 string can either be interpreted as a continuous constituent combining with a predicate, as in (9b), or as consisting of the constituent NP1 and the sequence *z* NP2 forming a constituent with the following predicate, as in (9c), and (2) the *z* NP2 string occurring postverbally, as in (9d), can either be interpreted as the right VP-adjunct or as an extracted part of the constituent consisting of the entire NP1 *z* NP2 expression. The ability of *z* NP2 strings to attach to VPs will be discussed in more detail in Section 5.3.1.

2.2 The Preposition *z* ‘with’

Next I will characterize the expression *z* ‘with’, which connects NP1s and NP2s in CCs, with respect to its grammatical category and subcategorization frame. I have already mentioned that *z* in CCs has the categorial status of a preposition; I will now summarize its crucial properties to support this view. The discussion will not draw on any particular definition of prepositions, but rather on particular properties which are characteristic of typical prepositions in Polish.

2.2.1 Postprepositional Pronouns

The crucial criterion identifying prepositions in Polish is their ability to occur with postprepositional pronouns. Note that Polish third person personal pronouns inflect besides case (nominative, genitive, dative, accusative, instrumental and locative), number (singular and plural) and accentability (yes or no) for postprepositionality

(yes or no). The examples in (22) illustrate the usage of postprepositional versus non-postprepositional pronouns, where the abbreviations PP+ and PP- refer to postprepositionality and non-postprepositionality, respectively.

- (22) a. Na niego czekać nie będę.
 for him.ACC.3RD.SG.PP+ wait not will.1ST.SG
 ‘I will not wait for him.’
- b. Jego zaproszę na imprezę na pewno.
 him.ACC.3RD.SG.PP- invite.1ST.SG to party for sure
 ‘I will definitely invite him to the party.’

The accusative third person singular pronoun *niego* ‘him’ in (22a) combines with a preposition and occurs in its postprepositional form, starting with an initial *n-*. The same occurs in (22b) in a preposition-free context in its non-postprepositional form, i.e., *jego* ‘him’.⁹

The criterion of postprepositionality cannot be applied to *z* in CCs. Within CCs, *z* combines with instrumental NPs, and instrumental forms of postprepositional and non-postprepositional pronouns are syncretic in Polish. Given this, it cannot be clearly determined whether an instrumental pronoun occurring as an NP2 in a CC is postprepositional or not.

It might be interesting to note that, contrary to what is presumed in Polish grammars, postprepositionality seems not to be restricted to prepositional contexts. As the example in (23) shows, some adjectives seem to be able to occur with postprepositional pronouns as well.

- (23) ta godna niego / ??jego kobieta
 this suitable his.GEN.3RD.SG.PP+ / his.GEN.3RD.SG.PP- woman
 ‘this woman suitable for him’

However, such data require a detailed examination and are not the subject of this study.

2.2.2 Vocalic Alternation

Another criterion that can be applied in the identification of primary, i.e., monomorphemic, prepositions (as opposed to secondary, i.e., derived, prepositions) is vocalic alternation. As a typical Polish primary preposition, *z* ‘with’ undergoes vocalic alternation when it appears in specific phonological environments. This is shown by the difference between *z Marią* ‘with Maria’ and *ze Stasiem* ‘with Staś’ in (24).

⁹For more details on the system of personal pronouns in Polish, see, for instance, Saloni (1981) and Trawiński (2007). For a discussion on postprepositionality as an inflectional category of third person personal pronouns in Polish, see Świdziński and Derwojedowa (2004) and Trawiński (2005b, 2007).

- (24) a. Jan z Marią wyjechał do USA.
 Jan with Maria.INSTR left.SG.M1 to USA
 ‘Jan left for the USA with Maria.’
- b. Jan ze Stasiem wyjechał do USA.
 Jan with Staś.INSTR left.SG.M1 to USA
 ‘Jan left for the USA with Staś.’

This kind of alternation is typical of all Polish prepositions realized by a consonant and not of nouns.

2.2.3 Modifiability by Adverbs

As already indicated, *z* NP2 sequences in CCs can be modified by adverbs. This is shown by the examples in (25).

- (25) a. Jan razem z Marią wyjechał do USA.
 Jan together with Maria.INSTR left.SG.M1 to USA
 ‘Jan left for the USA together with Maria.’
- b. Ojciec wraz z synem poszli na spacer.
 father together with son.INSTR went.PL.M1 for walk
 ‘The father and the son went for a walk together.’

Since adverbs in Polish can only modify prepositional phrases, adjectives, verbs or other adverbs, data as in (25) are consistent with the position that the *z* NP2 expressions in (25) are prepositional phrases headed by the preposition *z*.

2.2.4 Case Assignment

NP2s in all types of Polish CCs occur in instrumental case. Since outside of CCs, *z* occurs as a preposition and assigns instrumental case as well, which is illustrated in (26), it seems reasonable to conclude that *z* also acts as a preposition in CCs, selecting NPs and assigning instrumental case to them.¹⁰

- (26) a. Anna wiedziała, co zrobić z tą sprawą.
 Anna knew what do with this.INSTR matter.INSTR
 ‘Anna knew what to do in this matter.’
- b. Jan nie mógł sobie dać rady z matematyką.
 Jan not could REFL.PRN manage with mathematics.INSTR
 ‘Mathematics was quite difficult for Jan.’

Moreover, like all other Polish prepositions, *z* does not inflect.

Summing up, I have shown that *z* undergoes vocalic alternation, behaves like other prepositions in selecting NPs and assigning instrumental case to them, and can (together with the selected NPs) be modified by adverbs. All these properties characterize typical prepositions in Polish. Based on these observations, I conclude that the expression *z* in CCs is a preposition.

¹⁰Note that the non-comitative preposition *z* can also assign genitive case.

2.3 Semantic Typology

I will now provide a typology of Polish CCs based in the first instance on the lexicosemantic relationship between NP1 and NP2. I will discuss initial evidence that shows that at least three main lexicosemantic relationships between NP1 and NP2 can be identified in Polish CCs: accompanitive, conjunctive and inclusive. I will then give a (preliminary) set-theoretical interpretation for the three types of CCs.

2.3.1 Lexicosemantic Relationships

Consider the following examples.

- (27) Jan z Marią wyjechał do USA.
 Jan.SG with Maria.INSTR.SG left.SG to USA
 ‘Jan left for the USA with Maria.’
- (28) Jan z Marią wyjechali do USA.
 Jan.SG with Maria.INSTR.SG left.PL to USA
 ‘Jan and Maria left for the USA.’
- (29) My z Marią wyjechaliśmy do USA jako jedyna para
 we with Maria.INSTR.SG left.PL to USA as only couple
 małżeńska.
 married
 ‘Maria and I, the only married couple, left for the USA.’

The relationship between NP1 and NP2 in (27) is such that the individual referred to by NP2 accompanies the individual referred to by NP1 in the event referred to by the predicate.

In (28), the individuals associated with NP1 and NP2 are members of a set of equal participants involved in the event of leaving. NP1 and NP2 thus function as conjuncts, bearing the same thematic relationship to the predicate. A similar observation has been made in Comacho (1994) for Spanish, Ionin and Matushansky (2003) and Dalrymple et al. (1998) for Russian, and Schwartz (1988b), who speaks about this type of CC as *thematic coordination*, for data from various languages. By contrast, Miller (1971) and McNally (1993) claim that there are meaning differences between conjunctive coordination and comitative expressions of the type as in (28), in that the latter do not allow for distributive reading, whereas the former does. However, I will demonstrate in Chapter 3.3 that in Polish, both coordination and comitative constructions as in (28) can have distributive as well as collective interpretations. Finally, Urtz (1994) believes that the comitative preposition (in particular, the Russian preposition *s* ‘with’), unlike a conjunction, always implies a close but unequal relationship between the two referents, where the instrumental noun is more or less subordinate. However, this view is challenged by the usage

of NP1 z NP2 expressions with collective predicates (such as *meet, cooperate, collaborate, compare, gather, assemble* etc.), because individuals in their denotation are usually considered to have an equal relationship to each other. I thus argue that the comitative content in (28) resembles conjunctive coordination, and will show in the later chapters of this thesis that there is a clear correspondence between both constructions.

Finally, the relationship between NP1 and NP2 in (29) is such that the denotation of NP2 is included in the denotation of NP1: the meaning of the first person plural pronoun *my* ‘we’ in (29) includes both the individuals referred to by the NP *Maria* ‘Maria’ and the speaker, and thus, carries the meaning *Maria and I*. In some contexts, first person plural pronouns in combination with z NP2 sequences can refer to a set of individuals including the speaker, the individual denoted by the argument of the preposition (*Maria* ‘Maria’ in (29)), as well as further individuals. The sentence in (30) demonstrates this possibility.

- (30) Tylko my trzej z Janem spaliśmy z żonami w trzech osobnych
 only we three with Jan.INSTR.SG slept.PL with wives in three separate
 pokojach. Pozostałe małżeństwa spały wszystkie razem.
 rooms other married couples slept all together
 ‘Only Jan and the rest of us three slept with our wives in three separate
 rooms. The other married couples all slept in another room.’

A similar observation has been made by Urtz (1994, pp. 55–56), who indicates that in most Slavic languages, CCs involving plural pronouns refer to two people only, whereas in Polish, they may refer to more than two, depending on the context, the semantics and the pragmatics of the nouns and verbs used, as the following examples from Urtz (1994, p. 56) show.

- (31) My z żoną bardzo lubimy słuchać Mozarta.
 we with wife.INSTR.SG very like.PL to listen Mozart
 ‘My wife and I love to listen to Mozart.’
- (32) Miło nam z córką poznać pana.
 pleased to us with daughter.INSTR.SG to meet Mr.
 T1: ‘My daughter and I are pleased to meet you.’
 T2: ‘We and our daughter are pleased to meet you.’

Because the CC in (31) refers to a married couple, and marriage by definition involves exactly two people, the CC must refer to two people. However, since a daughter must have two parents, the CC in (32) may refer to two or three people.

Second¹¹ and third person plural pronouns display the same ambiguity in CCs, as the examples in (33) and (34) show.

¹¹Note that second person plural pronouns can also be forms of address to a single person. These should not be mistaken for forms used in CCs.

- (33) a. Wy z Marią wyjechaliście z synem do USA
 you.PL with Maria.INSTR.SG left.PL with son.INSTR to USA
 jako jedyna para małżeńska.
 as only couple married
 ‘You and Maria, the only married couple, left with your son for the USA.’
- b. Tylko wy trzej z Janem spaliście z żonami
 only you.PL three with Jan.INSTR.SG slept.PL with wives.INSTR
 w trzech osobnych pokojach. Pozostałe małżeństwa spały wszystkie
 in three separate rooms other married couples slept all
 razem.
 together
 ‘Only Jan and the rest of you three slept with your wives in three separate rooms. The other married couples all slept in another room.’
- (34) a. Oni z Marią wyjechali z synem do USA jako
 they with Maria.INSTR.SG left.PL with son.INSTR to USA as
 jedyna para małżeńska.
 only couple married
 ‘He and Maria, the only married couple, left with their son for the USA.’
- b. Tylko oni trzej z Janem spali z żonami w
 only they three with Jan.INSTR.SG slept.PL with wives.INSTR in
 trzech osobnych pokojach. Pozostałe małżeństwa spały wszystkie
 three separate rooms other married couples slept all
 razem.
 together
 ‘Only Jan and the rest of the three slept with their wives in three separate rooms. The other married couples all slept in another room.’

Note that CCs where the denotation of NP2 is included in the denotation of NP1 can also contain non-pronominal NP1s. (35), (36) (Adam Przepiórkowski, personal communication), and (37) demonstrate that non-pronominal plural nouns, collective nouns, and even singular, non-plurality denoting nouns are also possible in this type of CC. The adverb *włącznie* ‘including’ intensifies the inclusive interpretation.

- (35) Niektórzy członkowie rządu włącznie z premierem
 some members government including with prime minister.INSTR
 zastanawiają się nad dymisją.
 are wondering RM about demission
 ‘Some members of the government, including the prime minister, are wondering whether they should resign from their positions.’

- (36) a. Ten kwartet fortepianowy z Zimmermanem (grającym na
this quartet piano with Zimmerman.INSTR playing on
fortepianie) zagrał koncertowo.
piano played admirable
'This piano quartet played admirably, with Zimmerman at the pi-
ano.'
- b. Jazzowy sextet wszechczasów z Milesem Davisem (jako
jazz sextet of all ages with Miles.INSTR Davis.INSTR as
liderem) nagrał trzy płyty.
leader recorded three albums
'The best ever jazz sextet with Miles Davis (as the leader) recorded
three albums.'
- c. To małżeństwo z Bogusławem Lindą (w roli niewiernego
this marriage with Bogusław.INSTR Linda.INSTR in role unfaithful
męża) musiało się rozpaść.
husband had to RM fail
'This marriage with Bogusław Linda (as an unfaithful husband)
had to fail.'
- d. Cała rodzina z wujkiem i ciocią włącznie przyszła
whole family with uncle.INSTR and aunt.INSTR including came
na ślub.
to wedding
'The whole family, including the uncle and the aunt, came to the
wedding.'
- (37) a. Całe mieszkanie włącznie z łazienką będzie remontowane.
whole flat including with bathroom.INSTR will be renovated
'The whole flat including the bathroom will be renovated.'
- b. Całe ciało tego zwierzęcia włącznie z głową i ogonem
whole body this animal including with head.INSTR and tail.INSTR
pokrywają włosy.
cover hairs
'The whole body of this animal including the head and the tail is
covered with hair.'

2.3.2 An Overall Classification

On the basis of the data discussed above, I define three main classes of CCs in Polish, arising from the types of lexicosemantic relationships between NP1s and NP2s. I will call CCs as in (27) (= (38)) **accompanitive comitative constructions (ACCs)**, CCs as in (28) (= (39)) **conjunctive comitative constructions (CCCs)** and CCs as in (29) (= (40)) **inclusive comitative constructions (ICCs)**.

- (38) Jan z Marią wyjechał do USA. ACC
 Jan.SG with Maria.INSTR.SG left.SG to USA
 ‘Jan left for the USA with Maria.’
- (39) Jan z Marią wyjechali do USA. CCC
 Jan.SG with Maria.INSTR.SG left.PL to USA
 ‘Jan and Maria left for the USA.’
- (40) My z Marią wyjechaliśmy do USA jako jedyna para
 we with Maria.INSTR.SG left.PL to USA as only couple
 małżeńska. cICC
 married
 ‘Maria and I, the only married couple, left for the USA.’
- (41) Tylko my trzej z Janem spaliśmy z żonami w trzech osobnych
 only we three with Jan.INSTR.SG slept.PL with wives in three separate
 pokojach. Pozostałe małżeństwa spały wszystkie razem.
 rooms other married couples slept all together
 oICC
 ‘Only Jan and the rest of us three slept with our wives in three separate
 rooms. The other married couples all slept in another room.’

Furthermore, a distinction will be provided between ICCs that have a well-delineated denotation and ICCs that do not. Denotational well-delineation is to be understood here in the sense that all referents of a given ICC are clearly identifiable. The denotation of the ICC in (40) is well-delineated, since it includes only the speaker and the denotation of the instrumental NP – no further, unidentifiable individuals are implied. By contrast, the denotation of the ICC in (30) (= (41)) is not well-delineated: Besides the speaker and the denotation of the instrumental NP, it involves a third referent which cannot be clearly identified. Another example of an ICC with a non-well-delineated denotation is (35). Here, only one referent out of the whole set of the referents can be identified, namely the one provided by the instrumental NP. I will use the notion **closed inclusive comitative constructions (cICCs)** for ICCs with a well-delineated denotation, such as the ICC in (40), and the notion **open inclusive comitative constructions (oICCs)** to refer to ICCs with a non-well-delineated denotation, such as the ICC in (41).

The next section provides a set-theoretical representation for each of the CC types specified above.

2.3.3 A Set-Based Characterization

The three basic semantic types of CCs postulated above: the ACC, the CCC and the ICC (including the cICC and the oICC) reflect the native speakers’ intuitions in interpreting the sentences in (38)–(41). The contents manifest in these sentences

can be viewed as corresponding to three different concepts in terms of lexical semantics: accompaniment, conjunction and inclusion. This intuitive view can be made more precise using sets. First informal set-based characterizations are given in (42), (43) and (44), respectively.

- (42) The denotation of the accompanitive NP1 z NP2 expression where NP1 denotes a (possibly singleton) set A of individual entities and NP2 denotes a (possibly singleton) set B of individual entities includes A and B , where A and B are disjoint sets.
- (43) The denotation of the conjunctive NP1 z NP2 expression where NP1 denotes a (possibly singleton) set A of individual entities and NP2 denotes a (possibly singleton) set B of individual entities is the union of A and B .
- (44) The denotation of the inclusive NP1 z NP2 expression where NP1 denotes a set A of individual entities and NP2 denotes a (possibly singleton) set B of individual entities equals A , where A is a proper superset of B .

The characterization in (44) does not differentiate between cICCs and oICCs, as it merely states that the denotation of NP2 is a part of the denotation of NP1. No statement is made concerning the part of the denotation of NP1 z NP2 that is different from the denotation of NP2. (45) is an alternative characterization of the meaning of ICCs which explicitly accounts for cICCs and oICCs.

- (45) The denotation of the inclusive NP1 z NP2 expression where NP1 denotes a set A of individual entities and NP2 denotes a (possibly singleton) set B of individual entities equals A , where A is a set union of B and a set C of individual entities such that
- a. either C is a singleton set (for cICCs),
 - b. or the cardinality of C is greater than 1 (for oICCs).

The intuitive characterizations in (42), (43), (44) and (45) are schematically represented in (46), (47) and (48) and (49), respectively. The symbol $\llbracket \cdot \rrbracket$ stands for denotation, i.e., the interpretation function, A refers to a set of individual entities denoted by NP1, B refers to a set of individual entities denoted by NP2 and C refers to a non-empty set of individual entities.

- (46) $\llbracket \text{NP1 } z \text{ NP2} \rrbracket \supseteq A, B, \text{ where } A \cap B = \emptyset$ ACC
- (47) $\llbracket \text{NP1 } z \text{ NP2} \rrbracket = (A \cup B)$ CCC
- (48) $\llbracket \text{NP1 } z \text{ NP2} \rrbracket = A, \text{ where } A \supset B$ ICC

(48), describing the denotation of ICCs, can be replaced by the more specific schema in (49).

- (49) $\llbracket \text{NP1 } z \text{ NP2} \rrbracket = A$, where $A = (B \cup C)$, and ICC
- a. either $|C| = 1$ cICC
- b. or $|C| > 1$ oICC

The characterizations in (42)–(45) and their schematic paraphrases in (46)–(49) present in a set-theoretical fashion the crucial differences between ACCs, CCCs and ICCs. (42) and the corresponding schema in (46) thus indicate that, firstly, the denotation of the NP1 z NP2 sequence in ACCs includes the denotation of NP1 and NP2, and secondly, the denotations of NP1 and NP2 are disjoint. (43) and the corresponding schema in (47) imply that the denotation of the NP1 z NP2 sequence in the CCC includes the denotation of NP1 and NP2, which together form a single meaning component, i.e., a set of individual entities composed of the denotation of NP1 and the denotation of NP2. This characterization of the meaning of CCCs in (43) and (47) reflects the intuition described above that the individuals denoted by NP1 and NP2 in the CCC are members of a set of equal participants involved in the event expressed by the predicate. Finally, (44) and the corresponding schema in (48) indicate that the denotation of the NP1 z NP2 sequence in the ICC equals the denotation of NP1, and that the denotation of NP2 is included in it. The alternative description in (45) and the corresponding schema in (49) additionally account for the close and the open readings of the ICC.

The crucial denotational differences between the particular types of CCs thus arise from the way the denotation of NP1 and the denotation of NP2 are involved in the denotation of the entire NP1 z NP2 expression. The technical details on these denotational differences will be provided in Part II of this thesis.

Note that these observations only present a raw empirical perspective for a distinction between the meanings of the particular CC types. Also, the descriptions in (42) through (49) should be considered as preliminary representations of the particular denotations. The aim of this section was merely to express the intuitions described in the previous sections in a more precise way and to substantiate the basis for further discussion.

2.3.4 Evidence for the Typology

The typology of Polish CCs postulated above has a hypothetical character, since it is based on intuition rather than a careful examination of data. The empirical motivation will be provided in the following chapters. The aim of this section is to establish a clear basis, as theory-neutral and informal as possible, on which the empirical characterization of Polish CCs will be built in the remainder of Part I.

Since the core component of each CC is the NP1 z NP2 sequence, this sequence will be considered as the source of the ambiguity. The task of the following chap-

ters will thus be to demonstrate that the NP1 \bar{z} NP2 sequence as used in CCs is semantically ambiguous. To achieve this goal, I will use some tests.

Firstly, I will check whether the different types of the NP1 \bar{z} NP2 sequence trigger different presuppositions.¹² My crucial assumption is that semantically non-equivalent expressions can trigger different presuppositions, while semantically equivalent (same-denoting / coextensive) expressions, i.e., expressions that mean the same or something very similar (i.e., refer to the same things), trigger equivalent presuppositions. The sentences in (50), for instance, have different presuppositions (presuppositions are indicated by the symbol \gg). Since both sentences involve the same predicate and only differ with respect to the subject NPs, it is reasonable to assume that the two different presuppositions are triggered by these NPs, indicating that they are semantically non-equivalent. This is obviously the case, since the NP *the man* in (50a) refers to a unique male individual, while the NP *the married couple* in (50b) refers to a unique pair of two married individuals. Presuppositional effects in Polish CCs will be discussed in Section 3.1.

- (50) a. The man left.
 \gg 1 person left.
 b. The married couple left.
 \gg 2 persons left.

Secondly, I will examine whether the NP1 \bar{z} NP2 sequences in the three types of CCs behave similarly with respect to contrastive focus assignment. My assumption is that if two expressions do not allow for the same focus assignment, they might not correspond to each other in semantic respects. This can be illustrated by the German sentences in (51), discussed in Krifka (1998), where / and \ stand for rising and falling accent, respectively.

- (51) a. Ro/MAne hat Hans \VIEle gelesen.
 novels has Hans many read
 ‘As for novels, Hans has read many.’
 b. *Ro/MAN hat Hans \EInen gelesen.
 novel has Hans one read

The sentences in (51) involve the so called *split NP constructions*, i.e., constructions in which the noun and the quantifier appear discontinuously.¹³ The sentences correlate regarding focus marking, i.e., in both (51a) and (51b), the initial constituent and the quantifier are assigned focus. However, only (51a) is grammatical. Krifka (1998) argues that in German split NP constructions, the initial constituent must have the form of a full NP, such as a plural or a mass noun, but not a singular count noun. The stranded determiner must also be of the form of a

¹²See Section 3.1 for the notion of presupposition.

¹³For more details on split NP constructions in German, see van Riemsdijk (1987), Fanselow (1988, 1993) and De Kuthy (2002).

full NP. This is the case in (51a) but not in (51b). I point out that the explanation for the difference between (51a) and (51b) in Krifka (1998) is also closely related to the semantics of split NPs. I thus argue that the difference in the grammaticality of the sentences (51a) and (51b), which involve similar information structure licensed by assignment of contrastive focus, indicates that the focalized NPs differ with respect to their denotations. These issues will be discussed for CCs in Section 3.2.

Thirdly, I will examine in each type of CC whether an NP1 z NP2 sequence with morphosyntactically singular NP1 and NP2 that both denote singularities can have plural interpretation. As evidence for the availability of plural denotation, I will consider the ability to occur in collective and distributive contexts. For instance, the collective verb *meet* can only combine with semantically plural expressions due to its semantic requirements. Since the NP *the committee* combined with the collective predicate *meet* results in the grammatical sentence (52a), one can conclude that this NP denotes plurality. By contrast, (52b), involving the NP *the president* and the collective predicate *meet*, is ungrammatical, which indicates that *the president* does not denote plurality. Note that both *the committee* and *the president* are morphosyntactically singular, as shown in (52a) and (52b) by the singular agreement on the predicate. This issue and its application to CCs will be discussed in Section 3.3.

- (52) a. The committee meets in Geneva.
b. *The president meets in Geneva.

Fourthly, I will test whether the NP1 z NP2 expressions exhibit the same properties with respect to coreference. I assume that only semantically equivalent expressions are able to control the same discourse anaphor. In (53), for instance, the anaphor *they* can be controlled by the NP *John and Mary* and the NP *their parents*, but not by the NP *Peter*.¹⁴ From this it follows that the NPs *John and Mary* and *their parents* must have at least some common semantic properties, and that the NP *Peter* semantically differs from the two NPs. Obviously, the crucial semantic difference is that both *John and Mary* and *their parents* refer to plural entities, whereas *Peter* does not. Coreference phenomena exhibited in CCs will be discussed in Section 3.4.

- (53) [John and Mary]_i introduced Peter_j to [their parents]_k. They_{i/*j/k} laughed.

Finally, I will examine whether each type of CC allows the NP1 z NP2 expressions to be composed of quantified NPs, bare plural NPs and pronouns, besides proper names. My assumption is that semantically equivalent complex expressions exhibit no significant contrasts with respect to semantic properties of their components. The transitive verbs *write* in (54a) and *eat* in (54b) can, for instance, both combine with indefinite, definite and quantified NPs. Since these VPs do not differ

¹⁴Note that (53) has more interpretations than indicated by the subscripts, but they are ignored as irrelevant here.

with respect to the semantic properties of their components, they may be considered semantically equivalent. By contrast, the copular verb *become* in (54c) can only combine with indefinite NPs. This fact may indicate a denotational difference between this VP, on the one hand, and the VPs in (54a) and (54b), on the other hand. Semantic properties of the components of the particular CCs will be discussed in Chapter 4.

- (54)
- a. John wrote a / the / some / no book.
 - b. John ate an / the / some / no apple.
 - c. John became a / *the / *some / *no socialist.

2.4 Summary

In this chapter, I have introduced the following basic properties of Polish CCs:

- the assignment of instrumental case to NP2s,
- the broad comitative content,
- the conventional implicature of relatedness,
- the modifiability of *z* NP2 strings by collectivizing adverbs,
- the ability of *z* NP2 strings to combine with both nominal and verbal constituents.

Further, I provided evidence that the expression *z* ‘with’ appearing in CCs has a prepositional status. On the basis of the lexicosemantic relationship between the NP1 and the NP2, I have proposed the following typology of Polish CCs:

- accompanitive comitative constructions (ACCs),
- conjunctive comitative constructions (CCCs),
- inclusive comitative constructions (ICCs):
 - closed inclusive comitative constructions (cICCs),
 - open inclusive comitative constructions (oICCs).

In addition, I have given a preliminary set-based semantic description of the postulated CC types. I argued that the crucial denotational difference between the particular CC types concerns the way the denotation of the NP1 and the denotation of the NP2 are involved in the denotation of the entire NP1 *z* NP2 expression: the meaning of the NP1 and of the NP2 are disjoint in the ACC, conjoint in the CCC, and in the ICC, the denotation of the NP2 is a component of the denotation of the NP1.

This chapter has also established a basis on which the empirical discussion on Polish CCs will be built in the remaining chapters of Part I. In the following chapters, I will examine the particular CC classes with regard to presuppositional effects, contrastive focus assignment, plural semantics, coreferential properties, and semantic properties of the single NPs. The goal will be to provide evidence for the semantic classification of CCs proposed in this chapter.

Chapter 3

Semantic Evidence for the Typology of CCs

In this chapter, I will examine Polish CCs with respect to presuppositional effects (Section 3.1), contrastive focus assignment (Section 3.2), plural denotation (Section 3.3) and coreferential properties (Section 3.4). I will show that these phenomena provide empirical evidence for the typology of CCs proposed in Chapter 2. In the following discussion, I will use the terminological framework, including the abbreviations, introduced in Chapter 2.

3.1 Presuppositional Effects

In this section, I will demonstrate that the NP1 *z* NP2 expression is able to trigger different presuppositions. This fact will be considered as evidence for the availability of multiple denotations this expression may bear. I will then show how these denotations relate to the distinction between ACCs, CCCs and ICCs, proposed in Section 2.3.

3.1.1 The Notion of Presupposition

The notion of presupposition has been used in linguistics in a pragmatic and a semantic sense. The pragmatic concept of presupposition draws on background belief relating to an utterance that must be mutually known or assumed by the speaker and addressee for the utterance to be considered appropriate in context. An example of a pragmatic theory of presupposition is Stalnaker (1974), who defines presupposition without any reference to linguistic form. By contrast, Strawson (1950, 1964) accounts for presupposition not as a mental state of language users, but as a logical relation. He claims that a statement that results from a particular use of a sentence presupposes another statement if the first statement requires the truth of the presupposed statement. Thus, the statement asserted by the sentence in (55)

has, according to Strawson (1950), the presupposition, and hence as a necessary condition of its truth or falsity, the existence of one king of France.¹

- (55) The king of France is bald.
 >> There is a king of France.

Here, I will use the notion of presupposition in the Strawsonian, i.e., in the semantic sense, as a binary relation between pairs of sentences of a language.

3.1.2 Presuppositions Triggered by CCs

In this section, I will examine NP1 *z* NP2 expressions with respect to presuppositions they may trigger using sentences about the European Union (EU). Recall that until May 2004 the EU involved 15 member states: Belgium, France, Germany, Italy, Luxembourg, the Netherlands, Denmark, the Republic of Ireland, the United Kingdom, Greece, Portugal, Spain, Austria, Finland and Sweden. A major enlargement took place on May 1, 2004, when 10 states joined, namely Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia.² Now consider the sentence in (56) uttered before and after May 2004.

- (56) Prezydent Banku Światowego żałuje, że przekazał całą sumę Unii
 president World Bank regrets that handed out whole amount European
 Europejskiej z Polską i Słowenią, tak że każde z państw otrzymało
 Union with Poland and Slovenia so that each of countries got
 po 100 milionów euro.
 apiece 100 million euro
 T1: 'The president of the World Bank regrets that he handed out the
 whole amount to the European Union, Poland and Slovenia so that each
 country got 100 milion euros.'
 >> ₁ There was an amount of 1700 million euros.
 T2: 'The president of the World Bank regrets that he handed out the
 whole amount to the European Union, including Poland and Slovenia,
 so that each country got 100 milion euros.'
 >> ₂ There was an amount of 2500 million euros.

As the translations in T1 and T2 already indicate, the sentence in (56) is ambiguous between the inclusive and the accompanitive readings. Furthermore, this sentence triggers two different presuppositions related to the number of states predicated in this sentence, which is indicated in (56) by means of the symbols >> ₁

¹The Strawsonian notion of presupposition has been defined in Beaver (1997, p. 948), who also discusses further formal models of presupposition and presupposition projection, such as those suggested in Burton-Roberts (1989a,b,c, 1990), Karttunen (1973, 1974) or Gazdar (1979).

²On January 1, 2007, the most recent enlargement of the EU took place, when Bulgaria and Romania joined. Hence, at the present time, there are 27 member states in the EU. Given this, the sentence in (56) can trigger a third presupposition, i.e., that 27 countries will profit from the enlargement of the euro zone. In fact, this presupposition corresponds to the one given in >> ₂.

and \gg_2 . Thus, in the situation before May 1, 2004, when the EU involved 15 member states, and did not include Poland and Slovenia, the predication in (56) applies to 17 states, i.e., to all of the member states of the EU at that time, as well as to Poland and Slovenia. Under this interpretation, the sentence in (56) triggers the presupposition indicated by \gg_1 . By contrast, after May 1, 2004, when the EU has 25 members, including Poland and Slovenia, the sentence in (56) refers to 25 countries, and carries the presupposition indicated in \gg_2 .

Given the presuppositions in \gg_1 and \gg_2 , two possible denotations can be assumed to be available for the expression *cała UE z Polską i Słowenią* ‘the whole EU with Poland and Slovenia’ in (56). The first denotation refers to 17 countries: the 15 countries which were members of the EU before May 2004 (and are referred to by the NP *cała UE* ‘whole EU’), and 2 further countries, Poland and Slovenia (referred to by the expression *z Polską i Słowenią* ‘with Poland and Slovenia’). This reading is schematically presented in (57).

- (57) $\llbracket \text{cała UE z Polską i Słowenią} \rrbracket \ni$ Belgium, France, Germany, Italy, Luxembourg, the Netherlands, Denmark, the Republic of Ireland, the United Kingdom, Greece, Portugal, Spain, Austria, Finland, Sweden, Poland, Slovenia

(58) below demonstrates the second possible denotation available for *cała UE z Polską i Słowenią* ‘the whole EU with Poland and Slovenia’ in (56) and associated with the presupposition given in \gg_2 . This denotation includes the 25 member states of the EU after May 1, 2004 and referred to by the NP *cała UE* ‘whole EU’. Note that these 25 member states already include Poland and Slovenia, the countries referred to by the expression *z Polską i Słowenią* in (56).

- (58) $\llbracket \text{cała UE z Polską i Słowenią} \rrbracket \ni$ Belgium, France, Germany, Italy, Luxembourg, the Netherlands, Denmark, the Republic of Ireland, the United Kingdom, Greece, Portugal, Spain, Austria, Finland, Sweden, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia

I conclude on the basis of the above observations that, since the NP1 z NP2 expressions can trigger different presuppositions, they can be associated with different denotations. The two possible interpretations of the NP1 z NP2 expression in (56), given in (57) and (58), clearly correspond to two types of CCs defined in Chapter 2.3, namely, ACCs and ICCs, and, hence, support my semantic typology for Polish CCs.

However, the presuppositional effects demonstrated in (56) do not justify the postulation of the third type of CCs, namely, CCCs. In fact, CCCs trigger the same presupposition as CCs with the accompanitive reading. The example in (59), which corresponds to (56), shows that the sentence can only presuppose that there was an amount of 1700 million euros.

- (59) Prezydent Banku Światowego żałuje, że przekazał całą sumę Unii
 president World Bank regrets that handed out whole amount European
 Europejskiej z Polską i Słowenią, tak że każde z państw otrzymało
 Union with Poland and Slovenia so that each of countries got
 po 100 milionów euro.
 apiece 100 million euro
 T1: 'The president of the World Bank regrets that he handed out the
 whole amount to the European Union, Poland and Slovenia so that each
 country got 100 milion euros.'
 >> ₁ There was an amount of 1700 million euros.

The only possible interpretation of the expression *cała UE z Polską i Słowenią* in (59) is given in (60), and corresponds to that provided in (57).

- (60) [[cała UE z Polską i Słowenią]] \ni Belgium, France, Germany, Italy, Luxembourg, the Netherlands, Denmark, the Republic of Ireland, the United Kingdom, Greece, Portugal, Spain, Austria, Finland, Sweden, Poland, Slovenia

Based on the presuppositional inferences discussed above, we can differentiate between two denotational classes of CCs, inclusive and non-inclusive CCs. While the former correlate with ICCs, the latter correspond to both ACCs and CCCs. Empirical evidence for distinguishing between ACCs, on the one hand, and CCCs and ICCs, on the other hand, will be provided in the following sections.

3.2 Contrastive Focus

In this section, I will examine Polish CCs with respect to contrastive focus assignment. Focus in language determines which part of the sentence contributes the most important and most recent information; in other words, it determines the information status of the particular sentential constituents. Focus may be expressed prosodically, syntactically or both, depending on the language. Here, I will consider focal phenomena marked by stress, which will be represented in the examples by capital letters. My objective is to test whether ACCs, CCCs and ICCs allow for the same focus assignment.

3.2.1 Contrastive Focus in ACCs

Dyła (1988) has observed that in ACCs, NP1s and *z* NP2s can bear contrastive stress independently of each other. Thus, both sentences in (61), taken from Dyła (1988, p. 390), are fully grammatical.

- (61) a. JANEK z Ewą poszedł na spacer.
 Janek with Ewa.INSTR went.SG.M1 for walk
 'It was Janek who went for a walk with Ewa.'

- b. Janek Z EWA poszedł na spacer.
 Janek with Ewa.INSTR went.SG.M1 for walk
 ‘It was with Ewa that Janek went for a walk.’

This suggests that NP1s and *z* NP2s in ACCs may differ in information status. The same observation has been made in Ionin and Matushansky (2003) with respect to Russian data.

3.2.2 Contrastive Focus in CCCs

Unlike in ACCs, NP1s and *z* NP2 expressions in Polish CCCs must have the same information status. Thus, either both or neither of them must be focused. This is demonstrated by the examples in (62), taken from Dylą (1988, p. 390).

- (62) a. *JANEK z Ewą poszli na spacer.
 Janek with Ewa.INSTR went.PL.M1 for walk
- b. *Janek Z EWA poszli na spacer.
 Janek with Ewa.INSTR went.PL.M1 for walk
- c. JANEK Z EWA poszli na spacer.
 Janek with Ewa.INSTR went.PL.M1 for walk
 ‘It was Janek and Ewa who went for a walk.’
- d. Janek z Ewą poszli na spacer.
 Janek with Ewa.INSTR went.PL.M1 for walk
 ‘Janek and Ewa went for a walk.’

These facts have been also noted in Dylą and Feldman (2008) for Polish.³

3.2.3 Contrastive Focus in ICCs

Dylą and Feldman (2008) have observed that Polish ICCs are only grammatical if both the NP1 and the *z* NP2 string are stressed. For completeness, I add that no focus in Polish ICCs is also fully grammatical. Thus NP1s and *z* NP2 sequences in Polish ICCs must have the same information status. The examples in (63) demonstrate this.⁴

³Ionin and Matushansky (2003) discuss corresponding phenomena in Russian. However, their observations on information structure in Russian CCCs do not correspond to those made in Dylą and Feldman (2008). While Dylą and Feldman (2008) claim that in Russian CCCs the *z* NP2 sequence and not the entire NP1 *z* NP2 expression can be stressed, Ionin and Matushansky (2003) state that Russian CCCs are only grammatical if neither the NP1 nor the *z* NP2 is focused. Note that Ionin and Matushansky (2003) do not explicitly say whether contrastive stress assignment to both the NP1 and the *z* NP2 string is also possible in Russian.

⁴See also Ionin and Matushansky (2003) for a discussion on contrastive focus in Russian ICCs.

- (63) a. ??MY z Marią wyjechaliśmy do USA jako jedyna para
we with Maria.INSTR left.1ST.PL.M1 to USA as only couple
małżeńska.
married
- b. *My Z MARIĄ wyjechaliśmy do USA jako jedyna para
we with Maria.INSTR left.1ST.PL.M1 to USA as only couple
małżeńska.
married
- c. MY Z MARIĄ wyjechaliśmy do USA jako jedyna para
we with Maria.INSTR left.1ST.PL.M1 to USA as only couple
małżeńska.
married
'It was Maria and I who, as the only married couple, left for the
USA.'
- d. My z Marią wyjechaliśmy do USA jako jedyna para
we with Maria.INSTR left.1ST.PL.M1 to USA as only couple
małżeńska.
married
'Maria and I, as the only married couple, left for the USA.'

The facts above show that while NP1s and *z* NP2 strings may differ in information status in Polish ACCs, they must have the same information status in CCCs and ICCs.

While the previous section has shown that with respect to presuppositional effects, it is reasonable to distinguish between ICCs, on the one hand, and ACCs and CCCs, on the other hand, the observations regarding focus assignment demonstrate a similarity between CCCs and ICCs, on the one hand, and a difference between these two types of CCs and ACCs. As shown in the next section, these similarities and differences are supported by another property, namely, the availability of plural interpretation.

3.3 Plurality

Based on the discussion of presuppositions triggered by CCs in Section 3.1, we may expect all CCs to be semantically plural in the sense of denoting aggregations of entities. Another indication for the availability of plural denotation for CCs can be derived from the parallel between CCs and nominal coordination. Like CCs, nominal coordination consists of at least two NPs and a connector. This parallelism is schematically illustrated in (64).

- (64) a. NP1 *i* 'and' NP2 coordination
b. NP1 *z* 'with' NP2 CC

Since nominal coordination, including coordination of singular NPs, is always associated with plural semantics, one may expect the same in CCs. However, it should be mentioned that semantic plurality does not always go along with morphosyntactic plural marking on semantically plural expressions. Collective nouns such as the Polish *szlachta* ‘nobility’, *społeczeństwo* ‘society’ or *mrowie* ‘swarm’, German *Gruppe* ‘group’, *Paar* ‘couple’ or *Gesellschaft* ‘society’, or English *herd* or *crowd* are typical instances of a discrepancy between semantic and morphosyntactic plurality. While these nouns refer to aggregations of entities, and thus bear plural semantics, they are morphosyntactically singular. The concern of this section is semantic plurality.

As the semantics of plurals is closely associated with the matter of collective and distributive interpretations, I will examine whether all types of CCs postulated in Chapter 2.3 are able to appear in collective and distributive contexts. Section 3.3.1 will raise the issue of ambiguity of plurals and explicate the difference between the collective and distributive interpretations. Section 3.3.2 will focus on the collective reading of CCs and provide examples containing collective predicates and collectivizing adverbs. Section 3.3.3 will examine CCs with respect to distributivity by considering examples involving distributive predicates, reciprocal anaphora, verbs prefixed by *roz-*, the distributive expression *po* ‘apiece’, distributive adjectives and adverbs. Section 3.3.4 will present the final conclusions.

3.3.1 Ambiguity of Plurals

One of the most fundamental issues in the semantics of plurals is that sentences with plural NPs allow for distinct readings. There are, however, different views on how many readings can result from the use of plural NPs and on what the source of the ambiguity is. According to Scha (1981), the ambiguity between collective, distributive and possibly other readings is located in the plural NP, more precisely, in the determiner. Link (1983) and Landman (1989a,b) claim that plural NPs are unambiguous and the readings should be generated within the VP. Schwarzschild (1994) attributes semantic ambiguities resulting from the use of plural NPs to properties of the context, i.e., to pragmatic factors. In sum, there is no agreement on the number and nature of plural readings, and on which readings should in fact constitute separate readings in the formal semantic representation.⁵

I will focus on two readings of sentences which involve plurality, namely on collective and distributive readings, whose availability for plurals is rather indisputable. Possible further readings proposed in the linguistic literature, such as the intermediate reading, also referred to as the neutral, mixed, participatory, or participial reading, or the cumulative reading will not be considered here.

⁵An interesting type of plural expressions, associative plurals, has been discussed in Moravcsik (2003), who proposes six parameters for identifying the meaning differences among nominal plural expressions. Associative plurals are characterized as ranked group plurals that form a single paradigm with first and second person plural pronouns and inclusory constructions.

The example in (65) illustrates the ambiguity between the distributive and collective interpretations.

- (65) a. John and Mary won \$1000.
 b. John and Mary each won \$1000.
 = John won \$1000 and Mary won \$1000.
 c. John and Mary together won \$1000.

The sentence in (65a) can be true if John and Mary each won \$1000 (65b) or if John and Mary together won \$1000 (65c). The interpretation of (65a) as (65b) corresponds to the distributive reading, whereas (65c) corresponds to the collective reading. In other words, the distributive interpretation operates on each individual / atom / entity in the denotation of a plural expression, while the collective interpretation operates on the entire aggregation of individuals / atoms / entities in its denotation. The descriptions in (66) and (67) provide the semantic representations of the sentence in (65a) on its distributive and collective interpretation, respectively.

- (66) $\llbracket \text{John and Mary won } \$1000 \rrbracket =$
 $\llbracket \text{John won } \$1000 \rrbracket \wedge \llbracket \text{Mary won } \$1000 \rrbracket =$
 $\text{win}'(\mathbf{j}')(\$1000) \wedge \text{win}'(\mathbf{m}')(\$1000)$

- (67) $\llbracket \text{John and Mary won } \$1000 \rrbracket = \text{win}'(\mathbf{j}' \wedge \mathbf{m}')(\$1000)$

It should be stressed at this point that the descriptions in (66) and (67) only sketch the basic intuition of how the collective and distributive interpretations differ from each other. The technical details of modeling distributivity and collectivity within formal semantics are discussed in Part II.

I will now look at collective and distributive interpretations in sentences involving Polish CCs. The relevant assumption is that if an expression can occur in a collective and / or distributive context, this expression must denote plurality. To warrant that the plural denotation (if available) in the sentences involving CCs originates from NP1 z NP2 combinations and not from one of the involved NPs, all examined NP1s and NP2s will refer to singular entities. I further assume that if a complex nominal expression comprising two (or, possibly, more) semantically singular NPs appears to denote a plurality, the denotation of each NP must be a component of this plural denotation.

3.3.2 Collectivity

In the following discussion, I will use collective predicates (Section 3.3.2.1) and collectivizing adverbs (Section 3.3.2.2) to examine whether the collective interpretation is available for all CC types.

3.3.2.1 Collective Predicates

It has been generally assumed that the collective interpretation is available for CCCs (cf. McNally (1993) and Dalrymple et al. (1998)). McNally (1993) even claims that CCCs can only have a collective reading, and not a distributive one. Comacho (2000) makes similar generalizations about Spanish cICCs, claiming that these expressions are systematically excluded from contexts that require a distributive interpretation.

The sentences in (68) involve the collective predicate *spotykać się* ‘meet’, i.e., a predicate that only contains aggregations of individual atoms in its denotation.⁶

- (68) a. *Jan z Marią, który mieszka w USA, spotyka
Jan.SG with Maria.INSTR.SG who.SG.M1 lives.SG in USA meets.SG
się od czasu do czasu u rodziców.
RM from time to time at parents’
‘Jan, who lives in the USA, meets Maria from time to time at their
parents.’
- b. Jan z Marią spotykają się od czasu do czasu u
Jan.SG with Maria.INSTR.SG meet.PL RM from time to time at
rodziców.
parents’
‘Jan and Maria meet from time to time at their parents.’
- c. My z Marią spotykamy się we dwoje od czasu
we with Maria.INSTR.SG meet.IST.PL RM in two from time
do czasu u rodziców.
to time at parents’
‘Maria and I both meet from time to time at our parents.’
- d. My czterej z Janem włącznie spotykamy się systematycznie
we four with Jan.INSTR.SG including meet.IST.PL RM systematically
na brydża.
for bridge
‘We four including Jan meet systematically to play bridge.’

As the examples in (68b–d) show, CCCs, cICCs and oICCs can occur in collective contexts. In contrast, sentence (68a) involving an ACC is ungrammatical.

The same observations hold for the sentences in (69), which involve the aggregation-denoting predicative expression *być małżeństwem* ‘be a married couple’.

- (69) a. *Jan z Marią jest małżeństwem.
Jan.SG with Maria.INSTR.SG is.SG married couple
‘Jan and Maria are a married couple.’ [intended]

⁶Instances of other collective predicative expressions are *form a circle / line, be numerous, be few in number, encircle, collide, surround* etc.

- b. Jan z Marią są małżeństwem.
Jan.SG with Maria.INSTR.SG are.PL married couple
'Jan and Maria are a married couple.'
- c. My z Marią jesteśmy małżeństwem.
we with Maria.INSTR.SG are.1ST.PL married couple
'Maria and I are a married couple.'

3.3.2.2 Collectivizing Adverbs

The examples in (70) demonstrate that CCCs and ICCs are also grammatical in sentences containing collectivizing adverbs that modify VPs, whereas ACCs are not.⁷

- (70) a. *Jan z Marią bywa wspólnie u rodziców.
Jan.SG with Maria.INSTR.SG visits.SG together parents
'Jan visits together with Maria at their parents' . [intended]
- b. Jan z Marią bywają wspólnie u rodziców.
Jan.SG with Maria.INSTR.SG visit.PL together by parents
'Jan and Maria visit together at their parents' .'
- c. My z Marią, jak każde małżeństwo, bywamy wspólnie
we with Maria.INSTR.SG as every marriage go.1ST.PL together
na przyjęciach.
to parties
'Maria and I, like every married couple, go to parties together.'
- d. My czterej włącznie z Janem grywamy wspólnie w brydża.
we four including with Jan.INSTR.SG play together in bridge
'We four including Jan are used to playing bridge together.'

Given the examples in (68)–(70), we can conclude that CCCs and ICCs can occur in collective contexts and, thus, have collective interpretations, but ACCs cannot.

3.3.3 Distributivity

The distributive reading of CCCs has been previously discussed in McNally (1993), Dalrymple et al. (1998), Vassilieva and Larson (2001), Feldman (2002), Ionin and Matushansky (2003) and Dyła and Feldman (2008) for Russian; in McNally (1993) and Dyła and Feldman (2008) for Polish. Vassilieva and Larson (2001), Feldman (2002), Ionin and Matushansky (2003) and Dyła and Feldman (2008) have also addressed the issue of distributive interpretation in ICCs. With the exception of McNally (1993), who claims that Russian and Polish CCCs disallow distributive meaning, all these approaches assume that in CCCs and ICCs, a distributive reading

⁷Instances of other collectivizing adverbs are *together*, *simultaneously*, *unanimously*, *en masse*, *in chorus*, *at once* and *at the same time*.

is also possible. However, Dalrymple et al. (1998) argue that, although a distributive reading is available for Russian CCCs, a collective one is usually preferred. They further claim that there are no differences in the denotation of CCCs, simple plural NPs and coordinate structures: In a wide range of cases, Russian CCCs and coordinate noun phrases give rise to exactly the same set of possible readings; moreover, the same range of readings is available for non-coordinate plural NPs. Whether a given plural expression can or cannot have a distributive or collective reading is determined, according to Dalrymple et al. (1998), by specific pragmatic factors. I believe that these generalizations also apply to Polish. However, the semantic properties of the corresponding Polish data require a detailed examination, which exceeds the scope of this thesis.

The goal of this section is to provide evidence that in contrast to ACCs, Polish CCCs and ICCs can have distributive readings: they can cooccur with distributive predicates, reciprocal pronouns, predicates prefixed by *roz-*, the distributive preposition *po* ‘apiece’, distributive adjectives and distributive adverbs.

3.3.3.1 Distributive Predicates

McNally (1993, p. 374) gives the example in (71) to claim that Polish CCCs disallow a distributive reading.

- (71) Anna z Piotrem zarobili \$1000 w zeszłym miesiącu.
 Anna with Piotr.INSTR earned.PL \$1000 in last month
 ‘Anna and Piotr earned \$1000 last month.’

She claims that the sentence in (71) only describes a situation where the individuals together earned a total of \$1000. Although this interpretation is possible or even preferred, I believe that the distributive reading is also possible here: (71) can be true in a situation where each of the individuals earned \$1000, that is, if a total of \$2000 was earned.

Note that the predicate *zarobić* ‘earn’ is a mixed (or neutral) predicate in the sense that it can have both each atomic individual and the entire aggregation of individuals in its denotation.⁸ Clear evidence for or against the availability of a distributive reading can be provided by sentences containing distributive predicates, i.e., predicates which can only have atomic individuals in their denotation and cannot apply to aggregations, such as the following:

- (72) a. *Jan z Marią mocno wierzy w syna.
 Jan with Maria.INSTR strongly believes.SG in son
 ‘Jan and Maria strongly believe in their son.’ [intended]
- b. Jan z Marią mocno wierzą w syna.
 Jan with Maria.INSTR strongly believe.PL in son
 ‘Jan and Maria strongly believe in their son.’

⁸Other mixed expressions are, for instance, *carry a piano*, *give a presentation*, *win*, *receive* etc.

- c. My z Marią, jak wszyscy rodzice, mocno wierzymy
 we with Maria.INSTR like all parents strongly believe.1ST.PL
 w nasze dzieci.
 in our children
 ‘Maria and I, like all parents, strongly believe in our children.’
- d. My czterej włącznie z Janem mocno wierzymy w
 we four including with Jan.INSTR strongly believe.1ST.PL in
 wygraną.
 prize
 ‘We four including Jan strongly believe we will win.’
- (73) a. *Jan z Marią jest przeciwnikiem przemocy w grach
 Jan with Maria.INSTR is.SG objector violence in games
 komputerowych dla dzieci.
 computer for children
 ‘Jan and Maria object to violence in computer games for children.’
- [intended]
- b. Jan z Marią są przeciwnikami przemocy w grach
 Jan with Maria.INSTR are.PL objectors violence in games
 komputerowych dla dzieci.
 computer for children
 ‘Jan and Maria object to violence in computer games for children.’
- c. My z Marią, jak wszyscy rodzice, jesteśmy przeciwnikami
 we with Maria.INSTR like all parents are.1ST.PL objectors
 przemocy w grach komputerowych dla dzieci.
 violence in games computer for children
 ‘Maria and I, like all parents, object to violence in computer games
 for children.’
- d. My czterej włącznie z Janem jesteśmy przeciwnikami
 we four including with Jan.INSTR are.1ST.PL objectors
 przemocy w grach komputerowych dla dzieci.
 violence in games computer for children
 ‘We four including Jan object to violence in computer games for
 children.’
- (74) a. *Jan z Marią jest dumny ze swoich dzieci.
 Jan with Maria.INSTR is proud of POSS.REFL.PRN children
 ‘Jan and Maria are proud of their children.’ [intended]
- b. Jan z Marią są dumni ze swoich dzieci.
 Jan with Maria.INSTR are.PL proud of POSS.REFL.PRN children
 ‘Jan and Maria are proud of their children.’

- c. My z Marią, jak wszyscy rodzice, jesteśmy dumni ze swoich dzieci.
we with Maria.INSTR like all parents are.1ST.PL proud of POSS.REFL.PRN children
'Maria and I, like all parents, are proud of our children.'
- d. My czterej włącznie z Janem jesteśmy dumni ze swoich zwycięstw.
we four including with Jan.INSTR are.1ST.PL proud of POSS.REFL.PRN success
'We four including Jan are proud of our success.'

The distributive predicate *wierzyć w* 'believe in' in (72), the predicative expression *być przeciwnikiem* 'object to' in (73), as well as the predicative expression *być dumnym z* 'be proud of' in (74), can only contain individual atoms in their denotation.⁹ Since CCCs and both types of ICCs can combine with these predicates, the distributive interpretation must be available for them. In contrast, ACCs are not possible in distributive contexts.¹⁰

3.3.3.2 Reciprocals

Another context which triggers distributive interpretation can be constructed by using reciprocals. As is generally known, reciprocal anaphora require distributive antecedents. The meaning and the representation of reciprocals in connection with plural semantics in general and the distributive interpretation in particular, has, for instance, been discussed in Link (1984), Roberts (1987), Schwarzschild (1996), Sternefeld (1998), Sauerland (1998), Beck (2001) and Mari (2006).

The examples in (75) all involve the reciprocal pronoun *sobie nawzajem* 'each other' and thus provide a distributive context.

- (75) a. *[Jan z Marią]_i pomaga [sobie nawzajem]_i.
Jan.SG with Maria.INSTR.SG helps.SG REFL.PRN mutually
'Jan and Maria help each other.' [intended]
- b. [Jan z Marią]_i pomagają [sobie nawzajem]_i.
Jan.SG with Maria.INSTR.SG help.PL REFL.PRN mutually
'Jan and Maria help each other.'
- c. [My_i z Marią]_i, jak każde małżeństwo, pomagamy [sobie nawzajem]_i.
we with Maria.INSTR.SG like every married couple help.1ST.PL REFL.PRN mutually
'Maria and I, like every married couple, help each other.'

⁹Further examples of distributive predicative expressions are *be resigned to*, *sneeze*, *be tall* and *have blue eyes*.

¹⁰See also Dyła and Feldman (2008) for a discussion on the distribution of Polish CCCs and ICCs in distributive contexts.

- d. [[My cztery]_i włącznie z Janem]_i pomagamy [sobie
we four including with Jan.INSTR.SG help.1ST.PL REFL.PRN
nawzajem]_i.
mutually
'We four including Jan help each other.'

As the examples in (75) show CCCs and ICCs but not ACCs can control reciprocal anaphora. Thus we can conclude that CCCs as well as both cICCs and cICCs, must all contain more than one entity in their denotations.¹¹ The ungrammaticality of (75a) shows that the distributive interpretation is not available for ACCs.

3.3.3.3 The Prefix *roz-*

As Dalrymple et al. (1998) indicate in the context of Russian data, predicates beginning with the prefix *roz-* also involve reference to atomic individuals of an aggregation. To examine whether the three types of CCs can combine with such predicates, consider the examples in (76).

- (76) a. *Jan z Marią rozjechał się po
Jan.SG with Maria.INSTR.SG went different ways.SG.M1 RM after
przyjęciu każde w swoją stronę.
party each in POSS.REFL.PRN direction
'Jan and Maria went their own separate ways after the party.'
- [intended]
- b. Jan z Marią rozjechali się po
Jan.SG with Maria.INSTR.SG went different ways.PL.M1 RM after
przyjęciu każde w swoją stronę.
party each in POSS.REFL.PRN direction
'Jan and Maria went their own separate ways after the party.'
- c. My z Marią, jako jedyne małżeństwo tego wieczoru,
we with Maria.INSTR.SG as only married couple this evening
rozjechaliśmy się po przyjęciu każde w swoją
went different ways.1ST.PL RM after party each in POSS.REFL.PRN
stronę.
direction
'Maria and I, as the only married couple this evening, went our
own separate ways after the party.'

¹¹See also Dalrymple et al. (1998) for Russian CCCs with reciprocal anaphora.

- d. My czterej włącznie z Janem rozjechaliśmy
 we four including with Jan.INSTR.SG went different ways.1ST.PL
 się po przyjęciu każdy w swoją stronę.
 RM after party each in POSS.REFL.PRN direction
 ‘We four including Jan all went our own separate ways after the party.’

The examples in (76) show that CCCs and ICCs but not ACCs can occur with distributive predicates beginning with the prefix *roz-*, such as the verb *rozjechać się* ‘go different ways’.

3.3.3.4 The Distributive *po*

Dalrymple et al. (1998), as well as Dylą and Feldman (2008), provide the *po* ‘apiece’-test to demonstrate the availability of the distributive reading for CCCs. In (77), I adopt this test for all types of CC.

- (77) a. *Jan z Marią otrzymał od szefa po samochodzie.
 Jan.SG with Maria.INSTR.SG got.SG.M1 from boss.GEN apiece car
 ‘Jan and Maria each got a car from their boss.’ [intended]
- b. Jan z Marią otrzymali od szefa po samochodzie.
 Jan.SG with Maria.INSTR.SG got.PL.M1 from boss.GEN apiece car
 ‘Jan and Maria each got a car from their boss.’
- c. My z Marią, jak każde młode małżeństwo w tym kraju, otrzymaliśmy od państwa po samochodzie.
 we with Maria.INSTR.SG like every young married couple in this country got.1ST.PL.M1 from state.GEN apiece car
 ‘Maria and I, like every young married couple in this country, each got a car from the government.’
- d. My czterej włącznie z Janem otrzymaliśmy od szefa po samochodzie.
 we four including with Jan.INSTR.SG got.1ST.PL.M1 from boss.GEN apiece car
 ‘We four including Jan each got a car from our boss.’

As argued by Choe (1987) and Roberts (1987), the expression *po* ‘apiece’, also called an anti-quantifier, induces distributivity on the plural arguments of sentences.¹² Since the CCC in (77b), the cICC in (77c) and the oICC in (77d) can appear in sentences involving *po* ‘apiece’, we conclude that they can have a distributive interpretation. This, however, is not the case for ACCs, as (77a) indicates.

¹²For a discussion on morphosyntactic properties of the Polish distributive preposition *po* ‘apiece’, see Franks (1995) and Przepiórkowski (2006a).

3.3.3.5 Distributive Adjectives

The sentences in (78) provide distributive contexts induced by the adjective *oddzielny* ‘separate / different’.¹³

- (78)
- a. *Jan z Marią przyjechał oddzielnymi samochodami.
Jan.SG with Maria.INSTR.SG arrived.SG.M1 separate cars
‘Jan and Maria arrived in different cars.’ [intended]
 - b. Jan z Marią przyjechali oddzielnymi samochodami.
Jan.SG with Maria.INSTR.SG arrived.PL.M1 separate cars
‘Jan and Maria arrived in different cars.’
 - c. My z Marią, jako jedyne małżeństwo tego wieczoru,
we with Maria.INSTR.SG as only marriage this evening
przyjechaliśmy oddzielnymi samochodami.
arrived.1ST.PL.M1 different cars
‘Maria and I, as the only married couple this evening, arrived in different cars.’
 - d. My czterej włącznie z Janem przyjechaliśmy oddzielnymi
we four including with Jan.INSTR.SG arrived.1ST.PL.M1 different
samochodami.
cars
‘We four including Jan arrived in different cars.’

In the examples in (78), each individual in the denotation of the subjects is relevant for the interpretation of the adjective *oddzielny* ‘separate / different’ and, thus, for the interpretation of the whole sentence.¹⁴ As (78b–d) indicate, CCCs, cICCs and oICCs, respectively, can cooccur with these kinds of adjectives. The example (78a) demonstrates that ACCs are ungrammatical in such contexts.

3.3.3.6 Distributive Adverbs

The sentences in (79) involve the adverb *osobno* ‘separately’, which requires individual atoms in its denotation. Other adverbs of this type are, e.g., *indywidualnie* ‘individually’ or *pojedynczo* ‘alone’.

- (79)
- a. *Jan z Marią wyszedł z imprezy osobno.
Jan.SG with Maria.INSTR.SG left.SG.M1 from party separately
‘Jan and Maria left the party separately.’ [intended]
 - b. Jan z Marią wyszli z imprezy osobno.
Jan.SG with Maria.INSTR.SG left.PL.M1 from party separately
‘Jan and Maria left the party separately.’

¹³See also Dalrymple et al. (1998) for a discussion of the distribution of Russian CCCs with corresponding adjectives.

¹⁴Cf. Carlson (1987) for a discussion of adjectives in connection with the phenomenon of distributivity.

- c. My z Marią, jako jedyne małżeństwo na tej imprezie,
 we with Maria.INSTR.SG as only married couple at this party
 wyszliśmy osobno.
 left.1ST.PL.M1 separately
 ‘Maria and I, the only married couple at this party, left separately.’
- d. My czterej włącznie z Janem wyszliśmy z imprezy
 we four including with Jan.INSTR.SG left.1ST.PL.M1 from party
 osobno.
 separately
 ‘We four including Jan all left the party separately.’

The examples in (79) show that while CCCs, cICCs and oICCs can appear in contexts induced by adverbs having individual atoms in their denotations, ACCs cannot.

3.3.4 Summary

In this section, I have examined which type of CC can be interpreted as a semantically plural expression, i.e., as an aggregation of entities. I used collective and distributive contexts to test the availability of a plural denotation in CCs consisting of morphosyntactically singular NP1s and NP2s denoting singularities.

We concluded that CCCs, cICCs and oICCs, can all be interpreted as both collective and distributive expressions, and thus have plural denotations. It follows that the denotation of the NP1 z NP2 combination in CCCs and ICCs is composed of the denotation of NP1s and the denotation of NP2s. In contrast, none of the sentences discussed in this section was grammatical when an ACC was involved: neither a collective nor a distributive interpretation is possible for ACCs. This, in turn, shows that ACCs do not denote pluralities. Therefore, the denotation of the NP1 z NP2 combination in the ACC is not composed of the denotation of NP1 and the denotation of NP2, at least, not in the same way as in the CCC and ICC. In other words, while the denotation of NP1 and NP2 form an aggregation of entities in the CCC and the ICCs, the same do not form an aggregation of entities in the ACC.

The observations in the present section demonstrate a difference between plural-denoting and non-plural-denoting CCs (comprising singular NPs). Pertaining to my typology of Polish CCs proposed in Section 2.3, we can conclude that besides the facts related to the assignment of contrastive focus, discussed in the previous section, plurality facts also provide evidence for distinguishing between ACCs, on the one hand, and CCCs and ICCs, on the other hand.

3.4 Coreference

In this section, I will discuss coreference phenomena in sentences involving CCs. I will examine whether NP1s, NP2s and the entire NP1 z NP2 sequences in ACCs,

CCCs and ICCs can control relative pronouns, possessive, reflexive and possessive reflexive pronouns outside and inside CCs, as well as PRO subjects of infinitival and participial clauses. The goal is to determine whether coreference phenomena provide further evidence for differentiating between ACCs, CCCs and ICCs.

3.4.1 Coreference in ACCs

Dyła (1988) provides the examples in (80) and (81) to claim that only NP1s can act as antecedents of reflexive and possessive reflexive pronouns in Polish ACCs.¹⁵

(80) [Janek_i z Ewą_j]_k pojechał kupić sobie_{i/*j/*k/*l} samochód.
 Janek with Ewa.INSTR went.SG.M1 buy REFL.PRN car
 ‘Janek went with Ewa to buy himself a car.’

(81) [Janek_i z Ewą_j]_k odwiedził swego_{i/*j/*k/*l} kolegę.
 Janek with Ewa.INSTR visited.SG.M1 POSS.REFL.PRN friend.ACC
 ‘Janek visited his friend with Ewa.’

The index *l* in (80) and (81), as well as in the following examples, refers to an arbitrary individual, distinct from the individuals indicated by the indices *i*, *j* and *k*. Note that the pronoun *sobie* in (80) is controlled by the PRO subject of the infinitival clause, which, in turn, is controlled by the NP *Janek* ‘Janek’. Similarly, PRO subjects of participial clauses can only be controlled by NP1s, as (82) shows.¹⁶

(82) PRO_{i/*j/*k} Kupiwszy samochód, [Janek_i z Ewą_j]_k wrócił
 PRO having bought car.ACC Janek with Ewa.INSTR came back.SG.M1
 do domu.
 to home
 ‘Having bought a car, Janek arrived home with Ewa.’

In ACCs, NP1s, NP2s, some other individuals, as well as the entire NP1 z NP2 strings can act as controllers of possessive pronouns, as the examples in (83) demonstrate.

(83) a. [Janek_i z Ewą_j]_k odwiedził z synem_l jego_{i/l/m}
 Janek with Ewa.INSTR visited.SG.M1 with son.INSTR his.ACC
 kolegę.
 friend.ACC
 ‘Janek visited his friend with Ewa and his / their son.’

¹⁵On coreference in Russian ACCs, see Vassilieva and Larson (2001), Feldman (2002) and Ionin and Matushansky (2003).

¹⁶Note that past tense participles in Polish are not marked for number, gender or person.

- b. [Janek_i z Ewą_j]_k odwiedził z córką_k jej_{j/l/m}
 Janek with Ewa.INSTR visited.SG.M1 with daughter.INSTR her.ACC
 kolegę.
 friend.ACC
 ‘Together with Ewa and his / their daughter, Janek visited her friend.’
- c. [Janek_i z Ewą_j]_k odwiedził z synem ich_{k/l}
 Janek with Ewa.INSTR visited.SG.M1 with son.INSTR their.ACC
 kolegę.
 friend.ACC
 ‘Together with Ewa and his / their son, Janek visited their friend.’

However, only NP2s can control personal pronouns. NP1s or the entire NP1 z NP2 sequences cannot, as shown in (84).

- (84) [Janek_i z Ewą_j]_k pojechał kupić mu_{*i/l} / jej_{j/l} / im_{*k/l} buty.
 Janek with Ewa.INSTR went.SG.M1 buy him / her / them shoes
 ‘Janek went with Ewa to buy him / her / them shoes.’

Finally, the NP1s in ACCs can serve as antecedents of possessive and possessive reflexive pronouns modifying NP2s, as (85) illustrate.¹⁷

- (85) a. Dyrektor_i z jego_{i/j} zastępcą wyjechał do USA.
 director with his.INSTR assistant.INSTR left.SG.M1 to USA
 ‘The director left for the USA with his assistant.’
- b. Dyrektor_i ze swoim_{i/*j} zastępcą wyjechał do USA.
 director with POSS.REFL.PRN assistant.INSTR left.SG.M1 to USA
 ‘The director left for the USA with his assistant.’

Note that while the possessive pronoun *jego* ‘his’ in (85a) can refer either to the individual denoted the NP *dyrektor* ‘director’ or to an arbitrary individual, indicated by the index *j*, the possessive reflexive pronoun *swoją* in (85b) can only have the NP *dyrektor* as its antecedent.

3.4.2 Coreference in CCCs

Coreference phenomena have been discussed in detail in McNally (1993), Vasilieva and Larson (2001), Ionin and Matushansky (2003), Feldman (2002) and Dylą and Feldman (2008) for Russian CCCs. Comacho (1994) describes the behavior of Spanish CCCs with respect to control of PRO subjects. Dylą (1988) and Dylą and Feldman (2008) examine coreference in Polish CCCs.

According to Dylą (1988) and Dylą and Feldman (2008), only the entire NP z NP strings in Polish CCCs can bind reflexive possessive pronouns and PRO subjects of infinitive and participial clauses. This is illustrated in the examples (86) and (87).

¹⁷See also Dylą (1988).

- (86) [Jan_i z Maria_j]_k odwiedzili swego_{*i/*j/k} przyjaciela.
 Jan with Maria.INSTR visited.PL.M1 POSS.REFL.PRN friend.ACC
 ‘Jan and Maria visited their friend.’
- (87) a. [Jan_i z Maria_j]_k chcieli PRO_{*i/*j/k} wyjechać.
 Jan with Maria.INSTR wanted.PL.M1 PRO leave
 ‘Jan and Maria wanted to leave.’
- b. PRO_{*i/*j/k} Spakowawszy się, [Jan_i z Maria_j]_k wyjechali
 PRO having packed Jan with Maria.INSTR left.PL.M1
 do USA.
 to USA
 ‘Having packed, Jan and Maria left for the USA.’

The entire NP1 z NP2 strings in CCCs can also act as controllers of reflexive, possessive and relative pronouns. The examples in (88) demonstrate that the expression *Jan z Marią* ‘Jan and Maria’ can control the reflexive pronoun *się*, which has the morphosyntactic form *siebie* in (88a) and the form *sobie* in (88b). (88a) further shows that when the reflexive pronoun *siebie* combines with the adjective *sam* ‘self’, only the plural form of this adjective is grammatical. This additionally supports the treatment of the entire expression *Jan z Marią* as the antecedent. Note that the actual controller of the reflexive pronoun *sobie* in (88b) is the PRO subject, which, in turn, refers to the NP1 z NP2 string.

- (88) a. [Jan_i z Maria_j]_k zobaczyli [siebie samych]_k / *[siebie
 Jan with Maria.INSTR saw.PL.M1 REFL.PRN self.PL.M1 / REFL.PRN
 samego]_i / *[siebie samą]_j w lustrze.
 self.SG.M1 / REFL.PRN self.SG.FEM in mirror
 ‘Jan and Maria saw themselves in the mirror.’
- b. [Janek_i z Ewą_j]_k pojechali kupić sobie_{*i/*j/k} samochód.
 Janek with Ewa.INSTR went.PL.M1 buy REFL.PRN car.ACC
 ‘Janek and Ewa went to buy themselves a car.’

As the examples in (89) show, the entire NP1 z NP2 strings can control possessive pronouns.

- (89) a. [Janek_i z Ewą_j]_k odwiedzili z synem_l jego_{i/*j/*k/l/m}
 Janek with Ewa.INSTR visited.PL.M1 with son.INSTR his.ACC
 kolegę.
 friend.ACC
 ‘Janek and Ewa visited his friend with their son.’
- b. [Janek_i z Ewą_j]_k odwiedzili z córką_l jej_{*i/j/*k/l/m}
 Janek with Ewa.INSTR visited.SG.M1 with daughter.INSTR her.ACC
 kolegę.
 friend.ACC
 ‘Janek and Ewa visited her friend with their daughter.’

- c. [Janek_i z Ewą_j]_k odwiedzili z synem_l ich_{*i/*j/k/*l/m}
 Janek with Ewa.INSTR visited.PL.M1 with son.INSTR their.ACC
 kolegę.
 friend.ACC
 ‘Janek and Ewa visited their friend with their son.’

(89a) and (89b) demonstrate that not only the entire NP1 z NP2 strings but also NP1s and NP2s, as well as arbitrary individuals, indicated by the index *m*, can serve as antecedents of possessive pronouns. Note that coreference between the possessive pronoun and the NP2 or the NP1 z NP2 sequence in (89a), between the possessive pronoun and the NP1 or the NP1 z NP2 sequence in (89b), and between the possessive pronoun and the NP1, NP2 or the NP *synem* ‘son’ in (89c) is excluded due to the morphosyntactic properties of the pronouns rather than to semantic or pragmatic circumstances.

Finally, the entire NP1 z NP2 sequences in CCCs can act as controllers of relative pronouns. This is demonstrated in the examples in (90). Only plural relative pronouns are grammatical in sentences involving CCCs.

- (90) a. *[Jan_i z Marią_j]_k, który_i został zaproszony
 Jan with Maria.INSTR who.SG.M1 was.SG.M1 invited.SG.M1
 przez Piotra, przyszli punktualnie.
 by Piotr came.PL.M1 on time
 ‘Jan and Maria, who were invited by Piotr, arrived on time.’
- [intended]
- b. [Jan_i z Marią_j]_k, którzy_k zostali zaproszeni przez
 Jan with Maria.INSTR who.PL.M1 were.PL.M1 invited.PL.M1 by
 Piotra, przyszli punktualnie.
 Piotr came.PL.M1 on time
 ‘Jan and Maria, who were invited by Piotr, arrived on time.’

Unlike the entire NP1 z NP2 strings, NP1s and NP2s in CCCs seem to be able to control non-anaphoric personal pronouns, as (91) illustrates.

- (91) [Janek_i z Ewą_j]_k pojechali do miasta kupić mu_{i/l} / jej_{j/l} /
 Janek with Ewa.INSTR went.PL.M1 to downtown buy him / her /
 im_{*k/l} buty.
 them shoes
 ‘Janek and Ewa went downtown to buy him / her / *them shoes.’

Thus, the examples in (86)–(90) indicate that, with respect to the control of relative, reflexive, possessive and reflexive possessive pronouns, as well as PRO subjects of infinitival and participial clauses, the NP1 z NP2 strings in CCCs are to

be considered single constituents. In this regard, CCCs behave in the same way as ordinary coordination.¹⁸

There is, however, a difference between CCCs and ordinary coordinate structures in Polish concerning the distribution of possessive and possessive reflexive pronouns modifying NP2s (McNally (1993)). The relevant examples are provided in (92).¹⁹

- (92) a. Zarówno dyrektor_i jak i jego_i / *swój_i zastępca wyjechali
 both director as and his / POSS.REFL.PRN assistant left.PL.M1
 do USA.
 to USA
 ‘Both the director and his assistant left for the USA.’
- b. Dyrektor_i z(e) ??jego_i / ??swoim_i zastępcą wyjechali
 director with his / POSS.REFL.PRN assistant.INSTR left.PL.M1
 do USA.
 to USA
 ‘The director and his assistant left for the USA.’

While a clear contrast can be observed between possessive and reflexive possessive pronouns in coordination (cf. *jego* vs. *swoja* in (92a)), no such difference can be found in CCCs. Note that according to Dylą (1988), both irreflexive and reflexive possessive pronouns referring to NP1s in Polish CCCs are ungrammatical. However, the native speakers of Polish I interviewed judge sentences like (92b) to be marginal, but perhaps grammatical. Interestingly, first person possessive pronouns seem to be more acceptable than second person ones, which in turn are more acceptable than third person possessive pronouns. This is demonstrated in (93).

- (93) a. ?Ja z moim synem poszliśmy do kina.
 I with my.INSTR son.INSTR went.1ST.PL to cinema
 ‘I and my son went to the cinema.’
- b. ???Ty z twoim synem poszliście do kina.
 you.SG with your.INSTR son.INSTR went.2ND.PL to cinema
 ‘You and your son went to the cinema.’
- c. ??On z jego synem poszli do kina.
 he with his.INSTR son.INSTR went.3RD.PL to cinema
 ‘He and his son went to the cinema.’

¹⁸See also Dylą (1988), Vassilieva and Larson (2001), Feldman (2002), Ionin and Matushansky (2003) and Dylą and Feldman (2008) for similar observations.

¹⁹Note, however, that the Russian data provided in McNally (1993) lacks indices and is thus not precise concerning the reference of pronouns. Despite what her examples seem to indicate, Russian non-reflexive possessive pronouns cannot be coreferent with NP1s. According to Feldman (2002) and Dylą and Feldman (2008), only CCCs with reflexive possessive pronouns modifying NP2s and coindexed with NP1s are grammatical in Russian. Interestingly, as Stefan Dylą (personal communication) observed, with regard to the usage of reflexive possessive pronouns modifying NP2s in CCCs, Russian is similar to Old, Middle and Early Modern Polish.

But even if no possessive pronouns coindexed with the NP1 were possible in CCCs, there would still be a contrast between ordinary coordination and CCCs with respect to the occurrence of ordinary possessive pronouns. While they are fully grammatical in the case of ordinary coordination, they are not within the CCC. I thank Stefan Dylą (personal communication) for pointing this out to us. Given these observations, it seems plausible to assume different syntactic structures for ordinary coordination and CCCs.²⁰

3.4.3 Coreference in ICCs

Recall that in ICCs, the denotation of NP2s is included in the denotation of NP1s. Given this, we must assume the rather unusual assignment of indices schematically presented in (94).

(94) [NP1_i z NP2_j]_i

In (94), the index of the entire NP1 z NP2 string in ICCs is identical to the index of the NP1. This reflects the fact that plural pronouns in ICCs refer to exactly the same set of individuals as the whole NP1 z NP2 expressions.

I will now examine the behavior of ICCs with respect to coreference phenomena. As the examples in (95)–(97) show, the plural pronouns in ICCs, and so also the NP1 z NP2 strings, can control reflexive and possessive reflexive pronouns, as

²⁰Note that none of the existing theories of binding for Polish seem to be able to account for data such as (92) (cf. Reinders-Machowska (1991) or Marciniak (2001)). I will not attempt to provide an appropriate theory in this thesis. I only note that pronouns within CCCs pose a challenge to previous binding theories in the same respects as some other phenomena, a few of which are demonstrated below.

- (i) Czyżby autor_i swoich_i książek wstydział się swoich korzeni?
 whether author POSS.REFL.PRN books is ashamed RM POSS.REFL.PRN roots
 ‘Is the author of his own books ashamed of his roots?’

[Source (September 21, 2009):

<http://forum.nowiny24.pl/Pawel-Lenar-moja-ksiazke-czytaja-politycy-studenci-i-ksieza-t10712.html>]

- (ii) A i mój ulubiony dzisiaj film jest autobiografią, choć fikcyjną lub też
 and also my favorite today movie is auto-biography although fictitious or also
 fikcją, udającą [film dokumentalny]_i o życiu jego_i twórcy, albo postaci
 fiction trying to look like film documentary about life his author or character
 noszącej jego nazwisko, będącej reżyserem filmowym.
 bearing his name being movie director
 ‘Also my currently favorite movie is an auto-biography, although a fictitious one, or
 fiction trying to look like documentary about the life of his author or of the character
 bearing his name who is a movie director.’

[Source (September 21, 2009):

<http://agnisz.blox.pl/2007/05/Drogi-pamietniku.html>]

well as PRO subjects of infinitival and participial clauses.²¹

- (95) [My_i z Maria_j]_i wykupiliśmy sobie_{i/*j} wczasy
 we with Maria.INSTR bought.1ST.PL.M1 REFL.PRN holiday package
 dla par małżeńskich.
 for couples married
 ‘Maria and I bought ourselves a holiday package for married couples.’
- (96) [My_i z Maria_j]_i, jako jedyna para małżeńska w mieście,
 we with Maria.INSTR as only couple married in town
 zbudowaliśmy swój_{i/*j} dom w ciągu roku.
 built.1ST.PL.M1 POSS.REFL.PRN house within year
 ‘Maria and I were the only married couple in town who built our house
 in a year.’
- (97) a. [My_i z Maria_j]_i chcieliśmy PRO_{i/*j} wyjechać tylko
 we with Maria.INSTR wanted.1ST.PL.M1 PRO leave only
 we dwoje.
 in two
 ‘Maria and I wanted to leave only together.’
- b. PRO_{i/*j} Wybudowawszy dom, [my_i z Maria_j]_i, jako
 PRO having built house we with Maria.INSTR as
 najszczęśliwsza para małżeńska pod słońcem, zamieszkaliśmy
 happiest couple married under sun lived.1ST.PL.M1
 w nim z naszymi dziećmi.
 in it with our children
 ‘Having built a house, Maria and I, as the happiest married couple
 in the world, lived there with our children.’

The sentences in (95)–(97) involve cICCs. As (98)–(100) demonstrate, oICCs behave in the same way regarding coreference with reflexive and possessive reflexive pronouns, as well as PRO subjects of infinitival and participial clauses.

- (98) [[My trzej]_i z Janem_j]_i wykupiliśmy sobie_{i/*j} z żonami
 we three with Jan.INSTR bought.1ST.PL.M1 REFL.PRN with wives.INSTR
 wczasy tylko dla naszych trzech małżeństw.
 holiday packages only for our three married couples
 ‘Jan and the rest of us three bought ourselves and our wives holiday
 packages only for us three married couples.’
- (99) [[My trzej]_i z Janem_j]_i, jako właściciele trzech najsilniejszych par
 we three with Jan.INSTR as owners three strongest pair
 rąk w mieście, zbudowaliśmy swój_{i/*j} dom w ciągu roku.
 hands in town built.1ST.PL.M1 POSS.REFL.PRN house within year

²¹See Vassilieva and Larson (2001), Ionin and Matushansky (2003) and Feldman (2002) for coreference of Russian ICCs with possessive reflexive pronouns.

‘Jan and the rest of us three, as the owners of the three strongest pairs of hands in town, built our house in a year.’

- (100) a. Tylko [[my czworo]_i z Maria_j]_i chcieliśmy PRO_{i/*j}
 only we four with Maria.INSTR wanted.1ST.PL.M1 PRO
 grać dzisiaj w brydża. Inne czwórki nie miały ochoty.
 play today in bridge other fours not felt like it
 ‘Only Maria and the rest of us four wanted to play bridge today.
 No other group of four felt like joining us.’
- b. PRO_{i/*j} Pożegnawszy się z gośćmi, [[my troje]_i z
 PRO having said goodbye with guests.INSTR we three with
 synem]_i rozeszliśmy się do swoich sypialni. Ja
 son.INSTR went.1ST.PL.M1 RM to POSS.REFL.PRN bedrooms I
 do swojej, mąż do swojej i syn do swojej.
 to POSS.REFL.PRN husband to POSS.REFL.PRN and son to POSS.REFL.PRN
 ‘Having said goodbye to the guests, our son and the rest of us three
 went each to his own bedroom. I went to my bedroom, my husband
 to his bedroom and our son to his bedroom.’

The example in (101) further demonstrates that NP1s, and thus the entire NP1 z NP2 expressions, cannot bind personal pronouns. By contrast, NP2s, as well as the unexpressed speaker, can.

- (101) [My_i z moim szefem]_j zdecydowaliśmy się wreszcie kupić
 we with my.INSTR boss.INSTR decided.1ST.PL.M1 RM finally buy
 mi / *nam / mu]_{j/k} nowy komputer.
 me / us / him new computer
 ‘My boss and I finally decided to buy me / ourselves / him a new com-
 puter.’ [intended]

As in ACCs and perhaps also CCCs, NP1s in ICCs can in some contexts control reflexive possessive pronouns modifying NP2s. The sentence in (102) illustrates this fact.

- (102) My_i ze swoimi_i współmałżonkami, jako jedyne dwa małżeństwa,
 we with POSS.REFL.PRN spouses.INSTR as only two marriages
 wyjechaliśmy do USA.
 left.1ST.PL.M1 to USA
 ‘Our spouses and us, as the only two married couples, left for the USA.’

However, in the majority of contexts, control of reflexive possessive pronouns modifying NP2s by NP1s in ICCs is excluded. This is demonstrated in (103a) for cICCs and in (103b) for oICCs.

- (103) a. **My_i ze swoją_i żoną wykupiliśmy*
 we with POSS.REFL.PRN wife.INSTR bought.1ST.PL.M1
wczasy dla par małżeńskich.
 holiday package for couples married
 ‘My wife and I bought a holiday package for married couples.’
 [intended]
- b. **Tylko [my czworo]_i ze swoim_i instruktorem*
 only we four with POSS.REFL.PRN instructor.INSTR
chcieliśmy PRO grać dzisiaj w brydża. Inne czwórki nie
 wanted.1ST.PL.M1 PRO play today in bridge other fours not
miały ochoty.
 felt like it
 ‘Only our instructor and the rest of us four wanted to play bridge
 today. No other group of four felt like joining us.’ [intended]

Since acting as a possessor (in a broad sense) of a part of one’s own denotation violates pragmatic constraints, the ungrammaticality of the sentences in (103) is expected. The coindexation in (103a), for instance, results in an interpretation according to which the speaker and his wife are both identified as the possessor of the wife. Such a situation is incompatible with pragmatic knowledge. The grammaticality of the sentence (102), involving a similar coindexation, can be explained by the lexical meaning of the NP2 *współmałżonkowie* ‘spouses’, which can refer to both wives and husbands. For this reason, the sentence (102) can be interpreted in such a way that certain subsets of spouses are identified as possessors of certain subsets of spouses. This interpretation suggests a reciprocal relationship and is compatible with pragmatic concepts.

