

Abstract

Title of dissertation: COORDINATION WITHOUT GRAMMAR-INTERNAL
 FEATURE RESOLUTION

Paulina Lyskawa
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Dissertation directed by: Professors Maria Polinsky and Omer Preminger
 Department of Linguistics
 University of Maryland

Morphological agreement with coordinate phrases involves a computation that takes as its input a set of features from each conjunct and outputs exactly one resolved set of features (number, person, grammatical gender/noun class, commonly labelled phi-features). Such resolution is typically taken to be grammar-internal because it relies on other grammar-internal ingredients (phi-features, agreement, coordination), and at least in some instances seems to follow systematic rules that may be captured by familiar grammatical operations. Exceptions to these apparent rules, if not ignored altogether, have received disparate analyses depending on the language, framework, and the particular features involved. In this thesis, I argue that it is such exceptions that are illuminating, and that the appearance of rigid rules is misleading. Treating variation in agreement with coordinate phrases as exceptional with respect to the otherwise deterministic output rules either delays the task of explaining the surface data, or risks weakening the language competence theory by adding the baroque stipulations that a purely grammar-internal treatment would require. Phi-agreement with coordinate phrases is subject to inter- and intra-speaker variability and ineffability; such variation is widespread in the world's languages, even the ones with limited phi-agreement morphology like English. I therefore reject the grammar-internal approach to agreement with coordinate phrases and argue instead that the agreement morphology we observe on the surface is due to grammar-external mechanisms being recruited to determine the resulting agreement

morphology. Under this approach, systematicity in agreement with coordinations is only apparent and can be manipulated. The reason a grammar-internal mechanism is unavailable is because it would have to take place on the agreeing head (e.g., Infl⁰ or v⁰), and what we know about agreement between a syntactic head and multiple arguments (e.g., from omnivorous agreement and the Person Case Constraint) renders it ill-suited for the task of coordination resolution.

COORDINATION WITHOUT GRAMMAR-INTERNAL FEATURE RESOLUTION

Paulina Lyskawa

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Dissertation committee:

Professor Maria Polinsky, Co-chair
Professor Omer Preminger, Co-chair
Professor Jeffrey Lidz
Professor Alexander Williams
Professor Paolo Santorio, Dean's representative

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Abbreviations.....	viii
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1 Introduction	1
1.1 Overview of each chapter	6
2 Locating Agreement	9
2.1 Descriptive components of agreement.....	9
2.2 Agreement is syntactic: the historical tradition	15
2.3 Agreement is syntactic: empirical evidence	18
2.4 Agreement is also post-syntactic: empirical evidence	25
2.5 Agreement is a two-step process: it is both syntactic and post-syntactic	28
2.6 Agreement is not semantic; but phi-features have semantic import	39
2.6.1 Presuppositional phi-features, not presuppositional agreement.....	40
2.6.2 Dissociation of semantic and syntactic features and alternative agreement forms	49
2.6.3 An example treatment of agreement with semantic features	56
2.6.4 Phi-matching is not phi-agreement	59
2.7 Grammaticality illusions: Surface agreement morphology can be affected by processing limitations	60
2.8 Summary of the chapter	66
3 The syntactic structure of coordination	69
3.1 Definition of coordination.....	70
3.1.1 Narrowing down the scope of investigation.....	71
3.2 Three approaches to the syntactic structure of coordination	77
3.2.1 Parallel-structure approach.....	78
3.2.1.1 <i>Adapting the parallel-structure approach</i>	85
3.2.2 Two-dimensional, underlying subclausal conjuncts analysis	104
3.2.3 Two-dimensional, underlying clausal conjuncts analysis	108
3.3 Comparison of approaches in light of several empirical phenomena	113
3.3.1 Agreement.....	114
3.3.1.1 <i>Single Conjunct Agreement</i>	122
3.3.2 Categorial and lexeme selection.....	126
3.3.3 Law of the Coordination of Likes (and masqueraders).....	134
3.3.4 Ban on extraction	137
3.3.5 Constituency.....	140
3.3.6 Quantificational binding and binding principles.....	144
3.3.7 Typology of unbalanced case marking in a coordination	154
3.3.8 Theta roles.....	158
3.3.9 Plurality	160
3.3.10 Scope	163

3.4	Summary of the chapter	166
4	Resolution.....	168
4.1	Where resolution applies: Setting the limits	169
4.2	Extending the agreement model to coordinated arguments.....	175
4.3	Cross-linguistic resolution tendencies in noun phrase coordination.....	183
4.3.1	Person.....	184
4.3.2	Number.....	185
4.3.3	Grammatical gender & noun classes.....	192
4.4	An attempt at a grammar-based model of resolution.....	195
4.5	Against a syntactic and morphological approach to feature resolution under coordination	203
4.5.1	Resolution is unlike other phenomena reducing multiple sets of phi-features	204
4.5.1.1	<i>Omnivorous agreement</i>	204
4.5.1.2	<i>Person Case Constraint</i>	206
4.5.1.3	<i>Disjunction</i>	208
4.5.2	Resolution varies across and within speakers	213
4.5.3	Resolution may be ineffable.....	232
4.5.4	Resolution does arithmetic	236
4.6	Against a semantic approach	239
4.7	Summary of the chapter	243
5	Proposal.....	245
5.1	The problem.....	246
5.1.1	Sample derivation with grammar-external analysis of resolution.....	251
5.2	Arguments in favor of a grammar-external analysis of resolution	255
5.3	Arguments against a grammar-internal analysis of resolution revisited.....	259
5.4	Proposal.....	261
5.5	Consequences.....	264
5.6	Possibilities for falsifying the grammar-external hypothesis.....	268
5.6.1	All languages vs. some.....	269
5.6.2	All resolution vs. some.....	270
5.6.3	Coordination—structural ambiguity	270
5.6.4	Complex idiolects or dialectal code-switching	270
5.6.5	Dedicated projection for grammar-internal resolution mechanism	273
5.7	Summary of the chapter	276
6	Conclusions and future directions	277
	References	283

Abbreviations

ABS	absolutive	MI	masculine
ACC	accusative	MIN	minimal
ADV	adverb	N	neuter
AF	agent focus	NMH	not masculine human (see also VIR)
AP	antipassive	NMIN	non-minimal
ART	article	NOM	nominative
AUX	auxiliary	NVIR	non-virile (used only for Slavic)
CL	clitic	PART	particle
CLF	classifier	PAU	paucal
COND	conditional	PFV	perfective
COP	copula	PL	plural
DAT	dative	PN	pronominal/proper noun
DET	determiner	POSS	possessive
ERG	ergative	PPRT	past participle
EXPL	expletive	PRES	present
F	feminine	pro	null pronoun
FOC	focus	PROG	progressive
FV	final vowel	PST	past
GEN	genitive	REFL	reflexive
HAB	habitual	SC	small clause
IMPF	imperfective	SG	singular
INF	infinitive	SUBJ	subject
INSTR	instrumental	VIR	virile (3 masculine human plural, used only for Slavic)
L	left/linearization-related epenthetic morpheme (in Basque)		
LOC	locative		
M	masculine		
MA	masculine animal		
MH	masculine human		

1 Introduction

This thesis investigates the ways in which grammars of natural language reflect and negotiate the features [person], [number] and [gender] under coordination. I will follow Chomsky's (1981) terminology in grouping person, number and gender under the rubric of *phi-features*. In many languages, the phi-features of a nominal phrase determine the overt morphophonology of the verb or auxiliary, thus controlling *agreement morphology*. In a typical coordination structure, which involves two nominal conjuncts, each conjunct bears its own independent set of phi-features. In a way, this is a surplus of information, as far as the needs of the rest of the clause are concerned. Just because the agreement-controller is a coordinate structure, there are not suddenly more agreement slots on the verb or auxiliary with which to express the phi-features of the controller. Therefore, the overabundance of phi-features in a coordinate structure needs to be somehow reduced. A common type of reduction of such overabundance is one where the features of both conjuncts are taken into consideration, i.e., they are *resolved*. Another type of reduction of this overabundance observed in some languages is *single conjunct agreement*, where agreement is controlled by the features of only one conjunct, while the phi-features of the second conjunct are ignored. Here I focus on languages that are typically described as allowing (if not requiring) resolution of the phi-features under coordination. The main question pursued in this thesis is whether resolution is a grammar-internal or a grammar-external mechanism.

On the surface, we observe agreement forms resulting from various (apparently) rule-governed mechanisms for such resolution: for example, in English the coordination of a 1st person singular pronoun *I/me* with a 2nd person singular pronoun *you* in the subject position of a copular clause always results in the same form of the copula, *are*:

(1) Resolution of phi-features in English

You and me **are/*am/*is** best friends.

This lack of variability has motivated analyses in which each language has a systematic *formal* rule or set of rules for combining and resolving the two (or more) bundles of phi-features of two conjuncts down to one bundle.

Consider now an example from Polish. Polish is said to have rules responsible for the resolution of gender features under coordination (Prażmowska, 2016; Willim, 2012). According to the rules in (2)–(3), agreement with a coordinate structure should be both possible and *deterministic*. By deterministic, I mean that for every pair of sets of phi-features of the respective conjuncts, exactly one set of phi-features is deemed licit as the resolved output:

- (2) Polish rule for gender resolution under coordination: If any of the conjuncts bears a [HUMAN MASCULINE] feature, resolve to [VIRILE] (i.e., [MASCULINE HUMAN PLURAL]; more on the gender system of Polish in section 4.5.2).

Jaś i Małgosia spa-**li/*-ly**.
John(MH.SG) and Mary(F.SG) sleep-PST.VIR/*-PST.NVIR
'John and Mary were sleeping.'

- (3) Polish rule for gender resolution under coordination: If none of the conjuncts bears a [HUMAN MASCULINE] feature, resolve to an elsewhere form (i.e., [NON-VIRILE]).

Ania i Małgosia spa-**ly/*-li**.
Anne(F.SG) and Mary(F.SG) sleep-PST.NVIR/*-PST.VIR
'Anne and Mary were sleeping.'

However, we observe more variable cases, where individual speakers allow other variants of agreement for some (apparently idiosyncratic) combinations of conjuncts—either in addition to the variant predicted by a general rule of phi-feature resolution, or in place of it. The Polish example below shows the kind of phenomenon I will be looking at:

- (4) Speaker uncertainty: multiple agreement morphology variants in a sentence with a coordinate structure (Zieniukowa, 1979)

Bratowa i tort by-**li/-ly** już w drodze.
sister-in-law(F) and cake(MI) COP-PST.VIR/-PST.NVIR already on way
'A sister-in-law and a cake were already on their way.'

The two examples differ only in the agreement morphology on the copula—*byli* (COP.PST.VIR) vs. *były* (COP.PST.NVIR)—even though the phi-features inside the coordinated subject remain the same. When asked to provide acceptability judgments on these type of sentences, native speakers vary in their responses. Some accept both variants, some say neither variant is acceptable (i.e., the construction is ineffable), and others strongly prefer one over another. As I will discuss later, this phenomenon is not simply a result of dialectal differences between speakers—we also observe *intra*-speaker variability. While the two variants of agreement morphology in (4) above differ in gender resolution, I will also show that similar examples can be found for person resolution and number resolution across many unrelated languages, and apply not only to coordinations of noun phrases, but to coordination of entire clauses as well.

A theoretical account of this phenomenon will need to explain why these sentences look like exceptions to what seems to be a deterministic rule of agreement and resolution of phi-features under coordination. Furthermore, such a theoretical account will need to explain why speakers do not experience the same uncertainty with similar sentences that do not exhibit the same amount of agreement morphology:

- (5) Speaker’s confidence: one variant of agreement morphology in a sentence with a coordinate structure

Bratowa i tort są już w drodze.
 sister-in-law(F) and cake(MI) COP.PRES.3PL already on way
 ‘A sister-in-law and a cake are already on their way.’

The sentence in (5) differs from the one in (4) in its tense specification. The past-tense variant in (4) shows agreement in the full range of phi-features: person, number and gender. The present-tense variant in (5) shows agreement in a subset of those phi-features: person and number but not gender. While the example that is richer in agreement morphology, (4), induces unexpected variability, its counterpart that is poorer in agreement morphology, (5), does not. This data is

relevant for ascertaining the motivation for resolution—is it grammar-internal (e.g., upon building a coordinate structure in syntax conjoined sets of phi-features resolve) or is it driven by externalization (i.e., resolution takes place only when there is a need for some morphological exponent).

Can the syntactic structure of coordination tell us anything about the motivation for resolution? I will show that if there was a grammar-internal mechanism of phi-feature resolution under coordination, it would be constrained to take place on heads like Infl⁰ or v⁰ (chapter 3). This conclusion is a crucial element in modeling resolution. It allows us to compare the surface behavior of resolution with the surface behavior of phi-featural information reduction that takes place on Infl⁰ or v⁰ in other constructions that do not involve coordination. Examples of relevant empirical domains are omnivorous agreement and Person Case Constraint. In Kaqchikel constructions with omnivorous agreement with two 3SG arguments we observe 3SG agreement morphology in (6). In contrast, in (non-omnivorous) agreement controlled by coordination of two 3SG nouns we observe 3PL agreement morphology in (7). Therefore, if we assume that the only place for potential grammar-internal resolution to take place in sentences like (1)-(8) is on Infl⁰, we are faced with a problem of one head reducing phi-featural information differently depending on fine-grained (e.g., lexical) information usually assumed to be inaccessible to syntax.

(6) Omnivorous agreement in Kaqchikel Agent Focus with two 3SG arguments

Ja ri a Lu' x- \emptyset -/*-e-tz'et-ö rja'.
 FOC the CLF Lu COM-3SG.ABS-/*3PL.ABS-see-AF 3SG
 Intended: 'It was Lu who saw him.'

(7) Resolution in coordination in Kaqchikel (Brown et al., 2006, p. 197)

Jeb'el x-e'-etz'-an ri a Lolmay chuqa' ri a Lu'.
 good COM-3PL.ABS-play-AP the CLF Lolmay and the CLF Lu'
 'Mr. Lolmay and Mr. Lu played well.'

Last but not least, can semantics and/or reference be source of the (un)acceptability of phi-morphology controlled by coordination? Explaining resolution on semantic grounds is particularly attractive in examples that seem to “do” arithmetic, as (8). In languages with more articulated number systems, we see that resolution makes reference to the cardinality of the referent in the conjunct rather than just a formal feature.

(8) Conjunction of paucals and discourse-sensitive resolution in agreement in Biak (Harbour, 2020, pp. 1–2)

a. Inai **sko**-ya ma roma **sko**-i **sko**-fnak kayame.
 girl 3PAU-DET and boy 3PAU-DET 3PAU-play together
 ‘The (three) girls and (three) boys played together.’ (total of six children)
 (cardinality of the referents established in the discourse)

b. Inai **sko**-ya ma roma **sko**-i **si**-fnak kayame.
 girl 3PAU-DET and boy 3PAU-DET 3PL-play together
 ‘The (nine) girls and (nine) boys played together.’ (total of eighteen children)
 (cardinality of the referents established in the discourse)

I discuss why modeling resolution as grammar-based operation that performs calculations based on the cardinality of the referents is undesired. Furthermore, I show why a mechanism where syntax outputs all logically possible resolution variants that are then filtered out by reference is not enough to account for all the data (e.g., noun classes in inanimate noun phrase, ineffability).

In sum, the main proposal in this thesis is that resolution is performed grammar-externally, i.e., not within the competence system by syntax, semantic or morphology but rather within the performance system—a system of how abstract knowledge is put to use.

What many of the challenges to the idea of a grammar-internal resolution mechanism have in common is evidence for the sensitivity of resolution to semantics and pragmatics, as well as the richness of agreement morphology. That these factors play a role in determining agreement morphology is unexpected under the standard assumption that the mechanism at play is purely syntactic, both for coordinate and non-coordinate structures. I will argue that this interaction of

formal syntactic information, semantics, and pragmatics limits the possibilities for grammatical resolution mechanisms, and means that what we are looking at is in fact behavior that is determined grammar-externally.

This investigation and the resulting proposal contributes to our understanding of what the limits of syntax, and grammar in general, are. In this case, I propose that resolution of phi-features under coordination lies outside the mentioned limits. I argue that by recognizing these limits, rather than adding extra tools into the syntactic toolbox, we are maintaining the parsimony of the theory of syntax.

The proposal also touches on the topic of surface variability. Some of the surface variability is only apparent, e.g., it stems from underlying structural ambiguity or is governed by categorical idiolectal or dialectal variation. However, I argue that there is another source of surface variability, i.e., true under-specification of the competence output. In such cases, performance systems need to employ a “repair strategy”. The consequence of this proposal is that all sentences with agreement morphology controlled by coordination are in some sense an example of a convention strategy.

Finally, to some extent the present thesis also contributes to the modeling of phi-features, agreement and the structure of coordination. I provide a comprehensive overview of the evidence for the modular locus of agreement with some novel arguments against certain analyses. Moreover, I compare three main approaches to the syntactic structure of coordination and provide some novel evidence in favor of one of them—coordination as a parallel-structure.

1.1 Overview of each chapter

In the following chapter 2, I discuss the phenomenon of agreement—morphophonological covariation associated with phi-features. Based on existing evidence and analyses, I conclude that

agreement is a two-step operation spanning syntax and morphophonology. In syntax, an agreement probe on some head X^0 looks for a suitable goal (e.g., a phi-bearing nominal) and establishes a relationship with it. Next, in morphophonology this link is translated into copying of the phi-feature values from the controller onto the head associated with the probe. I also show that agreement is not a semantic phenomenon in a strict sense—it has an effect on interpretation, however there is no purely semantic mechanism that determines agreement morphology.

In chapter 3, I examine the syntactic structure of coordination. I compare three broad approaches to coordination—what-you-see-is-what-you-get, conjunction reduction, and parallel-structure. Using novel as well as existing empirical evidence, I conclude that coordination as a parallel-structure is empirically the most adequate way to model the syntax of coordination and adopt it for the chapters to follow. This chapter provides the necessary background for the reason I am comparing resolution of phi-features under coordination to reduction of phi-featural information in phenomena such as omnivorous agreement and Person Case Constraint in chapter 4—the overabundance of phi-feature information is constrained to heads such as Infl^0 or v^0 .

In chapter 4, I turn to the investigation of resolution itself. I summarize some of the typological tendencies found in the surface behavior of resolution and I explore what it would mean to model it as a syntactic mechanism. Next, I show three types of empirical evidence that are often ignored in analyses of resolution, but which constitute a strong argument against such a grammar-based approach. This evidence involves a comparison to other phenomena that involve an overabundance of phi-featural information, ineffability and inter- and intra-speaker variability, as well as arithmetic capabilities of resolution.

In chapter 5, I summarize the main proposal, in favor of a grammar-external resolution mechanism. I further propose that the absence of a grammar-internal resolution mechanism is due to the

aggregated phi-featural information of the entire coordination being constrained to external heads (like Infl^0 or ν^0) rather than a designated coordination projection. I argue that external heads cannot be the source of a resolution mechanism for phi-features under coordination. In other words, this extra-grammatical resolution mechanism is not restricted to specific combinations of phi-features in a subset of languages where we observe surface variability or ineffability of resolution, but rather any time we observe agreement controlled by coordination. The consequences of this proposal are twofold. First, agreement controlled by coordination is a previously unacknowledged instance of a strategy by convention. In this particular type of strategy, the grammar provides no instructions to the performance systems, and those systems have to “improvise”. Second, even cases of systematic behavior of agreement controlled by coordination cannot be (straightforwardly) used for modeling parts of grammar such as phi-systems, coordination or agreement.

Chapter 6 concludes and outlines ideas for future research.

2 Locating Agreement

In this chapter I discuss different proposals regarding the module of grammar responsible for agreement. Before I do so, let me first provide descriptive, pre-theoretical working definitions of some of the key components of the phenomenon under investigation.

2.1 Descriptive components of agreement

I will refer to the morphophonological covariation associated with phi-features as *agreement morphology*. I will use two phrases: *X controls agreement morphology* vs. *Y determines agreement morphology* to distinguish between two different ways of arriving at the surface agreement morphology. The former is meant to be a broader and neutral term for the relation between a noun phrase and agreement morphology without a commitment to the agreement mechanism; the latter will be restricted to a particular (yet typical) set of steps. To limit the scope of this investigation, I will only consider agreement morphology on predicates, setting aside agreement/concord on modifiers inside the noun phrase.¹ Agreement morphology depends on the *phi-features* of the agreement controller. Phi-features are nominal features (typically person, number and grammatical

¹ Most analyses of (predicate) agreement and (modifier) concord treat them as the same phenomenon (but see Norris, 2014, 2017). For the phenomenon I will be dealing with here, the concord data shows even more variability than the agreement data. One reason for this difference might be that while there is no structural ambiguity in the height of the predicate, the height of the modifier in a coordinate structure might differ, i.e., it might modify only a single conjunct of the entire coordinate phrase. This structural variability has consequence for the interpretation, but the way data from concord in a coordinate structure is often reported does not always carefully control for these interpretive differences. Nevertheless, I will show some data from concord with non-coordinate controllers in what follows whenever it becomes particularly relevant.

gender/noun class) that make contributions to different modules of grammar—syntax, semantics and morphology (see Adger & Harbour, 2008 for an overview). Within the model of grammatical competence, an agreement controller bearing such phi-features enters into a relation with the predicate, and this relation results in the observed agreement morphology.² I will refer to the process by which the agreement controller and the predicate enter into this relation as the *agreement operation* (but see note 2). Moreover, I will assume that agreement morphology can express only one set of phi-features in a given case.³ Therefore, if the agreement controller contains more than one set of phi-features, as in cases of coordination of multiple noun phrases, these sets of phi-features need to be *resolved* down to exactly one set. The question of where the resolution of phi-features takes place—whether it is within the coordinate structure itself, as part of the agreement operation, or elsewhere—will be discussed in chapters 3 and 4. Finally, I will take *coordination* to be any complex structure containing a juxtaposition of two elements and the

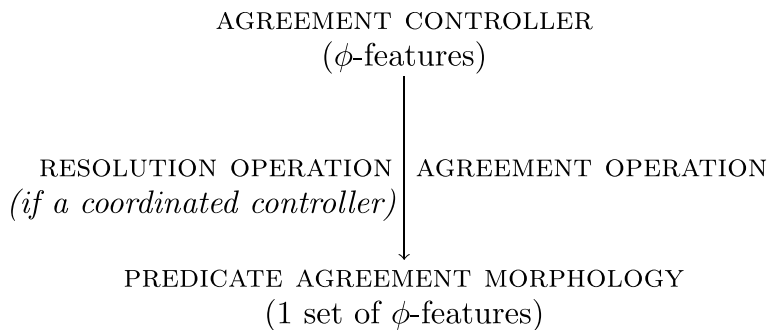
² I stay agnostic concerning the distinction between a derivational theory of agreement competence and a representational one. I will nevertheless describe agreement using terms that align closer with the derivational view such as *agreement operation*, *syntactic process*, *probing*, *establishing a link*, etc. In principle, however, what I say here could be reformulated in terms of well-formedness filters on grammatical representations.

³ At least in the languages under consideration here agreement morphology can express only one set of phi-features of a given controller, regardless of the complexity of this controller, e.g., whether it is a coordinate structure or not. There are certainly languages in which this is not true, such as Basque and Georgian. In these languages, the agreeing verb has the capacity to express the phi-features of more than one agreement-controller simultaneously (e.g. subject and object; or subject, object, and indirect object); though here, too, coordinated arguments count as one agreement controller rather than two (whether the agreement in question is resolved or not).

element linking them. However, I will limit the investigation to cases of logical conjunction, setting aside other cases of coordination or coordination-like juxtaposition (disjunction, comitatives).

All of these elements will be discussed in more detail throughout the thesis. In the meantime, I provide a summary diagram of the key components under investigation:

(9) Descriptive key components of the phenomenon under investigation



Note that in (9) the agreement operation and the resolution operation are independent of each other and unordered with respect to each other. We will see that when agreement morphology is controlled by coordination, both operations need to take place on the path towards expounding exactly one set of phi-features on the predicate, but their interaction is subject to analysis. In this chapter, I first take up the question of what the modular locus of the agreement operation is, in the absence of resolution operation, and in chapter 3 I discuss how the two operations interact.

A large portion of this thesis will deal with what the agreement and resolution operations are. In other words, how a coordinated agreement controller ends up controlling agreement morphology on a predicate. This question can be broken down into two parts distinguishing between the competence issues and performance issues. Here, I use the term *competence* as a system of abstract knowledge, i.e., what one knows, and *performance* as surface language behavior as manifested by production and comprehension, i.e., how the abstract knowledge is put to use. First, concerning the model of linguistic competence, we may ask whether agreement is a syntactic process, a

morphological one, or a semantic one. Second, we may ask whether linguistic performance always executes the exact instructions from the competence system. The alignment between competence and performance is particularly relevant here because even though most theories in linguistics treat them as separate entities, we also acknowledge that any piece of data we use to build a theory of competence is in fact filtered through the lens of performance. Despite the separation of linguistic competence and performance, we assume that they usually match. Here, I will challenge the generalization that in cases of agreement with a coordinate structure competence and performance match.

A central assumption which I adopt in this chapter and for the rest of the thesis is that, concerning the model of linguistic competence, agreement is in typical cases a two-step process. Crucially, it originates early in the derivation, i.e., in the syntactic module. The role of syntax in this process is to provide the morphophonological module with a set of legible instructions that it can carry out in the form of copying phi-feature values. Next, the morphophonological instructions are mapped onto the performance system. The question addressed here is whether the observed agreement morphology can ever be a result of something other than a direct 1:1 correspondence between a set of competence instructions and the performance execution of those instructions. I will explore multiple logical possibilities for the correspondence between the two modules, as sketched below:

(10) Logical possibilities of mappings between competence and performance systems

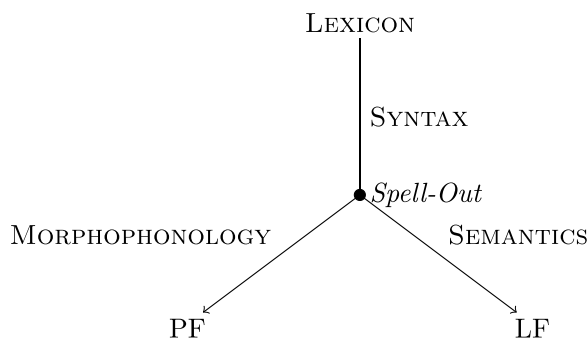
COMPETENCE	MAPPING	PERFORMANCE
1 set of instructions	→ (typical)	execution of 1 set of instructions
>1 set of instructions	→	requires further computation
<1 set of instructions	→	requires further computation

While 1:1 mapping is a typical scenario for the phenomenon of agreement, there are other logical possibilities such as too many instructions or too few instructions that the performance system

needs to “repair”. I will argue that in at least some cases of agreement with a coordinate structure, we encounter one of the atypical mappings between systems, specifically, the one in which the competence system provides the performance system with too many instructions. Though it is commonly assumed that in agreement with coordinated arguments the observed agreement morphology is a result of syntactic computation based on the phi-features of the conjuncts present in the coordinate structure, I will show that the behavior of agreement morphology suggests additional mechanisms might be at play. Chapter 4 presents the empirical facts from agreement with coordinate structures, which form the basis for this investigation. First, however, I will summarize key claims from the literature about the agreement operation and its location in the derivation.