The sentences in (103) remain ungrammatical even if we assume that the reflexive possessive pronouns refer to the speaker only. However, the phonologically covert speaker can be available for coreference in Polish ICCs, as in (104), which involves first person possessive pronouns.

- (104) a. *My z moim szefem wyjechaliśmy do USA tylko*
 we with my.INSTR boss.INSTR left.1ST.PL.M1 to USA only in
dwóch.
 two
 ‘My boss and I left for the USA, just the two of us.’

- b. Tylko my czterej z moim sąsiadem / z naszym
 only we four with my.INSTR neighbor.INSTR / with our.INSTR
 instruktorem chcieliśmy PRO grać dzisiaj w brydża.
 instructor.INSTR wanted.1ST.PL.M1 PRO play today in bridge
 Inne czwórki nie miały ochoty.
 other fours not felt like it
 ‘Only my neighbor / our instructor and the rest of us four wanted
 to play bridge today. No other group of four felt like joining us.’

Also, coreference with the covert addressee is possible in ICCs, as illustrated by the examples in (105), containing second person possessive pronouns modifying NP2s.

- (105) a. Wy z twoim szefem wyjechaliście do USA tylko
 you with your.INSTR boss.INSTR left.2ND.PL.M1 to USA only
 we dwóch.
 in two
 ‘Your boss and you, just the two of you, left for the USA.’
- b. Tylko wy czterej z twoim sąsiadem / z waszym
 only you four with your.INSTR neighbor.INSTR / with your.INSTR
 instruktorem chcieliście PRO grać dzisiaj w brydża.
 instructor.INSTR wanted.2ND.PL.M1 PRO play today in bridge
 Inne czwórki nie miały ochoty.
 other fours not felt like it
 ‘Only your neighbor / your instructor and the rest of you four
 wanted to play bridge today. No other group of four felt like join-
 ing you.’

However, it appears that third person possessive pronouns modifying NP2s and the phonologically unexpressed referents in the denotation of third person plural pronouns cannot be coreferential in Polish ICCs. Thus, the sentences in (106) are only grammatical if the possessive pronouns refer to some arbitrary individuals that are not part of the plural pronouns’ denotations.

- (106) a. Oni z jego szefem wyjechali do USA tylko we dwóch.
 they with his boss.INSTR left.3RD.PL.M1 to USA only in two
 ‘He and his boss, just the two of them, left for the USA.’
- b. Tylko oni czterej z jego sąsiadem / z ich instruktorem
 only they four with his neighbor.INSTR / with their instructor.INSTR
 chcieli PRO grać dzisiaj w brydża. Inne czwórki nie
 wanted.3RD.PL.M1 PRO play today in bridge other fours not
 miały ochoty.
 felt like it
 ‘Only his neighbor / their instructor and the rest of them four wanted
 to play bridge today. No other group of four felt like joining them.’

This observation parallels the one made in Marciniak (2001) with respect to the anaphoric interpretation of first, second and third person possessive pronouns in Polish. She claims that first and second person possessive pronouns, but not third person possessive pronouns, can be bound by subjects. Although the syntactic relationship between the possessive pronouns and the covert third person pronoun referents in (106) differs from that discussed in Marciniak (2001), since the possessive pronouns in (106) are part of the subjects, there seems to be a clear correspondence in the anaphoric properties of the possessive pronouns within and outside of ICCs.

The examples in (107) and (108) contain first and second person possessive pronouns occurring outside of ICCs.

- (107) a. [My_i z Marią_j]_i, jako jedyna para małżeńska w mieście,
we with Maria.INSTR as only couple married in town
zbudowaliśmy nasz_i dom w ciągu roku.
built.1ST.PL.M1 our house within year
'Maria and I were the only married couple in town who built our house in a year.'
- b. [My_i z Marią_j]_i, jako jedyna para małżeńska w mieście,
we with Maria.INSTR as only couple married in town
zbudowaliśmy jej_{j/k} dom w ciągu roku.
built.1ST.PL.M1 her house within year
'Maria and I were the only married couple in town who built her house in a year.'
- c. [My_i z Marią_j]_i, jako jedyna para małżeńska w mieście,
we with Maria.INSTR as only couple married in town
zbudowaliśmy mój dom w ciągu roku.
built.1ST.PL.M1 my house within year
'Maria and I were the only married couple in town who built my house in a year.'
- (108) a. [Wy_i z Marią_j]_i, jako jedyna para małżeńska w mieście,
you with Maria.INSTR as only couple married in town
zbudowaliście wasz_i dom w ciągu roku.
built.2ND.PL.M1 your.PL house within year
'Maria and you were the only married couple in town who built your house in a year.'
- b. [Wy_i z Marią_j]_i, jako jedyna para małżeńska w mieście,
you with Maria.INSTR as only couple married in town
zbudowaliście jej_{j/k} dom w ciągu roku.
built.2ND.PL.M1 her house within year
'Maria and you were the only married couple in town who built her house in a year.'

- c. [Wy_i z Marią_j]_i, jako jedyna para małżeńska w mieście,
 you with Maria.INSTR as only couple married in town
 zbudowaliście twój dom w ciągu roku.
 built.2ND.PL.M1 your.SG house within one year
 ‘Maria and you were the only married couple in town who built
 your house in a year.’

As these examples indicate, the phonologically unexpressed speaker / hearer, as well as the NP2 and the entire NP1 z NP2 string can bind possessive pronouns. This is also the case in ICCs in which the entire NP1 z NP2 strings and NP2s act as referents of third person possessive pronouns: As the examples in (109) demonstrate, binding by the unexpressed third person pronoun referent is possible. Thus, the third person possessive pronoun in (109c) can refer to either an arbitrary individual which is not involved in the denotation of the plural pronoun or to the referent of the singular third person pronoun contained in the denotation of the plural pronoun, and thus to the entire NP1 z NP2 expression.

- (109) a. [Oni_i z Marią_j]_i, jako jedyna para małżeńska w mieście,
 they with Maria.INSTR as only couple married in town
 zbudowali ich_i dom w ciągu roku.
 built.3RD.PL.M1 their house within year
 ‘Maria and he were the only married couple in town who built their
 house in a year.’
- b. [Oni_i z Marią_j]_i, jako jedyna para małżeńska w mieście,
 they with Maria.INSTR as only couple married in town
 zbudowali jej_{j/k} dom w ciągu roku.
 built.3RD.PL.M1 her house within year
 ‘Maria and he were the only married couple in town who built her
 house in a year.’
- c. [Oni_i z Marią_j]_i, jako jedyna para małżeńska w mieście,
 they with Maria.INSTR as only couple married in town
 zbudowali jego dom w ciągu roku.
 built.3RD.PL.M1 his house within year
 ‘Maria and he were the only married couple in town who built his
 house in a year.’

3.4.4 Summary

In this section, coreference phenomena in ACCs, CCCs, cICCs and oICCs have been examined. I have found some similarities but also significant differences between the three types of CCs. There are no contrasts in the coreferential behavior of NP2s: they can only control personal and possessive pronouns in all types of CC. The referential properties of NP1 z NP2 sequences are identical in CCCs and ICCs, where they can act as antecedents of relative pronouns, reflexive pronouns,

possessive pronouns, possessive reflexive pronouns and PRO subjects. By contrast, in ACCs, NP1 \bar{z} NP2 sequences can only control possessive pronouns. The NP1 can act as a controller of possessive pronouns in all three types of CCs. In all other cases, its ability to corefer differs in the different CC types. NP1s can in CCCs control personal pronouns, and reflexive pronouns in ACCs. Both in ACCs and ICCs, NP1s can act as antecedents of possessive reflexive pronouns and PRO subjects. In each type of CC, NP1s behave differently with respect to the control of pronouns which modify NP2s. While in ACCs, NP1s can act as controllers of both possessive and possessive reflexive pronouns modifying NP2s, in CCCs it is uncertain whether NP1s can control these pronouns, and in ICCs, NP1s can control possessive reflexive but not possessive pronouns modifying NP2s.

The examination of coreference phenomena has thus shown that there are good reasons for distinguishing between three semantic classes of CCs, which correspond to ACCs, CCCs and ICCs.

3.5 Summary

In this chapter, I provided evidence for the semantic classification of CCs proposed in Chapter 2. The evidence comes from semantic phenomena such as presuppositional effects, focus assignment, plural semantics and coreferential properties, and is summarized in Table 3.1. The symbols — and + indicate that a given property does / does not apply.

Semantic Property	ACC	CCC	ICC
ability of NP1 \bar{z} NP2s to trigger inclusive presupposition	—	—	+
ability of NP1 \bar{z} NP2s to be assigned focus	—	+	+
availability of plural denotation	—	+	+
ability of NP1 \bar{z} NP2s to act as controllers	—	+	+
ability of NP1s to act of controllers (of possessive reflexive pronouns and PRO subjects)	+	—	+

Table 3.1: Summary of semantic properties of CCs

The overview in Table 3.1 demonstrates that (1) NP1 \bar{z} NP2 sequences in ICCs but not in ACCs and CCCs can trigger an inclusive presupposition; (2) these sequences can be assigned contrastive focus in CCCs and ICCs, but not in ACCs; (3) plural interpretation is available for CCCs and ICCs but not for ACCs; (4) NP1 \bar{z} NP2 sequences in CCCs and ICCs, but not in ACCs, are able to act as controllers; and finally, (5) NP1s can control possessive reflexive pronouns and PRO subjects in ACCs and ICCs, but not in CCCs.

Since the NP1 *z* NP2 expression in the CCC and the ICC has a plural denotation, can act as controller and be assigned a contrastive focus, it is plausible that its denotation includes an entity composed of the denotation of NP1 and NP2. By contrast, the denotation of NP1 and the denotation of NP2 do not form an entity in the ACC, rather, NP1 and NP2 have disjoint reference. This generalization constitutes the most important semantic difference between Polish CCCs and ICCs, on the one hand, and ACCs, on the other hand.

Another generalization, based on the observation that the NP1 can act in the ACC and the ICC as antecedent of possessive reflexive pronouns and PRO subjects, is that in these two types of CCs, the NP1 refers to a semantically autonomic entity. The case is different in the CCC, where the referent of the NP1 is an inseparable part of the referent of the NP1 *z* NP2 sequence.

Finally, the denotation of the NP1 *z* NP2 expression and of the NP1 in the ICC are identical. This conclusion is based on the observations of presuppositional and coreference phenomena.

Chapter 4

Further Semantic Properties of CCs

In this chapter, I will discuss further semantic properties mentioned in the literature on CCs, and show that these properties do not provide significant evidence for distinguishing between ACCs, CCCs and ICCs in Polish. The discussed properties apply to NP1 and NP2 as individual constituents, and include (non)referentiality and pronominal realization (Section 4.1) as well as symmetry requirements with regard to definiteness, restrictiveness, animacy and humanness (Section 4.2). In Section 4.3, I will conclude this chapter and summarize the current results.

4.1 Quantified NPs, Bare Plurals and Pronouns

This section addresses the issue of semantic properties of NP1s and NP2s individually. It has often been mentioned in the literature that different kinds of NPs can be used in the different types of CCs. For instance, it has been postulated that only referential NPs can appear in CCCs, or that no pronouns can occur in CCCs, at least in Polish. I will thus examine which type of Polish CC can involve quantified NPs, bare plurals and pronouns in Polish.¹ The objective is to find out whether the claims in previous approaches can be confirmed by a closer examination of the data, and whether one can observe any differences between ACCs, CCCs and ICCs in relation to semantic properties of NP1s and NP2s.

I will exclusively focus on CCs involving two ordinary NPs, i.e., NPs in the strict sense. Thus CCs where NP1 and NP2 are realized by numeral phrases, deadjectival nouns, or free relatives will not be considered. It must also be clarified that personal pronouns are treated here as nouns.

The examples discussed in the previous chapters have shown that in all three kinds of CCs, NP1s and NP2s can be realized by proper names. In the following

¹Note that the term *bare plural* is usually used to refer to a plural noun phrase without an overt determiner. Since Polish is a determinerless language, I use this term to refer to a plural noun phrase without a restrictive, possessive or demonstrative modifier.

sections, I focus on three other potential semantic realizations of NP1s and NP2s. Section 4.1.1 will examine whether NP1s and NP2s can occur in the scope of generalized quantifiers and be realized as bare plurals. Section 4.1.2 will investigate the realization of NP1s and NP2s by personal pronouns, and test whether nominative pronouns can be dropped. Section 4.1.3 will draw final conclusions and sum up the discussion.

4.1.1 Quantified NPs and Bare Plurals

In this section, I will examine whether NP1s and NP2s can be realized by quantified NPs and bare plurals in all three types of CCS. Logical tradition assumes that NPs in natural language are either referential terms or quantified expressions.² Referential terms are assumed to denote entities such as individuals or events, and are associated with proper names such as *John*, demonstratives such *that man*, or pronouns such as *he*. Quantified expressions are assumed to range over a number of entities, and are associated with NPs combined with quantifiers, such *every man* or *some men*, or bare plural NPs such as *books*.

I will first examine the realization of NP1s and NP2s as quantified NPs and bare plurals in CCCs, then in ACCs and ICCs.

4.1.1.1 Quantified NPs and Bare Plurals in CCCs

McNally (1993) claims that CCCs may only involve referential NPs. That means that proper names can occur in CCCs, but quantified NPs or bare plurals are excluded. The following Polish example involving non-referential NPs from McNally (1993, p. 367), which she marks as ungrammatical, is supposed to illustrate her claim.

- (110) *Każdy chłopak z każdą dziewczyną odtńczyli polkę...
 each boy with each.INSTR girl.INSTR danced.PL.M1 polka

However, according to the judgments of native Polish speakers I interviewed, (110) is fully grammatical in a situation in which each boy danced the polka and each girl danced the polka (cf. the simplified formalization in (111)).

- (111) $\forall x(\mathbf{boy}'(x) \rightarrow \mathbf{dance-polka}'(x)) \wedge \forall y(\mathbf{girl}'(y) \rightarrow \mathbf{dance-polka}'(y))$

Only the interpretation in which each boy-girl pair danced the polka (cf. the simplified formalization in (112)) seems to be excluded here.³ Note, however, that some native speakers accept even this interpretation.

- (112) $\forall x \forall y(\mathbf{boy}'(x) \wedge \mathbf{girl}'(y) \rightarrow \mathbf{dance-polka}'(x \oplus y))$

²In fact, three semantic classes of NPs have been postulated by linguists: referential, quantificational and predicative NPs. I will ignore aspects of the predicative denotation as not relevant for our discussion.

³The \oplus symbol stands for the operation of sum formation in terms of Link (1983) (cf. Chapter 7).

Thus McNally's (1993) claim that only referential NPs can be involved in CCCs seems too restrictive, at least for Polish. The grammaticality of sentences such as (110) under the interpretation in (111), also goes against Dyła's (1988) assumption that only proper names can be contained in Polish CCCs.

Polish CCCs can also contain bare plural NPs, as demonstrated in (113).

- (113) a. Siostry z braćmi znieawidzili się od czasu śmierci
sisters with brothers.INSTR hated.PL.M1 RM from time death
rodziców.
parents
'The sisters and brothers started to hate each other at the moment
of their parents' death.'
- b. Kobiety z mężczyznami pomagali sobie nawzajem.
women with men.INSTR helped.PL.M1 REFL.PRN mutually
'The women and the men helped each other.'

Note that the CCC reading of the sentences in (113) is the only available reading. As (114) shows, an ACC reading, indicated by the non-masculine human gender value on the predicate, is not possible here.

- (114) a. *Siostry z braćmi znieawidziły się od czasu
sisters with brothers.INSTR hated.PL.NON-M1 RM from time
śmierci rodziców.
death parents
- b. *Kobiety z mężczyznami pomagały sobie nawzajem.
women with men.INSTR helped.PL.NON-M1 REFL.PRN mutually

However, bare plural NPs seem not to be possible in CCCs combined with neutral predicates such as *buy*, i.e., predicates which can apply to both each atomic individual and the entire aggregation of individual atoms in their denotations (cf. the discussion on the neutral predicate *earn* in Section 3.3.3.1.) Thus, in the sentences in (115), only the ACC reading is possible.

- (115) a. Siostry z braćmi *kupili / kupiły
sisters with brothers.INSTR bought.PL.M1 / bought.PL.NON-M1
dom.
house
'The sisters bought a house with their brothers.'
- b. Kobiety z mężczyznami *poszli / poszły do kina.
women with men.INSTR went.PL.M1 / went.PL.NON-M1 to cinema
'The women went to the cinema with the men.'

To sum up, NP1s and NP2s in Polish CCCs can not only be realized in Polish by proper names, but also by quantified NPs and bare plural NPs.⁴

⁴See also Dalrymple et al. (1998) for a discussion on plurality of NP1s and NP2s in Russian CCCs.

4.1.1.2 Quantified NPs and Bare Plurals in ACCs

Referential, i.e., entity denoting expressions are not required in Polish ACCs, either. As the example in (116) shows, quantified NPs are grammatical in ACCs.

- (116) Każdy mężczyzna z każdą kobietą poddał się
 each man with each.INSTR woman.INSTR submitted.SG RM
 szczepieniu przeciwko grypie.
 inoculation against influenza
 ‘Each man got vaccinated against influenza and each woman did the same.’

The sentence in (116) is only true in a situation in which each man got vaccinated and each woman did, too. This interpretation is formalized in (117). The pair reading is not available here for pragmatic reasons.

- (117) $\forall x(\mathbf{man}'(x) \rightarrow \mathbf{get-vaccinated}'(x)) \wedge$
 $\forall y(\mathbf{woman}'(y) \rightarrow \mathbf{get-vaccinated}'(y))$

NP1s and NP2s in ACCs can also be realized by bare plural NPs, which was already demonstrated in (115) above.

To conclude, NP1s and NP2s in ACCs can be realized by quantified NPs and bare plural NPs.

4.1.1.3 Quantified NPs and Bare Plurals in ICCs

NP1s and NP2s in ICCs are referential, i.e., entity denoting, by definition, if they are realized by pronominal. If they are non-pronominal, referentiality is not required. This is illustrated by the examples in (118).

- (118) a. Wszyscy politycy włącznie z premierem zastanawiają
 all politicians including with prime minister.INSTR wondering
 się nad dymisją.
 RM about demission
 ‘All politicians including the prime minister are wondering whether they should resign from their positions.’
- b. Ten dom ze wszystkimi pomieszczeniami będzie remontowany.
 this house with all.INSTR rooms.INSTR will be renovated
 ‘This house with all of its rooms will be renovated.’
- c. Każdy zespół ze wszystkimi muzykami wchodzącymi w
 every band with all.INSTR musicians.INSTR coming in
 jego skład weźmie udział w konkursie.
 its formation will take.SG part in contest
 ‘Every band together with all its musicians will participate in the contest.’

When NP1 in an ICC is plural pronoun, NP2 must sometimes satisfy the requirement of referentiality. On the one hand, NP2 cannot occur in the scope of generalized quantifiers. Thus, the quantified NP2s in the examples in (119) cause the entire sentence to be ungrammatical.

- (119) a. **To przecież wy z każdym chłopakiem na tej sali*
 it just you.PL with each.INSTR boy.INSTR in this room
odtańczyliście polkę, tworząc za każdym razem całkiem zgraną
 danced.2ND.PL polka forming every time quite well-rehearsed
parę.
 couple
 ‘It was just you and each boy in this room who danced the polka,
 forming every time a quite well-rehearsed couple.’
- b. **My siedmioro ze wszystkimi moimi pociechami, jak prawie*
 we seven with all.INSTR my.INSTR children.INSTR like almost
każda samotna matka z dziećmi w tym kraju, żyjemy
 every single mother with children.INSTR in this country live.1ST.PL
na koszt państwa.
 on cost state
 ‘All of my children and I, like almost every single mother with
 children in this country, live at the cost of the state.’

On the other hand, NP2s in ICCs can be realized by plural NPs. As (120) shows, ICCs with plural NP2s are fully grammatical in Polish.⁵

- (120) *My z (moimi) dziećmi bardzo tęsknimy do ich ojca,*
 we with my.INSTR children.INSTR very miss.1ST.PL to their father
a mojego męża.
 and my husband
 ‘My children and I miss their father and my husband very much.’

Thus, quantified NPs and bare plurals can act as possible realizations of NP1s and NP2 in Polish ICCs. In this respect, no contrast can be observed between ICCs, ACCs and CCCs.

4.1.2 Pronouns

The previous section has demonstrated that NP1s and NP2s in all three kinds of CCs can be realized by quantified NPs and bare plurals. Furthermore, each CC type allows proper names to appear as NP1s and NP2s, which was demonstrated by numerous examples in the previous chapters. In this section, I will examine whether NP1s and NP2s can be realized by personal pronouns, and whether pronominal NP1s can be dropped.

⁵See also Szupryczyńska (1990) for similar examples.

It is well known that the distribution of pronouns in language is considerably more restricted than the distribution of non-pronominal NPs. The occurrence patterns of pronouns have, in particular, been investigated in different versions of Binding Theory, such as Chomsky (1981, 1982), Reinhart (1983a,b), Reinhart and Reuland (1993), Pollard and Sag (1994), and other approaches. The distribution of pronouns sometimes appears to be a highly idiosyncratic phenomenon. For instance, when a first person pronoun is coordinated with a second or third person pronoun, the first person pronoun must, at least in languages such as English, follow the second or third person pronoun. This phenomenon will be discussed in detail in Chapter 6. Another example for the idiosyncratic behavior of pronouns can be found in the distribution of third person personal pronouns within preposition-pronoun contractions in Polish. As demonstrated in Trawiński (2005b, 2006), not all of these pronouns can contract with prepositions. Thus, it seems to be worth examining whether pronouns can occur as NP1 and NP2 in all CC types, and whether a pronominal NP1 can be dropped.

4.1.2.1 Pronouns in ACCs

In ACCs, both NP1s and NP2s can be realized by personal pronouns. (121)–(123) provide examples of ACCs involving singular pronouns.

- (121) a. Ja z Janem wyjechałem do USA.
I with Jan.INSTR left.1ST.SG.M1 to USA
'I left for the USA with Jan.'
- b. Jan ze mną wyjechał do USA.
Jan with me.INSTR left.3RD.SG.M1 to USA
'Jan left for the USA with me.'
- (122) a. Ty z Janem wyjechałeś do USA.
you.SG with Jan.INSTR left.2ND.SG.M1 to USA
'You left for the USA with Jan.'
- b. Jan z tobą wyjechał do USA.
Jan with you.INSTR.SG left.3RD.SG.M1 to USA
'Jan left for the USA with you.'
- (123) a. On z Janem wyjechał do USA.
he with Jan.INSTR left.3RD.SG.M1 to USA
'He left for the USA with Jan.'
- b. Jan z nim wyjechał do USA.
Jan with him.INSTR left.3RD.SG.M1 to USA
'Jan left for the USA with him.'

The examples in (124)–(126) show that ACCs can also contain plural personal pronouns. Note that the non-masculine human gender on the predicates in (124a),

(125a) and (126a) clearly indicates that the NP *Janem* ‘Jan’, which is a masculine human NP, does not participate in gender resolution. The plural pronouns in (124a), (125a) and (126a) refer to non-masculine human individuals and the denotation of *Janem* is not included in their denotations. This fact rules out the inclusive interpretation and thus clearly indicates the accompanitive reading.⁶

- (124) a. My z Janem wyjechałyśmy do USA.
we with Jan.INSTR left.1ST.PL.NON-M1 to USA
‘We left for the USA with Jan.’
- b. Jan z nami wyjechał do USA.
Jan with us.INSTR left.3RD.SG.M1 to USA
‘Jan left for the USA with us.’
- (125) a. Wy z Janem wyjechałyście do USA.
you.PL with Jan.INSTR left.2ND.PL.NON-M1 to USA
‘You left for the USA with Jan.’
- b. Jan z wami wyjechał do USA.
Jan with you.INSTR.PL left.3RD.SG.M1 to USA
‘Jan left for the USA with you.’
- (126) a. One z Janem wyjechały do USA.
they.FEM with Jan.INSTR left.3RD.PL.NON-M1 to USA
‘They left for the USA with Jan.’
- b. Jan z nimi wyjechał do USA.
Jan with them.INSTR left.3RD.SG.M1 to USA
‘Jan left for the USA with them.’

While the examples in (121)–(126) illustrate that one of the NPs involved in an ACC can be realized by a pronoun, the examples in (127) show that both NPs can be pronominal.

- (127) a. To właśnie on z nią wyjechał do USA.
it just he with her.INSTR left.3RD.SG.M1 to USA
‘It was he who left for the USA with her.’
- b. To właśnie one z nimi dwoma
it just they.NON-M1 with them.INSTR.M1 two.INSTR.M1
wyjechały do USA.
left.NON-M1 to USA
‘It was they who left for the USA with them two.’

Finally, the sentences in (128) demonstrate that nominative pronouns in ACCs can be dropped. Both singular and plural pronouns are allowed to be left phonologically unexpressed, as indicated by the number and gender form of the predicates.

⁶More details on gender resolution in CCs will be provided in Chapter 6.

- (128) a. (On) z Marią wyjechał do USA.
 he with Maria.INSTR left.3RD.SG.M1 to USA
 ‘He left for the USA with Maria.’
- b. (My) z Janem wyjechałyśmy do USA.
 we.NON-M1 with Jan.INSTR left.1ST.PL.NON-M1 to USA
 ‘We left for the USA with Jan.’

The evidence for pro-drop in ACCs can also be found in the National Corpus of Polish, which is demonstrated by (129) and (130).

- (129) Żyję tu z mamą cały czas i widzę, co się z nią dzieje.
 live here with mother whole time and see what RM with her happens
 ‘I live here the whole time with my mother, and I see what happens with her.’
- (130) Doszedł do obsmarowanej napisami windy. Wsiadł razem z sąsiadką.
 got to smeared writings elevator got in together with neighbor
 ‘He got to the elevator, which was smeared with writings. He got in it together with his neighbor.’

4.1.2.2 Pronouns in CCCs

Feldman (2002) argues that no pronominal NPs are possible in Russian CCCs.⁷ Dylą (1988, p. 409) makes the same generalization with respect to Polish CCCs, providing the following examples, which he marks as ungrammatical.

- (131) a. *On z Ewą poszli na spacer.
 he with Ewa.INSTR went.PL.M1 for walk
 ‘He and Ewa went for a walk.’ [intended]
- b. *Janek z nią poszli na spacer.
 Janek with her.INSTR went.PL.M1 for walk
 ‘Janek and she went for a walk.’ [intended]
- c. *On z nią poszli na spacer.
 He with her.INSTR went.PL.M1 for walk
 ‘He and she went for a walk.’ [intended]

Stefan Dylą (personal communication) has suggested that, possibly, the realization of NP2 by a pronoun alone makes CCCs ungrammatical, no matter whether the NP1 is a pronominal or a non-pronominal NP. This hypothesis is supported by (131b) and (131c), on the one hand, and by the sentence in (132), on the other hand, which is a citation from Wojciech Młynarski, provided by Stefan Dylą (personal communication).⁸

⁷See also Vassilieva and Larson (2001), who claim that in Russian CCs, if an NP1 is a pronoun and the agreement is plural, the pronoun must be plural. This enforces the ICC interpretation.

⁸Note, however, that the singular number on the predicate seems to be preferred in (132). In fact, some Polish native speakers allow only singular verbs here.

- (132) To on wraz z Jerzym Wasowskim podnieśli polską
 it he together with Jerzy.INSTR Wasowski.INSTR raised.PL.M1 Polish
 piosenkę do rangi zjawiska artystycznego najwyższej próby.
 song to rank phenomenon artistic highest pattern
 ‘It is he together with Jerzy Wasowski who transformed the Polish song
 into an art form of the highest quality.’

(132) is like (131a) in that both involve CCCs in which NP1 is realized by a pronominal NP and NP2 by a non-pronominal NP. Nevertheless, there is a difference in grammaticality between the two sentences. (132) is considered significantly better than (131a). I argue that this difference is due to stylistic rather than syntactic or semantic circumstances. If we put more lexical material into the pronominal NP1 and NP2 in (131a), the sentence becomes well-formed, as illustrated in (133). I thus argue that (131a) should be marked by the symbol # rather than *, as syntactically and semantically grammatical, but unacceptable for stylistic reasons.

- (133) To właśnie on, ten chłopak z sąsiedztwa, razem z Ewą,
 it just he this boy from neighborhood together with Ewa.INSTR
 moją najlepszą przyjaciółką, nikomu nic nie mówiąc wyjechali
 my.INSTR best.INSTR friend.INSTR nobody nothing not saying left.PL.M1
 do USA.
 to USA
 ‘That’s him, this boy from the neighborhood, and Ewa, my best friend,
 who left together for the USA without saying anything to anybody.’

The examples in (134) and (135) seem to confirm Stefan Dyła’s (personal communication) assumption that NP2s in CCCs require non-pronominal realizations, whereas NP1s can be realized either by pronominal or non-pronominal NPs. In (134a), NP1 is realized by a first person singular pronoun *ja* ‘I’ and in (135a) by a second person singular pronoun *ty* ‘you’. The NP2s are realized by non-pronominal NPs. Both sentences are fully grammatical. If NP2s are realized by pronouns and NP1s are non-pronominal, as in (134b) and (135b), the sentences become ungrammatical.

- (134) a. Tylko ja z Janem, jako jedyna para, pobraliśmy
 only I with Jan.INSTR as only couple married.1ST.PL.M1
 się wtedy w Las Vegas. Inni rozmyślili się w ostatniej
 RM then in Las Vegas others changed their minds RM in last
 chwili.
 minute
 ‘Jan and I were the only couple who married back then in Las
 Vegas. The others changed their minds at the last minute.’

- b. *Tylko Jan ze mną, jako jedyna para, pobraliśmy
 only Jan with me.INSTR as only couple married.1ST.PL.M1
 się wtedy w Las Vegas. Inni rozmyślili się w ostatniej
 RM then in Las Vegas others changed their minds RM in last
 chwili.
 minute
 ‘Jan and I were the only couple who married back then in Las Vegas. The others changed their minds at the last minute.’

[intended]

- (135) a. Tylko ty z Janem, jako jedyna para, pobraliście
 only you.SG with Jan.INSTR as only couple married.2ND.PL.M1
 się wtedy w Las Vegas. Inni rozmyślili się w ostatniej
 RM then in Las Vegas others changed their minds RM in last
 chwili.
 minute
 ‘Jan and you were the only couple who married back then in Las Vegas. The others changed their minds at the last minute.’
- b. *Tylko Jan z tobą, jako jedyna para, pobraliście
 only Jan with you.INSTR.SG as only couple married.2ND.PL.M1
 się wtedy w Las Vegas. Inni rozmyślili się w ostatniej
 RM then in Las Vegas others changed their mind RM in last
 chwili.
 minute
 ‘Jan and you were the only couple who married back then in Las Vegas. The others changed their minds at the last minute.’

[intended]

Things become different when NP2s are realized by the third person singular pronouns *on* ‘he’ or *ona* ‘she’, as in the examples in (136). Perhaps (136b) is slightly less preferred than (136a), but still much better than (134b) or (135b).

- (136) a. Tylko ona z Janem, jako jedyna para, pobrali
 only she with Jan.INSTR as only couple married.3RD.PL.M1
 się wtedy w Las Vegas. Inni rozmyślili się w ostatniej
 RM then in Las Vegas others changed their minds RM in last
 chwili.
 minute
 ‘Jan and she were the only couple who married back then in Las Vegas. The others changed their minds at the last minute.’

- b. ?Tylko Jan z nią, jako jedyna para, pobrali
 only Jan with her.INSTR as only couple married.3RD.PL.M1
 się wtedy w Las Vegas. Inni rozmyślili się w ostatniej
 RM then in Las Vegas others changed their minds RM in last
 chwili.
 minute
 ‘Jan and she were the only couple who married back then in Las
 Vegas. The others changed their minds at the last minute.’

One might speculate that the contrast between (136b), on the one hand, and (134b) and (135b), on the other hand, has to do with person resolution within particular CCCs and person agreement on the predicate. While the CCCs in (134) and (135) involve different persons, the CCCs in the sentences in (136) do not. This parallelism of the NP1 and the NP2 in (136b) may influence the grammaticality of the sentence.

CCCs involving pronouns are equally grammatical when both NP1s and NP2s are realized by personal pronouns. This is demonstrated by the examples (137).

- (137) a. Tylko ja z tobą, jako jedyna para,
 only I.1ST with you.2ND.INSTR.SG as only couple
 pobraliśmy się wtedy w Las Vegas. Inni rozmyślili
 married.1ST.PL.M1 RM then in Las Vegas others changed their minds
 się w ostatniej chwili.
 RM in last minute
 ‘You and I were the only couple who married back then in Las
 Vegas. The others changed their minds at the last minute.’
- b. Tylko ja z nim, jako jedyna para, pobraliśmy
 only I.1ST with him.3RD.INSTR as only couple married.1ST.PL.M1
 się wtedy w Las Vegas. Inni rozmyślili się w ostatniej
 RM then in Las Vegas others changed their minds RM in last
 chwili.
 minute
 ‘He and I were the only couple who married back then in Las Ve-
 gas. The others changed their minds at the last minute.’
- c. Tylko ty z nim, jako jedyna para,
 only you.2ND.SG with him.3RD.INSTR as only couple
 pobraliście się wtedy w Las Vegas. Inni rozmyślili
 married.2ND.PL.M1 RM then in Las Vegas others changed their minds
 się w ostatniej chwili.
 RM in last minute
 ‘He and you were the only couple who married back then in Las
 Vegas. The others changed their minds at the last minute.’

CCCs allow pro-drop, as seen in (138) and in (139), found in the corpus.

- (138) a. (Ona) z mężem wyjechali do USA.
 she with husband.INSTR left.PL.M1 to USA
 ‘She and her husband left for the USA.’
- b. (My) z mężami wyjechaliśmy do USA.
 we with husbands.INSTR left.1ST.PL.M1 to USA
 ‘We and our husbands left for the USA.’
- (139) [...] Iza nie zgromadziła zbyt wielu dóbr, ale razem z synem
 Iza not gathered too many goods but together with son
 gospodarzy mieli ich sporo [...]
 hosts had them a lot
 ‘Iza didn’t gather too many goods but she and the son of the hosts together had a lot of them.’

In these sentences, only the verb forms indicate that the subjects involve more individuals than those denoted by the NPs selected by the preposition *z* ‘with’. In (138a) and in the embedded clause in (139), the plural verb form implies that there is an additional individual in the extension of the predicate, and in (138b) the first person verb form indicates that there are first person individuals in the denotation of that predicate. Since in CCs in which the pronominal NPs are dropped, the person and number information is encoded on the verb, these CCs are often referred to in linguistic literature as verb-coded coordination.⁹

4.1.2.3 Pronouns in ICCs

We have seen before that NPs in ICCs can be realized by plural pronouns. The usage of singular pronouns as NPs is excluded by virtue of their semantics. Thus, only the ability of NP2s to be realized by pronouns will be examined in this section.

To show that NP2s in ICCs cannot be singular pronouns whenever NP1s are pronominal, I provide the examples (140).

- (140) a. *Tylko my z tobą, jako jedyna para,
 only we.1ST with you.2ND.INSTR.SG as only couple
 pobraliśmy się wtedy w Las Vegas. Inni rozmyślili
 married.1ST.PL.M1 RM then in Las Vegas others changed their minds
 się w ostatniej chwili.
 RM in last minute
 ‘You and I were the only couple who married back then in Las Vegas. The others changed their minds at the last minute.’

[intended]

⁹See, for instance, Comacho (1994, 2000) for Spanish verb-coded coordination and Schwartz (1988b,a), as well as Aissen (1989a) for the corresponding Tzotzil and Spanish data.

- b. *Tylko my z nim, jako jedyna para,
 only we.1ST with him.3RD.INSTR as only couple
 pobraliśmy się wtedy w Las Vegas. Inni rozmyślili
 married.1ST.PL.M1 RM then in Las Vegas others changed their minds
 się w ostatniej chwili.
 RM in last minute
 ‘He and I were the only couple who married back then in Las Vegas. The others changed their minds at the last minute.’

[intended]

- c. *Tylko wy z nim, jako jedyna para,
 only you.2ND.PL with him.3RD.INSTR as only couple
 pobraliście się wtedy w Las Vegas. Inni rozmyślili
 married.2ND.PL.M1 RM then in Las Vegas others changed their minds
 się w ostatniej chwili.
 RM in last minute
 ‘He and you were the only couple who married back then in Las Vegas. The others changed their minds at the last minute.’

[intended]

The examples in (141) demonstrate further that no plural pronouns are possible in Polish ICCs as NP2s, if NP1 is pronominal. Here, the order of pronouns does not affect the grammaticality.

- (141) a. *Tylko my czterej z wami, jako jedyna czwórka,
 only we.1ST four.M1 with you.2ND.INSTR.PL as only four
 zagraliśmy dzisiaj w brydża.
 played.1ST.PL.M1 today in bridge
 ‘Only you and the rest of us four, as the only group of four, played bridge today.’ [intended]
- b. *Tylko my czterej z nimi, jako jedyna czwórka,
 only we.1ST four.M1 with them.INSTR as only four
 zagraliśmy dzisiaj w brydża.
 played.1ST.PL.M1 today in bridge
 ‘Only they and the rest of us four, as the only group of four, played bridge today.’ [intended]
- c. *Tylko wy czterej z nimi, jako jedyna czwórka,
 only you.PL four.M1 with them.INSTR as only four
 zagraliście dzisiaj w brydża.
 played.2ND.PL.M1 today in bridge
 ‘Only they and the rest of you four, as the only group of four, played bridge today.’ [intended]

However, if NP1 is non-pronominal, NP2 in ICCs can be realized either as a singular or a plural pronoun, which is demonstrated in (142) and (143), respectively.

- (142) a. Cała rodzina włącznie ze mną wyjechała do USA.
 whole family including with me.INSTR left.SG to USA
 ‘The whole family, including me, left for the USA.’
- b. Cała rodzina włącznie z tobą wyjechała do USA.
 whole family including with you.INSTR.SG left.SG to USA
 ‘The whole family, including you, left for the USA.’
- c. Cała rodzina włącznie z nim samym wyjechała do USA.
 whole family including with himself.INSTR left.SG to USA
 ‘The whole family, including he himself, left for the USA.’
- (143) a. Cała rodzina włącznie z nami wyjechała do USA.
 whole family including with us.INSTR left.SG to USA
 ‘The whole family, including us, left for the USA.’
- b. Cała rodzina włącznie z wami wyjechała do USA.
 whole family including with you.INSTR.PL left.SG to USA
 ‘The whole family, including you, left for the USA.’
- c. Cała rodzina włącznie z nimi wyjechała do USA.
 whole family including with them.INSTR left.SG to USA
 ‘The whole family, including them, left for the USA.’

As in CCCs, nominative pronouns in ICCs can be dropped. The example in (144) demonstrates this fact.¹⁰

- (144) (My) z mężem, jako jedyne małżeństwo, wyjechaliśmy do
 we with husband.INSTR as only married couple left.1ST.PL.M1 to
 USA.
 USA
 ‘My husband and I, as the only married couple, left for the USA.’

Note that omitting plural pronouns in ICCs forces the structural interpretation according to which the *z*-PP attaches to the verb. If, however, a numeral such *oboje* ‘both’ is involved, as in (145) or in (146), found in the corpus, interpreting *z* NP2 as a verbal adjunct seems dispreferred or even impossible.

- (145) (My) oboje z mężem, jako jedyne małżeństwo, wyjechaliśmy
 we both with husband.INSTR as only married couple left.1ST.PL.M1
 do USA.
 to USA
 ‘My husband and I, as the only married couple, left for the USA.’

¹⁰See also Schwartz (1988a,b) for corresponding constructions, referred to as verb-coded coordinations, in other languages.

- (146) [...] oboje z Jagodą usiłowaliśmy po omacku podać sobie do
 both with Jogoda tried in the dark pass REFL.PRN to
 ust po kawałku melona [...]
 mouth apiece piece melon
 ‘Jagoda and I tried in the dark to pass each other a piece of melon in the
 mouth.’

It must be mentioned that the difference in structural interpretation does not affect the semantic interpretation of the sentences.

4.1.3 Summary

In this section, I have tested whether NP1 and NP2 can be realized by quantified NPs, bare plural NPs and pronominal NPs, in addition to the well-attested realizations as proper names. I have found that all these expressions are, with some exceptions for CCCs and ICCs, generally possible in all types of Polish CCs. The distribution of pronouns shows somewhat different patterns in the particular CCs, but all types of CC basically allow pronominal realizations of NP1s and NP2s.

Summing up, semantic properties of NP1s and NP2s such as (non)referentiality and pronominal realization do not provide explicit support for the typology proposed in Chapter 2, but they also do not challenge it.

4.2 Semantic Symmetry

In this section, I will first examine whether all CC types show equally free or equally restrictive behavior concerning definiteness and restrictiveness (Section 4.2.1). Section 4.2.2 will then consider animacy and humanness of NP1s versus NP2s.

4.2.1 Definiteness and Restrictiveness

Below, I examine NP1s and NP2 in CCCs, ICCs and ACCs with respect to definiteness and restrictiveness requirements.

4.2.1.1 Definiteness and Restrictiveness in CCCs

McNally (1993) and Dyła and Feldman (2008) have observed that NP1s and NP2s in CCCs must obey a symmetry requirement with respect to definiteness and the degree of restrictiveness. Thus, according to McNally (1993, p. 366), the following sentences are marginal.

- (147) a. ??/*Jakiś chłopak z dziewczyną tańczyli polkę na środku pokoju.
 some boy with girl.INSTR danced.PL polka in middle room
 ‘Some boy and some girl danced polka in the middle of the room.’
 [intended]

- b. ??/*Chłopak z jakąś dziewczyną tańczyli polkę na środku pokoju.
 boy with some girl.INSTR danced.PL polka in middle room
 ‘Some boy and some girl danced polka in the middle of the room.’

[intended]

The NP *chłopak* ‘boy’ in (147a) combines with the indefinite pronoun *jakiś* ‘some’, while the NP *dziewczyną* ‘girl’ is not specified for (in)definiteness. In (147b), the situation is reversed. While the NP *chłopak* ‘boy’ is not specified for (in)definiteness, the NP *dziewczyną* ‘girl’ is. These semantic configurations of NPs do not seem to be possible in Polish CCCs. Further, Dylą and Feldman (2008) provide the sentences in (148) and (149) to demonstrate that the NPs in CCCs must agree with respect to definiteness.

- (148) a. Mirek z Dorotą poszli na plażę.
 Mirek with Dorota.INSTR went.PL.M1 to beach
 ‘Mirek and Dorota went to the beach.’
- b. ?Mirek z tą dziewczyną poszli na plażę.
 Mirek with this.INSTR girl.INSTR went.PL.M1 to beach
 ‘Mirek and this girl went to the beach.’
- c. *Mirek z jakąś dziewczyną poszli na plażę.
 Mirek with some.INSTR girl.INSTR went.PL.M1 to beach
 ‘Mirek and some girl went to the beach.’ [intended]
- (149) a. Ten chłopak z tą dziewczyną poszli na plażę.
 this boy with this.INSTR girl.INSTR went.PL.M1 to beach
 ‘This boy and this girl went to the beach.’
- b. Jakiś chłopak z jakąś dziewczyną poszli na plażę.
 some boy with some.INSTR girl.INSTR went.PL.M1 to beach
 ‘A boy and a girl went to the beach.’

These examples clearly show that Polish CCCs require definiteness agreement between the NPs involved. The sentences in (150) also demonstrate that the two NPs in CCCs must include similar restricting material.

- (150) a. ??/*Stara kobieta z chłopakiem poszli na plażę.
 old woman with boy.INSTR went.PL.M1 to beach
 ‘An old woman and a boy went to the beach.’ [intended]
- b. Stara kobieta z młodym chłopakiem poszli na plażę.
 old woman with young.INSTR boy.INSTR went.PL.M1 to beach
 ‘An old woman and a young boy went to the beach.’

- (151) a. ??/*Kobieta w czerwonej sukience z mężczyzną weszli
 woman in red dress with man.INSTR came.PL.M1
 do pokoju.
 in room
 ‘A woman in a red dress and a man entered the room.’ [intended]
- b. Kobieta w czerwonej sukience z mężczyzną w różowym kapeluszu
 woman in red dress with man.INSTR in pink hat
 weszli do pokoju.
 came.PL.M1 in room
 ‘A woman in a red dress and a man with a pink hat entered the room.’

Thus, only if both NPs are modified by adjectives (150) or by PPs (151) are the sentences unquestionably grammatical.

4.2.1.2 Definiteness and Restrictiveness in ICCs

If NP1 is realized by a personal pronoun in an ICC, it is definite by definition. In such cases, NP2 must also be definite. Thus, none of the examples in (152) is grammatical in Polish.

- (152) a. *To my z facetem, prawie jak żona z mężem, weszliśmy
 it we with guy.INSTR almost as wife with husband.INSTR came.1ST.PL.M1
 razem do tego pokoju.
 together in this room
 ‘It was a guy and I who, almost as a wife and a husband, entered this room together.’ [intended]
- b. *To my z jakimś facetem, prawie jak żona z mężem,
 it we with some.INSTR guy.INSTR almost as wife with husband.INSTR
 weszliśmy razem do tego pokoju.
 came.1ST.PL.M1 together in this room
 ‘It was some guy and I who, almost as a wife and a husband, entered this room together.’ [intended]

By contrast, the corresponding sentence in (153), containing a definite NP2, is fully grammatical.

- (153) To my z tym facetem, prawie jak żona z mężem,
 it we with this.INSTR guy.INSTR almost as wife with husband.INSTR
 weszliśmy razem do tego pokoju.
 came.1ST.PL.M1 together in this room
 ‘It was this guy and I who, almost as a wife and a husband, entered this room together.’

Note, however, that the lack of quantifiers or demonstratives in an NP does not always indicate indefinite interpretation in Polish. Bare NPs referring to individuals in a close relationship to the speaker are often interpreted as definite. The sentence (154), for instance, is fully grammatical.

- (154) My z mężem poszliśmy we dwoje do kina.
 we with husband.INSTR went.1ST.PL.M1 in two to cinema
 ‘My husband and I both went to the cinema.’

If the NPs in an ICC are non-pronominal, no requirements on the definiteness seem to apply to either NP1 or NP2, as the examples in (155) illustrate.

- (155) a. Niektórzy studenci włącznie z Janem mają zamiar protestować
 some students including with Jan.INSTR have intention protest
 przeciwko opłatom za studia.
 against fees for studies
 ‘Some students including Jan intend to protest against the tuition fee.’
- b. Jakaś rodzina z niemowlakiem w wózku włącznie urządziła
 some family with infant.INSTR in buggy including organized
 piknik w parku miejskim.
 picnic in park city
 ‘A family including an infant in a buggy organized a picnic in the city park.’

Further, NP2s in ICCs with pronominal NP1s can be modified by adjectives, PPs and relative clauses. This, however, does not force the NP1 to combine with similar modifiers as well (irrespective of the fact that modifiability of pronouns is very restricted in Polish). Thus, sentences like those in (156) are fully grammatical.

- (156) a. To my z tym przystojnym facetem, prawie jak
 it we with this.INSTR good-looking.INSTR guy.INSTR almost as
 żona z mężem, weszliśmy razem do tego pokoju.
 wife with husband.INSTR came.1ST.PL.M1 together in this room
 ‘It was this good-looking guy and I who, almost as a wife and husband, entered this room together.’
- b. To my z tym facetem w czerwonym kapeluszu, prawie
 it we with this.INSTR guy.INSTR in red hat almost
 jak żona z mężem, weszliśmy razem do tego
 as wife with husband.INSTR came.1ST.PL.M1 together in this
 pokoju.
 room
 ‘It was this guy with a red hat and I who, almost as a wife and husband, entered this room together.’

If NP1s are non-pronominal, a symmetry with respect to restrictiveness is not required in ICCs, either (cf. (157)).

- (157) a. Niektórzy starsi studenci włącznie z Janem mają zamiar
 some older students including with Jan.INSTR have intention
 protestować przeciwko opłatom za studia.
 protest against fees for studies
 ‘Some older students including Jan are going to protest against the
 tuition fee.’
- b. Jakaś rodzina włącznie z małym niemowlakiem w wózku
 some family including with tiny.INSTR infant.INSTR in buggy
 urządziła piknik w parku miejskim.
 organized picnic in park city
 ‘A family including a tiny infant in a buggy organized a picnic in
 the city park.’

4.2.1.3 Definiteness and Restrictiveness in ACCs

No symmetry requirements with respect to definiteness and restrictiveness can be observed in Polish ACCs. Thus, the examples in (158) are all perfectly grammatical.

- (158) a. Jakiś chłopak z dziewczyną tańczył polkę na środku
 some boy with girl.INSTR danced.SG.M1 polka in middle
 pokoju.
 room
 ‘A boy danced polka with a girl in the middle of the room.’
- b. Chłopak z jakąś dziewczyną tańczył polkę na środku
 boy with some.INSTR girl.INSTR danced.SG.M1 polka in middle
 pokoju.
 room
 ‘A boy danced polka with some girl in the middle of the room.’

The sentences in (159) and (160) are also grammatical, even though they involve NPs with different restrictive material.

- (159) Stara kobieta z chłopakiem poszła na plażę.
 old woman with boy.INSTR went.SG.FEM to beach
 ‘An old woman went with a boy to the beach.’
- (160) Kobieta w czerwonej sukience z mężczyzną weszła do pokoju.
 woman in red dress with man.INSTR came.SG.FEM in room
 ‘A woman in a red dress came in the room with a man.’

To sum up, Polish CCCs exhibit a symmetry requirement with respect to definiteness and restrictiveness of NP1s and NP2s. This requirement does not apply to ACCs and ICCs. In ICCs, NP2 must only be definite if NP1 is realized by a plural pronoun. NP1 and NP2 are always allowed to differ with respect to restrictivity.

4.2.2 Animacy and Humanness

This section discusses the properties of animacy and humanness of NP1s and NP2s in the three CC types.

4.2.2.1 Animacy and Humanness in CCCs

Dyła (1988) claims that in most dialects of Polish, both NPs in CCCs must be animate and, in some dialects, even human. He provides the following examples, given here with the original notations of grammaticality judgments, where the symbol % marks dialect-related acceptability.

- (161) *Kasparow z komputerem grali zaledwie godzinę.
 Kasparow with computer.INSTR played.PL.M1 only hour
 ‘Kasparow and the computer played only for an hour.’ [intended]
- (162) %Pies z kotem żyły w zgodzie.
 dog with cat.INSTR lived.PL in peace
 ‘The dog and the cat lived in peace.’

According to Dyła (1988), (162) is considered grammatical in dialects which require the NPs to be animate and ungrammatical in dialects requiring the NPs in question to be human.

The example in (161) suggests that the NPs must be at least animate. Note, however, that this sentence is fully grammatical for some speakers of Polish. Perhaps those speakers perceive the object denoted by the NP2, that is *komputer* ‘computer’, as a sort of animate object (since it can play). If no such interpretational possibility is given, the speakers tend to agree in their judgments. Thus, (163), in which the NP2 can only be interpreted as an inanimate object, has been consistently judged as ungrammatical.

- (163) *Taka gruba dziewczyna z takim starym samochodem w
 such thick girl with such.INSTR old.INSTR car.INSTR at
 ogóle do ciebie nie pasują.
 all to you.SG not suit.PL
 ‘Such a fat girl and such an old car do not suit you at all.’

I do not quite agree with Dyła (1988) that both NPs in CCCs must be at least animate. The CCCs in the examples in (164) both contain non-animate NPs, yet, I believe, they are acceptable to speakers of all dialects of Polish.

- (164) a. Nóż z widelcem do kawy nie pasują.
knife with fork.INSTR to coffee not suit.PL
'A knife and a fork do not go with coffee.'
- b. Ta spódnica z tą bluzką kosztują razem 100
this skirt with this.INSTR blouse.INSTR cost.PL together 100
euro.
euro
'This skirt and this blouse cost together 100 euros.'

An example of a CCC with inanimate NP1 and NP2 has been also provided in Kopcińska (1995, p. 133), given here as (165).

- (165) Wódka z zakąską stały na stole.
vodka with appetizer.INSTR stood.PL on table
'The vodka and the appetizer were on the table.'

The ungrammaticality of sentences such as (161) or (163) is thus due to a discrepancy between NP1s and NP2s regarding humanness and / or animacy rather than to the fact that one of them denotes a non-animate object.

Klebanowska (1985) claims that whenever an NP1 refers to a human individual and an NP2 to a non-human, no plural agreement on the predicate is possible. She provides the following example.

- (166) Pani z pieskiem szła ulicą.
lady with dog.INSTR walked.SG.FEM street
'The lady walked with the dog along the street.'

Although singular agreement is preferred in (166), I claim that plural agreement is also possible here. The corresponding sentence in (167) is thus fully grammatical in Polish.¹¹

- (167) Pani z pieskiem szli ulicą.
lady with dog.INSTR walked.PL street
'The lady and the dog walked along the street.'

To conclude, I consider both animate (human and non-human) and inanimate NPs to be possible in CCCs. The only requirement with respect to animacy in CCCs is that of a symmetry: If one of the NPs is animate, the other must be animate as well.¹²

¹¹See also the discussion on number, gender and person resolution and number, gender and person agreement in CCCs in Chapter 6.

¹²For a discussion on animacy and humanness in Russian CCCs, see Urtz (1994).

4.2.2.2 Animacy and Humanness in ICCs

In Polish ICCs, the situation seems at first glance to be similar to CCCs. While only some native speakers of Polish found (168a) grammatical, all speakers judged (168b) to be ungrammatical.

- (168) a. ?My z moim komputerem rozegraliśmy jako dwóch
 we with my.INSTR computer.INSTR played.1ST.PL.M1 as two
 równorzędnych przeciwników kolejną partię szachów.
 equal rivals next game chess
 ‘My computer and I played the next chess game as two equal ri-
 vals.’
- b. *My z moim komputerem, jak każdy uczestnik ze
 we with my.INSTR computer.INSTR as every participant with
 swoim sprzętem, ulokowaliśmy się przy osobnym biurku.
 his equipment placed.1ST.PL.M1 RM by separate desk
 ‘I placed myself with my computer, as every participant with his
 equipment, at a separate desk.’ [intended]

The discrepancies in the judgments of the sentence in (168a) relate, as in the case of the example in (161), to different interpretations of the NP *komputerem* ‘computer’ as an animate or inanimate object. Since in (168b), the NP *komputerem* can only be interpreted as inanimate, all judgments were negative.

The example in (169) shows an ICC involving two inanimate NPs.

- (169) *Springer wydał właśnie nową książkę o składni. Będą one
 Springer published just new book about syntax will.PL they
 razem z załączoną CD kosztować 100 euro.
 together with enclosed.INSTR CD.INSTR cost 100 euro
 ‘Springer has already published a new book on syntax. The book and
 the enclosed CD will cost together 100 euros.’ [intended]

Although both objects in the denotation of the ICC in (169), i.e., *książka* ‘book’ and *CD* ‘CD’ refer to inanimate items, the expression as a whole is not grammatical. Thus, inanimate objects are not possible in Polish ICCs if NP1 is realized by a pronoun.

However, as some earlier examples indicate, ICCs can involve inanimate referents if the NP1 is non-pronominal. This is shown by (170), which repeats the examples in (37) from Chapter 2.

- (170) a. Całe mieszkanie włącznie z łazienką będzie remontowane.
 whole flat including with bathroom.INSTR will be renovated
 ‘The whole flat including the bathroom will be renovated.’

- b. Całe ciało tego zwierzęcia włącznie z głową i ogonem pokrywają włosy.
 whole body this.GEN animal.GEN including with head.INSTR and tail.INSTR cover.PL hairs
 ‘The whole body of this animal including the head and the tail is covered with hair.’

4.2.2.3 Animacy and Humanness in ACCs

Polish ACCs allow the combinations of animate and inanimate objects. Thus, all of the examples in (171) are grammatical.

- (171) a. Ja z moim komputerem rozegrałem właśnie kolejną partię szachów.
 I with my.INSTR computer.INSTR played.1ST.SG just next game chess
 ‘I just played the next chess game with my computer.’
- b. Ja z moim komputerem ulokowałem się przy osobnym biurku.
 I with my.INSTR computer.INSTR placed.1ST.SG RM by separate desk
 ‘I placed myself and my computer at separates desks.’
- c. Springer wydał właśnie nową książkę o składni. Będzie ona razem z załączoną CD kosztowała 100 euro.
 Springer published just new book about syntax will.SG it together with enclosed.INSTR CD.INSTR cost 100 euro
 ‘Springer has published a new book on syntax. It will cost together with the enclosed CD 100 euros.’

Summing up, Polish ACCs provide no restrictions on animacy and humanness of NP1s and NP2s. By contrast, ICCs allow only animate NP2s if NP1 is realized by a pronoun. CCCs admit both animate and inanimate objects in their denotations as long as the NPs agree in animacy.

4.3 Summary

In the preceding section, we have seen that the ability of NP1s and NP2s in the particular types of CC to be realized by definite and indefinite, restricted and non-restricted, animate and inanimate, as well as human and non-human NPs, provides no significant evidence for treating ACCs, CCCs and ICCs as semantically distinct expressions. All we can observe are somewhat different distribution patterns of pronouns and unequal symmetry requirements regarding definiteness, restrictiveness, animacy and humanness, which can be characterized as loose in ACCs,

conditionally loose in ICCs, and strict in CCCs. This, however, does not indicate any crucial differences in the denotation of these CCs. Rather these differences are idiosyncratic in nature and reflect various degrees of internal restrictiveness exhibited by ACCs, CCCs and ICCs with regard to the semantic realization of NP1s and NP2s.

These observations are similar to those I reported in Section 4.1 concerning the denotational properties of NP1 and NP2 in the three CC types. Thus, the data presented in this chapter do not provide further support for the typology put forth in Chapter 2. However, it also does not challenge this typology in any way.

To conclude our discussion so far, I repeat below the set-based characterization of the three basic CC types I proposed for Polish:

$$(172) \quad \llbracket \text{NP1 } z \text{ NP2} \rrbracket \supseteq A, B, \text{ where } A \cap B = \emptyset \quad \text{ACC}$$

$$(173) \quad \llbracket \text{NP1 } z \text{ NP2} \rrbracket = (A \cup B) \quad \text{CCC}$$

$$(174) \quad \llbracket \text{NP1 } z \text{ NP2} \rrbracket = A, \text{ where } A \supset B \quad \text{ICC}$$

Table 4.1, repeated from Chapter 3, summarizes the main semantic properties of the CC types that support evidence for this classification.

Semantic Property	ACC	CCC	ICC
ability of NP1 <i>z</i> NP2s to trigger inclusive presupposition	—	—	+
ability of NP1 <i>z</i> NP2s to be assigned focus	—	+	+
availability of plural denotation	—	+	+
ability of NP1 <i>z</i> NP2s to act as controllers	—	+	+
ability of NP1s to act of controllers (of possessive reflexive pronouns and PRO subjects)	+	—	+

Table 4.1: Summary of semantic properties of CCs

The remaining chapters of Part I will discuss morphosyntactic issues related to CCs, and examine whether the semantic similarities and differences between ACCs, CCCs and ICCs in Table 4.1 are reflected in morphosyntax.

Chapter 5

Syntactic Properties of CCs

Our discussion so far was focused on semantic properties of CCs, and it showed that some properties provide strong evidence for distinguishing between ACCs, CCCs and ICCs in Polish. In the following chapters, I will examine morphosyntactic aspects of CCs to find out whether they also support the typology proposed in Chapter 2. In the present chapter, I will focus on structural issues, while Chapter 6 will be devoted to agreement and resolution. My goal is to examine whether any discrepancies can be observed between ACCs, CCCs, and ICCs concerning these phenomena.

I will first investigate CCs with regard to their syntactic functions (Section 5.1), then examine further syntactic properties such as the possibility of multiple NP1s and multiple NP2 sequences (Section 5.2) as well as adjacency of NP1s and *z* NP2 strings, locality, and extractability (Section 5.3). Section 5.4 will conclude the chapter.

5.1 Syntactic Functions

So far, only CCs in subject position have been taken into consideration. This section shows that Polish CCs can also fulfill other syntactic functions: direct object (Section 5.1.2), indirect object (Section 5.1.3), prepositional object (Section 5.1.4) and possessor (Section 5.1.5).

5.1.1 Subject

For completeness, I repeat the examples (27), (28) and (29) from Chapter 2.3 as (175), (176) and (177), respectively, to show that all types of Polish CCs can appear as subjects.

- (175) Jan *z* Marią wyjechał do USA.
Jan.SG with Maria.INSTR.SG left.SG.M1 to USA
'Jan left for the USA with Maria.'

- (176) Jan z Marią wyjechali do USA.
 Jan.SG with Maria.INSTR.SG left.PL.M1 to USA
 ‘Jan and Maria left for the USA.’
- (177) My z Marią wyjechaliśmy do USA jako jedyna para
 we with Maria.INSTR.SG left.1ST.PL.M1 to USA as only couple
 małżeńska.
 married
 ‘Maria and I, as the only married couple, left for the USA.’

Note that the *z* NP2s sequences in (175) and (177) can also be analyzed as left-adjoined to the VPs. Crucially, however, the structural interpretation as part of the subject is available here. Sentence (178), introduced in Section 2.1.2 as (16), and sentence (179) provide unequivocal examples of ACCs and ICCs as subjects.¹

- (178) Jan z Marią albo Piotr wyjedzie do USA.
 Jan.NOM.SG with Maria.INSTR.SG or Piotr.NOM.SG will go.SG to USA
 ‘Jan will go to the USA with Maria or Piotr will.’
- (179) My dwoje z Marią, jako para małżeńska, oraz Piotr, jako
 we both with Maria.INSTR.SG as couple married and Piotr as
 kawaler, wyjedziemy razem do USA.
 bachelor will go.1ST.PL together to USA
 ‘Maria and I, as a married couple, and Piotr, as a bachelor, will go together to the USA.’

Dyła and Feldman (2008) and Schwartz (1985, p. 161) provide the examples in (180a) and (180b), where cICCs appear as dative subjects.

- (180) a. Nam z Ewą przyjemnie się tu mieszka.
 us.DAT with Ewa.INSTR enjoyably RM here live.SG
 ‘It is enjoyable for Ewa and me to live here.’
- b. Miło nam z córką.
 it pleases us.DAT with daughter.INSTR
 ‘My daughter and I are glad.’

As (181) demonstrates, ACCs and CCCs are also possible as dative subjects. In order to distinguish between the ACC and CCC readings, relative clauses have been incorporated into the sentences in (181) as well as into a number of sentences in the following sections. The singular form of the relative pronoun in (181a) indicates the ACC reading, the plural form in (181b) the CCC reading.

¹Cf. the discussion on structural constituency in Section 2.1.2.

- (181) a. Tej kobiecie z dzieckiem, która wprowadziła się
 this woman.DAT with child.INSTR who.SG.FEM moved.SG.FEM RM
 tu w maju, przyjemnie się tu mieszka.
 here in May enjoyably RM here live.SG
 ‘It is enjoyable for the woman with the child, who moved here in
 May, to live here.’
- b. Janowi z Ewą, którzy wprowadzili się tu w
 Jan.DAT with Ewa.INSTR who.PL.M1 moved.PL.M1 RM here in
 maju, przyjemnie się tu mieszka.
 May enjoyably RM here live.SG
 ‘It is enjoyable for Jan and Ewa, who moved here in May, to live
 here.’

Note that I ignore here the question of whether the dative NPs in (180) and (181) are indeed subjects as it is irrelevant for the general discussion in this thesis.

5.1.2 Direct Object

Dyła and Feldman (2008) argue that Polish cICCs can appear as direct objects. They provide no discussion of ACCs and CCCs in this syntactic function. The examples in (182), however, show that all CC types can appear as direct objects in Polish.²

- (182) a. Piotr zobaczył kobietę z dzieckiem, która
 Piotr saw woman.ACC.SG with child.INSTR.SG who.SG.FEM
 właśnie nadeszła.
 just arrived.SG.FEM
 ‘Piotr saw the woman with the child who just arrived.’
- b. Piotr zobaczył Jana z Marią, którzy właśnie
 Piotr saw Jan.ACC.SG with Maria.INSTR.SG who.PL.M1 just
 nadeszli.
 arrived.PL.M1
 ‘Piotr saw Jan and Maria, who just arrived.’
- c. Piotr zobaczył nas z Marią, jak tylko oboje
 Piotr saw us.ACC with Maria.INSTR.SG as only both
 ukazaliśmy się w drzwiach.
 appeared.1ST.PL RM in door
 ‘Piotr saw Maria and me as soon as we appeared at the door.’

5.1.3 Indirect Object

ACCs, CCCs, and ICCs can also occur as indirect objects, as the sentences in (183) show.

²See also McNally (1993) for Russian examples and Szupryczyńska (1990) for a discussion on related Polish data.

- (183) a. Piotr podarował kobiecie z dzieckiem, która
 Piotr gave woman.DAT.SG with child.INSTR.SG who.SG.FEM
 właśnie nadeszła, książkę ze swoim autografem.
 just arrived.SG.FEM book.ACC with POSS.REFL.PRN autograph.INSTR
 ‘Piotr gave the woman with a child, who just arrived, a book with
 his autograph.’
- b. Piotr podarował Janowi z Marią, którzy właśnie
 Piotr gave Jan.DAT.SG with Maria.INSTR.SG who.PL.M1 just
 nadeszli, książkę ze swoim autografem.
 arrived.PL.M1 book.ACC with POSS.REFL.PRN autograph.INSTR
 ‘Piotr gave Jan and Maria, who just arrived, a book with his auto-
 graph.’
- c. Piotr podarował nam z Marią, jak tylko oboje
 Piotr gave us.DAT with Maria.INSTR.SG as only both
 ukazaliśmy się w drzwiach, książkę ze swoim
 appeared.1ST.PL RM in door book.ACC with POSS.REFL.PRN
 autografem.
 autograph.INSTR
 ‘Piotr gave Maria and me a book with his autograph as soon as we
 appeared at the door.’

As (183c) indicates, cICCs are fully grammatical as indirect objects in Polish. However, Dyła and Feldman (2008) provide the following example, considered by the authors to be ungrammatical.

- (184) *Nam z Ewą nikt nie pomógł.
 us.DAT with Ewa.INSTR nobody not helped
 ‘Nobody helped Ewa and me.’

My own intuition as well as the judgments of ten native speakers of Polish say that this sentence is completely grammatical and natural.

5.1.4 Prepositional Object

The sentences in (185) provide evidence that all three types of CCs in Polish can serve as prepositional objects. For examples of cICCs as prepositional objects, see also Dyła and Feldman (2008).

- (185) a. Piotr patrzy na kobietę z dzieckiem, która
 Piotr look at woman.ACC.SG with child.INSTR.SG who.SG.FEM
 przyjechała pociągiem.
 arrived.SG.FEM train.INSTR
 ‘Piotr is looking at the woman with a child, who arrived by train.’

- b. Piotr czeka na Jana z Marią, którzy mają
 Piotr waits for Jan.ACC.SG with Maria.INSTR.SG who.PL.M1 have.PL
 przyjechać pociągiem.
 come train.INSTR
 ‘Piotr is waiting for Jan and Maria, who are going to arrive by
 train.’
- c. Piotr czekał na nas z Marią na dworcu, bo
 Piotr waited for us.ACC with Maria.INSTR.SG at station because
 oboje mieliśmy przejechać pociągiem.
 both had.PL arrive train.INSTR
 ‘Piotr waited for Maria and me at the station, because we both were
 arriving by train.’

5.1.5 Possessor

McNally (1993) and Feldman (2002) argue that Russian CCCs cannot act as possessors. The situation seems to be different in Polish. (186) provides examples of all types of CCs in that syntactic function.

- (186) a. Samochód tej dziewczyny z dzieckiem,
 car this.GEN.SG girl.GEN.SG.FEM with child.INSTR.SG.NEUT
 która zaparkowała obok nas, nadaje się na złom.
 who.SG.FEM parked.SG.FEM close to us qualifies RM for scrap
 ‘The car of this girl with the child, who parked close to us, qualifies
 as scrap.’
- b. Na honorowym miejscu wisi fotografia prezesa z
 on honor place hangs picture president.GEN.SG with
 żoną, którzy sympatycznie się z niej do nas uśmiechają.
 wife.INSTR.SG who.PL.M1 nicely RM from it to us smile.PL
 ‘On the place of honor, there is a picture of the president and his
 wife who nicely smile to us from it.’
- c. Płyty tego kwartetu fortepianowego z
 records this.GEN.SG quartet.GEN.SG piano.GEN.SG with
 Zimmermanem sprzedawały się doskonale.
 Zimmerman.INSTR.SG sold.PL.NON-M1 RM excellently
 ‘The records of this piano quartet with Zimmerman sold excel-
 lently.’

As (186) demonstrates, Polish ACCs, CCCs and ICCs are fully grammatical as possessors. However, (187) indicates that possessive ICCs involving plural pronouns are completely ungrammatical in Polish.

- (187) *Nas z Marią samochód, po tym jak oboje
 us.GEN.SG with Maria.INSTR.SG car after this when both
 uczyliśmy się nim jeździć, nadaje się na złom.
 learned.1ST.PL RM drive it qualifies RM for scrap
 ‘The car of Maria and me, after we both have learned to drive it, qualifies
 as scrap.’ [intended]

In Polish, non-pronominal possessors are marked genitive. Pronominal NPs appear as possessors in specific possessive forms, which differ from the genitive form of personal pronouns. The sentence with the possessive ICC in (187) contains a genitive form of the NP *my z Marią* ‘Maria and I’ and, thus, a genitive form of the personal plural pronoun *my* ‘we’. This is clearly ungrammatical in Polish. Schwartz (1985, p. 156), however, provides an example of a possessive NP1 *z* NP2 expression which seems to be fully grammatical. This example is given in (188).

- (188) nasza z nim znajomość
 our with him.INSTR acquaintance
 ‘my acquaintance with him’

A similar example is provided in Urtz (1994), based on Fokker and Smolikowska (1971), and is given here as (189).

- (189) Nasza z nim znajomość trwa już pięć lat.
 our with him acquaintance lasts already five years
 ‘My acquaintance with him has already lasted for five years.’

Schwartz (1985) argues that the possessive NP1 *z* NP2 expression in (188) should be interpreted as a cICC, i.e., as involving only two people. She also claims that to have the non-inclusive reading assigned to the plural pronoun, a different word order must be used, as in (190).

- (190) nasza znajomość z nim
 our acquaintance with him.INSTR
 ‘our acquaintance with him’

There are two crucial differences between (188) and (187) that may explain the difference in grammaticality. Firstly, while the pronoun in (188) is a possessive pronoun, the one in (187) is the genitive form of the personal pronoun *my* ‘we’. Secondly, while the noun *samochód* ‘car’ in (187) is a non-relational noun, the noun *znajomość* ‘acquaintance’ in (188) is a relational noun selecting two arguments, one of which is a PP headed by the preposition *z* ‘with’. Obviously, the argument *z*-PP can combine with possessive pronouns forming inclusive or conjunctive expressions which, in turn, can occur as pronominal possessors. The examples in (191), which contain relational nouns with similar subcategorization frames, seem to support this observation. Note that genitive forms of personal pronouns are ungrammatical here, as demonstrated in (192).

- (191) a. nasz z nim związek
 our with him.INSTR connection
 T1: ‘my connection with him’
 T2: ‘our connection with him’
- b. nasza z nią przyjaźń
 our with her.INSTR friendship
 T1: ‘my friendship with her’
 T2: ‘our friendship with her’
- (192) a. *nas z nim znajomość
 us.GEN with him.INSTR acquaintance
 ‘my acquaintance with him’ [intended]
- b. *nas z nim związek
 us.GEN with him.INSTR connection
 T1: ‘my connection with him’ [intended]
 T2: ‘our connection with him’ [intended]
- c. *nas z nią przyjaźń
 us.GEN with her.INSTR friendship
 T1: ‘my friendship with her’ [intended]
 T2: ‘our friendship with her’ [intended]

5.1.6 Summary

In this section, I have shown that all CC types can occur as nominative subjects, dative subjects, direct objects, indirect objects and prepositional objects. While ACCs, CCCs, and ICCs containing non-pronominal NP1s are possible as possessors as well, ICCs involving genitive personal pronouns cannot occur in this function. However, inclusive comitative possessors can be expressed by NP1 *z* NP2 combinations if NP1 is realized by a possessive pronoun.³

These observations show that the NP1 *z* NP2 sequences in ACCs, CCCs and ICCs have the same categorical status, i.e., they are nominal expressions.

5.2 Iteration, Recursion and Coordination

Next I will examine the internal syntactic complexity of the NP1 *z* NP2 sequences. I will test whether they may involve multiple NP1s and multiple *z* NP2 expressions, whether these expressions can appear iteratively or must occur recursively, and whether *z* NP2 expressions can conjoin with each other. My goal is to find out whether any differences can be observed between ACCs, CCCs and ICCs in this respect.

³See also Dalrymple et al. (1998), Ionin and Matushansky (2003), Dylą and Feldman (2008) and McNally (1993) for remarks on syntactic functions of Russian CCs, and Comacho (2000) on Spanish cICC. The occurrence of Russian CCs in various syntactic functions has also been discussed in Obst (2002).

5.2.1 Iteration, Recursion and Coordination in CCCs

McNally (1993) points out that neither NP1s nor *z* NP2s sequences in CCCs can be iterative. She considers (193) ungrammatical.

- (193) a. *Janek, Maria *z* Piotrem poszli do kina.
 Janek Maria with Piotr.INSTR went.PL.M1 to cinema
 ‘Janek, Maria and Piotr went to the cinema.’ [intended]
- b. *Janek *z* Marią *z* Piotrem poszli do kina.
 Janek with Maria.INSTR with Piotr.INSTR went.PL.M1 to cinema
 ‘Janek, Maria and Piotr went to the cinema.’ [intended]

Note that iteration is allowed in Polish coordination. This is demonstrated in (194).⁴

- (194) Janek, Maria *i* Piotr poszli do kina.
 Janek Maria and Piotr went.PL.M1 to cinema
 ‘Janek, Maria and Piotr went to the cinema.’

I also consider the iteration of NP1s as in (193a) to be out. However, the ungrammaticality of (193b) needs closer examination.

As mentioned in the context of VP adjuncts, pragmatic reasons tend to disallow multiple adjuncts of the same lexicosemantic type in a non-coordinate relationship to each other if they modify the same constituent (see, for instance, Section 2.1.2). These observations also apply to adjunction within NPs, as (195) illustrates.

- (195) a. Mężczyzna (#o nazwisku Nowak) o imieniu Jan znany jest
 man with surname Nowak with first name Jan known is
 tu wszystkim.
 here all
 ‘The man with the surname Nowak and the first name Jan is known
 to everybody here.’ [intended]
- b. Mężczyzna o nazwisku Nowak (#o imieniu Jan) znany jest
 man with surname Nowak with first name Jan known is
 tu wszystkim.
 here all
 ‘The man with the surname Nowak and the first name Jan is known
 to everybody here.’ [intended]

Under the assumption that both *z* NP2s in (193b) modify the NP *Janek* ‘Janek’, this sentence must indeed be judged ungrammatical. However, sentences such as (193b) exhibit structural ambiguities schematically presented in (196), which affect their grammaticality.

⁴For more details on Polish coordination, see Szpakowicz (1986) Szpakowicz and Świdziński (1990) and Świdziński (1992).

- (196) a. [NP1 [z NP2] [z NP3]]
 b. [[NP1 z NP2] z NP3]
 c. [NP1 z [NP2 z NP3]]

While (193b) is ungrammatical under the interpretation in (196a) for pragmatic reasons, it is fully grammatical under the interpretations in (196b) and (196c). The following examples demonstrate this fact.

- (197) a. Janek z Marią, którzy się bardzo lubią, razem
 Janek with Maria.INSTR who.PL.M1 RM very like together
 z sąsiadką z drugiego piętra poszli do kina.
 with neighbor.INSTR from second floor went.PL.M1 to cinema
 ‘Janek and Maria, who like each other very much, and their neighbor from the second floor, went together to the cinema.’
- b. Mój kumpel Piotrek razem z tą kobietą z
 my buddy Piotrek together with this.INSTR woman.INSTR with
 osiemnastoletnim synem, którzy wprowadzili
 eighteen years old.INSTR son.INSTR who.PL.M1 moved in.PL.M1
 się tu w sierpniu, poszli na spotkanie lokatorskie.
 RM here in August went.PL.M1 on meeting residents
 ‘My buddy Piotrek, this woman and her eighteen-year-old son, who moved in here together in August, went to the residents’ meeting.’

The plural relative clauses in (197) help to disambiguate the sentences. (197a) corresponds to (196b), (197b) to (196c): *Janek, Marią* and *sąsiadką* ‘neighbor’ are NP1, NP2 and NP3, respectively. The sequence *Janek z Marią* ‘Janek and Maria’ is interpreted as forming one constituent and combining with another *z NP* expression, i.e., with *z sąsiadką* ‘with their neighbor’. In (196b), *mój kumpel Piotrek* ‘my buddy Piotrek’, *tą kobietą* ‘this woman’ and *osiemnastoletnim synem* ‘her eighteen-year-old son’, correspond to the NP1, NP2 and NP3 in (196c). The sequence *z tą kobietą z osiemnastoletnim synem* ‘and this woman and her eighteen-year-old son’ is interpreted as forming one constituent and combining with the NP *mój kumpel Piotrek* ‘my buddy Piotrek’. This interpretation corresponds to the schematic representation given in (196c). Both sentences in (197) were judged by native speakers of Polish to be grammatical.

As Dyła (1988) and McNally (1993) point out, the *z NP2* sequences in CCCs can be conjoined by the conjunction *i* ‘and’. The sentence in (198) demonstrates this.⁵

- (198) Ewa z Marią i z Piotrem poszli do kina.
 Ewa with Maria.INSTR and with Piotr.INSTR went.PL.M1 to cinema
 ‘Ewa, Maria and Piotr went to the cinema.’

⁵See also Miller (1971) for a discussion on iteration in Russian CCCs and ordinary coordination.

This observation also holds for non-comitative adjuncts. Thus, by conjoining the adjunct PPs in (195), these sentences become fully acceptable. This is shown in (199).

- (199) Mężczyzna o nazwisku Nowak i o imieniu Jan znany jest
 man with surname Nowak and with first name Jan known is
 tu wszystkim.
 here all
 ‘The man with the surname Nowak and the first name Jan is known to
 everybody here.’

To conclude, NP1s cannot be iterated in Polish CCCs at all and z NP2s only under the recursive interpretation. The z NP2 expressions can be coordinated.

5.2.2 Iteration, Recursion and Coordination in ICCs

Iteration and recursion in ICCs has been discussed in Vassilieva and Larson (2001) for Russian. They claim that no iteration of z NP2s is possible in Russian cICC, but recursive cICCs are fully grammatical. I argue that this generalization also applies to Polish.

Consider the sentences in (200).

- (200) a. To przecież my z wami ze Staszkiem, jako trójka
 it just we with you.INSTR.PL with Staszek.INSTR as threesome
 przyjaciół, rozstrzygnęliśmy wtedy wspólnie ten problem.
 friends solved.1ST.PL.M1 then together this problem
 ‘It was Staszek, you and me who, as the threesome of friends,
 solved this problem at that time.’
- b. *To przecież [my [z wami] [ze Staszkiem]], jako trójka
 it just we with you.INSTR.PL with Staszek.INSTR as threesome
 przyjaciół, rozstrzygnęliśmy wtedy wspólnie ten problem.
 friends solved.1ST.PL.M1 then together this problem
 ‘It was Staszek, you and me who, as the threesome of friends,
 solved this problem at that time.’ [intended]
- c. To przecież [my z [wami ze Staszkiem]], jako trójka
 it just we with you.INSTR.PL with Staszek.INSTR as threesome
 przyjaciół, rozstrzygnęliśmy wtedy wspólnie ten problem.
 friends solved.1ST.PL.M1 then together this problem
 ‘It was Staszek, you and me who, as the threesome of friends,
 solved this problem at that time.’

- d. *To przecież [[my z wami] ze Staszkiem], jako
it just we with you.INSTR.PL with Staszek.INSTR as
trójka przyjaciół, rozstrzygnęliśmy wtedy wspólnie ten problem.
threesome friends solved.1ST.PL.M1 then together this problem
'It was Staszek, you and me who, as the threesome of friends,
solved this problem at that time.' [intended]

The bracketings provided in (200b), (200c) and (200d) indicate the three different structural interpretations schematically presented in (196), repeated here as (201).

- (201) a. [NP1 [z NP2] [z NP3]]
b. [[NP1 z NP2] z NP3]
c. [NP1 z [NP2 z NP3]]

The sentence in (200a) is ungrammatical under the interpretation in (200b) because it is analyzed as containing multiple adjuncts of the same lexicosemantic type in a non-coordinate relationship to each other, modifying the same constituent. This has already been argued to be disallowed for pragmatic reasons. The ungrammaticality of the interpretation in (200d) relates to the fact that pronominal NPs are not possible as realizations of NP2s in ICCs (cf. the discussion in Section 4.1.2.3). Only the reading in (200c) is grammatical in Polish. This reading corresponds to the schema in (201c).

As in CCCs, z NP2 strings in ICCs can be conjoined by the conjunction *i* 'and'. This is exemplified in (202).

- (202) To przecież my z Ewą i ze Staszkiem, jako trójka
it just we with Ewa.INSTR and with Staszek.INSTR as threesome
przyjaciół, rozstrzygnęliśmy wtedy wspólnie ten problem.
friends solved.1ST.PL.M1 then together this problem
'It was Staszek, Ewa and I who, as the threesome of friends, solved this
problem at that time.'

5.2.3 Iteration, Recursion and Coordination in ACCs

Iteration of NP1s and z NP2 strings is also out in Polish ACCs. The examples in (203) illustrate this.

- (203) a. *Janek, Maria z Piotrem poszedł do kina.
Janek Maria with Piotr.INSTR went.SG.M1 to cinema
'Janek and Maria went with Piotr to the cinema.' [intended]
b. *Janek z Marią z Piotrem poszedł do kina.
Janek with Maria.INSTR with Piotr.INSTR went.SG.M1 to cinema
'Janek went with Maria and Piotr to the cinema.' [intended]

The sentence in (203b) can in principle have the three interpretations represented in (196a)–(196c), repeated above as (201a)–(201c), respectively. Under the iterative interpretation in (201a), this sentence is ungrammatical. The examples in (204) show that under the recursive reading, represented in (201b) and (201c), it is fully grammatical.

- (204) a. Jakiś mężczyzna ze swoim psem z jakąś kobietą
 some man with POSS.REFL.PRN dog.INSTR with some woman
 w czerwonej sukience wszedł do pokoju.
 in red dress came.SG.M1 in room
 ‘Some man and his dog entered the room with some woman in a red dress.’
- b. Jakiś mężczyzna w okularach z jakąś kobietą
 some man with glasses with some.INSTR woman.INSTR
 ze swoim małym dzieckiem wszedł do pokoju.
 with POSS.REFL.PRN little.INSTR baby.INSTR came.SG.M1 in room
 ‘Some man with glasses entered the room with some woman and her little baby.’

The possessive reflexive pronouns in the examples in (204) enforce the ACC reading of the particular NP1 *z* NP2 sequences and thus help to disambiguate the sentences structurally. The sentence in (204a) corresponds to the interpretation in (201b), the one in (204b) to the interpretation in (201c).

As in CCCs and ICCs, the *z* NP2 expressions in ACCs can be connected by a conjunction. This can be seen in (205).

- (205) Janek z Marią i z Piotrem poszedł do kina.
 Janek with Maria.INSTR and with Piotr.INSTR went.SG.M1 to cinema
 ‘Janek went with Maria and Piotr to the cinema.’

5.2.4 Summary

I have shown that in Polish CCs, no iteration of the NP1s and the *z* NP2 sequences is allowed; multiple *z* NP2 strings are only grammatical under the recursive interpretation. However, the *z* NP2 expressions can be connected by the conjunction *i* ‘and’.

These observations provide further evidence for treating ACCs, CCCs and ICCs as syntactic entities of the same form.

5.3 Adjacency and Locality

In this section, I will first discuss CCs regarding locality conditions, in particular, whether *z* NP2 strings can be attached to VPs. Section 5.3.2 examines the three types of CCs with respect to whether NP1s and *z* NP2 strings must be adjacent

to each other or whether intervening elements such as clitics or parentheticals are allowed. Section 5.3.3 investigates extraction phenomena in the CC types. I will discuss extraction of NP1s and *z* NP2 strings out of NP1 *z* NP2 expressions as well as so-called Across-the-Board extraction. The observations will be summarized in Section 5.3.4.

5.3.1 VP-Attachment

In this section, I will consider the ability of the *z* NP2 strings to attach to VPs as their adjuncts. The objective is to find out whether there are any differences between particular CC types with respect to locality requirements on the NP1s *z* NP2 sequences.

In this thesis, I follow Stieber (1972), Bartmiński (1973), Wierzbicka and Wierzbicki (1969) and Świdziński (1996) in assuming that Polish is an SVO language (cf. Section 2.1.2). Recall that in sentences with two objects, the dative object usually precedes the accusative object. Within Polish NPs, adjectival (restrictive) modifiers usually precede the noun, while nominal and prepositional complements as well as prepositional modifiers follow it. Prepositional VP-modifiers can appear both to the left and to the right of modified VPs. Given this, sentences like (9a), discussed in Section 2.1.2 and repeated below as (206a), are structurally ambiguous. (206b)–(206d) correspond to the sentences (9b)–(9d) in Section 2.1.2. Recall that the structural interpretation in (206c) is associated with a prosodic break immediately following the NP1, indicated by the symbol ||.

- (206) a. Jan *z* Marią wyjechał.
 Jan with Maria.INSTR left.SG.M1
 ‘Jan left with Maria.’
- b. [Jan *z* Marią] wyjechał.
 Jan with Maria.INSTR left.SG.M1
 ‘Jan left with Maria.’
- c. Jan || [*z* Marią wyjechał].
 Jan with Maria.INSTR left.SG.M1
 ‘Jan left with Maria.’
- d. Jan wyjechał *z* Marią.
 Jan left.SG.M1 with Maria.INSTR
 ‘Jan left with Maria.’

As the different bracketings in (206b) and (206c) indicate, one interpretation of (206a) is that the NP1 *z* NP2 string forms a constituent, the other one is that the *z* NP2 sequence attaches to the VP. That is, the PP *z* *Marią* ‘with Maria’ in (206) can be syntactically associated with the preceding NP *Jan* ‘Jan’ or with the following VP *wyjechał* ‘left’ due to its semantic property of being able to modify both events and individuals. The structural ambiguity of CCs as in (206a), as well

as the ability of *z*-PPs in these constructions to combine with NPs and VPs, have also been observed in Szupryczyńska (1991).

The example in (206d) further shows that the *z* NP can attach to a VP as its right adjunct. The sentences in (206) are semantically fully equivalent: in each case, the individual denoted by the NP *Jan* ‘Jan’ and that denoted by the NP *Marią* ‘Maria’ participate in the event the predicate refers to in such a way that the latter accompanies the former. See also Section 2.1.2 for a discussion on structural ambiguity in sentences such as (206a).

While the examples in (206) provide evidence for VP-attachment of *z* NP2s in ACCs, (207) and (208) demonstrate that the *z* NP2s can be attached to VPs in cICC and oICC, respectively.

- (207)
- a. My *z* Marią wyjechaliśmy *we* dwoje do USA.
we with Maria.INSTR left.1ST.PL.M1 in two to USA
‘Maria and I both left for the USA.’
 - b. [My *z* Marią] wyjechaliśmy *we* dwoje do USA.
we with Maria.INSTR left.1ST.PL.M1 in two to USA
‘Maria and I both left for the USA.’
 - c. My || [*z* Marią wyjechaliśmy *we* dwoje do USA.]
we with Maria.INSTR left.1ST.PL.M1 in two to USA
‘Maria and I both left for the USA.’
 - d. My wyjechaliśmy *z* Marią *we* dwoje do USA.
we left.1ST.PL.M1 with Maria.INSTR in two to USA
‘Maria and I both left for the USA.’
- (208)
- a. To właśnie my czworo *z* Marią tworzymy tę zgraną
it just we four with Maria.INSTR form.1ST.PL this efficient
brydżową czwórkę.
bridge four
‘It is Maria and the rest of us four who form this efficient group of
four that plays bridge.’
 - b. [To właśnie my czworo *z* Marią] tworzymy tę zgraną
it just we four with Maria.INSTR form.1ST.PL this efficient
brydżową czwórkę.
bridge four
‘It is Maria and the rest of us four who form this efficient group of
four that plays bridge.’
 - c. To właśnie my czworo || [*z* Marią tworzymy tę zgraną
it just we four with Maria.INSTR form.1ST.PL this efficient
brydżową czwórkę].
bridge four
‘It is Maria and the rest of us four who form this efficient group of
four that plays bridge.’

- d. To właśnie my czworo tworzymy z Marią tę zgraną
 it just we four form.1ST.PL with Maria.INSTR this efficient
 brydżową czwórkę.
 bridge four
 ‘It is Maria and the rest of us four who form this efficient group of
 four that plays bridge.’

The sentence (207a), involving a cICC, has the interpretations in (207b) and (207c). (207d) further shows that the PP *z Marią* ‘with Maria’ can combine with the predicate as its right adjunct. These observations also apply to sentences involving oICCs. Thus, (208a) has two structural readings which are presented in (208b) and (208c). (208d) demonstrates that the *z* NP2 in the oICC does not have to be adjacent to the NP1 and can combine with the verb as its right adjunct. As in the case of sentences involving ACCs, (207) and (208) do not differ with respect to the properties of the set of individuals participating in the event denoted by the predicate and the lexicosemantic relationship between these particular individuals.⁶

The situation is different in Polish CCCs. As the examples in (209) illustrate, *z* NP2s in CCCs are obligatorily attached to NP1s.

- (209) a. Jan *z* Marią przyjechali do Warszawy.
 Jan with Maria.INSTR arrived.PL.M1 to Warsaw
 ‘Jan and Maria arrived in Warsaw.’
- b. [Jan *z* Marią] przyjechali do Warszawy.
 Jan with Maria.INSTR arrived.PL.M1 to Warsaw
 ‘Jan and Maria arrived in Warsaw.’
- c. *Jan || [*z* Marią przyjechali do Warszawy].
 Jan with Maria.INSTR arrived.PL.M1 to Warsaw
 ‘Jan and Maria arrived in Warsaw.’ [intended]
- d. *Jan przyjechali *z* Marią do Warszawy.
 Jan arrived.PL.M1 with Maria.INSTR to Warsaw
 ‘Jan and Maria arrived in Warsaw.’ [intended]
- e. *Jan przyjechali do Warszawy *z* Marią.
 Jan arrived.PL.M1 to Warsaw with Maria.INSTR
 ‘Jan and Maria arrived in Warsaw.’ [intended]

Thus, (209a), which includes a CCC, can only be structurally interpreted as in (209b), i.e., the expression *Jan z Marią* ‘Jan and Maria’ must form a constituent. The attachment of the *z* NP2 to the VP, either as its left or its right adjunct, is ungrammatical in Polish. This is shown by the examples in (209c)–(209e).

Summing up, while the NP1 *z* NP2 strings in ACCs and ICCs (both cICCs and oICCs) can occur discontinuously in the sense that NP1 and NP2 do not have

⁶See also Vassilieva and Larson (2001), Ionin and Matushansky (2003) and Feldman (2002) for a discussion on discontinuous NP1 *s* NP2 strings in Russian ACCs and ICCs. For Spanish data, cf. Comacho (1994).

to belong to the same local domain, the NP1 *z* NP2 strings in CCCs may not be discontinuous.

5.3.2 Clitics and Parentheticals

In this section, I will examine ACCs, CCCs and ICCs with regard to adjacency of NP1 and *z* NP2. Dylą (1988) and Dylą and Feldman (2008) claim that, in contrast to ACCs, CCCs do not allow intervening clitics and parentheticals between NP1s and *z* NP2s.⁷ Dylą (1988, p. 389) provides the examples in (210) and (211) to demonstrate this.

- (210) a. Janek, niestety, z Ewą poszedł na spacer.
 Janek unfortunately with Ewa.INSTR went.SG.M1 for walk
 ‘Unfortunately, Janek went for a walk with Ewa.’
- b. *Janek, niestety, z Ewą poszli na spacer.
 Janek unfortunately with Ewa.INSTR went.PL.M1 for walk
 ‘Unfortunately, Janek and Ewa went for a walk.’ [intended]
- (211) a. Janek się z Ewą spotkał na plaży.
 Janek RM with Ewa.INSTR met.SG.M1 on beach
 ‘Janek met with Ewa on the beach.’
- b. *Janek się z Ewą spotkali na plaży.
 Janek RM with Ewa.INSTR met.PL.M1 on beach
 ‘Janek and Ewa met.PL on the beach.’ [intended]

Thus, according to Dylą (1988), parentheticals and clitics intervening between NP1s and *z* NP2 strings are grammatical in ACCs, cf. (210a) and (211a), but not in CCCs, as demonstrated in (210b) and (211b).⁸ I agree that no intervening elements are possible in CCCs. However, I claim that it cannot be determined whether they are allowed in ACCs. As I have shown in the previous section, accompanitive and inclusive PPs can be attached to both NP1s and VPs, thus the *z*-PPs in (210a) and (211a) can be interpreted as either NP1-modifiers or VP-modifiers. That means that the parenthetical in (210a) and the clitic in (211a) can be analyzed as intervening either between the NP1 and the PP within the subject NP1 *z* NP2 or between the subject NP1 and the PP modifying the VP. Since neither analysis cannot be excluded, one cannot argue that NP1 *z* NP2 strings in ACCs allow intervening elements.

The same holds for ICCs. The examples in (212) and (213) demonstrate that parentheticals and clitics in ICCs, both cICC and oICC, are fully grammatical.

⁷See also McNally (1993) for a discussion on adverb interpolation in Russian ACCs and CCCs. For a distribution of clitics and parentheticals in Russian ACCs and CCCs, cf. Feldman (2002) and Dylą and Feldman (2008). For a discussion on adjacency in Spanish CCCs, see Comacho (1994).

⁸For details on the distribution of the Polish clitic *się*, see Misz (1966) and Kupść (2000). See also Derwojedowa (2000) for a discussion on word order in Polish simple sentences.

However, like with ACCs, one cannot determine whether the intervening elements appear within a NP1 *z* NP2 string or between a subject NP1 and a PP which modifies a VP.

- (212) a. My, niestety, *z* Marią, jako jedyna para małżeńska
 we unfortunately with Maria.INSTR as only couple married
 w mieście, mieszkamy *z* dziećmi i wnukami.
 in town live.1ST.PL with children.INSTR and grandchildren.INSTR
 ‘Unfortunately, Maria and I are the only married couple in town
 who lives together with children and grandchildren.’
- b. Tylko my czworo, niestety, *z* Marią graliśmy
 only we four unfortunately with Maria.INSTR played.1ST.PL.M1
 dzisiaj *z* jeszcze jedną czwórką *z* Lublina w brydża. Inne
 today with yet one four from Lublin in bridge other
 czwórki nie miały ochoty.
 fours not felt like it
 ‘Unfortunately, only Maria and the rest of us four, as well as one
 more group of four from Lublin, played bridge today. No other
 group of four felt like joining us.’
- (213) a. My się *z* Marią, jako troskliwy ojciec i matka, wybieramy
 we RM with Maria.INSTR as careful father and mother go.1ST.PL
z synem co miesiąc do lekarza.
 with son.INSTR every month to doctor
 ‘Maria and I, as careful parents, take our son to the doctor every
 month.’
- b. Tylko my czworo się *z* Marią spotkamy *z*
 only we four RM with Maria.INSTR will meet.1ST.PL with
 jeszcze jedną czwórką na brydża.
 yet one.INSTR four.INSTR on bridge
 ‘Only Maria and the rest of us four will meet with one more group
 of four to play bridge.’

Recall that collectivizing adverbs, such as *razem* ‘together’, are allowed to appear between NP1s and *z* NP2 strings in all types of CCs (cf. the discussion in Section 2.1.1). However, they are analyzed as modifying the *z* NP2 expressions and, therefore, are parts of these constituents rather than intervening items.

Thus, we can conclude that the interpolation of parentheticals and clitics between NP1s and *z* NP2s is clearly ungrammatical in Polish CCCs. Because of the structural ambiguity of ACCs and ICCs, it cannot be determined whether or not intervening elements are grammatical there.

5.3.3 Extraction

I will now examine the extractability of NP1s and z NP2 strings out of the NP1s z NP2 sequences in ACCs, CCCs and ICCs, and the so-called *Across-the-Board extraction*. Before turning to extraction phenomena in CCs, I will sketch some general characteristics of unbounded dependencies in Polish such as multiple *wh*-fronting, parasitic gaps and extraction out of subordinate clauses, infinitival verbal projections, NPs and PPs.

Polish allows multiple *wh*-fronting, as the sentences in (214) demonstrate. See also Witkoś (1996b) and Meyer (2004) for more details.

- (214) a. Kto_i kogo_j kocha ____i ____j?
 who.NOM who.ACC loves
 ‘Who loves whom?’
- b. Co_i gdzie_j umieściłeś ____i ____j?
 what where placed.2ND.SG.M1
 ‘What did you place where?’

It also allows parasitic gaps, i.e., constructions where an empty category is licensed by the occurrence of another empty category in the sentence. In sentence (215a), the NP *którą książkę* ‘which book’ is interpreted not only as binder of the direct object of the verb *oddajesz* ‘returned’, but also as licenser of the direct object of the noun *czytania* ‘reading’. Similarly, the NP *zegarek* ‘watch’ in (215b) is not only the binder of the relative pronoun *który* ‘which’, but also the licenser of the direct object of the verb *pożyczył* ‘borrowed’ and of the direct object of the verb *oddać* ‘give back’.

- (215) a. [Którą książkę]_i oddajesz ____i bez czytania ____i?
 which book returned.2ND.SG.M1 without reading
 ‘Which book did you return without reading?’
- b. Jan zgubił zegarek_i, który_i wczoraj pożyczył ____i od ojca i
 Jan lost watch which yesterday borrowed from father and
 miał oddać ____i dzisiaj.
 had give back today
 ‘Jan lost the watch which he borrowed yesterday from his father and wanted to give back today.’

Extraction out of subordinate clauses introduced by complementizers is rather problematic in Polish. In this respect, Polish is more restrictive than, for instance, English, as illustrated by the grammatical English sentence in (216) versus the corresponding ungrammatical Polish sentence in (217), both taken from Przepiórkowski (1999, p. 35).

- (216) Who_i did you tell Mary that John hit ____i?

- (217) ??Kogo_i powiedziałeś Marii, że Janek uderzył ____i?
 who.ACC told.2ND.SG.M1 Mary.DAT that Janek.NOM hit

However, extraction out of clauses introduced by the complementizer *żeby* ‘that’ seems, at least in some cases, to be possible. This is shown in (218) from Przepiórkowski (1999, p. 159).

- (218) Kogo_i chciałbyś, żeby wybrali ____i prezydentem?
 who.ACC want.2ND.SG.M1 that elect.3RD.PL president
 ‘Who would you want them to elect as president?’

In fact, the issue of exactly what constituents can be extracted out of what kinds of subordinate finite clauses in Polish is quite complex and not fully understood. For more discussion, see Cichocki (1983), Lasnik and Saito (1984), Kardela (1986), Bobrowski (1988), Willim (1989), Zabrocki (1989), Witkoś (1993) and Przepiórkowski (1999).

Further, it has been argued in, for instance, Dziwirek (1994, 1998) and Witkoś (1996a, 1998) that extraction out of infinitival verbal projections is completely fine in Polish. This can be seen in (219).

- (219) Kogo_i Jan chciał Ewie przedstawić ____i?
 who.ACC Jan wanted.2ND.SG.M1 Ewie.DAT introduce
 ‘Who did Jan want to introduce to Ewa?’

In Polish, as well as in other Slavic languages, it is possible to extract prenominal constituents out of NPs. An example is provided in (220).

- (220) Która_i Jan przeczytał ____i książkę?
 which Jan read.3RD.SG.M1 book
 ‘Which book did Jan read?’

Note that (220) violates the so called *Left Branch Condition* of Ross (1967), which says that no NP on the left branch of another NP may be extracted from that NP. For more discussion on these data in Polish, see Borsley (1983b,a), Dylą (1988) or Rappaport (2001).

Extraction out of complex NPs is not possible in Polish. This fact is demonstrated by the examples in (221). Given this, Polish seems to obey the so-called *Complex NP Constraint* of Ross (1967), which says that no element contained in an S dominated by an NP with a lexical head noun may be moved out of that NP.

- (221) a. Piotr zdementował plotkę, że Maria pocałowała Jana.
 Piotr contradicted rumor that Maria kissed Jan
 ‘Piotr contradicted the rumor that Maria kissed Jan.’
 b. *Kto_i Piotr zdementował plotkę, że ____i pocałował Jana?
 who.NOM Piotr contradicted rumor that kissed Jan
 c. *Kogo_i Piotr zdementował plotkę, że Maria pocałowała ____i?
 who.ACC Piotr contradicted rumor that Maria kissed

The examples in (222) demonstrate that extraction out of non-sentential constituents of complex NPs is disallowed as well.

- (222) a. Jan opracował [dokładny plan organizacji festiwalu
Jan worked out detailed.ACC concept.ACC organization.GEN festival.GEN
jazzowego w Poznaniu].
jazz.GEN in Poznań
'Jan worked out a detailed concept of the organization of the jazz
festival in Poznań.
- b. *Czego_i Jan opracował [dokładny plan organizacji
what Jan worked out detailed.ACC concept.ACC organization.GEN
____i]?
- c. *Jakiego_i Jan opracował [dokładny plan organizacji
what Jan worked out detailed.ACC concept.ACC organization.GEN
festiwalu ____i]?
festival.GEN

Further, preposition stranding is not possible in Polish. As the examples in (223) and (224) show, the preposition *z* 'with' must move along with its complement. (223c) and (224a) are cases of *Pied Piping*, first discussed in Ross (1967): When a *wh*-phrase is moved, it drags along a larger NP or PP in which it is contained.

- (223) a. Maria rozmawiała z Janem.
Maria spoke with Jan
'Maria spoke with Jan.'
- b. *Kim_i Maria rozmawiała z ____i?
who.INSTR Maria spoke with
'Whom did Maria speak with?' [intended]
- c. Z kim_i Maria rozmawiała ____i?
with who.INSTR Maria spoke
'With whom did Maria speak?'
- (224) a. chłopak, z którym_i Maria rozmawiała ____i
boy with who.INSTR Maria spoke
'the boy with whom Maria spoke'
- b. *chłopak, którym_i Maria rozmawiała z ____i
boy who.INSTR Maria spoke with
'the boy whom Maria spoke with' [intended]

One should keep in mind that complex NPs are islands in Polish, i.e., they do not allow extraction, cf. (221) and (222), but extraction of constituents on the left branch of NPs is possible. In the following discussion I will exclusively focus on extraction to the left periphery of the sentence, i.e., on so-called *fronting* or *topicalization*.

5.3.3.1 Extraction of *z* NP2s

The examples provided in this section demonstrate extraction of *z* NP2 strings out of NP1s *z* NP2 expressions in the three CC types. Note that this extraction is a case of *Pied Piping*, as the fronted *wh*-NP2 drags along the preposition *z* ‘with’.

Dyła (1988) has observed that while Polish ACCs allow extraction of *z* NP2s out of the NP1s *z* NP2 strings, CCCs do not. Dyła (1988, p. 388) provides the examples in (225) and (226), and claims that (225b) and (225c) are grammatical, while the corresponding examples in (226b) and (226c) are not.

- (225) a. Janek *z* Ewą poszedł na spacer.
 Janek with Ewa.INSTR went.SG.M1 for walk
 ‘Janek went for a walk with Ewa.’
- b. *Z* kim Janek poszedł na spacer?
 with whom.INSTR Janek went.SG.M1 for walk
 ‘With whom did Janek go for a walk?’
- c. dziewczyna, *z* którą Janek poszedł na spacer
 girl with whom.INSTR Janek went.SG.M1 for walk
 ‘the girl with whom Janek went for a walk’
- (226) a. Janek *z* Ewą poszli na spacer.
 Janek with Ewa.INSTR went.PL.M1 for walk
 ‘Janek and Ewa went for a walk.’
- b. **Z* kim Janek poszli na spacer?
 with whom.INSTR Janek went.PL.M1 for walk
- c. *dziewczyna, *z* którą Janek poszli na spacer
 girl with whom.INSTR Janek went.PL.M1 for walk

However, the *z* NP2s in (225) may be fronted verbal adjuncts rather than extracted out of NP1 *z* NP2 strings. In fact, it is very difficult to provide examples of ACCs involving clear instances of extraction of *z* NP2s out of NP *z* NP2s versus VPs. Given this, the question in what configurations *z* NP2s are extractable in ACCs must remain unanswered. It is unquestionable, however, that the *z* NP2 sequences in (226) are extracted out of the NP1 *z* NP2 expressions. As we saw in Section 5.3.1, *z* NP2 in CCCs cannot attach to VPs at all.

In any case, the examples in (225) and (226) show that there is a contrast between ACCs and CCCs with respect to the fronting of *z* NP2s. The same is shown by the topicalization data in (227) and (228), also taken from Dyła (1988, p. 388).

- (227) *Z* Ewą Janek poszedł na spacer.
 with Ewa.INSTR Janek went.SG.M1 for walk
 ‘With Ewa, Janek went for a walk.’
- (228) **Z* Ewą Janek poszli na spacer.
 with Ewa.INSTR Janek went.PL.M1 for walk
 ‘Janek and Ewa went for a walk.’ [intended]

In Section 5.3.1, we saw that, like in ACCs, *z* NP2 strings in ICCs can attach to VPs (cf. (207) and (208)). This fact makes it difficult to clearly determine whether the *z* NP2 expressions in (229) are extracted out of the NP1 *z* NP2 sequences or out of VPs.⁹

- (229) a. Wy dwoje z Marią, jako jedyna para, wyjechaliście
 you.PL two with Maria.INSTR as only couple left.2ND.PL.M1
 wtedy do USA.
 then to USA
 ‘Maria and you, as the only couple, left at that time for the USA.’
- b. Z kim mówiłeś, że tylko wy dwoje, jako jedyna
 with whom.INSTR said that only you.PL two as only
 para, wyjechaliście wtedy do USA?
 couple left.2ND.PL.M1 then to USA
 ‘With whom did you say that you left at that time as the only couple
 for the USA?’
- c. To jest ta dziewczyna, z którą mówiłeś, że tylko
 this is this girl with whom.INSTR said that only
 wy dwoje, jako jedyna para, wyjechaliście wtedy do USA.
 you.PL two as only couple left.2ND.PL.M1 then to USA
 ‘This is this girl with whom you said that you left for the USA at
 that time.’
- d. To chyba z Marią mówiłeś, że tylko wy dwoje,
 this probably with Maria.INSTR said that only you.PL two
 jako jedyna para, wyjechaliście wtedy do USA.
 as only couple left.2ND.PL.M1 then to USA
 ‘I guess it is Maria you said that only you and she, as the only
 couple, left at that time for the USA.’

On the basis of the examples (225)–(229), one can conclude that extraction of *z* NP2s out of the NP1 *z* NP2 strings is ungrammatical in Polish CCCs. ACCs and ICCs both allow extracting *z* NP2 sequences, but it is very difficult to determine whether the extraction takes place out of NP1 *z* NP2 expressions or out of VPs. It may be the case that both sources of extraction are allowed in these CCs.¹⁰

5.3.3.2 Extraction of NP1s

Dyła (1988, p. 388) claims, providing the examples in (230) and (231), that extraction of NP1s out of NP1 *z* NP2 strings is allowed in ACCs but not in CCCs.¹¹

⁹For a discussion on the extraction of *z* NP2s from the NP1 *z*-NP2 strings in Russian ICCs, see Vassilieva and Larson (2001), Feldman (2002) and Ionin and Matushansky (2003). For the corresponding Spanish data, see Comacho (1994).

¹⁰For a discussion on corresponding Russian data, cf. McNally (1993), Vassilieva and Larson (2001), Feldman (2002), Ionin and Matushansky (2003) and Dyła and Feldman (2008).

¹¹See also Dyła and Feldman (2008) and Feldman (2002) for Russian data.

- (230) a. Kto z Ewą poszedł na spacer?
 who with Ewa.INSTR went.SG.M1 for walk
 ‘Who went for a walk with Ewa?’
- b. chłopiec, który z Ewą poszedł na spacer
 boy who with Ewa.INSTR went.SG.M1 for walk
 ‘The boy who went for a walk with Ewa.’
- (231) a. *Kto z Ewą poszli na spacer?
 who with Ewa.INSTR went.PL.M1 for walk
- b. *chłopiec, który z Ewą poszli na spacer
 boy who with Ewa.INSTR went.PL.M1 for walk

However, there is no evidence that the *wh*-phrases in (230) have indeed been extracted out of the NP1 *z* NP2 strings and not out of the VPs.

The examples in (232), provided by Adam Przepiórkowski (personal communication), illustrate NP1 extraction in ICCs.

- (232) a. Który kwartet smyczkowy mówiłeś, że z Gidonem Kremerem
 which quartet violin said that with Gidon.INSTR Kremer.INSTR
 grającym na pierwszych skrzypcach wygrał konkurs muzyki kameralnej?
 playing on violin won.SG contest music chamber
 ‘Which violin quartet did you say won the chamber music contest
 with Gidon Kremer playing first violin?’
- b. To jest ten kwartet smyczkowy, który z Gidonem Kremerem
 this is this quartet violin which with Gidon.INSTR Kremer.INSTR
 grającym na pierwszych skrzypcach wygrał konkurs muzyki kameralnej.
 playing on first violin won.SG contest music chamber
 ‘This is this violin quartet which with Gidon Kremer, playing first
 violin, won the chamber music contest.’

Since NP1s in ICCs can combine both with *z* NP2s, and with VPs, it cannot be clearly determined whether the extraction in (232) is out of the NP1 *z* NP2 expression or out of the VP.

Given this fact and the examples in (230), one can conclude that ACCs and ICCs allow extraction of NP1s, but it is unclear whether NP1s are extracted out of the NP1 *z* NP2 strings, out of VPs, or out of both. By contrast, Polish CCCs do not allow extraction of the NP1s out of the NP1 *z* NP2 strings. Extraction out of VPs does not apply here.

5.3.3.3 Across-the-Board Extraction

According to the *Coordinate Structure Constraint* (CSC, Ross (1967)), in a coordinate structure (1) no conjunct may be moved, (2) nor may any element contained in a conjunct be moved out of the conjunct. Ross (1967) points out that in certain

constructions, the CSC does not apply: If the same constituent is moved out of each conjunct in a coordinate structure, the effect of the CSC is voided. He refers to this type of extraction as *Across-the-Board* (ATB) movement. An example of an ATB extraction in English is given in (233).

(233) I wonder [which books]_i [Mary hates ____i] and [Sam likes ____i].

The examples in (234), provided by Stefan Dyła (personal communication), demonstrate that ATB extraction can be observed in Polish coordination, but not in Polish CCs.

(234) a. Czyim_i manipulowałeś [____i ojcem] i [____i bratem]?
 whose manipulated.2ND.SG father and brother
 ‘Whose father and brother did you manipulate?’
 b. ??/*Czyim_i manipulowałeś [____i ojcem] z [____i bratem]?
 whose manipulated.2ND.SG father with brother
 ‘Whose father and brother did you manipulate?’ [intended]

Note that the example in (234b) is ungrammatical independently of whether the NP1 *z* NP2 expression is interpreted as an ACC or CCC. Further, it is very difficult, if not impossible, to construct an example involving an ICC. Since denotations of NP2s are included in denotations of NP1s in ICCs, it is hard to find a constituent that might be extracted out of the NP1 *z* NP2 without making the entire construction pragmatically odd.

I thus assume that no ATB extraction is possible in any type of CC in Polish.¹²

5.3.4 Summary

In this section, I looked at syntactic properties of CCs such as adjacency of NP1s and *z* NP2 strings, locality and extractability. I have observed that while the *z* NP2 sequences in ACCs and ICCs can be attached to VPs without changing the meaning of the entire sentence, they must belong to the same local domain as NP1s in CCCs. Parentheticals and clitics occurring between NP1s and *z* NP2s are not grammatical in CCCs. Due to structural ambiguity, it cannot be determined whether the same restrictions hold for ACCs and ICCs. Recall that in all types of Polish CCs, collectivizing adverbs can appear between NP1s and *z* NP2 strings. The requirement of adjacency thus has a structural rather than a linear or prosodic character (at least in CCCs). Finally, no extraction out of NP1 *z* NP2 strings is possible in Polish CCCs. In ACCs and ICCs, both NP1s and *z* NP2s can be extracted. However, it cannot be clearly determined whether these expressions are extracted out of the NP1 *z* NP2 sequences, out of VPs, or out of both of these syntactic contexts. Given that complex NPs are basically assumed to be islands for extraction in Polish, one might speculate that they are extracted out of VPs.

¹²For more details on ATB extraction in Polish, see Borsley (1981), Dyła (1984) and Bondaruk (2003).

5.4 Summary

In this chapter, I have demonstrated that all three types of Polish CCs can occur as nominative and dative subjects, direct and indirect objects, prepositional objects, and possessors. I have further shown that all CC types behave uniformly with respect to their internal structure, in the sense that no iteration of the NP1s and the z NP2 sequences is allowed, that multiple z NP2 strings must occur recursively, and that the z NP2 expressions can be conjoined. Finally, I have shown that CCCs exhibit strong restrictions regarding adjacency, locality and extractability. Due to structural ambiguity, it cannot be stated whether ACCs and ICCs have the same properties. The summary of the most important empirical observations in this chapter is given in Table 5.1. The symbol — indicates that a given property does not apply, + indicates that it does, and ? indicates that it cannot be clearly determined whether a given property applies or not.

Syntactic Property	ACC	CCC	ICC
ability to occur as nominative and dative subjects, direct, indirect and prepositional objects, and possessors	+	+	+
ability of z NP2s to conjoin and occur recursively	+	+	+
ability to iterate NP1s and z NP2s	—	—	—
requirement of adjacency and locality	?	+	?

Table 5.1: Summary of syntactic properties of CCs

On the basis of the observations summarized in Table 5.1, one can conclude that all three types of CCs have the same categorical status as nouns, since all of them can fulfill syntactic functions which are typical for nominal categories. Moreover, all three types of CCs have the same internal syntactic structure, since the NP1s and the z NP2 expressions are composed within ACCs, CCCs and ICCs in a similar way.

In the next chapter, I will examine the three CC types with respect to agreement as well as person, number and gender resolution.

Chapter 6

Agreement and Resolution

In the previous chapter, I demonstrated that ACCs, CCCs, and ICCs behave uniformly regarding their internal syntactic structure. In this chapter, I will discuss agreement as well as person, number and gender resolution. I will show that ACCs, CCCs and ICCs exhibit differences with respect to these properties.

Before discussing agreement and resolution in Polish CCs, I will briefly explain these phenomena in Section 6.1. Section 6.2 will present basic facts about agreement and resolution in Polish. Sections 6.3–6.5 will focus on ACCs, CCCs and ICCs, respectively, and examine person, number, and gender resolution, as well as person, number and gender agreement between CCs and predicates, relative pronouns and attributive modifiers. Section 6.6 will summarize the observations and generalizations of Chapter 6 and conclude Part I.

6.1 The Notions of Agreement and Resolution

The notions of agreement and resolution are closely related to the so called ϕ -features, such as CASE, PERSON, NUMBER and GENDER, which have become an inherent part of the majority of formal linguistic theories, both derivational and constraint-based ones.¹ While CASE has conventionally been considered a morphosyntactic feature, PERSON, NUMBER and GENDER have been treated in terms of either purely morphosyntactic agreement features (cf. Chomsky (1981, 1999), Kerstens (1993) etc.), purely semantic agreement features (cf. Lapointe (1980), Lapointe (1983), Hoeksema (1983), Chierchia (1988), Pollard and Sag (1994) etc.), or both morphosyntactic and semantic agreement features (cf. Kathol (1999) or Wechsler and Zlatić (2001)). In this thesis, this last view will be adopted, i.e., PERSON, NUMBER and GENDER will be treated as morphosyntactic and semantic features at the same time.

¹The notion of ϕ -features goes back to Chomsky (1981, p. 330): “Assume that there is some set of grammatical features ϕ [...]. The set ϕ includes person, number, gender, Case und perhaps other features (e.g. perhaps [wh-]). I refer to the members of ϕ as ϕ -features.”

In a trivial case, the values of the particular ϕ -features of a given linguistic sign are well-specified in the lexicon and are either identified / equated / unified with the values of the corresponding features of another linguistic sign of a given linguistic expression or are checked / assigned / determined by means of specific requirements provided by another linguistic sign in a given linguistic expression. The former situation refers to what is known as *agreement*, the latter to what is known as *government*.

Besides the trivial cases of agreement and government, a number of non-trivial cases have been observed in various languages, which pose a challenge for many linguistic theories. These non-trivial cases basically involve two problems. The first one is the simultaneous satisfaction of conflicting grammatical requirements by a particular form. It has been discussed in, among others, Dyła (1984), Pullum and Zwicky (1986), Ingria (1990) or Müller (1999). The second problem is the instantiation of values of ϕ -features in coordinate structures which involve conjuncts bearing non-uniform values of these ϕ -features. This issue, known as *resolution*, has, for instance, been addressed in Givón (1970), Corbett (1983a, 1991, 2000), Sag et al. (1985) or Wechsler (2009). Dalrymple and Kaplan (2000) discuss both problems and provide an LFG-based treatment of ϕ -features which draws on the assumption that these features take set-shaped rather than atomic values.

Previous discussions on the instantiation of values of the features PERSON, NUMBER and GENDER in complex structures composed of multiple nominal constituents with non-uniform values of the corresponding ϕ -features, have mainly focused on data from the domain of nominal coordination. A number of very interesting phenomena relating to agreement and resolution have been discussed in Bickel (2000) with reference to Tibeto-Burman languages. In these languages, not only coordinate structures, but also appositional, partitional and relational structures allow the participation of multiple NPs in agreement and resolution phenomena. This chapter will demonstrate that Polish CCs, in particular CCCs, provide an additional empirical basis for the investigation of resolution phenomena.

6.2 Agreement and Resolution in Polish

In this section, I will introduce crucial properties of subject-predicate agreement in Polish that will play a decisive role in the later discussion on CCs. Before starting this discussion, I will present some of the most conspicuous features of Polish.

First of all, Polish is an inflectional language. Nouns inflect for case and number, and have inherent gender and person. Polish verbs have aspect, which, however, is considered not to be an inflectional, but rather a classifying morphological category. There are three tenses in contemporary Polish: past, present and future. Perfective verbs occur in past and in future tenses, while imperfective verbs have past and present forms, as well as an analytical future form. Verbs inflect for person and number and, in the past tense, for gender. Adjectives inflect for number, gender and case. Prepositions and adverbs do not inflect in Polish. Finally, nom-

inative subjects agree with predicates with respect to number, gender and person. In the following subsections, I will provide the main rules for number, gender and person agreement and resolution that hold for Polish.

6.2.1 Number Agreement and Resolution

In Polish, the predicate agrees with the nominative subject in number. Thus the singular nominative subject in (235a) combines with the singular predicate, while the plural nominative subject in (235b) combines with the plural predicate.

- (235) a. Mężczyzna pracuje.
man.NOM.SG works.SG
'A man works.'
- b. Mężczyźni pracują.
men.NOM.PL work.PL
'Men work.'

If there is no nominative subject, the predicate appears in the singular form. This is demonstrated in (236).²

- (236) a. Przyszło dwóch mężczyzn.
arrived.SG two.ACC.PL men.GEN.PL
'Two men arrived.'
- b. Było im zimno.
was.SG them.DAT.PL cold
'They were cold.'
- c. Chłopcom brakowało ojca.
boys.DAT.PL lacked.SG father.GEN
'The boys missed the father.'

Subject-predicate number agreement also takes place when the plurality of the nominative subject arises from the combination of two or more singular components, as shown in (237).

- (237) Kobieta i mężczyzna pracują.
woman.NOM.SG and man.NOM.SG work.PL
'A woman and a man are working.'

²For a detailed discussion on agreement in Polish sentences without nominative subjects, more precisely, on default agreement in Polish, see Dziwirek (1990). This issue is mentioned in most Polish grammars. Note that treating numerals in numeral subjects as in (236a) as accusative is not common practice in Polish linguistics. For a discussion on the grammatical case on Polish numeral subjects, see Przepiórkowski (2004a). See also Corbett (1993) for a discussion on similar phenomena in Russian.

Two factors can influence the number resolution in coordinate structures: animacy and word order. Corbett (1983a) has observed that animate subjects and subject-predicate word order always allow plural agreement in Russian. I believe that this generalization also holds in Polish, as attested by the examples in (238) and (239).³

- (238) Pracują / pracuje kobieta i mężczyzna.
work.PL / work.SG woman.SG and man.SG
'A woman and a man are working.'
- (239) Jedzenie i picie smakowały / smakowało wyśmienicie.
food.SG and drink.SG tasted.PL / tasted.SG excellent
'The food and the drinks were excellent.'

As we can see in (238), singular agreement is allowed when the coordination appears after the predicate. (239) shows that if both conjuncts are inanimate, the singular is possible in addition to the more typical plural. The examples in (238) and (239) can, however, be considered instances of closest conjunct agreement, unrelated to number resolution.⁴

A further issue related to number agreement is presented by collective nouns. As observed by Szober (1969) or Bartnicka and Satkiewicz (1990), for instance, some Polish collective nouns combine with singular, others with plural predicates. For instance, *małżeństwo* 'married couple' in (240a) can only occur with singular predicates, while *państwo* 'Mr and Mrs' in (240b) can only combine with plural predicates, according to Polish grammars and dictionaries.⁵

- (240) a. Małżeństwo wyjechało / *wyjechali do USA.
married couple.SG left.SG / left.PL to USA
'The married couple left for the USA.'
- b. Państwo *wyjechało / wyjechali do USA.
Mr and Mrs left.SG / left.PL to USA
'The (married) couple left for the USA.'

The first case is what Szober (1969) calls *grammatical* and Corbett (1983a) calls *syntactic / strict* agreement, that is, a form of agreement related to morphosyntactic properties. The second case is an instance of *logical* (Szober (1969)), or *semantic / loose* agreement, that is, agreement related to pragmatics or contextual circumstances rather than to the morphosyntactic form.⁶ Whether a given

³See also Kallas (1974) and Kopcińska (1997) for a description of singular agreement of subject coordinate structures and predicates in Polish.

⁴For closest conjunct agreement in other languages, such as Arabic, Portuguese or English, see Aoun et al. (1994), Munn (1999), Aoun (1999), Villavicencio et al. (2005) or Sadler et al. (to appear).

⁵The Polish collective noun *państwo* is a form of address and has no direct translation into English. It refers to at least one man and one woman who may or may not be married. The word *państwo*, however, also has another usage in Polish, applying to a state. In this usage, *państwo* is an ordinary, non-collective noun that combines with singular predicates.

⁶For further discussion on the two types of agreement, see Corbett (1983a).

collective noun participates in morphosyntactic or contextual agreement is an idiosyncratic property of that noun that must be specified in its lexical entry.⁷

Note, however, that collectives combining with singular predicates can act as antecedents of plural anaphora, as shown in (241).

- (241) Małżeństwo_i wyjechało do USA. Zabrali oni_i ze sobą dzieci.
 married couple.SG left.SG to USA took.PL they with them children
 ‘The married couple left for the USA. They took the children along with them.’

The ability to combine with singular and plural predicates is not a special feature of Polish collectives. Corbett (1983a, 2000) provides examples not only from many Slavic languages, but also from English. As the sentences in (242), taken from Corbett (1983a, p. 8), show, English collective nouns, such as *committee*, can occur both with singular and plural predicates.⁸

- (242) a. The committee believes.
 b. The committee believe.

See also Wechsler and Zlatić (2001) for a discussion on similar phenomena in Serbo-Croatian.

For the sake of completeness, it should be noted that number agreement can also be observed in relative pronoun constructions, as in (243) and in attributive constructions, as in (244).

- (243) a. Książka, która / *które leży na stole, należy do Piotra.
 book.SG which.SG / which.PL lies on table belongs to Piotr
 ‘The book lying on the table belongs to Piotr.’
 b. Książki, które / *która leżą na stole, należą do Piotra.
 books.PL which.PL / which.SG lie on table belong to Piotr
 ‘The books lying on the table belong to Piotr.’
- (244) a. Książka leżąca / *leżące na stole należy do Piotra.
 book.SG lying.SG / lying.PL on table belongs to Piotr
 ‘The book lying on the table belongs to Piotr.’
 b. Książki leżące / *leżąca na stole należą do Piotra.
 books.PL lying.PL / lying.SG on table belong to Piotr
 ‘The books lying on the table belong to Piotr.’

⁷For more details regarding Polish collective nouns, see Habrajska (1995).

⁸The occurrence of collective nouns, such as *committee*, with singular and plural predicates is mainly associated with American versus British English, respectively. Note also that English collectives, even if they combine with plural predicates, always take singular determiners (cf. (i)).

(i) This / *these committee sat late.

See also (Corbett, 1983a, p. 9) and (Corbett, 2000, p. 189) for more details. Data like (242) have been also discussed in Hoeksema (1983).

The number value of the relative pronoun is always controlled by that of the antecedents, as demonstrated in (243), and the number value of the attribute agrees with the number value of the modified noun, as shown in (244).

In coordinate structures, conjoined singular nouns can occur with plural attributes, as in (245), taken from Topolińska (1984, p. 318).⁹

- (245) weseli chłopiec i dziewczyna
jolly.PL boy.SG and girl.SG

However, coordinate phrases can be modified by singular adjectives as well, as the examples in (246) illustrate.

- (246) a. Polski prezydent i premier, nasi czołowi politycy,
Polish.SG president.SG and prime minister.SG our leading politicians
wrócili do kraju.
came back.PL to country
'The Polish president and the prime minister, who are our leading politicians, returned home.'
- b. Mój syn i córka, moi jedyni spadkobiercy, wyemigrowali
my.SG son.SG and daughter.SG my only inheritors emigrated.PL
do Niemiec.
to Germany
'My son and my daughter, my only heirs, emigrated to Germany.'

Singular attributes seem to be preferred by native speakers of Polish. This is also supported by corpus data. Searching the IPI PAN Corpus for strings consisting of a nominative adjective, a nominative singular noun, the conjunction *i* 'and', and another nominative singular noun resulted in 2575 matches involving singular adjectives and 47 matches with plural adjectives.¹⁰ Corpus evidence thus indicates that singular agreement between adjectives and coordinate structures is more frequent than plural agreement. To verify this observation, a more detailed study is needed. This, however, exceeds the scope of this thesis.¹¹

6.2.2 Gender Agreement and Resolution

Before addressing the issue of gender agreement and gender resolution, I will briefly introduce the gender system of contemporary Polish. In this thesis, I will

⁹Note, however, that not all native speakers of Polish find the combinations of plural attributes with coordinate structures grammatical.

¹⁰Note, however, that sentences involving singular adjectives modifying coordinate structures consisting of singular NPs can have two readings, especially when the first NP is singular: one where the adjective modifies only the first NP, and one where it modifies the entire coordinate phrase. Often, pragmatic factors decide which reading is permitted or preferred.

¹¹For very interesting corpus-based investigations on NP-internal agreement strategies observed in Portuguese, see Villavicencio et al. (2005) and Sadler et al. (to appear).

adopt the approach of Mańczak (1956), which assumes five grammatical genders for Polish given in Table 6.1. Note, however, that Polish has been analyzed to distinguish from three to nine different genders, depending on whether the underlying criteria are based on syntactic, morphological, semantic, or a combination of semantic and morphosyntactic properties, and whether gender-number interaction is taken into consideration. For more details on Polish gender, see Mańczak (1956), Saloni (1976), Corbett (1983b), Świdziński (1992), Saloni and Świdziński (1985), Czuba and Przepiórkowski (1995), Czuba (1997), Bańko (2001), Woliński (2001), Przepiórkowski (2003) and Zaron (2005), as well as Zieniukowa (1981) and Dalewska-Greń (1991) for Polish gender from a confrontative point of view.

GENDER	EXAMPLE
masculine human / virile (M1)	<i>chłopiec</i> ‘boy’
masculine animate (M2)	<i>pies</i> ‘dog’
masculine inanimate (M3)	<i>stół</i> ‘table’
feminine (FEM)	<i>dziewczyna</i> ‘girl’
neuter (NEUT)	<i>okno</i> ‘window’

Table 6.1: The gender system of Polish

The gender value of a given noun in terms of Mańczak (1956) is determined on the basis of the morphosyntactic forms of adjectives combining with this noun in the accusative case in singular and plural. As the inflectional paradigm of the adjective *dobry* ‘good’ in Table 6.2 demonstrates, there are good reasons for distinguishing between the five grammatical genders (see the forms in bold).

	M1	M2	M3	NEUT	FEM
SG					
NOM	dobry	dobry	dobry	dobre	dobra
GEN	dobrego	dobrego	dobrego	dobrego	dobrej
DAT	dobremu	dobremu	dobremu	dobremu	dobrej
ACC	dobrego	dobrego	dobry	dobre	dobrą
INSTR	dobrym	dobrym	dobrym	dobrym	dobrą
LOC	dobrym	dobrym	dobrym	dobrym	dobrą
PL					
NOM	dobrzy	dobre	dobre	dobre	dobre
GEN	dobrych	dobrych	dobrych	dobrych	dobrych
DAT	dobrym	dobrym	dobrym	dobrym	dobrym
ACC	dobrych	dobre	dobre	dobre	dobre
INSTR	dobrymi	dobrymi	dobrymi	dobrymi	dobrymi
LOC	dobrych	dobrych	dobrych	dobrych	dobrych

Table 6.2: The inflectional paradigm of the adjective *dobry* ‘good’

As I have pointed out above, the gender value of the predicate agrees in Polish with the gender value of the nominative subject. This is demonstrated in the examples in (247), involving past tense verb forms, which, in contrast to present tense verb forms, show gender marking.

- (247)
- a. Chłopiec stał.
boy.NOM.SG.M1 stood.SG.M1
'The boy stood.'
 - b. Pies stał.
dog.NOM.SG.M2 stood.SG.M2
'The dog stood.'
 - c. Stół stał.
table.NOM.SG.M3 stood.SG.M3
'The table stood.'
 - d. Dziewczyna stała.
girl.NOM.SG.FEM stood.SG.FEM
'The girl stood.'
 - e. Dziecko stało.
child.NOM.SG.NEUT stood.SG.NEUT
'The child stood.'
 - f. Chłopcy stali.
boys.NOM.PL.M1 stood.PL.M1
'The boys stood.'
 - g. Psy stały.
dogs.NOM.PL.M2 stood.PL.M2
'The dogs stood.'
 - h. Stoły stały.
tables.NOM.PL.M3 stood.PL.M3
'The tables stood.'
 - i. Dziewczyny stały.
girls.NOM.PL.FEM stood.PL.FEM
'The girls stood.'
 - j. Dzieci stały.
children.NOM.PL.NEUT stood.PL.NEUT
'The children stood.'

Note that like the accusative plural form of the adjective *dobry* 'good' in Table 6.2, the masculine animate, masculine inanimate, feminine, and neuter plural past tense forms of the verb *stać* 'stand' in (247) exhibit syncretism. To avoid unnecessary repetitions, I will follow Przepiórkowski et al. (2002) and introduce the label NON-M1 for *non-masculine human* to refer to these four gender values.

The examples in (247) all involve nominative subjects. In Polish, however, non-nominative subjects are possible as well, in which case the predicate is always

neuter. This could already be observed in the examples in (236), repeated here as (248).

- (248) a. Przyszło dwóch mężczyzn.
arrived.3RD.SG.NEUT two.ACC.M1 men.GEN.M1
'Two men arrived.'
- b. Było im zimno.
was.3RD.SG.NEUT them.DAT cold
'They were cold.'
- c. Chłopcom brakowało ojca.
boys.DAT.PL.M1 lacked.3RD.SG.NEUT father.GEN
'The boys missed their father.'

It is well-known that subject-predicate agreement in Polish can be subject to morphosyntax or context / pragmatics. Examples for morphosyntactic subject-predicate agreement are provided in (249) and (250), and examples for context-driven subject-predicate agreement is given in (251), all taken from Przepiórkowski et al. (2002, p. 123).

- (249) Młode dziewczę przyszło / *przyszła zmartwione.
young girl.NEUT came.NEUT / came.FEM worried.NEUT
'The young girl came worried.'
- (250) Ten gruby babsztyl był / *była obrzydliwy.
this fat.M2 jade.M2 was.M2 / was.FEM icky.M2
'This fat jade was ugly.'
- (251) a. Jej wspaniałomyślna wysokość była zmęczona.
her generous.FEM highness.FEM was.FEM tired.FEM
'Her generous highness was tired.'
- b. Jego wspaniałomyślna wysokość był zmęczony.
his generous.FEM highness.FEM was.M1 tired.M1
'His generous highness was tired.'

The morphosyntactically neuter noun *dziewczę* 'girl' in (249) and the morphosyntactically masculine animate noun *babsztyl* 'jade' in (250), both referring to female individuals, can only occur with neuter and masculine animate predicates, respectively. The natural gender of the referents does not influence the gender form of the predicate. By contrast, the noun *wysokość* 'highness' in (251) is morphosyntactically feminine, but it can combine with both feminine and masculine human predicates, depending on whether it refers to a female or male individual.¹²

The sentence in (251b) demonstrates another interesting phenomenon in Polish, namely that the morphosyntactic and the contextual gender agreement can

¹²Note, however, that (251a) can also be analyzed as the case of morphosyntactic subject-predicate agreement.

happen at the same time. While the gender agreement between the subject and the predicate is context-driven, the adjective-noun agreement is morphosyntactic: both words are feminine.¹³

The issue of gender resolution is much more complicated. It has been discussed for Polish in Doroszewski (1962), Klemensiewicz (1967), Buttler et al. (1971), Zieniukowa (1979) and Corbett (1983a, 1991), among others. Kopcińska (1997) provides a detailed description of a vast number of gender and number combinations in Polish, inclusive pluralia tantum.¹⁴ Below, I will discuss the crucial aspects of this phenomenon and show how it challenges the rules for gender resolution of Corbett (1983a, 1991).

Gender resolution can particularly be observed in coordinate structures, where all conjuncts participate in the determination of the gender value. It has traditionally been assumed that gender agreement on the verb is masculine human whenever one of the conjuncts is masculine human, as shown in (252) and (253), involving the same examples with reordered conjuncts, and non-masculine human whenever all conjuncts are non-masculine human, as indicated by the examples in (254), involving various configurations.

- (252) a. Ojciec i syn wrócili.
father.M1 and son.M1 came back.PL.M1
'The father and the son came back.'
- b. Ojciec i pies wrócili.
father.M1 and dog.M2 came back.PL.M1
'The father and the dog came back.'
- c. Ojciec i jego oddział wrócili.
father.M1 and his department.M3 came back.PL.M1
'The father and his department came back.'
- d. Ojciec i matka wrócili.
father.M1 and mother.FEM came back.PL.M1
'The father and the mother came back.'
- e. Ojciec i dziecko wrócili.
father.M1 and child.NEUT came back.PL.M1
'The father and the child came back.'
- (253) a. Pies i ojciec wrócili.
dog.M2 and father.M1 came back.PL.M1
'The dog and the father came back.'
- b. Oddział i jego dyrektor wrócili.
department.M3 and its director.M1 came back.PL.M1
'The department and its director came back.'

¹³For a discussion on morphosyntactic versus natural gender and a comparison between Polish and Russian data, see also Weiss (1991, 1993).

¹⁴For the issue of gender resolution in other Slavic languages, see, for instance, Corbett (1983a, 1991) or Wechsler and Zlatic (2001, 2003).

- c. Matka i ojciec wrócili.
mother.FEM and father.M1 came back.PL.M1
'The mother and the father came back.'
- d. Dziecko i ojciec wrócili.
child.NEUT and father.M1 came back.PL.M1
'The child and the father came back.'
- (254) a. Kot i pies wróciły.
cat.M2 and dog.M2 came back.PL.NON-M1
'The cat and the dog came back.'
- b. Pies i autobus wróciły.
dog.M2 and bus.M3 came back.PL.NON-M1
'The dog and the bus came back.'
- c. Pies i dziewczyna wróciły.
dog.M2 and girl.FEM came back.PL.NON-M1
'The dog and the girl came back.'
- d. Pies i dziecko wróciły.
dog.M2 and child.NEUT came back.PL.NON-M1
'The dog and the child came back.'
- e. Autobus i pociąg wróciły.
bus.M3 and train.M3 came back.PL.NON-M1
'The bus and the train came back.'
- f. Autobus i limuzyna wróciły.
bus.M3 and limousine.FEM came back.PL.NON-M1
'The bus and the limousine came back.'
- g. Statek i czółno wróciły.
ship.M3 and canoe.NEUT came back.PL.NON-M1
'The ship and the canoe came back.'
- h. Matka i córka wróciły.
mother.FEM and daughter.FEM came back.PL.NON-M1
'The mother and the daughter came back.'
- i. Matka i dziecko wróciły.
mother.FEM and child.NEUT came back.PL.NON-M1
'The mother and the child came back.'
- j. Dziecko i cielę wróciły.
child.NEUT and calf.NEUT came back.PL.NON-M1
'The child and the calf came back.'

However, it has been observed that the first of these assumptions discounts a large number of data. Often, very similar gender agreement and gender resolution patterns can be observed in sentences with and without masculine human nouns. Doroszewski (1962, p. 237), for instance, provides the example in (255), in which a feminine and a masculine animate NP are conjoined (where *Reks* is a dog's name) and combine with a masculine human predicate.

- (255) Hania i Reks bawili się piłką.
 Hania.FEM and Reks.M2 played.PL.M1 RM ball
 ‘Hania and Reks played with a ball.’

It is very controversial whether the masculine human form on the predicate is just preferred or required in such cases, that is, whether non-masculine human predicates are also possible here.¹⁵ However, masculine human agreement on the predicate is not possible in all cases where a feminine and a masculine animate noun are coordinated. This is shown in the example in (256), provided by Stefan Dyla (personal communication).

- (256) Ta dziewczyna i ten babsztyl wsiadły / *wsiedli do autobusu.
 this girl.FEM and this jade.M2 got.PL.NON-M1 / got.PL.M1 into bus
 ‘This girl and this jade got on the bus.’

Here, only non-masculine human agreement on the verb is grammatical, which obviously has to do with the fact that both the morphosyntactically feminine noun *dziewczyna* ‘girl’ and the morphosyntactically masculine animate noun *babsztyl* ‘jade’ refer to female individuals.

A coordination of two (or more) masculine animate NPs is also not free of obscurities regarding gender resolution. Doroszewski (1962) and Klemensiewicz (1967) claim that with exclusively masculine animate conjuncts the non-masculine human form is required, cf. (257), taken from Doroszewski (1962, p. 237), where *Reks* and *Burek* are names of dogs. But according to Zieniukowa (1979), the masculine human form is preferred, as shown in (258), taken from Zieniukowa (1979, p. 123).

- (257) Reks i Burek pogryzły się.
 Reks.M2 and Burek.M2 bit.PL.NON-M1 each other
 ‘Reks and Burek bit each other.’
- (258) Pies i kot jedli na podwórzu.
 dog.M2 and cat.M2 were eating.PL.M1 in yard
 ‘The dog and the cat were eating in the yard.’

Masculine human gender is also possible in sentences where a feminine and a masculine inanimate NP are conjoined. This can be seen in (259), based on Zieniukowa (1979, pp. 124–125).

- (259) a. Matka i wózek ukazali się nagle.
 mother.FEM and pram.M3 appeared.PL.M1 RM suddenly
 ‘The mother and the pram appeared suddenly.’
- b. Matka i wózek ukazały się nagle.
 mother.FEM and pram.M3 appeared.PL.NON-M1 RM suddenly
 ‘The mother and the pram appeared suddenly.’

¹⁵Cf. the discussion in Klemensiewicz (1967), Buttler et al. (1971) and Zieniukowa (1979).

Zieniukowa (1979, p. 123), who surveyed agreement in Polish subject coordinate structures, also provides an example where a coordination of two feminine NPs results in a masculine human form (cf. 260). However, she points out that (260) is not consistent with the Polish standard and can be explained by a general tendency of particular informants to use the masculine human form.

- (260) Dziewczynka i wiewiórka skakali szybciej.
 girl.FEM and squirrel.FEM were jumping.PL.M1 faster
 ‘The young girl and the squirrel were jumping faster.’

Corbett (1983a) discusses some data that take into account the semantic / contextual gender of NPs involved. In (261) the syntactically and semantically feminine NP *pani* ‘lady’ and the syntactically neuter NP *dziecko* ‘child’ combine with the masculine human predicate.

- (261) Pani i dziecko szli ulicą.
 lady.FEM and child.NEUT went.PL.M1 street
 ‘The lady and the child went along the street.’

The noun *dziecko* ‘child’ can refer both to feminine and to masculine individuals. Corbett (1983a) proposes that the choice of the masculine denotation in (261) forces the masculine human agreement on the verb. Another example that supports this explanation is given in (262).

- (262) Wszystkie młodzież i biedactwo nie dali za wygraną...
 all youth.FEM and poor.NEUT not gave.PL.M1 for win
 ‘All of the youth and the poor did not give up.’

According to Corbett (1983a), both NPs may refer to male persons, though neither is masculine syntactically. This licenses the masculine human agreement on the verb.

Note that when nouns that are ambiguous with respect to the natural gender are involved, there are two agreement possibilities. This can be observed in (263), taken from Buttler et al. (1971, p. 250).

- (263) a. Dwoje dzieci i kobieta uratowali się z płonącego
 two children.NEUT and woman.FEM saved.PL.M1 RM from burning
 domu.
 house
 ‘Two children and a woman were saved from the burning house.’
 b. Dwoje dzieci i kobieta uratowały się z
 two children.NEUT and woman.FEM saved.PL.NON-M1 RM from
 płonącego domu.
 burning house
 ‘Two children and a woman were saved from the burning house.’

While in (263a) the noun *dzieci* ‘children’ is interpreted as a group of male individuals and forces the masculine human agreement on the predicate, the noun *dzieci* ‘children’ in (263b) is interpreted as a group of female individuals and thus the non-masculine human predicate appears.

An example involving a masculine animate noun is provided in (264).

- (264) Niemowlak i dziecko płakały / płakali.
 infant.M2 and child.NEUT were crying.PL.NON-M1 / were crying.PL.M1
 ‘The infant and the child were crying.’

In (264), the entire coordination can combine both with a non-masculine human and a masculine human predicate. According to my native Polish informants, the non-masculine human agreement is preferred in such contexts. Note that inverting the two NPs, as in (265), does not affect gender resolution.

- (265) Dziecko i niemowlak płakały / płakali.
 child.NEUT and infant.M2 were crying.PL.NON-M1 / were crying.PL.M1
 ‘The child and the infant were crying.’

The nouns in sentences with masculine human agreement on the predicate are obviously interpreted as referring to male individuals, whereas those in sentences with non-masculine human agreement on the predicate are interpreted as referring to female individuals. It is possible that there are predicates that lexically enforce a particular contextual gender of their subjects. However, I will not go into this subject.

But interestingly, even the presence of syntactically masculine human NPs does not always ensure that the predicate will be masculine human. Corbett (1983a) provides the following example:

- (266) a. Chłopcy i psy biegli.
 youths.M1 and dogs.M2 ran.PL.M1
 ‘Youths and dogs ran.’
 b. Chłopcy i psy biegły.
 youths.M1 and dogs.M2 ran.PL.NON-M1
 ‘Youths and dogs ran.’

In (266a) the entire coordination involving the masculine human and masculine animate NPs combines, as expected, with a masculine human predicate. However, (266b) shows that a non-masculine human verb is also possible, although dispreferred. The grammaticality of (266b) can be explained by the phenomenon of agreement with the neighbor, often referred to as *closest conjunct agreement*. In *closest conjunct agreement*, morphosyntactic properties of the predicate agree with morphosyntactic properties of the conjunct which appears closest to it.¹⁶

¹⁶See also data discussed in Kallas (1974) and Kopcińska (1997).

As one can see, gender agreement and gender resolution is an interesting but complicated aspect of Polish grammar. Zieniukowa (1979) claims that not only the gender itself plays a decisive role but also number, word order, humanness, and animacy.

Taking into account a large body of data, Corbett (1991, p. 286) formulates the rules for gender resolution in Polish given in (267), on the basis of Corbett (1983a, p. 200).

(267) Rules for gender resolution according to Corbett (1991, p. 286):¹⁷

1. if the subject includes a masculine personal conjunct, the predicate will be in the masculine personal form;
2. (optional) if the subject includes the features masculine and personal, whether these are syntactic or semantic, the predicate may be in the masculine personal form;
3. (optional) if the subject includes a masculine animate conjunct, the predicate may be in the masculine personal form;
4. otherwise the predicate will be in the non-masculine personal form.

Rule 1 makes correct predictions about gender resolution in sentences like (252), but wrong predictions about gender resolution in sentences like (266b). Rule 2 applies to the subject as a whole and allows syntactic and contextual features or a combination of these. This rule accounts for gender resolution in sentences as in (259), (261), (262), (263), (264), and (265). Rule 3 licenses gender resolution in expressions as in (255), (257), (258). It also applies to (256), but it makes the wrong predictions, as the masculine human form is ungrammatical there. No rule proposed by Corbett (1991) accounts for sentences such as (260). This fact fits with our conclusion that the grammaticality of such sentences is subject to social usage.

Thus, on the one hand, the rules for gender resolution for Polish provided by Corbett (1991) overgenerate (as in the case of (256)), and on the other hand, they undergenerate (as in the case of (266b)). However, if the grammaticality of sentences like (266b) can be explained by the phenomenon of closest conjunct agreement, a slight reformulation of these rules is sufficient to exclude sentences like (256), and thus make the right predictions about all cases of gender resolution in Polish. In (487) in Chapter 9, I provide the revised rules for gender resolution for Polish, accounting for all phenomena discussed in this section.

For a fairly detailed discussion on gender resolution in Polish coordination, I refer to Zieniukowa (1979) and Kopcińska (1997). See also Wechsler (2009) for a discussion of gender assignment in various languages and a proposal of a gender assignment hierarchy.

¹⁷The term (*masculine*) *personal* corresponds to (*masculine*) *human*.

6.2.3 Person Agreement and Resolution

In Polish, the predicate usually agrees with the nominative subject in person. Thus, the first-person nominative subject in (268a) combines with the first-person predicate, the second-person nominative subject in (268b) combines with the second-person predicate, and the third person nominative subject in (268c) combines with the third person predicate.

- (268) a. Ja pracuję.
I.1ST work.1ST
'I work.'
- b. Ty pracujesz.
you.2ND work.2ND
'You work.'
- c. On pracuje.
he.3RD works.3RD
'He work.'

If there is no nominative subject, the predicate appears in the third person form. This is illustrated in (269).

- (269) a. Było mi zimno.
was.3RD.SG.NEUT I.1ST.DAT cold
'I was cold.'
- b. Zabrakło ci odwagi.
lacked.3RD.SG.NEUT you.2ND.DAT courage
'You lacked courage.'

With respect to person resolution in coordinate structures, Polish behaves like many other languages: if different persons are conjoined, the first person has priority over the second and the second over the third, as in (270).

- (270) a. Ja i ty pracujemy.
I.1ST and you.2ND work.1ST.PL
'You and I work.'
- b. Ja i on pracujemy.
I.1ST and he.3RD work.1ST.PL
'He and I work.'
- c. Ty i on pracujecie.
you.2ND and he.3RD work.2ND.PL
'He and you work.'

Reordering the conjuncts does not affect person resolution, as demonstrated in (271).

- (271) a. Ty i ja pracujemy.
you.2ND and I.1ST work.1ST.PL
'You and I work.'
- b. On i ja pracujemy.
he.3RD and I.1ST work.1ST.PL
'He and I work.'
- c. On i ty pracujecie.
he.3RD and you.2ND work.2ND.PL
'He and you work.'

It must, however, be emphasized that the order of pronouns in (270) is preferred in Polish. This fact relates to the person hierarchy, according to which first person is higher in the hierarchy than second person, which is in turn higher than third person. Still, the order of pronouns with different person values is a question of preference rather than a requirement in Polish. In this respect, Polish differs from English. In English coordination, a specific order of pronouns with different person values is required and a violation of this order leads to ungrammaticality. This is demonstrated by (272a) and (273a) versus (272b) and (273b).

- (272) a. You and I studied law.
b. *I and you studied law.
- (273) a. He and I studied law.
b. *I and he studied law.

Corbett (1983a) provides the following rules for person resolution, which seem to hold for all Slavic languages and for many others as well:

- (274) Rules for person resolution according to Corbett (1983a):
1. if the conjuncts include a first person, first person agreement forms will be used;
 2. if the conjuncts include a second person, second person agreement forms will be used.

Corbett (1983a) points out that these rules are ordered. The second rule operates only if the condition on the operation of the first is not met. If neither rule can apply, then third person forms are assigned by default. Thus, if a controller is not marked as a first or a second person, the third person form will be used.¹⁸

However, there are some complications. As explicated in Section 6.2.1, a singular number on the predicate is allowed when the coordination appears after it. In such cases, the person resolution rules may or may not apply. In (275), the rules do not operate and the predicates agree with the first conjunct with regard to person.¹⁹

¹⁸Corbett (1983a) emphasizes that the person resolution rules formulated above are in accord with Givón's Topic Hierarchy (Givón (1976)) and Zwicky's Hierarchy of Reference (Zwicky (1977)).

¹⁹For a detailed discussion on this phenomenon, see Kallas (1974) and Kopcińska (1997).

- (275) a. Pracujesz ty i ja.
work.2ND.SG you.2ND and I.1ST
'You and I work.'
- b. Pracuje on i ja.
works.3RD.SG he.3RD and I.1ST
'He and I work.'
- c. Pracuje on i ty.
works.3RD.SG he.3RD and you.2ND
'He and you work.'

A quite unexpected effect related to person resolution is illustrated in (276).

- (276) Cała moja rodzina i wszyscy moi znajomi będziemy / będą
whole my family and all my friends will.1ST.PL / will.3RD.PL
świętować razem.
celebrate together
'My whole family and all of my friends will celebrate together.'

Although the coordination in (276) consists of two third person NPs, the person value of the predicate can be either first or third. One might assume that the person value of the possessive pronouns modifying these NPs affects the person resolution within the coordination and person agreement on the predicate. This hypothesis, however, must be abandoned in light of examples like (277), provided by Adam Przepiórkowski (personal communication).

- (277) Cała moja ekipa remontowa i wszyscy moi sąsiedzi *będziemy
whole my team renovation and all my neighbours will.1ST.PL
/ będą świętować koniec remontu.
/ will.3RD.PL celebrate end renovation
'My whole renovation team and all of my neighbours will celebrate the end of the renovation.'

In (277), the first person form on the verb is not possible, although both NPs in the subject contain first person pronouns. The involvement of the speaker seems to be the crucial factor in determining the person value here. Since the denotation of the subject in (276), more precisely, of the first NP contained in the subject, involves the speaker, first person agreement on the verb is possible. Because the speaker is not involved in the denotation of the subject in (277), first person agreement is not possible.

A similar observation can be made in parallel sentences involving second person pronouns. (278) and (279) both involve second person possessive pronouns. However, only in (278) is the second person form on the predicate possible. This can be explained by fact that the denotation of the subject in (278) involves the addressee, whereas the denotation of the subject in (279) does not.

- (278) Cała twoja rodzina i wszyscy twoi znajomi będziecie / będą
 whole your family and all your friends will.2ND.PL / will.3RD.PL
 świętować razem.
 celebrate together
 ‘Your whole family and all of your friends will celebrate together.’
- (279) Cała twoja ekipa remontowa i wszyscy twoi sąsiedzi *będziecie
 whole your team renovation and all your neighbours will.2ND.PL
 / będą świętować koniec remontu.
 / will.3RD.PL celebrate end renovation
 ‘Your whole renovation team and all of your neighbours will celebrate
 the end of the renovation.’

Note that cases such as those in (276) and (278) are not accounted for by the rules for person resolution in (274). In Chapter 9, I will propose a modification of these rules so that they make the right predictions for person resolution in the sentences in question (see (488)).

6.3 Agreement and Resolution in ACCs

This section examines agreement and resolution in ACCs. Section 6.3.1 focuses on number, Section 6.3.2 on gender, and Section 6.3.3 on person.

6.3.1 Number Agreement and Resolution in ACCs

It has been observed in Feldman (2002) and Ionin and Matushansky (2003) for Russian data that in ACCs, NP1s determine number agreement on the predicate. This observation also applies to Polish ACCs. Number resolution involving both NPs is not possible in Polish ACCs.

Therefore, since the NP1 in (280a) is singular, the entire ACC occurs with the singular predicate, and since in (280b) it is plural, the ACC combines with the plural predicate.

- (280) a. Nauczycielka z uczniami wyjechała do USA.
 female teacher.SG.FEM with scholars.PL left.SG.FEM to USA
 ‘The teacher left for the USA with the scholars.’
- b. Nauczycielki z uczniem wyjechały do USA.
 female teachers.PL.FEM with scholar.SG left.PL.FEM to USA
 ‘The teachers left for the USA with the scholar.’

Thus, the number of NP2s in ACCs (and gender, as it will be shown in the next section) does not participate in resolution. This fact is also reflected in relative pronoun constructions and modification, illustrated in (281) and (282), respectively.

- (281) a. Dziewczyna z dzieckiem, która / *którzy właśnie
 girl.SG.FEM with child.SG.NEUT who.SG.FEM / who.PL.FEM just
 ukazała się w drzwiach, zwróciła uwagę wszystkim.
 appeared.SG.FEM RM in door attracted.SG.FEM attention all
 ‘The girl who appeared at the door with a child attracted every-
 body’s attention.’
- b. Kobiety z psem, które / *który
 women.PL.FEM with dog.SG.M2 who.PL.NON-M1 / who.SG.M2
 właśnie ukazały się w drzwiach, zwróciły
 just appeared.PL.NON-M1 RM in door attracted.PL.NON-M1
 uwagę wszystkim.
 attention all
 ‘The women who appeared at the door with a dog attracted every-
 body’s attention.’
- (282) a. Jan z żoną, zaproszony / *zaproszeni przez
 Jan.SG.M1 with wife.SG.FEM invited.SG.M1 / invited.PL.M1 by
 Piotra, przybył punktualnie.
 Piotr arrived.SG.M1 on time
 ‘Jan, invited by Piotr, arrived with his wife on time.’
- b. Studentki z profesorem, zaproszone
 female students.PL.FEM with professor.SG.M1 invited.PL.NON-M1
 / *zaproszony przez rektora, przybyły punktualnie.
 / invited.SG.M1 by rector.ACC arrived.PL.NON-M1 on time
 ‘The female students, invited by the rector, arrived with the pro-
 fessor on time.’

In (281), the number of the NP1 determines the number of the relative pronouns. In (282), the NP1 acts as the number agreement trigger for the modifying participles. Neither in (281) nor in (282) does the NP2 participate in number agreement and number resolution.

6.3.2 Gender Agreement and Resolution in ACCs

In Polish ACCs, only NP1s are involved in gender resolution. Thus, the gender value of NP1s controls the gender value of predicates, relative pronouns and attributive modifiers.

The examples in (283) show that the gender value of the predicate agrees with the gender value of the NP1.

- (283) a. Jan z Marią wyjechał / *wyjechała do USA.
 Jan.M1 with Maria.FEM left.SG.M1 / left.SG.FEM do USA
 ‘Jan left with Maria for the USA.’

- b. Maria z Janem wyjechała / *wyjechał do USA.
 Maria.FEM with Jan.M1 left.SG.FEM / left.SG.M1 do USA
 ‘Maria left with Jan for the USA.’
- c. Dziecko z matką wyjechało / *wyjechała do USA.
 child.NEUT with mother.FEM left.SG.NEUT / left.SG.FEM to USA
 ‘The child left with its mother for the USA.’

The gender value of the verb in (283a) is masculine human, matching the gender value of the NP1. By contrast, the predicate in (283b) is feminine, since the NP1 is feminine. Finally, the gender value of the predicate in (283c) is neuter, because the gender value of the NP1 is neuter. The gender value of the NP2s does not affect the instantiation of the gender value of the entire NP1 z NP2 expressions.

6.3.3 Person Agreement and Resolution in ACCs

Like number and gender agreement, person agreement in Polish ACCs is determined by NP1s. This is shown in (284).

- (284) a. Ja z Marią wyjechałem do USA.
 I.1ST with Maria.3RD.INSTR left.1ST.SG to USA
 ‘I left with Maria for the USA.’
- b. Ty z Marią wyjechałeś do USA.
 you.2ND.SG with Maria.3RD.INSTR left.2ND.SG to USA
 ‘You left with Maria for the USA.’
- c. On ze mną wyjechał do USA.
 he.3RD with me.1ST.INSTR left.3RD.SG to USA
 ‘He left with me for the USA.’

The person value of NP2s does not affect the person value of entire ACCs and of the predicates. In other words, NP2s in ACCs are not involved in person resolution.

6.4 Agreement and Resolution in CCCs

In this section, agreement and resolution phenomena in CCCs will be examined. We will see that, in contrast to the NP2 in the ACC, the NP2 in the CCC does participate in number, gender and person resolution. Section 6.4.1 discusses number resolution within CCCs and number agreement on predicates, relative pronouns and modifiers. Section 6.4.2 concentrates on issues related to gender resolution and gender agreement. Finally, Section 6.4.3 focuses on agreement and resolution regarding person.

6.4.1 Number Agreement and Resolution in CCCs

It is one of the most significant properties of CCCs containing singular NP1s and singular NP2s that they involve plural agreement on the predicate. This fact was already demonstrated in (27), repeated here as (285).

- (285) Jan z Marią wyjechali do USA.
 Jan.SG with Maria.INSTR.SG left.PL.M1 to USA
 ‘Jan and Maria left for the USA.’

The examples in (286) and (287) show that CCCs can also act as controllers of plural relative pronouns and can be modified by plural attributive adjectives.

- (286) Jan z Marią, którzy / *który zostali zaproszeni
 Jan.SG with Maria.INSTR.SG who.PL / who.SG were.PL.M1 invited
 przez Piotra, właśnie przyszli.
 by Piotr just arrived.PL.M1
 ‘Jan and Maria, who were invited by Piotr, just arrived.’
- (287) Jan z Marią, zaproszeni / *zaproszony przez Piotra,
 Jan.SG with Maria.INSTR.SG invited.PL.M1 / invited.SG.M1 by Piotr
 przyszli punktualnie.
 arrived.PL.M1 on time
 ‘Jan and Maria, who were invited by Piotr, arrived on time.’

The plural form of the verbs in (285)–(287) indicates that the NP z NP clusters bear a plural valued number category. Thus, NP2s in CCCs clearly participate in number resolution. This observation has also been made in Dyła (1988), McNally (1993) and Dyła and Feldman (2008).²⁰

The behavior of CCCs with respect to number resolution resembles Polish coordination, which was discussed in Section 6.2.1. There is, however, a slight difference regarding number agreement. We have seen that coordinate phrases can combine both with plural and singular prenominal attributive modifiers, cf. (245) and (246) as well as (288a) (= (246a)) and (288b) below. However, CCCs do not seem to allow plural ones. This is illustrated by the examples in (289).

- (288) a. Polski prezydent i premier, nasi czołowi politycy,
 Polish.SG president.SG and prime minister.SG our leading politicians
 wrócili do kraju.
 came back.PL.M1 to country
 ‘The Polish president and the prime minister, who are our leading politicians, returned home.’

²⁰See also McNally (1993), Vassilieva and Larson (2001), Feldman (2002) and Dyła and Feldman (2008) for a discussion on number resolution in Russian CCCs.

- b. Polscy prezydent i premier, nasi czołowi politycy,
 Polish.PL president.SG and prime minister.SG our leading politicians
 wrócili do kraju.
 came back.PL.M1 to country
 ‘The Polish president and the prime minister, who are our leading
 politicians, returned home.’
- (289) a. Polski prezydent z premierem, nasi czołowi politycy,
 Polish.SG president.SG with prime minister.SG our leading politicians
 wrócili do kraju.
 came back.PL.M1 to country
 ‘The Polish president and the prime minister, who are our leading
 politicians, returned home.’
- b. ??Polscy prezydent z premierem, nasi czołowi politycy,
 Polish.PL president.SG with prime minister.SG our leading politicians
 wrócili do kraju.
 came back.PL.M1 to country
 ‘The Polish president and the prime minister, who are our leading
 politicians, returned home.’

6.4.2 Gender Agreement and Resolution in CCCs

The next interesting observation is that whenever a CCC involves a masculine human NP, regardless of whether it is the NP1 or the NP2, the gender value of the predicate is also masculine human, as one can see in (290) and (291). A similar observation has also been made in Dyła (2003) and Dyła and Feldman (2008).

- (290) a. Ojciec z synem wrócili /
 father.M1 with son.INSTR.M1 came back.PL.M1 /
 *wróciły do domu.
 came back.PL.NON-M1 to home
 ‘The father and the son came back home.’
- b. Ojciec z psem wrócili /
 father.M1 with dog.INSTR.M2 came back.PL.M1 /
 *wróciły do domu.
 came back.PL.NON-M1 to home
 ‘The father and the dog came back home.’
- c. Ojciec z jego oddziałem wrócili /
 father.M1 with his department.INSTR.M3 came back.PL.M1 /
 *wróciły z delegacji.
 came back.PL.NON-M1 from business trip
 ‘The father and his department came back from a business trip.’

- d. Ojciec z matką wrócili /
 father.M1 with mother.INSTR.FEM came back.PL.M1 /
 *wróciły do domu.
 came back.PL.NON-M1 to home
 ‘The father and the mother came back home.’
- e. Ojciec z dzieckiem wrócili /
 father.M1 with child.INSTR.NEUT came back.PL.M1 /
 *wróciły do domu.
 came back.PL.NON-M1 to home
 ‘The father and the child came back home.’
- (291) a. Pies z ojcem wrócili /
 dog.M2 with father.INSTR.M1 came back.PL.M1 /
 *wróciły do domu.
 came back.PL.NON-M1 to home
 ‘The dog and the father came back home.’
- b. Odział z jego dyrektorem wrócili /
 department.M3 with its director.INSTR.M1 came back.PL.M1 /
 *wróciły z delegacji.
 came back.PL.NON-M1 from business trip
 ‘The department and its director came back from a business trip.’
- c. Matka z ojcem wrócili /
 mother.FEM with father.INSTR.M1 came back.PL.M1 /
 *wróciły do domu.
 came back.PL.NON-M1 to home
 ‘The mother and the father came back home.’
- d. Dziecko z ojcem wrócili /
 child.NEUT with father.INSTR.M1 came back.PL.M1 /
 *wróciły do domu.
 came back.PL.NON-M1 to home
 ‘The child and the father came back home.’

The examples in (290) and in (291) show that both NPs participate in gender resolution. Further evidence is provided by relative pronoun constructions and attributive modification, as in (292) and (293), respectively.

- (292) a. Jan z Marią, którzy / *które zostali
 Jan.M1 with Maria.INSTR.FEM who.PL.M1 / who.PL.NON-M1 were
 zaproszeni przez Piotra, właśnie przyszli.
 invited by Piotr just arrived.PL
 ‘Jan and Maria, who were invited by Piotr, just arrived.’

- b. Maria z Janem, którzy / *które zostali
 Maria.FEM with Jan.INSTR.M1 who.PL.M1 / who.PL.NON-M1 were
 zaproszeni przez Piotra, właśnie przyszli.
 invited by Piotr just arrived.PL
 ‘Maria and Jan, who were invited by Piotr, just arrived.’
- (293) a. Jan z Marią, zaproszeni / *zaproszone przez
 Jan.M1 with Maria.INSTR.FEM invited.M1 / invited.NON-M1 by
 Piotra, przyszli punktualnie.
 Piotr arrived.PL on time
 ‘Jan and Maria, who were invited by Piotr, arrived on time.’
- b. Maria z Janem, zaproszeni / *zaproszone przez
 Maria.FEM with Jan.INSTR.M1 invited.M1 / invited.NON-M1 by
 Piotra, przyszli punktualnie.
 Piotr arrived.PL on time
 ‘Jan and Maria, who were invited by Piotr, arrived on time.’

Gender resolution in CCCs clearly corresponds to gender resolution in coordinate structures (cf. the discussion in Section 6.2.2). This is not only the case in sentences containing masculine human NPs. As we can see in (294)–(297), which correspond to the examples (255) and (258)–(260) of Section 6.2.2, respectively, there are also obvious parallels between CCCs and coordination regarding the usage of the masculine human gender in sentences without masculine human NPs.

- (294) Hania z Rekssem bawili się piłką.
 Hania.FEM with Reks.M2 played.PL.M1 RM ball
 ‘Hania and Reks played with a ball.’
- (295) Pies z kotem jedli na podwórzu.
 dog.M2 with cat.INSTR.M2 were eating.PL.M1 in yard
 ‘The dog and the cat were eating in the yard.’
- (296) Matka z wózkiem ukazali się nagle.
 mother.FEM with pram.INSTR.M3 appeared.PL.M1 RM suddenly
 ‘The mother and the pram appeared suddenly.’
- (297) *Dziewczynka z wiewiórką skakali szybciej.
 girl.FEM with squirrel.INSTR.FEM were jumping.PL.M1 faster
 ‘The girl and the squirrel were jumping faster.’ [intended]

CCCs can be subject both to morphosyntactic and contextual agreement, just like coordinate structures. In (298)–(301) examples are provided that correspond to the examples (261)–(263a) and (264) of Section 6.2.2, involving coordinate structures.

- (298) Pani z dzieckiem szli ulicą.
 lady.FEM with child.INSTR.NEUT went.PL.M1 street
 ‘The lady and the child went along the street.’
- (299) Wszystkie młodzież z biedactwem nie dali za wygraną...
 all youth.FEM with poor.INSTR.NEUT not gave.PL.M1 for win
 ‘All of the youth and the poor did not give up.’
- (300) Dwoje dzieci z kobietą uratowali się z
 two children.NEUT with woman.INSTR.FEM saved.PL.M1 RM from
 płonącego domu.
 burning house
 ‘Two children and a woman were saved from the burning house.’
- (301) Niemowlak z dzieckiem płakali przeraźliwie.
 infant.M2 with child.INSTR.NEUT were crying.PL.M1 bitterly
 ‘The infant and the child were crying bitterly.’

In (298)–(301), the masculine human form is possible because the individuals referred to by NP1s and / or NP2s provide a male interpretation. If no male interpretation of the individuals denoted by NP1s or NP2s is available, the non-masculine human form will be used. This also applies to ordinary coordination.

I thus agree with Corbett (1991), who claims that rules for gender resolution operate also in CCCs. Recall, however, that Corbett’s (1991) rules fail to account for some data, for instance those in (256) of Section 6.2.2. Interestingly enough, corresponding problematic cases can be observed in CCCs, as demonstrated in (302).

- (302) Ta dziewczyna z tym babsztylem wsiadły / *wsiedli
 this girl.FEM with this jade.INSTR.M2 got.PL.NON-M1 / got.PL.M1
 do autobusu.
 into bus
 ‘This girl and this jade got on the bus.’

Although the rules for gender resolution proposed in Corbett (1991) predict that if a masculine animate NP is involved, a masculine human form of the predicate can be used, the masculine human verb form is ungrammatical in (302).

6.4.3 Person Agreement and Resolution in CCCs

The involvement of both NPs can also be observed in person resolution, as the examples in (303) illustrate. If different persons are contained in a CCC, the first person has priority over the second and the second over the third.²¹

²¹Note that some native speakers of Polish consider examples like (303) somewhat unnatural. However, the longer the distance between an anaphor and its antecedent, the more acceptable they become.

- (303) a. Tylko ja z tobą, jako jedyna para, pobraliśmy
 only I.1ST with you.2ND.INSTR.SG as only couple married.1ST.PL
 się wtedy w Las Vegas. Inni rozmyślili się w ostatniej
 RM then in Las Vegas others changed their minds RM in last
 chwili.
 minute
 ‘You and I were the only couple who married back then in Las
 Vegas. The others changed their minds at the last minute.’
- b. Tylko ja z nim, jako jedyna para, pobraliśmy
 only I.1ST with him.3RD.INSTR as only couple married.1ST.PL
 się wtedy w Las Vegas. Inni rozmyślili się w ostatniej
 RM then in Las Vegas others changed their minds RM in last
 chwili.
 minute
 ‘He and I were the only couple who married back then in Las Ve-
 gas. The others changed their minds at the last minute.’
- c. Tylko ty z nim, jako jedyna para, pobraliście
 only you.2ND with him.3RD.INSTR as only couple married.2ND.PL
 się wtedy w Las Vegas. Inni rozmyślili się w ostatniej
 RM then in Las Vegas others changed their minds RM in last
 chwili.
 minute
 ‘He and you were the only couple who married back then in Las
 Vegas. The others changed their minds at the last minute.’