Before I move on to discuss the conceptual and empirical arguments concerning the modular locus of agreement in the grammar, let me first make explicit what model of grammar I assume here. In general, I will adopt the Single-Output Syntax model (Bobaljik, 1995, 2002) of the linguistic derivation:

(11) A Single Output Syntax model of linguistic derivations



In this model, the linguistic derivation proceeds in the following way: syntactic operations constitute a separate module and result in a spell-out, i.e., a point of divergence into two separate modules, morphology(/morpho-phonology) and semantics. The first crucial aspect of this model is the independence of the morphophonological and semantic modules. Morphophonology has

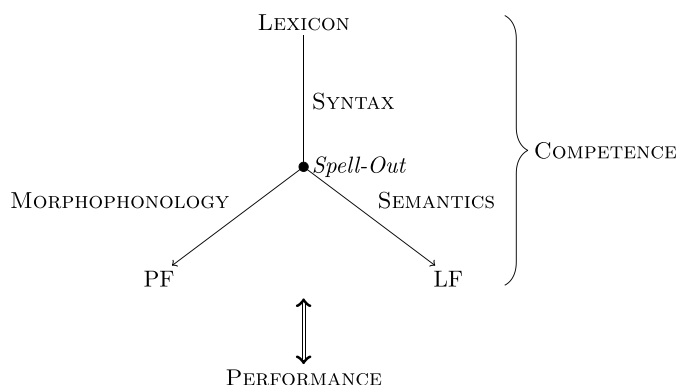
access only to the output of syntax, and not to any output or intermediate representation of semantics. Under this model, morphophonology can make use only of syntactic information (though certain features can be legible and active in both the syntax and the semantics).⁴ The second important aspect of the Single-Output Syntax model above, which contrasts with another popular model, the inverted Y-model (Chomsky & Lasnik, 1977),⁵ is that syntactic operations stop at the point of spell-out. In other words, the semantic module sees the *output* of syntactic operations, but it is distinct from the syntactic module itself. The same applies for the morphophonological module—it sees the final output of the syntactic operations. An important consequence of this assumption is that we cannot say that something is a syntactic operation and yet happens post spell-out, or that PF cannot see the final output of syntax in a single cycle (usually a phase).

⁴ There are models of linguistic derivations that do posit a direct link between morphophonology and semantics, e.g., Parallel Architecture (Jackendoff, 1997 et seq.). There is rich body of literature debating the right modeling of linguistic derivations that the scope of this thesis is not able to cover. For arguments against models with a direct link between morphophonology and semantics see Irurtzun (2009). For a history of the debate on related models see a video lecture by Lasnik (*Levels of Representation and Semantic Interpretation: A Brief History and a Case Study*, 2020).

⁵ In a Y-model, syntactic operations do not stop at the point of spell-out but rather continue all the way to the LF. However, spell-out is a point along the syntactic derivation which divides such a derivation into a part that is accessible for the morphophonological module (up to the spell-out) and a part that is inaccessible for the morphophonological module. As far as I can tell, following either the Single-Output Syntax model (adopted here) or the Y-model does not have any consequences for the proposal put forwards in this thesis and the choice of one over the other I purely for expositional purposes.

It is important to keep in mind that this model is a model of linguistic competence, not a model of language production or language processing.

(12) A Single Output Syntax model of linguistic derivations with a mapping to performance



Recall that the distinction of competence and performance systems was foreshadowed to play a crucial role for the current analysis. This will first be relevant in subsection 2.7, where I discuss so-called linguistic illusions, i.e., data that is usually analyzed as a result of pressures of language performance significantly ‘masking’ the hypothesized output of the competence grammar. I will provide more details of this phenomenon in the context of that discussion.

2.2 Agreement is syntactic: the historical tradition

There is a rich tradition in syntactic theory which takes predicate agreement with a single DP to be a syntactic operation. Part of the reason for this approach is the relative rigidity and predictability of agreement. It resembles other rigid and predictable syntactic operations like movement, more than it does certain variable and optional post-syntactic operations like, e.g., auxiliary-verb contraction (*I am* → *I'm*). In terms of the exact mechanism involved, agreement has historically been implemented in different ways across different frameworks. In Chomsky's *Syntactic Structures* (1957), where the first generative treatment of agreement is found, agreement is defined as a transformation that is structure-dependent (structural analysis below) and structure-

preserving (structural change below), thus a purely syntactic process. Structure-dependence meant that the transformation picked out the head of the noun phrase (i.e., a structurally-defined operand) rather than, e.g., the leftmost term (i.e., a linear operand). Structure-preservation, on the other hand, meant that the result of the agreement transformation was another syntactic structure, and thus available for further syntactic transformations. The diagram below presents the agreement transformation proposed in *Syntactic Structures*:

(13) Agreement transformation (#15) in Chomsky, 1957 (p. 112)

STRUCTURAL ANALYSIS:

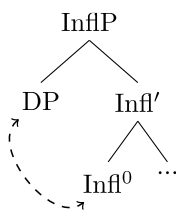
X - C - Y

STRUCTURAL CHANGE:

C →	{	S in the context of NPSG
		∅ in other contexts
		past in any context

Subsequent work by Chomsky attempted to make more precise the structural conditions on the application of agreement—for example, in the form of the *Spec-head* configuration in Chomsky’s *Barriers* (1986):

(14) Specifier-head configuration conditioning agreement (Chomsky, 1986, p. 24)



Fast-forward to the *Minimalist Program* (Chomsky, 1995 and in particular 2000, 2001), when work on superiority patterns in *wh*-movement and Relativized Minimality more generally (Rizzi, 1990) gave rise to a reconsideration of syntactic processes in terms of the *probe-goal* model. This was a change of perspective concerning many syntactic dependencies, where instead of the dependency being “driven” by the affected phrase (e.g., the moving *wh*-phrase), it was “driven” by the syntactic head interacting with that phrase (e.g., the interrogative complementizer). The

syntactic head was labeled the *probe*, and the phrase it interacted with, the *goal*. In the case of agreement, the probe is the verb or the relevant inflectional head (e.g., Tense), and the goal is the nominal argument that controls agreement. Agreement was also viewed as an operation whose secondary reflex is Abstract Case—the way for a nominal to get Case-marked was first to enter into a relationship with an agreement probe. This relation, although called *AGREE*, was argued to underlie much more than falls under the traditional notion of *agreement*—it also replaced featural movement as well as (at least some instances of) covert phrasal movement. Consequently, probe-goal relations were necessarily taken to be syntactic, as well. In sum, much generative work on agreement until this point took agreement to be a self-evidently syntactic operation.

Before I turn to more recent empirical work on agreement that corroborates this view, let me spell out some further general assumptions regarding how the agreement probe identifies its target within the probe-goal model:

(15) Constraints on syntactic agreement probing

- DOMAIN: agreement probe looks for a potential agreement controller within some domain, e.g., a phase;
- PROBE RELATIVIZATION: agreement probe is parametrized to look for a goal (an agreement controller) that is *active* (Chomsky, 2001), or is marked with a particular case value (Bobaljik, 2008) or is caseless (Preminger, 2014); further, it may be parametrized to look only for a particular value of a phi-feature (Bejar, 2003);
- MINIMALITY: agreement probe establishes a relation with the closest goal, i.e., the highest node asymmetrically c-commanded by the probe (Rizzi, 1990, 2001)

The DOMAIN constraint ensures that the agreement probe does not have unlimited search space, i.e., there is no agreement with arbitrarily far away goals (structurally speaking). The PROBE RELATIVIZATION constraint allows the probe to only target nominals bearing certain cases (Bobaljik, 2008) or feature values (Bejar, 2003), or ones which are still deemed *active* (Chomsky, 2001), or which are caseless (Preminger, 2014). The MINIMALITY constraint rules out agreement

of H^0 with X^0 across Y^0 when Y^0 asymmetrically c-commands X^0 . Additionally, MINIMALITY constraint determines that in cases of complex nominal phrases that contain other nominals within them (e.g., nominal modifiers introduced by adpositions), only the highest phi-features participate in valuation. There are likely to be further constraints, but their exact formulation is set aside for the current purposes. I am also setting aside for now constraints like DIRECTIONALITY (upward or downward c-command, discussed in 2.6.3), and FAILURE OUTCOME (whether the outcome of agreement failing to find an appropriate goal may result in default (Preminger, 2014) or in a derivation crash (Chomsky, 2000)).

2.3 Agreement is syntactic: empirical evidence

Besides the historical and conceptual reasons for placing agreement in syntax, there are also positive empirical arguments in favor of the same conclusion. First, it is well-established that agreement behaves like other syntactic operations in that an agreement probe can establish a relationship with a (non-local) goal it c-commands. While c-command is a necessary condition, it is not sufficient. Further conditions on agreement also serve as empirical evidence for agreement being a syntactic operation, as opposed to a purely surface/morpho-phonological one. This further empirical comes from—among others—the following sources: typological and analytical work by Baker (2008), work by Albizu (1997), Preminger (2011) and Rezac (2008) on Person Case Constraint (PCC) effects in Basque, and an argument by Preminger (2014) that (syntactic) movement is parasitic on agreement in languages without quirky subjects (like English and French). I will now provide a brief summary of these three arguments.

Baker (2008) investigates the relationship between agreement and different lexical categories like verbs and adjectives. He addresses the venerable observation that, cross-linguistically, person agreement tends to appear on verbs (or auxiliaries) but not on adjectives or nouns:⁶

(16) Person agreement on a copula in Swahili (Baker, 2008, p. 1)

Ni-li-kuwa ni-ki-som-a.
1SG.SUBJ-past-be 1SG.SUBJ-cont-read-FV
'I was reading.'

(17) Lack of person agreement on a predicative adjective in Swahili (Baker, 2008, p. 1)

Ni-Ø (*ni-)m-refu.
1SG.SUBJ-be (*1SG.SUBJ-)CL1-tall
'I am tall.'

Baker proposes the *Structural Condition On Person Agreement* (SCOPA): the controller of person agreement (a (pro)nominal phrase, in the usual case) must be in the specifier or the complement position of the agreement target (the predicate). According to the proposal, this sets person agreement apart from number and gender agreement, which are not subject to this requirement. Baker further assumes that verbs (and auxiliaries) have a specifier position that a nominal controller can occupy (e.g., merging first in Spec,VP, then moving to Spec,InfIP), while adjectives do not.⁷ In sum, Baker argues that agreement does not care about lexical category per se, but rather the type of syntactic structure. This requirement can only hold effectively if agreement is syntactic.

⁶ In Western European languages verbs do not expone gender agreement, however this pattern is not a cross-linguistically stable pattern, unlike the pattern whereby adjectives do not inflect for person.

⁷ The exact formulation of SCOPA is more nuanced than what I present here. Since the purpose of this section is to generally sketch the arguments in favor of agreement being syntactic, rather than provide extensive details of each argument, I refer the reader to Baker (2008) and Preminger (2011) for more details.

Another empirical argument for agreement being syntactic comes from Albizu (1997), Preminger (2011) and Rezac (2008), who argue that Person Case Constraint (PCC) effects in Basque are evidence for agreement being located in syntax and not (just) in morphology. They show that in one type of Basque applicative unaccusatives, where the dative argument is higher than the absolutive one (dative-over-absolutive), some combinations of verbal morphology on the finite auxiliary are allowed (18)a, while others are not, (18)b:⁸

(18) Basque dative-over-absolutive and PCC effects (Albizu, 1997, p. 21)

- a. Miren-i gozoki-ak gusta-tzen **∅-zai-zki-o.**
Miren-DAT sweet-ART_{PL}(ABS) like-IMP **3.ABS-√-PL.ABS-3SG.DAT**
‘Miren likes candy.’
- b. */?/? Ni Miren-i gusta-tzen **na-tzai-∅-o.**
me(ABS) Miren-DAT like-IMP **1.ABS-√-SG.ABS-3SG.DAT**
Intended: ‘Miren likes me.’

However, combinations of morphology like (18)b are not disallowed across all constructions or even across all types of applicative unaccusatives: this combination is grammatical in a construction where the absolutive argument is higher than the dative one (absolutive-over-dative):

(19) Basque absolutive-over-dative and the lack of PCC effects (Albizu, 1997, p. 21)

- Ni Peru-ri hurbildu **na-tzai-∅-o.**
me(ABS) Peru-DAT approach **1.ABS-√-SG.ABS-3SG.DAT**
‘I approach Peru.’

This argument is similar to Baker’s, in that it shows that the application of agreement must pay attention to finer details of the syntactic structure. These two empirical observations corroborate the earlier theoretical work that assumes agreement is syntactic. In sum, agreement cares about phi-features of a constituent in a particular syntactic configuration (see (15) above). I will now

⁸ See Rezac (2008, pp. 74–77) for diagnostics showing that the verbs in (18) and (19) are indeed dative-over-absolutive and absolutive-over-dative, respectively.

show a final empirical argument, which involves agreement feeding another syntactic operation (movement).

The final empirical argument I provide here for the syntactic nature of agreement is by Preminger (2014). He capitalizes on a typological observation regarding the “case-discrimination” property of two grammatical phenomena: agreement, and movement to canonical subject position. Finite agreement is case-discriminating in all languages we know of, though the particular set of targetable cases varies by language (see Bobaljik 2008). Furthermore, in some languages, movement to canonical subject positional is case-discriminating as well—and, crucially, in those languages, it targets the exact the same set of case markings as agreement does:

- (20) Typology of case-discrimination and case-indifference in agreement and movement to canonical subject position (adapted from Preminger, 2014, p. 164)

	MOVEMENT TO CANONICAL SUBJECT POSITION		FINITE AGREEMENT
Quirky-subject languages	Case-indifference (e.g., Icelandic: {NOM, DAT, ACC, etc.})	\supsetneq	Case-discriminating (e.g., Icelandic: {NOM})
Non-quirky-subject languages	Case-discriminating (e.g., French: {NOM})	=	Case-discriminating (e.g., French: {NOM})
<i>unattested</i>	Case-discriminating (e.g., hypothetical: {NOM})	\subsetneq	Case-discriminating, but differently (e.g., hypothetical: {NOM, ACC})

Preminger points out that assuming a separate case-discrimination mechanism as part of movement to subject position would be both redundant and wrong. It would be redundant, because agreement is already case-discriminating in all the relevant languages (and indeed, probably all languages). It would also be wrong, because if movement to subject position had its own case-discrimination capacity, we would expect there to be languages where both agreement and movement to subject position were case-discriminating, but each singled out a different set of possible case-markings. That this is unattested provides an argument that movement to subject position (in languages like

English or French) depends on agreement to identify its operand, and hence the case-discrimination capacity of movement is only “inherited.” Since movement is a syntactic operation (e.g., it has effects on scope), and agreement feeds movement in this way, it follows that agreement is syntactic as well. This view accounts for why French dative intervention causes ungrammaticality (23), rather than a default form as it does in quirky-subject languages like Icelandic (21). Consider first the Icelandic data below:

- (21) Dative intervention causing default agreement in Icelandic (Preminger, 2014, p. 166)
- a. Það finnst [**einhverjum student**]**DAT** [SC tölvurnar ljótar].
 EXPL find.SG **some** **student.SG.DAT** computer.the.PL.NOM ugly
 ‘Some students find the computers ugly.’
- b. * Það finnast [**einhverjum student**]**DAT** [SC tölvurnar ljótar].
 EXPL find.PL **some** **student.SG.DAT** computer.the.PL.NOM ugly
 Intended: ‘Some students find the computers ugly.’

In the example above, the agreement probe looks down for a nominative target, but finds a dative nominal first. This causes the probing to stop. Agreement has not found a target, which results in default singular morphology, as in (21)a. It is also possible for the dative argument to move out of the way of agreement (and into the subject position), allowing agreement to target the nominative goal:

- (22) Dative subject and plural agreement in Icelandic (Preminger, 2014, p. 132)
- [**Einhverjum stúdent**]₁ finnast t₁ [SC tölvurnar ljótar].
some **student.SG.DAT** find.PL computer.the.PL.NOM ugly
 ‘Some students find the computers ugly.’

This movement of a dative argument to the subject position is only possible because Icelandic, as a quirky-subject language, does not restrict movement to the canonical subject position to noun phrases that have been successfully targeted for agreement.

Now consider the French case:

(23) Dative intervention causing ungrammaticality in French (Preminger, 2014, p. 166)

* Jean_i semble [**à Marie**]**DAT** [t_i avoir du talent].
Jean seems **to Marie** have.INF of talent
Intended: ‘Jean seems to Marie to have talent.’

The French example above represents a string that cannot be derived by French grammar in any way. That is because when agreement probes down (before any movement), it first encounters a dative argument [*à Marie*]. This encounter with a non-nominative argument halts the agreement probing operation. Because French is a non-quirky-subject language, movement to canonical subject position depends, by hypothesis, on agreement to furnish it with a noun phrase to move. There is therefore simply no way to successfully derive a string like (23), in which *Jean* has moved from a structure in which it could have never been reached by the agreement probe. This difference between default morphology in (21) and outright ungrammaticality in (23) is thus explained under the assumption that agreement feeds movement to subject position. Thus, we have further evidence in favor of agreement being syntactic.

So far, I have presented empirical arguments in favor of agreement playing a role early in the derivation, i.e., in syntax. The first two arguments, based on SCOPA and on PCC effects, show that agreement has access to fine-grained syntactic information such as the specifier vs. complement distinction. The last argument, agreement feeding movement to a canonical subject position in non-quirky subject languages, shows that other syntactic operations rely on agreement—thus logically necessitating that agreement be located in the syntactic module. By no means are these three arguments the only empirical evidence for agreement being syntactic. I will note several other, equally powerful arguments in the rest of this section, but for sake of getting to the main problem faster, I will do so briefly. First, Bejar (2003) looks at cases of context-sensitive agreement (such as agreement displacement or omnivorous agreement) in Nishnaabemwin and Georgian, where the conditions governing which argument controls agreement are not defined by

the grammatical function of that argument (i.e., not simple subject-agreement or object-agreement), but rather by its particular phi-features (e.g., agreement with 1st person argument, either subject or object). She argues that agreement behaves like any other syntactic operation—it is cyclic, allows for long-distance dependencies, obeys downward locality/minimality, and shows intervention effects. She argues that syntactic modeling of a phenomenon that has syntactic characteristics is thus superior to morphological modeling in terms of fusion, or in terms of ordering vocabulary insertion rules. Second, research on ellipsis shows that agreement “survives” ellipsis, e.g., in expletive constructions, agreement is controlled by an argument that is eventually elided:

(24) Agreement with an argument in the ellipsis site (*Merchant, 2013*)

First, there were going to be bananas available, and then there **were**n’t.

In (24) above, the copula in the remnant requires plural agreement since the argument it agreed with (before the argument was “deleted”, or designated as “not-to-be-pronounced”) is itself plural. Under some analyses of ellipsis, this data points to agreement taking place before the structure is shipped off to PF, i.e., in syntax.

It may seem that all of the analyses of the empirical phenomena described in this section are theory-internal evidence for agreement being syntactic. In other words, their interpretation relies to a greater or lesser extent on some theoretical assumptions that as the research develops may fall out of favor. For example, Preminger’s analysis of the PCC facts assumes that agreement probes downwards which is not undisputed (Zeijlstra, 2012; though see Preminger, 2013). Similarly, Bejar’s context-sensitive agreement facts can be explained both syntactically and morphologically—however, it is the syntactic explanation that is accommodated most easily given our current knowledge of syntactic operations, while the morphological explanation requires non-trivial (but not necessarily unwarranted) loosening of constraints on morphological operations.

Nonetheless, whatever the current state-of-the-art or individually held assumptions about linguistic theory there are, at least some of the explanation is likely to resist the change in the theoretical trends.

In the following section, I will discuss some arguments against the purely syntactic treatment of agreement, and more specifically, arguments in favor of placing agreement in the post-syntactic component of grammar, i.e., squarely in the morphology. Eventually, I will adopt the view that agreement is a two-step process spanning across both of these modules (in line with Arregi & Nevins, 2012; Benmamoun et al., 2009; Bhatt & Walkow, 2013).

2.4 Agreement is also post-syntactic: empirical evidence

In this section, I discuss two empirical arguments—alliterative agreement in Abuṛ, and a cross-linguistic pattern of case-discriminating agreement—that have been used to argue that agreement is post-syntactic, i.e., morphological.

In parallel to the empirical work showing that agreement is syntactic, there has been work on so-called “alliterative” agreement in Abuṛ by Dobrin (1995), as well as typological and analytical work on case-discrimination by Bobaljik (2008), arguing that agreement is *post*-syntactic. I will now briefly sketch what these arguments are. First, Dobrin (1995) shows that in Abuṛ, concord morphology on adjectives and demonstratives takes the form of a faithful phonological copy of the final consonant of the agreement controller. Predicate agreement in general behaves the same way but there are some exceptions which show that abstract noun class system is operative as well. On the assumption that concord and agreement are both underlain by the same operation, I will use the data from concord to better illustrate the phenomenon of alliterative agreement. In (25)a all the concord (and agreement) markers have the exponent *n*, copying the final consonant of

aleman ‘man’, etc. Other nouns show different final consonants which are copied and expounded as concord and agreement in the same fashion:

(25) Alliterative concord and agreement in Abu? (Dobrin, 1995, p. 134)

- a. **Aleman** afu-**n**eri **n**-ahe?.
man good went
‘A good man went.’
- b. **Almil** afu-**l**i **l**-ahe?.
bird good went
‘A good bird went.’
- c. **Ihiaburuh** afu-**h**i **h**-ahe?.
butterfly good went
‘A good butterfly went.’
- d. **Bahiataf** afu-**f**i **f**-ahe?.
scaly river fish good went
‘A good scaly river fish went.’
- e. **Bahiatas** afu-**s**i **s**-ahe?.
fish.PL good went
‘Good fish went.’

Dobrin shows that even newly incorporated loanwords that contain a non-native phoneme, not found in the phonemic inventory of Abu?, agree alliteratively with their modifiers:

(26) Alliterative concord with a borrowing in Abu? (Dobrin, 1995, p. 135)

paip **apa**
pipe this
‘this pipe’

Unless we posit that Abu? has as many grammatical noun classes as consonants in its inventory, and with introduction of a novel phoneme, a novel grammatical noun class is created ad hoc, we must concede that concord can be expressed by a purely phonological copy of the material from the concord controller showing up on the target of concord. On the assumption that concord and agreement in the narrow sense (i.e., predicate-argument agreement) are underpinned by the same mechanism, this provides evidence for the mechanism in question having access to the segmental content of its operands. That is not expected if the mechanism in question is purely syntactic.

Another *prima facie* argument for the post-syntactic nature of agreement is put forth by Bobaljik (2008), who shows that agreement is case-discriminating, i.e., it has access to the output of the case-assignment computation. The argument is based on Moravcsik's hierarchy (1974), where she observes the following implicational hierarchy of grammatical functions controlling verbal agreement: if a language has verbal agreement with indirect object, it also always has verbal agreement with direct object and subject; if a language has verbal agreement with direct object, it also always has verbal agreement with subject but not necessarily indirect object; there are languages that have verbal agreement only with subject but there are no languages that have verbal agreement only with direct object or only with indirect object:

(27) Moravcsik's agreement hierarchy

subject > direct object > indirect object > adverb

Bobaljik modifies this hierarchy to account for languages with ergative-absolutive alignment, as well as cases where a language like Icelandic might in general show agreement with subjects but in some instances—when the subject is marked with quirky case—shows either default agreement (21) or agreement with the object (22). The revised hierarchy does not refer to grammatical functions, but rather to the case marking of the agreement controller:

(28) Bobaljik's revised agreement hierarchy

unmarked case > dependent case > lexical case
nominative/absolutive > accusative/ergative > dative

This hierarchy, like Moravcsik's, encodes a set of implications regarding agreement and its controllers. Here, Bobaljik observes that there are languages that show agreement only with nominals marked with unmarked case (nominative or absolutive). However, if a language also shows agreement with nominals marked with a dependent case (accusative or ergative), then that language also shows agreement with nominals in the unmarked case. Based on the assumption that

case itself is post-syntactic (Marantz, 1991), Bobaljik concludes that agreement must be post-syntactic as well.

In sum, both of these works argue that agreement is post-syntactic. How can we reconcile the seemingly conflicting evidence that agreement is syntactic and that it is also post-syntactic? I will now turn to the arguments that agreement is a *two*-step process taking place in two modules: syntax and post-syntax.

2.5 Agreement is a two-step process: it is both syntactic and post-syntactic

In this section, I will first show how we can reconcile the arguments for a morphological treatment of agreement (Section 2.4) with the arguments for a syntactic one (Section 2.3). Specifically, we can model agreement as a composite process that spans across *both* modules, and thus accommodate all the data described so far. I will also review some of the explicit bipartite models that have been put forth, and show what they have in common as well as what the main points of divergence between them are.

The seemingly contradicting evidence for agreement being located in two modules in fact provides insight into the complexity of the agreement mechanism. Bobaljik's empirical observation about agreement being case-discriminating does not by itself contradict the analysis of agreement being syntactic. Bobaljik shows that agreement has access to the result of the case-assignment computation. Therefore, on the assumption that case is computed post-syntactically, agreement must be post-syntactic as well. However, if we forgo the assumption that case computation is post-syntactic, we no longer *have* to conclude that agreement is post-syntactic. In fact, as already reviewed in 2.3, the case-assignment computation has been argued to be take place *within* syntax in other places in the literature. Once we adopt the view that case-assignment is syntactic, the case-

discrimination observation is no longer evidence for agreement being post-syntactic. Furthermore, treating agreement as post-syntactic requires access to the history of the syntactic derivation of the clause, so that e.g., agreement knows what argument was base generated in the vP position even when it was later scrambled (for a discussion see Arregi & Nevins, 2012, pp. 80–81). So far, this suggests a return to treating agreement as syntactic, in line with the historical approaches presented in Section 2.2 as well as the empirical evidence presented in Section 2.3. While we have a good deal of evidence for agreement being syntactic, there is no evidence that agreement is *exclusively* syntactic. I will now return to Dobrin’s observations concerning alliterative agreement from the previous section, and its consequence for treating agreement as syntactic *and* post-syntactic.

Dobrin’s observations concerning alliterative agreement, discussed in Section 2.4, suggest that some part of the agreement process must indeed take place in a post-syntactic module. Namely, the exact form of the agreeing morpheme may be determined by surface information such as the phonology of the agreement controller. However, the dependence of the *form* of the agreeing morpheme on the information that is only accessible post-syntactically, in and of itself, does not preclude the possibility that some part of agreement—in particular, the choice of agreement controller—happens earlier in the derivation, i.e., in syntax. Such a composite model of agreement was put forward in similar ways by Ackema & Neelman (2004), Haskell & MacDonald (2005), Benmamoun & Lorimor (2006), Franck et al. (2006), Benmamoun et al. (2009), Arregi & Nevins (2012), Bhatt & Walkow (2013), a.o. Even though these models differ from one another, they all converge on the proposal that morphological agreement is a result of a composite process involving (at least) two steps—first, the agreement operation is initiated in syntax, and second, the agreement operation is finalized afterwards. According to some of these proposals, this second step might also be in syntax (Bhatt & Walkow, 2013), or it may be in post-syntax (Arregi &

Nevins, 2012; Benmamoun et al., 2009). The modular locus of the second step of this complex agreement operation has non-trivial consequences for what the nature of this step is. While this issue is far from settled, for the current purposes it is not necessary to choose one two-step model over another. Instead, I will commit only to the parts that they all share (the two-step nature of agreement, originating in syntax). However, for the ease of exposition, I will adopt the terminology of AGREE-LINK and AGREE-COPY, following Arregi & Nevins (2012). Below, I summarize three of the aforementioned two-step models and the empirical evidence they are based on in order to support the claim that the agreement operation is bipartite.

Bhatt & Walkow (2013) propose a model of composite agreement in Hindi, in which the second step of the agreement operation takes place sometimes in syntax (subject agreement) and sometimes at PF (object agreement). The first step of the Agree process is MATCHING: establishing a link in syntax between the probe and the goal. The second step of the process is VALUATION: sharing the values of some feature. Feature valuation leads to the deactivation of these features. This step is the locus of the asymmetry between subjects and objects.

First, Bhatt and Walkow observe an asymmetry between agreement with a coordinate subject versus agreement with a coordinate object: the former requires resolved agreement (29), while the latter requires Closest Conjunct Agreement (CCA, with the first or last conjunct, depending on the word order) (30):⁹

⁹ Bhatt and Walkow acknowledge that the data is more complicated: unaccusative subjects sometimes require resolved agreement and sometimes CCA, number-sensitive items like ‘meet’ and ‘gather’ as well as some modifiers allow resolved agreement with objects. They put this data aside for future work. Further, Benmamoun et al. (2009, p. 71)

(29) Resolved agreement with coordinate subject in Hindi (Bhatt & Walkow, 2013, p. 956)

Ram aur Ramesh gaa {rahe hãĩ / *rahaa hai}.
Ram.M and Ramesh.M sing {PROG.M.PL be.PRS.PL / *PROG.M.SG be.PRES.SG}
'Ram and Ramesh are singing.'