If a CCC includes a first person, there is first person agreement on the predicate. If it includes a second person, but not a first person, second person agreement is found on the verb.

One can thus conclude that with respect to person resolution, Polish CCCs behave as ordinary coordination (cf. the discussion in Section 268).

6.5 Agreement and Resolution in ICCs

I now turn to agreement and number, gender and person resolution in ICCs. Section 6.5.1 focuses on number, Section 6.5.2 on gender, and Section 6.5.3 on person.

6.5.1 Number Agreement and Resolution in ICCs

Recall that ICCs are constructions in which the denotation of NP2s is included in the denotation of NP1s. The sentence in (29) from Chapter 2.3, repeated here as (304), provides a typical ICC.

- (304) My z Marią wyjechaliśmy do USA jako jedyna para
 we with Maria.INSTR.SG left.PL.M1 to USA as only couple
 małżeńska.
 married
 ‘Maria and I, as the only married couple, left for the USA.’

Whenever NP1s in ICCs are realized as plural pronouns, the entire ICC is plural, and combines with plural predicates. As Polish verbs are only marked for singular and plural and there are no dual, trial, quadral etc. number markers in Polish, examples like (304) cannot tell us whether NP2s in ICCs participate in number resolution. Some information on the actual number of event participants can, however, be provided by specific numerals modifying pronominal NP1s, as well as by particular verbal modifiers, such as *we dwoje* ‘both’, *we troje* ‘in three’ etc.

However, in ICCs involving non-pronominal singular NP1s, the number value of the verb is also singular. This could be seen in the examples in (36) of Chapter 2.3, repeated here as (305).

- (305) a. Ten kwartet fortepianowy z Zimmermanem (grającym na
 this quartet piano with Zimmerman.INSTR playing on
 fortepianie) zagrał / *zagrani koncertowo.
 piano played.SG / played.PL admirably
 ‘This piano quartet played admirably, with Zimmerman at the piano.’
- b. Jazzowy sextet wszechczasów z Milesem Davisem (jako
 jazz sextet of all ages with Miles.INSTR Davis.INSTR as
 liderem) nagrał / *nagrani trzy płyty.
 leader recorded.SG / recorded.PL three albums
 ‘The best ever jazz sextet with Miles Davis (as a leader) recorded three albums.’
- c. To małżeństwo z Bogusławem Lindą (w roli niewiernego
 this marriage with Bogusław.INSTR Linda.INSTR in role unfaithful
 męża) musiało / *musieli się rozpaść.
 husband had.SG / have.PL RM fail
 ‘This marriage with Bogusław Linda (as an unfaithful husband) had to fail.’
- d. Cała rodzina z wujkiem i ciocią włącznie przysła
 whole family with uncle.INSTR and aunt.INSTR including came.SG
 / *przyszli na ślub.
 / came.PL to wedding
 ‘The whole family, including the uncle and the aunt, came to the wedding.’

These examples show that in ICCs, NP2s do not contribute to number resolution. Even if the number value of NP2s is plural, as is the case in (305d), the number value of the entire ICC remains singular as long as the NP1 is singular.

6.5.2 Gender Agreement and Resolution in ICCs

Dyła (2003) discusses gender resolution in Polish CCs involving plural pronouns and observes that gender values of NP2s contribute to gender values of the entire subject in ICCs. This can be shown on the basis of the predicate form and gender resolution facts related to plural pronouns.

The gender values of first and second person plural pronouns in Polish are determined on the basis of the natural genders of individuals denoted by these pronouns. If a first or second person plural pronoun refers to a set of female individuals, this pronoun will combine with non-masculine human predicates, as in (306a) and (307a). If it denotes a set of individuals at least one of which is masculine human, then it will occur with masculine human verbs. This is shown in (306b) and (307b).

- (306) a. My, to znaczy Beata i Anna, wyjechałyśmy do USA.
we this means Beata and Anna left.1ST.PL.NON-M1 to USA
'We, that is Beata and Anna, left for the USA.'
- b. My, to znaczy Beata i Jan, wyjechaliśmy do USA.
we this means Beata and Jan left.1ST.PL.M1 to USA
'We, that is Beata and Jan, left for the USA.'
- (307) a. Wy, to znaczy Maria i Anna, wyjechałyście do USA..
you this means Maria and Anna left.2ND.PL.NON-M1 to USA
'You, that is Maria and Anna, left for the USA.'
- b. Wy, to znaczy Maria i Jan, wyjechaliście do USA.
you this means Maria and Jan left.2ND.PL.M1 to USA
'You, that is Maria and Jan, left for the USA.'

If an ICC refers to a female speaker and a male individual expressed by a masculine human NP2, as in (308), the entire NP1 z NP2 subject is masculine human and combines with the masculine human form of the predicate. Recall that a masculine human verb form always implies a masculine human subject (cf. Section 6.2.2).

- (308) My z mężem zawsze lubiliśmy grać w szachy.
we with husband.INSTR always loved.PL.M1 play in chess
'My husband and I always loved to play chess.'

Note that if NP2 does not affect gender resolution, we do not get the inclusive reading anymore, but rather the accompanitive one. This is illustrated by the contrast between (309) and (310), where NP2 does not participate in gender resolution.

- (309) a. My z Janem wyjechaliśmy do USA.
we with Jan.INSTR left.1ST.PL.M1 to USA
'Jan and the rest of us left for the USA.'

- b. Wy z Janem wyjechaliście do USA.
you.PL with Jan.INSTR left.2ND.PL.M1 to USA
'Jan and the rest of you left for the USA.'
- (310) a. My z Janem wyjechaliśmy do USA.
we with Jan.INSTR left.1ST.PL.NON-M1 to USA
'We left for the USA with Jan.'
- b. Wy z Janem wyjechaliście do USA.
you.PL with Jan.INSTR left.2ND.PL.NON-M1 to USA
'You left for the USA with Jan.'

The gender value of NP2 in ICCs only matters for gender resolution when NP1 is realized by a plural pronoun. This is because the denotation of the entire NP1 z NP2 expression in ICCs is identical to the plural pronoun involved in it. Plural pronouns, in turn, are subject to internal gender resolution which is determined on the basis of the natural genders of their referents. The internal gender resolution does not apply to non-pronominal plural nouns or collective nouns in Polish. This can be seen in (311a) and (311b), respectively.

- (311) a. Wszystkie instytucje włącznie z bankami
all institutions.FEM.PL including with banks.INSTR.PL.M1
wzięły / *wzięli udział w konkursie.
took.PL.NON-M1 / took.PL.M1 part in contest
'All institutions including banks took part in the contest.'
- b. Cała rodzina z wujkiem włącznie przyszła /
whole family.FEM with uncle.INSTR.M1 including came.SG.FEM /
*przyszedł na ślub.
came.SG.M1 to wedding
'The whole family including the uncle came to the wedding.'

Although the denotation of the NP2 in (311) is part of the denotation of the NP1, it does not affect the gender resolution of the entire NP1 z NP2 sequence. The gender value of the predicates in (311) is controlled by the gender value of the NP1. This observation also applies to ICCs involving plural pronouns as NP2.

Summing up, in Polish ICCs involving plural pronouns, NP2s contribute to the internal gender resolution of the pronouns. Thereby, the same set of rules for gender resolution applies as for ordinary coordination. The gender value of NP2s is irrelevant for the gender of the NP1 z NP2s expressions in ICCs with non-pronominal NP1s.

6.5.3 Person Agreement and Resolution in ICCs

Some generalizations about person agreement and person resolution in Polish ICCs can already be formulated on the basis of the data discussed in Section 4.1.2.3.

Since ICCs in which both the NP1 and the NP2 are realized as pronouns are not possible in Polish (cf. the examples in (140) and (141) in Chapter 4), person resolution in ICCs cannot be examined on the basis of sentences involving combinations of pronouns bearing different person values.²² However, sentences involving ICCs with non-pronominal NP1s and pronominal NP2s are grammatical in Polish and allow the investigation of person resolution phenomena. Consider the examples in (142a)–(142b) and (143a)–(143b) from Section 4.1.2.3, repeated here as (312) and (313), respectively.

- (312) a. Cała rodzina włącznie ze mną wyjechała do
 whole family.3RD including with me.1ST.INSTR left.3RD.SG to
 USA.
 USA
 ‘The whole family, including me, left for the USA.’
- b. Cała rodzina włącznie z tobą wyjechała
 whole family.3RD including with you.2ND.INSTR.SG left.3RD.SG
 do USA.
 to USA
 ‘The whole family, including you, left for the USA.’
- (313) a. Cała rodzina włącznie z nami wyjechała do USA.
 whole family.3RD including with us.1ST.INSTR left.3RD.SG to USA
 ‘The whole family, including us, left for the USA.’
- b. Cała rodzina włącznie z wami wyjechała
 whole family.3RD including with you.2ND.INSTR.PL left.3RD.SG
 do USA.
 to USA
 ‘The whole family, including you, left for the USA.’

These examples all involve ICCs in which the NP1 is a non-pronominal third person NP and the NP2 a first or second person singular or plural personal pronoun. In all these sentences, the predicates have the third person form, regardless of whether the person value of the NP2 is first or second. This indicates that the NP2s do not participate in person resolution and, thus, that only the NP1s trigger person agreement. Recall that in Polish, if different persons are combined, the first person has priority over the second and the second over the third (cf. the discussion of Section 6.2.3). Obviously, these rules do not apply to NPs involved in ICCs.²³

To conclude, in Polish ICCs, only NP1s take part in person resolution and act as person agreement triggers.

²²See also Feldman (2002) for similar effects in Russian ICCs.

²³For issues related to the person hierarchy in ICCs involving plural pronouns in various languages, see, for instance, Schwartz (1985, 1988a), Ladusaw (1989), Aissen (1989a,b) or Feldman (2002).

6.6 Summary

In this chapter, I presented a characterization of agreement and person, number and gender resolution in Polish and provided crucial properties of ACCs, CCCs and ICCs with respect to these phenomena.

On the basis of the data discussed in Sections 6.3–6.5, the following generalizations can be formulated: In ACCs, NP1s trigger number, gender and person agreement, NP2s do not participate in number, gender and person resolution. In CCCs, both NP1s and NP2s participate in number, gender and person resolution. In this respect, they clearly correspond to ordinary coordinate structures. The only difference relates to modifiability by prenominal plural adjectives. While coordinate phrases involving singular NPs allow both singular and plural prenominal attributive modifiers, CCCs involving singular NPs can only combine with singular ones. In ICCs, only NP1s trigger number, gender and person agreement. If NP1s in ICCs are realized by plural pronouns, NP2s participate in the pronoun-internal gender resolution.

To summarize the results of Part I, I combine the observations made in this chapter with those in Chapter 5 in the table below.

Morphosyntactic Property	ACC	CCC	ICC
ability to occur as nominative and dative subjects, direct, indirect and prepositional objects, and possessors	+	+	+
ability of z NP2s to conjoin and occur recursively	+	+	+
ability to iterate NP1s and z NP2s	—	—	—
requirement of adjacency and locality	?	+	?
ability of NP2s to participate in person, number and gender resolution	—	+	—

Table 6.3: Summary of morphosyntactic properties of CCs

Although the purely syntactic properties discussed in Chapter 5 did not turn up clear differences between the CC types, the morphosyntactic properties of ACCs, CCCs and ICCs I examined in Chapter 6 reflect the semantic properties discussed in Chapter 3 and Chapter 4. Firstly, we have concluded that in the ACC and the ICC, the NP1 introduces a semantically autonomous item which is able to act as controller. This is, however, not the case in the CCC, where NP1 and NP2 refer to entities which are only parts of the entity in the denotation of the NP1 z NP2 sequence, and only this complex entity can act as controller. This semantic generalization corresponds to the morphosyntactic one that in the ACC and ICC, only the NP1 triggers person, number and gender agreement. In the CCC, however, both the NP1 and the NP2 participate in person, number and gender resolution and

agreement.

The morphosyntactic asymmetry between the NP1 and the NP2 in ACC and ICC correlates with the (in ICCs conditionally) loose symmetry requirements regarding definiteness, restrictiveness, animacy and humanness (cf. Chapter 4.2). Recall that in the CCC, where NP1 and NP2 equally participate in person, number and gender resolution, a strict symmetry with respect to definiteness, restrictiveness, animacy and humanness is required.

Finally, the strict symmetry requirements with regard to the semantic properties of NP1 and NP2 in the CCC, as well as their equal contribution to person, number and gender resolution are in line with the fact that both constituents must be realized within the same local domain. This is not required in the ACC and ICC, where the NP2 can be realized as an adjunct to the NP1 or can be attached to the predicate.

A detailed overview of all empirical observations of Part I is presented in table form in Appendix A. The next part of this thesis will develop a formal description of the facts described so far.

Part II

Formal Description

Chapter 7

Theoretical Foundations

This chapter provides the theoretical background for my analysis of CCs developed in Chapter 9. I will first discuss some general issues related to the semantic representation of individual terms (with a specific focus on plurality), verbal predicates and prepositions. In Section 7.2, I will define a syntactic variant of the semantic representation language Ty2 that I will use to represent the translations of the linguistic expressions of our fragment of Polish. Section 7.3 introduces the formal and linguistic foundations of Head-Driven Phrase Structure Grammar (HPSG), the framework in which my analysis of CCs will be formalized. I will present the standard version of the HPSG linguistic theory, which underlies the previous HPSG-based approaches to CCs discussed in Chapter 8, and propose a modified version with the integrated semantic framework of *Lexicalized Flexible Ty2*. In Section 7.4, I will sum up the chapter.

7.1 Theoretical Preliminaries

In this section, I discuss aspects of the semantic representation of singular and plural individual terms, collective and distributive contexts, verbal predicates and prepositions relevant for my analysis of CCs.

7.1.1 Individual Terms

One of the important issues related to my analysis of CCs is the semantic representation of singular and plural individual terms and their proper denotation. Below, I outline some of the most prominent approaches to plural semantics and select the one that I want to adopt in my analysis.

There are several influential approaches to plural semantics. Some of the most prominent are Scha (1981), Hoeksema (1983), Link (1983, 1984, 1991, 1998), Landman (1989a,b), Krifka (1989a,b, 1996), Lasersohn (1988, 1995), Schwarzschild (1991, 1992, 1994, 1996), and Schein (1993). These approaches differ with respect to the postulated number and kinds of readings of plural expressions (collective,

distributive, group reading etc.), the treatment of ambiguities of plurals (the source for the ambiguity is considered as to be located either on plural NPs, or VPs, or within the context), and with respect to the underlying algebra, which, in turn, is related to the ontology design and the assumed reference of individual terms.

One of the central issues discussed in the literature on plural is how to model the domain of singular and plural individuals in order for them to be ontologically uniform entities. While earlier approaches such as Bartsch (1973), Hausser (1974), Bennett (1974), von Stechow (1980), Ladusaw (1982), and Hoeksema (1983) reconstruct the reference objects of plural terms as sets and those of singular terms as individuals, i.e., as two different types of entities, later theories attempt to obtain a uniformity of reference object types. Basically, there are two approaches to the uniform treatment of the reference objects of plural and singular terms. Under the first one, proposed in Link (1983, 1984) and adopted in Lønning (1987), Krifka (1989a,b, 1996), Kamp and Reyle (1993), Schein (1993), Schwertel (2005), and many others, both singularities and pluralities are viewed as individuals. These approaches use lattice-based algebra to model the domain of individuals, which is viewed as a join semilattice containing (1) *pure atoms*, modeling singular individuals associated with expressions such as *John* and *Mary* (represented as a, b etc.), (2) *impure atoms*, modeling group individuals associated, for instance, with collective nouns (represented as $\langle a \oplus b \rangle$), and (3) *sums*, modeling sum individuals associated with expressions such as *John and Mary* (represented as $a \oplus b$).¹ For example, if the individual constants **john'** and **mary'**, representing the meaning of *John* and *Mary*, respectively, denote atomic individuals, then the term **john' \oplus mary'**, representing the meaning of the expression *John and Mary*, denotes a sum individual of the same domain of individuals. The sum individual **john' \oplus mary'** is made up from the two individuals denoted by **john'** and **mary'** and is of the same elementary ontological type as the two. In terms of semantic type theory, pure atoms, impure atoms and sums are all expressions of the semantic type $\langle e \rangle$.

Under the second approach to the uniform modeling of singular and plural terms, proposed, for instance, in Scha (1981), Hoeksema (1983), Lasersohn (1988, 1995), Landman (1989a,b), Schwarzschild (1991, 1992, 1996), and Verkuyl and van der Does (1996), singularities and pluralities denote subsets of the domain of individuals. Here, set theory is the underlying algebra.² Singular terms denote singleton sets and plural terms denote sets containing more than one entity. For

¹The symbol \oplus must not be confused with the same symbol used in AVM descriptions of HPSG, such as the formalization of THE VALENCE PRINCIPLE in (348) in Section 7.3. While in the system of Link (1983, 1984), \oplus stands for the mereological sum operation, the corresponding symbol used in HPSG stands for the relation of append, defined in (349).

²Note that Schwarzschild (1991, 1992, 1994, 1996) assumes a non-standard version of set theory based on *Quine's Innovation* (Quine (1980)), which differs from the standard set theory by identifying atomic objects with singleton sets containing them. Thus, according to *Quine's Innovation*, for each atomic object x holds that $x = \{x\} = \{\{x\}\} = \{\{\{x\}\}\} = \dots$. According to Schwarzschild (1991, 1996), any conjunction involving individuals proceeds in the first step by identifying these individuals with singleton sets which contain these individuals and then by applying set union between the denotations of the particular terms.

example, the bracketed individual constants $\{\mathbf{john}'\}$ and $\{\mathbf{mary}'\}$, representing the meaning of *John* and *Mary*, denote sets containing just one individual each. The term $\{\mathbf{john}'\} \cup \{\mathbf{mary}'\}$, representing the meaning of the expression *John and Mary*, denotes set union of the two singleton sets, which is equivalent to a set containing these two individuals.³ As the lattice-based theories, the set-based approach offers an ontological uniformity of singular and plural terms. In this case, they are both sets. In terms of the semantic type theory, they are expressions of the semantic type $\langle e, t \rangle$.

Treating pluralities within a mereological paradigm makes it possible to keep the genuine type system in which singular and plural entities are of the same semantic type $\langle e \rangle$ and intransitive predicates are of type $\langle e, t \rangle$. Adopting the set-theoretical approach implies an increase of the complexity of the semantic types, which, however, does not form a technical obstacle. On the other hand, set-based theories are somewhat more straightforward to use by allowing to refer to both singular and plural entities via variables over sets. A variable ranging over a singleton set refers to a singular entity and a variable ranging over a set containing more than one element refers to a plural entity. In lattice-based theories, all variables refer to atomic entities. In order to be able to differentiate between variables with singular and plural reference, additional theoretical stipulations are needed. Further practical and conceptual advantages and disadvantages of the lattice-based versus the set-based algebras in the modeling of plural semantics have been discussed, among others, in Link (1983), Lasersohn (1988), Krifka (1989a,b, 1996), Kamp and Reyle (1993), and Landman (1989a,b).⁴ The general conclusion that can be drawn from these discussions is that there are no substantial differences between set-theoretical and lattice-theoretical approaches. Most of the linguistic phenomena described in one type can also be formulated in the other. This also holds for our fragment of Polish described in Chapter 9. In my analysis, I will

³Note that this is not the only way to account for nominal coordination in a set-theoretical framework. Another way to do that is what Schwarzschild (1996) calls set formation. The expression *John and Mary* is semantically represented as $\{\{\mathbf{john}'\}, \{\mathbf{mary}'\}\}$, and the extension of this term is a set containing two singleton sets. Given *Quine's Innovation*, this theory and the union-based theory assign the same interpretation to the semantic representation of expressions like *John and Mary*. There are, however, cases where they yield different interpretations, for instance, in coordination of plural terms and multi-conjunct coordination. As I am concerned in this thesis with non-iterative expressions including singular proper names only, I will adopt the union-based theory as it is simpler.

⁴One of the purely algebraic properties discussed in the literature which distinguish lattices from sets is associativity, which holds for lattices but not for sets. This property is exemplified in (i), where x , y and z are elements of a set S and \circ is a binary operation.

$$(i) \quad x \circ (y \circ z) = (x \circ y) \circ z$$

Given this property of lattices, sentences like (ii) cannot be properly accounted for under the lattice-based theories. This problem has already been mentioned in Hoeksema (1983) and Lasersohn (1988).

$$(ii) \quad \text{Romeo and Juliet and Tristan and Iseult loved each other.}$$

On the other hand, sentences like (ii) also pose a problem for set-based theories which model nominal coordination by means of set union.

adopt the set-theoretical approach as outlined above. However, this choice should not be taken as a commitment against the lattice-based theories.

7.1.2 Collectivity and Distributivity

Another theoretical issue relevant for my analysis of CCs concerns the treatment of collectivity and distributivity. Recall that under the collective interpretation, a predicate P contains an aggregation of individual entities in its denotation, while under the distributive interpretation, it contains atomic individuals. We have illustrated this difference in (65) in Chapter 3, repeated here as (314), where (314b) paraphrases (314a) under its distributive reading and (314c) under the collective one.

- (314) a. John and Mary won \$1000.
 b. John and Mary each won \$1000.
 = John won \$1000 and Mary won \$1000.
 c. John and Mary together won \$1000.

The ability to capture the distinction between distributive and collective readings is a crucial benchmark for any theory of plural semantics. Some theories, such as those of Bennett (1974) and Hausser (1974), assume that two interpretations are available for plural NPs: a group interpretation and an interpretation as a generalized quantifier over individuals. However, this assumption appears problematic in mixed contexts, i.e., in contexts providing both the collective and the distributive readings, such as (314a). Bartsch (1973), Scha (1981), Link (1983, 1991), Hoeksema (1983, 1988), Dowty (1986), Roberts (1987) and Lasersohn (1988) argue that plural NPs always denote groups, and the source of distributive interpretation should be shifted into the analysis of VPs. To technically realize this idea, Bartsch (1973), Scha (1981), Hoeksema (1983, 1988), Dowty (1986) and Lasersohn (1988) propose meaning postulates for predicates with distributive meaning. This approach also fails to account for mixed predicates like *win*.

By contrast, the ambiguity of sentences like (314a) can be licensed in other approaches where formal operators deriving the corresponding interpretations are provided. For instance, Link (1983) defines the distributivity operator *Distr*, also used in Lønning (1987), Roberts (1987) and many others. The operator *Distr* is an overt operator corresponding to the floated adverb *each* which marks distributive readings in its logical representation and makes it possible to account for scope phenomena. The definition of *Distr* according to Link (1983, p. 309) is provided in (315), where the predicate *At* stands for the property of being an atom in the model.

$$(315) \quad \textit{Distr}(P) \leftrightarrow \forall x(P(x) \rightarrow \textit{At}(x))$$

The ambiguity of sentences such as (314a) is explained by the presence or the absence of the distributivity operator *Distr* in the syntactic representation.

Schwarzschild (1991, 1996) argues that the availability of a distributive interpretation does not have to do with the semantics of particular lexical items and / or syntactic ambiguity, but rather with the context. To introduce a pragmatic element into the representation of a distributive interpretation, he provides the operator *Part*. *Part* applies to a predicate and a free variable over sets of sets, whose value is determined by the linguistic and non-linguistic context. Sentences with a collective reading are translated without the operator *Part*, while sentences with a distributive reading are translated with it. In this theory, there are no different readings, only different kinds of context dependencies.

In this thesis, I will adopt the semantics-driven approach to collectivity and distributivity as it is more common today. Following Bartsch (1973), Scha (1981), Link (1983, 1991), Hoeksema (1983, 1988), Dowty (1986), Roberts (1987) and Lasersohn (1988), I assume that the denotation of noun phrases does not change in collective and distributive contexts and that the collective and distributive interpretations are triggered by verbal predicates or other expressions. However, I do not introduce any operators which generate the distributive interpretation or provide any meaning postulates, but assume that the collective and distributive meanings are associated with the denotation of the logical representation of verbal predicates (or other expressions). My proposal also incorporates the Davidsonian style of representing verbal semantics. This strict lexicalist approach to collectivity and distributivity allows us to implement my semantic analysis of CCs in a very straightforward way without any additional stipulations.

In the next section, I demonstrate how the meaning of verbal predicates is represented according to my proposal.

7.1.3 Verbal Predicates

In my analysis of CCs, I adopt the semantic representation of verbal predicates as proposed in Davidson (1967). According to Davidson (1967), verbs have an obligatory argument position for events in addition to positions for internal and external arguments.⁵ This event argument position is filled by an event variable which stands for an individual event, and which is in the default case bound existentially. (316) gives the translation of *leave* under this approach and lambda notation, where x is an individual variable associated with the subject, and e is an individual event variable.

$$(316) \quad \lambda x. \exists e \mathbf{leave}'(e, x)$$

Via event variables, events are included in the logical representation of sentences. This idea has been incorporated into many approaches to verbal semantics,

⁵Parsons (1990) suggests a reanalysis of Davidson's approach in which the verb only takes an event argument, and external and internal arguments are linked to the event variable through thematic relations. I will not adopt this neo-Davidsonian format here, but rather use the original Davidsonian approach.

e.g., Link (1987), Krifka (1992), Lasersohn (1995), Landman (1996, 2000), Moltmann (1997), and others. In some models, such as that proposed in Croft (1991), an event structure consists of a one-dimensional linear sequence of subevents, each of which is in a causal relation with the following segment.

Similarly to individuals, which can be singular or plural, events are also assumed to be singular / atomic or plural / complex. The semantics of plural events can be represented in a similar fashion to the semantics of plural individuals, i.e., either in terms of mereological sums, as proposed in Link (1983) and Bach (1986), or in terms of sets of atomic events, as proposed in Lasersohn (1988). In my analysis, I will adopt the latter strategy, to be consistent with the assumed representation of individuals. I also postulate that the representations of both singular and plural events always denote subsets of the domain of events, thus, they are of the same ontological type. The event variable included in the semantic representation of verbal predicates is assumed in my analysis to be a variable over a set of atomic events rather than an atomic event variable. Singular events are represented using variables over singleton sets, and plural events using variables over sets including more than one element.

Given these stipulations about the semantic representation of singular and plural events and my assumptions about the semantic representation of singular and plural individuals, the verb *leave* is translated as in (317), where A is a variable over a (possibly singleton) set of individual entities associated with the subject, and E is a variable over a (possibly singleton) set of event entities.

$$(317) \quad \lambda A. \exists E \text{leave}'(E, A)$$

An important difference between the descriptions in (316) and (317) consists in their logical types. While the expression in (316) is of type $\langle e, t \rangle$, the one in (317) is of type $\langle \langle e, t \rangle, t \rangle$.

I further assume that the event variable in the logical representation of inherently collective predicates such as *surround* always ranges over singleton sets, and that the cardinality of the argument associated with the subject is greater than 1. The semantic representation of *surround* according to these assumptions is given in (318), where cardinality greater than 1 and cardinality of 1 are expressed by the use of the cardinality quantifiers $\exists_{>1}$ and $\exists_{!1}$, respectively.

$$(318) \quad \lambda A. \exists E (\text{surround}'(E, A) \wedge \exists_{>1} a (a \in A) \wedge \exists_{!1} e (e \in E))$$

The logical representation in (318) guarantees that the collective predicate *surround* combines with expressions denoting pluralities and that there is only one event in which all individuals in the denotation of this predicate (collectively) participate.

For inherently distributive predicates such as *die*, I assume the semantic representation in (319). Unlike other theories of distributivity, which use distributive operators or introduce appropriate meaning postulates, my theory accounts for distributivity via logical translations of distributive expressions.

$$(319) \quad \lambda A. \exists E(\mathbf{die}'(E, A) \wedge \forall A'((A \supset A' \wedge A' \neq \emptyset) \rightarrow (\exists \{e\} \mathbf{die}'(\{e\}, A') \wedge \{e\} \in E)))$$

According to (319), the distributive predicate *die* applies to an expression denoting a (possibly singleton) set of individuals such that for each non-empty subset of this set, there is a singleton subset of events, and the predicate applies to this singleton subset of events and the non-empty subset of individuals. Putting it in a more intuitive way, any (non-empty) configuration of individuals denoted by the argument associated with the subject of a distributive predicate belongs to the denotation of this predicate, and for any of these configurations there is an event to which this predicate applies.

I finally propose that the semantic representation of neutral or ambiguous predicates such as *leave* or *win*, which can occur both in collective and in distributive contexts, does not provide any restrictions on the cardinality of the arguments or any other restrictions, and has the form in (317). Due to the lack of restrictions on the event argument and the argument associated with the subject, neutral predicates are compatible with both collective and distributive contexts, which can be triggered by specific lexical items or affixes (cf. the discussion in Section 3.3).

Finally, all verbal predicates that allow modification by adverbials which operate on the event argument of these predicates will receive an additional translation in which the event variable is bound by the λ -operator. In (320), we can see this translation for the verb *leave*.

$$(320) \quad \lambda A \lambda E. \mathbf{leave}'(E, A)$$

When modified by collectivizing adverbs such as *together*, distributive adverbs such as *separately*, adverbs of completion such as *completely* or *partly*, or expressions such as *sequentially* or *step-by-step*, where the modifier acts as the semantic functor and the predicate as its argument, the event argument of the predicate will be bound by an existential quantifier provided in the logical representation of the modifier. The logical representation of the modifier also specifies the truth conditions regarding the event argument.

I further assume that the semantic type of events is v . As a consequence, the semantic type of (intransitive) predicates which allow modification by expressions operating on the event argument will be $\langle \langle e, t \rangle, \langle \langle v, t \rangle, t \rangle \rangle$.

In the next section, I discuss aspects of the semantic representation of prepositions, which constitute the core component of CCs and will play a crucial role in the semantic description of CCs in Chapter 9.

7.1.4 Prepositions

The semantic representation of a preposition is linked to the syntactic function of the PP it is heading. Prepositions heading complement-PPs are traditionally analyzed as semantically vacuous, whereas prepositions heading modifying PPs are

semantically contentful (Heim and Kratzer (1998)). Semantically empty prepositions, such as *in* in (321), are assumed to be invisible in the computation of the semantic interpretation. Alternatively, such prepositions can be analyzed as denoting the identity function of type $\langle e, e \rangle$, i.e., the function which maps every individual to itself. This strategy has been used in McNally (1993) to semantically account for CCs with the CCC reading (for details of and problems with this approach, see Chapter 8).

(321) Mary believes in John.

Semantically contentful prepositions are usually ambiguous between several readings, associated with various syntactic functions they fulfill. To illustrate this ambiguity, I will consider three usages of the preposition *in*: its usage as the head of a PP which modifies an NP in subject position, as the head of a PP which modifies a VP, and as the head of a predicative PP. In each case, the meaning of *in* entails localization, but the translation as a whole is different. For simplicity, I will work with atomic variables instead of set variables, use simplified representations of proper names, and omit the event variable.

The preposition *in* in (322), with the underlying syntactic structure and the corresponding logical representation given in Figure 7.1, acts as a syntactic and semantic head of the PP *in Massachusetts*. This PP modifies the NP *Cambridge*. The entire NP occurs in subject position. The preposition *in* as used here may be treated as an expression of the logical type $\langle e, \langle e, \langle \langle e, t \rangle, t \rangle \rangle \rangle$.

(322) Cambridge in Massachusetts is 378 years old.

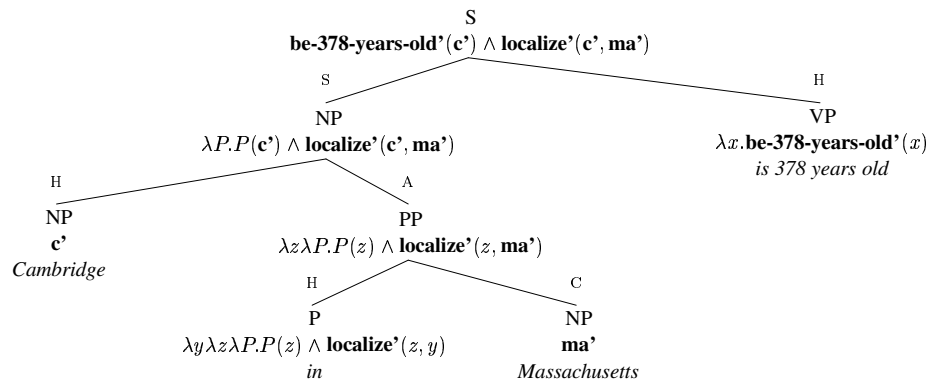


Figure 7.1: The structure of the sentence *Cambridge in Massachusetts is 378 years old*

The sentence (323) includes the preposition *in* which acts as the head of the PP *in Massachusetts*, which modifies the VP. The sentence has the syntactic structure

and the corresponding logical representation as in Figure 7.2, and the preposition *in* may be translated as an expression of type $\langle e, \langle \langle e, t \rangle, \langle e, t \rangle \rangle \rangle$. Note that this is an oversimplification: *in* expresses a localization relation between an event and an individual rather than between a truth-value and an individual.

(323) Tom works in Massachusetts.

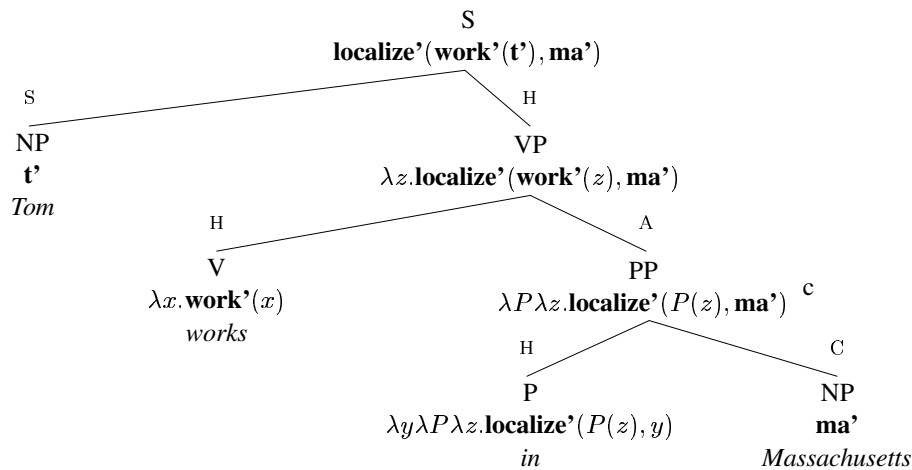


Figure 7.2: The structure of the sentence *Tom works in Massachusetts*

Finally, in (324), the preposition *in* is used as the head of the PP *in Massachusetts*, which occurs in predicative position. By assuming for the sentence (324) the syntactic structure given in Figure 7.3, *in* may be specified as an expression of type $\langle e, \langle e, t \rangle \rangle$. Note that the copula in Figure 7.3 is analyzed as semantically empty. If it is assigned a denotation and still combines with the PP as its argument, the logical type of the preposition will change accordingly.⁶

(324) Cambridge is in Massachusetts.

⁶For more discussion of the semantic treatment of the verb *be*, see Gamut (1991, pp. 187–190).

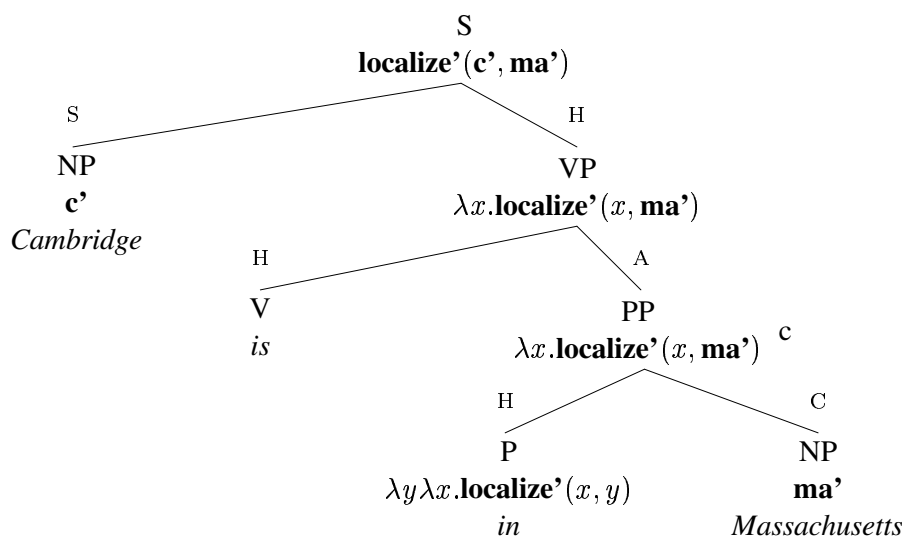


Figure 7.3: The structure of the sentence *Cambridge is in Massachusetts*

In addition to the readings of the preposition *in* given in (321), (322), (323), and (324), further readings are available in syntactic environments others than those discussed above. This ambiguity holds for other prepositions as well. For contentful prepositions, it is plausible to assume a systematic relation between their particular readings, which makes one predictable given the other. This relation can be captured by assuming flexible semantic types and a number of type-shifting / type-lifting / type-raising operations. A semantic system of this kind, referred to as *Flexible Montague Grammar*, has been proposed in Hendriks (1993). Shifting operations map denotations of the basic type to secondary denotations of the appropriate non-basic type. These operations were first proposed in Partee and Rooth (1983) for treating the meaning of the connectives *and* and *or*, which are able to connect phrases of a variety of different syntactic categories with meanings of a corresponding variety of semantic types.

In developing an analysis of Polish CCs in Chapter 9, I am interested in the semantic representation of prepositions occurring in two syntactic functions: as heads of PPs which modify subject NPs, and as heads of PPs which modify intransitive VPs. These two syntactic functions and the logical types associated with them correspond to the syntactic functions and logical types of the preposition *in* in (322) and (323). The typing of the comitative prepositions in our fragment of Polish will, however, be more complex, since I represent proper names as expressions of type $\langle e, t \rangle$ rather than $\langle e \rangle$ and incorporate an event variable into the semantic representation.

The Polish preposition *z* 'with' as used in ACCs and ICCs is ambiguous between a reading as the head of a PP modifying an NP and a reading as the head of a PP modifying a VP. However, I will not provide any shifting operations in

order to obtain one of these readings from the other. Instead, I will assume two basic translations for each reading. My motivation for this is that the ambiguity of prepositions is a more general and complex issue, which cannot be worked out here in full detail. In Chapter 5.1, I have shown that the Polish comitative preposition *z* ‘with’ can be a component of a subject, a direct, indirect or a prepositional object, as well as of a possessor. The same observation probably holds for the majority of primary (as opposed to complex) prepositions in Polish and many other languages. In order to determine a basic type and define a set of operations deriving translations for all other usages of prepositions, a closer and more systematic examination of the data is needed, including aspects such as the semantic relationship between semantically empty prepositions and their contentful counterparts, their interaction with quantifiers and intensional contexts, as well as possible scopal dependencies. I leave these tasks for future work.

Having discussed the relevant aspects of the semantic representation of singular and plural individual entities, verbal predicates (including inherently collective and distributive ones) and prepositions, I will now introduce the semantic representation language in which the corresponding semantic representations of our fragment of Polish will be expressed.

7.2 A Syntactic Variant of Ty2

To represent the translations of the linguistic expressions of our fragment of Polish, I will use terms of a syntactic variant of the semantic representation language Ty2. Ty2 is a two-sorted (hence Ty2) theory of types first introduced in Gallin (1975), later defined in Zimmermann (1989). Ty2 as defined in Gallin (1975) and Zimmermann (1989) provides two basic types, type *e* and type *s* for individual entities and possible worlds, respectively, and it can be considered an extensional counterpart to Montague’s *Intensional Logic*. Since my semantic analysis of CCs does not consider intensional contexts, the variant of Ty2 presented here does not introduce entities associated with possible worlds. Instead, I define two kinds of entities: *individuals* and *events*. These entities are assigned type *e* and type *v*, respectively. Type *t* is traditionally assigned to truth-values.⁷ I also define syntactic sugar for set-denoting terms ($\{\}$) in addition to the terms which are usually defined in other many-sorted logics. I also add conjunction, disjunction and inclusion of set-denoting terms, captured as set union (\cup), set intersection (\cap) and the superset relation (\supset), respectively.

The specification of the semantic representation language Ty2 including the syntactic sugar is given in (325) through (333). This specification is based on the specification of Ty2 in Sailer (2003).⁸

⁷Of course, it is possible to keep entities associated with possible worlds when introducing events, in which case my semantic representation language would get a three-sorted theory of types (Ty3).

⁸Note that our set of natural numbers \mathbb{N} includes 0. Note also that the specification of non-logical constants follows a system assuming finitely many constants, in contrast to a system assuming an

(325) Definition of Types

Let $Type$ be the smallest set such that
 $e, t, v \in Type$, and
 for each $\tau, \tau' \in Type$, $\langle \tau, \tau' \rangle \in Type$.

(326) Definition of a Set of Variables

Let Var be the smallest set such that
 for each $\tau \in Type$ and for each $n \in \mathbb{N}$, $v_{\tau, n} \in Var$.

(327) Definition of a Set of Constants

Let $Const$ be a finite set of symbols.

(328) Definition of Type Assignment to Constants

Let \mathcal{C} be a total function from $Const$ to $Type$.

(329) Definition of Ty2 Terms

Given a finite set $Const$ and a function \mathcal{C} from $Const$ to $Type$, $Ty2_{\mathcal{C}}$ is the smallest set such that,

$Var \subset Ty2_{\mathcal{C}}$,
 for each $c \in Const$, $c_{\mathcal{C}(c)} \in Ty2_{\mathcal{C}}$,
 for each $\phi_{\tau\tau'}, \psi_{\tau} \in Ty2_{\mathcal{C}}$, $(\phi_{\tau\tau'}\psi_{\tau})_{\tau'} \in Ty2_{\mathcal{C}}$,
 for each $v_{\tau, n} \in Var$, and for each $\phi_{\tau'} \in Ty2_{\mathcal{C}}$,
 $(\lambda v_{\tau, n}.\phi_{\tau'})_{\tau\tau'} \in Ty2_{\mathcal{C}}$,
 for each $\tau \in Type$, and for each $\phi_{\tau}, \psi_{\tau} \in Ty2_{\mathcal{C}}$,
 $(\phi_{\tau} = \psi_{\tau})_t \in Ty2_{\mathcal{C}}$,
 for each $\tau \in Type$, for each $n \in \mathbb{N}$,
 and for each $\phi_{1, \tau}, \dots, \phi_{n, \tau} \in Ty2_{\mathcal{C}}$,
 $\{\phi_{1, \tau}, \dots, \phi_{n, \tau}\}_{\tau t} \in Ty2_{\mathcal{C}}$,
 for each $\phi_{\tau t} \in Ty2_{\mathcal{C}}$, and for each $\psi_{\tau t} \in Ty2_{\mathcal{C}}$,
 $(\phi_{\tau t} \cup \psi_{\tau t})_{\tau t} \in Ty2_{\mathcal{C}}$,
 for each $\phi_{\tau t} \in Ty2_{\mathcal{C}}$, and for each $\psi_{\tau t} \in Ty2_{\mathcal{C}}$,
 $(\phi_{\tau t} \cap \psi_{\tau t})_{\tau t} \in Ty2_{\mathcal{C}}$,
 for each $\phi_{\tau t} \in Ty2_{\mathcal{C}}$, and for each $\psi_{\tau t} \in Ty2_{\mathcal{C}}$,
 $(\phi_{\tau t} \supset \psi_{\tau t})_t \in Ty2_{\mathcal{C}}$,
 for each $v_{\tau, n} \in Var$, and for each $\phi_t \in Ty2_{\mathcal{C}}$,
 $(\exists!_I v_{\tau, n}.\phi_t)_t \in Ty2_{\mathcal{C}}$,
 for each $v_{\tau, n} \in Var$, and for each $\phi_t \in Ty2_{\mathcal{C}}$,
 $(\exists_{>I} v_{\tau, n}.\phi_t)_t \in Ty2_{\mathcal{C}}$.

(330) Definition of Frame

Let E be a set of individuals and V be a set of events,
 then $F = \bigcup_{\tau \in Type} D_{E, V, \tau}$ is a frame where,

infinite set of constants (cf. Penn and Richter (2004) and Richter (2004b).)

$$\begin{aligned}
D_{E,V,t} &= \{1, 0\}, \\
D_{E,V,e} &= E, \text{ and} \\
D_{E,V,v} &= V, \text{ and} \\
\text{for each } \tau, \tau' \in \text{Type}, D_{E,V,\tau\tau'} &= D_{E,V,\tau'}^{D_{E,V,\tau}}.
\end{aligned}$$

(331) Definition of the Model

Given a set of constants $Const$, a type assignment function to constants \mathcal{C} , a set of individuals E and a set of events V ,

a Ty2 model is a pair $M = \langle F, int \rangle$, such that

F is a frame, and

int is a function from the set of constants to F such that

$$\text{for each } c \in Const, int(c) \in D_{E,V,\mathcal{C}(c)}.$$

(332) Definition of Variable Assignment

Ass is a subset of F^{Var} such that

$$Ass = \left\{ a \in F^{Var} \left| \begin{array}{l} \text{for each } n \in \mathbb{N}, \\ \text{for each } \tau \in \text{Type}, \\ a(var_{\tau,n}) \in D_{E,V,\tau} \end{array} \right. \right\}.$$

(333) Definition of the Semantics of Ty2 Terms

For each term $\phi_\tau \in \text{Ty2}_{\mathcal{C}}$, for each model M and for each variable assignment $a \in Ass$,

$\llbracket \phi_\tau \rrbracket^{M,a}$, the extension of a term ϕ in a model $M = \langle F, int \rangle$ under a variable assignment $a \in Ass$, is defined as follows:

for each $c \in Const$,

$$\llbracket c_{\mathcal{C}(c)} \rrbracket^{M,a} = int(c),$$

for each $\tau \in \text{Type}$, and for each $n \in \mathbb{N}$, for each $v_{\tau,n} \in Var$,

$$\llbracket v_{\tau,n} \rrbracket^{M,a} = a(v_{\tau,n}),$$

for each $\phi_{\tau\tau'} \in \text{Ty2}_{\mathcal{C}}$, and for each $\psi_\tau \in \text{Ty2}_{\mathcal{C}}$,

$$\llbracket (\phi_{\tau\tau'} \psi_\tau)_{\tau'} \rrbracket^{M,a} = \llbracket \phi_{\tau\tau'} \rrbracket^{M,a} (\llbracket \psi_\tau \rrbracket^{M,a}),$$

for each $var_{\tau,n} \in Var$, and for each $\phi_{\tau'} \in \text{Ty2}_{\mathcal{C}}$,

$$\llbracket (\lambda v_{\tau,n} \cdot \phi_{\tau'})_{\tau\tau'} \rrbracket^{M,a} = f \in D_{E,V,\tau'}^{D_{E,V,\tau}}, \text{ such that}$$

$$\text{for each } d \in D_{E,V,\tau} : f(d) = \llbracket \phi_{\tau'} \rrbracket^{M,a[v_{\tau,n}/d]},$$

for each $\phi_\tau, \psi_\tau \in \text{Ty2}_{\mathcal{C}}$,

$$\llbracket (\phi_\tau = \psi_\tau)_t \rrbracket^{M,a} = 1 \text{ if } \llbracket \phi_\tau \rrbracket^{M,a} = \llbracket \psi_\tau \rrbracket^{M,a}, \text{ else } 0,$$

for each $\phi_{1,\tau}, \dots, \phi_{n,\tau} \in \text{Ty2}_{\mathcal{C}}$, and for each $n \in \mathbb{N}$,

$$\llbracket \{\phi_{1,\tau}, \dots, \phi_{n,\tau}\}_{\tau t} \rrbracket^{M,a} = f \in D_{E,V,t}^{D_{E,V,\tau}}, \text{ such that}$$

$$\text{for each } d \in D_{E,V,\tau} :$$

$$f(d) = 1 \text{ if } d \in \{\llbracket \phi_{1,\tau} \rrbracket, \dots, \llbracket \phi_{n,\tau} \rrbracket\}, \text{ else } 0,$$

for each $\phi_{\tau t}, \psi_{\tau t} \in \text{Ty2}_{\mathcal{C}}$,

$\llbracket (\phi_{\tau t} \cup \psi_{\tau t})_{\tau t} \rrbracket^{M,a} = f \in D_{E,V,\tau}^{D_{E,V,\tau}}$, such that
 for each $d \in D_{E,V,\tau} : f(d) = 1$ if
 $\langle d, 1 \rangle \in \llbracket \phi \rrbracket^{M,a}$ or
 $\langle d, 1 \rangle \in \llbracket \psi \rrbracket^{M,a}$, else 0,
 for each $\phi_{\tau t}, \psi_{\tau t} \in \text{Ty}2_{\mathcal{C}}$,
 $\llbracket (\phi_{\tau t} \cap \psi_{\tau t})_{\tau t} \rrbracket^{M,a} = f \in D_{E,V,\tau}^{D_{E,V,\tau}}$, such that
 for each $d \in D_{E,V,\tau} : f(d) = 1$ if
 $\langle d, 1 \rangle \in \llbracket \phi \rrbracket^{M,a}$ and
 $\langle d, 1 \rangle \in \llbracket \psi \rrbracket^{M,a}$, else 0,
 for each $\phi_{\tau t}, \psi_{\tau t} \in \text{Ty}2_{\mathcal{C}}$,
 $\llbracket (\phi_{\tau t} \supset \psi_{\tau t})_t \rrbracket^{M,a} = 1$ if
 $\llbracket \phi \rrbracket^{M,a} \neq \llbracket \psi \rrbracket^{M,a}$, and
 for each $d \in D_{E,V,\tau} :$
 if $\langle d, 1 \rangle \in \llbracket \psi \rrbracket^{M,a}$
 then $\langle d, 1 \rangle \in \llbracket \phi \rrbracket^{M,a}$, else 0,
 for each $v_{\tau,n} \in \text{Var}$, and for each $\phi_t \in \text{Ty}2_{\mathcal{C}}$,
 $\llbracket (\exists!_I v_{\tau,n} \cdot \phi_t)_t \rrbracket^{M,a} = 1$ if
 there exists exactly one $d \in D_{E,V,\tau}$
 such that $\llbracket \phi_t \rrbracket^{M,a[v_{\tau,n}/d]} = 1$, else 0,
 for each $v_{\tau,n} \in \text{Var}$, and for each $\phi_t \in \text{Ty}2_{\mathcal{C}}$,
 $\llbracket (\exists_{>I} v_{\tau,n} \cdot \phi_t)_t \rrbracket^{M,a} = 1$ if
 there exist more than one $d \in D_{E,V,\tau}$
 such that $\llbracket \phi_t \rrbracket^{M,a[v_{\tau,n}/d]} = 1$, else 0.

Further terms of Ty2 such *true*, *false*, negation, conjunction, disjunction, implication, existential and universal quantification are defined as in Sailer (2003, p. 40), following Gallin (1975, p. 75). In addition to the universal and the existential quantifiers, my semantic specification language Ty2 includes two cardinality quantifiers: the quantifier which is denoted by the logical operator symbol $\exists!_I$ and which is used for expressing that a given formula holds for exactly one entity of the relevant type, and the quantifier which is denoted by the logical operator symbol $\exists_{>I}$ and which is used for expressing that a given formula holds for more than one entity of the relevant type.

Having defined the semantic representation language Ty2, I will now introduce the framework of HPSG, which will be used in Chapter 9 in my account of Polish CCs, and then encode the language Ty2 in the description language of HPSG.

7.3 HPSG

This section introduces the formal foundations and the linguistic-theoretical concepts of Head-Driven Phrase Structure Grammar (HPSG), which in general terms can be characterized as a generative, eclectic, comprehensive, surface-oriented, strict lexicalist, non-derivational, constraint-based, mathematically precise frame-

work for grammatical analysis. HPSG was inspired by several other frameworks, such as Government and Binding Theory (GB, cf. Chomsky (1981)), Lexical Functional Grammar (LFG, cf. Bresnan (1982)), Categorical Grammar (CG, cf. Ades and Steedman (1982)) and Generalized Phrase Structure Grammar (GPSG, cf. Gazdar et al. (1985)). It was also influenced by other fields such as computer science, drawing from the concepts of data type theory and knowledge representation. Due to a uniform underlying formalism and a modular organization of the linguistic theory, HPSG is very attractive for natural language processing.

Two aspects of HPSG will be discussed in this section: HPSG as a linguistic formalism, i.e., a set of formal tools for formulating and formalizing analyses of various linguistic phenomena, and HPSG as a linguistic theory, i.e., a collection of analyses of various linguistic phenomena encoded in this formalism. Section 7.3.1 will introduce the logical architecture of HPSG, including the way the empirical domain is modeled and described in HPSG. In Section 7.3.2, the HPSG linguistic theory will be characterized on the basis of the grammar of English developed in Pollard and Sag (1994), the most important instance of a concrete linguistic theory specified in this paradigm. In Section 7.3.3, I will provide a modified version of the standard HPSG linguistic theory with the integrated model-theoretic semantic framework of *Lexicalized Flexible Ty2*.

7.3.1 The Logical Architecture of HPSG

In this section, I will briefly explain how natural language expressions are assumed to be modeled in HPSG and how their models are described. I will also outline the basic architecture of HPSG grammars. The aim is to give an intuitive sense of the relevant aspects of the logical architecture of HPSG rather than provide its strict mathematical specification. An exhaustive and mathematically precise description of the formal foundations of HPSG can be found in Richter (2004a).⁹ The present section is partially based on this work, as well as on Levine (2003), Levine and Meurers (2006) and Przepiórkowski and Kupść (2006), who provide a compact and informal characterization of HPSG as a linguistic theory and a formal paradigm, and also discuss some aspects of its computational realizations.

⁹Several feature logics have been proposed to provide the formal foundations for HPSG. The most recent and widely employed formalism for the HPSG of Pollard and Sag (1994) is Relational Speciate Re-entrant Language (RSRL), defined in Richter et al. (1999) and Richter (2004a). RSRL extends Speciate Re-entrant Logic (SRL), defined in King (1989, 1994), by adding relations and quantification to the set of expressions. A brief overview of other logics for HPSG, including logics for earlier versions of HPSG such as that defined in Carpenter (1992), can be found in Levine and Meurers (2006).

7.3.1.1 Modeling the Empirical Domain

Natural language is viewed in HPSG¹⁰ as a system of total linguistic objects (as opposed to partial information about them) linked by specific properties. Types (versus tokens)¹¹ of total linguistic objects are modeled in HPSG by (abstract)¹² typed / sorted feature structures. Feature structures as used in HPSG are thus set-theoretic constructs idealizing expressions of natural languages. Abstracting away from technical details, they can be viewed as sets of attribute-value pairs or as configurations of arcs and nodes (graphs). An attribute (or an arc), also referred to as a feature, is associated with a property of a class of linguistic objects. It can mathematically be defined as a function from a set of nodes to a set of nodes. A value of an attribute (a node) is associated with linguistic objects of a specific sort, or a set or list of such objects. A value of an attribute may be either atomic or complex. Each node in a typed / sorted feature structure must be assigned a sort, also referred to as type, which indicates the type of the modeled entity. Feature structures, as models of total linguistic objects, are assumed to be totally well-typed and sort-resolved. Total well-typedness reflects the assumption that all well-formed linguistic objects are total, i.e., complete objects. A feature structure is totally well-typed when each node has all appropriate attributes (for the notion of appropriateness as used here, see Section 7.3.1.3). Sort-resolvedness requires that every node of a feature structure is labeled by a maximally specific sort, also referred to as a species (for a notion of maximally specific sorts, see Section 7.3.1.3). Totally well-typed sort-resolved (abstract) feature structures serve in HPSG as total models, i.e., complete representations of expressions of natural languages. They belong to the denotations of grammars. Finally, models of HPSG grammars are assumed to be *exhaustive models*, i.e., models that contain instances of all configurations that are licensed by the grammar. In that sense, they are maximal.¹³

¹⁰Note that there are two different formalisms for HPSG: the proposal of Pollard and Sag (1994) and the earlier proposal by the same authors (Pollard and Sag (1987)). In Pollard and Sag (1987) grammar is treated as a set of feature structures representing partial information about the language and feature structures are defined as representations of partial information about the language. By contrast, Pollard and Sag (1994) views language as a system of total objects. Grammar is treated as a signature together with a set of descriptions and feature structures are defined as complete representations, i.e., models, of idealized linguistic entities (object types). This is the HPSG framework I will adopt here. Wherever the term HPSG is used in this thesis, it refers to the formal paradigm introduced in Pollard and Sag (1994).

¹¹While types of a natural language can be understood as unique idealizations of classes of identically-shaped expressions of the language, tokens can be viewed as (arbitrarily many) instantiations of abstract types of a natural language.

¹²For a definition of abstract feature structures as used in HPSG and a discussion on the conceptual and formal differences between abstract, concrete and disjunctive feature structures, see Richter (2004a).

¹³An alternative theory of meaning of HPSG grammars has been proposed in Richter (2004b), who assumes *minimal exhaustive models*. Minimal exhaustive models are exhaustive models which contain unique unembedded sign configurations licensed by the grammar. Unembedded signs are entities associated with natural language utterances. They can be easily incorporated in the HPSG by extending the ontology of linguistic objects. A number of conceptual, empirical and techni-

7.3.1.2 Describing the Empirical Domain

The empirical domain, i.e., natural language expressions, is not described directly, but rather via a model, which, as indicated above, consists of a set of totally well-typed sort-resolved (abstract) feature structures.¹⁴ An HPSG grammar thus describes (is interpreted by) the model, i.e., a set of feature structures that satisfy all the formulae of the theory. It can be defined as a set of expressions of a formal language which determine the set of grammatical linguistic objects where every grammatical linguistic object is described by every formula of the theory.

To formulate generalizations about the empirical domain, a logical description language is needed. HPSG grammars traditionally use the formal language of so-called attribute-value matrix (AVM) diagrams. AVM diagrams are matrices, enclosed between square brackets. They are used to provide (partial) descriptions of feature structures and to put constraints on them. Various versions of the formal language of AVM diagrams have been discussed in detail and defined in Kasper and Rounds (1986), Carpenter (1992) and Richter (2004a). In this thesis, I will assume the version defined in Richter (2004a). An exemplary AVM is provided in Figure 7.4.

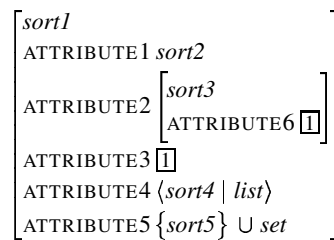


Figure 7.4: An exemplary AVM

AMVs include attribute names, such as ATTRIBUTE1 and ATTRIBUTE2 in Figure 7.4, and sort symbols, such as *sort1* and *sort2* in Figure 7.4, arranged in some specific way. The values of the attributes can be atomic, like the value of ATTRIBUTE1, or complex, like the value of ATTRIBUTE2. AVMs can also include so-called tags, which are conventionally depicted as boxed integers, like $\boxed{1}$ in Figure 7.4, and are usually used to indicate that two (or more) paths share their value. In HPSG, the sharing of path values is referred to as structure sharing or token identity. Tags, in fact, function in HPSG descriptions as variables. AVMs can further include list descriptions, which enumerate the descriptions of the elements between angled brackets. An exemplary list description appears in Figure 7.4 as

cal arguments for distinguishing between unembedded and embedded signs have been put forward in Richter (2004b). Note that minimal exhaustive models make it possible to formally integrate Montague-style semantics with the semantics of HPSG grammars (see Section 7.3.3). However, I will not go into the technical details here but assume such an architecture for my semantics.

¹⁴For different views on how the objects in the denotation of an HPSG grammar are related to the empirical domain see King (1999), Pollard (1999) and Richter (2007).

the value of the `ATTRIBUTE4`. The list in Figure 7.4 is expressed using the list notation with the vertical slash, `|`. The vertical slash separates a description of the first element on a list, e.g., `sort4` in Figure 7.4, from a description of the rest of the list after the first element. Lists can also be described by using the sort symbols `list`, `e(mpty)list` and `n(on)e(mpty)list`, referring to a list, an empty list and a non-empty list, respectively. Finally, AVMs can include set descriptions, for which the usual set notation is used. Alternatively, the sort symbols `set`, `e(mpty)set` and `n(on)e(mpty)set` can be used to indicate a set, an empty set and a non-empty set, respectively. An exemplary set description is provided in Figure 7.4 as the value of the `ATTRIBUTE5`.

Feature structures modeling complex linguistic expressions can also be described in HPSG by phrase structure trees, such as those used in traditional derivational linguistic theories. Tree descriptions can include AVMs to specify their nodes.

The formulae of the description language are combinable by standard logical connectives, such as conjunction (\wedge), disjunction (\vee), equation ($=$), negation (\neg), implication (\rightarrow) and equivalence (\leftrightarrow) in order to form more complex expressions. In addition, existential quantifiers (\exists) and universal quantifiers (\forall) can be used in descriptions.¹⁵ Finally, relations can be used in descriptions.

7.3.1.3 Designing the Signature

In HPSG, formal theories, i.e., HPSG grammars, are assumed to consist of two components: the signature and the theory proper. The theory is simply a set of grammatical principles. The signature contains a set of (non-logical) symbols used in the theory to formulate principles. The symbols in the signature are either names of sorts / types of objects described by the grammar, names of attributes / features that objects of particular types may bear, or relation symbols, which are given together with the arity of the relations. HPSG sort symbols are conventionally written in italics and attribute names in small caps. Sort symbols of an HPSG signature are organized hierarchically. This hierarchical organization constitutes the sort hierarchy, which is defined as a partial ordering of the set of sort symbols. Those sorts in the sort hierarchy which do not have any proper subsort are referred to as maximally specific sorts or species. A signature also determines the relationship between sorts and attributes, i.e., it specifies which attribute is appropriate to which sorts, and which sort is appropriate as a value of which attribute. The relationship between sorts and attributes is referred to in HPSG as appropriateness conditions or feature declarations. An exemplary signature is provided in Figure 7.5.

¹⁵Note, however, that quantifiers used in the formulae of the description language of HPSG are similar to but not the same as the corresponding quantifiers in first-order logic.

```

sort0
  sort1 ATTRIBUTE1 sort4
    ATTRIBUTE2 sort5
    sort2
    sort3 ATTRIBUTE3 sort6
  sort4
  sort5 ATTRIBUTE4 sort6
  sort6

```

Figure 7.5: An exemplary signature

The signature in Figure 7.5 specifies *sort0* as the highest sort in the hierarchy. All other sorts are subsumed by it. *sort0* immediately subsumes the sorts *sort1*, *sort4*, *sort5* and *sort6*, as indicated by indentation. Indentation further indicates that *sort1* immediately subsumes *sort2* and *sort3*. Furthermore, *sort2*, *sort3*, *sort4*, *sort5* and *sort6* are specified to be maximally specific sorts (species), i.e., they do not subsume any other sorts (except for themselves). The set of attributes is specified in that each attribute is provided behind the highest sort in the sort hierarchy for which this attribute is appropriate. Thus, ATTRIBUTE1 and ATTRIBUTE2 are appropriate for *sort1*, *sort2*, and *sort3*. They are, however, printed only at *sort1*. By inheritance, these attributes are also appropriate for *sort2* and *sort3*. For *sort3*, the attribute ATTRIBUTE3 is specified to be appropriate in addition to ATTRIBUTE1 and ATTRIBUTE2. Finally, the attribute ATTRIBUTE4 is specified to be appropriate for *sort5*. The indentation-based specification of the signature in Figure 7.5 can be replaced by a representation as a taxonomic tree, demonstrated in Figure 7.6.

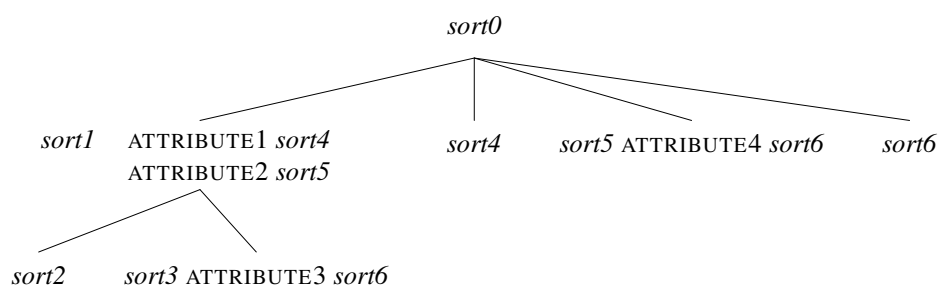


Figure 7.6: An exemplary signature represented as a tree

The crucial task of an HPSG signature is to specify the ontology, i.e., to make explicit what types of objects there are and what attributes they have. The task of an HPSG theory is to determine the subset of the objects declared in the signature which are well-formed / grammatical.

7.3.2 The HPSG Linguistic Theory

The fundamentals of the HPSG linguistic framework have been developed in Pollard and Sag (1994) with reference to English. Although a vast literature addressing empirical and theoretical issues in a wide range of languages has been published within the framework of HPSG during the past decade, this work still remains the standard reference. For this reason, in introducing the HPSG linguistic framework in this section, I will outline the basic architectural and linguistic assumptions of the grammar of Pollard and Sag (1994). I will, however, restrict the discussion to those components of the theory and those empirical phenomena which are relevant for the analysis of Polish CCs provided in Chapter 9.

7.3.2.1 The Architecture of Signs

The basic conceptual assumption of the grammar of Pollard and Sag (1994) is that all linguistic expressions are signs, understood in the sense of Ferdinand de Saussure's signs. Saussurean signs are bilateral formations consisting of a correlation of form and meaning. Pollard and Sag (1994, p. 15) define signs as "structured complexes of phonological, [morphological], syntactic, semantic, discourse, and phrase-structural information". Signs are further assumed to fall into two disjoint subclasses: lexical signs, i.e., words, and phrasal signs, i.e., phrases. Figure 7.7 and Figure 7.8 provide exemplary descriptions of words and phrases, respectively, given in AVM notation.

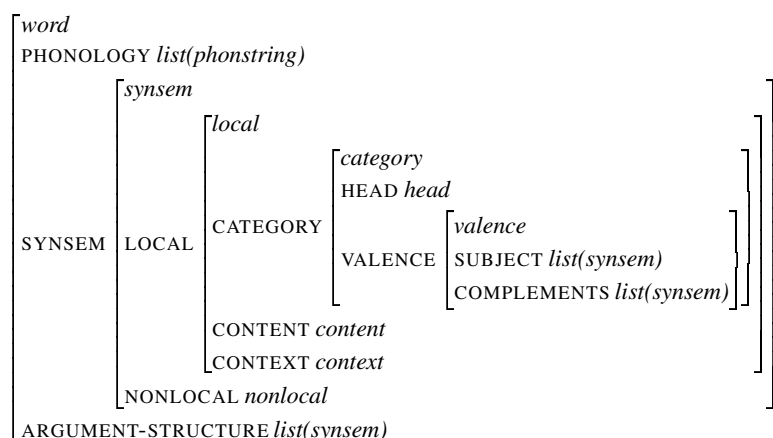


Figure 7.7: The architecture of words in terms of HPSG

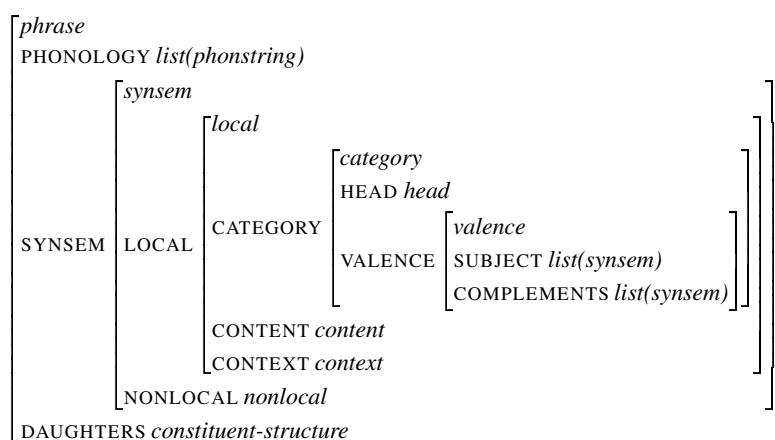


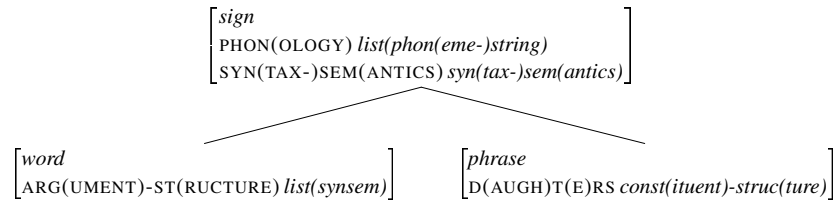
Figure 7.8: The architecture of phrases in terms of HPSG

The AVM descriptions in Figure 7.7 and Figure 7.8 demonstrate that all objects of the type *word* and all objects of the type *phrase* must have the attribute PHONOLOGY, providing a representation of the phonology of a given sign, and the attribute SYNSEM, whose value describes the syntax and semantics of a sign. The value of the attribute SYNSEM, i.e., the object of the type *synsem*, has two attributes: LOCAL and NONLOCAL. The value of the attribute NONLOCAL allows for describing unbounded dependency phenomena. The value of the attribute LOCAL, i.e., the object of the type *local*, provides three further attributes: CATEGORY, CONTENT and CONTEXT. The value of the attribute CONTENT specifies the semantic representation of a sign. The value of the attribute CONTEXT provides pragmatic information. The value of the attribute CATEGORY has two further features: HEAD and VALENCE. The value of the HEAD attribute of a sign is its part of speech. The value of the attribute VALENCE specifies the syntactic valency of a sign. The distinction between subjects and complements is made by means of the attributes SUBJECT and COMPLEMENTS, respectively. The AVMs in Figure 7.7 and Figure 7.8 further show that objects of the type *word* have the attribute ARGUMENT-STRUCTURE, while objects of the type *phrase* have the attribute DAUGHTERS. While the value of the attribute ARGUMENT-STRUCTURE indicates the argument structure of a word, the value of the attribute DAUGHTERS describes the constituent structure of a phrase.¹⁶

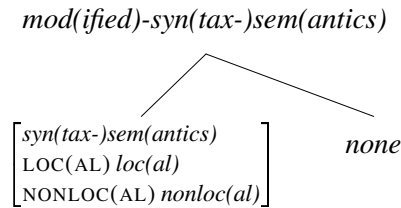
¹⁶Note that the grammar of Pollard and Sag (1994) comes in two versions: Chapters 1–8 and the Appendix, on the one hand, and Chapter 9, on the other hand. The crucial difference between the two versions consists in the treatment of valence and extraction. Whereas valence properties are captured by the value of one attribute, namely SUBCATEGORIZATION, and extraction of an object is assumed to leave a trace in Chapters 1–8 of Pollard and Sag (1994), in Chapter 9, valence properties are captured by the value of three attributes, SUBJECT, SPECIFIER and COMPLEMENTS, and extraction of an object is assumed not to leave a trace. The HPSG grammar of Polish CCs developed in this thesis is based on Chapter 9 of Pollard and Sag (1994). Thus, whenever the notion of HPSG linguistic theory is used in the further course of this thesis, it refers to the modified linguistic theory of Chapter 9 of Pollard and Sag (1994), as opposed to the one developed in Chapters 1–8.

The following sort hierarchy and feature declarations underly the relevant parts of the descriptions in Figure 7.7 and Figure 7.8. The sorts *sign*, *mod-synsem*, *local*, *category*, *valence* and *list* are immediately subsumed by *object*, which is assumed to be the highest sort in the hierarchy.

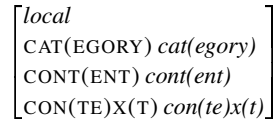
(334) *sign*:



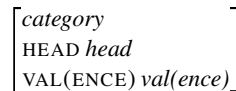
(335) *modified-synsem*:



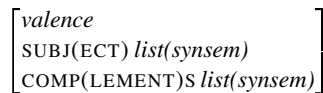
(336) *local*:

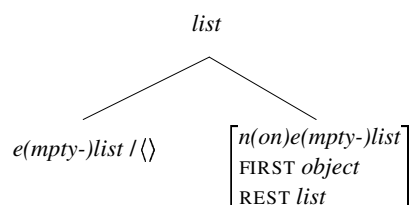


(337) *category*:



(338) *valence*:



(339) *list*:

In the next subsections, I will describe how objects of the types *word* and *phrase* are licensed in HPSG, and develop a sample HPSG grammar for a small fragment of Polish.

7.3.2.2 The Lexicon

Words are licensed by lexical entries, which are descriptions of feature structures of sort *word*. Lexical entries are incorporated in the grammar by means of THE WORD PRINCIPLE, given first informally and then formally in (340).

(340) THE WORD PRINCIPLE
Every word must be described by at least one lexical entry.

Formalization:

$$\textit{word} \longrightarrow (\text{LE}_1 \vee \dots \vee \text{LE}_n)$$

LE_1 and LE_n are meta-variables that stand for lexical entries. The set of lexical entries constitutes the lexicon. In the standard version of HPSG, the lexicon is thus a collection of descriptions of words. Meurers (2000) proposes that the lexicon additionally includes lexical rules, licensing derived words. Sailer (2003) postulates in addition to word-level lexical entries phrasal lexical entries. Here, I will adopt the standard approach to the lexicon as licensing words which are not the output of any derivational rules.

7.3.2.3 Phrasal Structures

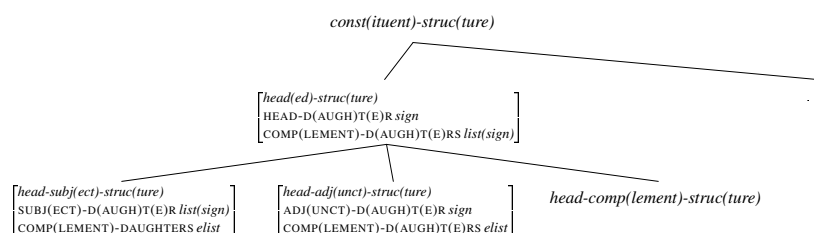
Single words, licensed by lexical entries, can combine to form phrasal structures. Phrasal structures are licensed by immediate dominance (id) schemata. Every headed phrase is assumed in HPSG to be licensed by an id schema. Pollard and Sag (1994) assume six id schemata: HEAD-SUBJECT SCHEMA, HEAD-COMPLEMENT SCHEMA, HEAD-SUBJECT-COMPLEMENT SCHEMA, HEAD-MARKER SCHEMA, HEAD-ADJUNCT SCHEMA and HEAD-FILLER SCHEMA. The id schemata correspond to the X-bar schema of the X-bar theory described by Chomsky (1986a, 1994). The X-bar schema, presented in (341), is a generalization on structural properties of all phrases.

(341) The X-bar schema

$$X^n \rightarrow \dots X^{n-1} \dots$$

Three of the id schemata will play a role in the grammar of Polish CCs developed in Chapter 9: the HEAD-SUBJECT SCHEMA, HEAD-COMPLEMENT SCHEMA and HEAD-ADJUNCT SCHEMA. I will introduce them here and ignore the remaining ones. I will also provide no description of head-specifier structures, discussed in Chapter 9 of Pollard and Sag (1994), as they are irrelevant for Polish. To formulate the three id schemata, I define the following sort hierarchy and feature declaration for *const-struct*, which, according to (334), describes the value of the attribute DTRS.

(342) *constituent-structure*:¹⁷



The HEAD-SUBJECT SCHEMA (343) describes head-subject structures of the form in Figure 7.9. It licenses saturated phrases. The non-head daughter is a subject.

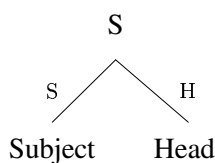


Figure 7.9: A head-subject structure

¹⁷According to the signature in Pollard and Sag (1994), the value of the attribute COMP-DTRS appropriate for the sort *head-struct* is a list of phrases, and the value of the attributes HEAD-DTR and ADJ-DTR appropriate for *head-adjunct-struct* is in each case *phrase*. Since I allow both phrasal and lexical signs to occur as complements, adjuncts and heads, I specify the value of COMP-DTRS as a list of signs, and the value of ADJ-DTR and HEAD-DTR for head-adjunct structures as *sign*.

- (343) HEAD-SUBJECT SCHEMA
 (according to Pollard and Sag (1994, p. 347))¹⁸
 A phrase with DTRS value of sort *head-subj-struct* in which the HEAD-DTR value is a sign.

Formalization:

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS} \left[\begin{array}{l} \textit{head-subj-struct} \\ \text{HEAD-DTR sign} \end{array} \right] \end{array} \right]$$

The HEAD-COMPLEMENT SCHEMA (344) describes head-complement structures of the form in Figure 7.10, where $\neg X^0$ refers to an arbitrary category of a non-minimal projection level. The non-head daughter, if any, is a complement.

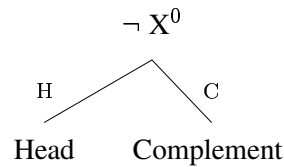


Figure 7.10: A head-complement structure

- (344) HEAD-COMPLEMENT SCHEMA
 (according to Pollard and Sag (1994, p. 348))¹⁹
 A phrase with DTRS value of sort *head-comp-struct* in which the HEAD-DTR value is a sign.

Formalization:

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS} \left[\begin{array}{l} \textit{head-comp-struct} \\ \text{HEAD-DTR sign} \end{array} \right] \end{array} \right]$$

Finally, the HEAD-ADJUNCT SCHEMA (345) describes head-adjunct structures of the form as in Figure 7.11, where XP refers to an arbitrary category of a phrasal projection level. It licenses phrases consisting of an adjunct and a modified head daughter.

¹⁸The original version of THE HEAD-SUBJECT SCHEMA of Pollard and Sag (1994, p. 347) requires that the HEAD-DTR value be a phrasal sign. Since I also allow words to occur as heads in head-subject structures, I specify the value of HEAD-DTR not as *phrase*, but as *sign*.

¹⁹As in the case of the HEAD-SUBJECT SCHEMA, the original version of the HEAD-COMPLEMENT SCHEMA of Pollard and Sag (1994, p. 348) requires that the HEAD-DTR value be a phrasal sign. In my version of this schema, the HEAD-DTR value is specified to be of sort *sign* in order to allow both phrasal and lexical signs to appear in these structures.

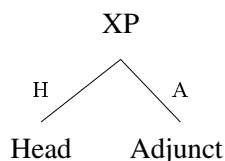


Figure 7.11: A head-adjunct structure

- (345) **HEAD-ADJUNCT SCHEMA**
 (according to Pollard and Sag (1994, p. 56))
 A phrase with DTRS value of sort *head-adjunct-struct*, such that the MOD value of the adjunct daughter is token-identical to the SYNSEM value of the head daughter.

Formalization:

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS} \left[\begin{array}{l} \textit{head-adjunct-struct} \\ \text{HEAD-DTR} \mid \text{SS} \boxed{\square} \\ \text{ADJUNCT-DTR} \mid \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD} \mid \text{MOD} \boxed{\square} \end{array} \right] \end{array} \right]$$

Note that all variables which are not explicitly bound by a quantifier (such as the variable \square in (345)) are assumed to be implicitly existentially bound.

The id schemata are integrated with the grammar by means of the implicational ID PRINCIPLE, provided in (346).

- (346) **THE ID PRINCIPLE**
 Every headed phrase must satisfy exactly one of the ID schemata.

Formalization:

$$[\text{DTRS } \textit{headed-struct}] \rightarrow (\text{HEAD-SUBJECT-SCHEMA} \vee \text{HEAD-COMPLEMENT-SCHEMA} \vee \text{HEAD-ADJUNCT-SCHEMA})$$

THE ID PRINCIPLE ensures that each headed phrase is described by one of the three id schemata. By means of the lexicon and the set of the id schemata, complex syntactic structures can be licensed.

7.3.2.4 Other Principles

Having provided THE WORD PRINCIPLE and THE ID PRINCIPLE, I will now introduce further principles which will play a role in our grammar of Polish CCs. I will first present the THE ARGUMENT REALIZATION PRINCIPLE, which, in fact, was not specified in Pollard and Sag (1994). THE ARGUMENT REALIZATION PRINCIPLE (347) determines how the elements on the ARGUMENT STRUCTURE list of words are distributed over the SUBJECT and COMPLEMENTS list.

(347) THE ARGUMENT REALIZATION PRINCIPLE

- a. The ARGUMENT-STRUCTURE list of a non-predicative word is token-identical to its COMPLEMENTS list and its SUBJECT list is the empty list.

Formalization:

$$\left[\begin{array}{l} \textit{word} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD} \mid \text{PRED} - \end{array} \right] \longrightarrow \left[\begin{array}{l} \text{ARGUMENT-STRUCTURE} \boxed{1} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \left[\begin{array}{l} \text{SUBJECT} \langle \rangle \\ \text{COMPLEMENTS} \boxed{1} \end{array} \right] \end{array} \right]$$

- b. The first element of the ARGUMENT-STRUCTURE list of a predicative word is mapped to its SUBJECT list, and the rest of the ARGUMENT-STRUCTURE list is token-identical to its COMPLEMENTS list.

Formalization:

$$\left[\begin{array}{l} \textit{word} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD} \mid \text{PRED} + \end{array} \right] \longrightarrow \left[\begin{array}{l} \text{ARGUMENT-STRUCTURE} \langle \boxed{1} \mid \boxed{2} \rangle \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \left[\begin{array}{l} \text{SUBJECT} \langle \boxed{1} \rangle \\ \text{COMPLEMENTS} \boxed{2} \end{array} \right] \end{array} \right]$$

THE ARGUMENT REALIZATION PRINCIPLE thus ensures that non-predicative expressions have no subjects and all their arguments are realized syntactically via the COMPLEMENTS list. Predicative expressions are described as having one subject, which is identified with the first element on their ARGUMENT-STRUCTURE list. The remaining arguments are realized via the COMPLEMENTS list. Note that THE ARGUMENT REALIZATION PRINCIPLE as formulated in (347) does not account for pro-drop, which is possible in Polish but is not included in the fragment of Polish described in this thesis.

I will further introduce THE VALENCE PRINCIPLE (348), which determines the way heads and non-heads combine with each other.

(348) THE VALENCE PRINCIPLE
(according to Pollard and Sag (1994, p. 348))

In a headed phrase, for each valence feature *F*, the *F* value of the head daughter is the concatenation of the phrase's *F* value with the list of the SYNSEM values of the *F*-DTRS value.

Formalization:

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS } \textit{headed-struct} \end{array} \right] \longrightarrow \left(\left(\left(\left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \mid \text{SUBJECT } \boxed{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \mid \text{SUBJECT } \boxed{3} \\ \text{SUBJ-DTR} \langle \text{SYNSEM } \boxed{2} \rangle \end{array} \right] \wedge \right] \right) \vee \\ \text{append}(\boxed{1}, \langle \boxed{2}, \boxed{3} \rangle) \end{array} \right) \right) \left(\left(\left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \mid \text{COMPLEMENTS } \boxed{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \mid \text{COMPLEMENTS } \boxed{3} \\ \text{COMP-DTRS} \langle \text{SYNSEM } \boxed{2} \rangle \end{array} \right] \wedge \right] \right) \vee \\ \text{append}(\boxed{1}, \langle \boxed{2}, \boxed{3} \rangle) \end{array} \right) \right) \left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \boxed{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \boxed{1} \\ \text{ADJ-DTR } \textit{sign} \end{array} \right] \end{array} \right] \right)$$

The formalization of THE VALENCE PRINCIPLE includes a relational description: $\text{append}/3$. The three place $\text{append}/3$ relation is a relation between three lists, where the list in the third argument is obtained by concatenating the list in the second argument with the list in the first argument. The relation $\text{append}/3$ is defined in (349).

- (349) $\text{append}/3$
 The relation $\text{append}(\boxed{1}, \boxed{2}, \boxed{3})$ holds iff the list $\boxed{3}$ is the concatenation of the list $\boxed{1}$ and the list $\boxed{2}$.

Formalization:

$$\forall \boxed{1} \forall \boxed{2} \forall \boxed{3} \left(\text{append}(\boxed{1}, \boxed{2}, \boxed{3}) \leftrightarrow \left(\left(\left(\left(\boxed{1} \textit{elist} \wedge \boxed{2} \textit{list} \wedge \boxed{2} = \boxed{3} \right) \vee \right) \exists \boxed{4} \exists \boxed{5} \exists \boxed{6} \left(\left(\left[\begin{array}{l} \textit{list} \\ \boxed{1} \text{ FIRST } \boxed{4} \\ \text{REST } \boxed{5} \end{array} \right] \wedge \left[\begin{array}{l} \textit{list} \\ \boxed{3} \text{ FIRST } \boxed{4} \\ \text{REST } \boxed{6} \end{array} \right] \wedge \text{append}(\boxed{5}, \boxed{2}, \boxed{6}) \right) \right) \right) \right)$$

The description including the relation $\text{append}/3$ can be abbreviated using the symbol \oplus , which is a notational variant of $\text{append}/3$. For example, the description $\text{append}(\boxed{1}, \boxed{2}, \boxed{3})$ is equivalent to $\boxed{3}(\boxed{1} \oplus \boxed{2})$.

Another important principle of the grammar of Pollard and Sag (1994) is THE HEAD FEATURE PRINCIPLE (350). THE HEAD FEATURE PRINCIPLE says that in headed structures, the head values of mother and head daughter must be identical.

- (350) THE HEAD FEATURE PRINCIPLE
 (according to Pollard and Sag (1994, p. 399))
 In a headed phrase, the values of SYNSEM | LOCAL | CATEGORY | HEAD and DAUGHTERS | HEAD-DAUGHTER | SYNSEM | LOCAL | CATEGORY | HEAD are token-identical.

Formalization:

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS } \textit{headed-struct} \end{array} \right] \rightarrow \left[\begin{array}{l} \text{SYNSEM | LOC | CAT | HEAD } \boxed{\mathbb{1}} \\ \text{DTRS | HEAD-DTR | SYNSEM | LOC | CAT | HEAD } \boxed{\mathbb{1}} \end{array} \right]$$

The semantics of phrases is governed in the grammar of Pollard and Sag (1994) by THE SEMANTICS PRINCIPLE (351).²⁰ By means of this principle, the semantics of the mother is identified with the semantics of a modifier or with the semantics of the head daughter if there is no modification.

- (351) THE SEMANTICS PRINCIPLE
 (according to Pollard and Sag (1994, p. 56))
 In a headed phrase, the CONTENT value is token-identical to that of the adjunct daughter if the DTRS value is of sort *head-adjunct-struct*, and with that of the head daughter otherwise.

Formalization:

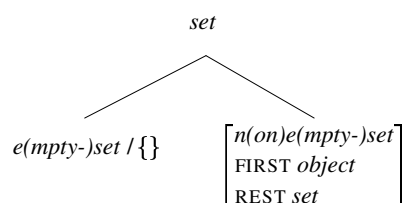
$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS } \textit{headed-struct} \end{array} \right] \rightarrow \left(\begin{array}{l} \left[\begin{array}{l} \text{SYNSEM | LOCAL | CONTENT } \boxed{\mathbb{1}} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-adjunct-struct} \\ \text{ADJUNCT-DTR | SYNSEM | LOCAL | CONTENT } \boxed{\mathbb{1}} \end{array} \right] \vee \end{array} \right] \\ \left[\begin{array}{l} \text{SYNSEM | LOCAL | CONTENT } \boxed{\mathbb{1}} \\ \text{DTRS } \left[\begin{array}{l} \neg \textit{head-adjunct-struct} \\ \text{HEAD-DTR | SYNSEM | LOCAL | CONTENT } \boxed{\mathbb{1}} \end{array} \right] \end{array} \right] \end{array} \right)$$

Further, THE PRINCIPLE OF CONTEXTUAL CONSISTENCY in (354) accounts for contextual aspects. The principle requires that all contextual restrictions provided by the daughters are collected at the mother node. This is implemented by means of the value of the path CONTEXT | BACKGROUND and under the sort hierarchies and feature declaration for *context* and *set* objects in (352) and (353), respectively.

²⁰Note that THE SEMANTICS PRINCIPLE in Pollard and Sag (1994, p. 56) provided in 351 is a simplification of the final version of THE SEMANTICS PRINCIPLE defined in Pollard and Sag (1994, pp. 401–402).

(352) *context*:²¹

$$\left[\begin{array}{l} \text{context} \\ \text{BACKGROUND } \textit{set}(\textit{psoa}) \end{array} \right]$$

(353) *set*:

(354) THE PRINCIPLE OF CONTEXTUAL CONSISTENCY

(according to Pollard and Sag (1994, p. 402))

The CONTEXT | BACKGROUND value of a given phrase is the union of the CONTEXT | BACKGROUND values of the daughters.

Formalization:

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS } \textit{headed-struct} \end{array} \right] \rightarrow$$

$$\left(\begin{array}{l}
 \left[\begin{array}{l} \text{SYNSEM | LOC | CONTEXT | BACKGROUND } \boxed{1} \cup \boxed{2} \\ \text{DTRS } \left[\begin{array}{l} \text{HEAD-DTR | SYNSEM | LOCAL | CONTEXT | BACKGROUND } \boxed{1} \\ \text{SUBJ-DTR } \langle \text{[SYNSEM | LOCAL | CONTEXT | BACKGROUND } \boxed{2}] \rangle \end{array} \right] \vee \end{array} \right] \\
 \left[\begin{array}{l} \text{SYNSEM | LOC | CONTEXT | BACKGROUND } \boxed{1} \cup \boxed{2} \\ \text{DTRS } \left[\begin{array}{l} \text{HEAD-DTR | SYNSEM | LOCAL | CONTEXT | BACKGROUND } \boxed{1} \\ \text{ADJ-DTR | SYNSEM | LOCAL | CONTEXT | BACKGROUND } \boxed{2} \end{array} \right] \vee \end{array} \right] \\
 \left[\begin{array}{l} \text{SYNSEM | LOC | CONTEXT | BACKGROUND } \boxed{1} \cup \boxed{2} \\ \text{DTRS } \left[\begin{array}{l} \text{HEAD-DTR | SYNSEM | LOCAL | CONTEXT | BACKGROUND } \boxed{1} \\ \text{COMP-DTRS } \langle \text{[SYNSEM | LOCAL | CONTEXT | BACKGROUND } \boxed{2}] \rangle \end{array} \right] \end{array} \right]
 \end{array} \right)$$

In the formalization of THE PRINCIPLE OF CONTEXTUAL CONSISTENCY, the set union operation is used, written as \cup . The symbol \cup abbreviates the three-place relation *set-union/3*, defined in (355).

²¹Note that in the signature of Pollard and Sag (1994), another feature is declared for the sort *conx*: the feature C-INDICES, whose value is an object of sort *c-indices*. The object *c-indices* provides a number of attributes such as SPEAKER, ADDRESSEE and UTTERANCE-LOCATION, giving information about the circumstances of an utterance. This feature geometry for *context* was adopted (sometimes with some modifications) in other HPSG approaches to pragmatic phenomena such as Murphy (1995), Green (1996), Androutsopoulos and Dale (2000) and Soehn (2006). In this thesis, I will make use only of the feature BACKGROUND.

- (355) `set-union/3`
 The relation `set-union($\boxed{1}$, $\boxed{2}$, $\boxed{3}$)` holds iff the set $\boxed{3}$ is the set-theoretical union of the set $\boxed{1}$ and the set $\boxed{2}$.

Formalization:

$$\forall \boxed{1} \forall \boxed{2} \forall \boxed{3} \left(\text{set-union}(\boxed{1}, \boxed{2}, \boxed{3}) \leftrightarrow \left(\forall \boxed{4} \left(\text{member}(\boxed{4}, \boxed{3} \text{ set}) \leftrightarrow \left(\text{member}(\boxed{4}, \boxed{1} \text{ set}) \vee \text{member}(\boxed{4}, \boxed{2} \text{ set}) \right) \right) \right) \right)$$

The definition of the `member/2` relation, used in the definition of `set-union/3`, is given in (356).²²

- (356) `member/2`
 The relation `member($\boxed{1}$, $\boxed{2}$)` holds between an object $\boxed{1}$ and a set $\boxed{2}$ in case the object is in the set.

Formalization:

$$\forall \boxed{1} \forall \boxed{2} \left(\text{member}(\boxed{1}, \boxed{2}) \leftrightarrow \left(\boxed{2} \left[\begin{smallmatrix} \text{set} \\ \text{FIRST } \boxed{1} \end{smallmatrix} \right] \vee \exists \boxed{3} \left(\boxed{2} \left[\begin{smallmatrix} \text{set} \\ \text{REST } \boxed{3} \end{smallmatrix} \right] \wedge \text{member}(\boxed{1}, \boxed{3}) \right) \right) \right)$$

Pollard and Sag (1994) provide no principle accounting for word order phenomena. Since I want my grammar to predict that the subject precedes the predicate, the head precedes its complements, and the modifier precedes the modified constituent (if it is headed by a preposition or a verb) or follows it (if it is headed by a noun or a verb), I additionally formulate THE CONSTITUENT ORDER PRINCIPLE, given (357). THE CONSTITUENT ORDER PRINCIPLE operates on PHON values and is designed to exactly account for the word orders in our grammar of CCs. It does not aim at capturing all linearization phenomena in Polish. For a more detailed (but still not exhaustive) description of linearization phenomena in Polish within the framework of HPSG, see Kupść (2000) and Przepiórkowski et al. (2002).

- (357) THE CONSTITUENT ORDER PRINCIPLE
 In a headed phrase, the PHON value is the concatenation of the PHON value of the non-head daughter with the PHON value of the head daughter, or the concatenation of the PHON value of the head daughter with the PHON value of the non-head daughter.

²²The definition in (356) does not consider lists and chains, i.e. lists or sets that are not components of the licensed structures, and for this reason it should be considered a simplification. Technical complications of using lists and sets which are not components of the described entities in the arguments of relations have been discussed Richter (2004a).

Formalization:

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DRTS } \textit{headed-struct} \end{array} \right] \rightarrow \left(\begin{array}{l} \left[\begin{array}{l} \text{PHON } \boxed{2} \oplus \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-subj-struct} \\ \text{HEAD-DTR} \mid \text{PHON } \boxed{1} \\ \text{SUBJ-DTR} \langle \boxed{[\text{PHON } \boxed{2}] \rangle} \end{array} \right] \end{array} \right] \text{V} \\ \\ \left[\begin{array}{l} \text{PHON } \boxed{1} \oplus \boxed{2} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-comp-struct} \\ \text{HEAD-DTR} \mid \text{PHON } \boxed{1} \\ \text{COMP-DTRS} \langle \boxed{[\text{PHON } \boxed{2}] \rangle} \end{array} \right] \end{array} \right] \text{V} \\ \\ \left[\begin{array}{l} \text{PHON } \boxed{2} \oplus \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-adj-struct} \\ \text{HEAD-DTR} \left[\begin{array}{l} \text{PHON } \boxed{1} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD } \textit{prep} \vee \textit{verb} \end{array} \right] \\ \text{ADJ-DTR} \mid \text{PHON } \boxed{2} \end{array} \right] \end{array} \right] \text{V} \\ \\ \left[\begin{array}{l} \text{PHON } \boxed{1} \oplus \boxed{2} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-adj-struct} \\ \text{HEAD-DTR} \left[\begin{array}{l} \text{PHON } \boxed{1} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD } \textit{noun} \vee \textit{verb} \end{array} \right] \\ \text{ADJ-DTR} \mid \text{PHON } \boxed{2} \end{array} \right] \end{array} \right] \end{array} \right)$$

THE ARGUMENT REALIZATION PRINCIPLE, THE VALENCE PRINCIPLE, THE HEAD FEATURE PRINCIPLE, THE SEMANTICS PRINCIPLE, THE PRINCIPLE OF CONTEXTUAL CONSISTENCY and THE CONSTITUENT ORDER PRINCIPLE together with THE WORD PRINCIPLE and THE ID PRINCIPLE are important components of an HPSG linguistic theory. In the following section, I will provide an exemplary grammar of Polish which will incorporate them.

7.3.2.5 A Sample Grammar

To illustrate how HPSG grammars are built and how the individual grammar ingredients interact, I will present here a small HPSG grammar of Polish which predicts exactly one sentence. This sentence is provided in (358).

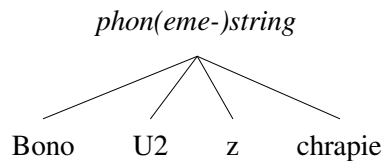
- (358) Bono z U2 chrapie.
 Bono from U2 snores
 ‘Bono from U2 snores.’

The grammar licensing (358) consists of the signature specified by the set of taxonomic trees in (334)–(339), (342), (352), (353), as well as (359)–(371), THE WORD PRINCIPLE in (372), providing the lexical entries for the noun *Bono*, the

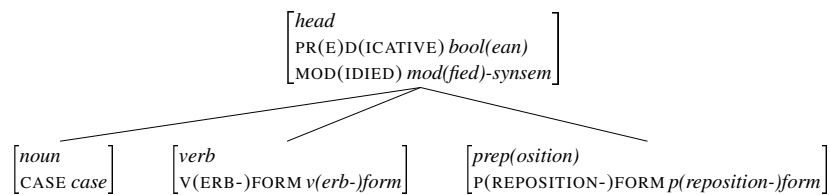
noun *U2*, the preposition *z* ‘from’ and the verb *chrapie* ‘snores’, specified in (373), (374), (375) and (376), respectively, as well as THE ARGUMENT REALIZATION PRINCIPLE in (347), THE VALENCE PRINCIPLE in (348), THE HEAD FEATURE PRINCIPLE in (350), THE SEMANTICS PRINCIPLE in (351), THE PRINCIPLE OF CONTEXTUAL CONSISTENCY in (354), THE CONSTITUENT ORDER PRINCIPLE in (357), as well as the relational principles *append/3*, *set-union/3* and *member/2*, defined in (349), (355) and (356), respectively.

The signature of our sample grammar includes a subset of the signature in Pollard and Sag (1994). To represent phoneme strings belonging to atomic expressions of our grammar, I will use their orthographic forms. The orthographic forms will thus be subtypes of the sort *phonstring*. To distinguish them from other homonymous sort symbols, in our signature I will use the standard font of the document for writing the subsorts of *phonstring*. The remaining sort symbols are written in italics. All supertypes in the trees in (334)–(339), (342), (352), (353) and (359)–(371) are immediate subtypes of *object*, which is assumed in Pollard and Sag (1994) to be the highest type in the hierarchy.

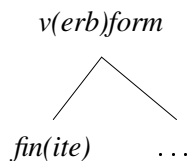
(359) *phonstring*:

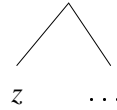
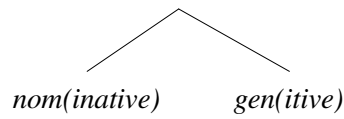
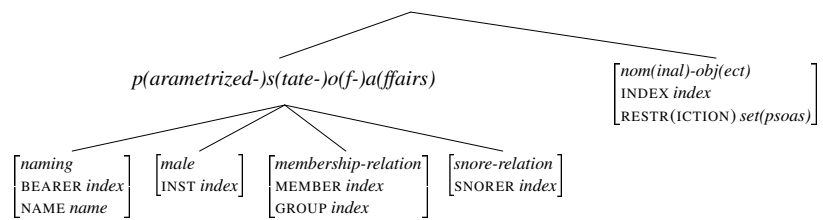
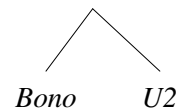
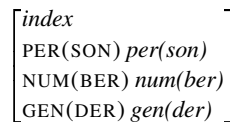


(360) *head*:

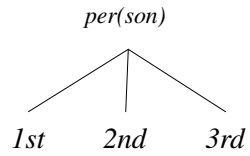
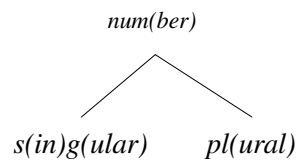
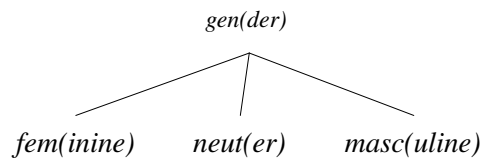
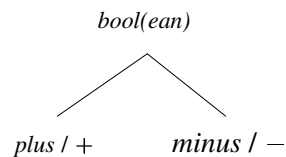


(361) *vform*:



(362) *pform:**p(reposition-)form*(363) *case:**case*(364) *content:*²³*cont(ent)*(365) *name:**name*(366) *index:*

²³Note that in Pollard and Sag (1994), a third subsort of *content* was assumed, *quant(ifier)*, for describing semantics of quantifiers. Since I do not treat quantification in this thesis, this sort will be ignored.

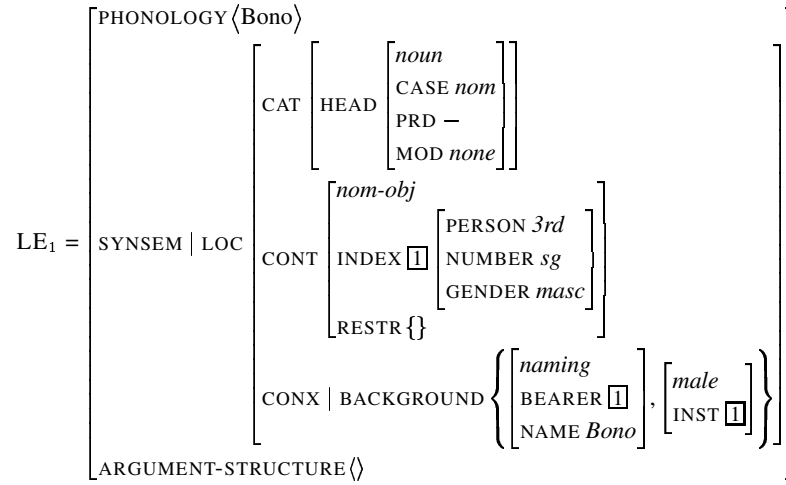
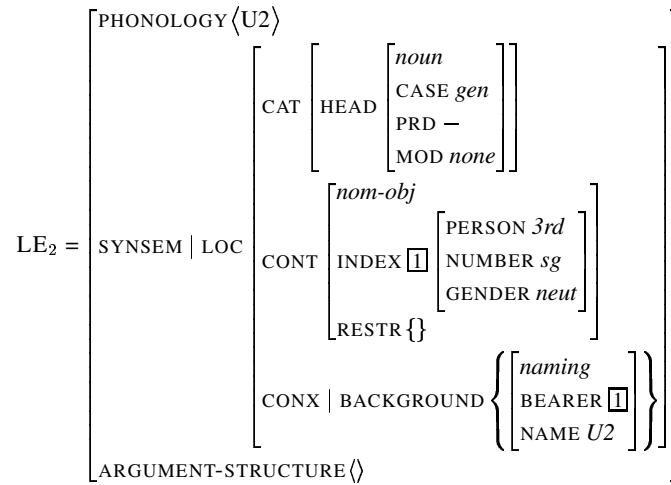
(367) *person:*(368) *number:*(369) *gender:*(370) *boolean:*

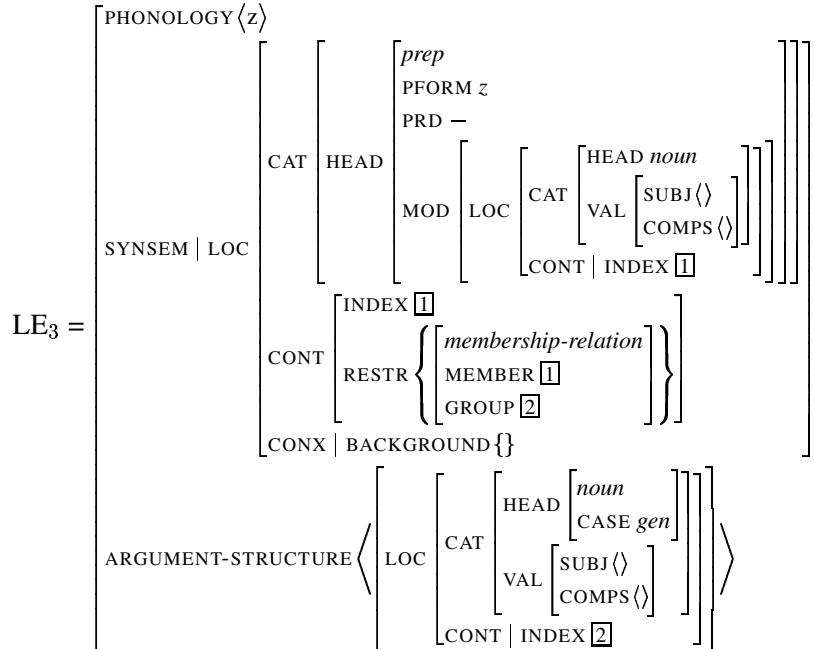
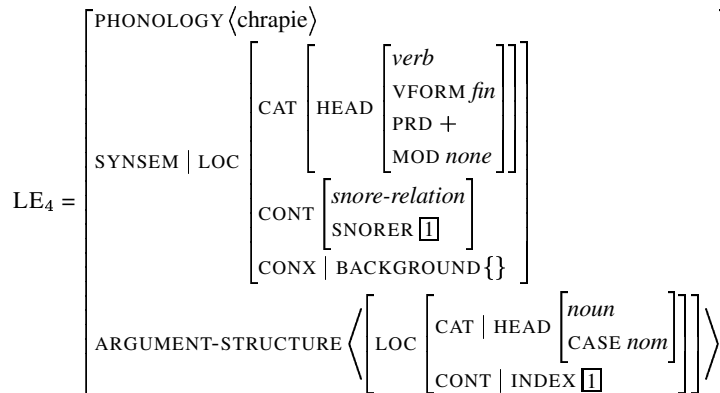
(371) Relation symbols and the arity of the relations:

append/3
 set-union/3
 member/2

THE WORD PRINCIPLE is given in (372) and the definitions of the disjuncts in the consequence of this principle are provided in (373), (374), (375) and (376).

(372) $word \longrightarrow (LE_1 \vee LE_2 \vee LE_3 \vee LE_4)$

(373) The lexical entry of *Bono*(374) The lexical entry of *U2*

(375) The lexical entry of *z* ‘from’(376) The lexical entry of *chrapie* ‘snores’

The lexical entry in (373) describes the proper name *Bono*, which is characterized as a nominative third person singular masculine noun. The lexical entry in (373) also contains the contextual information that this noun refers to a male individual and that the referent is identifiable by means of the name *Bono*. Since the ARG-ST list is specified to be an empty list, it follows by THE ARGUMENT REALIZATION PRINCIPLE that the VALENCE lists of this noun will be empty lists.

The lexical entry in (374) describes the proper name *U2* as a genitive third person singular neuter noun. This lexical entry further indicates that the referent of the noun *U2* is identifiable by means of the name *U2*. The ARG-ST list is empty. Due to THE ARGUMENT REALIZATION PRINCIPLE, the VALENCE lists of *U2* will also be empty lists.

The lexical entry in (375) describes the preposition *z* ‘from’. According to this description, it has the PFORM value *z*, and it has one argument which is specified as a genitive syntactically saturated noun. By means of THE ARGUMENT REALIZATION PRINCIPLE, which in this case requires the identity of the ARG-ST list and the COMPS list, this genitive argument will syntactically be realized via the COMPS list. The lexical entry in (375) further indicates that the preposition *z* ‘from’ modifies another syntactically saturated noun. The meaning of the preposition is described by means of the attribute CONTENT. According to the lexical entry in (375), *z* is a nominal object whose INDEX value is identified with the INDEX value of the modified noun and whose RESTR(CTION) set contains a *psoa* object which is a two-argument relation of membership. More precisely, the *psoa* object in the RESTR set of *z* is specified as the relation *membership-relation* providing two attributes, MEMBER and GROUP, associated with the thematic roles of the arguments. The value of the attribute GROUP is identified with the INDEX value of the selected noun. The value of the attribute MEMBER is identified with the INDEX value of the modified noun. The lexical entry of the preposition *z* ‘from’ provides no specific contextual information, which is reflected in (375) by specifying the value of the attribute BACKGROUND as an empty set.

Finally, the lexical entry in (376) describes the verb *chrapie* ‘snores’. According to this description, *chrapie* is a finite predicative verb with one nominal argument. By virtue of THE ARGUMENT REALIZATION PRINCIPLE, this argument will be mapped from the ARG-ST list to the SUBJ list. As an intransitive verb, *chrapie* ‘snores’ will have an empty COMPS list. The lexical entry in (376) further indicates that it denotes a one-argument relation, encoded as *snore-relation*. This relation provides one attribute, SNORER, which corresponds to the thematic role associated with the predicate *chrapac* ‘snore’. The value of the attribute SNORER is identified with the INDEX value of the subject noun. The lexical entry of *chrapie* ‘snore’ provides no specific contextual information.

By having specified the signature, provided the lexical entries for *Bono*, *U2*, *z* ‘from’ and *chrapie* ‘snores’, and formulated the grammar principles, our sample grammar is complete and can license the sentence (358) as illustrated in Figure 7.12.

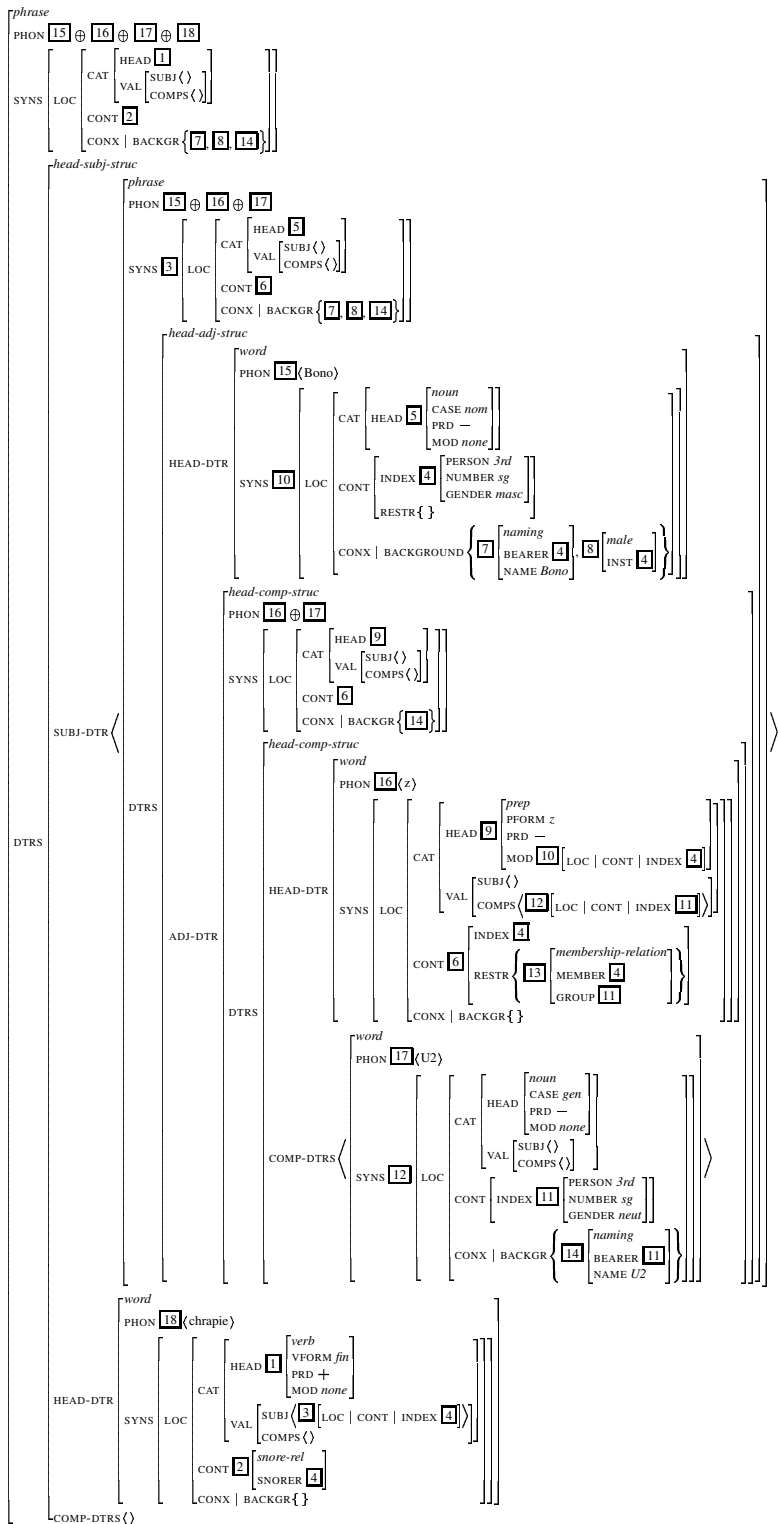


Figure 7.12: An AVM description of the sentence (358)

The AVM in Figure 7.12 describes an object of the type *phrase* with the phonological form licensed by THE CONSTITUENT ORDER PRINCIPLE in (357). Due to this principle, the phonology of the phrase results in the string *Bono z U2 chrapie*. This phrase is further licensed by THE HEAD-SUBJECT SCHEMA, defined in (343). By virtue of THE HEAD FEATURE PRINCIPLE, defined in (350), the HEAD value of the entire phrase is identified with the HEAD value of the head daughter. The CONTENT value of the phrase is identical to the CONTENT value of the head daughter due to the THE SEMANTICS PRINCIPLE, defined in (351). By means of THE PRINCIPLE OF CONTEXTUAL CONSISTENCY, defined in (354), the BACKGROUND value of the entire phrase includes the elements of the BACKGROUND sets of all constituents.

The description in Figure 7.12 further indicates that the phrase includes two daughters, the subject daughter and the head daughter. The head daughter is the word *chrapie* ‘snores’, licensed by the lexical entry in (376).²⁴ This object is characterized as a finite predicative verb selecting for a subject whose INDEX value is identified with the thematic role SNORER. THE VALENCE PRINCIPLE, provided in (348), ensures that the *synsem* object associated with the subject appears on the SUBJECT list of the head daughter and does not appear on the SUBJECT list of the entire phrase.

The subject daughter is described in Figure 7.12 as a phrase with the phonology *Bono z U2*, due to THE CONSTITUENT ORDER PRINCIPLE. This phrase is licensed by THE HEAD-ADJUNCT SCHEMA, provided in (345), and includes a head daughter and an adjunct daughter. Via THE HEAD FEATURE PRINCIPLE, the HEAD value of this phrase is identified with the HEAD value of the head daughter. By means of THE SEMANTICS PRINCIPLE, the CONTENT value of this phrase is identified with the CONTENT value of the adjunct daughter.

The head daughter of the subject phrase is described as a nominative third person singular masculine non-predicative noun with the phonology *Bono*. According to the BACKGROUND value, this noun refers to a male individual identified in the context via the name *Bono*. The adjunct daughter of the subject phrase is described as a phrase with the phonology *z U2*. This phrase is licensed by THE HEAD-COMPLEMENT SCHEMA. The HEAD value and the CONTENT value of this phrase are identical to the HEAD value and the CONTENT value of the head daughter, respectively. These identities are due to THE HEAD FEATURE PRINCIPLE and THE SEMANTICS PRINCIPLE. By virtue of THE VALENCE PRINCIPLE, the COMPLEMENTS list of the entire adjunct daughter is an empty list.

The adjunct daughter includes a head daughter and a complement daughter. The head daughter is described as a non-predicative preposition *z* selecting for a nominal object and modifying an additional nominal object. This preposition denotes a relation of membership providing two thematic roles: MEMBER and

²⁴Note that according to Pollard and Sag (1994), a lexical sign first has to project to a phrase and can then combine with its subject to form the phrase. Here, I do allow lexical signs to act as heads in head-complement structures.

GROUP. The INDEX value of the modified noun is identified with the first thematic role, while the INDEX value of the selected noun is identified with the second one. The complement daughter is described as a genitive third person singular non-predicative noun bearing the phonology *U2*. As the BACKGROUND value of this noun indicates, the entity referred to by this noun is identified in the utterance by means of the name *U2*.

The AVM description of the sentence (358) in Figure 7.12 can be directly translated to another description, namely, to a phrase structure tree. The corresponding tree description is provided in Figure 7.13.

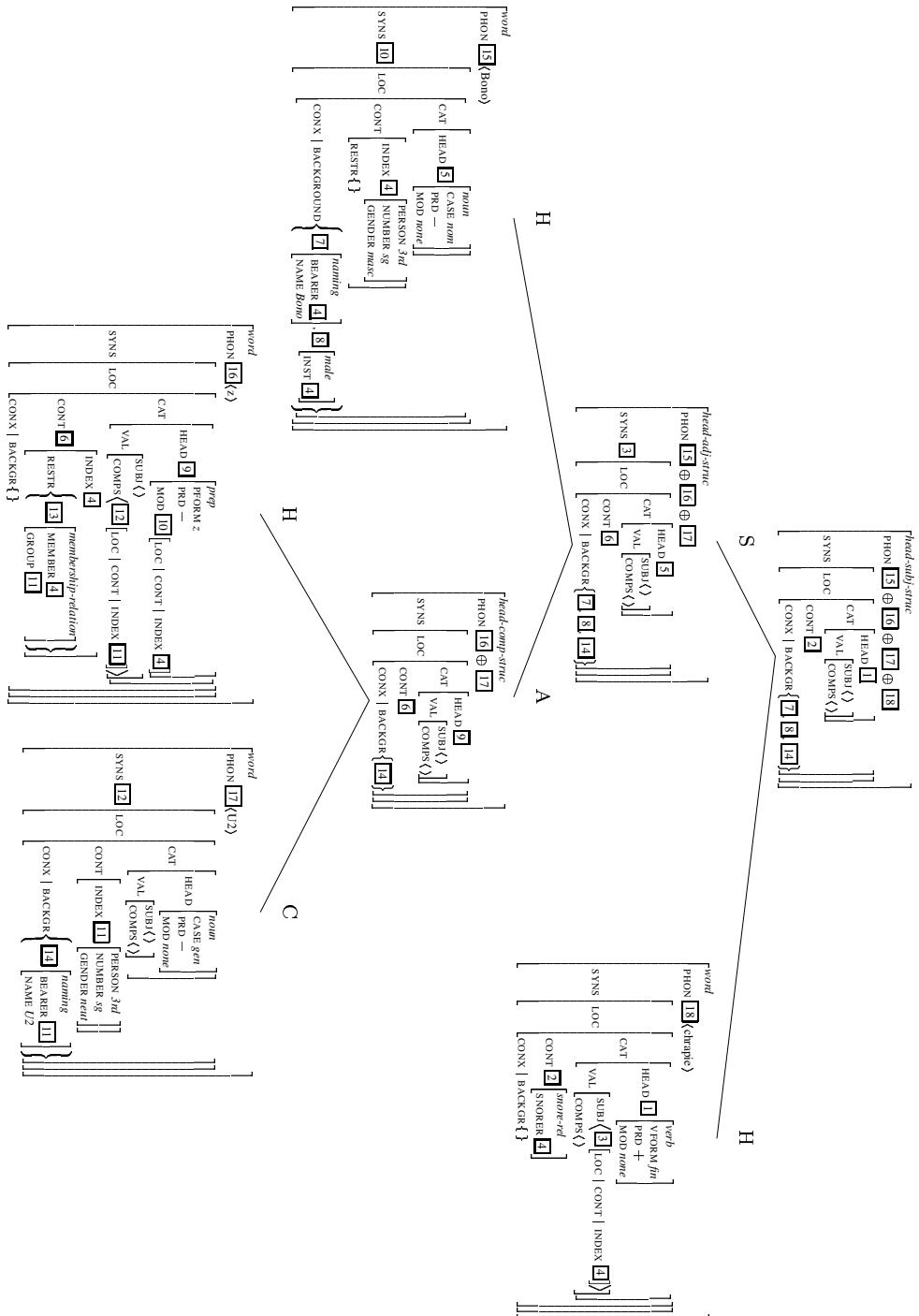


Figure 7.13: A tree description of the sentence (358)

The AVM description in Figure 7.12 and the tree description in Figure 7.13 can be considered as fully equivalent representation variants. When describing complex phrasal expressions, I will, however, use tree representations rather than AVMs, because trees allow for a clearer overview.

7.3.3 HPSG with a Model-Theoretic Semantics

In my semantic analysis of CCs, I want to use terms of the semantic representation language Ty2 as defined in Section 7.2 to represent the meanings of the linguistic expressions of our fragment and a classical λ -calculus-based system for semantic composition. This semantic description apparatus is incompatible with that presented above and used in our sample grammar, where the semantic information about a linguistic expression (based on the *Situation Semantics* framework in the tradition of Barwise and Perry (1983)) is provided via the attribute CONTENT and the percolation of the semantic information along the syntactic structures is determined by a grammar principle which operates on the values of this attribute.

In this section, I will define the semantic representation language Ty2 in RSRL (Richter (2004a)), the description language for my HPSG grammar, and then introduce the semantic framework of *Lexicalized Flexible Ty2* (LF-Ty2), which uses Ty2 and allows us to integrate standard model-theoretic semantics in the framework of HPSG.

7.3.3.1 Ty2 in HPSG

In order to use the Ty2 terms in an HPSG grammar, the semantic representation language Ty2 must be encoded in RSRL, the description language of HPSG. I encode Ty2 in RSRL by defining an RSRL grammar of Ty2, consisting of a signature and a theory. The signature for the grammar of Ty2 specifies the sorts and the attributes for describing Ty2 expressions together with the sort hierarchy and appropriateness conditions. This signature is given in (377).

(377) The signature for the RSRL grammar of Ty2

ty2

me TYPE *type*
variable NUM-INDEX *integer*
constant
 *constant*₁
 ...
 *constant*_{*n*}
application FUNCTOR *me* ARG *me*
abstraction VAR *me* ARG *me*
equation ARG1 *me* ARG2 *me*
set-of-me ARG *set(me)*
set-relation ARG1 *set-of-me* ARG2 *set-of-me*
 set-union
 set-intersection
superset-relation ARG1 *set-of-me* ARG2 *set-of-me*
negation ARG *me*
l-const ARG1 *me* ARG2 *me*
 disjunction
 conjunction
 implication
 bi-implication
quantifier VAR *variable* SCOPE *me*
 universal
 existential
 exactly-one
 more-than-one
type
 atomic-type
 entity
 event
 truth
 complex-type IN *type* OUT *type*
integer
 zero
 non-zero PRE *integer*

The signature in (377) draws on the signature for the RSRL grammar of Ty2 defined in Sailer (2003) with some modifications of the sort and attribute names in Penn and Richter (2004) and Richter (2004b), and with a number of extensions needed to account for set-denoting expressions. As the signature in (377) shows, all sorts in the hierarchy are subsumed by the sort *ty2*. The sort *ty2* immediately subsumes the sorts *m(eaningful-)e(xpression)*, *type* and *integer*. The sort *me* subsumes all sorts describing meaningful expressions of Ty2. This sort introduces

the attribute `TYPE`, whose value specifies the semantic type and which is inherited by all subsorts of *me*. In addition to the subsorts of *me* defined in the signature for the RSRL grammar of Ty2 in Sailer (2003), the sort *me* in our signature subsumes sorts for describing set-denoting terms. These sorts are *set-of-me(aningful-expressions)* and *set-rel(ation)* with the subsorts *set-union*, *set-intersection* and *superset-relation*. The sort *set-of-me(aningful-expressions)* introduces the attribute `ARG(UMENT)` which takes a set of meaningful expressions as its value. The sort *set* is defined as an immediate subsort of *object*, the highest type in the sort hierarchy of the HPSG grammar for our fragment of Polish. The sort *set-relation* provides the features `ARG(UMENT)1` and `ARG(UMENT)2`, each taking an object of the sort *set-of-me* as its value. By inheritance, the features `ARG(UMENT)1` and `ARG(UMENT)2` are also appropriate for the sorts *set-union*, *set-intersection* and *superset-relation*. Another extension to the signatures for the RSRL grammar of Ty2 includes two subsorts of the sort *quantifier*: *exactly-one* and *more-than-one*. These sorts are used for describing the corresponding cardinality quantifiers. The signature in (377) also provides a new type under the sort *atomic-type, event*, which corresponds to the semantic type of events. Finally, natural numbers used in the language Ty2 are encoded in the signature in (377) by means of the sort *integer* with two subsorts, *zero* and *non-zero*, on which the attribute `PRE(DECESSOR)` taking *integer* as its value, is defined. I assume that the sort *ty2* is immediately subsumed by the sort *object*, the highest type in the sort hierarchy of the HPSG grammar for our fragment of Polish.

The theory of the grammar of Ty2 includes the principles in (378) through (385). This set of principles licenses models of objects corresponding to natural numbers, the semantic types, and the well-formed meaningful expressions of Ty2.

(378) THE NATURAL NUMBERS PRINCIPLE

$$integer \longrightarrow \exists \boxed{1} (\boxed{1} \boxed{zero})$$

(379) THE COMPLEX TERMS PRINCIPLES

$$application \longrightarrow \left[\begin{array}{l} \boxed{TYPE} \boxed{2} \\ \boxed{FUNCTOR} \mid \boxed{TYPE} \left[\begin{array}{l} \boxed{IN} \boxed{1} \\ \boxed{OUT} \boxed{2} \end{array} \right] \\ \boxed{ARG} \mid \boxed{TYPE} \boxed{1} \end{array} \right]$$

$$abstraction \longrightarrow \left[\begin{array}{l} \boxed{TYPE} \left[\begin{array}{l} \boxed{IN} \boxed{1} \\ \boxed{OUT} \boxed{2} \end{array} \right] \\ \boxed{VAR} \mid \boxed{TYPE} \boxed{1} \\ \boxed{ARG} \mid \boxed{TYPE} \boxed{2} \end{array} \right]$$

$$equation \longrightarrow \left[\begin{array}{l} \boxed{TYPE} \textit{truth} \\ \boxed{ARG1} \mid \boxed{TYPE} \boxed{1} \\ \boxed{ARG2} \mid \boxed{TYPE} \boxed{1} \end{array} \right]$$

$$\text{negation} \longrightarrow \left[\begin{array}{l} \text{TYPE } \textit{truth} \\ \text{ARG} \mid \text{TYPE } \textit{truth} \end{array} \right]$$

$$\textit{l-const} \longrightarrow \left[\begin{array}{l} \text{TYPE } \textit{truth} \\ \text{ARG1} \mid \text{TYPE } \textit{truth} \\ \text{ARG2} \mid \text{TYPE } \textit{truth} \end{array} \right]$$

$$\text{quantifiers} \longrightarrow \left[\begin{array}{l} \text{TYPE } \textit{truth} \\ \text{SCOPE} \mid \text{TYPE } \textit{truth} \end{array} \right]$$

$$\text{set-of-me} \longrightarrow \forall \mathbb{1} \forall \mathbb{2} \left(\left[\begin{array}{l} \text{TYPE} \left[\begin{array}{l} \text{IN } \mathbb{1} \\ \text{OUT } \textit{truth} \end{array} \right] \\ \text{ARG } \mathbb{2} \end{array} \right] \rightarrow \forall \mathbb{3} \left(\text{member}(\mathbb{3}, \mathbb{2}) \rightarrow \mathbb{3}[\text{TYPE } \mathbb{1}] \right) \right)$$

$$\text{set-relation} \longrightarrow \left[\begin{array}{l} \left[\begin{array}{l} \text{TYPE} \left[\begin{array}{l} \text{IN } \mathbb{1} \\ \text{OUT } \textit{truth} \end{array} \right] \\ \text{ARG1} \mid \text{TYPE} \left[\begin{array}{l} \text{IN } \mathbb{1} \\ \text{OUT } \textit{truth} \end{array} \right] \end{array} \right] \\ \text{ARG2} \mid \text{TYPE} \left[\begin{array}{l} \text{IN } \mathbb{1} \\ \text{OUT } \textit{truth} \end{array} \right] \end{array} \right]$$

$$\text{superset-relation} \longrightarrow \left[\begin{array}{l} \text{TYPE } \textit{truth} \\ \text{ARG1} \mid \text{TYPE} \left[\begin{array}{l} \text{IN } \mathbb{1} \\ \text{OUT } \textit{truth} \end{array} \right] \\ \text{ARG2} \mid \text{TYPE} \left[\begin{array}{l} \text{IN } \mathbb{1} \\ \text{OUT } \textit{truth} \end{array} \right] \end{array} \right]$$

(380) THE TY2 NON-CYCLICITY PRINCIPLE²⁵

$$\textit{ty2} \longrightarrow \forall \mathbb{1} \left(\left(\bigvee \{ [\alpha \mathbb{1}] \mid \alpha \in \mathcal{A}_{\textit{Ty2}} \} \right) \rightarrow \neg \textit{ty2-component}(\cdot, \mathbb{1}) \right)$$

(381) THE TY2 FINITENESS PRINCIPLE²⁶

$$\textit{ty2} \longrightarrow \exists \mathbb{1} \forall \mathbb{2} \left(\textit{ty2-component}(\mathbb{2}, \cdot) \rightarrow \text{member}(\mathbb{2}, \mathbb{1} \textit{chain}) \right)$$

(382) THE TY2 IDENTITY PRINCIPLE

$$\textit{ty2} \longrightarrow \forall \mathbb{1} \forall \mathbb{2} \left(\text{copy}(\mathbb{1}, \mathbb{2}) \rightarrow \mathbb{1} = \mathbb{2} \right)$$

²⁵The symbol $\mathcal{A}_{\textit{Ty2}}$ is the set of attributes of the signature for the grammar of Ty2. The symbol \cdot is an RSRL variable and id is the identity function on objects.

²⁶For a definition of a *chain*, see Richter (2004a).

- (383) `ty2-component/2`
 The relation `ty2-component/2` holds between two Ty2 objects in case the objects are identical or the first Ty2 object is a component of the second one.

Formalization:

$$\forall \mathbb{1} \forall \mathbb{2} \left(\text{ty2-component}(\mathbb{1}, \mathbb{2}) \leftrightarrow \left(\mathbb{1} = \mathbb{2} \vee \bigvee \left\{ \exists \mathbb{3} \left(\mathbb{2}[\alpha \ \mathbb{3}] \wedge \text{ty2-component}(\mathbb{1}, \mathbb{3}) \mid \alpha \in \mathcal{A}_{\text{Ty2}} \right) \right\} \right) \right)$$

- (384) `copy/2`
 The relation `copy/2` holds between two *ty2* objects in case the configurations of objects under them are isomorphically configured, i.e., they all have the same attributes and corresponding attribute values of the same sort.

Formalization:²⁷

$$\forall \mathbb{1} \forall \mathbb{2} \left(\text{copy}(\mathbb{1}, \mathbb{2}) \leftrightarrow \left(\bigvee \left\{ \mathbb{1}[\sigma] \wedge \mathbb{2}[\sigma] \mid \sigma \in \mathcal{S}_{\text{Ty2}} \right\} \wedge \bigwedge \left\{ \forall \mathbb{3} \left(\mathbb{1}[\alpha \ \mathbb{3}] \rightarrow \exists \mathbb{4} \left(\mathbb{2}[\alpha \ \mathbb{4}] \wedge \text{copy}(\mathbb{3}, \mathbb{4}) \right) \right) \mid \sigma \in \mathcal{A}_{\text{Ty2}} \right\} \right) \right)$$

- (385) `subterm/2`
 The relation `subterm/2` holds between two *me* objects in case the first *me* object is a component of the second.

Formalization:

$$\forall \mathbb{1} \forall \mathbb{2} \left(\text{subterm}(\mathbb{1}, \mathbb{2}) \leftrightarrow \left(\mathbb{1} \text{ me} \wedge \mathbb{2} \text{ me} \wedge \text{ty2-component}(\mathbb{1}, \mathbb{2}) \right) \right)$$

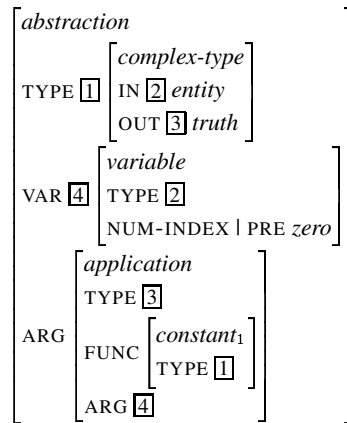
The principles in (378)–(385), except for the set expression principles in (379), are taken from Penn and Richter (2004) and Richter (2004b). The NATURAL NUMBERS PRINCIPLE in (378) ensures that the denoted structures correspond to the natural numbers. THE COMPLEX TERMS PRINCIPLES in (379) guarantee the proper typing of complex Ty2 expressions. The principles which apply to *application*, *abstraction*, *equation*, *negation* and *l-const* are adopted from Penn and Richter

²⁷The symbol \mathcal{S}_{Ty2} denotes the set of maximally specific sorts of the signature for the grammar of Ty2.

(2004) and Richter (2004b) and the remaining principles are introduced to account for semantic typing of complex set-denoting expressions of Ty2. THE TY2 NON-CYCLICITY PRINCIPLE in (380) ensures that no cyclic term configurations occur in the model of Ty2, i.e., no terms which contain themselves as a component. THE TY2 FINITENESS PRINCIPLE in (381) guarantees that all configurations of *ty2* objects in the (exhaustive) model of the grammar of Ty2 are finite. THE TY2 IDENTITY PRINCIPLE in (382) requires that any two isomorphic subconfigurations in a *ty2* configuration be token-identical. The definitions of the relations *ty2-component/2*, *copy/2* and *subterm/2* are provided in (383), (384) and (385). All relation symbols are specified in the signature of the grammar of our syntactic fragment of Polish.

Given the signature in (377) and the principles in (378) through (385), I can describe objects corresponding to Ty2 terms in AVM syntax as illustrated in (386).

(386) An AVM description of the Ty2 term
 $(\lambda v_{\langle e \rangle, 1} \cdot (\text{constant}_{1 \langle e, t \rangle} (v_{\langle e \rangle, 1}))_{\langle t \rangle})_{\langle e, t \rangle}$



As I can see in (386), the overall Ty2 term is a lambda abstraction, and therefore corresponds to an object of sort *abstraction*. The type of the term is $\langle e, t \rangle$, and hence its type is described by an object of sort *complex-type* ($\boxed{1}$). The variable bound by the λ -operator, $v_{\langle e \rangle, 1}$, is described as being a *variable* object ($\boxed{4}$). The type of the variable is identical to the TYPE | IN value of the abstraction, which is expressed by the tag $\boxed{2}$. The ARG value of the abstraction is an object of sort *application*, whose TYPE value is identical to the TYPE | OUT value of the abstraction ($\boxed{3}$) and whose ARG value is identical to the VAR value of the abstraction ($\boxed{4}$). The value of the FUNC attribute is an object of sort *constant*. The TYPE value of this object is identical to the TYPE value of the overall abstraction, which is expressed by the tag $\boxed{1}$.

I assume that the RSRL grammar of Ty2 defined in the signature in (377) and by the set of constraints in (378) through (385) can be proved to describe the language of Ty2. In Sailer (2003), the necessary proofs have been provided which show that the RSRL specification of Ty2 in Sailer (2003) describes the language Ty2.

I presume that the corresponding proofs for our RSRL grammar of Ty2 can be formulated in a similar fashion.

The encoding of the semantic representation language Ty2 in RSRL allows us to use Ty2 terms in an HPSG grammar. In the following section, I will introduce the semantic framework that I will use to formalize my semantic analysis of CCs in HPSG and show how the grammar of Ty2 can be integrated in the HPSG grammar of our syntactic fragment.

7.3.3.2 Lexicalized Flexible Ty2

In this section, I introduce the semantic framework of *Lexicalized Flexible Ty2* (LF-Ty2) and show how it is integrated with the HPSG syntax.

LF-Ty2 is an adaptation of a combinatorial system with λ -calculus and functional application (involving *Flexible Montague Grammar* of Hendriks (1993)) to HPSG presented in Sailer (2003). It uses the semantic representation language Ty2 as defined in Gallin (1975). In this thesis, I will use the syntactic variant of Ty2 defined in Section 7.2. The mechanisms of semantic composition in LF-Ty2 include: (i) a basic translation assigned to every word in the grammar, and (ii) functional application to compute the logical form of a phrase.

Sailer (2003) integrates the LF-Ty2 system with the HPSG syntax via the attribute CONTENT. He follows Pollard and Sag (1994) in the assumption that the CONTENT value of a sign is its logical form, i.e., some representation of its meaning. Both in Sailer (2003) and in Pollard and Sag (1994), the value of the CONTENT attribute contains the entire semantic representation of a sign. In the LF-Ty2 framework of Sailer (2003), the CONTENT value is an expression of Ty2. Lexical elements are assigned an expression of Ty2 as their basic translations. The CONTENT value of a phrase is the functional application of the CONTENT values of the daughters. This system makes it possible to use standard model-theoretic semantics in HPSG and it has been employed to describe sentential negation and negative concord in French and Polish (cf. Richter and Sailer (1999a) and Richter and Sailer (1999b), respectively), idiomatic expressions (cf. Sailer (2003)) and collocational prepositional phrases (cf. Trawiński et al. (2006)).

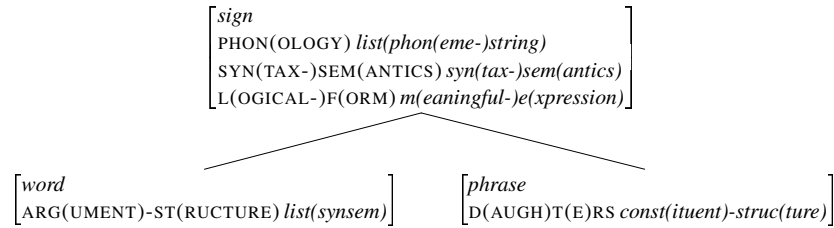
In this thesis, I would like to draw a line between local and nonlocal semantics, as proposed in Sailer (2004a). Sailer (2004a) argues that phenomena such as semantic selectional restrictions and the assignment of thematic roles are semantic local phenomena and should be treated within local / lexical semantics, while phenomena such as the scope of operators (such as negation, quantifiers, or tense) belong to semantic nonlocal phenomena and should be accounted for within combinatorial / compositional semantics. In my description of CCs, I will use local semantics to capture referential relations, agreement and resolution, and nonlocal semantics to account for semantic composition.

I implement the idea of the division between local and nonlocal semantics using two attributes: the attribute CONTENT, for encoding local semantics, and the attribute L(OGICAL-)F(ORM), as proposed in Sailer (2004a) and used in *Lexical*

Resource Semantics (LRS), an alternative system for combinatorial semantics in HPSG.²⁸ In my approach, the LF feature provides the interface between the grammar of Ty2 and an HPSG syntax.

I define the attribute LF to be appropriate for objects of sort *sign* and to take objects of sort *me* as its value. The new sort hierarchy and appropriateness conditions for *sign* are given in (387).

(387) *sign*:



The LF value of a lexical sign is specified in the lexical entry of this sign and is its basic translation. The LF value of a phrase corresponds to the functional application of the logical forms of its daughters and is licensed by THE SEMANTICS PRINCIPLE defined in (388).

(388) THE SEMANTICS PRINCIPLE²⁹

In a headed phrase, the LF value is the functional application of the LF value of one daughter to the LF value of the other daughter if the DTRS value is of sort *head-subj-struct* or *head-comp-struct*, or the functional application of the LF value of the adjunct daughter to the LF value of the head daughter if the DTRS value is of sort *head-adj-struct*.

phrase →

$$\left(\left[\begin{array}{l}
 \text{LF} \left[\begin{array}{l}
 \textit{application} \\
 \text{FUNC [1]} \\
 \text{ARG [2]}
 \end{array} \right] \vee \left[\begin{array}{l}
 \textit{application} \\
 \text{FUNC [2]} \\
 \text{ARG [1]}
 \end{array} \right] \\
 \text{DTRS} \left[\begin{array}{l}
 \textit{head-subj-struct} \\
 \text{HEAD-DTR | LF [1]} \\
 \text{SUBJ-DTR} \langle \text{LF [2]} \rangle
 \end{array} \right]
 \end{array} \right] \vee \left[\begin{array}{l}
 \text{LF} \left[\begin{array}{l}
 \textit{application} \\
 \text{FUNC [1]} \\
 \text{ARG [2]}
 \end{array} \right] \vee \left[\begin{array}{l}
 \textit{application} \\
 \text{FUNC [2]} \\
 \text{ARG [1]}
 \end{array} \right] \\
 \text{DTRS} \left[\begin{array}{l}
 \textit{head-comp-struct} \\
 \text{HEAD-DTR | LF [1]} \\
 \text{COMP-DTRS} \langle \text{LF [2]} \rangle
 \end{array} \right]
 \end{array} \right] \vee \left[\begin{array}{l}
 \text{LF} \left[\begin{array}{l}
 \textit{application} \\
 \text{FUNC [2]} \\
 \text{ARG [1]}
 \end{array} \right] \\
 \text{DTRS} \left[\begin{array}{l}
 \textit{head-adj-struct} \\
 \text{HEAD-DTR | LF [1]} \\
 \text{ADJ-DTR | LF [2]}
 \end{array} \right]
 \end{array} \right] \right)$$

²⁸LRS was elaborated in Richter and Sailer (2004a) and refined in Richter (2004b) and Richter and Kallmeyer (2009). It has been used in analyses of various linguistic phenomena, such as negative concord in Polish (cf. Richter and Sailer (2004b)), scope ambiguity in Dutch (cf. Bouma (2003)), Afrikaans tense phenomena (Sailer (2004b)), negative polarity in German (cf. Richter and Soehn (2006)) and negative concord in Romanian (cf. Iordăchioaia (2009) and Iordăchioaia and Richter (2009)). In Penn and Richter (2004), aspects of the computational implementation of LRS have been discussed and an HPSG grammar fragment with an integrated LRS modul has been implemented in the Department of Linguistics at the University of Tübingen. In contrast to LF-Ty2, the LRS framework employs mechanisms of semantic composition which are different from the classical combinatorial system with lambda-calculus and functional application.

²⁹I assume that the logical form of a phrase is a fully β -reduced form that results from applying λ -conversion to the functional application, as defined in Sailer (2003, pp. 185–214).

THE SEMANTICS PRINCIPLE in (388) requires that a syntactic adjunct is always a semantic functor, while in head-subject and in head-complement structures each daughter can act as a functor or an argument, depending on the types of the daughters

One remark should be made with regard to logical symbols such as \exists , \forall , \rightarrow , \wedge , \vee etc.: Those are used in our Ty2 descriptions are part of the semantic representation language Ty2, whereas those used in the RSRL descriptions are part of RSRL. On that account, the logical symbols \rightarrow and \vee in the formalization of THE SEMANTICS PRINCIPLE above are RSRL expressions.

7.4 Summary

In this chapter, I have established a theoretical basis for my analysis of CCs in Chapter 9. I have discussed general aspects of the semantic representation of (singular and plural) individual terms, verbal predicates (including distributive, collective and neutral predicates), and prepositions, and decided in favor of a set-theoretical approach to model individual and event entities. I have also defined a syntactic variant of the semantic representation language Ty2, which provides syntactic sugar making set-denoting terms as well as conjunction, disjunction and inclusion of set-denoting terms more straightforward to express. I have also introduced the formal and linguistic foundations of HPSG with the integrated model-theoretic semantic framework of LF-Ty2.

Given this theoretical machinery, I will be able to offer a comprehensive and precise description of the phenomena discussed in Part I at the syntax-semantics-pragmatics interface. Before presenting my analysis, I will discuss previous approaches to CCs in the next chapter and point out their advantages and shortcomings.

Chapter 8

Previous Approaches to CCs

The general conclusion from the observations presented in Part I was that the peculiarities of Polish CCs are primarily semantic. However, the majority of the previous approaches to CCs focus on syntactic aspects and attempt to explain the differences between the particular CC types using syntactic means (partially, with a semantic or pragmatic component). Some of the previous approaches look only at certain subsets of CCs (cf. Rigau (1989, 1990), Dyla (1988, 2003), Ladusaw (1989), McNally (1989), Aissen (1987, 1989a,b), Progovac (1997), Dalrymple et al. (1998), Lichtenberk (2000), den Dikken et al. (2001), Hetzron (1973), Hale (1975), Schwartz (1985, 1988a,b)), others try to account for all three CC classes (cf. Vassilieva and Larson (2001, 2005), Feldman (2001, 2002), Ionin and Matushansky (2003), Skrabalova (2003)). Besides the different scope of the investigated phenomena, these analyses also vary in the theoretical frameworks they use. However, nearly all proposals can be grouped into three major categories: adjunction-based, complementation-based and coordination-based ones.

In this chapter, I will provide an overview of these approaches starting with the adjunction-based ones (Section 8.1), which seem most appropriate to us for uniformly describing the syntactic structure of all three classes of CCs. In Section 8.2 and Section 8.3, I will present the complementation-based and the coordination-based analyses, respectively, and point out their advantages and shortcomings. Section 8.4 will sum up the discussion.

8.1 Adjunction-Based Analyses

Adjunction-based analyses have been proposed to account for all three classes of CCs: ACCs, CCCs and ICCs. Their basic assumption is that the comitative PP acts as the adjunct of the NP1, or as the adjunct of the VP, or as both the adjunct of the NP1 and the adjunct of the VP. Below, I outline these analyses as proposed for ACCs, ICCs and CCCs, respectively.

8.1.1 Adjunction-Based Analyses of ACCs

Syntactic adjunction is the commonly assumed analysis of ACCs. There are no proposals to treat ACCs in terms of coordination or complementation. However, there are no independent approaches devoted to ACCs. Analyses proposed for this class of CCs always result from discussions on the treatment of CCCs and / or ICCs: Aissen (1989a,b), Comacho (1994), Kopcińska (1995, 1997), Bobrowski (1998), Vassilieva and Larson (2001, 2005), Feldman (2001, 2002), Dyła (2003), Ionin and Matushansky (2003), and Skrabalova (2003).

While Comacho (1994) and Feldman (2001, 2002) do not specify whether the comitative PP should be analyzed as an adjunct to the NP or the VP, Aissen (1989a,b), who investigates CCs in Tzotzil, and Skrabalova (2003), who describes CCs in Czech, argue that the PP should be analyzed in ACCs as an adjunct to the VP. By contrast, Ionin and Matushansky (2003) argue against treating comitative PPs as VP-adjuncts, providing the following Russian examples:

- (389) a. Nina vstrietilas' *(s učitelem).
 Nina met.SG with teacher
 'Nina met (with) the teacher.'
- b. Zina poznaomila Stepana *(s učitelem).
 Zina acquainted Stepan with teacher
 'Zina introduced Stepan to the teacher.'

They argue that (389a) is an instance of a singular comitative construction, while (389b) involves a *with*-phrase associated with a direct object. In both sentences, the *with*-phrase is obligatory, hence it cannot be analyzed as a VP-adjunct.¹

The problem with this argument consists in the assumption that the sentence in (389a) involves a CC. According to my intuition, there is no comitative (accompanitive, conjunctive, or inclusive) relationship between the nominative NP and the NP selected by the preposition *s* 'with' in (389a). The verb *vstretit'sja* 'meet' simply belongs to the set of transitive verbs selecting for *with*-PPs as complements which, in turn, can express various contents. Other verbs with a similar subcategorization frame are, for instance, Polish *ociągać się z* 'temporize', *dać sobie radę z* 'manage', or *oswoić się z* 'familiarize'.

Ionin and Matushansky (2003) further argue that the verb *vstretit'sja* 'meet' in (389a) is a collective verb, which takes either singular arguments associated with a *with*-phrase or plural arguments. In sentences like (389a), the *with*-phrase contributes to the plurality of the argument that it is associated with. While I take for granted that verb *vstretit'sja* in its intransitive variant is a collective verb, I doubt that its transitive counterpart in (389a) is collective as well. I do not believe that any kind of plurality is available in this sentence. This can be inferred from the fact that the transitive verb *vstretit'sja* cannot combine with collectivizing adverbs, as demonstrated in (390).

¹For a critical view of obligatoriness versus optionality as a criterion for distinguishing complements and adjuncts, see Przepiórkowski (1999).

- (390) a. Nina i Petja vstretilis' (vmeste) v bare.
 Nina and Petja met.PL together in pub
 'Nina and Petja met together in the pub.'
- b. Nina vstretilas' s Petej (*vmeste) v bare.
 Nina met.SG with Petja together in pub
 'Nina met with Petja in the pub.'

The sentence in (390a) shows that the intransitive variant of *vstretit'sja* 'meet' can be modified by the collectivizing adverb *vmeste* 'together', whereas its transitive variant in (390b) cannot. These examples demonstrate a clear denotational difference between the transitive and the intransitive verb *vstretit'sja* 'meet'. Note that these observations also apply to Polish. The corresponding Polish examples are provided in (391): sentence (391a) involves the intransitive variant of the verb *spotkać się* 'meet' and (391b) involves its transitive variant.

- (391) a. Chłopaki / Jan i Maria / Jan z Marią spotkali się (razem) w
 boys / Jan and Maria / Jan with Maria met.PL RM together in
 pubie.
 pub
 'The boys / Jan and Maria met together in a pub.'
- b. Chłopak / Jan spotkał się z Marią (*razem) w pubie.
 boy / Jan met.SG RM with Maria together in pub
 'The boy / Jan met (with) Maria in a pub.'

Ionin and Matushansky (2003) propose that the comitative PP in ACCs originates as a DP-adjunct. This base structure, shown in Figure 8.1, is also assumed for CCCs and ICCs.

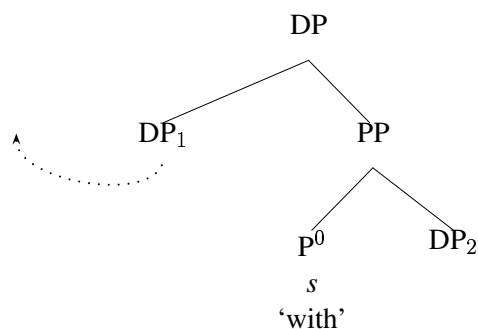


Figure 8.1: The base structure of CCs according to Ionin and Matushansky (2003)

The nominative DP (DP₁ in Figure 8.1) is further assumed to move out to [Spec, IP]. The PP can either move with it, licensing CCCs and ICCs, or be stranded / extraposed, licensing ACCs.

In contrast to Ionin and Matushansky (2003), Aissen (1989a,b) and Skrabalova (2003), Vassilieva and Larson (2001, 2005) allow both NP- and VP-adjunction in Russian ACCs, which are assigned the structures in Figure 8.2.

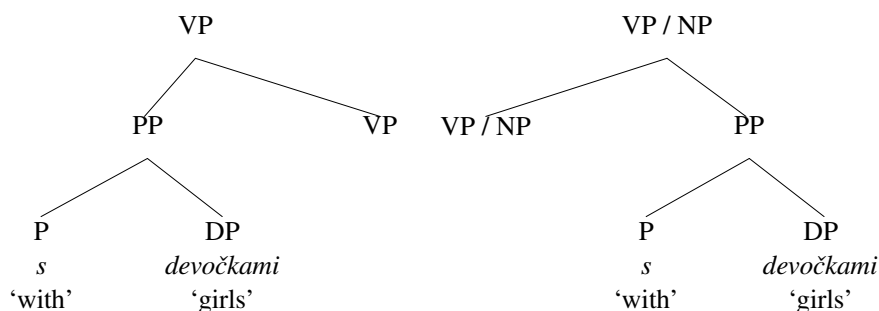


Figure 8.2: The structures of ACCs according to Vassilieva and Larson (2001, 2005)

The first tree in Figure 8.2 shows that the comitative PP in the ACC can attach to a VP as its left adjunct. The second one indicates that it can attach to a VP or to an NP (see the notation VP / NP) as its right adjunct. The same structures have been suggested for Polish ACCs in Szupryczyńska (1991), Kopcińska (1995, 1997) and Bobrowski (1998). They are also in line with the discussion on exocentric constructions (in terms of distributionalism / taxonomic structuralism) in Polish in Saloni and Świdziński (1985), and with our empirical discussion in Chapter 5.3, where I showed that *z*-PPs in Polish ACCs can attach both to NPs and VPs and that the type of attachment does not affect the meaning of the CC. I will thus adopt this proposal in my syntactic analysis of ACCs.

8.1.2 Adjunction-Based Analyses of ICCs

Analyzing ICCs in terms of adjunction has been proposed in Aissen (1989a,b), Ladusaw (1989), Lichtenberk (2000) and Skrabalova (2003). As we have seen above, Ionin and Matushansky (2003) also take adjunction as a base structure of ICCs, which they do not distinguish from CCCs and ACCs in this respect. All these analyses focus on ICCs where the comitative PP combines with a plural pronoun (which can be dropped or not), and the entire expression acts as a subject. There are no analytical proposals for discontinuous ICCs, where the comitative PP combines with the VP. Figure 8.3 provides the syntactic structure of a subject ICC as proposed in Aissen (1989a,b).

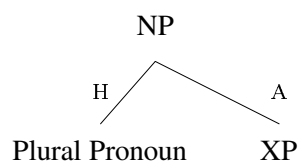


Figure 8.3: The structure of subject NPs in ICCs according to Aissen (1989a,b)

The NP in Figure 8.3 has two daughters: the plural personal pronoun, which is the head of the entire phrase, and the NP or PP (XP), which is treated as an adjunct daughter. The entire subject NP, which may lose its head through pro-drop, is assumed to act as the agreement controller.

While Aissen (1989a,b) and Skrabalova (2003) only focus on syntactic aspects of ICCs, Ladusaw (1989), Lichtenberk (2000) and Ionin and Matushansky (2003) also address the semantic issue of inclusion. Ladusaw (1989) proposes to analyze the head pronoun in Russian ICCs as having its customary meaning and the comitative PP as providing the extra information and narrowing the range of possible referents for the pronominal NP. In other words, the adjunct phrase imposes additional reference conditions on the referent of the head, but does not itself introduce any further referents.

Ladusaw (1989) emphasizes that the referent of the NP in the comitative PP must be a proper subpart of the group which is the referent of the head pronoun. Thus, the group referred to by the head pronoun must involve at least one entity besides the one referred to by the adjunct phrase. Therefore, the head pronoun must be semantically plural. The plurality of the pronoun hence follows from the semantics of the construction and does not need to be stipulated syntactically, as, for instance, in Schwartz (1988a). This proposal has also been adopted in Lichtenberk (2000), who describes similar constructions in Toqabaqita, and in Ionin and Matushansky (2003) for Russian. This idea will also be realized in my analysis of Polish ICCs.²

8.1.3 Adjunction-Based Analyses of CCCs

Adjuncton-based analyses of CCCs have been proposed in McNally (1989, 1993), Kopcińska (1995, 1997), Ionin and Matushansky (2003) and Trawiński (2005a). All these analyses assume that the comitative PP acts as an adjunct to NP1. In Figure 8.4, I present the syntactic structure of CCCs proposed in McNally (1989, 1993).

²See also Singer (2001a,b), who describes ICCs in some Australian languages and provides a typology of these constructions based on the notions of subset and superset.

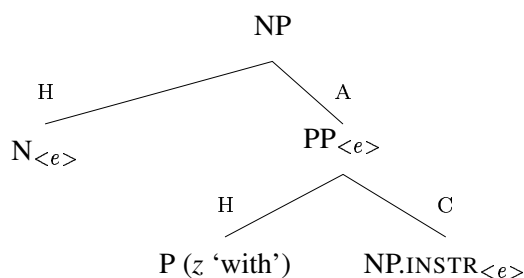


Figure 8.4: The structure of CCCs according to McNally (1989, 1993)

As indicated in this tree, CCCs are assumed to involve only referential NPs, i.e., NPs which have type $\langle e \rangle$ denotations. This makes CCCs different from ordinary coordination, which can involve any combination of referential and non-referential NPs. However, in Chapter 4.1 of Part I, I showed that NP1s and NP2s in Polish CCCs can be realized as quantified NPs and bare plural NPs, i.e., as expressions of the semantic type $\langle \langle e, t \rangle, t \rangle$ (cf. the discussion of Section 4.1.1.3). This clearly indicates that the generalization about the referentiality of NPs within CCCs does not hold for Polish.

To account for number resolution, McNally (1989, 1993) proposes that the *z*-PP denotes the same semantic entity as the NP contained within it, i.e., an entity of the semantic type $\langle e \rangle$. This, according to McNally (1993), would require an operation which joins individuals of type $\langle e \rangle$. The result would be a plural entity which could serve as an agreement controller. The semantic type of this plural entity is not specified.

The main problem with the analysis of comitative PPs in CCCs as expressions of the semantic type $\langle e \rangle$ is that it rules out possible modification by the adverb *razem* ‘together’ and other collectivizing adverbs (cf. the discussion of basic properties of CCs in Chapter 2). Adverbs are traditionally considered to combine with expressions of semantic types higher than type $\langle e \rangle$, e.g., the type of VPs or PPs. For this reason, I postulated in Trawiński (2005a) to semantically analyze PPs in CCCs as ordinary PPs with specific semantic restrictions encoding the conjunctive meaning. Moreover, I proposed to separate the meaning of comitative PPs and the entire CCCs from their agreement properties. I suggested that agreement properties of CCCs are not subject to any inheritance or composition, but are a result of applying a set of constraints on number, gender and person resolution that also hold for ordinary coordinate structures. I will follow this idea in this thesis.

8.1.4 Conclusion

Analyzing comitative PPs as syntactic adjuncts to NP1s and VPs explains many properties that ACCs, CCCs and ICCs share with each other and with other modifying PPs. In particular, the adjunction-based analyses correctly predict that (i) CCs can occur as subjects and objects, (ii) the category of phrases connected by

the preposition is nominal, (iii) NP1 receives case from the predicate, while the case of the NP2 is assigned by the preposition, (iv) the NPs cannot be inverted, (v) the comitative PP can be conjoined with another comitative PP by means of proper conjunctions, (vi) no iteration of NP1s and PPs is possible, (vii) no Across-the-Board extraction is possible. Given this, I will adopt the adjunction-based syntactic structure of CCs in my analysis. I assume that the other effects observed in CCs and providing the basis for distinguishing between their different classes follow mainly from semantic factors.

Below, I present a number of alternative proposals, which I consider problematic from the empirical or the theoretical point of view.

8.2 Complementation-Based Analyses

In this section, I will present analyses of CCs which are based on complementation: the analysis of CCCs proposed in Feldman (2001, 2002) and the analyses of ICCs provided in Feldman (2001, 2002), Vassilieva and Larson (2001, 2005) and den Dikken et al. (2001).

8.2.1 The Complementation-Based Analysis of CCCs

Bringing evidence from reflexivization, extraction, agreement patterns, discontinuity phenomena and semantic interpretation, Feldman (2001, 2002) proposes that the Russian comitative *s* ‘with’ in CCs with the CCC reading is a transitive noun that selects for an instrumental NP and a subject NP. She formalizes her analysis within the framework of HPSG. The relevant part of the lexical entry of Russian *s* ‘with’ she proposes is given in Figure 8.5, and the corresponding syntactic structure in Figure 8.6.³

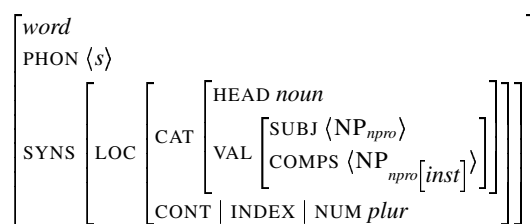


Figure 8.5: The relevant part of the lexical entry of Russian *s* ‘with’ according to Feldman (2001, 2002)

³I assume that the description $i + j$ used as the INDEX value of the entire structure simply acts as a new variable or designates a complex group index and has nothing to do with addition.

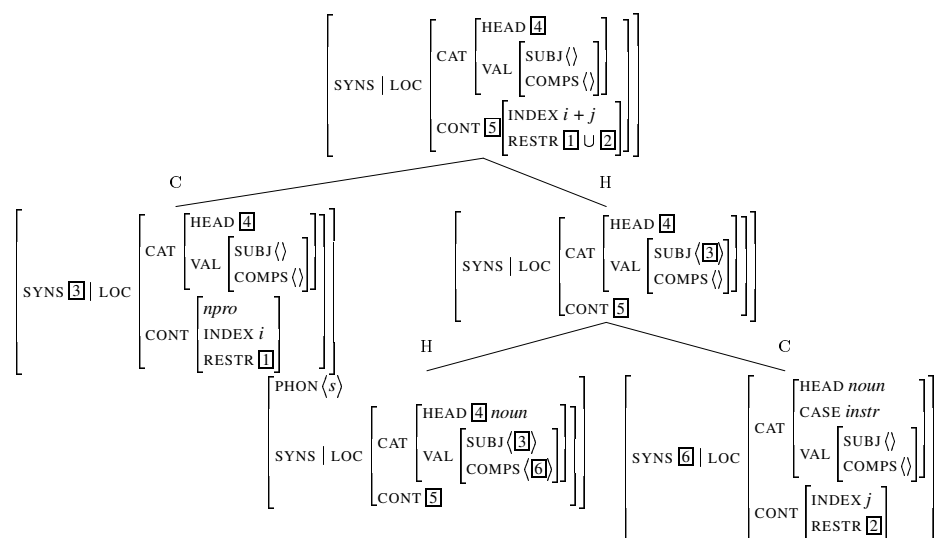


Figure 8.6: The structure of an exemplary CCC according to Feldman (2001, 2002)

Feldman's (2001, 2002) approach correctly describes number resolution in CCCs, makes the right predictions about the distribution of possessive reflexive pronouns in Russian CCCs and ensures that the NP1 always varies in case, while the NP2 is always instrumental.

However, there are two major problems with this proposal. Firstly, by treating *s* 'with' as a noun, the modifiability of the *s* NP cluster by collectivizing adverbs such as *vmeste* 'together' cannot be explained. As previously indicated, adverbs are traditionally considered unable to modify nominal objects. They usually modify events / actions / situations, associated with VPs, PPs or another adverbs. Due to the fact that in Feldman's (2001, 2002) approach, the *s* NP sequence is treated as a noun, no adverb modification can be licensed, at least not without providing special lexical entries for collectivizing adverbs.

Secondly, the vocalic alternation of *s* 'with' between *s* and *so* appears to be unexpected if this entity is a noun, as Feldman (2001, 2002) proposes. Such an alternation is typical for prepositions and not for nouns. These facts have been discussed in Section 2.2 of Part I, where evidence for the prepositional categorial status of the Polish comitative *z* 'with' was provided.

Feldman (2001, 2002) also discusses Russian CCs involving plural pronouns and argues that these CCs are ambiguous between ACCs and ICCs. For CCs with the ACC interpretation, she proposes an adjunction-based analysis, which I already mentioned in Section 8.1, for CCs with the ICC interpretation, a complementation-based analysis as well. This analysis is sketched below.

8.2.2 Complementation-Based Analyses of ICCs

Feldman (2001, 2002) assumes that plural pronouns occurring in ICCs are heads selecting as their complements *s*-phrases with particular specifications. Figure 8.7 describes a lexical entry of a transitive plural pronoun according to this assumption. Note that *pro_tr* in Figure 8.7 refers to transitive pronouns as opposed to intransitive pronouns, given as *ppro*.

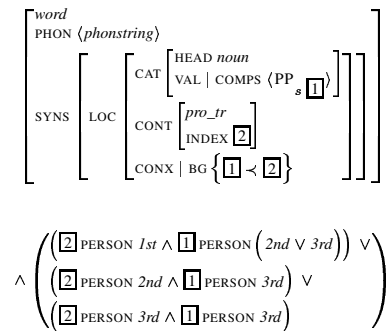


Figure 8.7: The relevant part of the lexical entry of Russian transitive plural pronouns according to Feldman (2001, 2002)

To account for person hierarchy, Feldman (2001, 2002) assumes a linear order on person values and provides a disjunction as in Figure 8.7.⁴ A special relation ensures that the denotation of the complement is included in the denotation of the head. Figure 8.8 demonstrates this analysis for Russian ICCs.

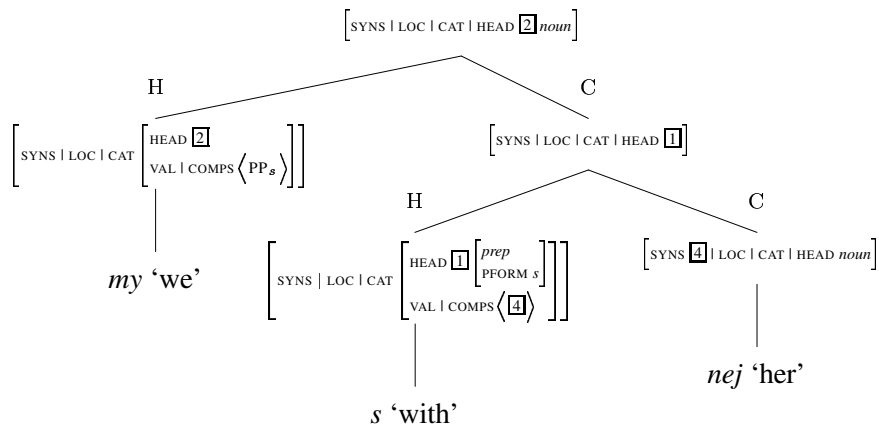


Figure 8.8: The structure of an ICC involving a plural pronoun according to Feldman (2001, 2002)

⁴Note that the description in Figure 8.7 contains some obvious formal errors, but I decided to depict it exactly as it occurs in Feldman (2001, 2002).

I do not believe that there is convincing empirical evidence for assuming a complementation-based analysis for (at least Polish) ICCs involving plural pronouns. Another shortcoming of Feldman's (2001, 2002) analysis is that each plural pronoun must be specified in the lexicon twice, i.e., as a transitive and an intransitive expression, which is redundant. Moreover, the analysis only accounts for ICCs denoting the speaker / addressee / referent of the third person singular pronoun and the referent of the NP2, i.e., ICCs with the cICC reading. ICCs with the oICC reading cannot be analyzed in this approach. Nor can be ICCs involving non-pronominal NPs as the realization of NP1s.

A complementation-based analysis of ICCs involving plural pronouns has been proposed in Vassilieva and Larson (2001, 2005) as well. They treat plural pronouns as if they were derived from the corresponding singular pronouns by the addition of individuals Δ , according to the schema in (392).

- (392) a. $we = I + \Delta$
- b. $you.PL = you.SG + \Delta$
- c. $they = he/she/it + \Delta$

According to the specifications in (392), the meaning of plural pronouns consists of a well-defined singular nucleus and an unspecified set of individuals Δ . Until the set Δ is specified, plural pronouns fail to refer. Vassilieva and Larson (2001, 2005) assume that Δ may be specified by a phrase which functions as a complement of the plural pronoun. They propose that Russian ICCs are instances of this kind of structures.

Thus, the Russian ICC in (393) is syntactically analyzed as a DP headed by the plural pronoun. The comitative PP is a complement of the pronoun head and supplies the unspecified individual in the plural pronoun meaning. Figure 8.9 provides the syntactic structure of (393) assumed in Vassilieva and Larson (2001, 2005).

- (393) my z Petej
we with Petja
'Petja and I'

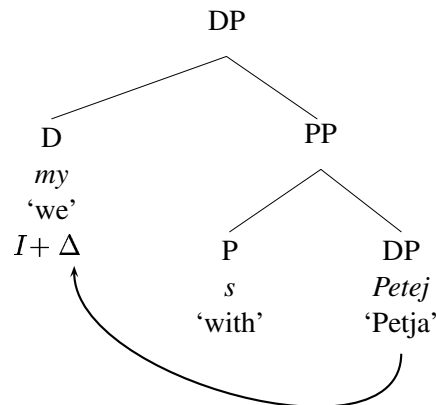


Figure 8.9: The structure of ICCs involving plural pronouns according to Vassilieva and Larson (2001, 2005)

Vassilieva and Larson (2001, 2005) also provide a semantic-pragmatic analysis of ICCs involving plural pronouns. For this, they adopt the formalism of Larson and Segal (1995), according to which sentences are assigned truth values with respect to a sequence δ , providing contextual information. I will not go into the technical details of this analysis, but would like to point out some of the problems associated with it.

As Vassilieva and Larson (2001, 2005) admit, neither discontinuous ICCs nor questioned z NP2s in ICCs can be licensed in their approach. Feldman (2001, 2002) mentions further incorrect predictions of the proposal, such as undesirable iteration, or the prediction that NP2s can be interpreted as speakers. Another shortcoming of the analysis relates to the semantic interpretation of oICC. Besides the speaker / addressee / referent of the third person pronoun and the individuals denoted by the NP2, Polish oICC denote other, unspecified individuals. By identifying the referents of plural pronouns with the referents of the corresponding first person pronouns and the referents of the NP2s, oICC cannot be accounted for.