(30) CCA with coordinate object in Hindi (Bhatt & Walkow, 2013, p. 956)

Ram-ne ek thailii aur ek baksaa uthaa{-yaa / *-yii / ???-ye}.
Ram-ERG a bag.F and a box.M lift{-PFV.M.SG / *-PFV.F / ???-PFV.M.PL}
'Ram lifted a small bag and a box.'

Bhatt & Walkow propose an analysis of the subject-object asymmetry in terms of (in-)activity of phi-features. Phi-features of a noun phrase start as active when a noun phrase is merged but become deactivated either by the agreement operation (relation with Infl^0 for both subjects and objects) or by the case licensing (relation with Infl^0 for subjects and v^0 for objects). Therefore, the relevant first operation in Bhatt & Walkow's proposed derivation is case licensing of the object and deactivation of its phi-features. Next, Infl^0 is probing for phi-features to agree with. It checks whether a subject is in the unmarked case (the only type of case-marking it can agree with due to case-discrimination (Bobaljik, 2008)). If so, then both steps of agreement, MATCHING and VALUATION, take place at once in syntax (with the entire coordination, whose features are active). This results in resolved agreement and that is the only derivation available. On the other hand, if a subject does not have unmarked case, e.g., it is marked ergative or dative, Infl^0 cannot agree with it and keeps probing further down the clause. If it encounters an object bearing unmarked case, Infl^0 will initiate agreement process with the unmarked object. Infl^0 will establish a link in syntax with the coordinated object. However, it will not be able to perform VALUATION due to the deactivated features of the coordination. The step of MATCHING between Infl^0 and the coordination

report that even transitive objects show resolved predicate agreement. The empirical picture might still need to be properly described, nevertheless the crucial observation that CCA is attested in certain constructions in Hindi remains uncontroversial.

object can still happen, despite the deactivated phi-features, but the step of VALUATION cannot—at least not in syntax. The derivation is then shipped off to post-syntax where linearization happens. After linearization, Infl^0 still needs to value its phi-features. Constrained by the domain it matched with within syntax, Infl^0 now has access to the phi-features within the coordination and will now value its phi-features with the features of the closest conjunct because post-syntax is linearly-oriented (unlike syntax, which is structurally-oriented). The schema in (31) recaps the steps of agreement probing by Infl^0 .

In sum, in Bhatt and Walkow's proposal, MATCHING always happens in syntax, but VALUATION can take place either in syntax (as happens in the case of Hindi coordinate subjects) or in post-syntax (coordinate objects). The former is possible only if the phi-features are active upon matching. The latter is possible only if the syntactic VALUATION fails (due to inactive or missing features). Only in case of VALUATION taking place in post-syntax, i.e., after linearization, can it access information from within the coordinate structure (and in a manner sensitive to linear ordering), resulting in CCA. Conversely, early VALUATION within syntax precedes linearization (and therefore cannot perform linearly-based computations, such as CCA) but can still access the features of the entire coordinate structure which leads to resolved agreement.

(31) Derivation with the focus on agreement (Bhatt & Walkow, 2013)

SYNTAX

a. Merge of v^0

v^0 licenses the case of the object &P.

Case licensing by v^0 deactivates the phi-features of the object.

b. Merge of Infl^0 parametrized to agree with the highest accessible unmarked argument

Infl^0 inspects the case of a subject—if it is unmarked, case-valuation, MATCHING and VALUATION take place; if the subject is marked with a case like ergative or dative, Infl^0 keeps probing.

Infl^0 inspects the case of an object—if it is unmarked, MATCHING takes places; however, due to an earlier operation of case licensing and the consequent case-deactivation of phi-features VALUATION cannot take place; if the object is case-marked, no MATCHING and consequent no VALUATION can take place.

c. The output of syntactic derivation is shipped off to the following module(s)

POST-SYNTAX / PF

d. Linearization

e. Unvalued Infl^0 looks for phi-feature to perform VALUATION

If MATCHING was established earlier in syntax, Infl^0 can now access phi-feature information of conjuncts within the MATCHING domain resulting in CCA.¹⁰

If there was no MATCHING with any argument or despite the access to linear information, phi-features do not perform VALUATION of Infl^0 , default agreement morphology is realized.

f. (Vocabulary Insertion)

It is worth noting at this point that at, a first glance, the treatment of resolved agreement proposed in this thesis differs in a significant way from the treatment of agreement by Bhatt and Walkow.

In subsequent chapters I argue that resolution, as a computation over all sets of phi-features in a coordination, takes place outside of the grammar. In contrast, Bhatt and Walkow are not concerned with where or when resolution takes place—MATCHING and VALUATION of the probe by the subject

¹⁰ Even in cases of object agreement, i.e., post-syntactic valuation, a non-head noun never controls CCA, i.e., there is never CCA with a possessor or a prenominal relative. This possibility might be ruled out if possessor and prenominal relatives are outside the domain of matching, e.g., they are inaccessible due to being in a different phase (see (15)).

phi features take place all at once in step (31)b without a distinction between simplex (non-coordinated, one set of phi-features) vs. coordinated arguments (at least two sets of phi-features). It is by virtue of not discussing alternative modules or systems where resolution takes place that a reader may assume that resolution takes place in syntax. Nevertheless, upon closer consideration of Bhatt and Walkow's analysis, we might argue that their account is underspecified with respect to when or where resolution takes place. For example, in principle the output of VALUATION in example (29) could be [plural] (i.e., resolution precedes VALUATION) or {[singular], [singular]} (i.e., resolution does *not* precede VALUATION) and require resolution in later, as I propose in this thesis.

Treating resolution as taking place outside of syntax, and outside of grammar, does *not* provide an argument against a two-step process of agreement—the very purpose of discussing Bhatt and Walkow's analysis of the above examples. The crucial distinction for the sake of their proposal is not the distinction between resolved vs. closest conjunct agreement but rather agreement that treats coordination as an unordered set of (sets of) phi features (i.e., agreement that does not make use of linear information), vs. agreement that has access to and makes use of linear information. Within this distinction, it is the very possibility of the latter outcome that is the main argument in favor of two-step agreement process—it is partially constrained by syntax (see the list of syntactic constraints in (15)), but also exhibits properties typical for a phenomenon that takes place post-syntactically (access to linear information).¹¹

¹¹ It is possible that if all agreement morphology controlled by coordination had the shape of closest conjunct agreement, it would be rather obvious and uncontested that agreement is a two-step process spanning syntax and

The following empirical evidence from Tsez is perhaps an even clearer example of the observation that it is closest conjunct agreement, with its reference to linear information instead of hierarchical information, that necessitates an additional step of post-syntactic computation as part of the phenomenon of agreement. This empirical evidence does not rely in any way on the contrast with resolved agreement, but rather on a comparison across languages with closest conjunct agreement. Thus, in the specific context of motivating the composite (i.e., bipartite) treatment of agreement, resolved agreement is in fact something of a red herring.

Benmamoun et al. (2009) also look at the phenomenon of CCA. They compare languages with different headedness parameters—head-initial Arabic (32) and head-final Hindi and Tsez (33):

(32) CCA in Moroccan Arabic (Benmamoun et al., 2009, p. 68)

Ža **ŝomar** w Kariim.
 came.III.M.SG **Omar** and Karim
 ‘Omar and Karim came.’

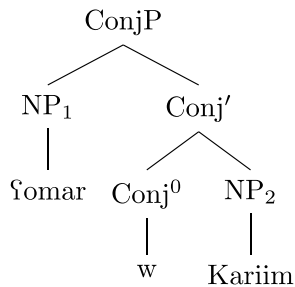
(33) CCA in Tsez (Benmamoun et al., 2009, p. 71)

Kid-no uži-**n** Ø-ik’i-s.
 girl.ABS.II-and boy.ABS.I-and I-went
 ‘A boy and a girl went.’

Based on the standard binding and extraposition tests from Munn (1999), Benmamoun et al. establish that the structure of coordinated phrases in all three languages is the same—it is asymmetrical with the leftmost conjunct c-commanding the right-most conjunct, despite the differences in headedness parameter. The tree in (34) below shows one possible implementation of such a structure:

morphology rather than just syntax. It is the prevalence of the other type of outcome, *resolved agreement*—which does not exhibit the hallmarks of a post-syntactic operation (e.g., access to linear order)—that creates the impression that agreement could proceed without involvement of the post-syntactic, morphological computation.

(34) Structure of coordination in Moroccan Arabic (Benmamoun et al., 2009, p. 68)



Despite the fact that the syntactic structure of coordination is the same in these three languages, their behavior with respect to CCA differs. In the Moroccan Arabic CCA example in (32), agreement on the verb expones the features of a conjunct that is simultaneously the linearly closest, the leftmost, and the structurally highest. That the hierarchical position of the conjunct plays a role in agreement is expected on any syntactic account of agreement. On the other hand, in the Tsez CCA example in (33), agreement on the verb expones the features of the closest conjunct which is this time the rightmost and also—arguably—*not* the highest conjunct. The authors propose that the difference between agreement with the leftmost vs. rightmost conjunct is the result of the linear adjacency of the verbal agreement target, ignoring hierarchical prominence. In other words, CCA cares about the *linearly* closest conjunct and not the *structurally* closest/highest one. In order to account for the evidence suggesting agreement is syntactic and cares about hierarchy, and the evidence suggesting agreement is post-syntactic and cares about linear information, Benmamoun et al. propose a two-step model of agreement. The first step happens in narrow syntax, and the second step takes place after syntax, in PF. First, the agreement probe establishes a relation between the agreement target and agreement goal (here, the coordinate structure in its entirety) based on hierarchy:

(35) Agreement with the highest goal in Hindi

Ve laṛkiyā: akhbaar paṛh-tii thī:
 those girl.F.PL newspaper.M read-HAB.F be.PST.PL
 ‘Those girls used to read (a/the) newspaper.’

In the example above, both the subject and the object are unmarked (absolute). In this case, the agreement is always with the higher argument, i.e., the subject. After the agreement relation is established in syntax, the agreement features are spelled out at PF based on linear proximity—and at that stage, these may be the resolved coordination features, or the features of the closest conjunct in terms of linear order. The second, post-syntactic step is left vague, but the authors clearly place it outside of syntax.

Yet another model of composite agreement is proposed by Arregi & Nevins (2012). They also define agreement as a two-step process taking place first in syntax, a step they term AGREE-LINK, and then in post-syntax, a step they term AGREE-COPY. Thus, their proposal is like the one by Benmamoun et al. (2009) and unlike the one by Bhatt and Walkow (2013) in that the second step *always* takes places post-syntactically.¹² The empirical motivation for analyzing agreement as a two-step process are the operations that intervene between the two steps and manipulate the output of AGREE-COPY. Arregi and Nevins base their two-step model of agreement on empirical data from Basque. They analyze the complex Basque auxiliaries as a complex of clitics and one non-clitic agreement morpheme. This agreement morpheme usually expones the phi-features of the absolute argument:

- (36) Agreement with an absolute argument on a Basque auxiliary (Hualde et al., 1994, p. 175)
- Liburu-a emo-n d-**o**-tzu-t.
book-ABS.SG give-PFV L-PRES.**3SG**-CL.DAT.2.SG-CL.ERG.1.SG
'I've given the book to you.'

¹² Furthermore, AGREE-COPY precedes linearization rather than follows it as it is in Bhatt and Walkow's post syntactic VALUATION. It might be the case that the order of these two operations differs cross-linguistically.

However, there are cases where this sole agreement morpheme within a complex auxiliary expones the phi-features of a dative argument despite the presence of the absolutive argument elsewhere in the structure:

(37) Agreement with a dative argument on a Basque auxiliary (Fernández, 2001, p. 153)

Mokixe-k gu-ri tabaku-a erregala- \emptyset g-**aitu**- \emptyset .
 Mokixe-ERG us-DAT tobacco-ABS.SG give-PFV CL.ABS.1.PL-**PRES.1.PL**-CL.ERG.3.SG
 ‘Mokixe has given us tobacco.’

Based on this data, they propose that the syntactic operation of AGREE-LINK always establishes an agreement link with both dative and absolutive arguments whenever such arguments are present in the structure. Further, they assume that AGREE-LINK in Basque is established between the probe and a clitic that is base-generated as a sister to the argument itself. Then, in post-syntax (or more precisely, in their Exponence Conversion module, the initial post-syntactic submodule responsible for the early stage of syntax-morphology mapping necessary to eventually insert a morphophonological form), AGREE-COPY has to decide whose features to copy onto the agreement probe. This step is subject to language-specific constraints. In Basque, they propose that the constraint states that AGREE-COPY always expones the features of the absolutive argument, masking the effects of AGREE-LINK with the dative argument. However, in some dialects of Basque, the two steps are separated by an additional, independently-motivated operation of Impoverishment where the dative feature of the agreeing clitic turns to an absolutive feature. This change makes the formerly-dative-now-absolutive clitic appropriate to be targeted by AGREE-COPY. Importantly, the case features on the argument itself do not change, only on the clitic.

To recap, the three models summarized in this section differ in the locus of the second step of the bipartite agreement operation, a difference which has non-trivial consequences for what the nature of this step is. For the purpose of this thesis, the most relevant is the claim that the agreement operation is composite and involves two tasks: identifying a controller (AGREE-LINK) and copying

its phi-features (AGREE-COPY). Foreshadowing the proposal to follow, I will argue that sentences involving resolved agreement controlled by coordination are an instance of AGREE-LINK successfully identifying agreement controller(s) and AGREE-COPY handing over an overabundance of featural information to the performance system. In the end, it is the performance system that needs to employ a grammar-external repair strategy to handle this overabundance of information, but it does so based on the instructions derived from AGREE-LINK and AGREE-COPY. As flagged in this section, my proposal by which resolution does not precede AGREE-COPY or AGREE-LINK does not contradict an analysis of two-step agreement that invoke the data from resolved agreement such as Bhatt and Walkow (2013). In fact, proposals discussed in sections 2.3 on the evidence for a syntactic step of agreement and 2.4, on the evidence for a post-syntactic step of agreement, although not in a direct discussion with each other, are also not contradicting each other but rather point to the composite nature of agreement.

I will now proceed to bring in yet another family of arguments into the mix: the contribution of semantics to phi-feature specification and agreement.

2.6 Agreement is not semantic; but phi-features have semantic import

For the sake of completeness, I will now review some of the work arguing that agreement is a semantic process, not a syntactic one (Bale, 2014), as well as the proposal that semantic agreement takes place alongside syntactic agreement (Smith, 2015). Let me begin by clarifying that there are at least five different notions that receive the label *semantics*, and it is important to clarify which of them we mean when discussing this topic. First, *semantics* is used to refer to formal features that are interpreted at LF; we will see its relevance in 2.6.2. Second, the term *semantics* can refer to the derivational system of compositional semantics; we have seen its relevance in 2.1 and it will

become relevant again throughout the parts of the thesis that talk about the general architecture of linguistic derivation. Third, *semantics* can also mean the interpretive relation between LFs and thoughts along with their ingredience; this and the following two notions labelled *semantics* are relevant in the discussion of agreement like we will see in this section as well as the discussion of resolution. The fourth notion is the property(-concepts) and proposition(-concepts) expressed by a sentence, like the property(-concept) of being a woman, or the proposition(-concept) that every woman is kind. The fifth and final notion covers properties that things in the world have, including properties they have in relation to our use of language.

I will now show that while phi-features have, at least in some cases, semantic import (they are presuppositional), we cannot reduce the agreement operation to this semantic mechanism. Then, I adopt the view that the phi-features are present in the structure-building module and require mapping between this module and both PF and LF. I will discuss a large body of empirical data suggesting that the mapping is not 1:1, though there seem to be interesting cross-linguistic regularities (cf. the Agreement Hierarchy of Corbett (1979)). It will be the first case discussed in this thesis so far that exhibits a variability of agreement options, which is nevertheless constrained in a systematic way. Finally, I will also make a case against equating agreement controlled by a noun phrase containing phi-features on the one hand, with phi-features themselves, on the other.

2.6.1 Presuppositional phi-features, not presuppositional agreement

In this section, I show what the semantic import of phi-features is, and what the arguments in favor of a semantic analysis of agreement are. It is a truism that phi features are usually interpreted by the semantics. Cooper (1983) followed by Heim and Kratzer (1998), Percus (2011), Charnavel (2019), and others proposed that the gender feature is presuppositional. Consider the following example:

- (38) Gender feature as a presupposition
- a. She is tall.
 - b. She is not tall.
 - c. Is she tall?
 - d. If she is tall, she'll reach the top shelf.

In (38)a it follows that the gender of the subject is female. This information is presupposed rather than asserted since it ‘survives’ a typical battery of tests for presuppositions, i.e., negation (38)b, question (38)c and conditional embedding (38)d (as opposed to the assertion of subject’s tallness).

Person features have also been argued to be presuppositional (Heim & Kratzer, 1998; Schlenker, 2003; Charnavel, 2019 a.o.).¹³ If phi-features exhibit semantic properties, we can entertain the strong hypothesis that they are *exclusively* semantic (abstracting away, for now, from the discussion in section 2.3). If this were the case, the covariation of agreement morphology with the phi-features of the agreement controller would need to somehow be a semantic phenomenon as well. Put differently, if phi-features were only in semantics, a semantic approach to agreement (as opposed to a syntactic one) would be conceptually necessary. In the modern linguistic literature, the first explicit attempt at such approach was put forward by Dowty & Jacobson (1989). Their proposal for semantic agreement (nevertheless with syntactic phi-features) was motivated by examples like the ones below:

¹³ The alternative analysis of these facts is that *definiteness* is the source of presupposition, not the gender of person feature itself (Kratzer, 2006). This approach would explain why number features are not presuppositional. (But see Bale (2014), which I discuss below.) It is a separate issue whether definiteness is therefore a part of the class of phi-features or not. The primary reason for presenting the semantic facts and the semantic analysis of phi-features here is its relevance to the discussion of agreement.

- (39) Motivation for semantic agreement (Dowty & Jacobson, 1989)
- a. John tries to wash himself.
 - b. John promised Mary to wash himself.
 - c. John persuaded Mary to wash herself.

Within the theory of the time, a syntactic agreement operation could not explain how the logical structurally non-local subject *John* controls the phi-features of *himself* in (39)a and (39)b but not in (39)c. Dowty & Jacobson proposed that a predicate where phi-features are exponed is a partially-defined function (similarly to how Heim & Kratzer (1998) handle presuppositions more generally) and the denotation of the subject needs to be in the domain of this function in order for its value to be defined. This relation constitutes semantic agreement.

Recently, Bale (2014) proposed a similar explicit mechanism of semantic agreement, which makes use of the presuppositional nature of phi-features. First, he notes the asymmetrical agreement patterns in conjunction and disjunction in Mi'gmaq, which appears hard to model within a theory of agreement where agreement operates in syntax, agreement with conjunctions and disjunctions is agreement with the conjunction/disjunction phrase, and the phi-features on this composite phrase are computed syntactically.¹⁴ In order to address this problem, he argues for a semantic analysis

¹⁴ Bale's use of empirical domain of agreement with conjunction to argue against syntactic agreement and in favor of semantic agreement may seem coincidental with my use of a similar empirical domain to argue for grammar-external resolution mechanism. However, note that Bale claims that syntactic modeling of the particular pattern under investigation is hard. By the end of this section, I will show that his alternative semantic modeling of this pattern is problematic as well. Bale has not considered at all the possibility that the pattern arises due to grammar-external mechanisms as claimed in this thesis. The reason Bale's agreement data may seem to be presupposition-driven is precisely because it is *coordination* agreement data (be they conjunctions or disjunctions), where—as I will show in

of agreement. He proposes that phi-features modify the target of agreement (e.g., a verb) directly, and trigger a presupposition that needs to be satisfied by the agreement controller (e.g., a subject DP) in order for the sentence to be felicitous. Assuming that all predicate agreement relies only on this semantic mechanism, it would allow us to dispose of the syntactic agreement operation altogether. However, the view that there is no syntactic agreement—only the presuppositions triggered by phi-features—is too strong. First, it only accounts for morphological agreement with arguments that semantically compose with the very predicate where agreement shows up.¹⁵ This cannot account for instances of long-distance agreement as we see in many languages around the world (Butt, 1993 in Urdu; Polinsky & Potsdam, 2001 in Tsez; Polinsky, 2003 for a cross-linguistic survey), where the argument controlling agreement is in subordinate clause, and an argument of an entirely different predicate than the matrix verb on which long-distance agreement can be seen:

(40) Long-distance agreement in Tsez (Polinsky & Potsdam, 2001, p. 584)

Enir [užā **magalu** bāc’ruḷi] **b**-iyaxo.
 mother [boy **bread.III.ABS** ate] **III**-know
 ‘The mother knows the boy ate the bread.’

In the long-distance agreement example (40), the agreement controller *magalu* ‘bread’ does not compose semantically with the predicate *biyaxo* ‘know’ where the agreement morphology is

this thesis—speakers employ all available mechanisms to determine what the “resolved” phi-features should be, and these mechanisms include, by definition, their knowledge about the presuppositions of phi-features and the logic of conjunction vs. disjunction.

¹⁵ In fact, it is likely that agreement *never* shows up on the predicate that the controller serves as an argument of. Subject agreement is often on Inf^0 , not v^0 . Object agreement is sometimes on v^0 , but v^0 introduces the subject, not the object. The only exception might be ergative agreement on v^0 , as argued for Ch’ol by (Coon, 2010, p. 17), but that is far from a pervasive pattern.

exponed. Therefore, Bale's presuppositional modifier attaching to the predicate could not straightforwardly filter out agreement controllers from other noun classes, because the argument with which the matrix verb composes is the entire embedded clause, whose noun class (IV, in this case) does not change depending on the noun class of the absolutive argument contained within it. Similarly, cases of complementizer agreement such as those seen in Bavarian (Fuß, 2014) and in Polish (Borsley & Rivero, 1994) pose a similar challenge to the direct semantic compositionality of the agreement target and phi-features of the controller:

(41) Complementizer agreement in Polish (Borsley & Rivero, 1994, p. 418)¹⁶

Chc-ę, **że-by-ś** widzia-ł-∅ królik-a.
want-1SG **that-COND-2SG** see-PST-3SG.M rabbit-ACC.
'I want you to see the rabbit.'

In example (41) above, the complex complementizer *żeby* obligatorily expones agreement morphology with the 2SG subject of the embedded clause. It is a challenge for the semantic compositionality account since the subject is not an argument of the complementizer.

The second potential problem with Bale's semantic proposal is the revision of the featural specification to one that requires negative values:

¹⁶ The status of *-ś* morpheme on a complementizer as an agreement morpheme or a clitic is debated. Regardless of its analysis, it is still a challenge for Bale's analysis of agreement as a semantic composition of an argument and a predicate.

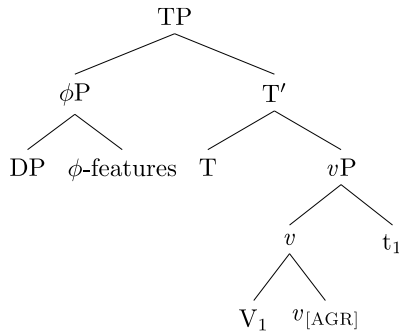
(42) Featural specification in Mi'gmaq (Bale, 2014)

OLD FORMAT		NEW FORMAT
[1, SG]	→	[-2, -3, -DL]
[2, SG]	→	[-1, -3, -DL]
[3, SG]	→	[-1, -2, -DL]
[3, DL]	→	[-1, -2, -DL]
[2, 3, DL]	→	[-1, -PL]
[1, 3, DL]	→	[-2, -PL]
[1, 2, DL]	→	[-3, -PL]

This way of representing featural specification would be particularly inelegant for features with many possible values, such as noun classes in Bantu. In such a system every individual noun class would have to be represented as the negation of each of the other (n-1) noun classes, and there would be many other possible combinations of featural specifications (e.g., a negation of only (n/2) of the noun classes) which would correspond to no attested morphosyntactic noun class. While such inelegance in and of itself may not constitute a reason to reject the entire proposal of a semantic agreement mechanism, adopting this featural representation has the consequence of losing the predictions associated with privative positive values made by Harley & Ritter (2002). For example, in Harley and Ritter's privative feature system, surface singular is the absence of the marked [plural] feature. This model easily accounts for omnivorous [plural] agreement—agreement pattern where morphology expones [plural] feature of either of the two core arguments in the clause, regardless of its grammatical function (further discussed in 4.5.1.1). In their feature system an agreement probe can make reference to the feature [plural]. At the same time, Harley and Ritter's model easily accounts for the impossibility of “omnivorous *singular* agreement” (discussed in more detail in 4.5.1.1), because there is no such entity as a [singular] feature that the agreement probe could search for (Preminger, 2019a). On the other hand, if syntax could in principle make reference to a [-PL] feature as in Bale's system, the fact that omnivorous [-PL]

agreement is unattested turns out to be an accidental typological gap. Finally, in order for the phi-features to semantically compose with the agreement target, Bale follows Sauerland (2003) in assuming that the projection of the phi-features is outside of the DP proper:

(43) Location of the phi-feature projection according (Bale, 2014)



This again is at odds with results from the study of the morphosyntax of phi-features. First, Ritter (1991, 1992) has shown that number features have a dedicated projection Num(ber)P *within* the extended nominal projection (i.e., below D and above N/n). For example, in Hebrew, in order to account for three types of genitive constructions showing the same order of main constituents, Ritter argues for an intermediate Num projection between D and N. Further, Bale’s assumption of featureless DPs is problematic given the facts concerning NP ellipsis (Bobaljik & Zocca, 2011; Ranero, In prep). Some cases of NP-ellipsis are sensitive to the gender features of the remnant and the elided material:

(44) Asymmetrical behavior of NP-ellipsis under gender mismatch (Ranero, In prep)

- a. El actor de Hollywood y la actriz de Bollywood llegaron.
 the.M actor of Hollywood and the.F actress of Bollywood arrived
 ‘The Hollywood actor and the Bollywood actress arrived.’
- b. ?? El actor de Hollywood y la de Bollywood llegaron.
 the.M actor of Hollywood and the.F of Bollywood arrived
 ‘The Hollywood actor and the Bollywood (female) one arrived.’
- c. * La actriz de Bollywood y el de Hollywood llegaron.
 the.F actress of Bollywood and the.M of Hollywood arrived
Intended: ‘The Bollywood actress and the Hollywood (male) one arrived.’

In the examples above, we observe first that it is possible to contrast gender mismatching noun phrases (44)a. When we elide part of the second NP, we observe an asymmetry in acceptability: a mismatch of masculine-<feminine> is more acceptable than a mismatch of feminine-<masculine>.¹⁷ If the gender features were outside of the noun phrase than we would not expect any asymmetry in NP-ellipsis since these gender features would not be elided. (Note, crucially, that the determiners, viz. D⁰, are outside of the ellipsis site in both (44)b and (44)c, and thus, on Sauerland/Bale's hypothesis (schematized in (43)), the gender features would be outside the ellipsis site, as well.)

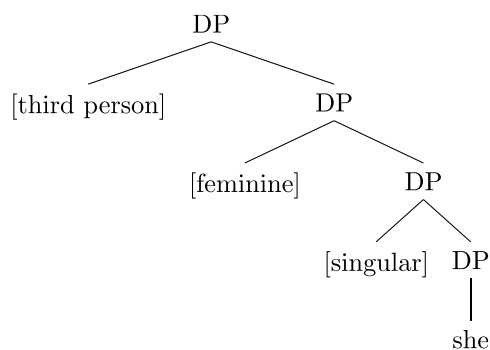
In sum, while Bale's goal is to account for the asymmetrical agreement patterns in conjunction and disjunction in Mi'gmaq that syntactic agreement cannot account for straightforwardly (again, on the assumption that these agreement facts arise through agreement with a coordinate phrase that has acquired its phi-features from the individual conjuncts/disjuncts syntactically), his unconventional assumptions about the representation of phi-features and the location of the phi-projection make the semantic account less appealing. Nevertheless, this is the most explicit attempt to replace the syntactic agreement operation with a semantic one.

Taking stock of where we are now, the view that the phi-features of a noun determine agreement morphology on a predicate via a syntactic operation is by far the most convincing. At the same

¹⁷ Although both NP-ellipsis examples are somewhat bad, in other classes of nouns, we observe other types of ellipsis acceptability behavior—symmetrical acceptability regardless of the order of gender mismatch (e.g., 'lawyer' *abogado* & *abogada*) and symmetrical unacceptability regardless of the order of gender mismatch (e.g., 'cat' *gato* & *gata*). Thus, we observe that it is not the case that NP-ellipsis is across-the-board banned or across-the-board allowed, but rather it is allowed depending on some properties of the juxtaposed noun phrases.

time, it does not conflict with the observation that phi-features also play a role in semantics, i.e., they trigger presuppositions. The way to capture this dual behavior of phi-features is to posit that they are present in the structure building phase and then they are used independently in the morphophonological/PF module (for agreement morphology) and in semantics/LF (for interpretation). As for the latter mapping, Heim and Kratzer (1998) propose an explicit model of the relation between the syntax and semantics of phi-features—while phi-features are merged in syntax (and are subject to syntactic operations), they are read in the semantic module, resulting in a presuppositional interpretation:¹⁸

(45) Phi-feature projection for the pronoun ‘she’ (adapted from Heim & Kratzer, 1998, p. 244)



This model, however, does not in itself say much about the mapping that needs to take place between the modules, e.g., syntax and morphology, syntax and semantics. I will now show extensive empirical data from a variety of phenomena where some nouns and pronouns allow for more than one agreement form. This data can be used to argue against the following aspects of this model: (i) a single agreement mechanism, (ii) a single set of phi-features, or (iii) simple one-to-one mapping of features between modules.

¹⁸ Note that in Heim & Kratzer’s model the phi-features are also adjoined to the DP like in Sauerland’s and Bale’s proposals described above.

2.6.2 Dissociation of semantic and syntactic features and alternative agreement forms

So far I have followed the standard assumption that nouns and pronouns typically have phi-features (somewhere in their extended projection). Furthermore, I have argued that such features are typically expounded via an agreement operation that starts in syntax and continues into morphophonology. In this section, I present additional data showing that in *some* circumstances, *some* nouns and pronouns show an additional *alternative* form of agreement that is not a default, but rather seems like agreement with some interpretable/real-world features of that noun or pronoun. The data comes from a variety of phenomena, namely: pluralia tantum, imposters, hybrid nouns, corporate nouns, and epicene nouns. These data challenge simpler models where one set of syntactic features always maps to one set of semantic interpretations and morphophonological realizations.

While phi-features are present in syntax and make a contribution in semantics, it has been shown that there might not be a one-to-one correspondence between the syntactic features and their semantic contribution, i.e., they might mismatch. For example, a feature [plural] in syntax might be interpreted as a plurality (in a typical scenario) or as an atomic individual (in cases of *pluralia tantum*)¹⁹. Despite the semantic import of phi-features, agreement with phi-features tracks the

¹⁹ By atomicity I mean lacking salient parts. It accounts for the difference in the semantics (e.g., telicity) of *wine* vs. *a glass of wine* in a way that reference to cardinality (e.g. $|x|=1$ vs. $|x|>1$) could not handle. For details of the argument see Krifka (1992) and Harbour (2007).

formal, i.e., syntactic featural, specification, rather than the properties of the referent. First consider cases of *pluralia tantum*, like ‘scissors’ or ‘pants’:²⁰

(46) Syntactic agreement with pluralia tantum

- a. The pants are/*is on the floor.
- b. Jedn-e drzwi był-y otwart-e.
one-NVIR door COP.PST-NVIR open-NVIR
‘One (set of) doors was open.’

Even in cases of referring to one item of clothing, as in (46)a, agreement is necessarily plural, not singular. This is because formally, the word ‘pants’ is plural. Therefore, agreement tracks the formal number of the controller and not the number of the referent. A similar contrast is observed in Polish in (46)b where *drzwi* is a pluralia tantum noun showing plural agreement on the copula and a modifier even though the modifier itself means ‘one’. The same applies to person:

(47) Syntactic agreement with person imposters (Collins & Postal, 2012)

Yours truly is/*am always right.

Even though ‘yours truly’ in (47) refers to the speaker in the speech act, i.e., the first person, agreement is with the third person, i.e., the formal feature of the noun phrase. Finally, consider an example of formal gender agreement in German:

(48) Syntactic agreement with diminutives in German

das/*die Mädchen
DET.N/*F girl
‘the girl’

²⁰ There are also entirely semantic approaches to analyzing pluralia tantum (Acquaviva, 2008) or ‘furniture’-type mass noun (Grimm, 2012). My proposal does not argue against these proposals nor is it dependent on them being wrong. Instead, I am using pluralia tantum and all following phenomena in this subsection as an example of a broader phenomenon, of the duality of phi-features/dissociation across operations/modules.

The type of diminutive in (48) is neuter in German, despite referring to a female in this case. This requires the determiner to be neuter as well, rather than feminine. Nevertheless, it is possible to refer to *das Mädchen* using a feminine pronoun *sie* if such a pronoun is in a different utterance—possibly a contrast between featural agreement and anaphoric use of features (reference tracking or phi-feature matching, as will be discussed in 2.6.4).

Thus, in cases where the formal person, number or gender feature does not match the semantic properties of the referent, agreement usually tracks the formal feature. This observation suggests an attractive generalization regarding the mapping of phi-features between syntax and semantics, whereby the formal and the semantic features can disassociate but nevertheless morphophonological agreement always tracks the formal features.

However, such a generalization does not capture all the facts. There are notable exceptions to this generalization where agreement morphology on the predicate tracks one set of features, and concord on modifiers, a different set of features. For example, in (37), the plural noun *deca* ‘children’ is the agreement controller. The prenominal modifiers appear in the feminine singular, but the post-nominal auxiliary and participle are marked with plural and neuter plural respectively.

(49) Hybrid agreement in Serbo-Croatian (Wechsler & Zlatić, 2000, p. 816)

Ta dobra deca su došla.
 that.F.SG good.F.SG children(F.SG) AUX.3PL come.PPRT.N.PL
 ‘These good children came.’

Next, consider an even more striking example of different concord morphology controlled by the same noun:

(50) Hybrid agreement in Hebrew (abbreviated from Landau, 2016, p. 1005)

ha-be'alim ha-pratijim ha-axaron
 the-owner the-private.PL the-last.SG
 ‘the last private owner’

In (50), the noun has two modifiers, and they each show concord with a different value of the number feature; the head noun is semantically singular but morphologically plural, and the modifier ‘private’ shows agreement in the formal feature, whereas ‘last’ agrees based on the semantics of the head noun.

Both of these examples show that formal and semantically-oriented agreement can co-occur in the same clause or even noun phrase.

Across languages the disassociation within the agreement morphology may happen for the gender feature, the number feature, or both. Such examples come under various labels, for example *hybrid nouns* (Despić, 2017; Landau, 2016), *collective nouns* (Smith, 2015), and *corporate nouns* (Corbett, 1991, pp. 67–68, 2000, pp. 190–191). I will use the term *hybrid* here. Hybrid nouns and pronouns are attested in Bosnian-Croatian-Serbian (BCS) (e.g., polite plural *Vi, braća* ‘brother’, *vojvoda* ‘duke’), in French (e.g., polite pronoun *vous, sentinelle* ‘sentry’), in Icelandic (*skáld* ‘poet’), in Russian (e.g., *vrač* ‘doctor’ and other names of professions), in Hebrew (e.g., *be’alim* ‘owner(s)’), in Arabic (*hamil* ‘pregnant person’), in some dialects of English (e.g., *committee, team, government*), Spanish (Nuessel, 1984), Old Chur (Huntley, 1989), Paumarí (Chapman & Derbyshire, 1991), Kabardian (Kumaxov, 1969), Samoan (Mosel & Hovdhaugen, 1992) and many other languages. The cross-linguistic commonality of such nouns has given rise to a family of proposals across generative frameworks for the existence of two sets of phi-features: formal (syntactic) and interpretable²¹ (semantic) features (Despić, 2017; Landau, 2016; Smith, 2015;

²¹ Labeling the contrast as syntactic vs. semantic features is somewhat misleading because (as I will show later) the latter are (also) constrained syntactically (Perlmutter, 1972). The labeling reflects the fact that they match the real-

Wechsler & Zlatić, 2000). While these proposals differ in the exact implementation of the dual nature of phi-features and associated agreement morphology, at some level of abstraction they share the common idea that the morphology found on some agreeing forms is the result of matching a set of formal syntactic features, and the morphology found on other agreeing forms is the result of matching semantic features. For example, in (49) above, feminine singular on the demonstrative and adjective is agreement with syntactic features of ‘children’ while plural neuter on the participle is agreement with the semantic features of that noun. I will return to explicit models of this phenomenon later in this section but, before I do so, let me discuss the inter- and intra-linguistic systematicity of agreement with these features.

We have seen already that there are different positions in a sentence where phi-features can be expounded, i.e., show co-variation with the phi-features of the (pro)nominal controller. Let me now illustrate this using one example from Polish. Phi-features of a noun (3SG.F *wróżka* ‘fairy’) can be expounded on an attributive modifier (*zielona* ‘green’), on a predicate (*mieszkała* ‘lived’), on a relative pronoun (*która* ‘which/who’) or on a personal pronoun (*ją* ‘her’):

- (51) Noun controlling phi-features on an attributive modifier, predicate, relative pronoun and personal pronoun

To zielon-**a** wróżk-**a**,
 DEM green-NOM.SG.F fairy(F)-NOM.SG.F

któr-**a** mieszka-ł-**a** w lesie.
 which-NOM.F.SG live-PST-F.3SG in forest(MI).LOC.SG

Widziałam **ją** wczoraj.
 see.PST.F.1SG 3SG.F.ACC yesterday
 ‘This is a green fairy that lived in the woods. I saw her yesterday.’

world interpretable features more closely. Even though I will continue using the term *semantic* features to mean an alternative set of features that are available for agreement only under some circumstances, I do not mean to commit to any one particular analysis of where these features come from or how exactly they agree with their target.

Multiple sites where phi-featural morphology can appear have motivated the following hierarchy:

(52) Agreement hierarchy (Corbett, 1979, p. 203)²²

attributive - predicate - relative pronoun - personal pronoun

Corbett (1979) observes that there are languages that in cases of mismatching phi, such as *pants*, might expone either set of features, e.g., either formal plural or semantic singular. Further, he observes that a language might have a restriction as to which position in the sentence, attributive modifier, predicate, relative pronoun, personal pronoun, allows expone either set of feature or just the formal set of features. For example, Polish *para* ‘couple’ allows semantic or formal (plural, any gender) features to control a personal pronoun, but only formal (singular, feminine) features can control an attributive modifier, predicate or relative pronoun. In turn, Spanish *Su Majestad* ‘his/her majesty’ allows semantic or formal features to control a personal pronoun, relative pronoun or a predicate but only formal features can control an attributive modifier. Finally, we observe that these positions can be monotonically ordered as in (52) such that if a language allows both sets of features to control a given position, we also expect that the same language allows both sets of features to control any position to its right in the hierarchy (but not necessarily to its left). In other words, there is an implication relation between these positions and their ability to expone either set of features.

The hierarchy can be illustrated by agreement with English *committee*-type nouns:

(53) Agreement with *committee*-type nouns in British English (Corbett, 1979, p. 203)

The committee has/have decided.

²² The term *agreement* used here by Corbett encompasses both agreement in the strict sense (as I use here) as well as phi-matching discussed later in 2.6.4. In short, Corbett uses agreement to mean morphophonological covariation due to any nominal features, formal or not.

In (53) above we see the possibility of two agreement forms on the auxiliary—agreement with a syntactic singular feature and agreement with a semantic plural feature. The two agreement forms are not available across the board. For example, agreement with plural semantic features is not possible on a demonstrative:

(54) Number concord on demonstrative with *committee*-type nouns (Corbett, 1979, p. 203)

This/*these committee sat late.

While the hierarchy is robust cross-linguistically, there may be further language-specific restrictions that limit the availability of agreement with semantic features. For example, there is no plural agreement with *committee*-type nouns in expletive constructions where the *committee*-type noun remains syntactically low (sometimes called existential constructions) (Elbourne, 1999):

(55) *Committee*-type nouns in an existential construction (Elbourne, 1999, p. 87)

There is/*are a committee deciding the budget for next year.

Finally, the range of interpretations in raising constructions (Elbourne, 1999) and in predicate constructions (den Dikken, 2001) is limited when plural agreement arises:

(56) Interpretation of *committee*-type nouns in raising constructions (Elbourne, 1999, p. 81)

a. A northern team is likely to be in the final.
 $\exists \gg$ likely There is a northern team such that this team is likely to win.
likely $\gg \exists$ It is likely that some northern team will win the race.

b. A northern team are likely to be in the final.
 $\exists \gg$ likely There is a northern team such that this team is likely to win.
* likely $\gg \exists$ It is likely that some northern team will win the race.

(57) Interpretation of *committee*-type nouns in predicate constructions (den Dikken, 2001, p. 30)

a. The best/most argumentative committee is theirs.
✓ subject interpretation = the best/most argumentative committee belongs to them
✓ predicate interpretation = their committee is the best/most argumentative one

b. The best/most argumentative committee are theirs.
✓ subject interpretation = the best/most argumentative committee belongs to them
* predicate interpretation = their committee is the best/most argumentative one

What is important for our purposes is the observation that the distribution of agreement with semantic features is not completely free but rather seems to be restricted syntactically as well as having effects on semantics (e.g., scope and interpretation). Foreshadowing the main empirical basis of this thesis from variability in agreement with coordination agreement with semantic features is, in contrast, more systematic and, for lack of a better term, “grammar-like.” At a minimum, semantic agreement can be captured using syntactic tools that are not atypical for agreement analyses. The following section shows in more detail how the phenomenon labeled as *semantic agreement*, even though contrasts on the surface with a bona fide syntactic agreement, is easily accounted for using nothing beyond typical syntactic tools. Therefore, the availability of two agreement forms in this case is not a challenge to the syntactic treatment of agreement at all but rather further support for it.

2.6.3 An example treatment of agreement with semantic features

The cross-linguistic hierarchy given in (52) above, coupled with language-specific observations regarding the restrictions of agreement with semantic features, has resulted in a rich body of research on the difference between the two types of features or the associated agreement (Landau, 2016; Norris, 2017; Smith, 2015; Wechsler & Zlatić, 2000). I will discuss the model of agreement with such features proposed by Smith (2015), who calls the phenomenon *semantic agreement* in order to make explicit that it is an instance of agreement that has consequences for semantics (e.g., scope), even though it still takes place within the syntactic computation (see below). This analysis posits that there may be more than one derivation that results in agreement morphology—but crucially the two derivations do not mix and match.

Smith (2015) looks at agreement with nouns with two mismatching number features. In particular, he considers mismatches involving *committee*-type nouns in British English:²³

(58) Agreement with *committee*-type nouns in British English (Smith, 2015, p. 199)

- a. The government is debating the bill.
- b. The government are debating the bill.

Smith analyzes singular agreement morphology in (58)a as the result of morphosyntax, i.e., agreement with the formal syntactic (uF) features of the noun *government* which are valued as singular. Conversely, (58)b shows plural agreement morphology which Smith claims is the result of semantics, i.e., agreement with the semantic features (iF) of the same noun. He proposes that every noun comes with two such sets of features²⁴ and while in most cases their values match, in *committee*-type nouns they do not. He argues that the difference in agreement morphology in (58) above is not a result of a difference in the featural specification of the noun itself but rather the

²³ A reverse of *committee*-type nouns in British English, where the noun is formally singular but allows plural agreement, is found with Hebrew *be'alim* 'owner(s)' ((50)), also discussed by Smith (2015). *be'alim* has a plural nominal suffix *-im* but can refer to a singular owner or plural owners. Furthermore, predicate agreement and modifier agreement can also be plural or singular depending on the number of the referent. Similarly to the behavior of *committee*-type nouns in British English discussed here we see constraints on the use of one agreement variant. These constraints suggest the choice of the variant is not a free-for-all process. While such systematic and robust behavior is usually taken to be indicative of a syntactic mechanism, I will challenge this assumption and discuss how and why robust and systematic behavior of this sort might arise due to grammar-external mechanisms, i.e., without the involvement of syntax after all.

²⁴ However, Smith (2015, pp. 137–138) also says that the two sets of features are not quite equal—the semantic features are not always active but when they are, agreement will try to target the semantic rather than the syntactic features.

difference in the underlying structure of the clause. He proposes that semantic (plural) agreement is more restrictive—it requires upward AGREE (agreement controller c-commands the agreement probe) and takes place entirely pre-Spell-Out. He follows Wurmbrand (2012) in positing that some syntactic operations (binding, control) may care about semantic rather than syntactic features. On the other hand, syntactic (in the case of *committee*, singular) agreement does not have such restrictions: the c-command relation between controller and the probe does not care about the relative height of its two operands and it happens post-Spell-Out. Therefore, the labels *semantic* vs. *syntactic* agreement may be somewhat misleading in that semantic agreement, per Smith, takes place entirely in syntax, while syntactic agreement spans across syntax and morphophonology.²⁵ The reason why the former is called *semantic* is that this operation accesses what Smith argues to be the set of features that is later interpretable in LF module and does not get shipped to PF (though as we see their reflex is present in PF in the form of agreement morphology). On the other hand, he argues that syntactic features are the mirror image of semantic features—they are shipped of only to PF but not to LF. This restriction on semantic agreement allows him to capture empirical observations concerning the restricted distribution of plural agreement with *committee*-type nouns shown in (53)-(57) above. In sum, semantic agreement is analyzed as taking place in syntax, but its derivation is independent from the syntactic agreement derivation (semantic phi features cannot participate in the syntactic agreement derivation). This will become relevant in chapter 4 where I show the type of analyses put forward to account for the variability of agreement morphology with

²⁵ Another difference between semantic vs. syntactic agreement in Smith's analysis is that the former takes place late in the syntactic computation, right before the pre-Spell Out. This way there cannot be semantic agreement and then reconstruction to a different position in the structure.

coordinate structures. For now, let me finish this section on semantic agreement with a case against treating all phi-feature matching as a result of syntactic agreement.

2.6.4 Phi-matching is not phi-agreement

Below, I discuss a few other proposals that do not reject the existence of a syntactic agreement operation but rather argue for the existence of an independent semantic phi-*matching* operation as well.

There is empirical evidence that the phi-features of a nominal can be expressed elsewhere in the sentence even in cases where syntactic agreement is not possible. Consider first the data below:

- (59) Donkey anaphora in (Preminger, 2019a, p. 10)
- a. No linguist who has purple pants looks silly in them.
 - b. * No linguist who has purple pants looks silly in it.

In (59)a the noun phrase *purple pants* and the pronoun *them* refer to the same entity in the world. Furthermore, the contrast with (59)b shows that the pronoun picks out the phi-features of *purple pants*. In other words, there is some non-arbitrary link between the noun phrase and the pronoun. However, this link cannot be a syntactic agreement operation. First, there is no c-command relation between the noun phrase and the pronoun—a relation taken to be a fundamental property of syntactic agreement (Baker, 2008; Chomsky, 2000; Preminger, 2014). Furthermore, the noun phrase is within a Complex NP Island (a relative clause) inside a Subject Island. Islands are generally taken to be inaccessible for any movement, therefore the analysis where the pronoun covertly moves up to be in the domain of agreement with the covarying expression is not possible. This serves as a fairly straightforward illustration that morpho-phonological co-variation between the noun phrase and the pronoun in (59)a does not have to be syntactic. In sum, these data point to the independence of phi-matching and phi-agreement. It is relevant to make the distinction clear

for the purpose of this thesis whose main argument is that some instances of agreement morphology are not a result of syntactic agreement operation.

Another strong case of agreement morphology not always being a result of a syntactic operation comes from the data on a particular type of linguistic illusion, agreement attraction, described in the following section.

Summarizing the present section on semantic agreement, I have shown that phi features are presuppositional but agreement itself cannot be reduced to the same phenomenon. I have also discussed a proposal by Smith (2015) which differentiates two ways of deriving agreement morphology, called semantic and syntactic agreement. Both derivations start in syntax but target different sets of phi-features and obey different constraints. This proposal challenges the simple notion that agreement morphology is always a result of the same 1:1 feature-matching/valuing operation within syntax. Finally, I have shown that the matching of phi-features does not automatically entail the involvement of syntactic phi-agreement—non-syntactic routes to phi-matching are available as well. The following section will review a similar argument that not all agreement morphology is syntactic but rather can be a result of surface processing effects.

2.7 Grammaticality illusions: Surface agreement morphology can be affected by processing limitations

The previous section on semantic agreement considered the possibility of agreement morphology expressing different sets of features of the same noun phrase, so that some agreement tracks semantic interpretable features, and other agreeing forms track the formal set of features of that noun phrase. In this section, I will discuss a scenario where agreement morphology expresses a set

of features of a *different noun phrase* when compared to canonical syntactic agreement. Recall the constraints for identifying an agreement target by a probe:

(60) Agreement constraints

DOMAIN:	agreement probe looks for a potential agreement controller within some domain, e.g., a phase;
PROBE	agreement probe is parametrized to look for an agreement controller
RELATIVIZATION:	that is marked with a particular case value; further it may be parametrized to look for a particular value of a phi-feature;
MINIMALITY:	once agreement probe identifies the agreement controller, it copies the feature value(s) of the entire phrase, therefore if the phrase is complex (it contains multiple nouns), agreement probe will copy the feature value(s) of the structurally highest head.

The DOMAIN constraint ensures that the agreement probe does not have unlimited search space, i.e., there is no agreement with arbitrarily long-distance goals. The PROBE RELATIVIZATION constraint allows the probe to discriminate against certain case (Bobaljik, 2008) or feature values (Bejar, 2003). The MINIMALITY constraint rules out agreement of H^0 with X^0 across Y^0 when Y^0 asymmetrically c-commands X^0 . It also determines that in cases of complex nominal phrases that contain subordinate modifiers like PPs, only the highest phi-features participate in valuation. I will turn now to discuss cases that contrast with canonical agreement that obeys constraints in (60). These are cases where speakers produce agreement that reflects phi-features of a noun phrase different than the one predicted by the theory of agreement (Bock & Miller, 1991):

(61) Hierarchical and non-hierarchical agreement (Bock & Miller, 1991, p. 56)

- a. The key to the cabinets **was** rusty.
- b. The key to the cabinets **were** rusty.

The subject of the two variants in (61), [the key to the cabinets], is a complex noun phrase headed by a singular noun *key*. A typical analysis of agreement predicts that this head noun should determine agreement morphology on the finite verb or auxiliary and thus the agreement morphology on the copula should be singular as well. This is borne out in (61)a. However, speakers

often produce and accept a plural agreement variant when they encounter an *agreement attractor* such as *cabinets* in (61)b, thus the name for the phenomenon: *agreement attraction*. Similar observations are made for comprehension where ungrammatical sentences of this type do not slow down reading times (Wagers et al., 2009). Some analyses of the phenomenon propose that the phi-features of a modifier of the head noun, e.g., the plural feature of the noun phrase in the PP [to *the cabinets*], interfere with the processing of the phi-features of the larger noun phrase that occupies subject position either by ‘incorrect’ representation of the complex subject features or because of issues with re-accessing such features from memory. In such cases the agreement on the finite verb or auxiliary matches the features of the attractor noun phrase.

It is crucial to stress that agreement attraction is subject to reassessment—speakers/comprehenders given more favorable circumstances (more time, less memory load) usually correct themselves and ultimately judge the sentences like (61)b as unacceptable. Besides external factors like cognitive load, grammar-like factors seem to play a role as well. While the linear proximity is often viewed as relevant (Quirk et al., 1985), it is usually considered a minor factor—structural proximity has a bigger effect on agreement attraction than the linear proximity:

(62) Complex noun phrases and the effect on agreement attraction (Franck et al., 2002)

- a. * The threat to the presidents of the company are serious.
- b. * The threat to the president of the companies are serious.

Both examples in (62) are ungrammatical but Franck et al. (2002) found that (62)a is more likely to be accepted than (62)b. They argue that this difference arises from the fact that the agreement attractor in the former (*presidents*) is structurally closer to the agreement target than the agreement attractor in the latter (*companies*). Other factors that may increase the acceptability of a sentence with agreement attraction are the featural markedness of the attractor (in English plural serves as an attractor but singular does not (Eberhard, 1997)) and semantic relatedness (an attractor that is

semantically similar to the head increases the acceptability of agreement attraction (Solomon & Pearlmutter, 2004)). Finally, consider an example of agreement attraction where the agreement attractor is *not* a modifier of the head noun expected to agree under normal circumstances (Kimball & Aissen, 1971; Wagers et al., 2009):

(63) Agreement attraction despite a linear intervener (Wagers et al., 2009)

* The **drivers** who the **runner wave** to each morning honk back cheerfully.

In the ungrammatical but frequently accepted example (63) above, the verb *wave* inside a relative clause does not agree in number with the expected subject of a relative clause *runner* but rather with the matrix subject *drivers* even though the latter does not linearly intervene between the relative clause subject and its expected agreement target. This non-linear agreement attraction has a similar profile (effect size, number asymmetry) as the more typical seemingly-linear one in (61) (Wagers et al., 2009).

The three examples in (61)-(63) identified by psycholinguistics literature broadly as agreement attraction may or may not ultimately be a result of the same cognitive mechanism. On the one hand they show a similar behavioral profile in psycholinguistics experiments. The rate of agreement attraction in experiments that use a head_{SG}-attractor_{PL}-predicate sequence agreement attraction on average equals 13% (but cf. Hammerly, Staub, & Dillon (2019) who argue that much of the effect is due to the nature of the experimental task). Furthermore, agreement attraction is influenced by extra-linguistic factors such as memory load; finally, even if speakers initially produce or accept the agreement attraction variant, if given a chance to revise, they ultimately do so and produce or prefer the canonical non-attraction variant.

On the other hand, the three examples in (61)-(63) involve a broad range of linguistic constructions. What unifies them from an analytical point of view is that they contrast with

syntactic agreement in being influenced by factors like semantic relatedness as well identifying a different target of agreement than predicted by the algorithm in (60).

In sum, at some level of abstraction the examples in (61)-(63) form a natural class as they contrast with syntactic agreement and show a similar behavioral profile. For this reason, acceptability of agreement attraction utterances, whether in production or comprehension, is usually analyzed as the effect of surface processing, rather than an output of the grammar. From this point onwards, I will refer to this class of examples simply as extra-linguistic agreement.

The analysis of agreement attraction and extra-linguistic agreement in general, tends to inform primarily the theory of processing; however, it also has potential to provide insight into the linguistic representation of phi-features and agreement. Research on agreement attraction is relevant for the topic of agreement with coordination for two reasons. First, it shows that surface agreement morphology may be a result of extra-linguistic processes. Relatedly, this phenomenon exemplifies a case where speaker acceptability does not match linguistic grammaticality. Consider the following mappings between *grammaticality*, i.e., the product of linguistic competence/underlying grammar, and *acceptability*, i.e., native speaker's intuition about the suitability of a given string in their language:

(64) Grammaticality and acceptability mappings

- a. +grammatical +acceptable
- b. -grammatical -acceptable
- c. -grammatical +acceptable →grammaticality illusions, e.g., agreement attraction
- d. +grammatical -acceptable →processing limitations, e.g., self-embeddings

The first two options in the above schema represent the typical cases where linguistic behavior matches linguistic competence, i.e., speakers accept sentences that are generated by the grammar (64)a and speakers reject sentences that are not generated by the grammar (64)b. In (64)c, we see

the first case of mismatch between grammaticality and acceptability. Examples of agreement attraction like (61)-(62) are at least sometimes judged by speakers to be acceptable, despite our strong theoretical predictions that they cannot be generated by the underlying grammar. A reverse scenario is exemplified by (64)d where speakers reject a sentence despite it being generatable by the grammar. An example of such mismatch is self-embeddings (Gibson, 1998):

(65) Double self-embedding

The cat the dog the girl chased bit ran away.