A similar proposal for analyzing ICCs involving (dropped) plural pronouns, but without a semantic component, has been provided in den Dikken et al. (2001) on the basis of Hungarian data such as (394).

- (394) [(Mi) a nővéremmel] nem mentünk moziba
 we the sister.1ST.SG.COMIT not went.1ST cinema-to
 'My sister and I did not go to the cinema.'

den Dikken et al. (2001) argues for the syntactically complex representation of first person plural pronouns given in Figure 8.2.2.

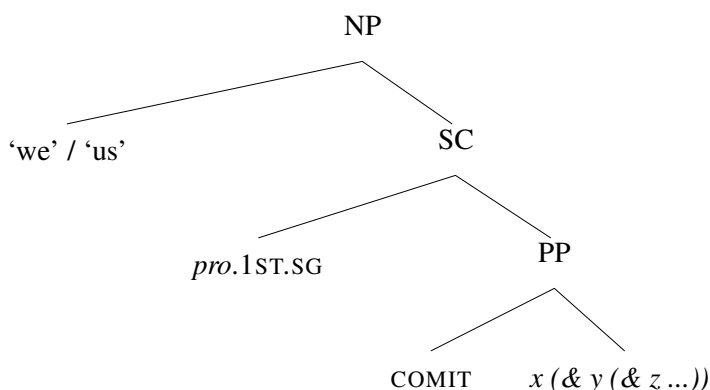


Figure 8.10: The structure of first person plural pronouns according to den Dikken et al. (2001)

In the structure in Figure 8.2.2, the plural pronoun *we / us* acts as the head of the entire construction and is responsible for first person plural agreement on the finite verb. Further evidence for treating the plural pronoun as the head comes from control. den Dikken et al. (2001) suggest that the comitative PP has a first person singular null subject (*pro*), and this entire phrase is combined with the plural pronoun. However, they leave open whether the comitative PP is a complement or an adjunct of the plural pronoun head.

I also assume that first person singular pronoun referents are available in ICCs containing (first person) plural pronouns (cf. our discussion of the control data in Section 3.4.3). However, I assume that this fact is a semantic or even pragmatic matter rather than a syntactic one. Given this, the treatment of ICCs in purely syntactic terms, as postulated in den Dikken et al. (2001), seems unmotivated.

In the next section, I will look at one more strategy to deal with CCs and point out the problems associated with it.

8.3 Coordination-Based Analyses

There are a number of approaches to CCs that treat them in terms of conjunctive coordination. They differ in technical details and vary depending on what underlying syntactic structure is assumed for coordination,⁵ but they make similar predictions and entail similar problems. In this section, I will discuss these approaches as they

⁵Note that there is no uniform treatment of coordination in linguistics. It has been previously analyzed as (1) flat structures of the form [_{NP} NP Conj NP] (cf. Sag et al. (2003), Dalrymple and Kaplan (2000), as well as Kupść et al. (2000) for Polish); (2) head-head structures of the form [_{NP} NP [_{NP} Conj NP]] (cf. the proposal of Sag et al. (1985) and Gazdar et al. (1985) within the GPSG framework); (3) specifier-head structures of the form [_{ConjP} NP [_{Conj'} Conj NP]] (cf. Kayne (1994) and Johannessen (1998)); (4) head-adjunct structures of the form [_{NP} NP [_{BP} Boolean NP]] (cf. Munn (1993)); or (5) coordinate structures of the form [_{CoordP} [_{NP} Conj NP] ... [_{NP} Conj NP]] (cf. Abeillé (2003)).

were proposed for ICCs and CCCs, pointing out their major shortcomings. As noted in Section 8.1, there are no coordination-based approaches to ACCs, which are always analyzed in terms of adjunction.

8.3.1 Coordination-Based Analyses of ICCs

Coordination-based analyses of ICCs have been proposed in Progovac (1997), Dylą (2003), Hetzron (1973), Hale (1975), Aissen (1987) and Schwartz (1985, 1988a,b). These approaches only discuss ICCs which involve (dropped) plural pronouns as realizations of NP1s. Such ICCs are often referred to as the plural pronoun construction (PPC).

Progovac (1997) argues that PPCs can be described on the basis of the general structure of coordination. Based on sentences such as (395), she assumes that each conjunct in a coordinate structure is an adjunct to a phrase with an empty pronominal head.

(395) We, I and Tom, arrived late.

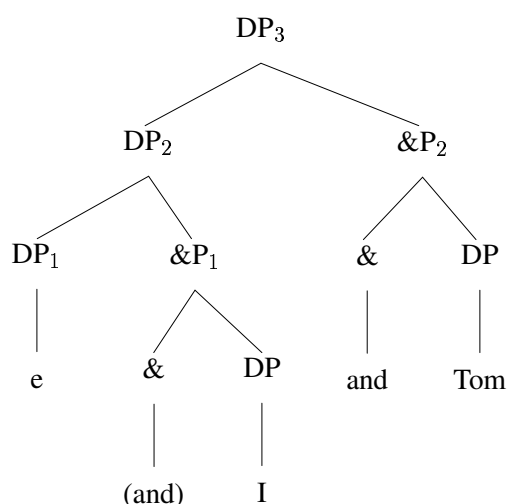


Figure 8.11: The structure of coordination according to Progovac (1997)

(395) is given the structural representation in Figure 8.11, which is supposed to cover every type of coordination, including PPCs. It is headed by the empty pronoun *e* modified by two conjunction phrases: $\&P_1$ and $\&P_2$. Each conjunction phrase is assumed to be headed by the conjunction $\&$, which, however, does not have to be realized phonetically within the first adjoined conjunction phrase. This analysis predicts, according to Progovac (1997), the possibility of asymmetric coordination involving inclusive plural pronouns. While in English the empty head pronoun will normally not surface, in languages with PPCs, the pronominal head will be realized, but the first conjunct will be omitted.

A coordination-based analysis has been also suggested for Polish PPCs in Dylą (2003), who focuses on gender resolution in these expressions. Unfortunately, he does not provide a syntactic structure. Regarding the meaning of PPCs, Dylą (2003) assumes, following Ladusaw (1989) and Aissen (1989a), that the NP2 in the PPC does not add a new referent, but the referent it denotes is included in the set of referents of the plural pronoun.

An interesting discussion on the relationship between ordinary coordination and PPCs can be found in Schwartz (1985), who examines these constructions in languages such as Kpelle, Mokilese, Latvian, Fijian, Ewe, Mende, Temne, Diola-Fogny, Kirundi, Acholi, Bari, Nuer, Logbara, Tera, Tagalog, Yapese, Hawaiian, Hungarian, Russian and Polish. Schwartz (1985) proposes the general structural schema in (396) to represent these constructions, where “&” stands for a connector, which governs the form of the following NP in some languages but not in others, and in some languages does not appear at all.

(396) [_{NP} [+Pronoun, + Plural] (&) NP]

Based on the comparison of the syntactic structure of these constructions and the syntactic structure of NP conjunction, Schwartz (1985) distinguishes four syntactic types of PPCs:⁶

Type 1: The structure of the PPC and the NP conjunction is the same,

Type 2: There is an overt connector morpheme in the PPC and it differs from the connector for NP conjunction,

Type 3: The PPC differs from the corresponding NP conjunction in size of the connector morpheme (the PPC has no overt connector, while NP conjunction does, or the size of the connector morpheme is reduced relative to the connector in NP conjunction),

Type 4: NP conjunction is an expansion of the PPC in the sense that NP conjunction is formed by placing an additional third person plural pronoun after the initial NP.

Schwartz (1988a) further suggests that the initial pronoun should possibly be considered to be the single syntactic head of the construction rather than the initial component of a multiheaded syntactic coordination. As arguments for treating pronouns as single syntactic heads in PPCs, she lists (1) the externally governed case marking of these pronouns, (2) the general higher cohesiveness of PPCs relative to an ordinary nominal coordination, (3) impossible inversion of these pronouns and the NP2s, and, finally, (4) consistency with the general linearization principles of the languages, in that nominal heads generally precede complex non-heads within

⁶Note that I would typically use the term coordination instead of conjunction here, but in the present discussion I will keep the original terminology of Schwartz (1985).

their phrases, and with the specific order of phrases introduced by this connector relative to its head in those languages where an overt connector morpheme of the PPC has other functions.

Further, according to Schwartz (1988a), the initial pronoun carries person, number and case properties for the full construction. She claims, however, that the pronoun by itself has a singular referent. Thus, the entire construction has a coordinate interpretation, which Schwartz refers to as *thematic coordination*: The (unique) referent of the plural pronoun and the referent of the NP2 are assigned the same Θ -role.

The main problem with this analysis consists in analyzing plural pronouns as denoting a single referent. I assume that these pronouns have their usual meanings as sets of individuals. Strong evidence for this assumption is the modifiability by numerals such as *both*, *two* or *three*. If the pronouns had singular referents, no modification by numerals would be expected to be possible.⁷

There are numerous approaches dedicated to a specific subtype of PPCs, namely, PPCs involving dropped pronouns, which Schwartz (1988a) calls verb-coded coordination (VCC). This kind of CCs can also be observed in Polish, which I have shown in Chapter 4. The overview below demonstrates that VCCs are widespread cross-linguistically and that there have been many attempts to explain them.

Schwartz (1988b) discusses VCCs in Dakota, Yapese, Kanuri, Bulgarian, Hungarian, Hausa, Chilean Spanish, Finnish, Cherokee, Navajo, Tzozil, as well as in Polish, and proposes the following schematic representation for these constructions:

$$(397) \quad (S (V \ V, \text{PRONOUN}_{i+j}, \ X), (NP (\&), \ NP_i), \ Y)$$

According to the schema in (397), the VCC is composed of three constituents, separated in (397) by commas which indicate that the constituents are not linearized. The first constituent consists of the verb (V), the covert pronominal information (PRONOUN_{i+j}) and, possibly, a further arbitrary constituent (X). The pronominal component includes information about the referent of the NP_i , indicated by the index i , and additional participant information, indicated by the index j . The second constituent is an NP composed of a facultative connector (&) and the NP_i . The optional third constituent (Y) is an arbitrary expression, e.g., an adjunct. Schwartz (1988b) further formulates a set of syntactic, semantic and pragmatic conditions which account for the distribution and use of VCCs.

This analysis is in fact a pro-drop analysis. The hypothetical dropped pronoun does not appear as a component of a syntactic coordination presumably involving the NP_i . However, this pronoun as well as the NP_i are assumed to be components of a thematic coordination in the sense that they bear the same Θ -role.

Schwartz (1988a) offers some suggestions for an analysis of VCCs, including agreement, within the framework of GPSG. However, no formal description is provided.

⁷See also Ladusaw (1989) for similar observations.

A coordination analysis of similar expressions using pro-drop has also been proposed in Hetzron (1973), Hale (1975) and Aissen (1987), who investigate these constructions in Tzotzil, Navajo and Hungarian, respectively. They mainly focus on agreement control in these expressions. Contrary to the general assumption that only final, surface syntactic constituents control agreement (cf. Chomsky (1965), Pollard and Sag (1988), Gazdar et al. (1985), Pollard and Sag (1994) etc.), in all these approaches, agreement controllers correspond to initial, deep constituents. Sentences such as the Tzotzil one in (398) are thus analyzed as in Figure 8.12.⁸

- (398) Libatotikotik xchi[?]uk li Xune.
 we.went with the Xun
 ‘I went with Xun.’

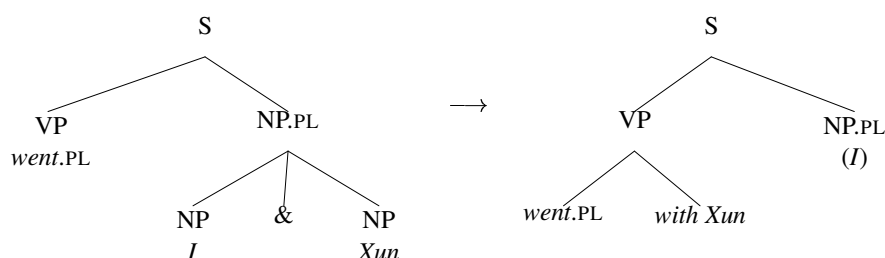


Figure 8.12: The analysis of ICCs given in Aissen (1987), Hale (1975) and Hetzron (1973)

Under this analysis, a sentence involving a VCC has a nominal coordination as its subject. As a typical coordination, this subject is necessarily plural. Then the coordination is split up. One conjunct replaces the earlier coordinate NP as subject and the other conjunct attaches to the VP. The subject NP replacing the coordination in Figure 8.12 is a dropped first person singular pronoun. Hetzron (1973) proposes such an analysis for Hungarian under the name *comitativization*, Hale (1975) for Navajo as conjunct movement, and Aissen (1987) for Tzotzil as *conjunct union*. All three accounts assume that agreement is controlled by the deep constituent, i.e., by the earlier plural subject.

There is yet another analysis of VCCs, proposed in Rigau (1989, 1990) for Catalan. (399) provides an example.

- (399) Amb en Pere ballareu tota la nit.
 with Peter will dance.2ND.PL during the night
 ‘Peter and you will dance during the night.’

Rigau (1989, 1990) assumes that Catalan VCCs are instances of clitic left dislocation structures. (Clitic) left dislocation refers to constructions where the element

⁸Note that this sentence has also an accompanitive interpretation, which is irrelevant here.

which is placed in front of the sentence is associated with some kind of pronoun (cf. Cinque (1977, 1990)). Rigau (1989, 1990) considers the PP *amb en Pere* ‘with Peter’ a dislocated constituent which appears in an *A'* position and is related to the sentence through an empty plural pronoun *pro* in subject position which serves as a resumptive pronoun for this PP. This is demonstrated schematically in (400).

(400) [_{CP} Amb en Pere_i [_{CP} [_{IP} *pro*_i ballareu tota la nit]]]

This analysis is based on the parallelism between Catalan VCCs and other constructions in Catalan that involve dislocated constituents, such as *wh*-extraction. For this reason, transferring to other languages would probably be unmotivated.

In this thesis, I will not postulate a separate analysis for CCs involving dropped pronouns. I rather assume that the occurrence of covert / phonetically unexpressed pronouns in CCs follows from the general properties of a language, which can allow for *pro*-drop or not, and is not a peculiarity of CCs. The coordination-based analyses of ICCs presented above, both those involving and those not involving *pro*-drop, are problematic for a number of empirical reasons which will be discussed in detail in Section 8.3.3 in the context of CCCs. The coordination-based analyses of CCCs are outlined below.

8.3.2 Coordination Analyses of CCCs

CCCs have previously been analyzed in terms of coordination in Dylą (1988), Comacho (1994), Skrabalova (2003), Vassilieva and Larson (2001, 2005) and Bobrowski (1998). Dylą (1988) examines these expressions in Polish with respect to extraction, reflexivization, clitic and parenthetical placement, and contrastive stress assignment. On the basis of the observation that CCCs correspond to ordinary coordinate structures with respect to number, gender and person resolution, control of pronouns and PRO subjects as well as the availability of distributive and collective interpretation, Dylą (1988) proposes to analyze them as NP coordination, more precisely, as conjunctionless binary coordination. Figure 8.13 provides the structure of an exemplary CCC in his GPSG-based approach.

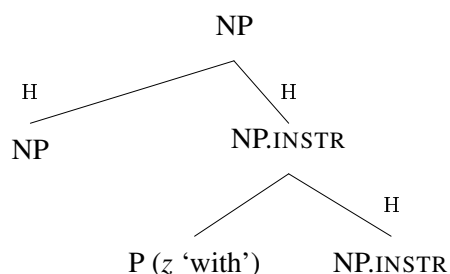


Figure 8.13: The structure of CCCs according to Dylą (1988)

The preposition *z* ‘with’ is analyzed here as a clitic combining with an instrumental NP, which is the head of the *z* NP cluster. The entire structure is thus a multiheaded NP.

Analyzing CCCs as true instances of coordination was also postulated in Comacho (1994) for Spanish. He claims that the basic difference between the comitative coordination and ordinary *and*-coordination consists in the fact that, unlike *and*, the Spanish connector *con* ‘with’ assigns case. The syntactic structure he proposes for CCCs differs from that proposed in Dylą (1988), and is illustrated in Figure 8.14 for the Spanish CCC in (401).

- (401) un hombre con una mujer
 a man with a woman
 ‘a man and a woman’

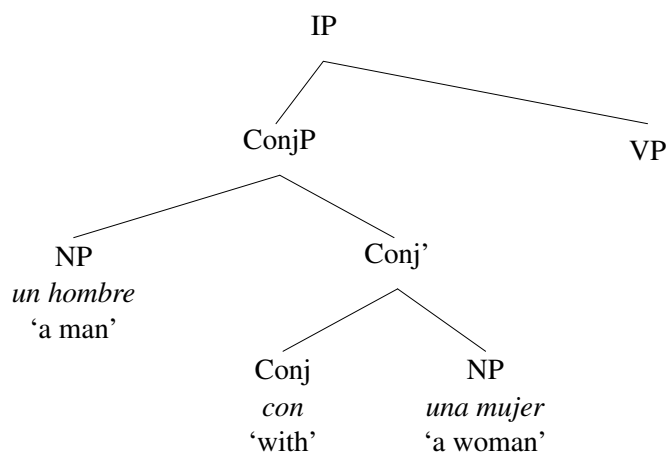


Figure 8.14: The structure of CCCs according to Comacho (1994)

According to the structure in Figure 8.14, a sentence involving a CCC is syntactically composed of the conjunction phrase (ConjP) and a VP. The ConjP involves two conjuncts connected by the conjunction *con* ‘with’: the NP *un hombre* ‘a man’ and the NP *una mujer* ‘a woman’. Like Dylą (1988), Comacho (1994) argues that the coordination analysis of CCCs makes it possible to account for the agreement facts: as in ordinary conjunction, each conjunct contributes to the agreement features of the conjunction phrase.

A coordination-based analysis has also been suggested for Czech CCCs in Skrabalova (2003). She considers two possible syntactic structures for these expressions: one corresponding to the one in Comacho (1994), where the comitative morpheme functions as a conjunction rather than a preposition and acts as the head of the entire ConjP, and one where the CCC is a ConjP involving a zero-conjunction; the comitative PP functions here as its complement. These structures are illustrated for sentence (402) in (403a) and (403b), respectively.

- (402) Ja s Marií jsme šli do kina.
 I with Mary.INSTR AUX.PL gone.PL.MASC to cinema
 ‘Mary and I went to the cinema.’

- (403) a. [IP [ConjP Ja [Conj’ s Marií]] [I’ jsme [VP šli do kina]]]
 b. [IP [ConjP já [Conj’ e [PP s Marií]]] [I’ jsme [VP šli do kina]]]

Treating CCCs in terms of ordinary coordination has been also proposed in Vassilieva and Larson (2001, 2005) for Russian. The corresponding syntactic structures of CCCs and ordinary coordination are provided in (8.15), where the two NPs (DPs, according to Vassilieva and Larson (2001, 2005)) as well as the preposition *s* ‘with’ and the conjunction *i* ‘and’ each form a separate constituent.

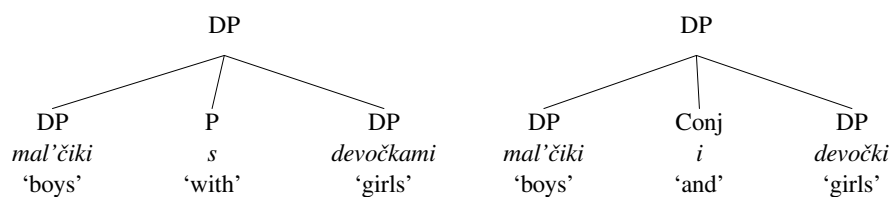


Figure 8.15: The structure of CCCs and ordinary coordination according to Vassilieva and Larson (2001, 2005)

A similar, flat syntactic structure has been also proposed in Bobrowski (1998), who assumes that Polish CCs with the CCC reading are generated from coordinate structures of the form in Figure 8.16, for sentence (404).

- (404) Chłopiec i dziewczyna idą.
 boy and girl walk.PL
 ‘A boy and a girl walk.’

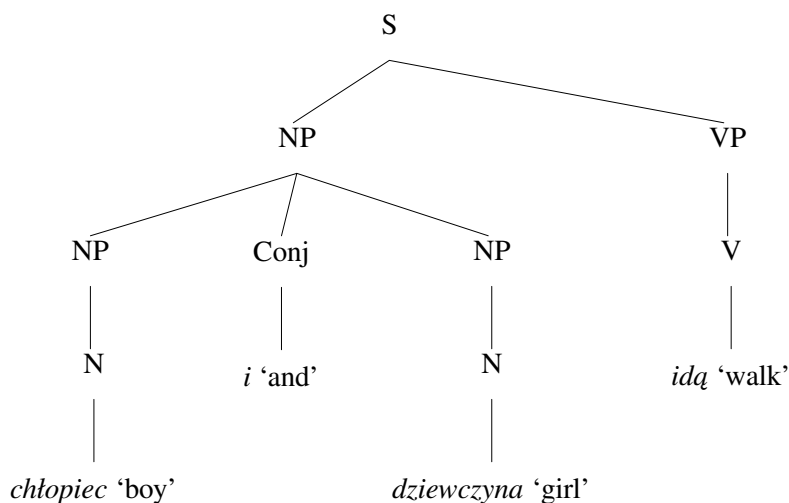


Figure 8.16: The structure of the sentence (404) according to Bobrowski (1998)

In the process of the derivation, a transformation replaces the conjunction *i* ‘and’ with the preposition *z* ‘with’. Additionally, NP-internal morphological operations take place which rewrite the nominative form of the NP *dziewczyna* ‘girl’ into the instrumental form.

Regardless of what underlying syntactic structure is assumed, I consider coordination-based analyses of CCCs problematic for a number of empirical reasons pointed out below.

8.3.3 Discussion

As we have seen, there are numerous proposals for treating CCCs in terms of coordination. Despite different grammatical frameworks and different underlying syntactic structures, all these analyses have in common that they are empirically problematic. This will be demonstrated in the present section.

The major motivation for analyzing CCCs in terms of coordination is that they behave similarly to ordinary nominal coordination with respect to agreement and control phenomena. Also, CCCs express very similar meaning as nominal coordination: they provide a plural entity and allow distributive and collective interpretations.⁹ In these regards, the coordination analyses of CCCs make the right predictions. However, they are problematic for a number of other empirical reasons which I will discuss below with reference to Polish.

Firstly, an analysis of Polish CCCs as coordinate structures cannot account for the instrumental case of NP2, at least not without additional stipulations. Case as-

⁹This issue has been discussed in detail in Dalrymple et al. (1998) with reference to Russian. Dalrymple et al. (1998) postulate that CCCs have the same denotation as coordinate NPs and non-coordinated plurals. All these expressions are assumed to denote first-order sums of individuals in terms of Link (1984, 1991).

signment has also been used as a counter-argument for a coordination-based analysis of Russian and Spanish CCCs in McNally (1993) and Comacho (1994), respectively. By definition, internal case assignment is not possible in coordination; typically, case is assigned by an external case assigner to all NPs. Thus, usually all coordinated NPs bear the same case. This is illustrated by the Polish examples in (405).

- (405) a. Jan i Maria przyszli.
Jan.NOM and Maria.NOM came
'Jan and Maria came.'
- b. Nie zaprosiliśmy Jana i Marii.
not invited.1ST.PL Jan.GEN i Maria.GEN
'We did not invite Jan and Maria.'
- c. Janowi i Marii daliśmy książkę.
Jan.DAT and Maria.DAT gave.1ST.PL book
'We gave Jan and Maria a book.'
- d. Nie przejmuj się wcale Janem i Marią!
not care.2ND.SG RM at all Jan.INSTR and Maria.INSTR.
'Don't care about Jan and Maria!'
- e. Rozmawiamy o Janie i Marii.
talk.1ST.SG about Jan.LOC and Maria.LOC
'We are talking about Jan and Maria.'
- f. Zobaczyliśmy Jana i Marię.
saw.1ST.SG Jan.ACC and Maria.ACC
'We saw Jan and Maria.'

However, it must be mentioned that in Polish, NPs bearing different case values can also be coordinated. This is shown in the following examples, taken from Przepiórkowski (1999, p. 175).

- (406) Kto, co i komu dał?
who.NOM what.ACC and whom.DAT gave
'Who gave what to whom?'
- (407) Dajcie wina i całą świnie!
give wine.GEN and whole.ACC pig.ACC
'Serve (some) wine and a whole pig!'
- (408) Przyjedzie albo późnym wieczorem, albo następnej zimy.
will come or late.INSTR evening.INSTR or next.GEN winter.GEN
'(S)he will come either late in the evening, or next winter.'

In (406), which contains a sequence of *wh*-words in clause-initial position, a nominative NP, an accusative NP and a dative NP are coordinated. In (407), a

genitive NP, which functions here as a partitive, is coordinated with an accusative NP. Finally, in (408), an instrumental NP is coordinated with a genitive NP. In this sentence, both NPs act as temporal adjuncts.

In CCCs, the case of the NP2 is always instrumental, as shown in (409); it is obviously assigned by the preposition *z* ‘with’ (cf. the discussion in Section 2.2 of Part I).

- (409)
- a. Jan z Marią przyszli.
Jan.NOM with Maria.INSTR came
‘Jan and Maria came.’
 - b. Nie zaprosiliśmy Jana z Marią.
not invited.1ST.PL Jan.GEN with Maria.INSTR
‘We did not invite Jan and Maria.’
 - c. Janowi z Marią daliśmy książkę.
Jan.DAT with Maria.INSTR gave.1ST.PL book
‘We gave Jan and Maria a book.’
 - d. Nie przejmuj się wcale Janem z Marią!
not care.2ND.SG RM at all Jan.INSTR with Maria.INSTR.
‘Don’t care about Jan and Maria!’
 - e. Rozmawiamy o Janie z Marią.
talk.1ST.SG about Jan.LOC with Maria.INSTR
‘We are talking about Jan and Maria.’
 - f. Zobaczyliśmy Jana z Marią.
saw.1ST.SG Jan.ACC with Maria.INSTR
‘We saw Jan and Maria.’

Moreover, in ordinary coordination, not only NPs but also VPs, APs and other kinds of phrases as well as mixed categories are possible. This is illustrated by the examples in (410) and (411), taken from Kupść et al. (2000). By contrast, only NPs can be included in CCCs, as shown in (412).¹⁰

- (410)
- a. Jan i Maria przyszli. NP + NP
Jan and Maria came
‘Jan and Maria came.’
 - b. Jan przyszedł, ale już wyszedł. VP + VP
Jan came but already left
‘Jan came but he already left.’
 - c. Kupił duży i wygodny rower. AP + AP
bought.3RD.SG big and comfortable bike
‘He bought a big and comfortable bike.’

¹⁰See also Miller (1971), McNally (1993) and Feldman (2002) for similar observations with respect to Russian data.

- (411) a. Kupił książki i po zeszytcie. NP + PP
bought.3RD.SG books and apiece exercise book
'He bought books and one exercise book of every kind.'
- b. Doradził mu wyjazd i żeby nie wracał. NP + CP
advised.3RD.SG him departure and to not came back.3RD.SG
'He advised him to leave and never come back.'
- c. Wie o wypadku i że wszystko się dobrze skończyło. PP + CP
knows about accident and that everything RM well ended
'He knows about the accident and that everything ended up well.'
- d. Odpowiadał szybko i bez zastanowienia. AdvP + PP
answered.3RD.SG quickly and without thinking
'He was answering quickly and without thinking.'
- e. Przyjedzie jesienią lub na wiosnę. NP + PP
will come.3RD.SG autumn or on spring
'He'll come in autumn or in spring.'
- (412) a. Jan z Marią przyszli. NP + NP
Jan with Maria came
'Jan and Maria came.'
- b. *Jan przyszedł z już wyszedł. VP + VP
Jan came with already left
- c. *Kupił duży z wygodny rower. AP + AP
bought.3RD.SG big z comfortable bike
- d. *Kupił książki z po zeszytcie. NP + PP
bought.3RD.SG books z apiece exercise book

Further, as mentioned in Chapter 4.1 of Part I, CCCs allow pro-drop. Ordinary Polish coordination, however, does not. This can be seen in the contrast between (413a) and (413b).

- (413) a. (On) z bratem poszli do kina.
He with brother went to cinema
'He and my / his brother went to the cinema.'
- b. *(On) i Maria poszli do kina.
he and Maria went to cinema
'He and Maria went to the cinema.'

This observation has also been made in Comacho (1994), who points out that under the coordination-based analysis, the contrast between CCCs and ordinary

coordinate structures with respect to pro-drop cannot be explained.¹¹

McNally (1993) further observed that treating CCCs as cases of coordinate structures fails to explain the difference in the distribution of possessive and possessive reflexive pronouns in ordinary coordinate structures and in CCCs. This issue was already discussed in Chapter 3.4 on the basis of the examples in (92), repeated here as (414).

- (414) a. Zarówno dyrektor_i jak i jego_i / *swoj_i zastępca wyjechali
 both director as and his / POSS.REFL.PRN assistant left
 do USA.
 to USA
 ‘Both the director and his assistant left to the USA.’
- b. Dyrektor_i z(e) ??jego_i / ??swoim_i zastępcą wyjechali do
 director with his / POSS.REFL.PRN assistant left to
 USA.
 USA
 ‘The director and his assistant left to the USA.’

While a clear contrast between possessive and reflexive possessive pronouns can be observed in coordination (cf. *jego* vs. *swoja* in (414a)), no such difference can be found in CCCs. Recall that according to Dylą (1988), neither irreflexive possessive nor reflexive possessive pronouns can refer to NP1s in Polish CCCs. However, my Polish informants judge sentences as in (414b) to be marginal, but perhaps grammatical. Given this observation, it seems plausible to assume different syntactic structures for ordinary coordination and CCCs.

Another problematic aspect of coordination-based analyses such as that in Vasileva and Larson (2001, 2005) is that inversion of NP1 and NP2, which is possible in a typical coordination as illustrated in (415), cannot be ruled out and, consequently, the licensing of ungrammatical sentences such as (416b) cannot be prevented.¹²

¹¹To account for this difference, Comacho (1994) considers two possible solutions: an additional functional projection and the assumption that case assignment properties of the Spanish comitative *con* ‘with’ license the movement of the head to a position where it can be identified via agreement with the verb.

¹²Note, however, that free reshuffling of conjuncts occurs only in multiple conjunct coordination. In binary coordination, the order of conjuncts is rigid. This fact is illustrated in (i), provided by Stefan Dylą (personal communication).

- (i) a. Zarówno Kwaśniewski jak i Belka spotkali się z Bushem.
 both Kwaśniewski as and Belka met RM with Bush
 ‘Both Kwaśniewski and Belka met Bush.’
- b. *Jak i Belka zarówno Kwaśniewski spotkali się z Bushem.
 as and Belka both Kwaśniewski met RM with Bush
 ‘Both Belka and Kwaśniewski met Bush.’ [intended]

- (415) a. Jan i Maria wyjechali.
Jan and Maria left
'Jan and Maria left.'
- b. Maria i Jan wyjechali.
Maria and Jan left
'Maria and Jan left.'
- (416) a. Jan z Marią wyjechali.
Jan with Maria left
'Jan and Maria left.'
- b. *Marią z Jan wyjechali.
Maria.INST with Jan left
'Maria and Jan left.' [intended]

Also, a coordination-based analysis does not account for grammatical structures such as that in (417), where in addition to the preposition *z* 'with', an alleged conjunction, the proper conjunction *i* 'and' is present.

- (417) Jan z Marią i z Anną wyjechali.
Jan with Maria and with Anna left
'Jan, Maria and Anna left.'

As illustrated by the example in (418), involving *i* 'and' as well as the synonymous conjunction *oraz* 'and', the occurrence of multiple conjunctions in parallel is ungrammatical in Polish.

- (418) Jan i Maria (*oraz) i Anna wyjechali.
Jan and Maria and and Anna left
'Jan, Maria and Anna left.'

And finally, CCCs behave differently from coordination with respect to Across-the-Board extraction. In a coordinate structure, the same constituent may be moved out of each conjunct. This, however, does not seem to be possible in sentences involving CCCs. I discussed this issue in Chapter 5.3 on the basis of the examples in (234), repeated here as (419).

- (419) a. Czyim_i manipulowałeś [_i ojcem] i [_i bratem]?
whose manipulated.2ND.SG __ father and __ brother
'Whose father and brother did you manipulate?'
- b. ??/*Czyim_i manipulowałeś [_i ojcem] z [_i bratem]?
whose manipulated.2ND.SG __ father with __ brother
'Whose father and brother did you manipulate?' [intended]

To conclude, although clear similarities can be observed between coordination and CCCs, there are many arguments against a uniform syntactic analysis for

these expressions. In particular, the data shows that CCCs and ordinary coordination (i) exhibit different case assignment patterns, (ii) have different part of speech requirements, (iii) show different behavior regarding pro-drop, (iv) differ in the distribution of possessive and reflexive pronouns, (v) behave differently regarding inversion, (vi) and the cooccurrence of multiple conjunctions, and, finally, (vii) they manifest different properties with respect to Across-the-Bord extraction.

8.4 Summary

In this chapter, I presented previous analyses of CCs grouping them into three major classes: adjunction-based, coordination-based and complementation-based analyses. I have also shown that CCCs and ICCs have previously been treated in terms of coordination, adjunction and complementation, and that for ACCs, only adjunction-based analyses have been proposed. The majority of the previous approaches that deal with two or three types of CCs and try to explain the differences between them do so by means of syntactic stipulations. However, this is not consistent with my observations that the differences between the three types of CCs are strongly related to semantic factors. Given this, I will postulate in this thesis a single syntactic structure for ACCs, CCCs and ICCs, and propose that the differences between them follow from their semantic properties.

Since coordination-based and complementation-based analyses are problematic for a number of empirical and theoretical reasons pointed out above, I will adopt the adjunction-based analyses in my approach. This allows us to treat all types of CCs in a uniform fashion with regard to their syntactic structure and, thus, to explain all of the syntactic properties they share.

In the following chapter, I will provide details of my analysis of CCs based on the empirical discussion in Part I and taking into account the conclusions of our discussion in this chapter.

Chapter 9

The Analysis of Polish CCs

As Chapter 8 has shown, the differences between the three types of CCs have been previously accounted for by assuming different syntactic structures. I have argued that this approach is not always empirically motivated and have demonstrated that some of the analyses are highly problematic for a number of empirical or theoretical reasons. In this chapter, I will propose an alternative analysis based on the assumption that ACCs, CCCs and ICCs have a uniform, adjunction-based syntactic structure, and that the crucial differences between them follow from their semantic properties. I propose that the semantic difference between the particular types of CCs is triggered by the denotation of the preposition *z* ‘with’, for which I suggest three different semantic representations. I also propose a new theory of indexation and ϕ -features, which allows us to account for agreement and resolution as well as for a number of reference phenomena.

The theoretical core of my analysis is the assumption that all three types of Polish CCs are syntactically and semantically, that is, in terms of the logical representation regular expressions, in the sense that they are licensed by the same set of syntactic principles and semantic operations as all other non-comitative expressions of the same type. In this respect, my theory is different from Comacho (1994), Aissen (1989a,b), Dyła (1988, 2003), Vassilieva and Larson (2001, 2005), Feldman (2001, 2002) and Skrabalova (2003), who explain the differences between the particular types of CCs by different syntactic structures and / or different ways of semantic licensing. In my view, a uniform syntactic structure and a fully compositional semantic representation explain why all types of CCs share so many properties, such as the assignment of instrumental case to NP2s, the modifiability of *z* NP2s by collectivizing adverbs, the ability of *z* NP2s to conjoin and occur recursively, the inability to iterate NP1s and *z* NP2s, and, finally, the ability of all CCs to occur as nominative and dative subjects, direct, indirect and prepositional objects, as well as possessors. In Section 9.1, I provide a syntactic analysis which explains this uniform behavior of Polish CCs.

On the basis of the syntactic analysis in Section 9.1, in Section 9.2 I develop the semantic analysis of CCs. I claim that the differences between the particular

types of CCs such as the availability of plural denotation in CCCs and ICCs, but not in ACCs, or the ability to trigger inclusive presupposition in ICCs, in contrast to CCCs and ACCs, are semantic in nature. Therefore, I propose to account for these properties at the level of the logical representation. I postulate that the Polish preposition *z* 'with' is in its comitative usage semantically ambiguous between the accompanitive, conjunctive and inclusive readings. This ambiguity is licensed by three different translations of *z*, each of which provides different truth conditions. The remaining lexical components of CCs, including plural pronouns, are assumed to bear their ordinary meanings. In this respect, my analysis differs from Feldman (2001, 2002), who assumes two lexical entries for plural pronouns licensing transitive pronouns, which occur in ICCs, and intransitive pronouns, which occur in other contexts. By contrast, Ladusaw (1989) proposes to treat plural pronouns in ICCs as bearing their customary meaning, i.e., as being semantically plural. In his account, the comitative PPs impose additional reference conditions on the referents of the plural pronoun, but do not introduce any additional referents. My analysis follows Ladusaw (1989) in this respect.

In Section 9.3, other aspects of the meaning of CCs are discussed, such as relatedness and natural gender. I propose to analyze these contents at the pragmatic level, and show how they are linked to the logical representation at the semantics-pragmatics interface.

A further important component of my analysis of CCs is related to the ability of CCCs and ICCs, but not ACCs, to act as controllers of plural anaphoric expressions. This phenomenon can easily be explained in the case of ICCs, which always involve a plurality-denoting expression which can then serve as a potential antecedent, but it cannot be explained for CCCs without additional stipulations. For this reason, Dyla (1988), Comacho (1994), Vassilieva and Larson (2001), Feldman (2001, 2002), and Skrabalova (2003) analyze CCCs as coordinate structures (of different forms). McNally (1989) suggests a semantic solution, according to which the denotation of the comitative PP is identified with the denotation of the NP2, and at the level of the CCC, the denotation of the NP1 and the denotation of the PP are joined via a semantic operation. I have extensively argued against these proposals. Here I suggest that the ability of CCCs (including singular individuals) to control plural anaphora should essentially be treated in terms of the mechanism of indexation, which does not necessarily have to be anchored to the syntactic structure and the logical representation. In Section 9.4, I formulate a theory of indexation which makes it possible to account for referential relations involving CCCs, as well as for many other phenomena which pose a challenge for the existing theories of indices. The core of my theory of indexation is the assumption that indexation entails referential relations but does not entail agreement. I also propose that in CCCs (and other expressions involving split antecedents), indices are constructed (in line with a grammatical principle), while in all other syntactic structures, they are inherited from the syntactic head.

The last component of my analysis of CCs concerns person, number and gender resolution, which occurs in CCCs but not in ACCs and ICCs. To account for

resolution in CCCs, I formulate a new theory of ϕ -features which draws on the distinction between inherent and resolved values. My analysis of agreement and resolution, including principles for person, number and gender resolution for Polish, is provided in Section 9.5. The advantage of my analysis compared to previous approaches is its general character: This analysis not only describes agreement and resolution phenomena in CCCs but it also accounts for corresponding phenomena in coordinate structures and in a number of lexical expressions where internal gender resolution takes place. Finally, my theory incorporates both morphosyntactic and context-related aspects.

I will formalize my analysis within the formal framework of HPSG with LFTy2. The HPSG-grammar of CCs developed in this chapter draws on the sample grammar developed in Section 7.3.2.5, but it introduces some modifications and extensions in the feature architecture of signs and in the linguistic theory. The modifications are immediately motivated by the phenomena observed in Polish CCs, but I will show that other linguistic theories can benefit from these modifications as well.

The proposed analysis applies to a fragment of Polish which includes the three sentences in (420), (421) and (422), involving an ACC, a CCC and an ICC, respectively. Recall that (420) and (422) are structurally ambiguous between a reading where the PP attaches to the NP1 and one where it attaches to the VP (cf. the discussion in Section 5.3.1).

- | | | |
|-------|--|-----|
| (420) | Jan (razem) z Marią wyjechał. | ACC |
| | Jan.SG together with Maria.INSTR.SG left.SG
'Jan left together with Maria.' | |
| (421) | Jan (razem) z Marią wyjechali. | CCC |
| | Jan.SG together with Maria.INSTR.SG left.PL
'Jan and Maria left together.' | |
| (422) | My (razem) z Marią wyjechaliśmy. | ICC |
| | we together with Maria.INSTR.SG left.PL
'Maria and I left together.' | |

9.1 The Syntactic Structure

In this section, I provide a syntactic analysis of CCs. As already indicated in Chapter 2, in this thesis I assume a configurational rather than a linearization-based approach to Polish syntax, and consider Polish an SVO language following Klemsiewicz (1949), Stieber (1972), Bartmiński (1973), Wierzbicka and Wierzbicki (1969) and Świdziński (1996). Although Polish has often been seen as a free word order language and some phenomena, such as clitic placement or weak auxiliaries, have previously been described in terms of linearization-based theories (cf. Kupść (2000) and Borsley (1999), respectively), I have argued in Chapter 2

that, in fact, different linearizations in Polish correspond to different information and prosodic structures, can have semantic effects and have an impact on subject-predicate agreement. Given that and in view of the strict restrictions on the linear position of conjuncts in Polish, the placement of clitics, the extraction out of constituents, as well as on the basis of the rigid word order within Polish NPs and PPs, I will treat the word order in Polish as fixed rather than free. Of course, the variety of possible word orders in Polish is still greater than in English, for instance. However, aspects of this variety play no role in our discussion of CCs.

In describing the syntactic structure of CCs, I will use strictly binary branching structures instead of flat structures. This choice has a methodological rather than an empirical motivation. Binary branching structures allow us to keep the syntactic combinatorics simple. Also, in some computer systems for implementing HPSG-based grammars, such as LKB,¹ binary branching structures are the only option.

9.1.1 The Syntactic Analysis

I propose for all Polish CCs a uniform syntactic structure of the form presented in Figure 9.1.

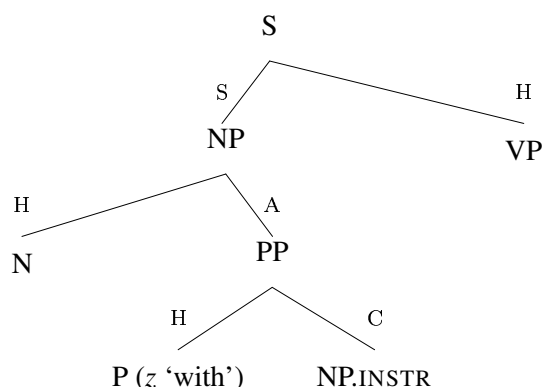


Figure 9.1: The syntactic structure of sentences involving continuous CCs

According to this structure, each CC is an NP headed by the NP1 which is modified by the z -PP. The z -PP is headed by the preposition z which, in turn, selects for the instrumental NP2. The entire CC combines with the VP as its subject.

¹Cf. Copestake (2002), URL: <http://wiki.delph-in.net/moin/LkbTop>. Note that there are currently several environments for implementing HPSG-style grammars, including, besides LKB, ALE (URL: <http://www.cs.toronto.edu/~gpenn/ale.html>; Carpenter (1992), Carpenter and Penn (1999) and Penn and Haji-Abdolhosseini (2003)), TRALE (URL: <http://www.sfs.uni-tuebingen.de/hpsg/archive/projects/trale/>; Haji-Abdolhosseini and Penn (2002), Penn et al. (2002) and Penn and Haji-Abdolhosseini (2003)), and ConTroll (URL: <http://www.sfs.uni-tuebingen.de/control1/>; Götz and Meurers (1997) and Götz et al. (1997)).

For the sake of simplicity, I will ignore other syntactic functions of CCs. Thus, sentences (420)–(422) are all described by the syntactic tree in Figure 9.1.

As I have indicated above, the *z*-PP in the CCC exclusively combines with the NP1, but in the ACC and in the ICC, it can alternatively attach to a VP, both as its left and its right adjunct. The former of these two possible syntactic configurations is illustrated in Figure 9.2. The later one will not be discussed here separately as it does not provide anything beyond the first situation.

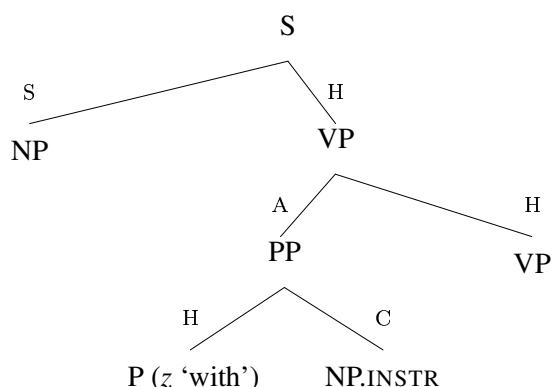


Figure 9.2: The syntactic structure of sentences involving discontinuous CCs

The availability of the structures in Figure 9.1 and in Figure 9.2 as syntactic interpretations of sentences involving ACCs and ICCs correctly predicts the structural ambiguity of the sentences in (420) and (422) as well as all corresponding sentences discussed in Part I.

Summing up, I postulate a uniform adjunction-based analysis of CCs and argue that sentences involving CCs are licensed by means of regular grammar constraints on phrase structures.

9.1.2 An HPSG Syntax

My syntactic analysis of CCs and of the sentences involving them corresponds exactly to the syntactic analysis of sentence (358), repeated here as (423), described by the sample grammar of Section 7.3.

- (423) Bono *z* U2 *chrapie*.
 Bono from U2 snores
 ‘Bono from U2 snores.’

Given the principles of our sample grammar, the sentences in (420)–(422) can be described as shown in Figure 9.3. The relevant lexical entries are given in (424)–(427).

(424) The relevant part of the lexical entry of *Jan* ‘Jan’

PHON⟨Jan⟩					
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CASE <i>nom</i>					
PRD —					
MOD <i>none</i>					
ARG-ST⟨⟩					

(425) The relevant part of the lexical entry of *z* ‘with’

PHON⟨z⟩											
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(426) The relevant part of the lexical entry of *razem* ‘together’

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(427) The relevant part of the lexical entry of the third person singular verb *wyjechał* ‘left’

PHON⟨wyjechał⟩							
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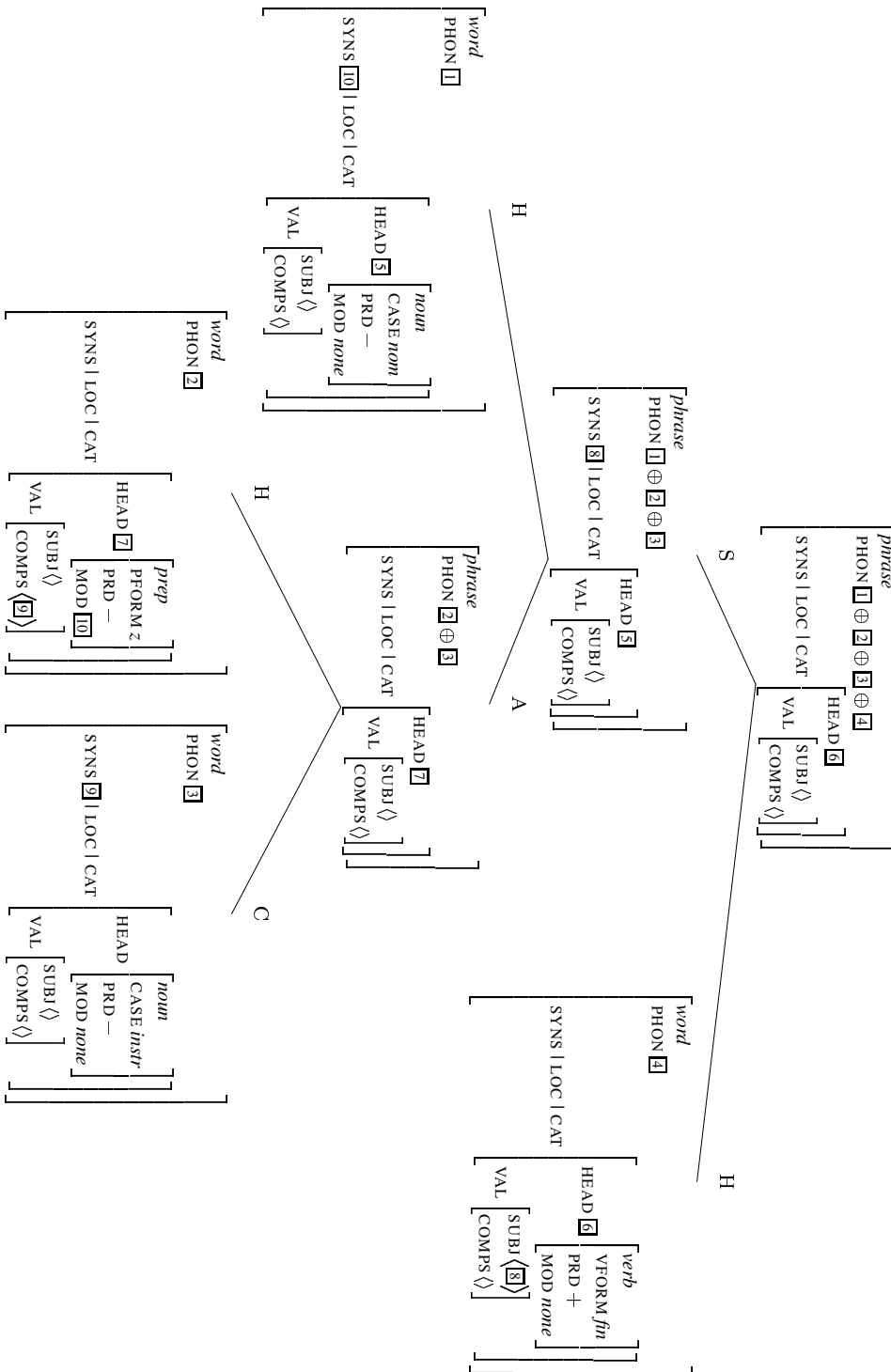


Figure 9.3: A syntactic description of sentences (420), (421) and (422)

The NPs *Jan* ‘Jan’, *my* ‘we’ and *Maria* ‘Maria’ and the adverb *razem* ‘together’ are described by their lexical entries as requiring no arguments, whereas the preposition *z* ‘with’ and the verbs *wyjechał*, *wyjachali* and *wyjechaliśmy* ‘left’ are described as selecting for one argument. By virtue of THE ARGUMENT REALIZATION PRINCIPLE, the VALENCE lists of the NPs and the adverb are empty, whereas the object at the ARG-ST list of the preposition is mapped to its COMPS list, and the object at the ARG-ST list of each verb is mapped to its SUBJ list. These valence properties are specified in the tree in Figure 9.3.

Figure 9.3 further shows that the preposition combines with the instrumental NP as its complement to build a saturated PP. This phrase is licensed by SCHEMA 2 (HEAD-COMPLEMENT SCHEMA) and THE VALENCE PRINCIPLE, which ensures that the COMPS list of the PP is empty. By virtue of SCHEMA 5 (HEAD-ADJUNCT SCHEMA), the PP combines with the nominative NP as its adjunct. The modified NP is then selected by the predicate as its subject by means of SCHEMA 1 (HEAD-SUBJECT SCHEMA) and THE VALENCE PRINCIPLE.

Figure 9.3 also describes the percolation of the HEAD values along the syntactic structures according to THE HEAD FEATURE PRINCIPLE. Finally, it specifies the constituent order, which is accounted for by means of the phonological form and is licensed by THE CONSTITUENT ORDER PRINCIPLE. THE CONSTITUENT ORDER PRINCIPLE guarantees that the preposition precedes its complement, the nominative NP precedes its modifier, and the entire subject precedes the predicate.

Figure 9.4 provides a syntactic description of sentences (420) and (422) according to which the PP attaches to the VP. These sentences are licensed by exactly the same principles as the sentences described in Figure 9.3.

Finally, the tree in Figure 9.5 shows the syntactic structure of the PP *z Maria* ‘with Maria’ modified by the adverb *razem* ‘with’.

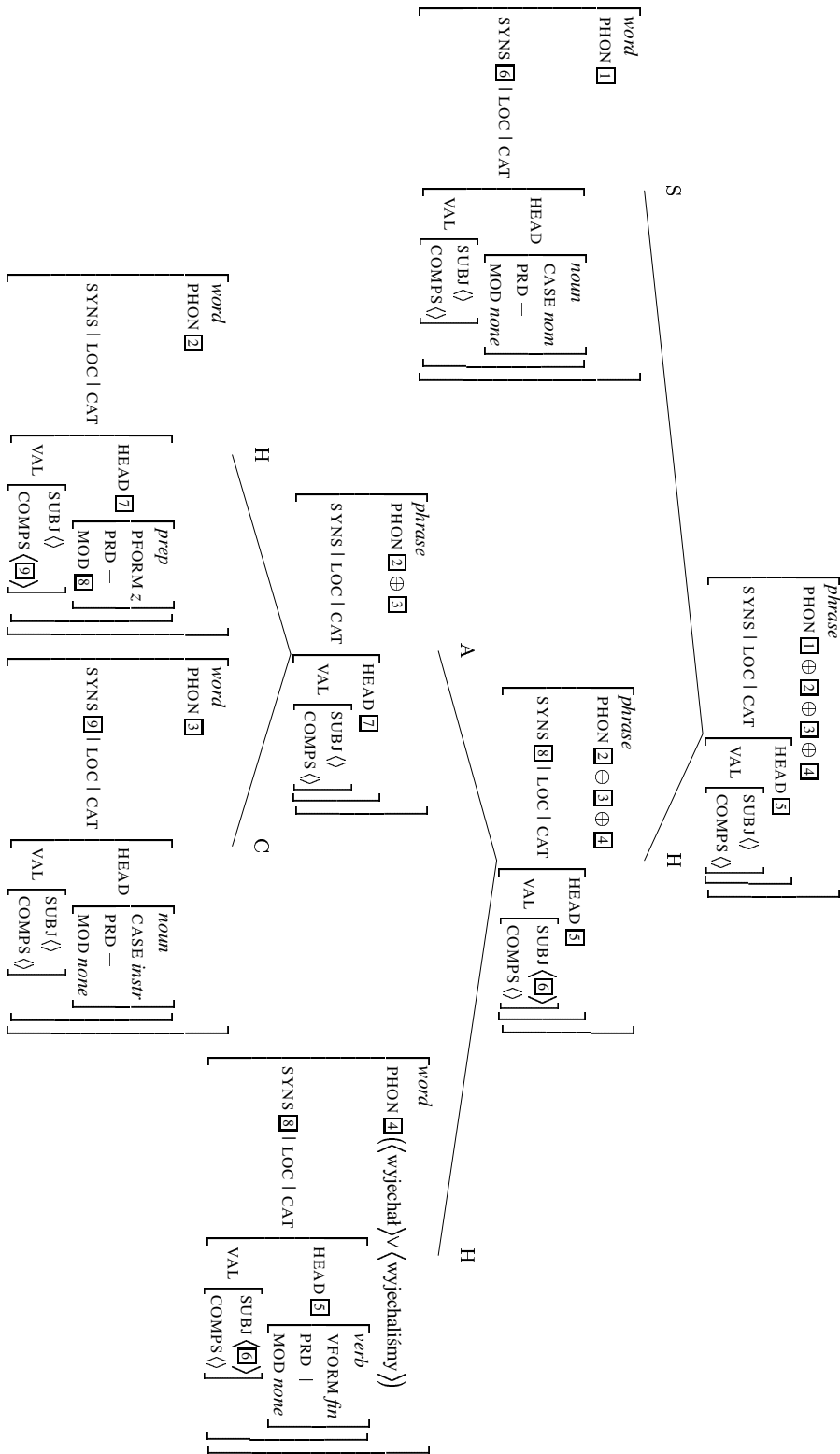


Figure 9.4: The structure of the sentences (420) and (422) under the syntactic interpretation of the PP as a VP-adjunct

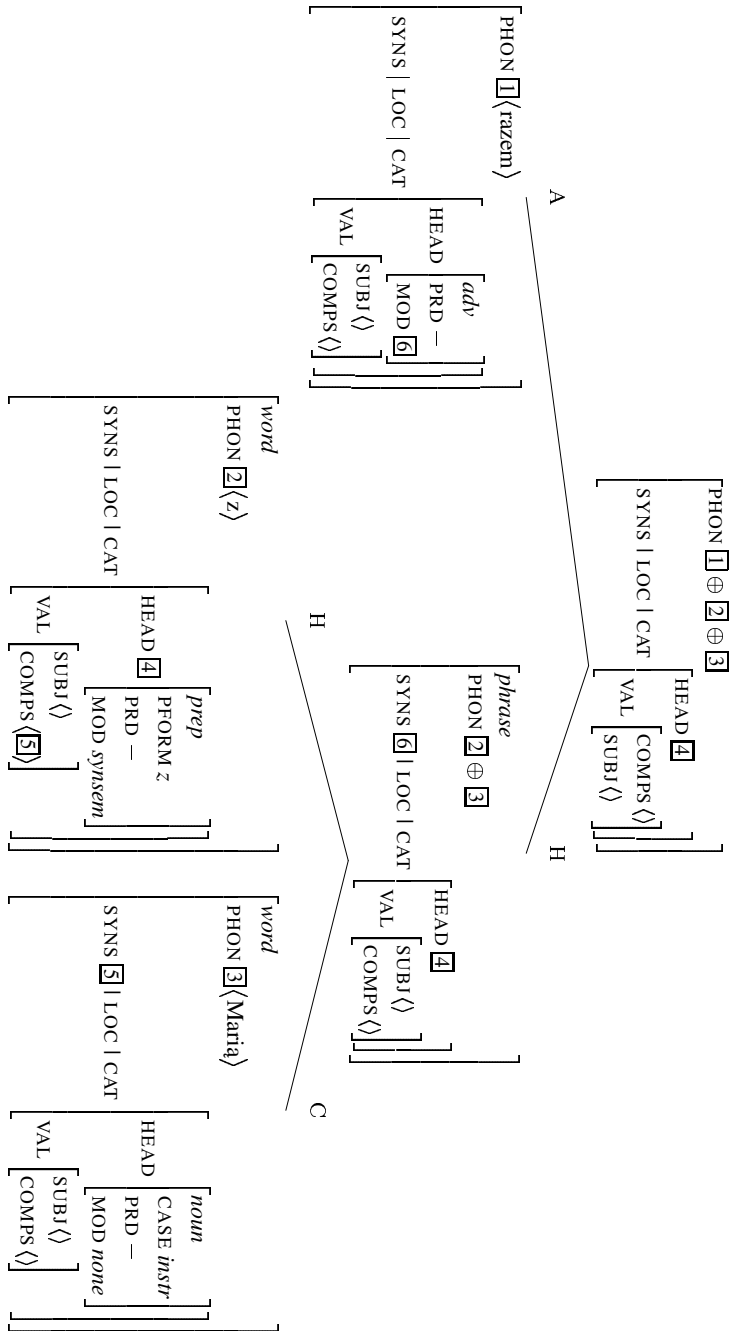


Figure 9.5: The structure of the PP *razem z Marią* 'together with Maria'

As in Figures 9.3 and 9.4, the preposition z in the tree in Figure 9.5 selects the instrumental NP by virtue of SCHEMA 2 (HEAD-COMPLEMENT SCHEMA) and THE VALENCE PRINCIPLE. The entire PP combines with the adverb according to SCHEMA 5 (HEAD-ADJUNCT SCHEMA). The HEAD values and the constituent order are described by THE HEAD FEATURE PRINCIPLE and THE CONSTITUENT ORDER PRINCIPLE, respectively.

Having described the underlying syntactic structure of CCs as well as the syntactic structure of sentences involving CCs, I will now address their semantic interpretation.

9.2 The Semantic Representation

I have argued that Polish CCs have three different semantic interpretations: the accompanitive, conjunctive and inclusive interpretation. The crucial differences between these interpretations have been schematically indicated in (46), (47) and (48) in Section 2.3. In Section 9.2.1, I will propose three basic translations for the preposition z that license these three readings. I will also specify the basic translations of other expressions occurring in our fragment of Polish and demonstrate how the semantic representations of the sentences (420)–(422) are derived. In Section 9.2.2, I will present the formalization of my semantic analysis in the paradigm of HPSG with LF-Ty2.

9.2.1 The Basic Translations and Semantic Derivations

In this subsection, I introduce the basic translations of all lexical expressions of our fragment of Polish and the semantic derivations of the sentences in (420)–(422), represented by terms of Ty2. As a notation for the mapping of the basic translation of a word into a term of Ty2, I will adopt the symbol \rightsquigarrow . To express that the function \rightsquigarrow maps the word *leave* into the Ty2 term $\lambda X. \exists E \mathbf{leave}'(E, X)$, I write $leave \rightsquigarrow \lambda X. \exists E \mathbf{leave}'(E, X)$. To represent variables over atomic event entities, I use e_1, \dots, e_n , and write lower-case letters from the end of the alphabet for atomic individual entities. I further reserve two symbols for representing the speaker and the addressee: i and you , respectively. Variables over sets of events will be written as E_1, \dots, E_n , while variables over sets of individuals will be written in upper case letters from the end of the alphabet. To represent individual constants, I will use lower-case initial characters of the names. The individual constant \mathbf{j}' thus represents an individual named *John*. Predicate constants will be written as lower-case character strings associated with English names of predicates. The predicate constant \mathbf{leave}' thus represents the predicate *leave* and the corresponding Polish predicate *wyjechać* ‘leave’.

First, I provide the logical representation of proper names and the verbal predicate of our fragment, and introduce the semantic representations of the accompanitive preposition z . I then demonstrate how the semantic representation of sen-

tence (420), including an ACC, is derived based on these basic translations. Subsequently, I will move to CCCs, ICCs and collectivizing adverbs.

The basic translations of the proper names *Jan* ‘Jan’ and *Maria* ‘Maria’ are given in (428) and (429), respectively.

$$(428) \quad Jan \rightsquigarrow \{\mathbf{j}'\}_{\langle e,t \rangle}$$

$$(429) \quad Maria \rightsquigarrow \{\mathbf{m}'\}_{\langle e,t \rangle}$$

The logical representation of (the English counterpart of) the predicate *wyjechać* ‘leave’ has already been discussed in Section 7.1.3. I postulated two basic translations for this verb, one for its use in combination with modifiers, and one for its use in contexts where no modification takes place. These two translations were introduced in (317) and (320), respectively, and are repeated in (430) and (431).

$$(430) \quad wyjechać \text{ ‘leave’ } \rightsquigarrow \lambda X_{\langle e,t \rangle} . \exists E \mathbf{leave}'(E, X)$$

$$(431) \quad wyjechać \text{ ‘leave’ } \rightsquigarrow \lambda X_{\langle e,t \rangle} \lambda E_{\langle v,t \rangle} . \mathbf{leave}'(E, X)$$

In the following, I will write predicate variables which are assigned a type as in (430) with the subscript 1 (e.g., P_1) and those which are assigned a type as in (431) with the subscript 2 (e.g., P_2).

Finally, I propose that the preposition *z* as used in Polish ACCs translates into the two terms provided in (432) and (433).

$$(432) \quad z \rightsquigarrow \lambda Y_{\langle e,t \rangle} \lambda X_{\langle e,t \rangle} \lambda P_2_{\langle \langle e,t \rangle, \langle \langle v,t \rangle, t \rangle \rangle} . \exists E (P_2(E, X) \wedge (X \cap Y = \emptyset) \wedge \forall E' ((E \supset E' \wedge E' \neq \emptyset) \rightarrow (P_2(E', X) \wedge \exists E'' \mathbf{accompany}'(E'', Y, X)))) \quad \text{NP, ACC}$$

$$(433) \quad z \rightsquigarrow \lambda Y_{\langle e,t \rangle} \lambda P_2_{\langle \langle e,t \rangle, \langle \langle v,t \rangle, t \rangle \rangle} \lambda X_{\langle e,t \rangle} . \exists E (P_2(E, X) \wedge (X \cap Y = \emptyset) \wedge \forall E' ((E \supset E' \wedge E' \neq \emptyset) \rightarrow (P_2(E', X) \wedge \exists E'' \mathbf{accompany}'(E'', Y, X)))) \quad \text{VP, ACC}$$

These semantic representations provide the same truth conditions but differ in their combinatorics. While the term in (432) gives the logical representation of the accompanitive preposition *z* heading PPs which modify subject NPs, the term in (433) represents the semantics of the corresponding preposition heading PPs which modify VPs. Both prepositions combine with predicates of the semantic type $\langle \langle e, t \rangle, \langle \langle v, t \rangle, t \rangle \rangle$. The truth conditions of both terms provide an existentially bound event variable and guarantee that the relation P_2 (denoted by the predicate) holds between the set of events represented by this variable and the set of individuals denoted by the modified NP (the subject NP, represented by X). Further, the truth conditions ensure that for each non-empty subset of the set of events to which the predicate P_2 applies, there is a set of events such that the relation of accompaniment holds between this set of events, the set of individuals denoted by the prepositional object, and the set of individuals denoted by the

subject (the modified NP). Putting it more intuitively, each relation (including the referents of VP-subject or the modified NP) denoted by the predicate P_2 is associated with an event of accompaniment (applying to the referents of the PP-object and to the referents of the VP-subject or the modified NP, respectively). Finally, both descriptions in (432) and (433) warrant that the prepositional object and the VP-subject (the modified NP) have disjoint denotations. This is expressed by the specification $X \cap Y = \emptyset$, which I have already used in Section 2.3.3 to render the core difference between ACCs and the other types of CCs. Due to the disjoint denotation of the nominal arguments and the fact that there is no single event in which the referents of these two NPs are involved, the descriptions in (432) and (433) make the right predictions regarding the incompatibility of ACCs with collective and distributive contexts.

Given the basic translations of the accompanitive preposition z in (432) and (433), the proper names *Jan* and *Maria* in (428) and (429), respectively, as well as the verb *wyjechać* in (431), the semantic representation of the sentence in (420) can be derived. Recall that this sentence involves an ACC and has two structural interpretations. For now, I will ignore the adverb *razem* ‘together’.

The tree in Figure 9.6 gives the derivation of the semantic representation of (420) with the reading where the PP modifies the nominative NP. The underlying syntactic structure for this reading was given in Figure 9.1. For the terminal nodes, I give the basic translations as provided by the function \rightsquigarrow . At the phrasal nodes, I specify the terms that represent the functional application of the semantic representation of one of the daughters to the other, and also the terms that are derived from this functional application by λ -conversion. Also, simplification steps are possible by logical equivalence.

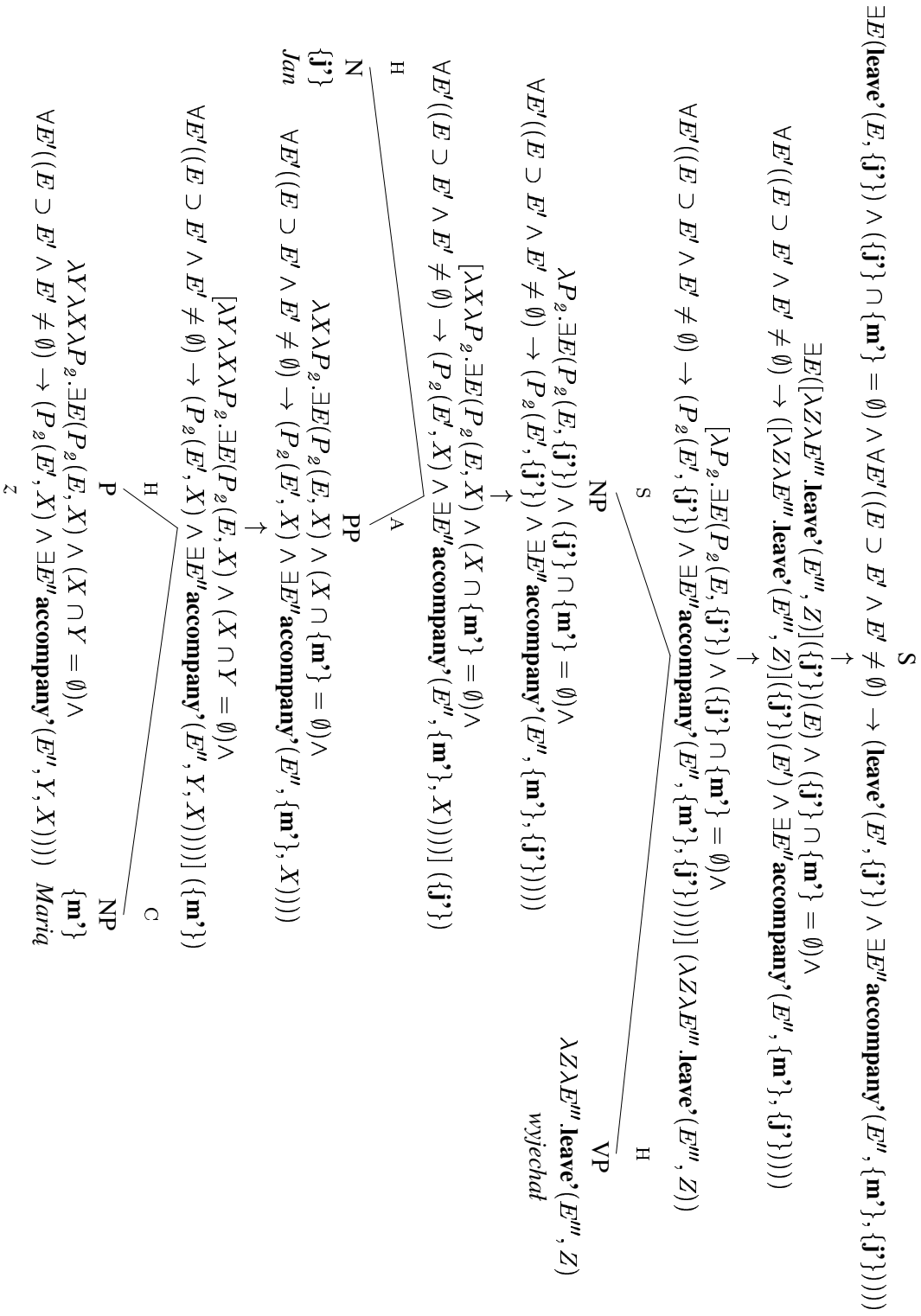


Figure 9.6: A representation of the sentence (420) with the interpretation of the PP as an NP-adjunct

The structure in Figure 9.6 shows that the translation of the entire subject is computed by first combining the basic translation of the preposition *z* (provided in (432)) with the basic translation of the NP *Maria* (given in (429)), and then with the basic translation of the NP *Jan* (given in (428)) by functional application. The translation of the sentence results from combining of the translation of the subject NP and the basic translation of the verb *wyjechał* (specified in (431)), where the subject NP acts as the functor and the predicate as its argument.

According to the semantic representation in Figure 9.6, the sentence in (420) is true if there is a set of events of leaving in which Jan participates, and for each non-empty subset of the events of Jan's leaving there is a set of events such that the relation of accompaniment holds between this set of events, Maria and Jan. In short, the sentence is true if Jan left and Maria accompanied him.

The structure in Figure 9.7 describes the computation of the semantic representation of the sentence in (420) with the reading where the meaning of the PP applies to the meaning VP. The underlying syntactic structure licensing this reading has been provided in Figure 9.2.

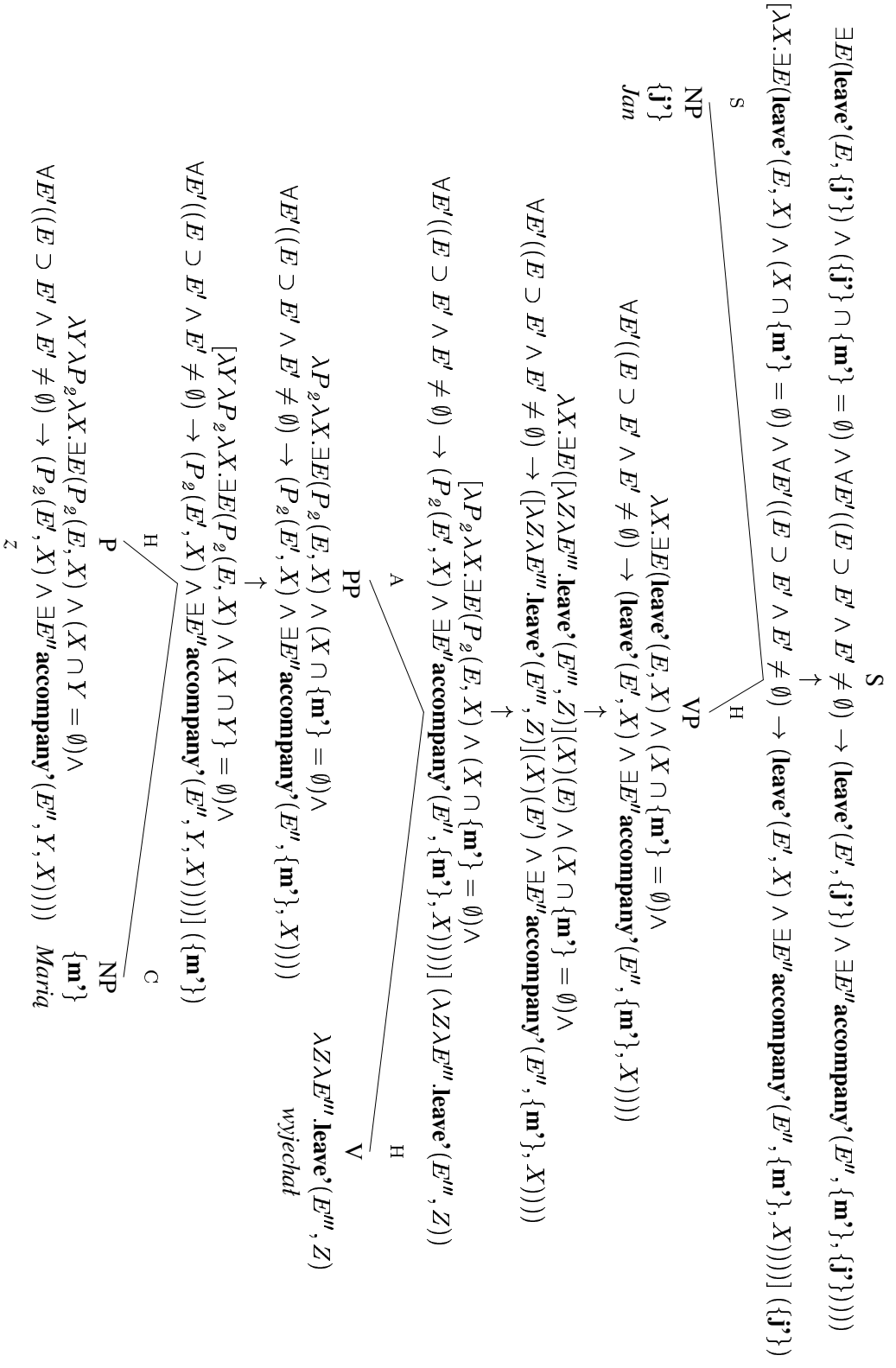


Figure 9.7: A representation of the sentence (420) with the interpretation of the PP as an VP-adjunct

The tree in Figure 9.7 shows that the basic translation of the preposition z (specified in (433)) combines by functional application with the basic translation of the NP *Maria*. The translation of the PP then combines with the basic translation of the predicate. In this case, the PP acts as the functor and the predicate as the argument. Finally, the translation of the modified VP combines with the basic translation of the NP *Jan*. Note that the computation of the semantic representation of sentence (420) provided in Figure 9.6 differs from that provided in Figure 9.7 but it results in exactly the same semantic representation for the entire sentence.

I will now move to the semantic representation of sentence (421), which involves a CCC. To account for the conjunctive reading, I define a basic translation for the conjunctive preposition z as given in (434).

$$(434) \quad z \rightsquigarrow \lambda Y_{\langle e,t \rangle} \lambda X_{\langle e,t \rangle} \lambda P_{I \langle \langle e,t \rangle, t \rangle} \cdot P_I(X \cup Y) \quad \text{NP, CCC}$$

As the semantic representation in (434) indicates, the truth conditions of the conjunctive preposition state that a sentence involving a CCC is true in a situation where the denotation of the subject is the union of the denotation of the prepositional object and the denotation of the modified NP. This is expressed by the term $X \cup Y$, which I have already used in Section 2.3.3 to specify the difference between CCCs and other types of CCs. Due to the specification of the subject position of the predicate as set union, which implies plurality, and the fact that no restrictions are specified on the cardinality of the set of events, both the distributive and the collective interpretation are possible. Note that I do not provide a translation for the conjunctive preposition z as a head of a VP-modifier. The lack of such a translation correctly predicts that conjunctive PPs, in contrast to accompanitive and inclusive PPs, can only combine with NPs and do not attach to VPs.

The semantic derivation of (421) using the translation of z in (434) is provided in Figure 9.8.

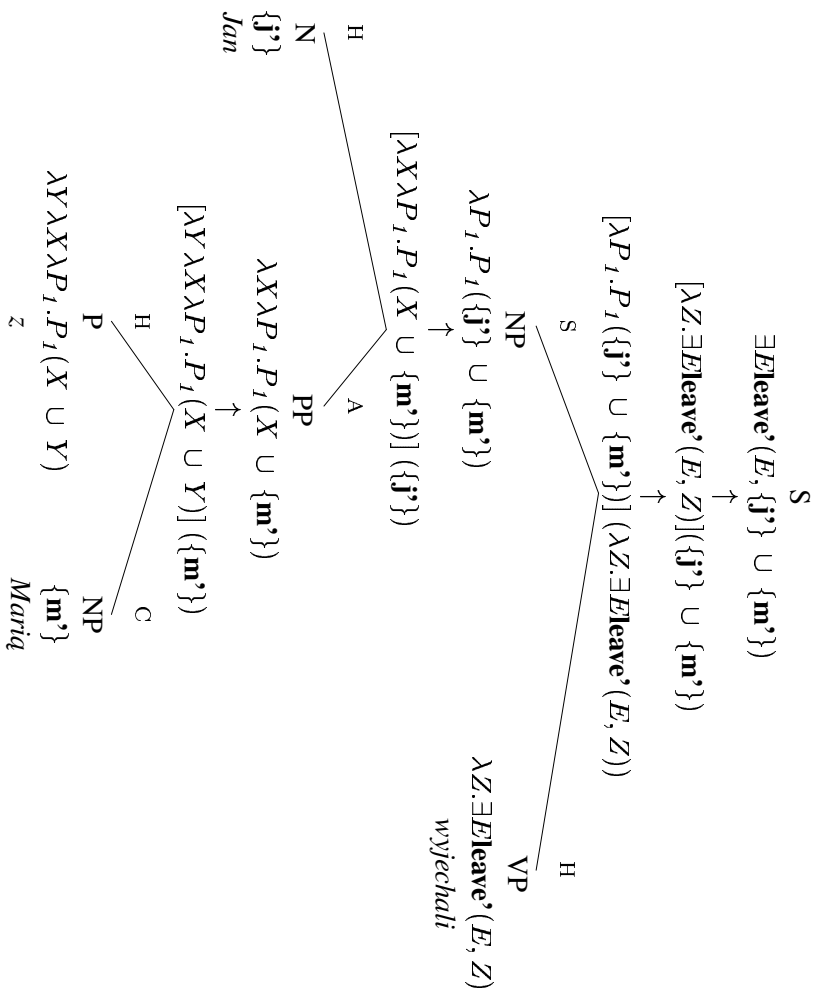


Figure 9.8: A representation of the sentence (421), including a CCC

By functional application, the logical representation of the preposition combines first with the basic translation of the complement NP and then with the basic translation of the modified NP. Then the semantic representation of the entire subject combines with the semantic representation of the predicate. Here, the subject acts as a functor and the predicate as an argument. The translation of the entire sentence includes a plural entity, composed of the denotation of the two NPs, and no restrictions on the event variable. As a result, both the collective and the distributive interpretation is possible.

According to the semantic representation in Figure 9.8, the sentence in (421) is true if there is a set of events such that the relation of leaving holds between this set of events and the set including Jan and Maria. In other words, the sentence is true if either there is a single event in which Jan and Maria are leaving (collective reading) or there is a set including at least one event of Jan's leaving and at least one event of Maria's leaving (distributive reading).

Note that the semantic representation of sentence (421) in Figure 9.8 can also be assigned to corresponding sentences involving ordinary coordination, such as (435).

- (435) Jan i Maria wyjechali.
 Jan.NOM.SG and Maria.NOM.SG left.PL
 'Jan and Maria left.'

As indicated in Section 7.1.1, I analyze nominal coordination in terms of set-union and coordinative connectives as syncategorematic items. Given that, the meaning of the coordination *Jan i Maria* 'Jan and Maria' is just a set containing Jan and Maria. By taking the meaning of the verb *wyjechali* 'left' as specified in (430) and used in the derivation in Figure 9.8, and by applying this meaning to the meaning of the coordination, we arrive at the same semantic representation of the sentence as in Figure 9.8. Thus in my approach, sentences involving ordinary nominal coordination and corresponding sentences with CCCs differ in their syntactic and semantic combinatorics, but are equivalent with respect to the meaning of their subject-NPs.

Next, I present my semantic analysis of ICCs, for which I need a basic translation of the plural pronoun *my* 'we' and of the inclusive preposition *z*. In (436), I give the translation of the pronoun.

- (436) my 'we' $\rightsquigarrow \{i, \dots\}_{\langle e, t \rangle}$

According to this translation, *my* denotes a set of individual entities including the speaker (represented by the variable *i*) and at least one further individual, which is indicated by the dots.² Note that the availability of the speaker in the first

²The logical form of the second person plural pronoun *wy* 'you' can be represented in a similar fashion as illustrated in (i).

- (i) wy 'you' $\rightsquigarrow \{you, \dots\}_{\langle e, t \rangle}$

person plural pronoun was also postulated in Vassilieva and Larson (2005) and den Dikken et al. (2001). However, in contrast to the latter, which postulates a syntactic exponent for the singular referent in the syntactic structure of the plural pronoun, I claim that the singular referent is only a component of the plural pronouns' denotation and is not realized syntactically.

The semantic representation in (436) does not provide any restrictions on how many speakers are included in the entire set. However, if we follow Grice's theory (Grice, 1989), which considers only a single speaker and a single hearer per utterance, this set may only include one speaker. One way to encode this restriction could be to provide a constraint on the set in (436) which allows only one element represented by *i*. An alternative could be to formulate a pragmatic constraint which operates on utterances and states that every utterance is associated with exactly one speaker. Since the latter strategy is more general than the former, it might be a better choice.

The logical representation of the first person plural pronoun must, however, be restricted to sets not including addressee variables. This restriction reflects the intuition that the group of individuals the first person plural pronoun refers to does not include the addressee. Thus, I assume that the set in (436) does not contain elements represented by *you*.

Finally, I propose basic translations of the inclusive preposition *z* in (437) and (438).

$$(437) \quad z \rightsquigarrow \lambda Y_{\langle e,t \rangle} \lambda X_{\langle e,t \rangle} \lambda P_{I \langle \langle e,t \rangle, t \rangle} . \exists Z (P_I(Z) \wedge Z = X \wedge Z \supset Y)$$

NP, ICC

$$(438) \quad z \rightsquigarrow \lambda Y_{\langle e,t \rangle} \lambda P_{I \langle \langle e,t \rangle, t \rangle} \lambda X_{\langle e,t \rangle} . \exists Z (P_I(Z) \wedge Z = X \wedge Z \supset Y)$$

VP, ICC

The logical representations in (437) and (438) correspond to the preposition *z* heading PPs which modify NPs and PPs which modify VPs, respectively. The truth conditions state that a sentence involving an ICC is true in a situation where the denotation of the prepositional object (represented by *Y*) is included in the denotation of the subject NP (the modified NP) (represented by *X*). Since these logical representations entail a plural entity, both distributive and collective readings are possible.

The semantic derivations of the sentence in (422), involving an ICC, are provided in Figure 9.9 and Figure 9.10. Recall that this sentence has two structures: In the first one, the comitative PP modifies the plural pronoun, in the second one, the PP acts as a VP-modifier.

According to (i), the pronoun *wy* denotes a set of individuals including the addressee and at least one further individual. An additional constraint must ensure that the non-empty set does not contain the speaker.