The example in (65) contains a matrix clause and two center embedded relative clauses. Reducing the self-embedding to one relative clause is usually judged as acceptable:

(66) Single self-embedding

The cat the dog bit ran away.

Adding an overt relativizer *that* and a pause at the end of the relative clause further help parse the sentence.

(67) Single self-embedding with an overt relativizer

[The cat [that the dog bit] ran away.]

Linguistic theory predicts that adding another relative clause modifying *the dog* should result in a grammatical outcome.

(68) Double self-embedding parsed into clauses

[The cat [that the dog [that the girl chased] bit] ran away.]

Therefore, although at a first glance (65) may look like word salad, there are strong theoretical reasons to maintain that it is in fact in compliance with our linguistic competence. It is hypothesized that it is a parsing limitation, therefore an extra-linguistic factor, that prevents the sentence from being judged as acceptable.

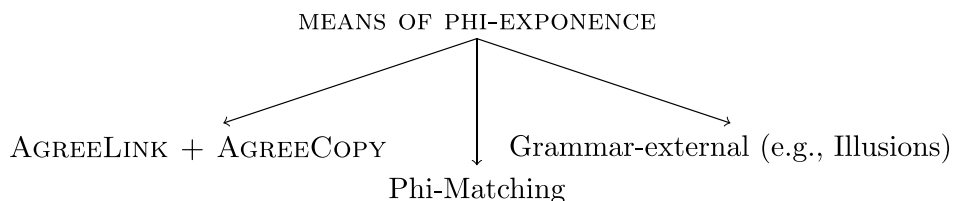
To summarize, linguistic performance and linguistic competence are imperfectly related. In other words, just because certain strings are a part of speakers' linguistic repertoire does not immediately

mean those strings are a product of the underlying grammar and vice versa. We have seen that linguistic behavior is influenced by extra-grammatical properties like parsing strategies and memory architecture. With this division of labor in mind, we are ready to turn to the discussion of coordination in chapter 3 and review the empirical facts from agreement with coordination in chapter 4.

2.8 Summary of the chapter

In this chapter I have discussed three broad ways in which phi-features can be expounded, which are summarized below:

(69) Means of phi-exponence



The AGREELINK and AGREECOPY mechanism was the one I focused on most. I have presented arguments both in favor of a portion of the agreement mechanism being located in the syntactic module, and in favor of another portion of the agreement mechanism being located in a post-syntactic module (morphophonology). Agreement cares about the phi-features of a constituent in a particular syntactic position, and feeds other syntactic operations like movement (to canonical subject position). Moreover, the exact form of agreement morphology is sensitive to surface morphophonological information showing that even though the agreement operation starts in syntax, it spans the post-syntactic module of grammar as well. I assume that canonical agreement with formal features as well as syntactic-semantic agreement with interpretable phi-features discussed in 2.6.3 are both underlain by this mechanism. Further, I assume that the following mechanisms of expounding phi-features are deployed only if this one is not available for some reason.

Second, I separated this AGREELINK and AGREECOPY mechanism from the phi-matching mechanism discussed in 2.6.4. I assume that the latter is restricted to exposing phi-featural information on pronouns that access the phi-feature values from the discourse and thus, it does not need to obey the domain constraint like AGREELINK does.

Third, I discussed cases of exposing phi-features that arise due to grammar-external mechanisms, e.g., grammaticality illusions in 2.7—the observation that agreement morphology occasionally expresses a set of features of a *different noun phrase* than canonical syntactic agreement would predict, i.e., not the highest head of the agreement target. This phenomenon is particularly relevant for the issue of how we interpret surface data which might not reflect the output of the underlying grammar.

Besides these three mechanisms, I also argued against certain analyses of agreement. There is a rich tradition of naming particular variants of agreement semantic, which I showed cannot conceptually be a result of a mechanism that is constrained to the semantic module as there is no direct link between semantics and morphophonology that bypasses syntax. Finally, I argued against modelling agreement as a mechanism relying solely on satisfying presuppositions.

In the following chapter I consider the other relevant component in the discussion of resolution of phi-features under coordination—coordination itself. After that chapter, I return to the discussion of the syntactic treatment of agreement, considering how it would extend to agreement with coordinate structures. Put together, I show what the problems are with the assumption that the mechanism for agreement with a single DP and with a coordinate structure is exactly the same. I will argue that the data warrants considering an additional extra-grammatical mechanism for deriving agreement morphology controlled by a coordinate structure. The outcome will be a tension between a purely grammatical model and a grammar-external model. The former requires

many stipulations to account for the empirical data, while the latter may seem less parsimonious at first glance, but it allows syntax to be stricter and simpler, while capturing a larger portion of the empirical landscape. I will ultimately argue that the non-parsimony is deceptive and in fact, we can strengthen syntactic theory by accounting for this phenomenon in non-syntactic terms, and removing the baroque stipulations that a purely syntactic treatment would require.

3 The syntactic structure of coordination

In this chapter I describe the particular approach to the syntactic structure of coordination that I adopt in this thesis, i.e., coordination as a three-dimensional parallel-structure. Adopting this approach will allow us to reason about the nature of resolution more concretely, and ultimately, it will provide a partial motivation for arguing that resolution is not a grammar-based mechanism. It is also particularly relevant for justifying the comparison I make between coordination and other structures that do not involve coordination, but nevertheless require some mechanism for reducing phi-featural information (omnivorous agreement, Person Case Constraint effects in 4.5.1)

This chapter is structured as follows: first, I provide a non-formal definition of coordination and identify its different subtypes. I also discuss the possibility that different types of coordination underlyingly have different syntactic structures. Given the focus of the thesis, i.e., phi-feature resolution, I narrow down the scope of my investigation to a particular type of coordination - logical conjunction with a list-like interpretation - the most canonical type of DP coordination. DP coordination is the most frequent type of coordination we will see in the main part of the thesis. After I establish the limits of my inquiry, I proceed to describe the mechanics of the parallel-structure approach to coordination proposed by Goodall (1987), with some novel adaptations. This approach, combined with the assumed model of agreement from chapter 2, identifies where in the structure the phi-resolution rules (however stipulative they may be) would need to be situated should they be grammar-internal. Foreshadowing the answer, grammar-based resolution would need to be performed in a position external to the coordination itself, on a head associated with an agreement probe like Infl^0 or v^0 , rather than on a dedicated coordination projection like &P.

Since the parallel-structure approach is by no means the only available approach to coordination, I compare it to two other competitors: (i) the (currently) commonly assumed model of subclausal two-dimensional coordination, particularly adjunction model by Munn (1993), and (ii) clausal two-dimensional coordination with reduction - the original approach (Chomsky, 1957) that is still being argued for by some (Schein, 2017). I justify my adoption of the parallel-structure approach in light of a variety of empirical phenomena. From this assortment of phenomena, resolved agreement points against the clausal reduction approach and syntactic selection against an adjunction model. The other phenomena I discuss had been used as evidence for one or another approach to coordination but here I show that all of them are well-explained by the parallel-structure approach as well. I acknowledge that this is not the last word to be said about the structure of coordination, but making concrete proposals regarding phi-feature resolution requires that we commit ourselves to some concrete model of coordinate structure.

3.1 Definition of coordination

Coordination is a syntactic object where two (or more) well-formed and independent constituents are linked together to form a logical constituent. On the surface, the individual conjuncts (sub-constituents) can be as large as a CP or as small as a DP (or even smaller):

(70) CP coordination

Wizards cooked and witches slept.

(71) DP coordination

Wizards and witches cooked.

Coordination usually requires a linking element like *and*, *or*, *but*, *while*, *whereas*, etc. Different linking elements contrast in the logical relations they represent. For example, *and* denotes a conjunction and *or* for many English speakers may denote both inclusive and exclusive disjunction. Further, some of the linking elements of the same logical type impose semantic and

syntactic requirements on the conjuncts. For example, in English *and* links many different conjuncts but *while* and *but* do link DPs.²⁶ Additionally, the latter two introduce a meaning of contrast between conjuncts. In Malagasy both *sy* and *ary* mean ‘and’ but the former links conjuncts smaller than a InfIP and the latter links InfIP and larger conjuncts (Keenan & Ochs, 1979).

As we identify different types of coordination, it may turn out that despite its apparent uniformity, coordination does not constitute a natural class of linguistic phenomena. Even coordination with the linking element *and*, given its wide range of syntactic behaviors, which I will sketch below, is likely to involve two or more distinct syntactic structures. This thesis focuses mainly on the canonical cases of conjunction where the conjuncts have a list-like or contrastive interpretation. This motivates setting aside any examples that may potentially have a different underlying structure thus narrowing down the scope of this chapter. Below I delineate the limits of my investigation.

3.1.1 Narrowing down the scope of investigation

I limit the investigation to cases of logical conjunction (72), setting aside other cases of coordination or coordination-like juxtaposition (disjunction (73), subordination and phrases containing comitatives (74)):

(72) Logical conjunction (main focus of this thesis)

- a. I’ll invite Pat and Mat.
- b. I’ll invite Pat and call Mat.

²⁶ I am setting aside examples where *but* has a meaning of ‘with the exception of’ and well as examples that conceal more structure than visible on the surface:

- (i) I like nobody but Archer.
- (ii) Friends but kissed twice. (source: Saturday Night Live 11/07/2020)

(73) Logical disjunction (outside the scope of this thesis)

- a. I'll invite Pat or Mat.
- b. I'll invite Pat or call Mat.

(74) Subordination (outside the scope of this thesis)

I'll invite Pat with Mat.

Typically, examples of logical conjunction contain a linking element like *and*, *but* or *as well as*. I further restrict the focus of this thesis to examples that exhibit some sort of interpretative parallelism or contrast between conjuncts. This class of examples differs from examples that also contain a linking element like *and* but have a meaning of cause and effect, conditional, purpose or sequence of events:

(75) Non-canonical conjunction examples (cause & effect reading)

- a. I went to the store and bought cat food.
- b. He can eat a lot and still stay hungry.

Besides the interpretative distinctness of the cause & effect vs. parallel/contrastive conjunction examples, they are also likely to have a different underlying syntactic structure (Goldsmith, 1985; Ross, 1967). First, the examples in (75) above contain the linking element *and* yet contrast with canonical examples like in (73) in the possibility of extraction from a single conjunct:

(76) Extraction out of a canonical and non-canonical conjunction

- a. * Who will you invite __ and visit Mat?
- b. * Who will you invite Pat and visit __ ?
- c. How much can he eat __ and still stay hungry?
- d. What did you go to a store and buy __?

The ban on extraction out of coordination (Ross, 1967), discussed further in 3.3.4, is a hallmark of canonical, parallel/contrastive cases of coordination. There are further properties that set apart parallel vs. non-parallel examples of coordination. Munn (1993, p. 70) investigates the behavior of a predicate like *expect* which takes different complements: finite clauses (CP), exceptionally

case marked infinite clauses (ECM) and control infinite clauses (PRO). The complement of *expect* can also be a coordination of these clauses. Nevertheless, some combinations are not acceptable:

- (77) Coordination of CP, ECM and PRO clausal conjuncts—conditional/sequential conjuncts (Munn, 1993)
- a. John expects that Perot will run and that he'll win.
 - b. * John expects that Perot will run and to vote for him.
 - c. * John expects that Perot will run and Bill to vote for him.
 - d. Perot expects to run and that he'll win.
 - e. Perot expects to run and to win easily.
 - f. * Perot expects to run and his wife to vote for him.
 - g. John expects Perot to run and that he'll vote for him.
 - h. * John expects Perot to run and to vote for him.
 - i. John expects Perot to run and his wife to vote for him.

Based on the above examples, Munn draws the conclusion that a predicate like *expect* cannot take the following combinations of conjuncts as its complement: CP & PRO (77)b, CP & ECM (77)c, PRO & ECM (77)f, ECM & PRO (77)h. This conclusion then leads to a particular proposal regarding a general syntactic structure for coordination. Munn assumes a particular theory of c-selection features—PRO and ECM are specified for [INFINITIVE] and CP is unmarked for this feature; ECM is specified for [CASE], PRO and CP are unmarked for this feature. If one of these features is present on a first conjunct, it is licensed by the virtue of being c-selected by a higher head. In turn, if one of these features is present on a second-conjunct, it cannot be licensed directly via c-selection, as Munn argues there is no c-selection between a higher head and a second conjunct (the details of this model are discussed further in 3.2.2). Instead, feature licensing on the second conjunct is ‘parasitic’ on feature licensing on the first conjunct—features on the second conjunct are licensed only when they are already present and c-selected on the first conjunct. This featural analysis together with the proposed structure of coordination account for the conclusion based on (77). An alternative structure for coordination where each conjunct is c-selected for would not by

itself explain the unacceptability of CP & PRO (77)b , CP & ECM (77)c, PRO & ECM (77)f, ECM & PRO (77)h. However, note that all examples in (77) have conditional/sequential meaning. Further, this generalization about the unacceptability of some combinations of conjuncts does not extend to parallel/contrastive conjuncts:

(78) Coordination of CP, ECM and PRO clausal conjuncts—parallel/contrastive conjuncts

- a. I expect that Perot will lose and/but to win myself this time. (cf. (77)b)
- b. I expect that Perot will lose and/but Bill to win this time. (cf. (77)c)
- c. I expect to lose and/but Bill to win this time. (cf. (77)f)
- d. I expect Perot to lose and/but to win myself this time. (cf. (77)h)

I will treat this distinction in acceptability based on the meaning of coordination as evidence for different underlying structures. Together with the evidence regarding extraction described above, it points towards the existence of two syntactic structures that map onto distinct meaning relations. Since the primary focus of this thesis is a canonical DP coordination and in such a coordination, conjuncts typically have a parallel or list-like meaning, the goal of this chapter is to determine the syntactic structure only for this type of coordination. Nevertheless, in order to do so, I will be using evidence from coordination of other syntactic categories as long as it also has a parallel/list meaning. Hence, it is crucial to keep the list-like type of coordination separate from other types of coordination like in (75) or (77). In other words, despite sharing the linking element *and*, such constructions do not share the underlying syntactic structure.

It is also possible that the canonical parallel/list coordination vs. cause & effect coordination are not the only two types of coordination with distinct structures. Let me now discuss one more example of apparent coordination, so-called *truncation*, that does not pattern with the canonical parallel/list coordination:

(79) Non-canonical conjunction—truncation (Goodall, 1987, pp. 29–30)

John rode his bike to Albuquerque and Mary took the train.

Let us focus on the interpretation where both John and Mary travelled to Albuquerque (via different means of transportation). The PP *to Albuquerque* is absent from the surface of the second clausal conjunct, but nevertheless the interpretation in question suggests that it might be underlyingly present.²⁷ The same meaning may also be expressed as in (80), where the PP is present only in the second clausal conjunct but interpreted again in both:

(80) Canonical conjunction (Goodall, 1987, pp. 29–30)

John rode his bike and Mary took the train to Albuquerque.

Goodall analyzes the string in (80) as true logical conjunction (possibly combined with Right-Node-Raising where material on the right edge of the sentence, i.e., following the coordination, is in fact interpreted in multiple places—as part of each conjunct). Despite the fact that both strings share the same interpretation, particularly involving a common destination, only the example of truncation (79) allows substitution of the linking element *and* for *whereas* or *while* while retaining the interpretation of the PP across both clauses:

²⁷ It is also possible that in (79) the PP *to Albuquerque* is not underlyingly present in syntax in both clausal conjuncts but rather it is only present in *one* conjunct (where it is also visible on the surface) and the interpretation of the same PP modifying the other conjunct is obtained via pragmatic inference. The same possibility of pragmatic inference rather than an underlying syntactic presence of the PP modifier applies to the example in (80). This analysis is strengthened by the fact that truncation does not seem to be possible with truncated arguments rather than modifiers:

(iii) ??Mary's proud that John travelled to Cameroon and Ann's glad that Bill.

This piece of evidence only strengthens the point I attempt to make here that examples like (79) should be set aside in the present investigation so I start with simpler examples before moving on to the more complex ones. Finally, the fact that pragmatic effects plays an important role in the topic of conjunction and need to be distinguished from the syntactic effects is further discussed in section 3.3.3.

- (81) Linking element *while* in truncation vs. canonical conjunction (Goodall, 1987, pp. 29–30)
- a. John rode his bike to Albuquerque while Mary took the train.
 - b. * John rode his bike while Mary took the train to Albuquerque.
(*on the relevant interpretation*)

Examples of truncation are not diagnosable by the extraction test shown in (76), i.e., extraction from a single conjunct fails under truncation the same way it fails under the canonical coordination. Moreover, the use of the linking elements *while* and *whereas* is restricted to clausal coordination. Therefore, using these linking elements as a diagnostic for truncation is limited to the examples of truncation where the conjuncts are full clauses rather than smaller constituents. It might be the case that truncation always involves clausal conjuncts and thus we can always use this diagnostic. However, to the best of my knowledge there is no analysis of truncation that explicitly restricts it to clausal coordination. Given the lack of clear analysis of truncation and the limited diagnostics available, I will assume that it is indeed limited to clausal coordination and apply the *while* test whenever such examples are at stake.

Taking stock, while the logical definition of conjunction is fairly straightforward, its form in natural language overlaps with other structures. The empirical boundaries of logical conjunction vs. apparent conjunction are only partially defined. In this thesis, I restrict the investigation to canonical examples that do not allow extraction of, or out of, a single conjunct, nor the use of the linking elements *while* or *whereas*.

In the following section, I discuss three distinct approaches to the syntactic structure of coordination. They each have their strengths and shortcomings and the debate on their relative success is still ongoing. It may turn out that all of these models are attested in world's languages, or even within a single language. Nevertheless, given the narrow focus of this thesis, i.e., phi-feature resolution under coordination, I argue that the parallel-structure approach by Goodall

(1987) is the most promising. I start by outlining and then adapting the parallel-structure approach, followed by outlining two other popular models that make distinct empirical predictions. In section 3.3, I discuss a variety of the empirical phenomena and evaluate whether they match the predictions made by the three approaches.

3.2 Three approaches to the syntactic structure of coordination

In this section, I outline three distinct approaches to the syntactic structure of coordination that make different empirical predictions: (i) a parallel-structure approach, with a focus on a model by Goodall (1987); (ii) a two-dimensional what-you-see-is-what-you-get approach, with a focus on a model by Munn (1993); and (iii) a two-dimensional clausal reduction approach, which has been argued for on and off since Chomsky (1957).

I start by discussing Goodall's (1987) proposal for parallel-structure in syntax that will be employed in the following chapters. The proposal introduces a way to combine constituents in a three-dimensional space in syntax. The main motivation for adopting this analysis of coordination is its consequence for how the external syntax (i.e., the structure outside of the coordination) sees the coordination. Goodall's proposal is not the only proposal that makes use of special syntactic primitives in the analysis of coordination. There is rich literature on parallelism and multidominance in syntactic objects, including coordinate structures, that precedes Goodall (1987)'s proposal (Chomsky, 1982; Goodall, 1985; Jaeggli, 1981; Manzini, 1983; Zubizarreta, 1982) as well as follows it (Blevins, 1990; Citko, 2000, 2011; de Vries, 2005, 2008, 2009; Gračanin-Yuksek, 2007, 2013; McCawley, 1988; Moltmann, 1992; Muadz, 1991; van Riemsdijk, 2006). It is not the goal of this thesis to adjudicate between these different proposals—rather, by providing some of these references, I merely intend to show that treating coordination as a special

syntactic object is by no means unprecedented. Furthermore, since much of the cited work applies the same parallelism approach to structures other than coordination (e.g., Manzini (1983) on causatives, Goodall (1987) on restructuring predicates, Citko (2000) on free relatives), coordination might not be completely unique in this sense. From the perspective of the Minimalist Program, it might be a rather welcome to conclude that multiple constructions share a seemingly atypical syntactic mechanism.

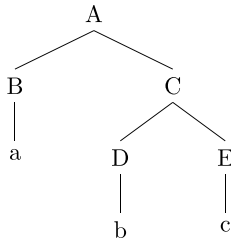
Ultimately, adopting a version of Goodall's analysis will allow us to reason more adequately about the nature of phi-feature resolution. After reviewing that analysis, I contrast it with two other families of analyses of coordination that make use of more traditional syntactic primitives—derived (=all conjuncts are underlying clausal) vs. underived (=conjuncts may be subclausal) two-dimensional structures. Even though the parallel-structure model involves adopting a new operation of UNION for building a syntactic structure, I show in section 3.3 that this approach makes correct empirical predictions, particularly for agreement, and lexeme and category selection. I also discuss wider gamut of phenomena. In doing so, I show that both two-dimensional approaches, despite not involving a new tool for building syntactic structures, need to stipulate other operations that are limited to the phenomenon of coordination. Viewed together, the parallel-structure proposal is successful to a degree that is at least comparable to its competitors.

3.2.1 Parallel-structure approach

The central assumption in early analyses of coordination was that it is a typical two-dimensional syntactic object. The representation of standard two-dimensional syntactic objects at the time of Goodall's formalization was primarily done via Reduced Phrase Markers (Lasnik & Kupin, 1977). An RPM is a collection of strings (terminals and monostings, that is, elements with at most one non-terminal) whose elements all stand in defined precedence and dominance relations with one

another. Consider the following example of a structure represented graphically as a tree and then as an RPM where capital letters represent non-terminals and lower-case letters represent terminals:

(82) Tree structure & its RPM



RPM: {A, Bbc, aC, aDc, abE, abc}

In an RPM, each pair of strings must be defined in terms of dominance or precedence. Thus, when we take a pair aDc and abc we know that D dominates b and when we take a pair abE and abc we know that E dominates c. In addition, we know that D precedes E.

However, RPMs may be easily translated into later approaches like minimalist *MERGE* (Chomsky, 1995). Two-dimensional syntactic objects at least since the X' Theory have the following related properties:

(83) (Some) typical properties of two-dimensional syntactic objects

- BINARY every non-terminal node has at most two daughters (Kayne, 1984)
- BRANCHING
- SINGLE every node is immediately dominated by only one other node, i.e., each node has only one mother
- IMMEDIATE
- DOMINANCE
- ENDOCENTRICITY every head projects its phrase, and every phrase has a prominent head; a consequence of this property is that features of the head are also present on the phrase level of the projection (Stowell, 1981)
- ALGORITHMIC as a two-dimensional object that has breadth and depth, it is linearized
- LINEARIZATION into a one-dimensional object via some algorithm, e.g., based on asymmetric c-command relations and dominance (Kayne, 1994)

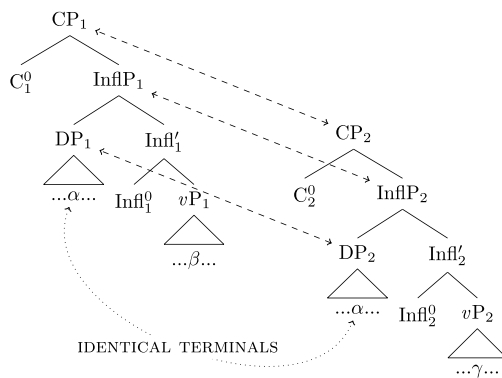
Minimalism inherited these properties from X'-theory and attempts to explain them. Most of these properties are now explained by the manner in which syntactic structure is built. In most formulations of minimalist syntax, applications of *MERGE* are subject to the Extension Condition

(Chomsky, 1993, 1995) or No Tampering Condition (Chomsky, 2007, 2008). These conditions require that a syntactic element be added only at the root of the existing syntactic structure. In other words, the structure of an existing (complex) syntactic object cannot be altered; it can only be expanded, by creating a new object that contains the original unaltered syntactic object. The consequence of this way of structure building is that first, the original syntactic object and the newly merged syntactic object make a constituent and second, the original syntactic object and the newly merged syntactic object are dominated by the same single non-terminal node. As MERGE allows adding only one constituent at a time and immediately creates a new constituent, the result is binary branching and single motherhood. Endocentricity is empirically grounded but is not an obvious consequence of MERGE itself. To the extent that it is a desideratum, it would need to follow from an independent mechanism of head-driven labeling (Chomsky, 2013, 2015; Collins, 2002). Finally, Linearization is a property required by PF; however, the exact algorithm by which a two-dimensional structure is converted to a one-dimensional one may in principle be built into the syntactic structure (e.g., ordered pairs of syntactic constituents) or derived from it (e.g., by the Linear Correspondence Axiom (Kayne, 1994) or Cyclic Linearization (Fox & Pesetsky, 2005)).

The gist of Goodall's proposal is that some structure building in syntax is done via *UNION* of RPMs. The operation of *UNION* identifies identical terminals and fuses them together, while allowing non-identical terminals from different clauses to continue to exist in parallel planes until a late linearization operation applies, at PF. Per Goodall, *UNION* gives rise to constructions such as coordination, causatives, and restructuring. Of these three, I will only discuss coordination. I take no stance, for the purpose of this thesis, on whether *UNION* is or is not an adequate analysis of causatives and restructuring.

UNION applies to full clauses already built via more typical structure-building operations—be they the construction of D-Structure, as in Government & Binding theory, or the application of MERGE, as I will assume here. UNION (as opposed to MERGE) of two full clauses means that they continue to exist in parallel planes: identical terminal nodes and the non-terminal nodes that contain them fuse across clauses, while distinct terminals and non-terminal nodes that do not contain any fused terminals continue to be distinct:

(84) UNION operation of two clauses—predicate coordination



In the diagram above, there are two clauses that undergo UNION. They each contain an identical terminal α . These two α terminals fuse together (dotted curvy line). The pairs of non-terminals that dominate α , i.e., DP_1 and DP_2 , $InflP_1$ and $InflP_2$, and CP_1 and CP_2 also fuse (indicated by the dashed straight lines) by virtue of dominating the fused terminal α (Goodall, 1987, p. 36). I will distinguish between fusing and *co-fusing*—*fusing* applying to identical terminals and their projections (α in (84)), and consequential *co-fusing* applying to the projections dominating the previously fused terminals (DP_1 and DP_2 , $InflP_1$ and $InflP_2$, and CP_1 and CP_2 in (84)). The precise consequence of fusing and co-fusing nodes (apart from the fact that they are pronounced only once) is not explicit in the original proposal. In 3.2.1.1, I return to this issue and propose some additional properties of this approach that have consequences for endocentricity, multidominance, multiple Spell-Out, and agreement.

To complete the overview of the original model, I lay out the remaining properties of a derivation that involves UNION. Before being shipped off to PF where linearization takes place, the unfused nodes exist in parallel planes. This parallelism captures quite elegantly sentences with a double coordinate structure and two meanings:

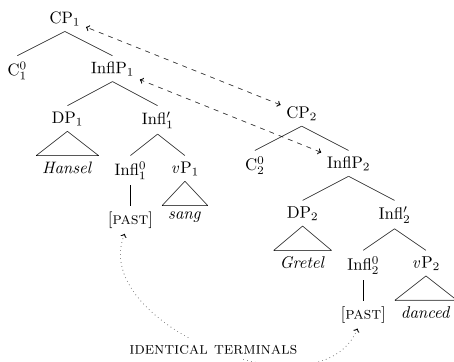
(85) Double coordination and two readings

Hansel and Gretel sang and danced.

- a. RESPECTIVE [CP₁ Hansel sang] and [CP₂ Gretel danced].]
READING
- b. CONJOINED [CP₁ Hansel sang] and [CP₂ Gretel sang] and [CP₃ Hansel danced]
READING and [CP₄ Gretel danced].]

The meaning ambiguity in these types of examples is particularly difficult to capture in any two-dimensional model of coordination. On Goodall’s analysis, the semantic difference is a consequence of syntactic ambiguity—UNION of two clauses in the respective reading vs. UNION of four clauses in the conjoined reading. In the first, respective reading, I assume that Infl⁰ [PAST] is shared and fused.²⁸

(86) UNION of (85)a—respective reading



²⁸ I make an assumption about fusing Infl⁰ despite Goodall’s proposal not having such a head in the structure at all. For the justification of this assumption and its consequences see section 3.2.1.1.

UNION based on the shared Infl⁰ [PAST] accounts for why an analogous pair of sentences *without* a shared temporal specification on Infl⁰ cannot be coordinated in the same fashion (i.e., with the ‘respective’ interpretation):

- (87) Unavailability of the respective interpretation with different temporal specification
* Hansel and Gretel sang and will dance respectively.

There is at least one other type of example in which a respective reading is unavailable, namely, coordination of expletive with non-expletive subjects:

- (88) Unavailability of the respective interpretation with expletive and non-expletive
* It and snow rained and fell respectively.

In the sentence above, the temporal specification is shared across sentences, thus at minimum we expect that this requirement for UNION to apply is met. The question that remains is what else is needed to allow for coordination. Descriptively, it seems that some lexical items, here expletives, simply cannot be coordinated. Nevertheless, it is not the case that expletives simply cannot participate in UNION altogether:

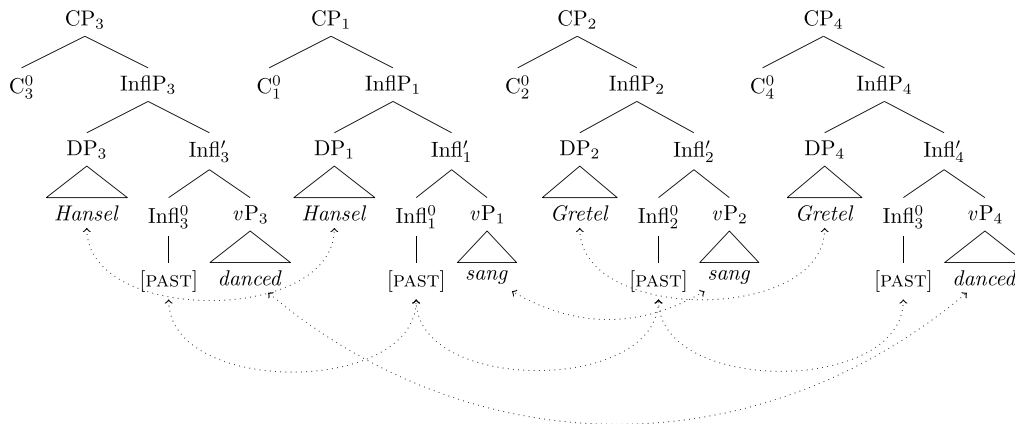
- (89) Availability of coordination below an expletive
It snowed and rained.

This issue is closely related to the notion of Law of Coordination of Likes which I discuss in 3.3.3. Ultimately, however, that discussion concludes that the evidence in the previous literature provides no support for an independent, formal requirement of identity among conjuncts. Therefore, examples like (88) remain a puzzle for the time being.

Returning to the acceptable example in (85)a, its structure in (86) is sent off to PF for linearization at the same time as it is sent off to LF for interpretation—the respective reading is preserved.

In the second, conjoined reading, multiple nodes fuse due to the presence of shared Infl⁰ [PAST] as well as (at least) four other identical terminals—*Hansel*, *Gretel*, *sang* and *danced*—all four Infl⁰ [PAST] fuse together as well as shared pairs of terminals:

(90) UNION of (85)b—conjoined reading



The result of this UNION operation is that there are no distinct CP nodes. This syntactic representation is then sent off to PF where the output of linearization is identical to that of the first reading, but crucially, it is treated differently at LF, resulting in the conjoined reading.²⁹

It is important to reiterate at this point that the addition of the UNION operation is independent of the properties of two-dimensional syntactic objects listed in (83) *within* a plane (including after the application of one or more instances of the UNION operation). Therefore, for now, I am assuming that all syntactic operations *within* a base clause proceed in the typical way. However,

²⁹ There are also two other interpretations available where Hansel and Gretel danced (together) and Hansel and Gretel sang (also together but at another time) vs. Hansel sang and danced (i.e., sang while dancing) and Gretel sang and danced (independently from Hansel). This might suggest that UNION is an operation over pairs of clauses and depending on the ordering of UNION of pairs of clauses we might arrive at different interpretations if the earlier iteration of UNION is independently sent off to LF before they become the input to the later iteration of UNION. I leave the discussion of the interpretation of post-UNION structures to section 3.3.10.

what is of particular interest is how the same operations proceed *across* parallel planes. In order to unpack this question, we will need to make certain assumptions about the nature of node-fusing that are not explicit in the original proposal. The following section is a sketch of a possible adaptation of the original parallel-structure approach. The most relevant domain within which we need to consider this question is the domain of agreement which will be discussed later in 3.3.1.

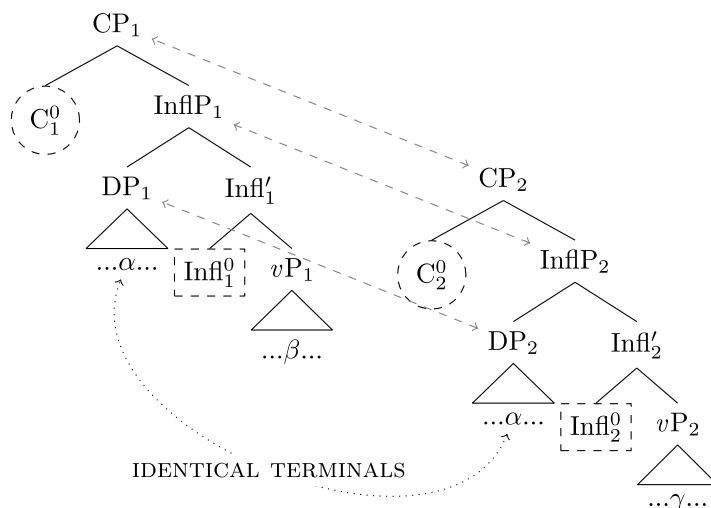
3.2.1.1 Adapting the parallel-structure approach

In this section, I adapt the original parallel-structure approach by Goodall by adding certain details that will prove necessary in order to explain more empirical data. I focus on the following two questions. First, what is the nature of the UNION operation, particularly the node fusing part? Is it obligatory or optional? What does it mean for nodes to be identical? Second, what is the nature of Spell-Out in a system that includes UNION? Does it happen only once at the end of the entire derivation or can there be multiple Spell-Outs, as argued in the recent literature on Phase Theory?

Let us begin by addressing the question of UNION and fusing first. The original proposal does not explicitly state whether co-fusing applies also to the nodes that are a part of the co-fused projections but themselves do not dominate the fused terminals—in this case, C_1^0 and T_1^0 in (84) repeated below for convenience:³⁰

³⁰ This is a broader gap in the original proposal, which does not discuss any functional nodes besides the top S. The entire discussion focuses on nodes that contain lexical items, like N and V.

(91) Co-fusing of non-dominating nodes in parallel-structure model



There are two, orthogonal motivations for co-fusing these nodes that result in slightly different predictions. First, we could assume that these nodes co-fuse as well, in order to maintain the uniformity of endocentricity—i.e., that a single, fused XP has exactly one X head. Despite this potentially simple justification, I will show that with a more fleshed out theory of identity of functional nodes C^0_1 and T^0_1 in (91) fuse independently of the subject DPs. The proposal of fusing heads as a result of endocentricity raises an issue for sentences with non-identical specification of function heads. For example, in the case of (87) above, I proposed that if Infl^0 heads have a different temporal specification (e.g., [PAST] and [PRESENT]) they do not fuse. We might therefore expect to run into a conflict of instructions whenever endocentricity forces Infl^0 heads to fuse but their actual content is non-identical:

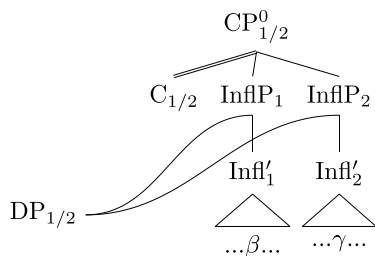
(92) UNION of clauses with distinct features of Infl^0

- a. A witch had cooked a stew.
- b. A witch will make sandwiches.
- c. A witch had cooked a stew and will make sandwiches

(92)a and (92)b above share a subject in the Spec-InflP position. According to the assumption entertained so far regarding co-fusion of containing nodes and endocentricity, we predict that Infl^0 would fuse. However, the two Infl^0 heads are distinct, not only with respect to features but also

overt lexical material *will* and *had*. In (92)c we see that they do not fuse (and do not resolve) but continue to be distinct in each conjunct. Let me sketch three possible alternative analyses of this data. First, we might posit that the shared subject is in a higher position than Spec-InfIP, e.g., it is topicalized above InfIP. Then, fusion of that topicalization projection allows us to maintain a non-fused InfIP and Infl⁰ below the topicalized subject. Second, we might loosen the restriction on endocentricity and propose that in cases of contrastive, non-resolvable content of heads, they do not participate in co-fusion. Last but not least, we might maintain strict endocentricity and instead loosen the restriction on co-fusion of containing nodes. In other words, the higher nodes containing the identical fused terminals do not automatically fuse by the sheer virtue of containing fused material but rather they fuse, and only when their own heads are identical across two input conjuncts. I will assume the last proposal, i.e., no co-fusion based on containment, only fusion based on identity.³¹ The result of abandoning automatic co-fusion triggered by any dominated fused terminal is that a fused subject DP in (92)c is multidominated by two InfIPs, one in each distinct plane:

(93) Output of UNION of (92) without dependent co-fusion (double edges connect fused nodes)



Let us now dive deeper into the issue of terminal identity and subsequent fusion. Consider a pair of sentences and the output of their UNION below:

³¹ Whether certain features stand in an identity relation or not is an independent issue. See e.g., Ranero (In prep)'s work on identity in voice features and in gender features.

(94) Subject coordination

- a. Snow White sleeps.
- b. The seven dwarves sleep.
- c. Snow White and the seven dwarves sleep.

(94)a and (94)b share not only the verb but also Infl^0 [PRESENT]. I proposed above that each of these pairs of nodes fuse due to their respective identities. However, one might be concerned about the distinct agreement on the two Infl^0 heads—singular in (94)a and plural in (94)b. Crucially, following the discussion in the previous chapter, I assume that in the first step of phi-agreement, i.e., AGREE-LINK, a syntactic relation between a probe like Infl^0 and a goal like DP does not result in feature valuation on Infl^0 . Therefore, at this stage, there is not yet any difference between the two Infl^0 heads that could constitute a contrast for the sake of fusion with another Infl^0 . In other words, the Infl^0 s in the input clauses above *do* fuse. I return to the consequences of this fusion of distinctly Agree-Linked Infl^0 heads in the next chapter when I discuss phi-feature resolution under coordination.

We need to also ensure that the fusion operation pays attention not only to the content and identity of the node but also its position. For example, take two following two sentences which share all of the lexical items but not their positions in the clause:

(95) Input clauses to UNION with shared lexical items in distinct syntactic positions

- a. A wizard saw a witch.
- b. A witch saw a wizard.

Even though there are two identical DPs *a wizard*, two DPs *a witch* and two V^0 s *see* in the two clauses, it would be undesirable to allow them to fuse into a surface sentence like *A wizard saw a*

witch. or *A witch saw a wizard.* (it would also be unclear where to insert the linking element *and*).

The only UNION that can take place over sentences in (95) results in the following:³²

(96) Output of UNION of (95)

A wizard and a witch saw a witch and a wizard (respectively).

Thus, fusion has access not only to the information about the content of the terminal but also its position in the clause. What exactly this information about the position in the clause may look like is a question that is part of the broader issue of identity. While this topic requires a more thorough investigation (see footnote 31), let me briefly sketch two possible ways we can represent structural positions and then outline the problems both of these approaches face. First, structural-position information corresponds to theta-role information to some degree. However, requiring theta role identity for fusing as a result of UNION is too restrictive (see also section 3.3.8):

(97) Distinct theta roles of the surface non-coordinated subject

John hunted tigers and was killed by a snake.

Under the analysis where the example above is the output of UNION of two sentences *John hunted tigers.* and *John was killed by a snake.*, the identical terminal *John* is able to fuse due to its identity of the syntactic position (subject) and despite the non-identity of the theta roles (agent and theme respectively).

On the other hand, some strictly syntactic approaches to the structural identity issue might not be restrictive enough. Let me now sketch an alternative where each terminal is specified with information about its sister and/or mother. To illustrate how this approach will overgenerate, consider the following example:

³² The sentence may ultimately turn out to be unacceptable due to Principle C violation but UNION itself has nothing to say about it. I return to the issue of binding in section 3.3.6.

- (98) Input clauses to UNION with shared lexical items in distinct syntactic positions
- a. A wizard saw a witch's cat.
 - b. A witch's cat saw a wizard.

In both sentences in (98), the DP *witch* is a sister to D' under X' structure, or D under Bare Phrase Structure, and it is a daughter of another DP (the extended projection of *cat* in both sentences). If sharing this information was enough, the terminal *witch* in both these sentences could fuse. This result is undesired—fusing possessors that are a part of a larger DP in distinct structural positions needs to be ruled out by the grammar. However, if we revise this proposal to include information about all dominance instead of just immediate dominance, we are able to address the issue above. A version of such proposal was put forward by Rudin (2019, p. 258) for identifying a matching structure in calculating ellipsis site:

- (99) Structure matching (Rudin, 2019, p. 258)
 A node *n* in domain *d* structure-matches a node *n'* in domain *d'* iff *n* and *n'* are dominated by an identical sequence of immediately dominating nodes within *d* and *d'*.

Given this approach to structure matching, the two nodes with an identical lexical terminal *witch* in (98)a and (98)b are specified with the following information:

- (100) Structural (dominance) information specified for the nodes with a terminal *witch* in (98)
 DP *witch* in (98)a DP – V – VP – T – TP – C – CP
 DP *witch* in (98)b DP – T – TP – C – CP

According to (100), the structural information on the two nodes compared for the purpose of identity do not match thus fusing is not possible. This approach to encoding structural identity, without any further stipulations, predicts that some conjuncts in examples of Right-Node-Raising would not be structurally identical and thus, these examples could not be constructed via UNION:

identical as in (102). A second possibility is making a reference to abstract indices, that would also account for the grammaticality of sentences like the one below:

(103) Subject coordination with phonologically identical content and different referents

- a. [A witch]_i saw a cat.
- b. [A witch]_j saw a cat.
- c. [A witch]_i and [a witch]_j saw a cat.

In other words, a sensitivity to conflicts in referential indices could be another way of assuring non-identity of the terminals or projections. Finally, it is possible that UNION itself is optional rather than obligatory. The drawback of this solution is the possibility of generating structures like the one below:

(104) Object coordination with partially non-fused subject under optional UNION

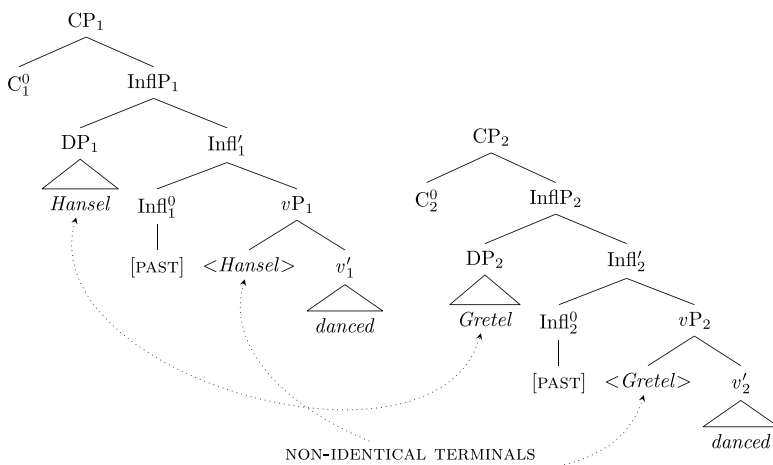
- a. A witch bought a cat.
- b. A witch bought a rabbit.
- c. * A (and) a witch bought a cat and a rabbit.

For the purposes of this thesis, I will assume a combination of the first and last explanation (and stay agnostic as to the second one regarding indices). If the nouns in two DPs are distinct but other material in their extended projection (e.g., determiners) is identical, their UNION is optional. As a consequence, we might get either DP coordination (extended projections do not fuse at all) or a smaller coordination, e.g., determiners fusing above NP (coordination of only strictly non-identical terminals). By analogy, if the verbs in a clause are distinct but other material in their extended projection is identical, e.g., v^0 , we may get a VP or vP (or larger up to CP) coordination. On the other hand, if the nouns in two DPs underwent UNION as in (104)c the identical functional material must fuse as well. (If the functional material is non-identical, it results in ungrammaticality as in (87)).

Before I turn to the second area of novel assumptions that need to be made for the parallel-structure approach, there is one more issue of (non-)identity I have been ignoring for now, namely traces or copies of moved terminals. For the sake of exposition, I will assume the Copy Theory of movement; however, the Trace Theory is fully consistent with the proposed assumptions as well. Every moved element in a syntactic structure leaves behind a copy that can then be read off e.g., at LF with all the original properties of the merged element. Some copies are not pronounced at PF, and one copy (not necessarily the pronounced one) is interpreted at LF (the notion of Coherent-LF in Hornstein, 1995). According to the vP -internal subject hypothesis, every external argument is base-generated in a specifier of vP but then it may move up to a specifier of a InflP to become a surface subject of a sentence. I am assuming that this hypothesis holds equally for non-coordinated and coordinated DPs in subject position. Consider an example with coordinated DPs in subject position, along with their lower copies:

(105) UNION with non-identical subjects

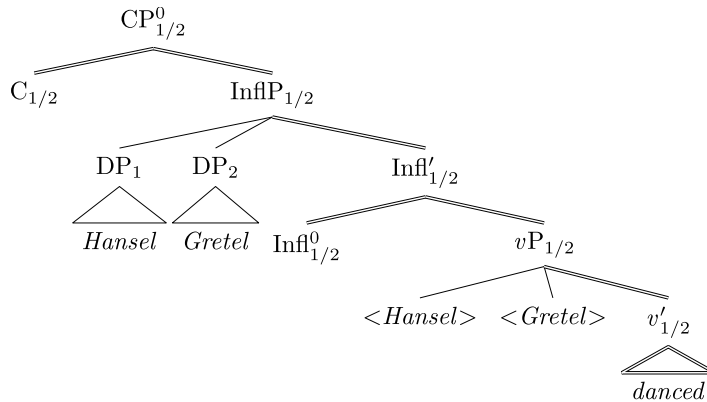
- a. Hansel danced.
- b. Gretel danced.
- c. Hansel and Gretel danced.



In the structure above, only the non-identical terminals are marked with loosely dotted arrows. These are the subject DPs in the Spec, InflP position as well as their copies in the Spec, vP . Given

the non-identity of the copies, I assume that they do not fuse either, and instead constitute another coordination in the output clause:

(106) DP coordination in the subject position and their copies (double edges connect fused nodes)



For the sake of simplicity, I will ignore that coordination of copies in my diagram representations unless it is relevant, e.g., for LF interpretative purposes.

Let me now turn to another novel assumption about the mechanics of the parallel-structure approach, i.e., its interaction with phases and Transfer to the PF and LF interfaces. The original proposal stated that UNION can take place only over full CPs and its output is then shipped off to the interfaces. In other words, nothing smaller than a CP was sent off to the interfaces. I propose to update this analysis given the development of Phase Theory (Chomsky, 2000, 2001, 2001) and the notion of multiple Transfers (or Spell-Outs) (Uriagereka, 1999, 2012). I maintain that analyzing coordination as a result of the UNION operation of two syntactically well-formed clauses is compatible with the Phase Theory. There are many different, sometimes contradicting analyses of phases, with variations regarding (i) which heads constitute phases and whether they are inherently a phase head or whether they become a phase head during the course of the derivation, (ii) whether elements within a phasal domain become inaccessible upon completion of a phase for all syntactic operations, or just a subset of these (e.g., MOVE vs. AGREE), (iii) whether completing a phase always corresponds to simultaneous syntactic inaccessibility, PF Transfer and LF Transfer.

My goal in this section is not to argue for which version of the Phase Theory is ultimately the right one. Rather, a particular view of phases might help us evaluate the relative successes of the parallel-structure approach to coordination compared to its competitors described next in 3.2.2 and 3.2.3. Below I sketch some details of the interaction of the parallel-structure model of coordination and phases.

A phase is a unit of a syntactic derivation that consists of three elements: a phase head, its complement and its specifier. When a phase is complete (and when exactly it is, is another debate in the literature), its complement becomes, for all intents and purposes, an atom that cannot be altered from outside the phase by syntactic operations like MOVE, MERGE or perhaps AGREE(-LINK). It is commonly assumed that cross-linguistically C^0 , v^0 and D^0 constitute phase heads (Citko 2014). In other words, in all languages a run-of-the-mill transitive clause with two DP arguments consists of four phases (bolded below) - a CP phase, a vP phase and two DP phases:

(107) Phases in a transitive clause with two DP arguments

[**CP** [**DP** A witch] [_{InflP} [**vP** [**vP** bought [**DP** a cat]]]]].

Such a syntactic atom may also be a unit as far as interfacing with morphophonology and semantics is concerned. This atom can enter into further derivation but crucially its properties will not change.

Below I offer a brief sketch of three properties of Phase Theory that interact in an interesting way with the parallel-structure model—inaccessibility of phases for outside syntactic operations, (iterative) Transfer of phasal material to LF and its effect on scope interpretation, and (iterative) Transfer of phasal material to PF and its consequences for linearization and prosody.

First, as already mentioned above, a complete phase is inaccessible for outside syntactic operations like MOVE and AGREE. Given the lateness of UNION in the derivation, I assume that indeed this can be maintained—there is no movement or syntactic agreement coming from inside any of the

phases. In a nutshell, there is no MOVE or AGREE operation that needs to be explained in sentences with coordination derived via UNION in any other way than such operations need to be explained in sentences without coordination. All movement and AGREE take place within each conjunct, pre-UNION. For example, in sentences where surface coordination is clefted, movement occurred individually for each conjunct DP:

(108) Clefting pre-UNION

- a. It was Pat that fixed the sink.
- b. It was Mat that fixed the sink.
- c. It was Pat and Mat that fixed the sink.

In 3.3.4, I will show how this analysis lends itself to a straightforward explanation of the Coordinate Structure Constraint. Before I discuss the consequences that such a model has for interpretation, let me observe that the Phase Theory opens a question about the operation of UNION itself. I will assume that UNION is not an operation that changes the syntax within a phase in the way that MOVE and AGREE are.³³

Further, upon completion of a phase, its domain may be sent off to the LF and/or PF interfaces for further morphophonological or semantic operations. There is rich research into the role that phasal domains play at the interfaces, however it is crucial to keep in mind that there are phonological and semantic phenomena as well that disobey phasal boundaries or obscure the PF or LF mapping at the interfaces. For example, binding may happen across phasal boundaries, and ellipsis may delete any effect of phonological derivation within the ellipsis site. (And note that, crucially, ellipsis can delete structures much larger than a single phase.) Therefore, effects of phasehood on

³³ Alternatively, we may assume that not all syntactic operations are subject to phasal restriction (see arguments in favor of AGREE not being subject to phases in Bošković (2003, 2007) and Bhatt (2005)).

PF and/or LF may constitute at best a unidirectional argument—if we see a correlation between the domain of some morphophonological operation and some semantic operation, phasehood and Transfer may be implied but if we do not see such a correlation it is not evidence against phasehood. Keeping this in mind, let me now sketch a possible effect of phases on the PF and LF interfaces if coordination was to be derived via UNION.

Sending off a phasal domain to LF allows it to be interpreted as a unit and independently from alterations due to later syntactic derivation. Multiple Transfers to LF, e.g., pre- and post-UNION might in fact be desirable. Consider the scopal ambiguity of the following sentence:

(109) Scope-taking quantifier and coordination

Nobody saw Pat and Mat.

- a. SCOPE OVER ENTIRE COORDINATION: There is no individual such that this individual saw both Pat and Mat (but there are individuals who saw just Pat or just Mat).
- b. SCOPE OVER EACH CONJUNCT: There is no individual such that this individual saw Pat and there is no individual such that this individual saw Mat (and it entails that there is also no individual that saw both Pat and Mat).

This ambiguity is accommodated by a parallel-structure model where Transfer to LF takes place (at least) twice: first, pre-UNION where *nobody* takes scope over each conjunct individually and second, post-UNION where *nobody* takes scope over the entire coordination of DPs. I will argue in 3.3.10 that alternative approaches to coordination that involve subclausal conjunction without any derivation cannot straightforwardly account for this ambiguity. Overall, the issue of LF Transfer and interpretation requires more investigation. Let me flag at this point that late LF Transfer would handle over semantics unboundedly-large chunks of material for interpretation all at once. It is undesired from the perspective of preservation of locality in semantic interpretation. On the other hand, if LF Transfer can take place only at or post-UNION, it constrains us to the LF Transfer of such large chunks. Otherwise, some of the appeal of the original proposal would be lost (e.g.,

handling the respective reading in (85)). The discussion on the PF Transfer as well as the empirical data presented in the following subsections suggest that it is indeed a complex problem and requires much more attention than I can provide in the scope of this thesis.

As far as PF Transfer is concerned, it is commonly assumed that a phasal domain establishes the order of constituents within it and such order cannot be altered (Fox & Pesetsky, 2005; cf. M. Richards, 2007). UNION preserves the linear order within and between phases. Consider UNION of two simple clauses resulting in subject coordination:

(110) Linearization within a conjunct clauses and post-UNION

- a. [CP₁ [InfIP₁ [DP₁ > [NP₁ Witches] > [T⁻¹ slept]]]]
- b. [CP₂ [InfIP₂ [DP₂ > [NP₂ Wizards] > [T⁻² slept]]]]
- c. [CP_{1/2} [InfIP_{1/2} [DP_{1/2} > [NP₁ Witches]
[NP₂ Wizards] > [T^{-1/3} slept]]]]

Linearization of (110)a states that *witches* precedes *slept*. Linearization of (110)b states that *wizards* precedes *slept*. After UNION and fusion, *witches* still precedes *slept* and so does *wizards* (110)c.

What post-UNION linearization does is adding information, i.e., linear order of *witches* with respect to *wizards*, rather than alter or delete any of the pre-existing information. In sum, parallel-structure assembled using the UNION operation are generally compatible with cyclic-linearization proposals.

Further, sending off a completed phasal domain to PF maps such a domain onto a distinct prosodic unit. I will describe below the predictions that this mapping makes; however, it is important to point out that this mapping is part of the competence module. As we have seen in chapter 2 on agreement, the predictions generated by the competence model might be mitigated by the factors associated with performance module. Prosody in coordination is in fact an empirical domain where such performance-obscuring-competence interaction has been observed (Hirsch & Wagner, 2014,

2016). The following is therefore not so much a full-fledged experimental design ready to be tested but more of a thought experiment based on the parallel-structure approach to coordination and the proposal regarding prosodic mapping by Wagner (2005).³⁴

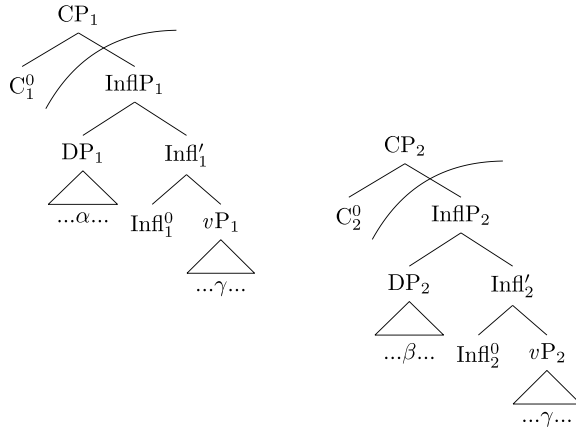
Despite the presence of syntactic hierarchy, prosody within a domain is flattened; only the edges are abstractly marked. Each phasal domain with assigned prosodic boundaries, essentially an atom, can enter into further derivation. Next, a larger syntactic structure creates a phase, this atom is sent off to PF, and the prosodic boundaries are assigned again. Thus, we end up with a recursive mapping of prosodic edges reflecting the underlying phasal history of the derivation. In the course of this prosodic derivation earlier boundaries are not erased but are adjusted for their strength. The end result is instructions about the relative strength of these boundaries. The prediction that this view on prosody makes with respect to the parallel-structure approach to coordination is that in some configurations two prosodic boundaries will coincide due to UNION and in other configurations they may not. Let me now illustrate this prediction more concretely.