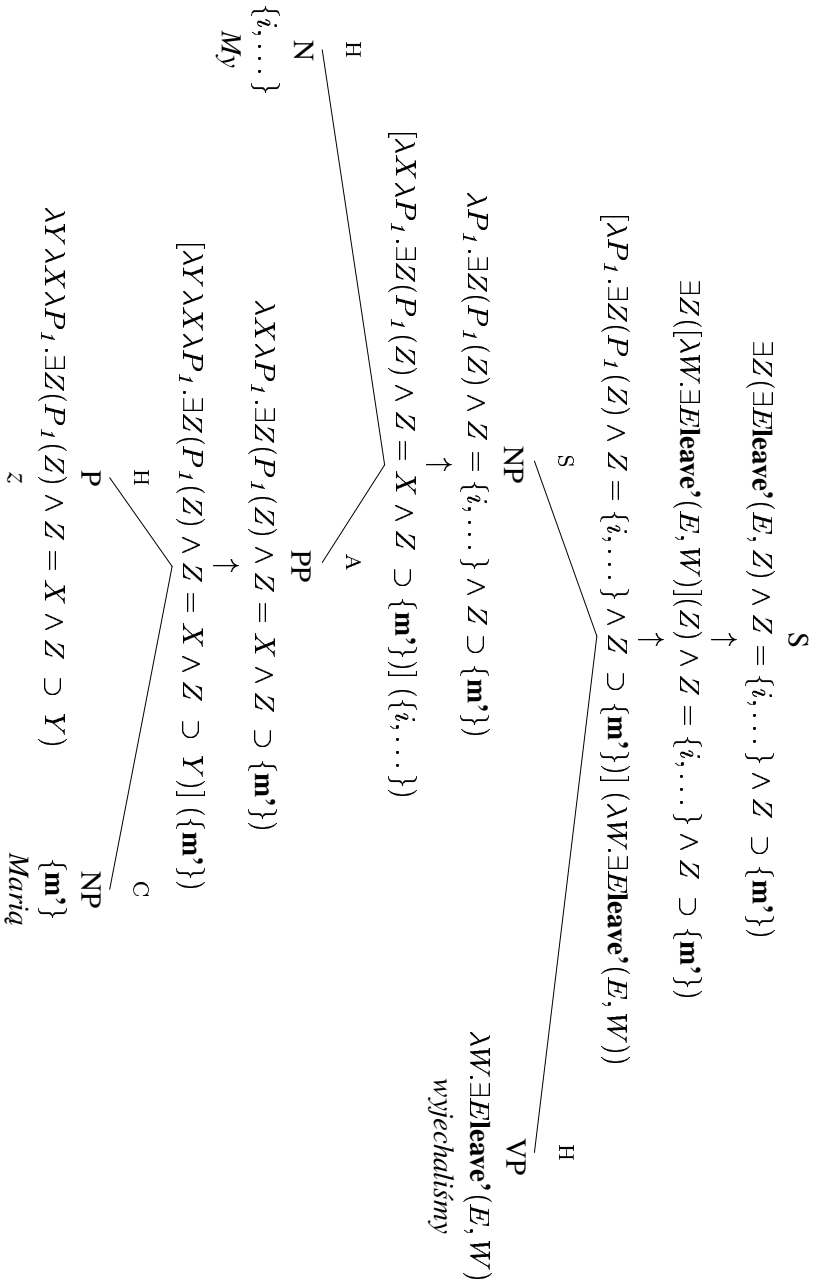


Figure 9.9: A representation of the sentence (422) with the interpretation of the PP as an NP-adjunct

Figure 9.9 shows that the basic translation of the inclusive preposition z (specified in (437)) combines first with the basic translation of the complement NP and then with the basic translation of the modified plural pronoun. The truth conditions provided by the logical representation of the preposition require that the denotation of the complement NP be a proper subset of the denotation of the modified NP, thus, the inclusive interpretation is licensed. The translation of the subject NP then applies to the translation of the predicate (as defined in (430)), resulting in the semantic representation of the sentence.

Note that the set of individuals in the denotation of the subject NP includes the speaker (represented by i), the individual denoted by the complement NP (represented by the constant \mathbf{m}'), and possibly further individuals (indicated by the dots). The sentence is true if there is a set of events such that the relation of leaving holds between this set of events and the set of individuals. If the sentence is true of a set of individuals only including the speaker and Maria in a set of events of leaving, the ICC is interpreted as closed. If the sentence is true of a set of individuals including the speaker, Maria and further individuals, the ICC is interpreted as open.

The derivation of the semantic representation for the sentence (422) with the structural interpretation according to which the PP modifies the VP is provided in Figure 9.10.

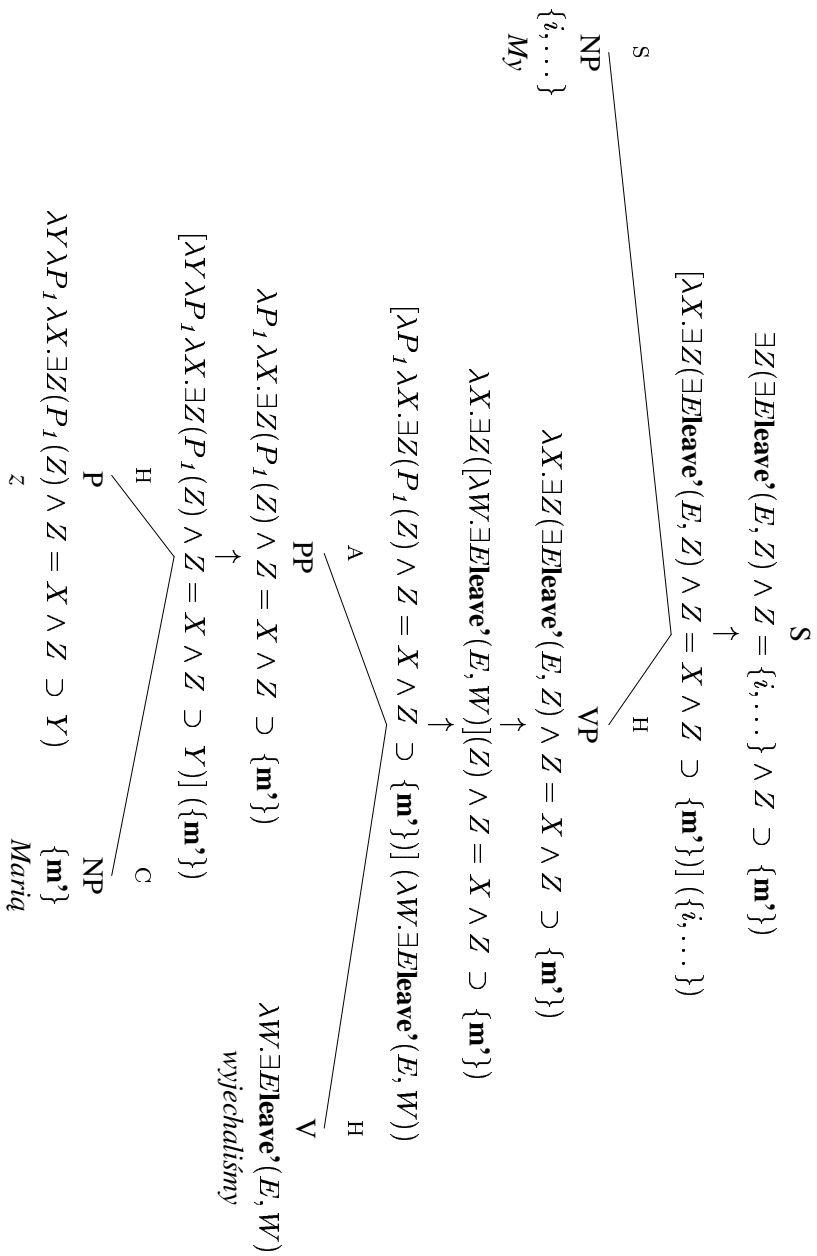


Figure 9.10: A representation of the sentence (422) with the interpretation of the PP as an VP-adjunct

As Figure 9.10 shows, the basic translation of the conjunctive preposition (provided in (438)) first combines with the basic translation of the complement NP, and then with the basic translation of the predicate. Finally, the translation of the entire VP combines with the translation of the subject NP. Just like the semantic representation of the sentence in Figure 9.9, the semantic representation in Figure 9.10 includes a plural entity and no restrictions on the event argument, thus, both the collective and the distributive interpretation is possible. The sentence can be true of the speaker and Maria only, yielding a closed interpretation of the ICC, or it can be true of some further individuals besides the speaker and Maria, yielding an open interpretation.

The semantic representation of the sentence in Figure 9.10 is identical to that of the sentence in Figure 9.9. Thus, in spite of two different syntactic structures and two semantic derivations, the sentence in (422) has exactly one denotation. Note that the comitative PPs which modify NPs function in my analysis as typical restrictive modifiers.

In the following section, I will implement my semantic analysis of CCs in HPSG using LF-Ty2.

9.2.2 The HPSG Formalization

As stated in Section 7.3.3, logical representations of the meanings of natural language expressions are captured in HPSG via the attribute LF. Thus, the basic translations of the expressions of our fragment of Polish provided in Section 9.2.1 appear now in the descriptions of the LF values in the lexical entries of the expressions of our fragment. The relevant parts of the lexical entries of all the expressions of our fragment of Polish are provided in (439) through (445). Note that in the descriptions below, I use more intuitive names for the non-logical constants than those used in Section 7.3.3. For instance, in the LF value of the proper name *Jan* ‘Jan’, I write **j**’ instead of $\mathbf{const}_{e,1}$.

(439) The relevant part of the lexical entry of *Jan* ‘Jan’

$$\left[\begin{array}{l} \text{word} \\ \text{PHON} \langle \text{Jan} \rangle \\ \text{LF} \{ \mathbf{j}' \} \langle e, t \rangle \end{array} \right]$$

(440) The relevant part of the lexical entry of *Maria* ‘Maria’

$$\left[\begin{array}{l} \text{word} \\ \text{PHON} \langle \text{Maria} \rangle \\ \text{LF} \{ \mathbf{m}' \} \langle e, t \rangle \end{array} \right]$$

(441) The relevant part of the lexical entry of *my* ‘we’³

$$\left[\begin{array}{l} \text{word} \\ \text{PHON} \langle \text{My} \rangle \\ \text{LF} \{ i, \dots \} \langle e, t \rangle \end{array} \right]$$

³Recall that the set $\{i, \dots\}$ does not contain elements represented by *you*.

- (442) The relevant parts of the lexical entries of the third person singular verb *wyjechał* ‘left’ for use with expressions which do not operate on the event argument (a) and for use with expressions which do so (b); the lexical entries of the corresponding plural forms will be defined in a similar way

- a.
$$\left[\begin{array}{l} \text{word} \\ \text{PHON} \langle \text{wyjechał} \rangle \\ \text{LF } \lambda X_{\langle e, t \rangle} . \exists E \text{leave}'(E, X) \end{array} \right]$$
- b.
$$\left[\begin{array}{l} \text{word} \\ \text{PHON} \langle \text{wyjechał} \rangle \\ \text{LF } \lambda X_{\langle e, t \rangle} \lambda E_{\langle v, t \rangle} . \text{leave}'(E, X) \end{array} \right]$$

- (443) The relevant parts of the lexical entries of the accompanitive preposition *z* ‘with’ heading PPs which modify subject NPs (a) and heading PPs which modify VPs (b)

- a.
$$\left[\begin{array}{l} \text{word} \\ \text{PHON} \langle z \rangle \\ \text{LF } \lambda Y_{\langle e, t \rangle} \lambda X_{\langle e, t \rangle} \lambda P_{\langle \langle e, t \rangle, \langle \langle v, t \rangle, t \rangle \rangle} . \exists E (P_{\emptyset}(E, X) \wedge \\ (X \cap Y = \emptyset) \wedge \forall E' ((E \supset E' \wedge E' \neq \emptyset) \rightarrow \\ (P_{\emptyset}(E', X) \wedge \exists E'' \text{accompany}'(E'', Y, X)))) \end{array} \right]$$
- b.
$$\left[\begin{array}{l} \text{word} \\ \text{PHON} \langle z \rangle \\ \text{LF } \lambda Y_{\langle e, t \rangle} \lambda P_{\langle \langle e, t \rangle, \langle \langle v, t \rangle, t \rangle \rangle} \lambda X_{\langle e, t \rangle} . \exists E (P_{\emptyset}(E, X) \wedge \\ (X \cap Y = \emptyset) \wedge \forall E' ((E \supset E' \wedge E' \neq \emptyset) \rightarrow \\ (P_{\emptyset}(E', X) \wedge \exists E'' \text{accompany}'(E'', Y, X)))) \end{array} \right]$$

- (444) The relevant part of the lexical entry of the conjunctive preposition *z* ‘with’

- $$\left[\begin{array}{l} \text{word} \\ \text{PHON} \langle z \rangle \\ \text{LF } \lambda Y_{\langle e, t \rangle} \lambda X_{\langle e, t \rangle} \lambda P_{\langle \langle e, t \rangle, t \rangle} . P_1(X \cup Y) \end{array} \right]$$

- (445) The relevant parts of the lexical entries of the inclusive preposition *z* ‘with’ heading PPs which modify NPs (a) and heading PPs which modify VPs (b)

- a.
$$\left[\begin{array}{l} \text{word} \\ \text{PHON} \langle z \rangle \\ \text{LF } \lambda Y_{\langle e, t \rangle} \lambda X_{\langle e, t \rangle} \lambda P_{\langle \langle e, t \rangle, t \rangle} . \exists Z (P_1(Z) \wedge Z = X \wedge Z \supset Y) \end{array} \right]$$
- b.
$$\left[\begin{array}{l} \text{word} \\ \text{PHON} \langle z \rangle \\ \text{LF } \lambda Y_{\langle e, t \rangle} \lambda P_{\langle \langle e, t \rangle, t \rangle} \lambda X_{\langle e, t \rangle} . \exists Z (P_1(Z) \wedge Z = X \wedge Z \supset Y) \end{array} \right]$$

The meanings of the sentences of our fragment, including the two readings of (420) and (422) with the comitative PP as an adjunct to the nominative NP or the VP, are derived by virtue of THE SEMANTICS PRINCIPLE in (388). Figure 9.11, Figure 9.12 and Figure 9.13 present the HPSG descriptions of the meanings of (420), (421) and (422), respectively. These descriptions correspond to the derivations in Figure 9.6, Figure 9.8 and Figure 9.9 of the previous section. The semantic representations in Figure 9.7 and Figure 9.10 provided in Section 9.2.1 can be formalized in HPSG in a similar fashion on the basis of the lexical entries in (443b) and (445b), respectively. Note that in contrast to the descriptions in Section 9.2.1, the descriptions below do not involve reduction steps. Note also that by convention, commas are left out on the PHON lists.

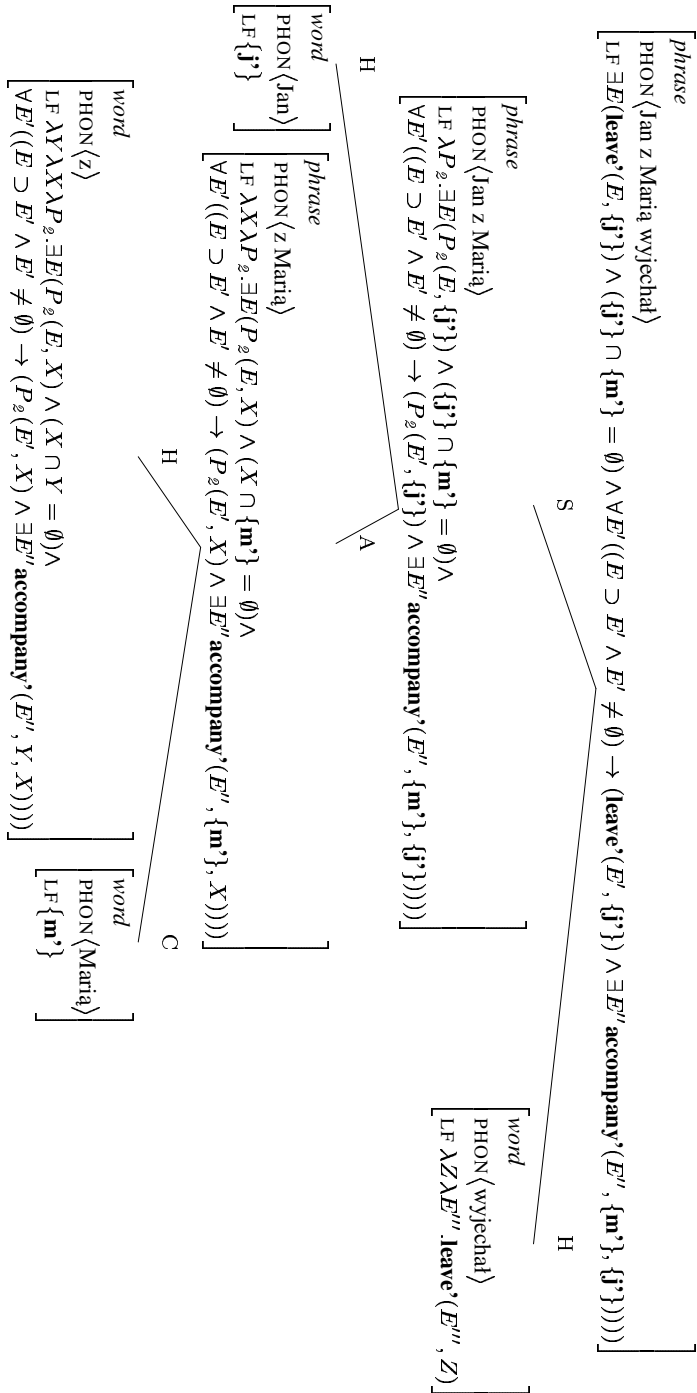


Figure 9.11: A description of the sentence (420), including an ACC, with the interpretation of the PP as the NP-adjunct

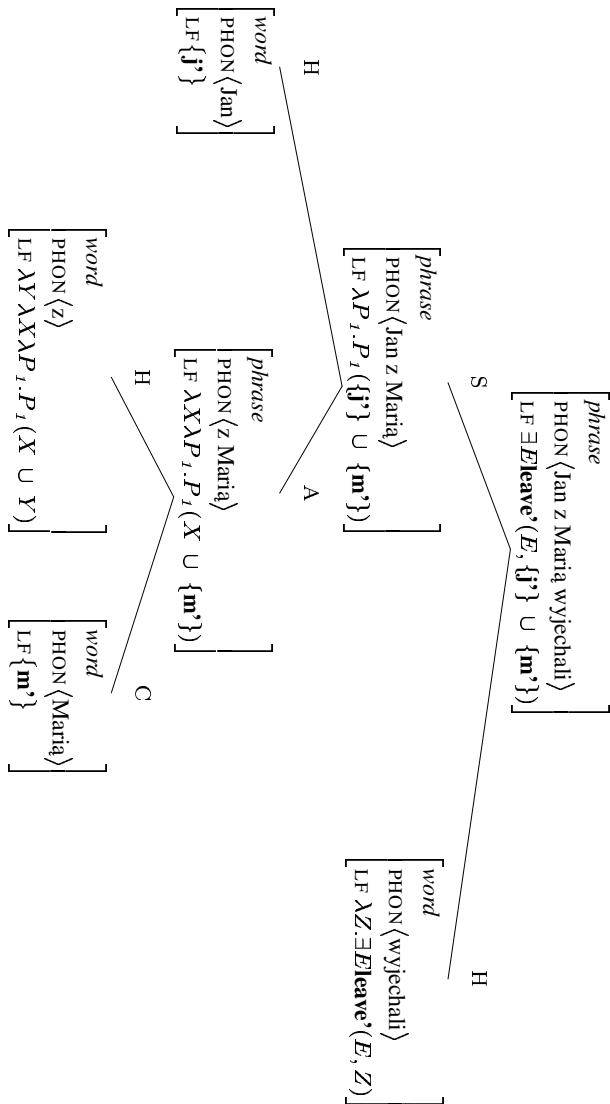


Figure 9.12: A representation of the sentence (421), including a CCC

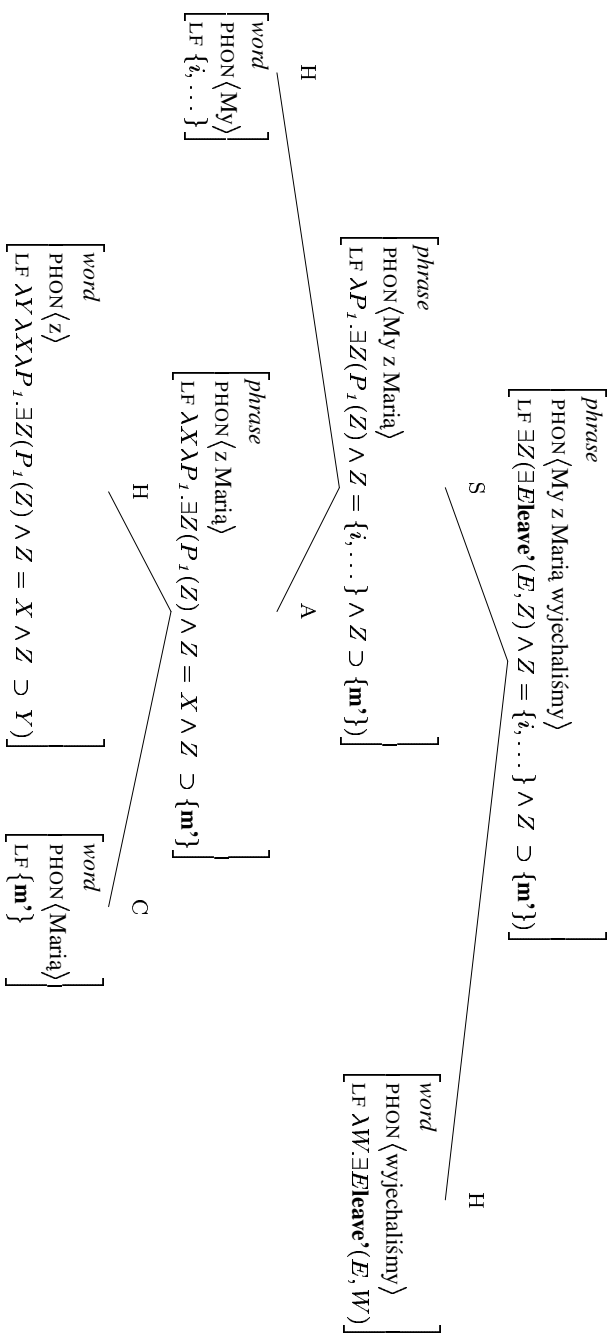


Figure 9.13: A representation of the sentence (422), including an ICC, with the interpretation of the PP as an NP-adjunct

The descriptions above show again that all sentences of our fragment can be semantically analyzed in a fully compositional way. Moreover, all semantic representations discussed in this section are relevant for the determination of truth conditions of the sentences of our fragment. There are, however, aspects of the meaning of sentences (420)–(422) which do not necessarily affect their truth or falsity. These aspects include the relatedness of individuals in the denotation of CCs and the natural gender of these individuals. A proper description of natural gender is of particular importance, since it has an impact on agreement and resolution in Polish. I suggest to account for these additional aspects at the semantics-pragmatics interface in the way sketched in the next section.

9.3 The Semantics-Pragmatics Interface

The following section is devoted to pragmatic and semantic-pragmatic aspects of my analysis of CCs. In Section 9.3.1, I propose a way to describe pragmatic contents associated with CCs and in Section 9.3.2, I provide an HPSG implementation of my analysis.

9.3.1 Pragmatic Contents

As emphasized before, all three types of Polish CCs implicate that individuals in their denotations are related to each other in some very broad sense (cf. the discussion in Section 2.1.1). Instances of such relatedness include family relationships such as that between husband and wife, between mother and child, or between brother and sister, professional relationships such as the relationship between doctor and patient, or between teacher and student, and many other relationships. Conceivably, this relatedness could be treated in terms of a conventional implicature (in terms of Grice (1957, 1969, 1975, 1978, 1981)), i.e., as a meant, implied part of the meaning. This proposal was made, for instance, in McNally (1993). Since the scope of this thesis does not allow investigating the nature of implicatures to elaborate their formal description, I will talk about the relatedness in CCs in more general terms as pragmatic or contextual content. I propose that this part of the meaning of CCs is associated with the comitative prepositions. In other words, I assume that all comitative prepositions indicate by their conventional senses that the referents of the two NPs they combine with are in some sense related.

I further assume that a part of the meaning of expressions which include human individuals in their denotations involves information on the natural gender of these individuals. For instance, the meaning of the proper name *John* is associated with an individual named *John*, and by its conventional sense, this proper name implies that this individual is male. In contrast, the meaning of the proper name *Mary* is associated with an individual named *Mary*, and this proper name implies that this individual is female. I propose to treat information on natural gender of individuals in the denotation of proper names as contextual content.

Thus, every word and phrase in the language has a logical representation, which is a representation of its meaning, and in addition to the logical representation, some words may introduce some pragmatic contents, which are representations of additional, context-dependent aspects of their meaning. For the sake of consistency and to be able to link the context-dependent information with the logical representation, I propose to represent pragmatic contents as terms of Ty2. Thereby, all terms representing pragmatic contents are associated with expressions of type $\langle t \rangle$. As a notation for the mapping of a pragmatic content associated with a lexical item into a term of Ty2, I will use the symbol \dashrightarrow . To express that the function \dashrightarrow maps the pragmatic content of relatedness associated with the comitative preposition z ‘with’ into the Ty2 term **related’**(X, Y), I write $z \dashrightarrow$ **related’**(X, Y). I also assume that a Ty2 term representing pragmatic content associated with an expression bears on the Ty2 term representing the logical representation of this expression. More precisely, I assume that all variables in a term representing pragmatic content that are not bound by any operators provided in this term are bound in the corresponding logical form. This linkage between Ty2 terms representing the semantics and Ty2 terms representing the associated pragmatic contents can be accounted for within HPSG with LF-Ty2, however, the technical details remain to be worked out in future research.

The descriptions in (446) and (447) provide contextual contents associated with the proper names *Jan* ‘Jan’ and *Mariq* ‘Maria’ based on the logical representations of these proper names.

$$(446) \quad \textit{Jan} \quad \rightsquigarrow \{\mathbf{j}'\}_{\langle e, t \rangle} \\ \dashrightarrow \mathbf{male}'(\{\mathbf{j}'\})$$

$$(447) \quad \textit{Mariq} \quad \rightsquigarrow \{\mathbf{m}'\}_{\langle e, t \rangle} \\ \dashrightarrow \mathbf{female}'(\{\mathbf{m}'\})$$

According to (446), the proper name *Jan* ‘Jan’ denotes a set involving one individual (represented by the constant \mathbf{j}') and implies that this individual is male. (447) indicates that the proper name *Mariq* ‘Maria’ denotes a set including one individual (represented by the constant \mathbf{m}') and implies that this individual is female.

I assume that all comitative prepositions provide the pragmatic content of relatedness. This is illustrated in (448), (449) and (450), presenting all previously defined logical representations for the accompanitive, conjunctive and inclusive prepositions, respectively, accompanied by an additional term **related’**(X, Y). This term represents the pragmatic content of relatedness and indicates that the individuals in the denotation of the prepositions are in some sense related to each other.

$$(448) \quad \text{a.} \quad z \quad \rightsquigarrow \quad \lambda Y \lambda X \lambda P_2. \exists E P_2(E, X) \wedge (X \cap Y = \emptyset) \wedge \\ \forall E' ((E \supset E' \wedge E' \neq \emptyset) \rightarrow (P_2(E', X) \wedge \\ \exists E'' \mathbf{accompany}'(E'', Y, X))) \quad \text{NP, ACC} \\ \dashrightarrow \quad \mathbf{related}'(X, Y)$$

- $\rightsquigarrow \lambda Y \lambda P_2 \lambda X. \exists E P_2(E, X) \wedge (X \cap Y = \emptyset) \wedge$
 $\forall E' ((E \supset E' \wedge E' \neq \emptyset) \rightarrow (P_2(E', X) \wedge$
 $\exists E'' \mathbf{accompany}'(E'', Y, X)))$ VP, ACC
 $\dashrightarrow \mathbf{related}'(X, Y)$
- (449) $z \rightsquigarrow \lambda Y \lambda X \lambda P_1. P_1(X \cup Y)$ CCC
 $\dashrightarrow \mathbf{related}'(X, Y)$
- (450) a. $z \rightsquigarrow \lambda Y \lambda X \lambda P_1. \exists Z (P_1(Z) \wedge Z = X \wedge Z \supset Y)$ NP, ICC
 $\dashrightarrow \exists W (Z \supset W \wedge W \neq Y \wedge W \neq \emptyset \wedge \mathbf{related}'(W, Y))$
- b. $z \rightsquigarrow \lambda Y \lambda P_1 \lambda X. \exists Z (P_1(Z) \wedge Z = X \wedge Z \supset Y)$ VP, ICC
 $\dashrightarrow \exists W (Z \supset W \wedge W \neq Y \wedge W \neq \emptyset \wedge \mathbf{related}'(W, Y))$

Note that the pragmatic contents associated with the inclusive prepositions, illustrated in (450), do not indicate a relatedness between the referent of the prepositional object and the referent of the nominative NP, as the pragmatic contents associated with accompanitive and conjunctive prepositions do. Instead, they state that the relation of relatedness holds between the referent of the prepositional object (represented by Y) and some referent(s) different from Y (represented by W) in the denotation of the nominative NP (represented by Z). Since Y is included in Z, this specification prohibits that the requirement of relatedness is fulfilled in ICCs simply by virtue of the relatedness of Y to itself.

Finally, I postulate that for lexical items, contextual contents associated with them are given in the lexicon. For non-lexical expressions, I propose that contextual contents associated with them are logical conjunctions of contextual contents of their parts. The contextual contents in sentences (420), (421) and (422) of our fragment, whose logical representations are repeated in (451a), (452a) and (453a), will then have the forms in (451b), (452b) and (453b), respectively.

- (451) a. $\exists E \mathbf{leave}'(E, \{\mathbf{j}'\}) \wedge (\{\mathbf{j}'\} \cap \{\mathbf{m}'\} = \emptyset) \wedge \forall E' ((E \supset E' \wedge E' \neq \emptyset) \rightarrow (\mathbf{leave}'(E', \{\mathbf{j}'\}) \wedge \exists E'' \mathbf{accompany}'(E'', \{\mathbf{m}'\}, \{\mathbf{j}'\})))$
 b. $\mathbf{related}'(\{\mathbf{j}'\}, \{\mathbf{m}'\}) \wedge \mathbf{male}(\{\mathbf{j}'\}) \wedge \mathbf{female}'(\{\mathbf{m}'\})$
- (452) a. $\exists E \mathbf{leave}'(E, \{\mathbf{j}'\} \cup \{\mathbf{m}'\})$
 b. $\mathbf{related}'(\{\mathbf{j}'\}, \{\mathbf{m}'\}) \wedge \mathbf{male}(\{\mathbf{j}'\}) \wedge \mathbf{female}'(\{\mathbf{m}'\})$
- (453) a. $\exists Z (\exists E \mathbf{leave}'(E, Z) \wedge Z = \{i, \dots\} \wedge Z \supset \{\mathbf{m}'\})$
 b. $\exists W (Z \supset W \wedge W \neq \{\mathbf{m}'\} \wedge W \neq \emptyset \wedge \mathbf{related}'(W, \{\mathbf{m}'\})) \wedge \mathbf{female}'(\{\mathbf{m}'\})$

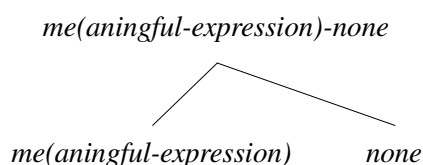
Note that the terms in (451b), (452b) and (453b), representing contextual contents, are linked to the corresponding terms in (451a), (452a) and (453a), representing semantics, by involving the same individual constants. As I have indicated above, the technical details of the relationship between these two representation levels remain to be worked out.

9.3.2 The HPSG Formalization

In Section 7.3 we saw that in HPSG, pragmatic information is provided via the path $\text{CON(TE)X(T)} \mid \text{BACKGROUND}$. The feature BACKGROUND is traditionally assumed to take a set of objects of sort \textit{psoa} as its value. By virtue of $\text{THE PRINCIPLE OF CONTEXTUAL CONSISTENCY}$ in (354), which operates on BACKGROUND values, all contextual restrictions provided by the daughters were collected in the BACKGROUND value of the mother node.

In my analysis of CCs, I will adopt the feature BACKGROUND . However, I postulate that the value of this feature is an object of sort $\textit{m(eaningful-)e(xpression)-none}$. The object $\textit{me-none}$ is defined as an immediate subsort of the sort \textit{object} and it immediately subsumes the sorts $\textit{m(eaningful-)e(xpression)}$ and \textit{none} , shown in (454).

(454) $\textit{me-none}$:



I further assume that pragmatic contents provided by a lexical sign are specified in the BACKGROUND value in the lexical entry of this sign. If a word does not provide any background information, its BACKGROUND value will be valued as \textit{none} . If a word provides some background information, this information will be specified in its BACKGROUND value as a meaningful expression of type t . This enables us to formalize the pragmatic part of my analysis of CCs from Section 9.3. By allowing a Ty2 expression to be the value of the attribute BACKGROUND , I provide an interface between the logical and pragmatic representations.

In (455) and (456), the lexical entries of the two proper names of our fragment are provided according to the new theory of context. Note that the individual constants \mathbf{j}' and \mathbf{m}' occur in the expressions describing both the values of BACKGROUND and the values of LF , which interfaces the two descriptions.

(455) The relevant part of the lexical entry of *Jan* ‘Jan’

$$\left[\begin{array}{l}
 \textit{word} \\
 \text{PHON} \langle \text{Jan} \rangle \\
 \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{male}'(\{\mathbf{j}'\}) \\
 \text{LF} \{\mathbf{j}'\}
 \end{array} \right]$$

(456) The relevant part of the lexical entry of *Mariq* ‘Maria’

$$\left[\begin{array}{l}
 \textit{word} \\
 \text{PHON} \langle \text{Maria} \rangle \\
 \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{female}'(\{\mathbf{m}'\}) \\
 \text{LF} \{\mathbf{m}'\}
 \end{array} \right]$$

The terms in the BACKGROUND values of the proper names are exactly the terms given in (446) and (447) in Section 9.3.1 as contextual contents associated with these expressions. In Section 9.3.1, I have also suggested how the pragmatic content of relatedness associated with the comitative prepositions can be captured. In (457), I provide the HPSG formalization of this idea with application to the conjunctive preposition. The BACKGROUND values of the remaining comitative prepositions will be described in exactly the same way.

$$(457) \left[\begin{array}{l} \text{word} \\ \text{PHON} \langle z \rangle \\ \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{related}'(X, Y) \\ \text{LF } \lambda Y \lambda X \lambda P_1 . P_1(X \cup Y) \end{array} \right]$$

Finally, I have proposed that contextual contents associated with a phrasal expression are logical conjunctions of contextual contents of their parts. This idea can easily be implemented in HPSG with the modified version of the THE PRINCIPLE OF CONTEXTUAL CONSISTENCY in (458).

(458) THE PRINCIPLE OF CONTEXTUAL CONSISTENCY

The CONTEXT | BACKGROUND value of a given phrase is (i) the conjunction of the CONTEXT | BACKGROUND values of the daughters if these values are of sort *me*, (ii) *none* if the CONTEXT | BACKGROUND values of the daughters are of sort *none*, (iii) identical to the CONTEXT | BACKGROUND value of the daughter whose CONTEXT | BACKGROUND value is of sort *me*, while the CONTEXT | BACKGROUND value of the other daughter is of sort *none*.

Formalization:

$$\text{phrase} \rightarrow \left(\left(\left(\left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{2} \\ \text{SUBJ-DTR} \langle \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{3} \rangle \end{array} \right] \right] \wedge \right) \vee \\ \left(\text{conjoin}(\mathbf{1}, \mathbf{2}, \mathbf{3}) \vee \\ \text{equalize}(\mathbf{1}, \mathbf{2}, \mathbf{3}) \right) \end{array} \right) \wedge \right) \vee \\ \left(\left(\left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{2} \\ \text{ADJ-DTR} \mid \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{3} \end{array} \right] \right] \wedge \right) \vee \\ \left(\text{conjoin}(\mathbf{1}, \mathbf{2}, \mathbf{3}) \vee \\ \text{equalize}(\mathbf{1}, \mathbf{2}, \mathbf{3}) \right) \end{array} \right) \wedge \right) \vee \\ \left(\left(\left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{2} \\ \text{COMP-DTRS} \langle \text{SS} \mid \text{LOC} \mid \text{CONTEXT} \mid \text{BACKGROUND } \mathbf{3} \rangle \end{array} \right] \right] \wedge \right) \vee \\ \left(\text{conjoin}(\mathbf{1}, \mathbf{2}, \mathbf{3}) \vee \\ \text{equalize}(\mathbf{1}, \mathbf{2}, \mathbf{3}) \right) \end{array} \right) \wedge \right) \vee \end{array} \right)$$

The formalization of THE PRINCIPLE OF CONTEXTUAL CONSISTENCY includes two relations: *conjoin/3* and *equalize/3*. These relations are defined in (459) and (460), respectively.

(459) *conjoin/3*

The relation *conjoin*($\boxed{1}$, $\boxed{2}$, $\boxed{3}$) holds iff the meaningful expression $\boxed{1}$ is the logical conjunction of the meaningful expression $\boxed{2}$ and the meaningful expression $\boxed{3}$.

Formalization:

$$\forall \boxed{1} \forall \boxed{2} \forall \boxed{3} \left(\text{conjoin}(\boxed{1}, \boxed{2}, \boxed{3}) \leftrightarrow \boxed{1} \left[\begin{array}{l} \text{conjunction} \\ \text{ARG1 } \boxed{2} \\ \text{ARG2 } \boxed{3} \end{array} \right] \right)$$

(460) *equalize/3*

The relation *equalize*($\boxed{1}$, $\boxed{2}$, $\boxed{3}$) holds iff (i) $\boxed{1}$, $\boxed{2}$ and $\boxed{3}$ are of sort *none*, or (ii) $\boxed{1}$ equals $\boxed{2}$ and $\boxed{2}$ is of sort *me* and $\boxed{3}$ is of sort *none*, or (iii) $\boxed{1}$ equals $\boxed{3}$ and $\boxed{3}$ is of sort *me* and $\boxed{2}$ is of sort *none*.

Formalization:

$$\forall \boxed{1} \forall \boxed{2} \forall \boxed{3} \left(\text{equalize}(\boxed{1}, \boxed{2}, \boxed{3}) \leftrightarrow \left(\begin{array}{l} (\boxed{1} \text{ none} \wedge \boxed{2} \text{ none} \wedge \boxed{3} \text{ none}) \vee \\ (\boxed{1} = \boxed{2} \text{ me} \wedge \boxed{3} \text{ none}) \vee \\ (\boxed{1} = \boxed{3} \text{ me} \wedge \boxed{2} \text{ none}) \end{array} \right) \right)$$

Figure 9.14 illustrates the semantic and pragmatic derivation (including the interrelatedness between them) of the sentence (421), containing a CCC, according to the new specifications in the lexical entries of *Jan*, *Mariq* and *z* in (455), (456) and (457), respectively, and under the terms of THE SEMANTICS PRINCIPLE in (388) and THE PRINCIPLE OF CONTEXTUAL CONSISTENCY in (458).

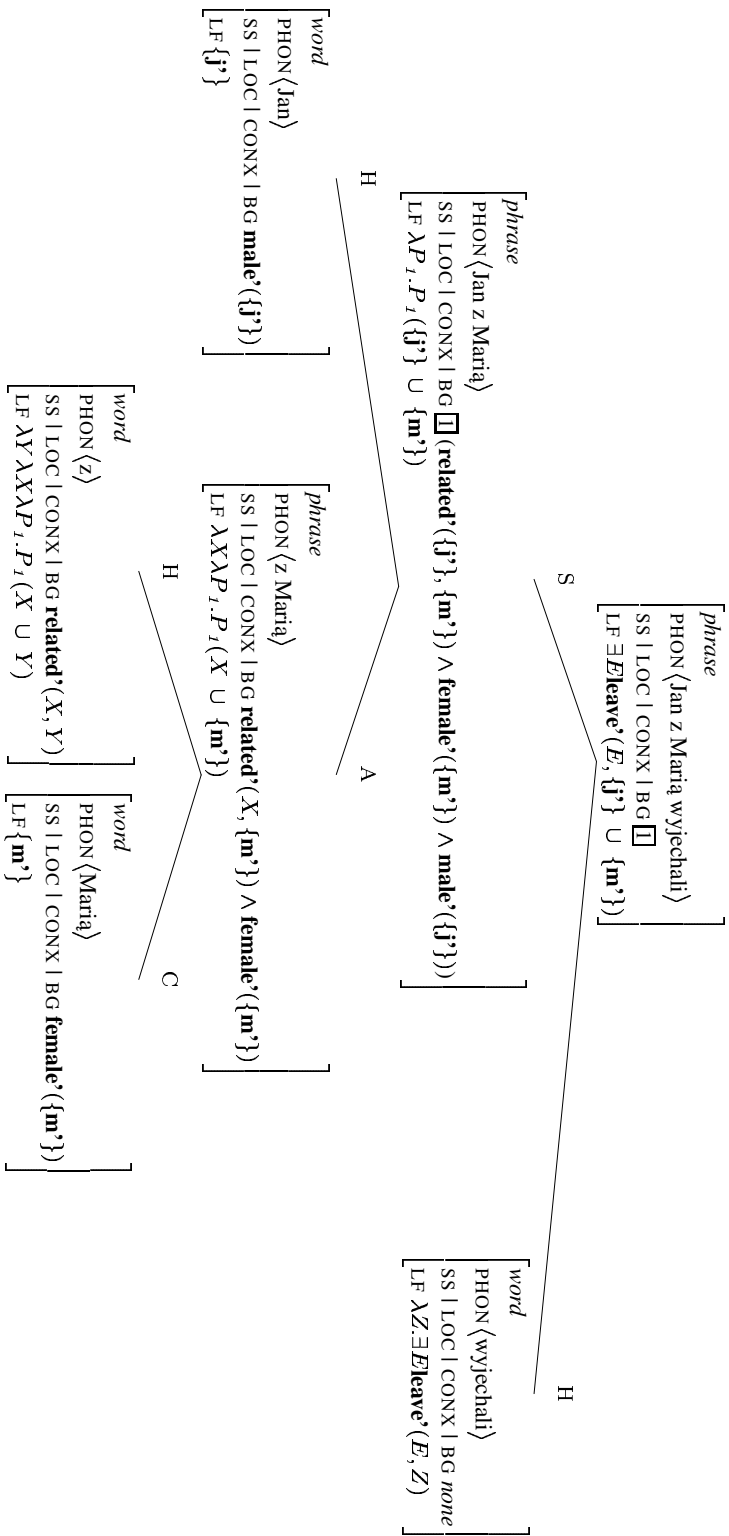


Figure 9.14: A representation of the sentence (421), including a CCC

Note that all variables which appear in the BACKGROUND values in the tree in Figure 9.14 are replaced in the derivation parallel to the replacement of the corresponding variables which appear in the LF values. For example, the variable Y which appears in the BACKGROUND value and in the LF value of the preposition z is substituted at the higher projection level by the expression $\{\mathbf{m}'\}$. The replacement of the variable Y by $\{\mathbf{m}'\}$ in the LF value of z is a result of λ -conversion. For a variable which occurs in the BACKGROUND value of a phrase, I require that if the same variable in the LF value of this phrase is replaced by an expression, the variable in the BACKGROUND value be replaced by the same expression. The technical details of the linkage between the semantic and pragmatic representations must still be worked out.

9.4 The Representation and Interpretation of Indices

One of the properties of Polish CCCs and ICCs, distinguishing them from ACCs, is the ability of the NP1 z NP2s sequences to act as antecedents of anaphoric expressions (cf. Chapter 3.4 for details). In linguistic theories, the anaphor-antecedent relationship is conventionally indicated by coindexation, i.e., by the identity of referential indices. However, some linguistic phenomena, among them CCCs, appear problematic for (at least some of) the existing theories which draw on the notion of coindexation.

In this section, I outline different approaches to the representation and interpretation of indices, and discuss some data demonstrating their shortcomings. I then propose a new approach to indexation, illustrate how it can be applied to CCCs, and demonstrate how it can avoid previous problems in the analysis of anaphoric relations. Finally, I will formalize my analysis in the framework of HPSG.

9.4.1 Previous Approaches to Indexation

The mechanism of coindexation is crucial to formal theories accounting for the distribution of anaphoric expressions such as reflexives and reciprocals (Binding Theory), traces (Trace Theory, Empty Category Principle) and PRO (Control Theory), and is used in many linguistic frameworks, such as GB (Chomsky, 1981), LFG (Bresnan, 2001), LTAG (Ryant and Scheffler, 2006; Kallmeyer and Romero, 2007), and HPSG (Pollard and Sag, 1994). However, views on the representation and interpretation of indices differ considerably. Indices have been viewed (1) as atomic or complex expressions, (2) as entailing or as not entailing agreement, or (3) as entailing or as not entailing coreference. In GB (Chomsky, 1981), referential indices are traditionally represented by atomic numeric or alphabetic subscripts. In LFG (Bresnan, 2001), LTAG (Ryant and Scheffler, 2006; Kallmeyer and Romero, 2007) and the variant of HPSG in Sag et al. (2003), they are encoded as atomic individual (or situation) variables specified as values of the attribute INDEX. In these frameworks, indices are conventionally written with a lower-case letter. Coindexed

objects are described by the feature INDEX taking the same lower-case letter as its value. In the standard HPSG framework of Pollard and Sag (1994), the value of the attribute INDEX of semantically contentful nouns is not an atomic entity but rather a complex abstract linguistic object providing three agreement features: PERSON, NUMBER and GENDER. Fiengo and May (1994), focusing on issues raised by strict and sloppy identity in ellipsis, have put forth a model of indexation in which indices are complex objects made up of an *indexation type* and an *indexical value*. Finally, Heim (1998) has developed a theory of indexation that assigns NPs two indices at the same time: an *outer index* and an *inner index*, used to account for bound variable anaphora and coreference, respectively.

Some linguistic theories assume that coindexation entails agreement. For instance, in the standard version of HPSG (Pollard and Sag, 1994), coindexed objects have identical values of their (semantic) features PERSON, NUMBER and GENDER. In the version of HPSG put forth by Sag et al. (2003), a principle is postulated which guarantees that coindexed objects agree. The LTAG theory of binding of reflexives and reciprocals proposed in Ryant and Scheffler (2006) also predicts agreement.

Finally, there are two fundamentally different views of the interpretation of coindexation. According to the first one, represented by Reinhart (1983a,b) and Roberts (1987), coindexation does not entail coreference, nor does non-coindexation entail non-coreference. Reinhart (1983a,b) assumes that indices only represent syntactic binding relations, and Roberts (1987) argues that coindexation is only a guide to interpretation in discourse, and not necessarily an indication of coreference. According to the second view, represented by Heim (1998), Fiengo and May (1994) and Pollard and Sag (1994), coindexation does entail coreference. Heim (1998) argues that every occurrence of an *inner index* must be associated with the same referent. Fiengo and May (1994) assume that coindexation establishes identity of expressions, and hence identity of reference. Finally, Pollard and Sag (1994, p. 75) state that “the connection between coindexing and coreference is simply that if two expressions are coindexed and one of them refers, then the other expression refers to the same thing”.

Given this diversity of approaches to the representation and interpretation of indices in the literature, it seems necessary for a theory which draws on the notion of indexation to specify in what sense this notion is used in this theory. Below, I discuss a number of phenomena, including CCCs, which demonstrate how essential the assumed notion of indexation might be for the predictive power of a theory based on it.

9.4.2 Challenges for Previous Approaches to Indexation

In the trivial case, an anaphor and its antecedent are coreferent, i.e., they refer to the same entity, they have the same morphosyntactic properties and the same level of syntactic complexity. This case is illustrated in (461).

(461) **Eva** hates **herself**.

The reflexive anaphor *herself* in (461) not only correlates with its antecedent *Eva* by referring to the same entity, but also with respect to morphosyntactic properties and syntactic form. Both the anaphor and the antecedent have the third person singular feminine form and are syntactically expressed by a single noun phrase. Sentences like (461) pose no challenge for theories which deal with the distribution of anaphoric expressions using the mechanism of indexation which is based on atomic indices and which entails agreement and coreference.

However, some relations between anaphora and their antecedents do pose a challenge for this kind of mechanism. These include nominals with mixed agreement features, collective nouns, anaphoric relations involving reciprocals, as well as partial control and split antecedent phenomena.

(462) provides an example of a nominal with mixed agreement features.

(462) **Ten** **babsztyl** znieawidził / *znieawidziła **siebie samego**
 this.M1 jade.M1 started to hate.M1 / started to hate.FEM himself
 / **siebie sama**.
 / herself
 ‘This jade started to hate herself.’

The Polish noun *babsztyl* ‘jade’ is morphologically masculine but it refers to a female individual. As the example shows, it combines with a masculine demonstrative pronoun and a masculine predicate, but it can control both masculine and feminine reflexive pronouns. Thus, the description of the referential relation between *babsztyl* and the reflexive pronouns in sentence (462) is problematic for theories of indexation assuming agreement between an anaphor and its antecedent.

Another example of this type can be found in German. The German noun *Mädchen* ‘girl’ is morphosyntactically neuter but it refers to a female individual. It can control both neuter and feminine pronouns. In a theory which draws on the notion of indexation entailing agreement, the referential relationship between this noun, which is neuter, and feminine pronouns cannot be expressed.⁴

Another phenomenon which is difficult to account for in theories using the mechanism of indexation entailing agreement is collective nominals. In the majority of cases, collective nouns combine with singular adjectives and singular predicates. They can, however, control both singular and plural pronouns. The Polish sentence in (463), which was found in the IPI PAN Corpus and exemplifies a relatively frequent phenomenon, involves the morphosyntactically singular collective noun *Europa* ‘Europe’ which controls the plural pronoun *nich* ‘them’.

⁴See also Wechsler and Zlatić (1998, 2001, 2003) for further examples.

- (463) Możemy oczywiście dać **Europie** także słowo honoru, ale obawiam
 we can of course give Europe also word honor but I'm afraid
 się, że nie byłaby to oferta zbyt dla **nich** interesująca.
 RM that not would this offer too for them interesting
 'Of course, we can also give Europe our word of honor, but I'm afraid
 that it wouldn't be an interesting offer for them.'

Pollard and Sag (1994, p. 72) provide a similar English example, cited here as (464).

- (464) The **Senate** just voted **itself** another raise. Most of **them** were already overpaid to begin with.

In (464), the collective noun *Senate* acts as controller of the singular pronoun *itself* on the one hand, and the plural pronoun *them* on the other hand. Pollard and Sag (1994) provide further examples of this type, such as the one in (465).

- (465) The **dog** is so stupid, every time I see **it** I want to kick it. **He**'s a damned good hunter though.

According to Pollard and Sag (1994), *Senate* in (464) and *dog* in (465) are referred to in virtue of being anchored to a particular index. In discourse, however, an old referent can be assigned a new index. Coreference, hence, does not have to be indicated by coindexation. Exactly this is the case in (464) and (465). According to Principle A of the Binding Theory in Pollard and Sag (1994), only anaphora are required to be coindexed with their antecedents. There are, however, good reasons to assume some reference marking for other pronouns as well. In particular, a formal indication of a connection between an anaphoric personal, possessive or relative pronoun and its antecedent would be useful in accounting for their *phi*-features.⁵

The Polish sentence in (466) provides an example where a collective noun controls a singular and a plural anaphoric expression within a single utterance.

- (466) **Nasza klasa** postawiła **sobie samej** (a nie pod wpływem nauczycieli)
 our class set itself and not under influence teachers
 za cel wspieranie **siebie nawzajem**.
 as target support each other
 'Our class has set itself (and not under the influence of the teachers) the target to support each other.'

The collective noun *klasa* 'class' acts as the antecedent of the reciprocal pronoun *siebie nawzajem* 'each other', which necessarily has a plural-denoting antecedent, and the singular possessive reflexive pronoun *sobie samej* 'itself'. This

⁵See Wechsler and Zlatić (1998) for a discussion on similar issues with reference to Serbo-Croatian.

situation poses a challenge for theories of indexation where indexation entails agreement and coreference. Firstly, a single noun cannot simultaneously agree with multiple expressions bearing different agreement features, at least not without additional stipulations. Secondly, collective nouns such as *klasa* ‘class’ are ambiguous: They refer both to a group / set of entities and to each entity in this group / set of entities. Due to this ambiguity, collective nouns can act as antecedents of both singular and plural anaphoric expressions. However, this ambiguity cannot be expressed in theories of indexation entailing coreference, where only one reading at a time can be accounted for.

Another set of data which poses a challenge for theories of indexation using atomic indices is split antecedence. The typical example is nominal coordination which controls a plural anaphor, such as (467).

(467) **John** and **Mary** presented **themselves** personally.

In (467), the antecedent of the plural reflexive pronoun is split between two NPs. The referential relation cannot be indicated using atomic indices. To account for such cases, Fiengo and May (1994) propose to treat the index of plural anaphora as a fusion of the indices of their antecedents. Thus, if the NP *John* in (467) bears the atomic index i and the NP *Mary* the index j , then the index of the reflexive pronoun *themselves* is a fusion of i and j , written as $i \oplus j$. It is, however, not clear what algebra Fiengo and May (1994) assume and, consequently, how the operation of fusion is exactly defined.

Another case of split antecedent is found in Polish CCCs which control plural anaphora, as in (468).

(468) **Ja** z **żoną** pomagamy **sobie samym**.
 I with wife.INSTR help ourselves
 ‘My wife and I help ourselves.’

In (468), the antecedent of the plural anaphor *sobie samym* ‘ourselves’ is split into the nominative NP and the instrumental NP. The referential relation between the antecedent and the anaphor cannot be indicated by atomic indices.

Finally, theories of indexation which use atomic indices cannot account for referential relations in sentences like the one in (469).

(469) **John** asked **Mary** to help **each other**.

The referential relation between the reciprocal pronoun *each other* and its antecedent, which is split, cannot be indicated. While the split antecedents in (467) and (468) form a constituent, the components of the antecedent of *each other* in (469) are different syntactic constituents, and thus, particularly problematic.

In summary, the antecedent-anaphor relations presented in (462) through (469) are problematic for theories of indexation based on atomic indices and entailing

coreference and agreement. However, an explicit representation of anaphoric relations in these sentences is relevant for Binding Theory and Control Theory. In the following section, I provide a theory of indexation which offers a way to account for these data.

9.4.3 The Theory of Indexation

I propose an approach to indexation which draws on two basic assumptions. Firstly, I assume that indexation expresses the relationship between the referents associated with syntactic expressions. Coindexation is a special case of indexation, which entails coreference. Secondly, I assume that indexation does not entail agreement, neither morphosyntactic nor semantic / pragmatic agreement. This allows us to coindex expressions which bear different person, number or gender features (cf. the examples in (462), (463), (464) and (465)).

I further propose that lexical referential expressions are assigned their referential indices in the lexicon. These indices are represented by sets of Ty2 terms. Referential indices of referring nominal objects are sets of atomic Ty2 individual variables (or constants) rather than atomic individual variables. The referential index of a singular nominal expression will be a singleton set containing a Ty2 variable (or constant) which belongs to the meaning representation of this expression and is associated with its referent. The index of a plural nominal expression will be a set of Ty2 variables (or constants), each of which belongs to the meaning representation of this expression and is associated with a single referent.⁶ Indexation consist in establishing identities between these sets and / or their subsets. Note that predicative lexical expressions are assigned a referential index as well. This index is understood as a set of atomic Ty2 event variables. Assigning indices to predicative expressions allows us to represent referential relations between predicative expressions and pronouns referring to them in the same fashion as referential relations in the nominal domain.

Finally, I postulate that in phrasal structures other than coordination and CCCs, the referential index of the mother is identical to the referential index of the head daughter. In coordinate structures and CCCs, the index of the mother is a new index. In the case of nominal coordination, this new index is a set of Ty2 individual terms which is the union of the indices of all daughters. In CCCs, the new referential index is a set of Ty2 individual variables (or constants) which is the union of the index of the NP1 and the index of the NP2. This new index is used to indicate anaphoric relations within an utterance.

Thus, according to my analysis, the index of coordinate structures and CCCs is constructed (by virtue of a grammatical principle), whereas in ACCs and ICCs, the instantiation of the indexical information is the result of inheritance. This analysis explains the different behavior of CCCs (which show similarities to ordinary coordination) from ACCs and ICCs with respect to control phenomena.

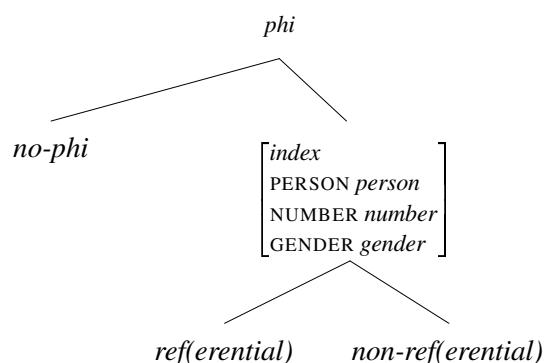
⁶It is an open question whether expressions referring to infinite sets can be appropriately handled in this approach.

In the proposed approach to indexation, which separates information relevant to agreement from that relevant to reference, theories which account for agreement and theories which account for the distribution of anaphoric expressions can operate independently of each other. As a result, my approach can account for a diversity of referential relations, such as those discussed above, which are problematic for the existing theories. As the mechanism of indexation is based on sets of variables rather than atomic variables, the split antecedence phenomenon, including Polish CCCs, can easily be accounted for.

9.4.4 The HPSG Formalization

I implement my analysis of indexation by means of the feature CONTENT, taking an object of sort *content* as its value. I further assume a uniform feature geometry for *content*, and adopt the sort hierarchy and appropriateness conditions below the sort *content* as proposed in Sailer (2004a). According to Sailer (2004a), all *content* objects have an INDEX and MAIN attribute, and the value of the MAIN attribute of a word is the major semantic constant contributed by this word. Since not all words contribute a semantic constant, e.g., quantifiers or pronouns, I propose to specify the value of the MAIN attribute as *me-none* (cf. (454)). The attribute INDEX has, according to Sailer (2004a), values of sort *ex(tended)-index*, for which the attributes PHI and VAR(IABLE) are declared. I define the value of the attribute PHI as in (470), following Sailer (2004a), Soehn (2006) and Chaves (2007).

(470) *phi*:



Thus, the value of the PHI attribute is of sort *phi*, which has two subsorts: *no-phi* (for expressions with no ϕ -features, such as prepositions) and *index*, which is structured as defined in Pollard and Sag (1994). It includes the features PERSON, NUMBER and GENDER, corresponding to the traditional ϕ -features, and has two subsorts: *ref(erential)* (for referential expressions, such as personal pronouns or proper names) and *non-ref(erential)* (for non-referential expressions).

The value of the attribute VAR is assumed in Sailer (2004a) to be an individual variable for nominal expressions and an event variable for verbal expressions.⁷ I propose that the attribute VAR takes a set of variables and / or individual constants of Ty2 as its value instead of atomic variables. The VAR value of lexical items which do not refer to any entities and cannot control anaphoric expressions will be specified as the empty set. The proposed signature specifications for *content* and *ex-index* are given in (471) and (472), respectively, and an AVM description of an exemplary *content* object is given in (473).

(471) *content*:

$$\left[\begin{array}{l} \textit{content} \\ \text{INDEX } \textit{ex(tended)-index} \\ \text{MAIN } \textit{me-none} \end{array} \right]$$

(472) *extended-index*:

$$\left[\begin{array}{l} \textit{ex(tended)-index} \\ \text{PHI } \textit{phi} \\ \text{VAR(IABLE) } \textit{set} \end{array} \right]$$

(473) An AVM description of an exemplary *content* object

$$\left[\begin{array}{l} \textit{content} \\ \text{INDEX } \left[\begin{array}{l} \textit{ex(tended)-index} \\ \text{PHI } \left[\begin{array}{l} \textit{index} \\ \text{PERSON } \textit{person} \\ \text{NUMBER } \textit{number} \\ \text{GENDER } \textit{gender} \end{array} \right] \\ \text{VAR } \{x, j'\} \end{array} \right] \\ \text{MAIN } \textit{me-none} \end{array} \right]$$

In my approach, the VAR value of a singular nominal expression such as *Tom* or *boy* is specified in the lexicon as a singleton set which includes an individual constant \mathbf{t}' or an individual variable x , respectively, also included in the logical form of this expression. The VAR value of a verbal expression denoting a singular event includes one event variable. The VAR value of a syntactically simplex plural expression, such as a plural pronoun, is always a set of variables of cardinality greater than 1. The descriptions in (474)–(481) provide the relevant parts of the lexical entries of the expressions in our fragment of Polish in line with these assumptions.⁸ The PHI values will be discussed in the next section.

⁷Note that Sailer (2004a) assumes eventuality variables for verbs instead of event variables. A differentiation between eventualities and events is irrelevant for the discussion in this thesis. I decided to talk about VAR values of verbs in terms of event variables to be consistent with the Davidsonian style of verbal semantics (cf. Davidson (1967)). Cf. also Van Eynde (1998), Sag et al. (2003) and Trawiński (2004, 2005a) for HPSG approaches to the representation of verbal semantics in line with Davidson (1967).

⁸Note that I use the symbol \in both in Ty2 descriptions as well as in RSRL descriptions.

$$(474) \left[\begin{array}{l} \text{PHON} \langle \text{Jan} \rangle \\ \text{SS} \mid \text{LOC} \mid \text{CONT} \left[\begin{array}{l} \text{INDEX} \mid \text{VAR} \{ \mathbf{j}' \} \\ \text{MAIN } \mathbf{j}' \end{array} \right] \\ \text{LF} \{ \mathbf{j}' \} \end{array} \right]$$

$$(475) \left[\begin{array}{l} \text{PHON} \langle \text{Maria} \rangle \\ \text{SS} \mid \text{LOC} \mid \text{CONT} \left[\begin{array}{l} \text{INDEX} \mid \text{VAR} \{ \mathbf{m}' \} \\ \text{MAIN } \mathbf{m}' \end{array} \right] \\ \text{LF} \{ \mathbf{m}' \} \end{array} \right]$$

$$(476) \left[\begin{array}{l} \text{PHON} \langle \text{My} \rangle \\ \text{SS} \mid \text{LOC} \mid \text{CONT} \left[\begin{array}{l} \text{INDEX} \mid \text{VAR} \boxed{1} \\ \text{MAIN } \textit{none} \end{array} \right] \\ \text{LF } X \end{array} \right] \wedge$$

$$\forall x (x \in \boxed{1} \rightarrow x \in X) \wedge$$

$$\forall x' (x' \in X \rightarrow x' \in \boxed{1})$$

$$(477) \left[\begin{array}{l} \textit{word} \\ \text{PHON} \langle \textit{wyjechał} \rangle \\ \text{SS} \mid \text{LOC} \mid \text{CONT} \left[\begin{array}{l} \text{INDEX} \mid \text{VAR} \boxed{1} \\ \text{MAIN } \textit{leave}' \end{array} \right] \\ \text{LF } \lambda X. \exists E \textit{leave}'(E, X) \end{array} \right] \wedge$$

$$\forall e (e \in \boxed{1} \rightarrow e \in E) \wedge$$

$$\forall e' (e' \in E \rightarrow e' \in \boxed{1})$$

$$(478) \left[\begin{array}{l} \textit{word} \\ \text{PHON} \langle \textit{wyjechał} \rangle \\ \text{SS} \mid \text{LOC} \mid \text{CONT} \left[\begin{array}{l} \text{INDEX} \mid \text{VAR} \boxed{1} \\ \text{MAIN } \boxed{2} \textit{leave}' \end{array} \right] \\ \text{LF } \boxed{3} (\lambda X \lambda E. \textit{leave}'(E, X)) \end{array} \right] \wedge$$

$$\exists \boxed{4} \vee \boxed{5}$$

$$\left(\left(\left(\boxed{4} \left[\begin{array}{l} \textit{application} \\ \text{ARG } \boxed{3} \end{array} \right] \wedge \boxed{5} \left[\begin{array}{l} \textit{application} \\ \text{FUNC } \boxed{2} \end{array} \right] \wedge \textit{subterm}(\boxed{5}, \boxed{4}) \right) \rightarrow \right. \right. \\ \left. \left(\forall \boxed{6} \forall e \left(\left(\boxed{5}[\text{ARG } \boxed{6}] \wedge e \in \boxed{6} \right) \rightarrow e \in \boxed{1} \right) \wedge \right. \right. \\ \left. \left. \left(\neg \exists \boxed{7} \neg \exists e' \left(\boxed{5}[\text{ARG } \boxed{7}] \wedge e' \in \boxed{1} \wedge e' \notin \boxed{7} \right) \right) \right) \right)$$

$$(479) \left[\begin{array}{l} \textit{word} \\ \text{PHON} \langle z \rangle \\ \text{SS} \mid \text{LOC} \mid \text{CONT} \left[\begin{array}{l} \text{INDEX} \mid \text{VAR} \{ \} \\ \text{MAIN } \textit{accompany}' \end{array} \right] \\ \text{LF } \lambda Y \lambda X \lambda P_2. \exists E (P_2(E, X) \wedge (X \cap Y = \emptyset) \wedge \\ \forall E' ((E \supset E' \wedge E' \neq \emptyset) \rightarrow (P_2(E', X) \wedge \exists E'' \textit{accompany}'(E'', Y, X)))) \end{array} \right]$$

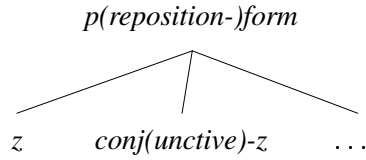
$$(480) \left[\begin{array}{l} \text{word} \\ \text{PHON} \langle z \rangle \\ \text{SS} \mid \text{LOC} \mid \text{CONT} \left[\begin{array}{l} \text{INDEX} \mid \text{VAR} \{ \} \\ \text{MAIN} \textit{none} \end{array} \right] \\ \text{LF} \lambda Y \lambda X \lambda P_1. \exists Z P_1(Z) \wedge Z = X \wedge Z \supset Y \end{array} \right]$$

$$(481) \left[\begin{array}{l} \text{word} \\ \text{PHON} \langle z \rangle \\ \text{SS} \mid \text{LOC} \mid \text{CONT} \left[\begin{array}{l} \text{INDEX} \mid \text{VAR} \{ \} \\ \text{MAIN} \textit{none} \end{array} \right] \\ \text{LF} \lambda Y \lambda X \lambda P_1. P_1(X \cup Y) \end{array} \right]$$

As the descriptions in (474) and (475) show, the VAR values of the proper names in our fragment contain the individual constants provided by their logical forms. Note that the values of the attributes VAR and LF in these lexical entries are, in spite of the same notation, objects of different sorts, namely *set* (of meaningful expressions) and *set-of-me*, respectively. The lexical entry of the first person plural pronoun in (476) guarantees that the VAR value contains all entities which are also contained in the LF value, and vice versa. The lexical entries in (477) and (478) describe the verb *wyjechał* whose logical form provides an existentially bound event variable (predicate of type P_1) and the verb *wyjechał* whose logical form introduces an event variable bound by a λ -operator (predicate of type P_2), respectively. The second conjunct in (477) guarantees that the VAR set entails all entities which are members of the set of events E , and vice versa. The second conjunct in (478) ensures that the VAR value contains all entities that are members of all sets of events which are parts of the logical form of the mother node and to which the constant **leave'** applies. Recall that expressions combining with this type of predicate operate on its event variable. Finally, the lexical entries of the accompanitive, inclusive and conjunctive preposition *z* in (479), (480) and (481), respectively, state that their VAR values are empty sets.

I further postulate that the VAR value of a phrase other than a CCC or a coordinate structure is token-identical with the VAR value of the head daughter. A similar constraint holds for the values of the attribute MAIN. For CCCs, I propose that their VAR value is the union of the VAR value of the head daughter and the VAR value of the preposition's complement daughter. Their MAIN value will be *none*. These assumptions are formulated as THE VARIABLE FEATURE PRINCIPLE and THE MAIN FEATURE PRINCIPLE given in (483) and (484), respectively. In order to be able to refer to CCCs, i.e., to head adjunct structures, where the adjunct daughter is headed by the conjunctive preposition *z*, I define a new subsort for the sort *pform*: *conj(unctive) z*, which represents the prepositional form of the conjunctive preposition *z*. The new sort hierarchy below the sort *pform* is given in (482).

(482) *pform*:

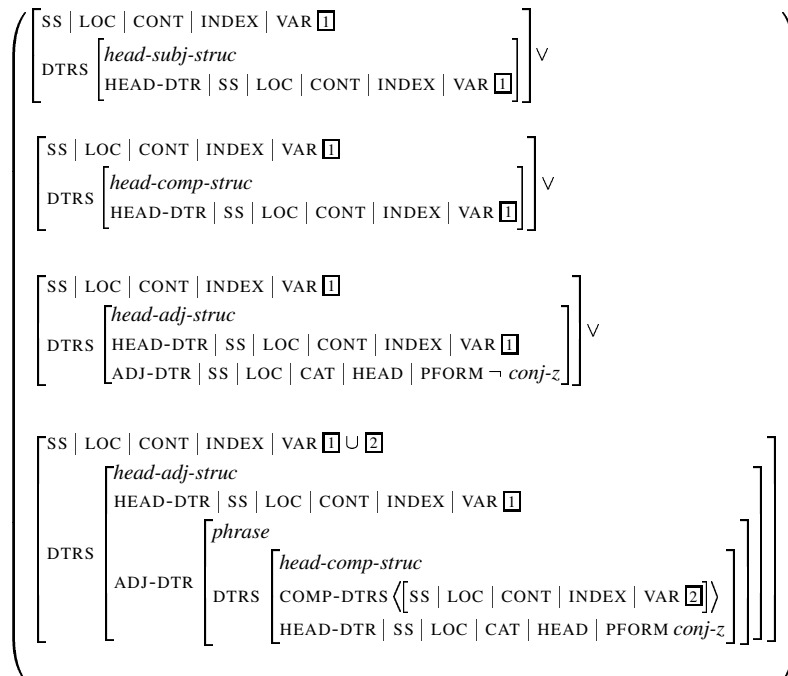


(483) THE VARIABLE FEATURE PRINCIPLE

In a phrase, the VAR value is (i) token-identical with the VAR value of the head daughter if the DTRS value is of sort *head-subj-struct*, *head-comp-struct* or *head-adj-struct* where the value of ADJ-DTR | DTRS | HEAD-DTR | SS | LOC | CAT | HEAD | PFORM is not *conj-z*, or (ii) the union of the VAR value of the head daughter and the VAR value of the adjunct's complement daughter if the DTRS value is of sort *head-adj-struct* where the value of ADJ-DTR | DTRS | HEAD-DTR | SS | LOC | CAT | HEAD | PFORM is *conj-z*.

Formalization:

phrase →



(484) THE MAIN FEATURE PRINCIPLE

In a phrase, the MAIN value is (i) token-identical with the MAIN value of the head daughter if the DTRS value is of sort *head-subj-struct*, *head-comp-struct* or *head-adj-struct* where the value of ADJ-DTR | DTRS | HEAD-DTR | SS | LOC | CAT | HEAD | PFORM is not *conj-z*, or (ii) *none* if the DTRS value is of sort *head-adj-struct* where the value of ADJ-DTR | DTRS | HEAD-DTR | SS | LOC | CAT | HEAD | PFORM is *conj-z*.

Formalization:

$$\text{phrase} \rightarrow \left(\begin{array}{l} \left[\begin{array}{l} \text{SS | LOC | CONT | MAIN } \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-subj-struct} \\ \text{HEAD-DTR | SS | LOC | CONT | MAIN } \boxed{1} \end{array} \right] \end{array} \right] \vee \\ \left[\begin{array}{l} \text{SS | LOC | CONT | MAIN } \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-comp-struct} \\ \text{HEAD-DTR | SS | LOC | CONT | MAIN } \boxed{1} \end{array} \right] \end{array} \right] \vee \\ \left[\begin{array}{l} \text{SS | LOC | CONT | MAIN } \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-adj-struct} \\ \text{HEAD-DTR | SS | LOC | CONT | MAIN } \boxed{1} \\ \text{ADJ-DTR | SS | LOC | CAT | HEAD | PFORM } \neg \textit{conj-z} \end{array} \right] \end{array} \right] \vee \\ \left[\begin{array}{l} \text{SS | LOC | CONT | MAIN } \textit{none} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-adj-struct} \\ \text{ADJ-DTR | SS | LOC | CAT | HEAD | PFORM } \textit{conj-z} \end{array} \right] \end{array} \right] \end{array} \right)$$

I further propose to treat the mechanism of indexation, as used in theories of the distribution of anaphoric expressions, in terms of VAR value identities. Because my mechanism of indexation is based on the idea of complex, set-based indices instead of atomic indices, the non-trivial referential relations discussed in Section 9.4.2 can be accounted for by using common set theoretical operations such as set union, the subset relation, or the membership relation. Quantification over sets can be applied as well. For example, the referential relations between the anaphora and their split antecedents in (467), (468) and (469) can be expressed by specifying the VAR value of the anaphora as the union of the VAR values of all components of the antecedent. The exact formulation of anaphoric relationships of this sort will be subject to the respective theory.

Figure 9.15, Figure 9.16 and Figure 9.17 provide descriptions of the sentences of our fragment which involve the redefined feature CONTENT and which satisfy the constraints on the VAR and MAIN values. To show the correlation between all linguistic representation levels operating on meaningful expressions, the following trees also include contextual information.

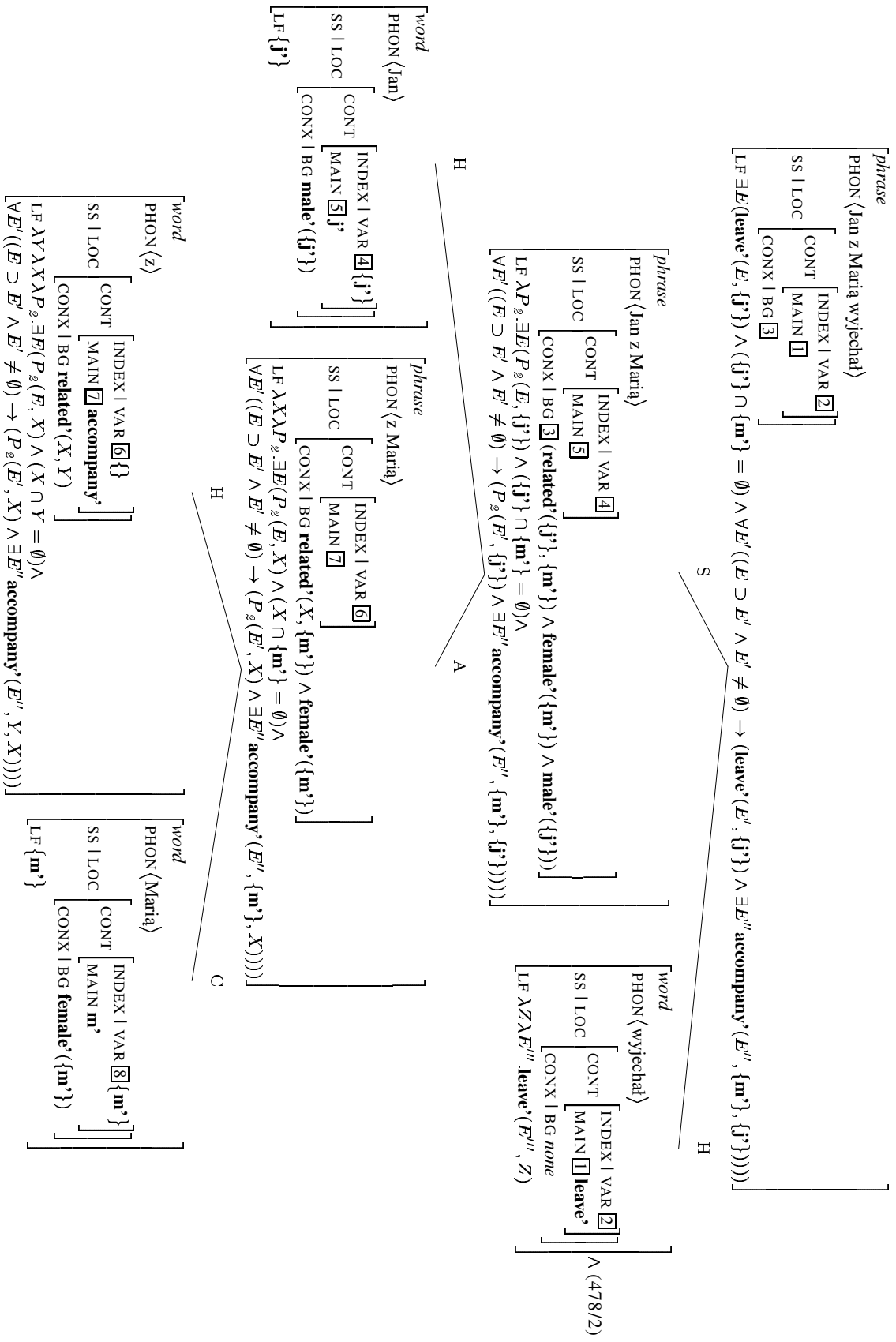


Figure 9.15: A description of the sentence (420), including an ACC, with the interpretation of the PP as the NP-adjunct

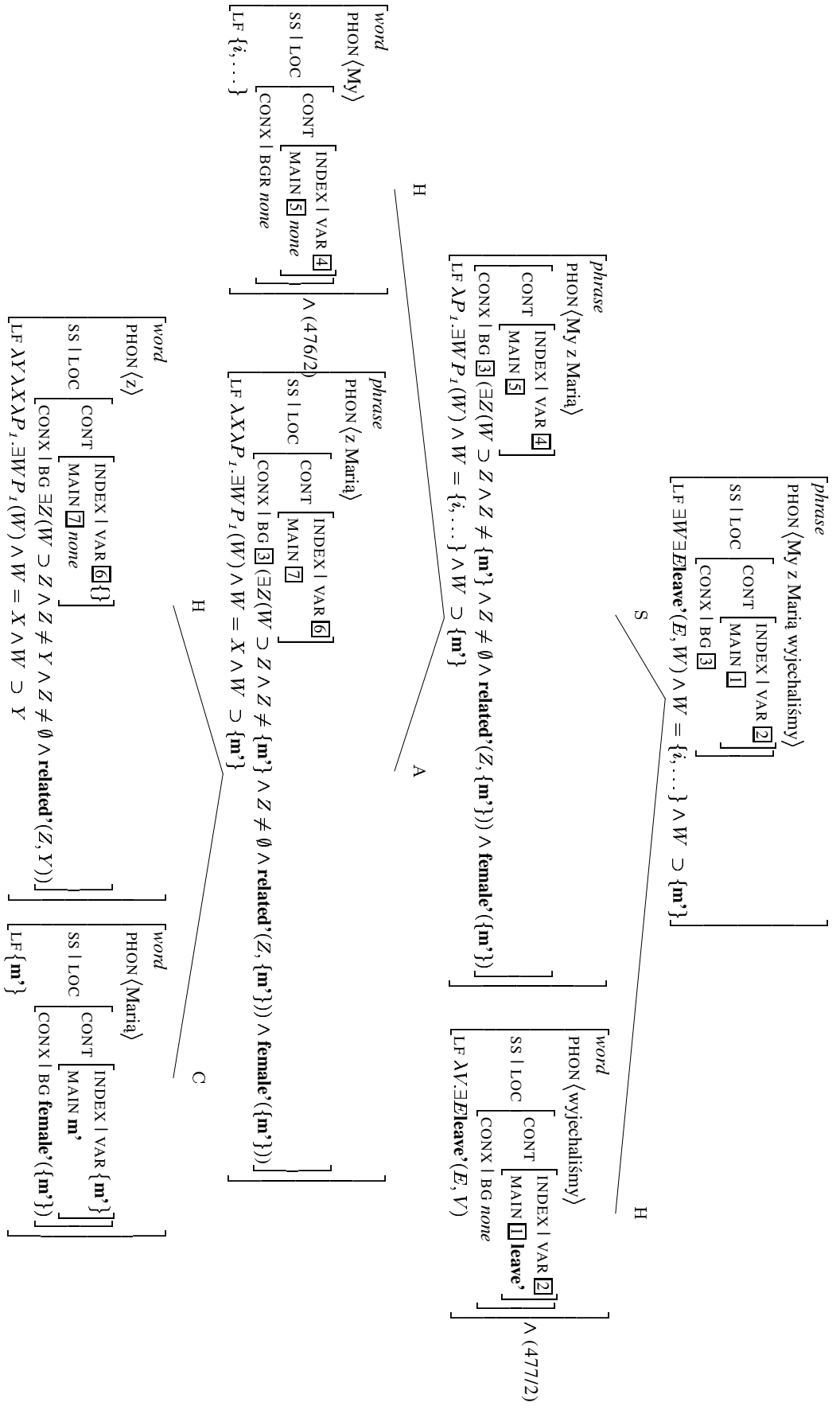


Figure 9.16: A representation of the sentence (422), including an ICC, with the interpretation of the PP as an NP-adjunct

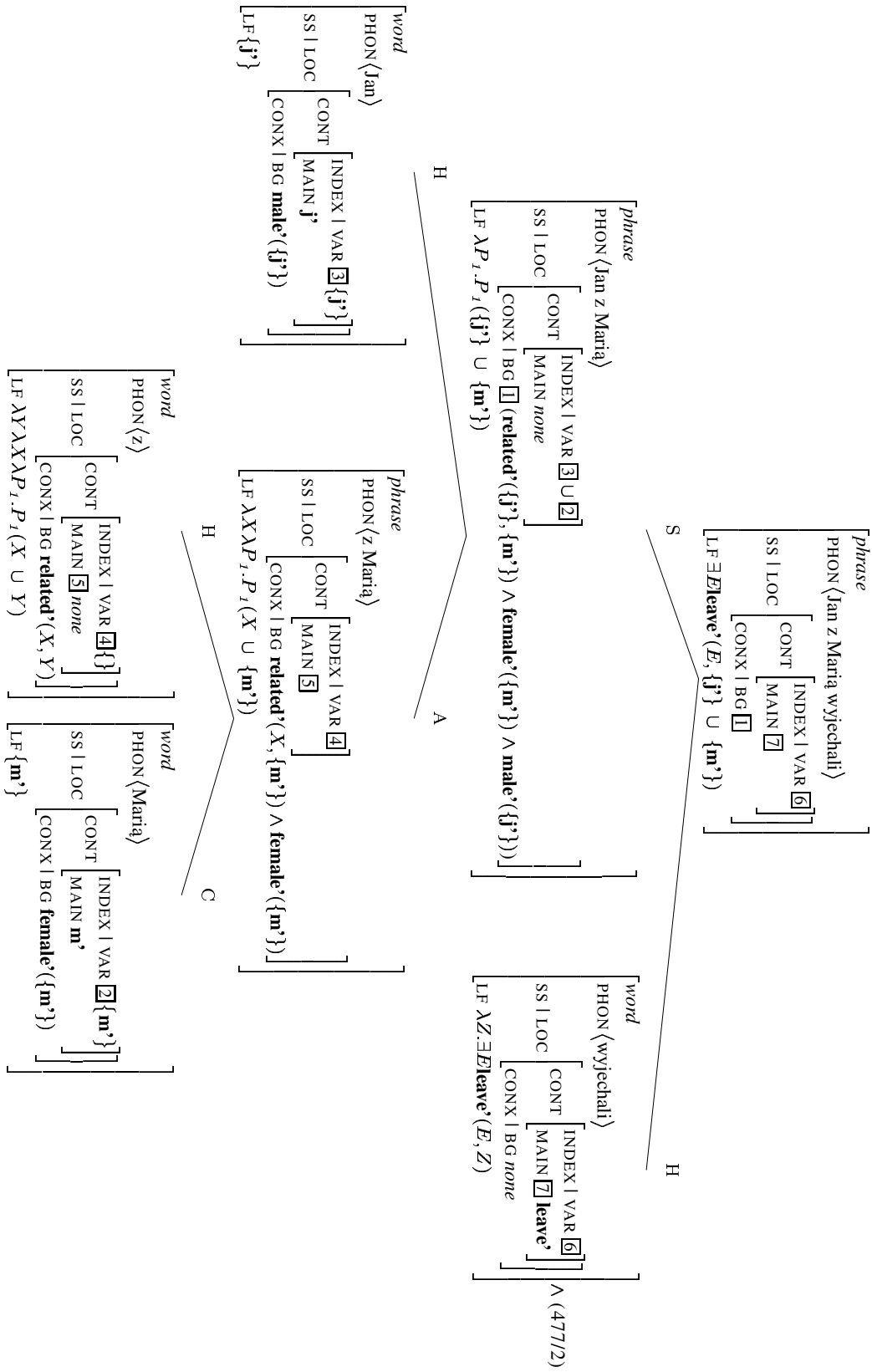


Figure 9.17: A representation of the sentence (421), including a CCC

Due to THE VARIABLE FEATURE PRINCIPLE in (483), the VAR value of the ACC in Figure 9.15 and of the ICC in Figure 9.16 are token-identical with the VAR value of the head daughter, i.e., with the NP *Jan* ‘Jan’ (cf. the tag $\boxed{4}$). By contrast, the VAR value of the CCC *Jan z Marią* ‘Jan and Maria’ in Figure 9.17 provides a new object, which is the union of the VAR value of the nominative NP and the VAR value of the instrumental NP. Since I have assumed that the values of the attribute VAR serve as a new mechanism of indexation, i.e., that the VAR value of an anaphoric expression is identified with the VAR value of the controller, my theory correctly predicts that CCCs and ICCs, but not ACCs, can act as controllers of plural anaphors (cf. the discussion on coreference phenomena in Section 3.4). Also, given the fact that the VAR value of the first person plural pronoun contains a variable associated with the speaker, referential relations between this pronoun and, for example, a first person singular possessive pronoun can be formally expressed (cf. the discussion in Section 3.4). Moreover, the ϕ -features are specified in my account independently of the attribute VAR. As a result, coindexing of non-agreeing expressions is possible. For instance, a singular expression can perfectly control a plural expression and vice versa.