Wagner (2005) does not argue for particular syntactic heads being phasal heads but following a common claim that CPs are phases, we might assume that CPs or InflPs are where the prosodic

³⁴ Wagner's approach to prosody is distinct but not incompatible with another popular approach to prosodic structure, i.e., the Match Theory (Selkirk, 2011) where each CP/IP maps to an intonational unit, each XP onto a phonological phrase and each X⁰ onto a prosodic word. Wagner proposes that CP/IP are not the only intonational units; any other syntactic phases constitute such units as well; he does not deal with phonological phrases.

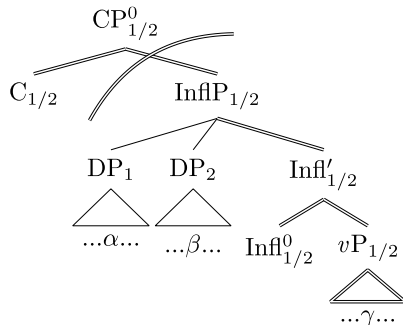
edges are marked.³⁵ Therefore, structurally speaking, in sentences with subject coordination, the prosodic edge is above InflP and not immediately adjacent to the coordination itself:

(111) Prosodic units within each constituent clause (before UNION)



Even if on the surface the coordination appears at the left-edge of the sentence, we do not predict the prosodic boundary to change in any way after the UNION:

(112) Prosodic unit after UNION



³⁵ Wagner argues that whatever the phase heads may be, the prosodic units created due to phases correspond to interpretative units. In other words, Transfer to PF and LF is synchronous. Given that some PF vs. LF diagnostics for Transfer give conflicting evidence, it has been proposed that the two types of Transfer need not be in sync (Cecchetto, 2004; Fesler, 2004; Marušič, 2005) or one can be delayed with respect to the other (Bachrach & Katzir, 2009). Given the counterevidence to PF-LF correspondence, I leave this issue for future research.

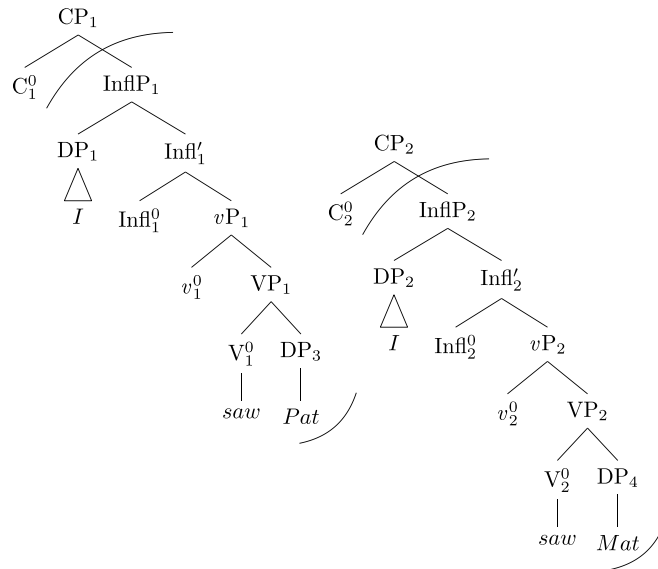
Crucially, we do not predict any special prosodic boundary to exist if coordination was built via UNION as opposed to direct MERGE (as in a model adopted in Wagner (2005) or an adjunction model discussed in 3.2.2).

On the other hand, we might predict that non-coinciding prosodic boundaries might be detected in sentences where UNION results in a coordination of two constituents at the bottom of the structure, i.e., the right edge of a phase and a sentence, unlike in the left edge example above in (112):

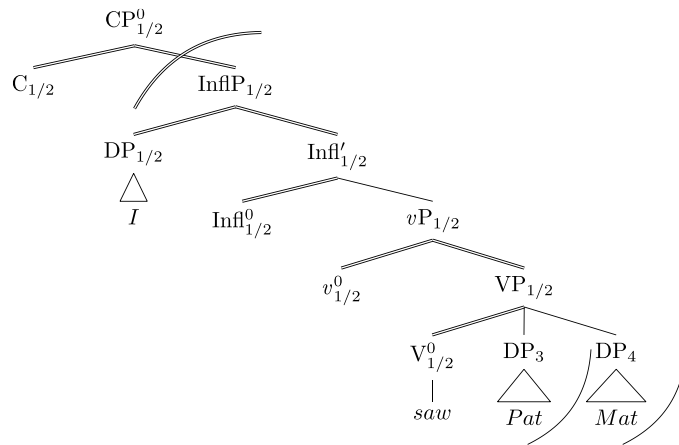
(113) Coordination at the right phase edge and the prosodic boundaries (vertical lines)

a. I saw Pat |

b. I saw Mat. |



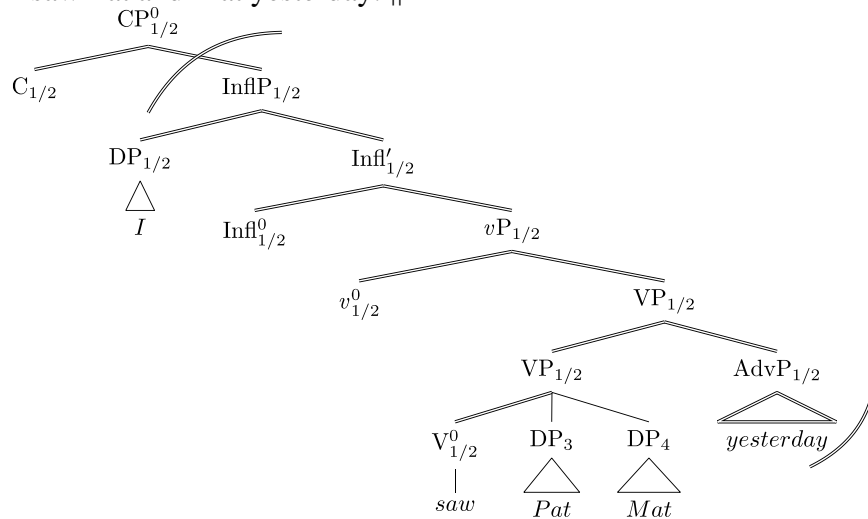
- c. I saw Pat | and Mat. |
 I saw Pat and | Mat. |



Moreover, in a sentence where two DPs are coordinated at the right edge of the sentence we expect that a prosodic boundary associated with that right phase edge will not occur between the coordinated DPs if there was more shared material on the right edge:

(114) Coordination near the right phase edge the prosodic boundaries (vertical lines)

- a. I saw Pat yesterday. |
 b. I saw Mat yesterday. |
 c. I saw Pat and Mat yesterday. ||



As the topic of this thesis is neither prosody nor phases, and only indirectly the syntactic structure of coordination, I leave testing this prediction for future research. Ultimately, this boundary might

be obscured by other prosodic processes that generally make the correspondence between syntactic and prosodic structure opaque (see for example discussion in Clemens (To appear) and references therein) or performance considerations as mentioned earlier.

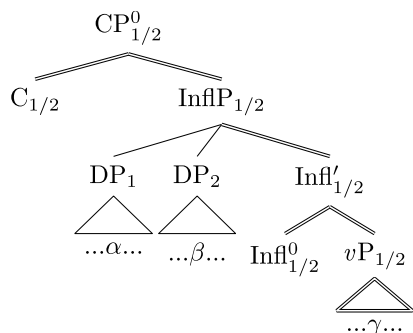
Besides prosody, there are other phonological properties that are analyzed as making reference to syntactic structure and particularly phases (e.g., sandhi phenomena). In a similar vein to my remarks regarding prosody, these issues are outside the scope of this thesis, but I hope that the work in this chapter will contribute to their investigation using the tools explored here.

Below is a summary of the key properties and consequences of the parallel-structure approach to the syntactic structure of coordination that will allow us to evaluate its appropriateness with respect to some empirical properties in 3.3:

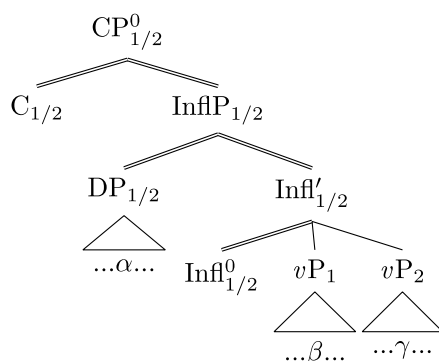
(115) Summary of the properties of the syntactic structure of coordination under the parallel-structure approach	
RELATION BETWEEN THE COORDINATION AND THE REST OF THE STRUCTURE	each input sentence must be a well-formed clause; each (surface) conjunct must be category- and lexeme-selected by a higher head
CONSTITUENCY	no <i>andP</i> ; no obvious way that a linking element <i>and</i> forms a syntactic constituent with either conjunct
HIERARCHY	flat; no c-command relation between conjuncts

For the sake of exposition, below are two diagrams of the output of the UNION operation, one representing a simple subject DP coordination and one for *vP* coordination (where $1/2$ subscript indicates fused nodes, double edges indicate the relation between fused nodes, and single edges connect parallel planes):

- (116) Result of UNION operation—subject coordination in parallel planes
e.g., A witch and a wizard slept.



- (117) Result of UNION operation—vP in parallel planes
e.g., A witch sang and danced.

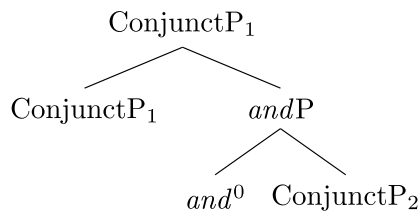


With these properties and adaptations of the parallel-structure approach, we are now ready to turn to describing the mechanics of two other popular approaches, i.e., what-you-see-is-what-you-get, with a focus on Munn (1993)'s model, and the clausal conjunction model, with PF reduction in place of fusion.

3.2.2 Two-dimensional, underlying subclausal conjuncts analysis

An alternative approach to coordination involves a what-you-see-is-what-you-get two-dimensional structure. The surface coordination is also the underlying coordination. There is no derivation that turns clausal coordination into subclausal coordination, but rather MERGE of one conjunct with another (or with the coordinator, or with the constituent formed from merging the coordinator with another conjunct)—followed by a MERGE of this complex syntactic object with the rest of the clause:

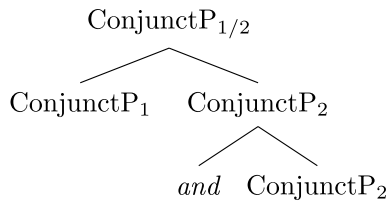
(118) Subclausal coordination—adjunction model (Munn, 1993)



There are other versions of this approach that I briefly contrast below. What they all crucially share is that the surface conjuncts are also the underlying conjuncts, i.e., they may be smaller than a clause and do not need to undergo any derivation or reduction. This is one of the advantages of the approach. However, all versions of this approach require a stipulation about the category of the projection. In most cases, there is a designated coordination head that projects (sometimes labelled Boolean Phrase, CoordinationP, &P, or *andP*). Some versions also propose that the category of the entire coordination is the same as the category of an individual conjunct (or both conjuncts). This shared category is supposed to capture the empirical observation about the distribution of the entire coordination matching the distribution of its conjunct(s)—I will return to this observation in section 3.3.2 on lexeme- and category-selection. In the meantime, let me contrast different versions of the WYSIWYG approach in light of the categories involved. The adjunction model in (118) posits that there is an *and*⁰ that selects for a complement. The result is *andP* that in turn, adjoins to another conjunct. The result of this adjunction is a phrase with the category of the higher conjunct reprojecting. Without any further stipulation, this model predicts that the distribution of the entire coordination matches the distribution of the highest (and in English, linearly first) conjunct; the category of the second conjunct does not matter for the purpose of c- or l-selection by a higher head.

Another version of an adjunction model by Al Khalaf (2015) claims that the linking element *and* adjoins directly to the conjunct and the category of the conjunct projects:

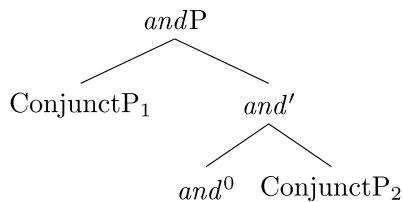
(119) Subclausal coordination—adjunction model (Al Khalaf, 2015)



The two models share a property of coordinate structure where the top label contains (some) featural information about both conjuncts. I will discuss later in the section 3.3.1 on agreement and 3.3.2 on selection how this information gets there. The main difference between the two models is that for Munn there is no special syntactic relationship between two conjuncts, i.e., they may be of different syntactic categories and only the top one is selected for by a higher head, while Al Khalaf’s model is more restrictive and requires some syntactic identity between categories of conjuncts. Again, I will return to this issue in the section 3.3.2 on selection as well as 3.3.3 on Law of Coordination of Likes.

Both adjunction models contrast with a model where *andP* is the maximal projection of the entire coordination phrase with one conjunct in the specifier position and one in the complement:

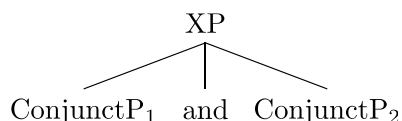
(120) Subclausal coordination—Specifier-complement model (Kayne, 1994)



This specifier-complement model needs to further stipulate what governs the distribution of *andP*. For example, one might propose that the features of one (or each) conjunct percolate up to the top

projection and are thus accessible by any higher selecting or probing heads.³⁶ Again, I will return to the topic of selection in section 3.3.2 of this chapter. This percolation stipulation will also be relevant for the issue of agreement discussed in section 3.3.1. In the meantime, let me turn to the final version of subclausal coordination, one with a flat internal structure:

(121) Subclausal coordination—flat structure model



The label XP in (121) is a placeholder for a variety of categories—some approaches like Gazdar, Klein, Pullum, & Sag, (1985) posit lack of endocentricity in coordination (a multiply-headed phrase) but in principle it could also be a category of any (or both) of the conjuncts, or *andP*. The labeling of the coordination phrase thus depend on the independent assumptions about labeling of a flat syntactic object.

As the goal of this chapter is to contrast what empirirical predictions are made by different approaches to the syntactic structure of coordination, I will focus on Munn’s adjunction version of the WYSIWYG approach, since it is the most unlike the parallel-structure approach. Below is a side-by-side comparison of some key properties of the two appraoches:

³⁶ Al Khalaf’s model makes further assumptions that also play a role in selection: (i) all the syntactic structure is built top-down (Phillips, 1996), (ii) categorial features resolve just like it is often (but not in this thesis) assumed phi-features resolve.

(122) Comparison of parallel structures and two-dimensional adjunction models

	PARALLEL-STRUCTURE	TWO-DIMENSIONAL ADJUNCTION
RELATION BETWEEN THE COORDINATION AND THE REST OF THE STRUCTURE	each input sentence must be a well-formed clause; each (surface) conjunct must be c- and I-selected by a higher head	only the first conjunct must be c- and I-selected by a higher head
CONSTITUENCY	no <i>andP</i> ; no obvious way how a linking element <i>and</i> forms a syntactic constituent with either conjunct	<i>andP</i> & <i>ConjunctP</i> ₁ ; the linking element <i>and</i> and the second conjunct form a syntactic constituent
HIERARCHY	no c-command relation between conjuncts	first conjunct c-commands the second conjunct

I will now turn to the third approach, i.e., clausal conjunction with reduction, which was not only the original approach to the syntactic structure of coordination but also represents a middle-ground between the parallel-structure approach (underlying full clausal conjuncts) and the WYSIWYG approach (two-dimensions).

3.2.3 Two-dimensional, underlying clausal conjuncts analysis

An alternative analysis of coordinate structure posits that all coordination is underlyingly clausal coordination, sometimes followed by a transformation reducing redundant material. It is the earliest analysis (Chomsky, 1957) and it is still argued for today (Schein, 2017).³⁷ In *Syntactic*

³⁷ There is also a version of this conjunction reduction approach that involves conjunction of constituents that are underlyingly smaller than a CP, e.g., a surface DP&DP coordination in the object position as derived from a *vP*&*vP* coordination (Hirsch, 2017).

Structures (Chomsky, 1957) two full, nearly identical clauses were combined. The syntactically corresponding but lexically non-identical material from the second clause was simply added to the first clause and the rest of the material in the second clause was removed:

(123) Conjunction transformation (Chomsky, 1957)³⁸

Structural analysis:

S₁: W₁-X₁-Z₁

S₂: W₂-Y₂-Z₂

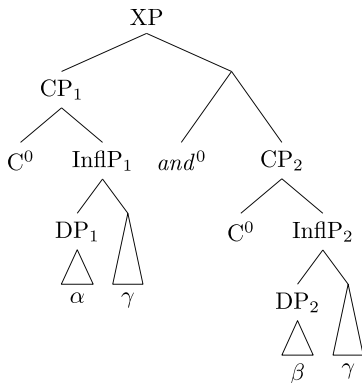
where X₁ and Y₂ are constituents of the same kind

Structural change:

S₃: W₁-X₁ and Y₂-Z₁

In this narrow sense, the approach to coordination where a transformation operates over full clauses mirrors Goodall's proposal described above in 3.2.1. However, with the transition to the Government & Binding framework, the structural analysis part stayed largely the same, but the structural change part did not. First, full clauses were conjoined:

(124) Underlying input in a two-dimensional derivation analysis—subject coordination³⁹



³⁸ The assumption about constituency in this structural analysis of conjunction is also the reason why conjunction is often a test for constituency.

³⁹ In this diagram I am assuming a hierarchical structure. This assumption is not necessary, i.e., the clausal reduction approach is consistent with a flat structure. However, for the sake of exposition and consistency, I am assuming a

Second, the nature of the removal of the material in the second clause was made more explicit. It was assumed that the removal is a reduction at PF. Instead of fusing the redundant nodes in syntax, as in Goodall's parallel-structures proposal, these extra nodes were assumed to be deleted at PF. On the empirical side, this analysis is fairly successful in that it is able to account for a wide range of data. However, in order to derive the attested surface strings, deletion needs to be a fairly powerful and unconstrained operation. Ultimately, this lack of constraints on deletion causes a serious overgeneration problem. Goodall (1987, p. 18) shows that sometimes non-constituents would need to be deleted (125), deletion would need to apply in the right-hand conjunct (125), vs. in the left-hand conjunct (126), and deletion would need to be followed by regrouping constituents (127)—properties that do not have a straightforward parallel elsewhere in the grammar:

- (125) Reduction of non-constituents, right-hand conjunct - coordination in object position (Goodall, 1987, p. 18)
- a. [The old man fed the birds] and [the old man fed the squirrels].
 - b. [The old man fed the birds] and [~~the old man fed~~ the squirrels].
 - c. The old man fed [the birds and the squirrels].
- (126) Reduction of constituents in the left-hand conjunct—coordination in subject position (Goodall, 1987, p. 18)
- a. [Louise rode bicycle(s)] and [George rode bicycle(s)].
 - b. [~~Louise rode bicycle(s)] and [George rode bicycle(s)].~~
 - c. [Louise and George] rode bicycles.
- (127) Reduction and regrouping of constituency—‘respectively’-type of coordination
- a. [Tom eats bread] and [Jane eats crackers].
 - b. [~~Tom eats bread~~] and [Jane eats crackers].
 - c. [Tom and Jane] eat [bread and crackers] (respectively).

more common hierarchical structure here. As I will show in 3.3.5, 3.3.6 and 3.3.7, there is no conclusive evidence for a hierarchical vs. flat structure in coordination, and thus the ultimate argument against adopting this approach will not rely on this issue.

In sum, formulation of the deletion operation would require extending the generative power of grammar and at the same time restricting it to a specific construction. From the point of view of the parsimony of the theory, this is not a desirable solution.⁴⁰ On the other hand, in 3.2.1.1 I showed that the operation of UNION also needed further adaptations in order to account for a range of data. Ultimately the constraints on both the deletion operation under the two-dimensional approach and the UNION operation under the parallel-structure approach would need to be investigated in greater detail than the scope of this thesis allows. For now, I have shown no real advantage of one approach over another. Foreshadowing the next section, I will propose that the superiority of the parallel-structure approach lies in the explanatory power it provides for resolved phi-agreement. However, I will *not* argue against the clausal reduction approach for examples with Closest Conjunct Agreement (Arsenijević et al., 2020). In fact, it might be the most attractive approach for this particular corner of grammar. I return to this issue in 3.3.1.1.

This section concludes a three-part overview of the different approaches to the structure of coordination—three-dimensional coordination (parallel-structure), two-dimensional subclausal coordination (adjunction), and two-dimensional clausal coordination (clausal reduction). In (128) is a summary of the key properties.

I will assume the first model, as it has the greatest potential to shed light on the nature of resolved agreement with coordinations. It has an advantage over the adjunction model with respect to selection, contra Munn (1993)'s suggestion. I will show this in section 3.3.2. Furthermore, it has an advantage over the conjunction reduction model with respect to resolved agreement. I will show

⁴⁰ For another argument against a two-dimensional derivational analysis of at least some subclausal coordination, see Mendes & Ruda (2019). The argument is based on the interaction of ellipsis and first conjunct agreement.

this in section 3.3.1. Moreover, I will also briefly go over other phenomena that interact with coordination and discuss them in light of these three main models. I select a handful of phenomena that had been claimed previously to serve as evidence in favor of other models, and I will argue that contrary to previous claims, the parallel-structure approach accounts for these phenomena equally well. With the parallel-structure approach to the syntactic structure of coordination in place, in the following chapter I return to the discussion of resolution—what the language-specific and cross-linguistic empirical picture looks like, what the apparent resolution rules are, and where in the modular structure of the grammar resolution might take place.

(128) Comparison of all three models

	PARALLEL-STRUCTURE	TWO-DIMENSIONAL ADJUNCTION	TWO-DIMENSIONAL CLAUSAL REDUCTION
RELATION BETWEEN THE COORDINATION AND THE REST OF THE STRUCTURE	each input sentence must be a well-formed clause; each (surface) conjunct must be c-selected by a higher head	only the first conjunct must be c-selected by a higher head	each input sentence must be a well-formed clause; each (surface) conjunct must be c-selected by a higher head
CONSTITUENCY	no <i>andP</i> ; no obvious way how a linking element <i>and</i> forms a syntactic constituent with either conjunct	<i>andP</i> & <i>ConjunctP</i> ₁ ; the linking element <i>and</i> and the second conjunct form a syntactic constituent	depends on further assumptions about structure building and the reduction operation, e.g., without reorganization of constituents, subclausal coordination does not obey conditions on constituency
HIERARCHY	no c-command relation between conjuncts	first conjunct c-commands the second conjunct	depending on further assumptions, two clauses may or may not be in a hierarchical relation

3.3 Comparison of approaches in light of several empirical phenomena

In the previous three subsections I discussed different approaches to the syntactic structure of coordination—clausal coordination in parallel planes in 3.2.1, subclausal coordination in two dimensions in 3.2.2., and clausal coordination followed by reduction in two dimensions in 3.2.2. I will now compare how these three approaches account for several empirical phenomena side by side. I will start with a discussion of how different proposals interact with the modern approach to agreement detailed in the previous chapter. Resolved agreement is by no means the only interesting or even the most discussed empirical property of coordination. (In fact, it might be one of the most frequently put aside.) Nevertheless, it is necessary for us to understand how each of the approaches handles this domain as it is the topic of the thesis. After discussing agreement, I will present novel data that challenge Munn’s assumption regarding the lack of syntactic selection between a higher head and second (or subsequent) conjuncts. I will show that there is positive evidence in favor of syntactic selection even beyond the first conjunct. This data will constitute another piece of evidence in favor of the view that conjuncts start off as full, syntactically well-formed clauses. Finally, I will briefly go over other empirical properties that an adequate analysis of the structure of coordination should be able to account for. Among these properties are the following: properties previously claimed to show asymmetry between conjuncts (constituency, asymmetric binding between conjuncts, unbalanced case marking) and properties from the syntax-semantics interface that were used to argue in favor of one or the other model (the Law of the Coordination of Likes, plurality, scope, and theta-roles).

We will see that when considering many of these properties, none of the analyses seem to be clearly superior or clearly inferior to their competitors. Most of the evidence in favor or against each particular type of analysis is inconclusive. It is not necessarily impossible that a natural

system like human language exhibits redundancy, and at least two of the analyses are in fact possible paths to what is descriptively called “coordination.” Nevertheless, ultimately even this massively redundant system would not be able to explain why some agreement with coordination is variable or ineffable, or draw a distinction between seemingly stable vs. variable agreement resolution (the focus of the following chapter). This is the reason why I assume one particular model of coordination, the parallel-structure model of Goodall (1987), and explore the issue of agreement with coordination through the lens of this one model. The following provides a summary of the empirical and analytical strengths and weaknesses of each of the three analyses.

3.3.1 Agreement

In this section, I show that with respect to resolved agreement, i.e., agreement that expones features of more than one conjunct, the parallel-structure approach to coordination is not only successful, but also makes the fewest stipulations. In particular, once we assume the phi-agreement model presented and motivated in the previous chapter, the only element that the parallel-structure model needs to add is the mechanism of resolution itself. For the WYSIWYG approach, besides the resolution mechanism, we will need to postulate an additional step of featural percolation; the two-dimensional model predicts only single conjunct agreement.

Let me start with a recap of the discussion of the agreement operation in the previous chapter. The previous chapter established that agreement with non-coordinated arguments is a two step-process, which includes a syntactic component (AGREE-LINK) and a morphophonological component (AGREE-COPY):

(129) Agreement steps in a canonical/typical agreement scenario—competence model

SYNTAX		MORPHO(PHONO)LOGY	
RELATION	RESULT	RELATION	RESULT
AGREE-LINK	1 set of syntactic instructions	AGREE-COPY	1 set of PF instructions

This two-step analysis is based on the syntactic and morphological properties of agreement. One syntactic property is that agreement makes reference to constituents in a particular syntactic position, feeding other syntactic operations like movement (Baker, 2008; Chomsky, 1957; Preminger, 2011, 2014 a.o.). One morphological property is agreement has access to linear and morphophonological information (Arregi & Nevins, 2012; Benmamoun et al., 2009; Bhatt & Walkow, 2013; Dobrin, 1995 a.o.).

Now let me turn to how this agreement model interacts with the parallel-structure approach to coordination. Consider the following sentences:

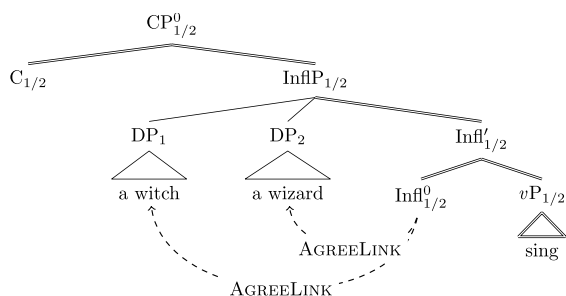
(130) Surface subject conjunction and its assumed base sentences under the parallel-structure approach

A witch and a wizard sing.

- a. [CP₁ [DP₁ A witch] [InflP₁ sing].]
- b. [CP₂ [DP₂ A wizard] [InflP₁ sing].]