My approach to indexation in interaction with the semantic approach makes it a possible to uniformly account for singular and plural terms (associated with both syntactically simplex and complex expressions), inclusiveness, distributivity and collectivity, including simultaneous licensing of these two interpretations, as well as various types of referential relations, such as coreference with and without agreement or split antecedent phenomena. For alternative HPSG approaches to plural semantics, see Frank and Reyle (1995) and Chaves (2005), both using the framework of Underspecified Discourse Representation Theory (UDRT, Reyle (1993)), and Chaves (2007), who uses the framework of Minimal Recursion Semantics (MRS, Copestake et al. (2005)). See also Wechsler and Zlatic (2001) for an analysis of the ambiguity between the aggregate and non-aggregate interpretations postulated there for some collective Serbo-Croatian nouns within the traditional semantic framework of Pollard and Sag (1994).

9.5 The Analysis of Agreement and Resolution

As we saw before, Polish CCCs, similarly to nominal coordination and in contrast to ACCs and ICCs, are subject to person, number and gender resolution. In Chapter 6, I demonstrated that this phenomenon pertains to the morphosyntactic and pragmatic domains. I also showed that person, number and gender resolution in Polish does not only apply to syntactically complex expressions, such as coordination and CCCs, but also to non-phrasal expressions such as plural pronouns and morphosyntactically feminine title terms of type *świętobliwość* ‘holiness’, and that Polish title terms are subject to mixed agreement. In this section, I will formulate a theory of agreement and resolution which uniformly accounts for these phenomena. The complexity of this theory and the breadth of the empirical domain

it applies to, which goes beyond the scope of the present thesis, makes it necessary to leave the implementation of the theory in HPSG for future work.

9.5.1 Morphosyntactic Agreement Features and ϕ -Features

To properly account for all agreement phenomena, including mixed agreement, I adopt the idea proposed in Czuba and Przepiórkowski (1995), based on Kathol (1999) and elaborated for Polish in Przepiórkowski et al. (2002). According to this approach, nominal expressions contain information about their number and gender at two representation levels: at the morphosyntactic and at the (local) semantic level.⁹ In my proposal, the agreement features specified at the (local) semantic level include person, number and gender, i.e., the traditional ϕ -features. The agreement between particular expressions in the sentence can then be treated by means of their morphosyntactic agreement features, by means of their ϕ -features, or both.

Having two different sets of agreement features makes it possible to account for the agreement mismatch in sentences involving Polish title terms such as *wysokość* ‘highness’, *mość* ‘majesty’, *magnificencja* ‘magnificence’, *ekscelencja* ‘excellency’ and *świętobliwość* ‘holiness’. This issue was discussed in Chapter 6 on the basis of sentence (251), repeated here as (485).

- (485) a. Jej wspaniałomyślna wysokość była zmęczona.
 her generous.FEM highness.FEM was.FEM tired.FEM
 ‘Her generous highness was tired.’
- b. Jego wspaniałomyślna wysokość był zmęczony.
 his generous.FEM highness.FEM was.M1 tired.M1
 ‘His generous highness was tired.’

Recall that the noun *wysokość* ‘highness’ can refer to both males and females. In (485a), it denotes a female and appears with a feminine predicate, a feminine possessive pronoun and a feminine attribute. In this case, there is no mismatch between the values of the morphosyntactic and the semantic agreement features. In (485b), the morphosyntactically feminine noun *wysokość* ‘highness’ refers to a male and combines with a masculine predicate and a masculine possessive pronoun, while the attributive modifier is feminine. Thus, we have on the one hand morphosyntactic agreement (between the noun and the attributive modifier), and on the other hand, context-driven agreement (between the noun, the predicate and the pronominal pronoun). Given these observations, I assume following Przepiórkowski et al. (2002) that in Polish, agreement between an attributive adjective and a noun should be described in terms of morphosyntactic agreement,

⁹A similar proposal has been made in Wechsler and Zlatić (2001). A distinction between two sets of agreement features (*phi-features* versus *sigma-features*) has also been proposed in D’Alessandro (2004) within the GB framework. Another alternative to account for agreement mismatches, a property-based approach, has been proposed in Barlow (1999). See also Dalrymple and Kaplan (2000) for the treatment of conflicting requirements on some features and feature resolution in coordinate structures within the LFG framework.

whereas agreement between a nominative subject and a predicate should be treated in terms of context-driven agreement. In my analysis, the context-driven agreement will be described using ϕ -features.

These considerations correspond to the Agreement Hierarchy of Corbett (1979), also discussed in Corbett (1983a, 1991, 2000, 2003) and presented here in Figure 9.18.

attributive < predicate < relative pronoun < personal pronoun

Figure 9.18: The Agreement Hierarchy

The Agreement Hierarchy says that for a given controller, the likelihood of contextually driven agreement will increase by moving rightwards along the hierarchy. For an example, see the percentage distribution of masculine plural (versus neuter plural) forms in Serbian-Croatian-Bosnian in Corbett (2003), derived from Sand (1971). Although the Agreement Hierarchy does not make a statement about possessive pronouns, one can stipulate that they are located on the same level in the hierarchy as personal pronouns. The sentences in (485), where the gender of the possessive pronouns is justified contextually, seem to provide a piece of evidence for this.

Assuming two bundles of agreement features, morphosyntactic and ϕ -features, will also allow us to account for a number of agreement mismatch phenomena in other languages, such as those described in Kathol (1999) for Spanish, in Wechsler and Zlatić (1998, 2001, 2003) for Serbo-Croatian, in Osenova (2003) for Bulgarian, or in Rosen (2007) for Czech.

9.5.2 Inherent versus Resolved ϕ -Features Values

To account for person, number and gender resolution, I propose treating the values of the ϕ -features in terms of inherent versus resolved values. The values of the features PERSON, NUMBER and GENDER of the majority of Polish nouns will be specified in the lexicon, i.e., they will be analyzed as inherent values. For morphosyntactically feminine title terms as well as for first and second person plural pronouns, I assume that the values of their PERSON and NUMBER features are specified in the lexicon as well. The value of their GENDER feature will, however, be resolved. As for CCCs (as well as nominal coordination), the values of all their ϕ -features will require resolution. The resolution rules will apply to all objects whose ϕ -features' values are to be resolved.

The values of the ϕ -features which must be resolved are licensed by virtue of three grammar principles: THE PRINCIPLE FOR NUMBER RESOLUTION, THE PRINCIPLE FOR GENDER RESOLUTION, and THE PRINCIPLE FOR PERSON RESOLUTION. These principles are based on the rules for number, person and gender resolution proposed in Corbett (1983a, 1991, 2000), which were discussed in Chapter 6.

THE PRINCIPLE FOR NUMBER RESOLUTION is provided in (486). It ensures that all expressions whose ϕ -feature NUMBER is specified as taking a value which must be resolved are plural. Given the assumptions in the previous section, the principle in (486) will apply to nominal coordination and Polish CCCs.

- (486) THE PRINCIPLE FOR NUMBER RESOLUTION
If the value of the ϕ -feature NUMBER must be resolved, this value will be plural.

THE PRINCIPLE FOR GENDER RESOLUTION is given in (487). This principle operates on the morphosyntactic as well as the contextual representation. In addition to the phenomena treated by the rules for gender resolution of Corbett (1983a, 1991, 2000), the principle in (487) accounts for internal gender resolution in title terms and plural pronouns. It also makes the right predictions about all the data discussed in Section 6.2.2 which have not or not correctly been accounted for by Corbett's rules.

- (487) THE PRINCIPLE FOR GENDER RESOLUTION
If the value of the ϕ -feature GENDER must be resolved, then
1. if a (syntactically complex) expression includes a masculine human component and at least one of the referents is male, the entire expression will be masculine human;
 2. if the denotation of a word includes a male referent, the gender value of this word will be masculine human;
 3. if a singular word refers to a female individual, the gender value of this word will be female;
 4. if an expression refers to female individuals only, this expression will be non-masculine human;
 5. if there is no morphosyntactically singular masculine animate or masculine inanimate component, the entire expression will be non-masculine human;
 6. otherwise, the masculine human or nonmasculine human forms may be used.

The five clauses of the principle in (487) account for gender resolution in (1) nominal coordination and CCCs involving a masculine human component and a component referring to a male individual; (2) plural pronouns and title terms involving a male referent; (3) title terms referring to female individuals; (4) nominal coordination and CCCs referring to female individuals; and, finally, (5) nominal coordination and CCCs without a singular masculine animate or inanimate component.

(488) provides THE PRINCIPLE FOR PERSON RESOLUTION. Like THE PRINCIPLE FOR GENDER RESOLUTION, this principle applies to contextual and morphosyntactic information.

(488) THE PRINCIPLE FOR PERSON RESOLUTION

If the value of the ϕ -feature PERSON must be resolved, then

1. if an expression includes a first person component, the person value of this expression will be first;
2. if an expression includes a second person component and no first person component, the person value of this expression will be second;
3. if an expression does not include a first or second person component and there is no speaker or addressee in the denotation of this expression, the person value of this expression will be third.

THE PRINCIPLE FOR PERSON RESOLUTION ensures that not only the morphosyntactic person value of components determines person resolution, but also the involvement of the speaker and the addressee in their denotations. By virtue of this principle, both the morphosyntactic and context-driven person resolution in Polish CCCs (as well as nominal coordination) can be accounted for.

To sum up, the proposed theory of number, gender and person resolution for Polish explains the majority of the data discussed in Chapter 6.

9.6 Summary

In this chapter, I proposed an analysis of Polish CCs at the syntax-semantics-pragmatics interface, and I implemented this analysis within the HPSG framework with a model-theoretic semantics. I have argued that all three types of Polish CCs have the same underlying syntactic structure, which explains why ACCs, CCCs and ICCs share so many properties, such as (i) the assignment of instrumental case to NP2s, (ii) the modifiability of PPs by collectivizing adverbs, (iii) the ability of PPs to conjoin and occur recursively, (iv) the inability to iterate NP1s and PPs, and, finally, (v) the ability to occur as nominative and dative subjects, direct, indirect and prepositional objects, as well as possessors. I have also argued that the crucial differences between ACCs, CCCs and ICCs are semantic in nature and are triggered by the meaning of the preposition *z* ‘with’. My semantic analysis, based on three different translations of the preposition *z*, correctly predicts that (i) ICCs can trigger inclusive presupposition, (ii) ICCs and CCCs, but not ACCs, can occur in distributive and collective contexts, (iii) ICCs and CCCs, but not ACCs (including singular NPs), can act as controllers of plural anaphora. Furthermore, I suggested that the person, number and gender form of CCCs is subject to resolution. This distinguishes CCCs from ACCs and ICCs, where person, number and gender are inherited from the syntactic head, and brings them more in line with ordinary coordination. The person, number and gender resolution effects in CCCs correlate with their semantic properties: CCCs refer to plural entities and their respective ϕ -features reflect this fact at the syntactic level. Finally, I suggest that the

inability of conjunctive PPs to attach to VPs follows from the absence of an appropriate translation of the preposition *z*. To put it in other words, the availability of only one translation of the conjunctive preposition *z* (for combining with NPs) explains why sentences involving VPs modified by comitative PPs can never provide a conjunctive interpretation in Polish.

This chapter also formulates a new theory of indices, which accounts for referential relations involving CCCs (and other data) by assuming constructed indices (as opposed to inherited indices). Moreover, it proposes a new theory of agreement and resolution for Polish, which differentiates between inherent and resolved ϕ -features.

To conclude, my analysis offers a systematic description of the crucial properties of Polish CCs discussed in Part I, and correctly accounts for their accompanitive, conjunctive and inclusive readings. My analysis also has implications for other linguistic phenomena such as coordination, plurality, distributivity and collectivity, (mixed) agreement and resolution, partial and split antecedence.

Chapter 10

Concluding Remarks and Future Directions

10.1 Conclusions

The main conclusion reached in this thesis is that there are three types of CCs in Polish: accompanitive, conjunctive and inclusive, and that the differences between them are semantic, and not syntactic. My semantic approach significantly differs from previous approaches to CCs, which attempt to explain the three readings available for CCs by syntactic stipulations, possibly with a semantic component. Having discussed numerous analyses, using different frameworks, such as GPSG, HPSG, GB and Minimalism, I demonstrated that the syntactic approach to CCs did not achieve satisfactory results. Many of the previous syntactic analyses offer only partial explanations, many of them, in particular, the coordination-based ones, are problematic for empirical or theoretical reasons. Specifically, I have shown that the Polish *z* is an ordinary preposition (it undergoes vocalic alternation, selects NPs and assigns case) and the *z* NP2 strings are PPs that are headed by *z* and can be modified by adverbs. These facts are incompatible with the analyses treating *z* NP2 sequences as NPs or PPs with nominal semantics. I have also argued that plural pronouns in ICCs have their ordinary syntactic properties and carry their customary meanings. This observation conflicts with the complementation-based approaches to ICCs, where these pronouns are analyzed as syntactically and semantically unsaturated. Moreover, these approaches do not account for ICCs with non-pronominal NP1s.

As I have shown in the empirical part of this thesis, Polish CCCs behave very similarly to ordinary nominal coordination concerning agreement and control phenomena. They also have a plural entity in their denotation and are able to occur in distributive and collective contexts. These parallels between CCCs and coordination motivated many linguists to analyze these two types of expressions in a uniform way as licensed by the same kind of syntactic structure. I have demonstrated that this approach ignores many empirical facts which clearly distinguish

CCCs from coordination. Firstly, the grammatical category of both phrases in CCs is limited to nouns, while in ordinary coordination, phrases of arbitrary category can be combined. Secondly, CCs involve internal case assignment, while in ordinary nominal coordination, case is assigned externally by an assigner to all NPs. Thirdly, while in ordinary coordination, the coordinated phrases can be arbitrarily inverted, the NPs in CCs cannot. Fourthly, proper conjunction can appear in CCs and is clearly distinct from the CC structure itself. Fifthly, there is no contrast between possessive and reflexive possessive pronouns in CCs, more precisely, CCCs, but there is in ordinary coordination. Sixthly, in contrast to ordinary coordination, pro-drop is possible in CCs. Finally, CCs do not allow for Across-the-Board extraction, while ordinary coordination does.

This thesis shows that a semantic approach to CCs sheds considerable light on the behavior of these expressions. The core of the proposed analysis are three different translations of the comitative preposition, which trigger the three readings of CCs. The truth conditions in these translations allow us to make the right predictions about the different behavior of ACCs, CCCs and ICCs with respect to presuppositional effects, ability to occur in distributive and collective contexts and coreference. The semantic representation of ACCs, CCCs and ICCs also correlates with the behavior of these expressions with respect to agreement and person, number and gender resolution. Moreover, the syntactic uniformity of ACCs, CCCs and ICCs assumed in this thesis explains the numerous properties that these expressions share. In particular, I analyze comitative PPs in all types of CCs as syntactic adjuncts to NP1s or VPs. This correctly predicts that, firstly, the category of phrases connected by the preposition is nominal; secondly, CCs are able to fulfill all syntactic functions that are typical for ordinary NPs; thirdly, NP1 receives case from the predicate, while NP2 from the preposition; fourthly, NP1 and NP2 cannot be inverted; fifthly, the comitative PP can be conjoined with another comitative PP via an ordinary conjunction; sixthly, no iteration of NP1s and PPs is possible; seventhly, no Across-the-Board extraction is possible; and finally, PP can be modified by an adverb.

My analysis can also explain why in some languages, such as Polish, Russian or Czech, CCs have several readings, and in other languages, such as English or German, they seem to have only one. The explanation for this lies in the number and the nature of the available translations of the comitative preposition, or, to put it differently, in the degree of its polysemy. Whereas the Polish, Russian or Czech comitative preposition has three different translations (licensing ACCs, CCCs and ICCs), the English preposition *with* and the German *mit* are each assigned only one translation (licensing ACCs). If there are languages where CCs have more than three readings or readings different from those discussed in this thesis, one might presume that in those languages, appropriate semantic representations for the comitative preposition are available. Note also that the corresponding translations may differ cross-linguistically. For example, in contrast to Polish ICCs, Russian ICCs only have the closed reading. To block the open reading, an appropriate restriction on cardinality must be included into the semantic representation of the

inclusive preposition. I presented some suggestions in Section 2.3.3.

In this thesis, the syntactic properties, such as structural constituency and case assignment, are accounted for at the syntactic level, while the semantic properties, such as (semantic) plurality, distributivity and collectivity, accompaniment, and inclusiveness, are captured at the level of the semantic representation. Phenomena such as relatedness of individuals in the denotation of CCs or agreement and resolution, are treated at the semantics-pragmatics and morphosyntax-semantics-pragmatics interface, respectively. I further provide an interface between the lexical and the combinatorial semantics, at which coreference phenomena are accounted for. I believe that these features make my analysis more elegant than some of the previous approaches to CCs, which often try to explain semantic facts (such as plural denotation) by syntactic stipulations or to account for syntactic or semantic licensing by assuming odd lexical entries. In my approach, all lexical components of CCs bear their customary forms and meanings. The polysemy of the comitative preposition, which this analysis draws on, is one of the most typical properties of prepositions in general and has been primarily discussed within the field of cognitive linguistics. In this respect, my semantic analysis seems more natural than analyses which draw on purely syntactic stipulations.

In contrast to the previous approaches to Polish CCs and to most of the previous approaches to CCs in other languages, my analysis can be seen as theoretically and empirically comprehensive in a sense. It is empirically comprehensive in terms of accounting for all three types of CCs in Polish, including the open and closed subtypes of ICCs. It is theoretically comprehensive in that it not only offers explanations at a selected grammatical level, e.g. syntax, but it incorporates the morphosyntax-semantics-pragmatics interface.

From the grammar-theoretical perspective, this thesis illustrates that HPSG with LF-Ty2 provides the necessary means to analyze CCs entirely in a formal linguistic framework, and that their meaning can be derived in a classical, compositional way. Due to the encoding of the semantic, pragmatic and indexical information using the same kind of expressions (Ty2 expressions in my analysis), the dependences between these representation levels can be accounted for in a natural way.

10.2 Empirical, Theoretical and Practical Implications

The main contribution of this thesis is the classification and the detailed description of Polish CCs, which have not attracted a lot of attention in the Polish grammars so far. The description of ICCs might be of particular interest for Polish linguists, since there is no mention of their existence at all in Polish traditional linguistic literature, whereas the existence of expressions corresponding to ACCs and CCCs has occasionally been pointed out. Moreover, I identify two readings of ICCs, which have not been mentioned before for any language: the open and the closed reading. By this, I hope to make a contribution to the grammatical coverage of

contemporary Polish and to Polish lexicography. I also hope that this thesis will have an impact on the cross-linguistic research on CCs and that it contributes to a better understanding of these constructions and related phenomena.

The detailed investigation of Polish CCs at the morphosyntax-semantics-pragmatics interface in this thesis also provides new insights into a number of linguistic areas such as agreement, person, number and gender resolution, plurality, coordination and coreference. So far, these phenomena have been investigated without consideration of CCs. In this study, Polish CCs act as the main empirical basis for my theory of indices (which assumes the distinction between constructed and inherited indices) and of agreement and resolution for Polish (which differentiates between inherent and resolved ϕ -features). These theories also account for other phenomena such as coordination, distributivity and collectivity, mixed agreement, partial and split antecedence.

The formal foundations of my HPSG grammar of CCs, in particular, the definition of the semantic representation language introducing two kinds of entities: individuals and events, and the integration of this language in the semantic representation language of HPSG, makes my analysis compatible with standard model-theoretic semantics using λ -calculus. This makes it possible to extend my analysis of CCs to other expressions such as bare plural NPs or coordination in a very natural way. On the other hand, my analysis can be integrated into the existing analyses of plural expressions which use set theory as the underlying algebra to model individual entities. I also hope that this thesis will make a contribution to the cross-linguistic typology of plurals.

The identification and description of three readings of Polish CCs, which arise from three different meanings of the comitative preposition, might be also relevant for some real-world applications, especially those kinds which require some degree of semantic interpretation and are closely associated with tasks such as parsing and word sense disambiguation. Machine Translation, Natural Language Generation, Natural Language Understanding, Question Answering or Summarization are some such applications.

10.3 Outlook

Other types of NPs In this thesis, I have exclusively focused on CCs involving proper names and pronouns, analyzed as sets of entities, i.e., as expressions of the semantic type $\langle e, t \rangle$. This had consequences for the combinatorial properties of the proposed translations of the comitative preposition, which are designed to apply to $\langle e, t \rangle$ -type expressions. However, I have shown that NP1 and NP2 can be also realized by quantified NPs and bare (plural) common NPs (cf. the examples in Section 4.1.1). Under the traditional treatment of these NPs as sets of sets of entities, i.e., as expressions of the semantic type $\langle \langle e, t \rangle, t \rangle$, my analysis would require a modification concerning combinatorial aspects. I leave open whether this goal can be better achieved by type-shifting operations applying

to the translations of the comitative preposition or by assuming additional lexical entries.

Besides NPs in the strict sense, Polish CCs can also involve other types of expressions, which have not been considered in the present analysis. Some examples with numeral expressions are given in (489), which probably involves dropped personal plural pronouns, and in (490), which is ambiguous between two or even three CC readings. (491) shows an adjectival expression, whereas (492) is a clausal one and involves a free relative.

- (489) a. Obaj z bratem wyjechaliśmy.
both with brother.INSTR went.1ST.PL.M1
'My brother and I both went.'
- b. Obaj z bratem wyjechaliście.
both with brother.INSTR went.2ND.PL.M1
'You and your brother both went.'
- c. Obaj z bratem wyjechali.
both with brother.INSTR went.3RD.PL.M1
'He and his brother both went.'
- (490) a. Was troje z Janem poszło na spacer.
you.PL three.ACC with Jan.INSTR went.3RD.SG.NEUT for walk
T1: 'Jan and the two of you went for a walk.' ICC
T2: 'You three went with Jan for a walk.' ACC
T3: 'You three and Jan went for a walk.' CCC
- b. Siedziało nas trzech z profesorem przy moim biurku.
sat.3RD.SG.NEUT us three.ACC with professor.INSTR at my desk
T1: 'We three and the professor sat at my desk.' CCC
T2: 'The professor and the rest of us three sat at my desk.' ICC
- (491) Najwyższy z nich z najniższym z nich zamknęli całą resztę w pokoju.
the tallest from them with the smallest.INSTR from them closed.PL.M1
whole rest in room
'The tallest of them and the shortest of them locked everyone else in a room.'
- (492) Kto namalował ten obraz razem z tym, kto go sprzedał, nieźle zarobili.
who painted this picture together with that.INSTR who it sold
not bad earned.PL.M1
'The person who painted this picture and the person who sold it earned a fair amount of money.'

The analysis of the CCs in these sentences requires an adequate syntactic and semantic description of Polish numeral and adjectival phrases and relative clauses, which is a nontrivial and very complex issue and was thus beyond the scope of this thesis. However, it would be desirable to include these expressions in the treatment of CCs for empirical-descriptive reasons and in order to verify and refine the semantic representations of the comitative preposition.

Collectivizing adverbs Another interesting issue that arises for further research is the interaction of CCs with collectivizing adverbs. I have mentioned several times in this thesis that comitative PPs can be modified by adverbs such as *together* and used this observation as an argument against treating the modified sequences as nominal expressions. Whereas the syntactic analysis of comitative PPs modified by collectivizing adverbs seems rather unproblematic (this syntactic modification can be licensed by the same principle that licenses any other modifier-head phrases), the question of the semantic licensing appears more complicated. This question is related to the semantic representation of collectivizing adverbs and has been widely debated in linguistic literature, among others in Bennett (1974), Krifka (1989a), Lasersohn (1988, 1995), Moltmann (1992, 1997, 2004), Landman (1996), Verkuyl (1999), Mari (2002) and Jayez and Mari (2005), where spatial, temporal and proximity aspects were discussed. An interesting discussion on this topic can be found Lasersohn (1988), who considers the English preposition *with* to be semantically equivalent to the English adverb *together* and other expressions which he refers to as group-sensitive adverbials. This analysis cannot be applied to Polish alone on the basis of the ambiguity of *z*.

To semantically account for the Polish collectivizing adverbs, I would suggest adopting the idea of Schwarzschild (1996), who observed that *together* behaves like the counterpart of the distributive *each*. He proposes an analysis in terms of event semantics where the use of a distributive expression such as the floated *each* is associated with separate events, while the use of a collectivizing expression such as *together* is associated with a single event. The problematic aspect of his analysis consists in the assumption that *together* is a *plurality seeker* which cannot occur without a plural antecedent, as the ungrammatical example in (493), taken from Schwarzschild (1996, p. 196), is supposed to show. We find exactly the same assumption in Hoeksema (1983), who claims that collectivizing adverbs operate to restrict the denotation of subject arguments to groups.

(493) *John walked together.

However, the plurality requirement can obviously be waived if a comitative PP is available. This is demonstrated in (494).

(494) John walked together with Bill.

This observation suggests that collectivizing adverbs provide different truth conditions concerning plurality depending on whether they modify VPs or comitative PPs: While a collectivizing adverb which modifies a VP requires a plural

entity in its denotation, a collectivizing adverb that modifies a comitative PP does not. The common semantic contribution of collectivizing adverbs which modify VPs and those which modify comitative PPs would consist in restricting the cardinality of the event variable introduced by the modified VP or comitative PP (which is a variable over a set of events in my analysis) to 1. The technical details of this suggestion remain to be worked out, and this is realizable within the framework I used to describe CCs. At all events, I believe that an adequate semantic treatment of collectivizing adverbs should necessarily incorporate CCs.

Relatedness In this thesis, I assumed, following Miller (1971), Comacho (1994, 2000), Kopcińska (1995), McNally (1993) and Urtz (1994), that individuals in the denotation of CCs are somehow related to each other, and that this property distinguishes CCs, in particular CCCs, from ordinary coordination. This assumption was made on a purely intuitive basis and does not follow from any deeper study. However, a closer investigation of this issue would be highly interesting and relevant from the empirical, theoretical and practical point of view, for example for learners of Polish.

Trying to prove the theory of relatedness, I have conducted a small study using data from the National Corpus of Polish (the URL: <http://nkjp.pl>). I compared the distribution of relational nouns such as kinship terms or certain profession terms within CCs and within ordinary coordination. My key assumption was that if the theory of relatedness is right, then the frequency of the relational nouns I took into consideration is significantly higher in CCs than in ordinary coordination (relative to the total frequency of CCs and coordinations involving these nouns). The initial results seemed to refute the theory of relatedness, because they revealed similar distribution patterns for the investigated relational nouns in CCs and in coordinations. To further check the results, I looked at the distribution of non-relational nouns such as *poet* or *lecturer* in CCs and coordinations. This revealed that the proportion between the frequencies of non-relational nouns in CCs and in coordinations significantly differed from that observed for relational nouns. More precisely, the frequency of non-relational nouns in CCs was extremely low in comparison to coordination. These results suggest that relatedness indeed plays a role in the grammar of CCs, and, therefore, it seems to be worthy of further empirical exploration.

Technical Issues Regarding technical aspects, there are two details that should still be worked out. Firstly, the formal properties of the linkage between the semantic and pragmatic representations in HPSG descriptions must be defined. In particular, I proposed that in the course of semantic and pragmatic derivation, all variables which appear within the pragmatic representation are replaced parallel to the replacement of the corresponding variables in the logical form. To license this replacement, an additional principle is needed which operates on Ty2 terms in signs descriptions.

Secondly, my theory of agreement and resolution for Polish must be implemented in HPSG. Finally, to verify the HPSG-based analysis of CCs I developed in this thesis, it would be useful to implement it using one of the available systems for development and visualization of HPSG-style grammars, and then revise it as necessary. The implementation of the syntactic part of my analysis would be relatively uncomplicated using any available system. However, the implementation of the semantic part may appear more challenging, because it requires a platform that can deal with λ -calculus and sets as data structures.

Cross-linguistic aspects This thesis brought evidence that there are three basic types of CCs in Polish. These results correspond to the observations made in the literature for many other languages. From the cross-linguistic perspective, it would be highly interesting to compare the types and the behavior of Polish CCs regarding the aspects discussed in this thesis with the corresponding expressions attested in other languages. This has been done to a certain extent in Dylą and Feldman (2008) for Polish and Russian and in Schwartz (1985) for Polish, Russian, Hungarian and other languages.

A detailed cross-linguistic study of CCs with respect to all perceivable meaning nuances would allow us to find out whether there are any correlations between the number and the types of the available CC readings in a language and other linguistic phenomena such as pro-drop or agreement. Also, it would be an important step along the way to understanding linguistic strategies for expressing comitativity, be it accompaniment, inclusiveness, conjunction or any other type of association.

All of these issues are left for future work.

Appendix A

Overview of Empirical Observations

This appendix provides a detailed overview of all empirical observations made in Part I and Part II, presented in table form. The symbol – indicates that a given property does not apply, the symbol + indicates that a given property does apply, and the symbol ? indicates that it cannot be clearly determined whether a given property applies or not.

Basic Properties	ACC	CCC	cICC	oICC
assignment of the instrumental case to NP2	+	+	+	+
comitative content	+	+	+	+
conventional implicature of togetherness	+	+	+	+
modifiability of z NP2 by collectivizing adverbs	+	+	+	+
prepositional status of z	+	+	+	+

Table A.1: Basic properties of CCs (cf. Chapter 2)

Presuppositional Effects	ACC	CCC	cICC	oICC
ability of NP1 z NP2 to trigger inclusive presupposition	–	–	+	+

Table A.2: Presuppositional effects (cf. Section 3.1)

Focalization	ACC	CCC	cICC	oICC
ability of NP1 to be assigned contrastive focus	+	–	–	–
ability of z NP2 to be assigned contrastive focus	+	–	–	–
ability of NP1 z NP2 to be assigned contrastive focus	–	+	+	+

Table A.3: Contrastive focus (cf. Section 3.2)

Agreement and Resolution	ACC	CCC	cICC	oICC
participation of NP2s in number resolution	–	+	–	–
participation of NP2s in gender resolution	–	+	–	–
participation of NP2s in person resolution	–	+	–	–
hybrid agreement	–	+	–	–

Table A.4: Agreement and resolution (cf. Chapter 6)

Collectivity and Distributivity	ACC	CCC	cICC	oICC
appearance with collective predicates	–	+	+	+
appearance with collectivizing adverbs	–	+	+	+
appearance with distributive predicates	–	+	+	+
appearance with reciprocals	–	+	+	+
appearance with verbs prefixed by <i>roz-</i>	–	+	+	+
appearance with the distributive <i>po</i>	–	+	+	+
appearance with distributive adjectives	–	+	+	+
appearance with distributive adverbs	–	+	+	+

Table A.5: Collectivity and distributivity (cf. Section 3.3)

Coreference	ACC	CCC	cICC	oICC
control of personal pronouns by NP1	–	+	–	–
control of personal pronouns by NP2	+	+	+	+
control of personal pronouns by NP1 z NP2	–	–	–	–
control of relative pronouns by NP1 z NP2	–	+	+	+
control of reflexive pronouns by NP1 z NP2	–	+	+	+
control of possessive pronouns by NP1 z NP2	+	+	+	+
control of possessive reflexive pronouns by NP1 z NP2	–	+	+	+
control of PRO subjects by NP1 z NP2	–	+	+	+
control of reflexive pronouns by NP1	+	–	–	–
control of possessive pronouns by NP1	+	+	+	+
control of possessive reflexive pronouns by NP1	+	–	+	+
control of PRO subjects by NP1	+	–	+	+
control of reflexive pronouns by NP2	–	–	–	–
control of possessive pronouns by NP2	+	+	+	+
control of possessive reflexive pronouns by NP2	–	–	–	–
control of PRO subjects by NP2	–	–	–	–
control of possessive pronouns modifying NP2 by NP1	+	– ^a	–	–
control of possessive reflexive pronouns modifying NP2 by NP1	+	–	+	+
control of possessive pronouns modifying NP2 by the speaker included in NP1	+	+	+	+
control of possessive pronouns modifying NP2 by the hearer included in NP1	+	+	+	+
control of possessive pronouns modifying NP2 by the third person pronoun referent included in NP1	+	+	+	+

Table A.6: Coreferential properties (cf. Section 3.4)

^aIt applies mainly to third person possessive pronouns.

Quantified NPs and Bare Plurals	ACC	CCC	cICC	oICC
occurrence of NP1s in the scope of generalized quantifiers	+	+	+	+
occurrence of NP2s in the scope of generalized quantifiers	+	+	+ ^a	+ ^b
realization of NP1s as bare plurals	+	+ ^c	+	+
realization of NP2s as bare plurals	+	+ ^d	+	+

Table A.7: Quantified NPs and bare plurals (cf. Section 4.1.1)

^aIt is only possible if NP1s are non-pronominal.

^bIt is only possible if NP1s are non-pronominal.

^cIt is only possible with distributive predicates.

^dIt is only possible with distributive predicates.

Pronouns and Pro-Drop	ACC	CCC	cICC	oICC
realization of NP1s as pronouns and NP2s as non-pronouns	+	+	+	+
realization of NP1s as non-pronouns and NP2s as pronouns	+	- ^a	+	+
realization of NP1s and NP2s as pronouns	+	+	-	-
pro-drop	+	+	+	+

Table A.8: Pronouns and pro-drop (cf. Section 4.1.2)

^aIt is possible with first and second person pronouns.

Semantic Symmetry	ACC	CCC	cICC	oICC
requirement of definiteness symmetry	-	+	- ^a	- ^b
requirement of restrictiveness symmetry	-	+	-	-
requirement of inanimacy symmetry	-	- ^c	-	-

Table A.9: Semantic symmetry (cf. Section 4.2)

^aIt does not apply if NP2s are pronominal.

^bIt does not apply if NP2s are pronominal.

^cIt does not apply if NP1s are non-pronominal.

Syntactic Functions	ACC	CCC	cICC	oICC
ability to occur as nominative subjects	+	+	+	+
ability to occur as dative subjects	+	+	+	+
ability to occur as direct objects	+	+	+	+
ability to occur as indirect objects	+	+	+	+
ability to occur as prepositional objects	+	+	+	+
ability to occur as possessors	+	+	+ ^a	+ ^b

Table A.10: Syntactic functions (cf. Section 5.1)

^aIt is only possible if NP1s are not personal pronouns.

^bIt is only possible if NP1s are not personal pronouns.

Iteration, Recursion, Conjunction	ACC	CCC	cICC	oICC
iteration of NP1s	–	–	–	–
iteration of <i>z</i> NP2s	–	–	–	–
recursion	+	+	+	+
conjunction of <i>z</i> NP2s	+	+	+	+

Table A.11: Iteration, recursion and conjunction (cf. Section 5.2)

Adjacency and Locality	ACC	CCC	cICC	oICC
extraction of NP1s	?	–	?	?
extraction of <i>z</i> NP2s	?	–	?	?
appearance of clitics between NP1s and <i>z</i> NP2s	?	–	?	?
appearance of parentheticals between NP1s and <i>z</i> NP2s	?	–	?	?
VP-attachment of <i>z</i> NP2s	+	–	+	+

Table A.12: Adjacency and locality (cf. Chapter 5.3)

Appendix B

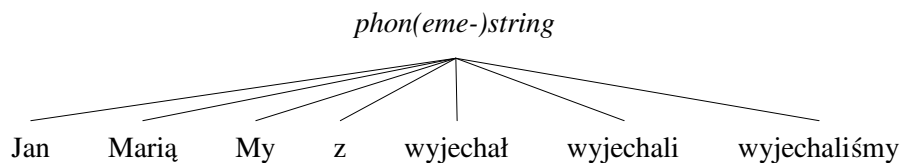
Overview of the HPSG Grammar of Polish CCs

This appendix summarizes the HPSG analysis of Polish CCs proposed in this thesis. It specifies of all sorts, attributes and relation names used in this analysis and provides an overview of all lexical entries as well as implicational and relational constraints, and id-schemata. The majority of the sorts and attributes in the signature below are adopted from the signature of Pollard and Sag (1994). All extensions or modifications are appropriately marked.

B.1 The Signature

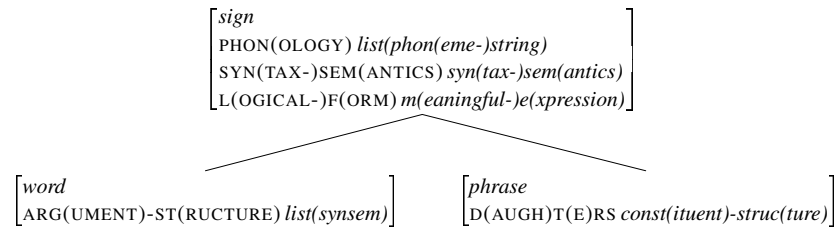
The subtypes of the sort *object*:

(495) *phoneme-string*:

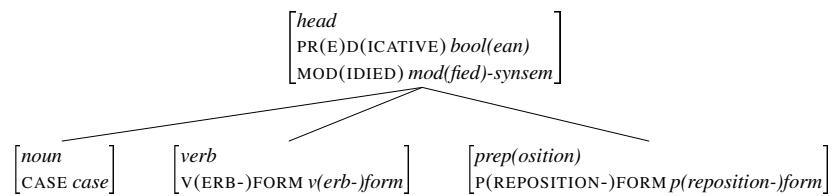


(496) *sign*:

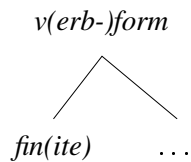
The attribute L(OGICAL-)F(ORM) has been adopted from Sailer (2004a) (cf. Section 7.3.3.2).



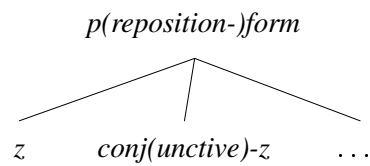
(497) *head*:



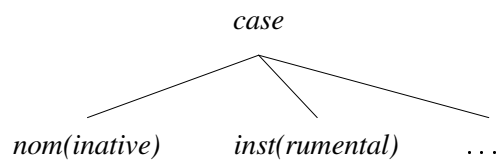
(498) *verb-form*:

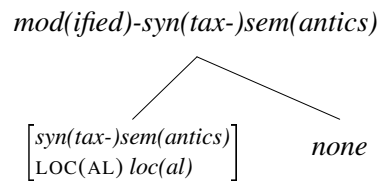
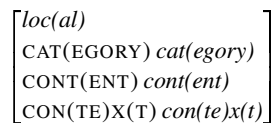
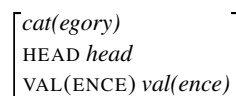
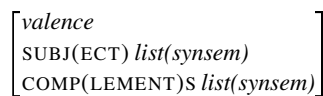


(499) *preposition-form*:

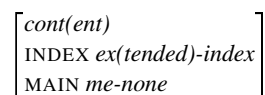


(500) *case*:

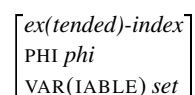


(501) *modified-syntax-semantics:*(502) *local:*(503) *category:*(504) *valence:*(505) *content:*

The signature specifications for *content* are adopted from Sailer (2004a) (cf. Section 9.4.4).

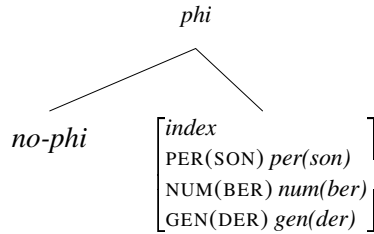
(506) *extended-index:*

The signature specifications for *extended-index* are based on Sailer (2004a). However, I define the value of the attribute VARIABLE to be a set of meaningful expressions instead of a meaningful expression (cf. Section 9.4.4).

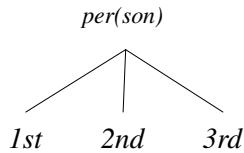


(507) *phi*:

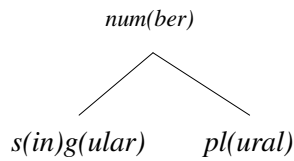
The signature specifications for *phi* are based on Sailer (2004a) and Soehn (2006) (cf. Section 9.4.4).



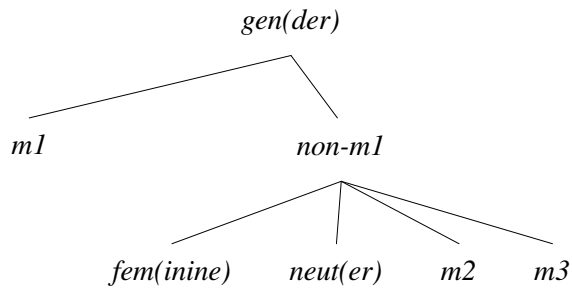
(508) *person*:



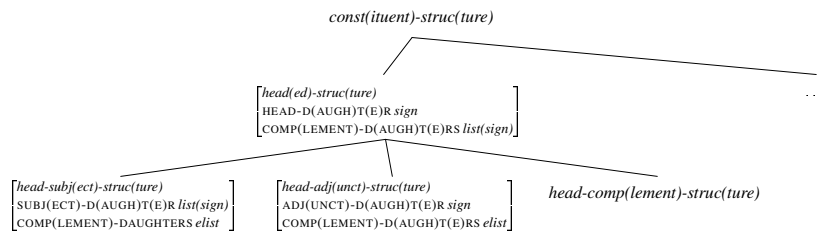
(509) *number*:



(510) *gender*:



(511) *constituent-structure*:



(512) *context*:

The signature specifications for *context* are based on Pollard and Sag (1994) but I define the value of the attribute CONTEX to be a meaningful expression or none rather than a set of propositions (cf. the discussion in Section 9.3.2).

$$\left[\begin{array}{l} \text{con}(te)x(t) \\ \text{BACKGROUND } me\text{-}none \end{array} \right]$$

(513) *meaningful-expression-none*:

The sort *meaningful-expression-none* is a new sort introduced and discussed in Section 9.3.2.

$$\begin{array}{c} me(aningful\text{-}expression)\text{-}none \\ \swarrow \quad \searrow \\ me(aningful\text{-}expression) \quad none \end{array}$$

(514) *boolean*:

$$\begin{array}{c} bool(ean) \\ \swarrow \quad \searrow \\ plus / + \quad minus / - \end{array}$$

(515) *ty2*:

The signature specifications for *ty2* draw on the signature for the RSRL grammar of Ty2 defined in Sailer (2003) with some modifications of the sort and attribute names in Penn and Richter (2004) and Richter (2004b). The extensions to these definitions include: *set-of-me*, *set-relation*, including the subsorts *set-union*, *set-intersection* and *superset-relation*, *exactly-one*, *more-than-one* and *event*. For more details see Section 7.3.3.1.

ty2

me TYPE *type*

variable NUM-INDEX *integer*

constant

accompany'

leave'

j'

m'

male'

female'

related'

application FUNCTOR *me* ARG *me*

abstraction VAR *me* ARG *me*

equation ARG1 *me* ARG2 *me*

set-of-me ARG *set(me)*

set-relation ARG1 *set-of-me* ARG2 *set-of-me*

set-union

set-intersection

superset-relation ARG1 *set-of-me* ARG2 *set-of-me*

negation ARG *me*

l-const ARG1 *me* ARG2 *me*

disjunction

conjunction

implication

bi-implication

quantifier VAR *variable* SCOPE *me*

universal

existential

exactly-one

more-than-one

type

atomic-type

entity

event

truth

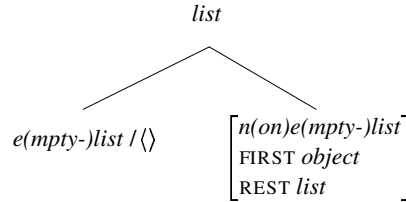
complex-type IN *type* OUT *type*

integer

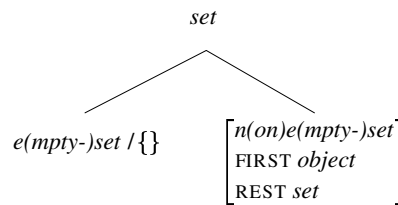
zero

non-zero PRE *integer*

(516) *list*:



(517) *set*:

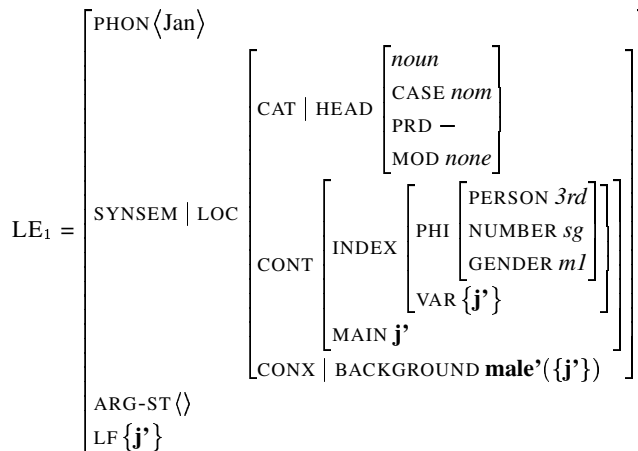


(518) The relation symbols and the arity of the relations (these specifications are not a part of the signature of Pollard and Sag (1994)):

- member/2
- append/3
- conjoin/3
- equalize/3
- ty2-component/2
- copy/2
- subterm/2

B.2 The Lexical Entries

(519) The lexical entry of the noun *Jan*



(520) The lexical entry of the noun *Maria*

$$LE_2 = \left[\begin{array}{l} \text{PHON } \langle \text{Maria} \rangle \\ \text{SYNSEM} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \textit{noun} \\ \text{CASE } \textit{inst} \\ \text{PRD } - \\ \text{MOD } \textit{none} \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI} \left[\begin{array}{l} \text{PERSON } \textit{3rd} \\ \text{NUMBER } \textit{sg} \\ \text{GENDER } \textit{fem} \end{array} \right] \\ \text{VAR } \{ \mathbf{m}' \} \end{array} \right] \\ \text{MAIN } \mathbf{m}' \end{array} \right] \\ \text{CONX} \mid \text{BACKGROUND } \mathbf{female}'(\{ \mathbf{m}' \}) \end{array} \right] \\ \text{ARG-ST } \langle \rangle \\ \text{LF } \{ \mathbf{m}' \} \end{array} \right]$$

(521) The lexical entry of the pronoun *my* ‘we’

$$LE_3 = \left[\begin{array}{l} \text{PHON } \langle \text{My} \rangle \\ \text{SYNSEM} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \textit{noun} \\ \text{CASE } \textit{nom} \\ \text{PRD } - \\ \text{MOD } \textit{none} \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI} \left[\begin{array}{l} \text{PERSON } \textit{1st} \\ \text{NUMBER } \textit{pl} \\ \text{GENDER } \textit{gen} \end{array} \right] \\ \text{VAR } \mathbb{1} \end{array} \right] \\ \text{MAIN } \textit{none} \end{array} \right] \\ \text{CONX} \mid \text{BACKGROUND } \textit{none} \end{array} \right] \\ \text{ARG-ST } \langle \rangle \\ \text{LF } X \{ i, \dots \} \\ \forall x (x \in \mathbb{1} \rightarrow x \in X) \wedge \forall x' (x' \in X \rightarrow x' \in \mathbb{1}) \end{array} \right] \wedge$$

(522) The lexical entry of the verb *wyjechali* ‘left’

$$LE_5 = \left[\begin{array}{l} \text{PHON } \langle \text{wyjechał} \rangle \\ \text{SYNSEM} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \textit{verb} \\ \text{VFORM } \textit{fin} \\ \text{PRD } + \\ \text{MOD } \textit{none} \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI} \left[\begin{array}{l} \text{PERSON } \textit{3rd} \\ \text{NUMBER } \textit{pl} \\ \text{GENDER } \textit{ml} \end{array} \right] \\ \text{VAR } \mathbb{1} \end{array} \right] \\ \text{MAIN } \mathbf{leave}' \\ \text{CONX} \mid \text{BACKGROUND } \textit{none} \end{array} \right] \\ \text{ARG-ST } \left\langle \left[\begin{array}{l} \text{LOC} \mid \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \textit{noun} \\ \text{CASE } \textit{nom} \end{array} \right] \right] \right\rangle \\ \text{LF } \lambda X. \exists E \mathbf{leave}'(E, X) \\ \forall e (e \in \mathbb{1} \rightarrow e \in E) \wedge \forall e' (e' \in E \rightarrow e' \in \mathbb{1}) \end{array} \right]$$

(523) The lexical entries of the verb *wyjechał* ‘left’

$$\text{LE}_{4a} = \left[\begin{array}{l} \text{PHON} \langle \text{wyjechał} \rangle \\ \text{SYNSEM} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \textit{verb} \\ \text{VFORM } \textit{fin} \\ \text{PRD } + \\ \text{MOD } \textit{none} \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI} \left[\begin{array}{l} \text{PERSON } \textit{3rd} \\ \text{NUMBER } \textit{sg} \\ \text{GENDER } \textit{m1} \vee \textit{m2} \vee \textit{m3} \end{array} \right] \\ \text{VAR } \boxed{1} \end{array} \right] \\ \text{MAIN } \textit{leave}' \\ \text{CONX} \mid \text{BACKGROUND } \textit{none} \end{array} \right] \\ \text{ARG-ST} \left\langle \left[\text{LOC} \mid \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \textit{noun} \\ \text{CASE } \textit{nom} \end{array} \right] \right] \right\rangle \\ \text{LF } \lambda X. \exists E \textit{leave}'(E, X) \end{array} \right] \wedge$$

$$\forall e (e \in \boxed{1} \rightarrow e \in E) \wedge \forall e' (e' \in E \rightarrow e' \in \boxed{1})$$

$$\text{LE}_{4b} = \left[\begin{array}{l} \textit{word} \\ \text{PHON} \langle \text{wyjechał} \rangle \\ \text{SS} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \textit{verb} \\ \text{VFORM } \textit{fin} \\ \text{PRD } + \\ \text{MOD } \textit{none} \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI} \left[\begin{array}{l} \text{PERSON } \textit{3rd} \\ \text{NUMBER } \textit{sg} \\ \text{GENDER } \textit{m1} \vee \textit{m2} \vee \textit{m3} \end{array} \right] \\ \text{VAR } \boxed{1} \end{array} \right] \\ \text{MAIN } \textit{leave}' \\ \text{CONX} \mid \text{BACKGROUND } \textit{none} \end{array} \right] \\ \text{ARG-ST} \left\langle \left[\text{LOC} \mid \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \textit{noun} \\ \text{CASE } \textit{nom} \end{array} \right] \right] \right\rangle \\ \text{LF } \boxed{3} (\lambda X \lambda E. \textit{leave}'(E, X)) \end{array} \right] \wedge$$

$$\exists \boxed{4} \vee \boxed{5} \left(\left(\boxed{4} \left[\begin{array}{l} \textit{application} \\ \text{ARG } \boxed{3} \end{array} \right] \wedge \boxed{5} \left[\begin{array}{l} \textit{application} \\ \text{FUNC } \boxed{2} \end{array} \right] \wedge \text{subterm}(\boxed{5}, \boxed{4}) \right) \rightarrow \right. \\ \left. \left(\forall \boxed{6} \forall e \left((\boxed{5}[\text{ARG } \boxed{6}] \wedge e \in \boxed{6}) \rightarrow e \in \boxed{1} \right) \wedge \right. \\ \left. \left(\neg \exists \boxed{7} \neg \exists e' (\boxed{5}[\text{ARG } \boxed{7}] \wedge e' \in \boxed{1} \wedge e' \notin \boxed{7}) \right) \right)$$

(524) The lexical entries of the verb *wyjechaliśmy* ‘left’

$$LE_{6a} = \left[\begin{array}{l} \text{PHON} \langle \text{wyjechaliśmy} \rangle \\ \text{SYNSEM} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \text{verb} \\ \text{VFORM } \textit{fin} \\ \text{PRD } + \\ \text{MOD } \textit{none} \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI} \left[\begin{array}{l} \text{PERSON } \textit{1st} \\ \text{NUMBER } \textit{pl} \\ \text{GENDER } \textit{ml} \end{array} \right] \\ \text{VAR } \boxed{1} \end{array} \right] \\ \text{MAIN } \textit{leave}' \\ \text{CONX} \mid \text{BACKGROUND } \textit{none} \end{array} \right] \end{array} \right] \end{array} \right] \wedge \\ \text{ARG-ST} \left\langle \left[\text{LOC} \mid \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \text{noun} \\ \text{CASE } \textit{nom} \end{array} \right] \right] \right\rangle \\ \text{LF } \lambda X. \exists E \textit{leave}'(E, X) \end{array} \right.$$

$$\forall e (e \in \boxed{1} \rightarrow e \in E) \wedge \forall e' (e' \in E \rightarrow e' \in \boxed{1})$$

$$LE_{6b} = \left[\begin{array}{l} \text{word} \\ \text{PHON} \langle \text{wyjechaliśmy} \rangle \\ \text{SS} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \text{verb} \\ \text{VFORM } \textit{fin} \\ \text{PRD } + \\ \text{MOD } \textit{none} \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI} \left[\begin{array}{l} \text{PERSON } \textit{1st} \\ \text{NUMBER } \textit{pl} \\ \text{GENDER } \textit{ml} \end{array} \right] \\ \text{VAR } \boxed{1} \end{array} \right] \\ \text{MAIN } \textit{leave}' \\ \text{CONX} \mid \text{BACKGROUND } \textit{none} \end{array} \right] \end{array} \right] \end{array} \right] \wedge \\ \text{ARG-ST} \left\langle \left[\text{LOC} \mid \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \text{noun} \\ \text{CASE } \textit{nom} \end{array} \right] \right] \right\rangle \\ \text{LF } \boxed{3} (\lambda X \lambda E. \textit{leave}'(E, X)) \end{array} \right.$$

$$\exists \boxed{4} \forall \boxed{5}$$

$$\left(\left(\left[\boxed{4} \right]_{\text{ARG } \boxed{3}} [\textit{application}] \wedge \left[\boxed{5} \right]_{\text{FUNC } \boxed{2}} [\textit{application}] \wedge \text{subterm}(\boxed{5}, \boxed{4}) \rightarrow \right. \right. \\ \left. \left(\forall \boxed{6} \forall e \left(\left(\left[\boxed{5} \right]_{\text{ARG } \boxed{6}} \wedge e \in \boxed{6} \right) \rightarrow e \in \boxed{1} \right) \wedge \right. \right. \\ \left. \left. \left(\neg \exists \boxed{7} \neg \exists e' \left(\left[\boxed{5} \right]_{\text{ARG } \boxed{7}} \wedge e' \in \boxed{1} \wedge e' \notin \boxed{7} \right) \right) \right) \right)$$

(525) The lexical entries of the accompanitive preposition *z*

$$\text{LE}_{7a} = \left[\begin{array}{l} \text{PHON} \langle z \rangle \\ \text{SYNSEM} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \textit{prep} \\ \text{PFORM } z \\ \text{PRD } - \end{array} \right] \\ \text{MOD} \left[\text{LOC} \mid \text{CAT} \left[\begin{array}{l} \text{HEAD } \textit{noun} \\ \text{VAL} \left[\begin{array}{l} \text{SUBJ} \langle \rangle \\ \text{COMPS} \langle \rangle \end{array} \right] \end{array} \right] \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI } \textit{no-phi} \\ \text{VAR } \{ \} \end{array} \right] \\ \text{MAIN } \mathbf{accompany}' \end{array} \right] \\ \text{CONX} \mid \text{BACKGROUND } \mathbf{related}'(X, Y) \end{array} \right] \\ \text{ARG-ST} \left\langle \left[\begin{array}{l} \text{LOC} \mid \text{CAT} \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} \textit{noun} \\ \text{CASE } \textit{instr} \end{array} \right] \\ \text{VAL} \left[\begin{array}{l} \text{SUBJ} \langle \rangle \\ \text{COMPS} \langle \rangle \end{array} \right] \end{array} \right] \end{array} \right] \right\rangle \\ \text{LF } \lambda Y \lambda X \lambda P_2. \exists E (P_2(E, X) \wedge \\ (X \cap Y = \emptyset) \wedge \forall E' ((E \supset E' \wedge E' \neq \emptyset) \rightarrow \\ (P_2(E', X) \wedge \exists E'' \mathbf{accompany}'(E'', Y, X)))) \end{array} \right.$$

$$\text{LE}_{7b} = \left[\begin{array}{l} \text{PHON} \langle z \rangle \\ \text{SYNSEM} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \textit{prep} \\ \text{PFORM } z \\ \text{PRD } - \end{array} \right] \\ \text{MOD} \left[\text{LOC} \mid \text{CAT} \left[\begin{array}{l} \text{HEAD } \textit{verb} \\ \text{VAL} \left[\begin{array}{l} \text{SUBJ} \langle \textit{synsem} \rangle \\ \text{COMPS} \langle \rangle \end{array} \right] \end{array} \right] \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI } \textit{no-phi} \\ \text{VAR } \{ \} \end{array} \right] \\ \text{MAIN } \mathbf{accompany}' \end{array} \right] \\ \text{CONX} \mid \text{BACKGROUND } \mathbf{related}'(X, Y) \end{array} \right] \\ \text{ARG-ST} \left\langle \left[\begin{array}{l} \text{LOC} \mid \text{CAT} \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} \textit{noun} \\ \text{CASE } \textit{instr} \end{array} \right] \\ \text{VAL} \left[\begin{array}{l} \text{SUBJ} \langle \rangle \\ \text{COMPS} \langle \rangle \end{array} \right] \end{array} \right] \end{array} \right] \right\rangle \\ \text{LF } \lambda Y \lambda P_2 \lambda X. \exists E (P_2(E, X) \wedge \\ (X \cap Y = \emptyset) \wedge \forall E' ((E \supset E' \wedge E' \neq \emptyset) \rightarrow \\ (P_2(E', X) \wedge \exists E'' \mathbf{accompany}'(E'', Y, X)))) \end{array} \right.$$

(526) The lexical entries of the inclusive preposition *z*

$$\text{LE}_{9a} = \left[\begin{array}{l} \text{PHON} \langle z \rangle \\ \text{SYNSEM} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \text{prep} \\ \text{PFORM } z \\ \text{PRD } - \\ \text{MOD} \left[\begin{array}{l} \text{LOC} \mid \text{CAT} \left[\begin{array}{l} \text{HEAD } \textit{noun} \\ \text{VAL} \left[\begin{array}{l} \text{SUBJ} \langle \rangle \\ \text{COMPS} \langle \rangle \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI } \textit{no-phi} \\ \text{VAR } \{ \} \end{array} \right] \\ \text{MAIN } \textit{none} \end{array} \right] \\ \text{CONX} \mid \text{BACKGROUND } \textit{related}'(X, Y) \end{array} \right] \\ \text{ARG-ST} \left\langle \left[\begin{array}{l} \text{LOC} \mid \text{CAT} \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} \textit{noun} \\ \text{CASE } \textit{instr} \end{array} \right] \\ \text{VAL} \left[\begin{array}{l} \text{SUBJ} \langle \rangle \\ \text{COMPS} \langle \rangle \end{array} \right] \end{array} \right] \end{array} \right] \right\rangle \\ \text{LF } \lambda Y \lambda X \lambda P_1. \exists Z (P_1(Z) \wedge Z = X \wedge Z \supset Y) \end{array} \right]$$

$$\text{LE}_{9b} = \left[\begin{array}{l} \text{PHON} \langle z \rangle \\ \text{SYNSEM} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \text{prep} \\ \text{PFORM } z \\ \text{PRD } - \\ \text{MOD} \left[\begin{array}{l} \text{LOC} \mid \text{CAT} \left[\begin{array}{l} \text{HEAD } \textit{verb} \\ \text{VAL} \left[\begin{array}{l} \text{SUBJ} \langle \textit{synsem} \rangle \\ \text{COMPS} \langle \rangle \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI } \textit{no-phi} \\ \text{VAR } \{ \} \end{array} \right] \\ \text{MAIN } \textit{none} \end{array} \right] \\ \text{CONX} \mid \text{BACKGROUND } \textit{related}'(X, Y) \end{array} \right] \\ \text{ARG-ST} \left\langle \left[\begin{array}{l} \text{LOC} \mid \text{CAT} \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} \textit{noun} \\ \text{CASE } \textit{instr} \end{array} \right] \\ \text{VAL} \left[\begin{array}{l} \text{SUBJ} \langle \rangle \\ \text{COMPS} \langle \rangle \end{array} \right] \end{array} \right] \end{array} \right] \right\rangle \\ \text{LF } \lambda Y \lambda P_1 \lambda X. \exists Z (P_1(Z) \wedge Z = X \wedge Z \supset Y) \end{array} \right]$$

(527) The lexical entry of the conjunctive preposition *z*

$$LE_8 = \left[\begin{array}{l} \text{PHON} \langle z \rangle \\ \text{SYNSEM} \mid \text{LOC} \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \text{prep} \\ \text{PFORM } conj\text{-}z \\ \text{PRD } - \\ \text{MOD} \left[\text{LOC} \mid \text{CAT} \left[\begin{array}{l} \text{HEAD } noun \\ \text{VAL} \left[\text{SUBJ} \langle \rangle \right] \right] \right] \right] \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{INDEX} \left[\begin{array}{l} \text{PHI } no\text{-}phi \\ \text{VAR } \{ \} \end{array} \right] \\ \text{MAIN } none \end{array} \right] \\ \text{CONX} \mid \text{BACKGROUND } related'(X, Y) \end{array} \right] \\ \text{ARG-ST} \left\langle \left[\begin{array}{l} \text{LOC} \mid \text{CAT} \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} noun \\ \text{CASE } instr \end{array} \right] \\ \text{VAL} \left[\text{SUBJ} \langle \rangle \right] \right] \right] \right] \right\rangle \\ \text{LF } \lambda Y \lambda X \lambda P_1 . P_1 (X \cup Y) \end{array} \right]$$

B.3 The Principles

(528) THE WORD PRINCIPLE
(based on Pollard and Sag (1994))

$$word \rightarrow (LE_1 \vee LE_2 \vee LE_3 \vee LE_{4a} \vee LE_{4b} \vee LE_5 \vee LE_{6a} \vee LE_{6b} \vee LE_{7a} \vee LE_{7b} \vee LE_8 \vee LE_{9a} \vee LE_{9b})$$

(529) THE HEAD FEATURE PRINCIPLE
(based on Pollard and Sag (1994))

$$\left[\begin{array}{l} \text{phrase} \\ \text{DTRS } headed\text{-}struc \end{array} \right] \rightarrow \left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD } \boxed{1} \\ \text{DTRS} \mid \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD } \boxed{1} \end{array} \right]$$

(530) THE SEMANTICS PRINCIPLE

$$phrase \rightarrow \left(\left(\left[\begin{array}{l} \text{LF} \left[\begin{array}{l} \text{application} \\ \text{FUNC } \boxed{1} \\ \text{ARG } \boxed{2} \end{array} \right] \vee \left[\begin{array}{l} \text{application} \\ \text{FUNC } \boxed{2} \\ \text{ARG } \boxed{1} \end{array} \right] \right] \vee \left[\begin{array}{l} \text{LF} \left[\begin{array}{l} \text{application} \\ \text{FUNC } \boxed{1} \\ \text{ARG } \boxed{2} \end{array} \right] \vee \left[\begin{array}{l} \text{application} \\ \text{FUNC } \boxed{2} \\ \text{ARG } \boxed{1} \end{array} \right] \right] \right] \vee \left[\begin{array}{l} \text{LF} \left[\begin{array}{l} \text{application} \\ \text{FUNC } \boxed{2} \\ \text{ARG } \boxed{1} \end{array} \right] \right] \right) \vee \left(\left[\begin{array}{l} \text{DTRS} \left[\begin{array}{l} \text{head-subj-}struc \\ \text{HEAD-DTR} \mid \text{LF } \boxed{1} \\ \text{SUBJ-DTR} \langle \text{LF } \boxed{2} \rangle \end{array} \right] \right] \vee \left[\begin{array}{l} \text{DTRS} \left[\begin{array}{l} \text{head-comp-}struc \\ \text{HEAD-DTR} \mid \text{LF } \boxed{1} \\ \text{COMP-DTRS} \langle \text{LF } \boxed{2} \rangle \end{array} \right] \right] \right) \vee \left(\left[\begin{array}{l} \text{DTRS} \left[\begin{array}{l} \text{head-adj-}struc \\ \text{HEAD-DTR} \mid \text{LF } \boxed{1} \\ \text{ADJ-DTR} \mid \text{LF } \boxed{2} \end{array} \right] \right] \right) \right)$$

(531) THE ARGUMENT REALIZATION PRINCIPLE

$$\begin{array}{l}
 \text{a. } \left[\begin{array}{l} \textit{word} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD} \mid \text{PRED} \mid - \end{array} \right] \longrightarrow \left[\begin{array}{l} \text{ARGUMENT-STRUCTURE } \boxed{1} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \left[\begin{array}{l} \text{SUBJECT } \langle \rangle \\ \text{COMPLEMENTS } \boxed{1} \end{array} \right] \end{array} \right] \\
 \\
 \text{b. } \left[\begin{array}{l} \textit{word} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD} \mid \text{PRED} \mid + \end{array} \right] \longrightarrow \left[\begin{array}{l} \text{ARGUMENT-STRUCTURE } \langle \boxed{1} \mid \boxed{2} \rangle \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \left[\begin{array}{l} \text{SUBJECT } \langle \boxed{1} \rangle \\ \text{COMPLEMENTS } \boxed{2} \end{array} \right] \end{array} \right]
 \end{array}$$

(532) THE VALENCE PRINCIPLE
(based on Pollard and Sag (1994))

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS } \textit{headed-struct} \end{array} \right] \longrightarrow \left(\begin{array}{l} \left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \mid \text{SUBJECT } \boxed{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \mid \text{SUBJECT } \boxed{1} \oplus \langle \boxed{2} \rangle \\ \text{SUBJ-DTR} \langle \text{[SYNSEM } \boxed{2}] \rangle \end{array} \right] \Big]_{\vee} \\ \\ \left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \mid \text{COMPLEMENTS } \boxed{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL} \mid \text{COMPLEMENTS } \boxed{1} \oplus \langle \boxed{2} \rangle \\ \text{COMP-DTRS} \langle \text{[SYNSEM } \boxed{2}] \rangle \end{array} \right] \Big]_{\vee} \\ \\ \left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL } \boxed{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{VAL } \boxed{1} \\ \text{ADJ-DTR } \textit{sign} \end{array} \right] \end{array} \right] \end{array} \right)$$

(533) THE PRINCIPLE OF CONTEXTUAL CONSISTENCY

$$\textit{phrase} \longrightarrow \left(\begin{array}{l} \left(\left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CONTEXT} \mid \text{BACKGROUND } \boxed{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \boxed{2} \\ \text{SUBJ-DTR} \langle \text{[SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \boxed{3}] \rangle \end{array} \right] \Big] \wedge \\ \left(\text{conjoin}(\boxed{1}, \boxed{2}, \boxed{3})_{\vee} \right) \\ \left(\text{equalize}(\boxed{1}, \boxed{2}, \boxed{3}) \right) \end{array} \right)_{\vee} \\ \\ \left(\left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CONTEXT} \mid \text{BACKGROUND } \boxed{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \boxed{2} \\ \text{ADJ-DTR} \mid \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \boxed{3} \end{array} \right] \Big] \wedge \\ \left(\text{conjoin}(\boxed{1}, \boxed{2}, \boxed{3})_{\vee} \right) \\ \left(\text{equalize}(\boxed{1}, \boxed{2}, \boxed{3}) \right) \end{array} \right)_{\vee} \\ \\ \left(\left[\begin{array}{l} \text{SYNSEM} \mid \text{LOC} \mid \text{CONTEXT} \mid \text{BACKGROUND } \boxed{1} \\ \text{DTRS} \left[\begin{array}{l} \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOCAL} \mid \text{CONTEXT} \mid \text{BACKGROUND } \boxed{2} \\ \text{COMP-DTRS} \langle \text{[SS} \mid \text{LOC} \mid \text{CONTEXT} \mid \text{BACKGROUND } \boxed{3}] \rangle \end{array} \right] \Big] \wedge \\ \left(\text{conjoin}(\boxed{1}, \boxed{2}, \boxed{3})_{\vee} \right) \\ \left(\text{equalize}(\boxed{1}, \boxed{2}, \boxed{3}) \right) \end{array} \right) \end{array} \right)$$

(534) THE CONSTITUENT ORDER PRINCIPLE

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DRTS } \textit{headed-struct} \end{array} \right] \rightarrow \left(\begin{array}{l} \left[\begin{array}{l} \text{PHON } \boxed{2} \oplus \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-subj-struct} \\ \text{HEAD-DTR} \mid \text{PHON } \boxed{1} \\ \text{SUBJ-DTR} \langle \boxed{[\text{PHON } \boxed{2}] \rangle} \end{array} \right] \end{array} \right] \vee \\ \\ \left[\begin{array}{l} \text{PHON } \boxed{1} \oplus \boxed{2} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-comp-struct} \\ \text{HEAD-DTR} \mid \text{PHON } \boxed{1} \\ \text{COMP-DTRS} \langle \boxed{[\text{PHON } \boxed{2}] \rangle} \end{array} \right] \end{array} \right] \vee \\ \\ \left[\begin{array}{l} \text{PHON } \boxed{2} \oplus \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-adj-struct} \\ \text{HEAD-DTR} \left[\begin{array}{l} \text{PHON } \boxed{1} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD } \textit{prep} \vee \textit{verb} \end{array} \right] \\ \text{ADJ-DTR} \mid \text{PHON } \boxed{2} \end{array} \right] \end{array} \right] \vee \\ \\ \left[\begin{array}{l} \text{PHON } \boxed{1} \oplus \boxed{2} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-adj-struct} \\ \text{HEAD-DTR} \left[\begin{array}{l} \text{PHON } \boxed{1} \\ \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD } \textit{noun} \vee \textit{verb} \end{array} \right] \\ \text{ADJ-DTR} \mid \text{PHON } \boxed{2} \end{array} \right] \end{array} \right] \end{array} \right)$$

The principles in (535) through (539) are part of the theory of the grammar of Ty2. They license models of objects corresponding to natural numbers, the semantic types, and the well-formed meaningful expressions of Ty2. Except for the last three constraints in (536), these principles are taken from Penn and Richter (2004) and Richter (2004b).

(535) THE NATURAL NUMBERS PRINCIPLE

$$\textit{integer} \rightarrow \exists \boxed{1} (\boxed{1} \textit{zero})$$

(536) THE COMPLEX TERMS PRINCIPLES

$$\textit{application} \rightarrow \left[\begin{array}{l} \text{TYPE } \boxed{2} \\ \text{FUNCTOR} \mid \text{TYPE} \left[\begin{array}{l} \text{IN } \boxed{1} \\ \text{OUT } \boxed{2} \end{array} \right] \\ \text{ARG} \mid \text{TYPE } \boxed{1} \end{array} \right]$$

$$\textit{abstraction} \rightarrow \left[\begin{array}{l} \text{TYPE} \left[\begin{array}{l} \text{IN } \boxed{1} \\ \text{OUT } \boxed{2} \end{array} \right] \\ \text{VAR} \mid \text{TYPE } \boxed{1} \\ \text{ARG} \mid \text{TYPE } \boxed{2} \end{array} \right]$$

$$\text{equation} \longrightarrow \left[\begin{array}{l} \text{TYPE } \textit{truth} \\ \text{ARG1} \mid \text{TYPE } \boxed{1} \\ \text{ARG2} \mid \text{TYPE } \boxed{1} \end{array} \right]$$

$$\text{negation} \longrightarrow \left[\begin{array}{l} \text{TYPE } \textit{truth} \\ \text{ARG} \mid \text{TYPE } \textit{truth} \end{array} \right]$$

$$\textit{l-const} \longrightarrow \left[\begin{array}{l} \text{TYPE } \textit{truth} \\ \text{ARG1} \mid \text{TYPE } \textit{truth} \\ \text{ARG2} \mid \text{TYPE } \textit{truth} \end{array} \right]$$

$$\text{quantifiers} \longrightarrow \left[\begin{array}{l} \text{TYPE } \textit{truth} \\ \text{SCOPE} \mid \text{TYPE } \textit{truth} \end{array} \right]$$

$$\text{set-of-me} \longrightarrow \forall \boxed{1} \forall \boxed{2} \left(\left[\begin{array}{l} \text{TYPE} \left[\begin{array}{l} \text{IN } \boxed{1} \\ \text{OUT } \textit{truth} \end{array} \right] \\ \text{ARG } \boxed{2} \end{array} \right] \rightarrow \forall \boxed{3} \left(\text{member}(\boxed{3}, \boxed{2}) \rightarrow \boxed{3} \left[\text{TYPE } \boxed{1} \right] \right) \right)$$

$$\text{set-relation} \longrightarrow \left[\begin{array}{l} \text{TYPE} \left[\begin{array}{l} \text{IN } \boxed{1} \\ \text{OUT } \textit{truth} \end{array} \right] \\ \text{ARG1} \mid \text{TYPE} \left[\begin{array}{l} \text{IN } \boxed{1} \\ \text{OUT } \textit{truth} \end{array} \right] \\ \text{ARG2} \mid \text{TYPE} \left[\begin{array}{l} \text{IN } \boxed{1} \\ \text{OUT } \textit{truth} \end{array} \right] \end{array} \right]$$

$$\text{superset-relation} \longrightarrow \left[\begin{array}{l} \text{TYPE } \textit{truth} \\ \text{ARG1} \mid \text{TYPE} \left[\begin{array}{l} \text{IN } \boxed{1} \\ \text{OUT } \textit{truth} \end{array} \right] \\ \text{ARG2} \mid \text{TYPE} \left[\begin{array}{l} \text{IN } \boxed{1} \\ \text{OUT } \textit{truth} \end{array} \right] \end{array} \right]$$

(537) THE TY2 NON-CYCLICITY PRINCIPLE

$$\textit{ty2} \longrightarrow \forall \boxed{1} \left(\left(\bigvee \{ [\alpha \boxed{1}] \mid \alpha \in \mathcal{A}_{\textit{Ty2}} \} \right) \rightarrow \neg \textit{ty2}\text{-component}(\cdot, \boxed{1}) \right)$$

(538) THE TY2 FINITENESS PRINCIPLE

$$\textit{ty2} \longrightarrow \exists \boxed{1} \forall \boxed{2} \left(\textit{ty2}\text{-component}(\boxed{2}, \cdot) \rightarrow \text{member}(\boxed{2}, \boxed{1} \textit{chain}) \right)$$

(539) THE TY2 IDENTITY PRINCIPLE

$$\textit{ty2} \longrightarrow \forall \boxed{1} \forall \boxed{2} \left(\text{copy}(\boxed{1}, \boxed{2}) \rightarrow \boxed{1} = \boxed{2} \right)$$

(540) THE VARIABLE FEATURE PRINCIPLE

phrase →

$$\left(\begin{array}{l} \left[\begin{array}{l} \text{SS | LOC | CONT | INDEX | VAR } \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-subj-struct} \\ \text{HEAD-DTR | SS | LOC | CONT | INDEX | VAR } \boxed{1} \end{array} \right] \end{array} \right] \vee \\ \\ \left[\begin{array}{l} \text{SS | LOC | CONT | INDEX | VAR } \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-comp-struct} \\ \text{HEAD-DTR | SS | LOC | CONT | INDEX | VAR } \boxed{1} \end{array} \right] \end{array} \right] \vee \\ \\ \left[\begin{array}{l} \text{SS | LOC | CONT | INDEX | VAR } \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-adj-struct} \\ \text{HEAD-DTR | SS | LOC | CONT | INDEX | VAR } \boxed{1} \\ \text{ADJ-DTR | SS | LOC | CAT | HEAD | PFORM } \neg \textit{conj-z} \end{array} \right] \end{array} \right] \vee \\ \\ \left[\begin{array}{l} \text{SS | LOC | CONT | INDEX | VAR } \boxed{1} \cup \boxed{2} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-adj-struct} \\ \text{HEAD-DTR | SS | LOC | CONT | INDEX | VAR } \boxed{1} \\ \text{ADJ-DTR } \left[\begin{array}{l} \textit{phrase} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-comp-struct} \\ \text{COMP-DTRS } \langle \text{SS | LOC | CONT | INDEX | VAR } \boxed{2} \rangle \\ \text{HEAD-DTR | SS | LOC | CAT | HEAD | PFORM } \textit{conj-z} \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right) \end{array}$$

(541) THE MAIN FEATURE PRINCIPLE

$$\left(\begin{array}{l} \left[\begin{array}{l} \text{SS | LOC | CONT | MAIN } \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-subj-struct} \\ \text{HEAD-DTR | SS | LOC | CONT | MAIN } \boxed{1} \end{array} \right] \end{array} \right] \vee \\ \\ \left[\begin{array}{l} \text{SS | LOC | CONT | MAIN } \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-comp-struct} \\ \text{HEAD-DTR | SS | LOC | CONT | MAIN } \boxed{1} \end{array} \right] \end{array} \right] \vee \\ \\ \textit{phrase} \rightarrow \left[\begin{array}{l} \text{SS | LOC | CONT | MAIN } \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-adj-struct} \\ \text{HEAD-DTR | SS | LOC | CONT | MAIN } \boxed{1} \\ \text{ADJ-DTR | SS | LOC | CAT | HEAD | PFORM } \neg \textit{conj-z} \end{array} \right] \end{array} \right] \vee \\ \\ \left[\begin{array}{l} \text{SS | LOC | CONT | MAIN } \textit{none} \\ \text{DTRS } \left[\begin{array}{l} \textit{head-adj-struct} \\ \text{ADJ-DTR | SS | LOC | CAT | HEAD | PFORM } \textit{conj-z} \end{array} \right] \end{array} \right] \end{array} \right)$$

- (542) THE ID PRINCIPLE
(based on Pollard and Sag (1994))

$$[\text{DTRS } \textit{headed-struct}] \rightarrow \left(\left[\begin{array}{c} \textit{phrase} \\ \text{DTRS } \left[\begin{array}{c} \textit{head-subj-struct} \\ \text{HEAD-DTR } \textit{sign} \end{array} \right] \end{array} \right] \vee \left[\begin{array}{c} \textit{phrase} \\ \text{DTRS } \left[\begin{array}{c} \textit{head-comp-struct} \\ \text{HEAD-DTR } \textit{sign} \end{array} \right] \end{array} \right] \vee \left[\begin{array}{c} \textit{phrase} \\ \text{DTRS } \left[\begin{array}{c} \textit{head-adjunct-struct} \\ \text{HEAD-DTR } | \text{SS } \square \\ \text{ADJUNCT-DTR } | \text{SS } | \text{LOC } | \text{CAT } | \text{HEAD } | \text{MOD } \square \end{array} \right] \end{array} \right] \right) \right)$$

The following principles license relations used in the grammar of CCS. The relations defined in (547), (548), (549) are adopted from Penn and Richter (2004) and Richter (2004b).

- (543) member/2

$$\forall \square_1 \forall \square_2 \left(\text{member}(\square_1, \square_2) \leftrightarrow \left(\square_2 \left[\begin{array}{c} \textit{set} \\ \text{FIRST } \square_1 \end{array} \right] \vee \exists \square_3 \left(\square_2 \left[\begin{array}{c} \textit{set} \\ \text{REST } \square_3 \end{array} \right] \wedge \text{member}(\square_1, \square_3) \right) \right) \right)$$

- (544) append/3

$$\forall \square_1 \forall \square_2 \forall \square_3 \left(\text{append}(\square_1, \square_2, \square_3) \leftrightarrow \left(\left(\left(\square_1 \textit{elist} \wedge \square_2 \textit{list} \wedge \square_2 = \square_3 \right) \vee \left(\exists \square_4 \exists \square_5 \exists \square_6 \left(\square_1 \left[\begin{array}{c} \textit{list} \\ \text{FIRST } \square_4 \\ \text{REST } \square_5 \end{array} \right] \wedge \square_3 \left[\begin{array}{c} \textit{list} \\ \text{FIRST } \square_4 \\ \text{REST } \square_6 \end{array} \right] \wedge \text{append}(\square_5, \square_2, \square_6) \right) \right) \right) \right) \right)$$

- (545) conjoin/3

$$\forall \square_1 \forall \square_2 \forall \square_3 \left(\text{conjoin}(\square_1, \square_2, \square_3) \leftrightarrow \square_1 \left[\begin{array}{c} \textit{conjunction} \\ \text{ARG1 } \square_2 \\ \text{ARG } \square_3 \end{array} \right] \right)$$

- (546) equalize/3

$$\forall \square_1 \forall \square_2 \forall \square_3 \left(\text{equalize}(\square_1, \square_2, \square_3) \leftrightarrow \left(\left(\square_1 \textit{none} \wedge \square_2 \textit{none} \wedge \square_3 \textit{none} \right) \vee \left(\left(\square_1 = \square_2 \textit{me} \wedge \square_3 \textit{none} \right) \vee \left(\square_1 = \square_3 \textit{me} \wedge \square_2 \textit{none} \right) \right) \right) \right)$$

- (547) ty2-component/2

$$\forall \square_1 \forall \square_2 \left(\text{ty2-component}(\square_1, \square_2) \leftrightarrow \left(\square_1 = \square_2 \vee \vee \left\{ \exists \square_3 \left(\square_2[\alpha \ \square_3] \wedge \text{ty2-component}(\square_1, \square_3) \mid \alpha \in \mathcal{A}_{\text{Ty2}} \right) \right\} \right) \right)$$

- (548) copy/2

$$\forall \square_1 \forall \square_2 \left(\text{copy}(\square_1, \square_2) \leftrightarrow \left(\left(\vee \left\{ \square_1[\sigma] \wedge \square_2[\sigma] \mid \sigma \in \mathcal{S}_{\text{Ty2}} \right\} \right) \wedge \left(\wedge \left\{ \forall \square_3 \left(\square_1[\alpha \ \square_3] \rightarrow \exists \square_4 \left(\square_2[\alpha \ \square_4] \wedge \text{copy}(\square_3, \square_4) \right) \mid \sigma \in \mathcal{A}_{\text{Ty2}} \right) \right\} \right) \right) \right)$$

$$(549) \quad \text{subterm}/2$$

$$\forall \mathbb{1} \forall \mathbb{2}$$

$$\left(\text{subterm}(\mathbb{1}, \mathbb{2}) \leftrightarrow (\mathbb{1} \text{ me} \wedge \mathbb{2} \text{ me} \wedge \text{ty2-component}(\mathbb{1}, \mathbb{2})) \right)$$

B.4 The ID Schemata

The following three principles for licensing phrasal structures are used in the grammar of CCs. The descriptions are based on the corresponding id-schemata of Polard and Sag (1994)

$$(550) \quad \text{HEAD-SUBJECT SCHEMA}$$

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS} \left[\begin{array}{l} \textit{head-subj-struct} \\ \text{HEAD-DTR sign} \end{array} \right] \end{array} \right]$$

$$(551) \quad \text{HEAD-COMPLEMENT SCHEMA}$$

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS} \left[\begin{array}{l} \textit{head-comp-struct} \\ \text{HEAD-DTR sign} \end{array} \right] \end{array} \right]$$

$$(552) \quad \text{HEAD-ADJUNCT SCHEMA}$$

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS} \left[\begin{array}{l} \textit{head-adjunct-struct} \\ \text{HEAD-DTR} \mid \text{SS} \mid \mathbb{1} \\ \text{ADJUNCT-DTR} \mid \text{SS} \mid \text{LOC} \mid \text{CAT} \mid \text{HEAD} \mid \text{MOD} \mid \mathbb{1} \end{array} \right] \end{array} \right]$$

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