AGREE-LINK, establishing a relationship between the agreement probe and the goal, is the first step of this operation that takes place as soon as the relevant structure is built, e.g., as soon as Infl⁰ merges with a constituent containing an accessible DP. AGREE-COPY, copying the values from the goal onto the probe, does not take place until post-syntax. Therefore, in each of the base clauses that form the input to the UNION operation, AGREE-LINK has taken place—in (130)a Infl₁⁰ has established a link with DP₁, and in (130)b Infl₂⁰ has established a link with DP₂. Next, UNION takes place, fusing the two VPs together, because they share the terminal *sing*. The crucial question is whether the Infl⁰s fuse as well, given that they are not strictly identical—they each have undergone AGREE-LINK with a different DP. Following the discussion in 3.2.1.1, I assume that this is indeed the case and the Infl⁰s fuse since they share featural content (e.g., [PRESENT]). The result is a single Infl⁰ that is linked (via AGREE-LINK) with two DPs, namely DP₁ *a witch* and DP₂ *a wizard*:

(131) DP subject coordination and AGREE-LINK in the parallel-structure approach



Next, we might assume that AGREE-COPY is presented with a list of information (culled from the feature-values of both DP_1 and DP_2) that somehow needs to get resolved, in order to expone this information as exactly one agreement morpheme. Note that the resolution here would necessarily take place on $Infl^0$ rather than in or on a coordination phrase. According to the derivation we just sketched, there is never a unique projection like $\&P$ that subsumes the coordination of *a witch and a wizard* in (130) to the exclusion of other constituents in the clause, and therefore no projection where resolution could take place prior to being targeted by the agreement probe on $Infl^0$. In other words, there is no node in syntax hosting the linking element like *and* as in the WYSIWYG approach. In the parallel-structure approach, *and* is the output of linearization of unfused nodes at PF. The framework of Distributed Morphology (Harley & Noyer, 1999) calls such post-syntactic operations *dissociated node insertion* (Embick & Noyer, 2007, p. 309)—insertion of morpheme without a syntactic-featural content like theme vowels. For the discussion of constituency see section 3.3.5.

At this point, let me flag that forcing phi-featural resolution under conjunction to take place on $Infl^0$ might help us explain why resolution is not grammar-based despite its grammatical-like appearance. In other words, it may help us understand the apparent robustness and invariance of phi-features resolution in certain languages (including English). I will discuss this issue in more

details in the following chapter, after introducing some basic concepts regarding resolution of phi-features under conjunction.

Before I move on to the discussion of agreement in other approaches to coordination, I would like to note that the model of agreement I assume here was put forward long after Goodall's proposal. Goodall's original work only briefly touched on the interaction of structural parallelism and agreement (1987, pp. 92–96). Since he proposed that UNION of clausal conjuncts takes place at D-structure, he hypothesized that agreement must take place after UNION. First, he eliminated the option of agreement taking place at D-structure given the behavior of expletives vs. raised subjects:

(132) Agreement with expletives vs. raised subjects

- a. It seems that the girls have arrived.
- b. The girls seem to have arrived.

If movement in general is to take place after D-structure, then raising of the subject *the girls* must have occurred after D-structure as well. We see that *the girls* controls agreement when raised in (132)b but not when in-situ (132)a. Goodall concluded that agreement takes place after subject raising, thus not at D-structure.⁴¹

⁴¹ At the point in time that Goodall published this proposal, the actual pair of sentences he used to illustrate this point (here (132)) was no longer thought to be transformationally related. Nevertheless, the same point about movement post D-structure and agreement can be made with a different pair of sentences that contrasts expletive & A-raising subject and that was still considered to be transformationally related:

- (iv) There seem(s) to be some girls outside.
- (v) Some girls seem(*s) to be outside. (transformationally derived from the expletive counterpart above)

We are now left with two possibilities—agreement at S-structure or agreement at PF. Due to the behavior of agreement in sentences with two coordinations (subjects and verbs) that may have the ‘respective’ meaning, Goodall concluded that agreement is a PF phenomenon:

(133) Agreement with subject and predicate coordinations

- a. Pat and Mat sing and dance (respectively).
- b. * Pat and Mat sings and dances (respectively).

The input to (133)a (with the ‘respective’ interpretation) are two conjunct sentences:

(134) Input conjunct sentences to (133)a

- a. Pat sing.
- b. Mat dance.

Even after the UNION (but before linearization), the subject of *sing* is singular *Pat* while the subject of *dance* is singular *Mat*. In other words, neither of the predicates has a plural subject. Therefore, if agreement was to take place before the PF linearization, we would end up with 3rd singular *-s* contrary to the facts in (133) above. On the other hand, if we assume that agreement takes place after linearization, i.e., at PF where the subject of the composite predicate *sing and dance* is now plural *Pat and Mat*, we may account for the plural agreement in (133). Goodall observed that this analysis requires that the phi-features and their mapping to a reference if a single phrase might differ from one derivational level to another (e.g., singular at S-structure but plural at PF and LF). This observation seems to be independently motivated, for example, by the requirement of collective and distributional predicates that their argument be semantically plural, but not necessarily formally plural:

(135) Collective predicates and plurality requirement

- a. The neighbors meet in the yard.
- b. * The neighbor meet(s) in the yard.
- c. Pat and Mat meet in the yard.
- d. The couple meets in the yard.

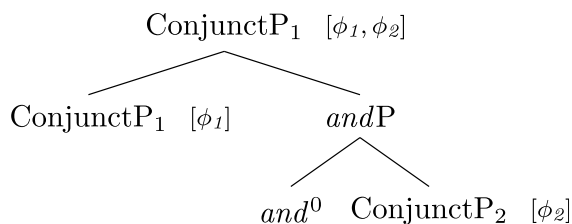
In the example above, the argument *the couple* is formally singular (resulting in singular agreement) but semantically plural. This semantic plurality satisfies the plurality requirement of a collective predicate like *meet*.⁴² In sum, the behavior of conjunction with collective predicates (further discussed in 3.3.9) shows that it is semantically plural, but we have not seen any evidence for formal plurality so far.

Returning to the discussion of agreement, the conclusion that agreement takes place at PF is in fact in line with the proposal established in the previous chapter that agreement is a two-step process (AGREE-LINK in syntax and AGREE-COPY in post-syntax). With the advancement in work on agreement, we now know that the proper analysis of agreement is more complex. Thus, I take Goodall's evidence to show that AGREE-COPY takes place at PF, while AGREE-LINK takes place earlier, in syntax. The discussion under (130) sketched how the two-step agreement model interacts with the parallel-structure model of coordination. I will elaborate on this issue in the following chapter.

Let me now turn to an alternative view of how agreement takes place in a coordination, i.e., a view where coordination projects its own phrase, as represented by the adjunction model put forth by Munn (1993) and outlined in 3.2.2. According to Munn, features of the second conjunct, i.e., an adjunct, percolate up to the top (re)projection ConjunctP₁:

⁴²Following this observation by Goodall (1987), Munn (1993) put forward an argument that there are predicates (e.g., *to be similar*) that care about the *syntactic* plurality of their agreement argument, and such predicates are acceptable with a DP coordination but not with a formally singular noun like *a couple*. I return to this issue in section 3.3.9 where I show that such predicates are acceptable with formally singular nouns and their occasional unacceptability has to do with a comparison base rather than formal features.

(136) Feature percolation in an adjunction model



Then, the phi-features are resolved, but the nature of this mechanism is not discussed—in principle the resolution could happen on Infl^0 , like in the parallel-structure approach discussed above, or on the maximal projection ConjunctP_1 .⁴³

What this approach needs to stipulate further is why the features percolate from the *andP* adjunct but not from any other adjunct:

(137) Singular agreement with a non-coordinated subject—DP with a PP adjunct

A wizard with long hair was/*were making sandwiches.

We might explain the contrast between agreement with a DP with an *andP* conjunct vs. a DP with any other adjunct by stipulating that *andPs* are special, e.g., they are porous for the purposes of featural percolation and other adjuncts are not. The strongest version of this stipulation is that the *andP* conjunct will always allow percolation of its complement DP phi-features and other adjuncts will never allow it. For example, Heycock and Zamparelli (2005) argue that the following examples are not structurally ambiguous; they involve a coordination of two NPs (rather than (138)b being underlyingly a coordination of two DPs) despite the correlation of interpretation and agreement:⁴⁴

⁴³ As mentioned in 3.2.2, there is another version of the adjunction model, represented in (119). This version posits a unique mechanism of labeling in coordination, where labels of conjuncts combine via Set Label, a union of individual labels. For our purposes, it is a formalized version of percolation.

⁴⁴ For arguments showing that it is not enough to say that this is a semantic effect, see section 4.4.

(138) Coordination of DPs and singular agreement (Heycock & Zamparelli, 2005)

- a. My friend and colleague is writing a paper. joint reading
(my friend is also my colleague)
- b. My friend and colleague are writing a paper. split reading
(my friend and my colleague are separate individuals)

Conversely, there are PP complements in a singular DP that trigger plural agreement on the predicate:

(139) Complex noun phrases with singular head and plural agreement

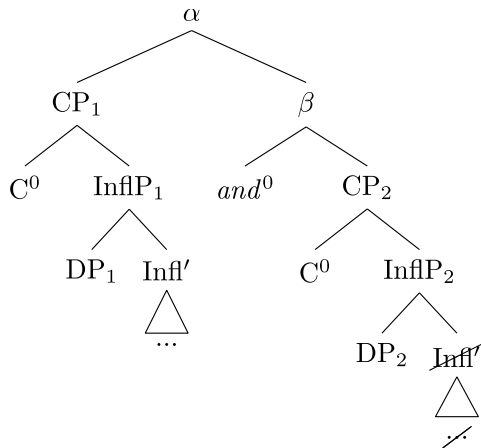
- a. A number of witches is/are plotting something
- b. About half of the witches is/are plotting something.

In sum, the adjunction model of coordination requires a powerful stipulation of featural percolation in order to allow for these features to resolve at the top of the coordination projection.

The third approach to the syntactic structure of coordination, i.e., two-dimensional clausal reduction, makes it virtually impossible to model resolved agreement. Regardless of the relative timing of structure building and AGREE_{LINK} or AGREE_{COPY}, or the timing of clausal reduction and AGREE_{LINK} or AGREE_{COPY}, the pairs of nodes that are responsible for agreement never come in contact—the two Infl⁰s never form an underlying syntactic unit as in the parallel-structure approach; the two surface-coordinated DPs never form a syntactic constituent as in the adjunction model:⁴⁵

⁴⁵ One could posit a reorganization of the entire structure. It would be necessary also to account for why both conjuncts look like they are in the same syntactic position (e.g., both are in the subject position). I leave this possibility for future research.

(140) Non-constituency of DPs and Infl⁰ in a clausal reduction approach



I will assume then that the clausal reduction approach to the syntactic structure of coordination is a non-starter for examples with resolved agreement. On the other hand, it is the approach that fairly straightforwardly explains Single/Closest Conjunct Agreement, especially in cases when such an agreement-controlling conjunct is hierarchically lower than a non-agreeing conjunct (Aoun et al., 1994, 1999; Wilder, 1997). Although Single Conjunct Agreement is outside the scope of this thesis, its investigation and contrast with resolved agreement might help us shed light on some properties of agreement resolution. The following section is a short introduction to this topic.

3.3.1.1 Single Conjunct Agreement

Single conjunct agreement is a phenomenon where the entire coordination is in a configuration typical for agreement in a given language but the agreement expones phi-features of only one of the conjuncts. For example, in Hindi, agreement is controlled by unmarked (absolutive) arguments. In (141) we see that if the coordination in the subject position is unmarked, agreement is necessarily plural, i.e., resolved:

(141) Resolved agreement with coordinate subject in Hindi (Bhatt & Walkow, 2013, p. 956)

Ram aur Ramesh gaa {rahe hãĩ / *rahaa hai}.
 Ram.M and Ramesh.M sing {PROG.M.PL be.PRS.PL / *PROG.M.SG be.PRES.SG}
 ‘Ram and Ramesh are singing.’

In contrast, in (142) we see that if the *object* is unmarked (and subject is marked with ergative) then agreement is controlled by a single, linearly closest (unmarked) conjunct; crucially resolved agreement is unacceptable:

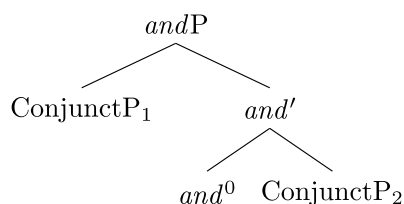
(142) Single conjunct agreement with coordinate object in Hindi (Bhatt & Walkow, 2013, p. 956)

Ram-ne ek thailii aur ek baksaa uthaa{-yaa / *-yii / ???-ye}.
Ram-ERG a bag.F and a box.M lift{-PFV.M.SG / *-PFV.F / ???-PFV.M.PL}
'Ram lifted a small bag and a box.'

Single conjunct agreement is attested in many languages around the world. Some of the numerous examples involve dialects of Arabic (Aoun et al., 1994, 1999), dialects of Dutch (van Koppen, 2007), Hindi-Urdu (Benmamoun et al., 2009; Bhatt & Walkow, 2013), Irish (McCloskey, 1986), South Slavic (Bosnian, Croatian, Serbian and Slovenian in Willer Gold et al., 2018), Tsez (Benmamoun et al., 2009), and many other. In section 2.5 I discussed some analyses of such agreement, not accidentally labelled *closest* conjunct agreement. In the two analyses that I discussed, one by Bhatt & Walkow (2013) for Hindi and one by Benmamoun et al. (2009) for a contrast between Hindi and Tsez, the main claim is that the choice of which conjunct controls agreement morphology is established at PF, post Linearization. In other words, agreement expones the phi-features of conjunct A instead of conjunct B not because conjunct A is structurally higher than conjunct B but rather because it is linearly closer to the agreement probe. In most languages where CCA has been investigated the two notions are indistinguishable. However, Tsez coordination provides an adequate testbed disentangling linear vs. hierarchical proximity. Benmamoun et al. show that the standard tests for hierarchy like binding and extraposition indicate

an asymmetry with the leftmost conjunct being higher than the rightmost conjunct (as in (143))⁴⁶ and yet it is the rightmost (thus lower) conjunct that controls agreement (as in (144)):

(143) Asymmetrical structure in Tsez coordination argued by Benmamoun et al. (2009)



(144) CCA in Tsez (Benmamoun et al., 2009, p. 71)

Kid-no **uži-n** **∅-ik'i-s.**
 girl.ABS.II-and boy.ABS.I-and I-went
 'A boy and a girl went.'

If linear proximity is a PF property, and it determines the exact agreement morphology in a CCA scenario, then all three approaches to the syntactic structure of coordination described in this chapter are equally suitable to model it. The three structures are indistinguishable once a syntactic object has been linearized. However, it is also worth pointing out is that languages with single conjunct agreement vary significantly with respect to constraints on the distribution of CCA. For example, in Hindi we see that it largely tracks the subject vs. object distinction. In Polish, linear order of subject and predicate plays a role. Furthermore, even when these constraints are obeyed, not all speakers of a given language accept single conjunct agreement. For example, in Hindi-

⁴⁶ The assumption of asymmetry between conjuncts in a coordinate structure and the application of various tests for the direction of asymmetry is common. Nevertheless, I will challenge this assumption and show that the results of the standard tests for asymmetry (e.g., binding) are subject to alternative interpretations. The CCA data presented here shows that even the apparent asymmetry in the structure cannot explain the asymmetry in which conjunct controls CCA—it is based on linear proximity. Thus, in the end, even if we abandoned the assumption of structural asymmetry in a coordinate structure, and assumed symmetry instead, we could maintain the same analysis of CCA data presented here.

Urdu, Bhatia (2011) and Bhatt and Walkow (2013) report that the the acceptability of CCA also varies with the presence of some determiners, some unaccusative predicates and some morphology on the intervening material. Finally, there tends to be prescriptive pressure for resolution in some types of constructions but not others. In sum, even though the empirical landscape is still being explored, it seems that single conjunct agreement is not a uniform phenomenon but rather arises due to different underlying mechanisms. For example, Aoun, Benmamoun and Sportiche (1994) argued that a clausal reduction approach to the syntactic structure of coordination is the only approach that properly models CCA in Arabic. Since then, Arsenijević et al. (2020) argued that this analysis does not extend to CCA observed in South Slavic, based on the acceptability of the following examples:

(145) CCA in Serbian with collective predicates

U bici su se sudarala koplja i sablje.
 in battle AUX.PL REFL collided.N.PL spear.N.PL and saber.F.PL
 ‘Spears and sabers collided in the battle.’ (mixed and split event readings acceptable)

They observe that for examples of plural CCA with collective predicates (where gender features of only the closest conjunct are exponed), there are two readings—(i) a mixed reading (spears and sabers collided with each other) and (ii) a split reading (spears collided only with spears and sabers collided only with sabers). Further they assume that in a clausal reduction approach each clause gets interpreted *only* individually, before the surface reduction. Thus, such an approach to the syntactic structure of coordination falsely predicts only a split reading. However, I contend that a single, individual interpretation at the level of each clausal conjunct is not a necessary assumption. Later, in 3.3.10, I will show that coordination needs to be also interpreted by LF based on its post-fusion structure and thus, in principle mixed reading is compatible with clausal reduction approach. To summarize the section on agreement, I argued that the parallel-structure approach is superior in modeling resolved agreement compared to WYSIWYG or clausal reduction approaches. It is

the only approach that does not require any additional stipulation regarding how phi-features of all conjuncts are accessed by an agreement probe (no stipulated percolation or restructuring). In the parallel-structure approach, before UNION takes place, Infl⁰s AGREE-LINK with their respective Goals, then fuse resulting in a single, multiply Agree-Linked Infl⁰. In order for morphology to expone this abundance of phi information, it needs to perform resolution (as it would need to do under any other approach to coordination). What is the nature of resolution is the topic of the following chapter. In the meantime, I will go over other empirical phenomena, starting with syntactic selection, that serve as an argument against the subclausal adjunction approach.

3.3.2 Categorical and lexeme selection

Another widely observed property of coordination is its transparency with respect to selection. If the two conjuncts are of the same syntactic category, then the entire coordination has the distribution of this category. For the purpose of the c-selection mechanism then, it is enough for the category of one of the conjuncts to be c-selected by a higher head, the category of the second conjunct would not be directly selected but only matched with the category of the first conjunct.⁴⁷ These kinds of examples with like syntactic categories are well-handled by all three approaches to coordination. However, a place where the three approaches make different predictions is with examples where two conjuncts do not match in properties that are usually thought to be targeted by selection, i.e., semantic and syntactic features as well as lexical specification. Let me start the discussion with the latter properties as to the best of my knowledge there has been no previous mention of lexeme selection in the literature on coordination.

⁴⁷ It is an orthogonal question whether conjuncts need to have a matching syntactic category or a matching feature of other type. I present some empirical facts against this view in 3.3.3.

Consider nouns, verbs and adjectives that l(exeme)-select for a particular semantically vacuous preposition (Merchant, 2019). I will show below that if a given e.g., verb selects strictly for a particular semantically-contentless preposition, in a coordination of two PPs the verb l-selects the preposition on both conjuncts. First consider preposition selected by the verb *pride* (*oneself*) and the noun *pride*:

(146) Discrepancy in a preposition selected by a verb *pride* and a noun *pride*

- a. I pride myself on this soup.
- b. I take pride in this soup.
- c. * I pride myself in this soup
- d. * I take pride on this soup.

Even though the verb and the noun *pride* are clearly semantically and morphologically related, they select for distinct prepositions. Due to this discrepancy, we might assume that the prepositions they select for are a matter of idiosyncratic l-selection and not s(ematic)-selection. Now consider the behavior of coordination with the same selector:

(147) Preposition in a PP coordination selected by a verb *pride* and a noun *pride*

- a. I pride myself [on this soup] and [on this pie].
- b. I take pride [in this soup] and [in this pie].
- c. * I pride myself [in this soup] and [in this pie].
- d. * I take pride [on this soup] and [on this pie].
- e. * I pride myself [on this soup] and [in this pie].
- f. * I pride myself [in this soup] and [on this pie].

The examples in (147) show that the same semantically-contentless prepositions are obligatory on both PP conjuncts. It is not possible to satisfy the l-selection by the presence of the l-selected preposition on only one conjunct. Moreover, this obligatoriness cannot be explained by some other constraint on strict matching between the two prepositions—in predicates that optionally l-select

for various semantically-contentless preposition, a mismatch of such prepositions in a PP coordination is acceptable:

- (148) L-selection by the noun *concern*
- a. a concern [for grammar]
 - b. a concern [about grammar]
 - c. a concern [for grammar] and [about typos]
 - d. a concern [about grammar] and [for typos]

This fact regarding the l-selection for both conjuncts is readily accommodated by either two-dimensional or three-dimensional analyses where the underlying conjuncts are full clauses and l-selection takes place within each conjunct. The underived subclausal coordination analysis on the other hand, and especially the adjunction model proposed by Munn (1993), require some special mechanism by which the projection dominating the coordination is “transparent”, i.e., the category, features but also the lexical specification of the conjuncts is projected on the node that dominates both of them. The features (including category features and some kind of lexical root features) are either stipulated to percolate up (Munn, 1993), or explicitly argued to percolate up (the Set Label mechanism in Al Khalaf (2015)). Nevertheless, just percolating the category or lexeme features of both conjuncts up to the &P (or its equivalent) would presumably render (148)c-(148)d ungrammatical, since the percolated features conflict. And allowing any combination of features as long as they are both PPs gets (147) incorrectly. To the best of my knowledge, the l-selection data above constitutes the strongest argument in favor of underlying clausal structure of coordination.

Let us now address some of the well-known examples of coordination of conjuncts of different syntactic categories (Bayer, 1996; Bruening & Al Khalaf, 2020; Grosu, 1985; Peterson, 1981, 2004; Sag et al., 1985 a.o.). Consider first the following examples:

(149) Coordination of unlike categories—acceptable sentences

- a. I like [DP witches] and [CP that they are spooky].
- b. John eats [DP the strangest food] and [PP with the strangest companions]. (Grosu, 1985)
- c. Robin knows [DP Kim] and [AdvP intimately]! (Zoerner, 1995)
- d. It's [DP five o'clock] and [VP getting dark already]. (Peterson, 1981)
- e. Pat is [AdjP healthy] and [PP of sound mind]. (Sag et al., 1985)

According to the simple WYSIWYG adjunction approach, the first conjunct is c-selected but the category of the second conjunct does not matter, i.e., it is a coincidence that the category of the second conjunct could in principle be c-selected by a particular higher head in each of the examples above. Recall that on the clausal conjunction approach (either parallel-structure or two-dimensional reduction) it is not a coincidence; each conjunct was independently c-selected for.

Now consider unlike category coordination that is nevertheless unacceptable:

(150) Coordination of unlike categories—unacceptable examples

- a. * Danny became [DP a political radical] and [PP under suspicion]. (Bruening & Al Khalaf, 2020)
- b. * Gerry became [DP a republican] and [VP awarded a prize]. (Sag et al., 1985)
- c. * John sang beautifully and a carol. (Peterson, 1981)

Again, clausal approaches handle these examples in a straightforward way—the second conjunct violates the c-selection properties of the higher head. In contrast, without any further constraints, the WYSIWYG approach does not account for this contrast—the syntactic category of the second conjunct does not matter. There are (at least) three additional proposals put forth within the WYSIWYG approach to rule out sentences like the ones in (150). First, Munn proposes a particular constraint on the semantic identity of the conjunct. The linking element like *and* is a special set forming operator that raises in LF and requires matching semantic types of arguments it composes with. I leave it for future research to determine whether all and only unacceptable examples are filtered via this constraint. Nevertheless, this constraint by itself would not rule out sentences like (147)c-(147)f which have a matching semantic type but differ in lexical form of a preposition.

Alternatively, categorial features could percolate up and form a bundle on the top projection accessible by a c-selecting head. This way, we essentially arrive at a double c-selection by a single head (see Al Khalaf (2015) for a formalization and arguments in favor of this view). The final solution is that some coordination of unlikes is a result of ellipsis (Bruening & Al Khalaf, 2020)—a version of conjunction reduction described in 3.2.3. Thus, constraints on ellipsis (e.g., co-reference) may rule out some examples of unlikes. In sum, these are three, not mutually exclusive mechanisms that constrain the coordination of (un-)likes but do not require positing an underlying clausal structure.

There is another (sub-)type of unlike coordination examples that I would like to highlight as it is the only one that constitutes a potential problem for the clausal approach to coordination. In such examples second conjunct seems to violate c-selection requirements and nevertheless is acceptable:

(151) Coordination of DP & CP (Sag et al., 1985) and their presumed clausal components

- a. You can depend on [DP my assistant] and [CP that he will be on time].
- b. You can depend on [DP my assistant].
- c. * You can depend (on) [CP that he will be on time].
- d. We talked about [DP Mr. Colson] and [CP that he had worked at the White House].
- e. We talked about [DP Mr. Colson].
- f. * We talked about [CP that he had worked at the White House].

If this presumably c-selection violating constituent is in the first conjunct position, the result is unacceptability:

(152) Coordination of CP & DP

- a. * You can depend on [CP that my assistant will be on time] and [DP his diligence in the most mundane tasks].
- b. * We talked about [CP that Mr. Colson had worked at the White House] and [DP his possible connections to the head of the committee].

These kinds of examples are sometimes taken to show that c-selection only cares about the category of the first conjunct (Zhang, 2009).⁴⁸ Labeling the entire coordination based on the category of the first conjunct would be stipulative for all WYSIWYG models except for a subclausal coordination built via adjunction. Nevertheless, recall that this adjunction model fails to explain the restriction on the type of prepositions in the second conjunct in unacceptable examples in (147)—examples I argued constitute evidence in favor of l-selection for each conjunct. We are now faced with a conundrum—we have seen apparent examples in favor of l-selection of each conjunct as well as apparent examples against c-selection of the second conjunct. Let me suggest two possible ways of reanalyzing the data in (151) that will allow us to maintain the selectional restriction for both conjuncts. First, it might be the case that (151) involves a coordination of two DPs with a null noun that heads the CP:

(153) Coordination of DP & [DP [CP]]

- a. You can depend on [DP my assistant] and [DP [CP that he will be on time]].
- b. We talked about [DP Mr. Colson] and [DP [CP that he had worked at the White House]].

If this was true, the second conjunct would not actually be violating c-selection. Bruening and Al Khalaf observe an analogy of CPs behaving like noun phrases in other contexts as well, i.e., leftward displacement (Takahashi, 2010) and ellipsis (Arregi, 2010):

⁴⁸ Sag et al. (1985) also report that c-selection seems to be violated in two parallel non-coordination examples:

(vi) That Bill would arrive on time was crucially depended on.

(vii) That Bill will arrive on time, we're really depending on.

Therefore, the coordination might be a red herring after all for explaining the data with the selection for surface *that*-headed arguments.

(154) CP behaving like a DP in leftward displacement (Munn, 1993, p. 81)

a. That Bill would arrive on time was crucially depended on.

b. That Bill will arrive on time, we're really depending on.

(155) CP behaving like a DP in ellipsis (split question) (Arregi, 2010, p. 577)

What are you ashamed of, that you ignored me?

Bruening and Al Khalaf propose that the noun is semantically null and selects only for CPs. There are at least two outstanding issues that remain to be addressed in an analysis that posits a presence of such a noun. First, it is unclear why this null noun appears only in coordination, displacement and ellipsis but not in a simple non-coordinated sentence like (151)c or (151)f. Second, it remains to be explained why this noun selects only for CPs. While selection for a single category is by no means rare, it also runs the risk of simply restating the problem.⁴⁹

Besides being stipulative, this analysis faces another problem of not explaining other unexpectedly acceptable sentences where the second conjunct is a CP:

(156) Acceptability of InfIP & CP coordination despite c-selection violation (source: a Facebook conversation between Heidi Harley and David Pesetsky as related by Omer Preminger p.c.)

? It looks like Mary is late and that John is already here.

The null-noun analysis would not explain the (relative) acceptability of (156). There are two relevant syntactic analyses for *It looks like + complement*. First, where *looks like* is raising predicate with an expletive *it* and a clausal complement, and second, where *looks like* is a non-raising predicate with a referential *it* and a nominal complement. Crucially, there is no syntactic

⁴⁹ There are other, more nuanced challenges to the exact analysis of these examples by Bruening & Al Khalaf (2020). For example, in order to account for why the null noun is not found in the first conjunct (i. e., why (152) is unacceptable), they propose an analysis in which the syntactic structure is built top-down. While the top-down approach to structure building is commonly assumed in on-line parsing, it would require a substantial revision of the competence models. For a more detailed discussion see Lyskawa (In prep).

frame where *it* is an expletive but *looks like* takes a nominal complement or *it* is referential but *looks like* takes a clausal complement. Therefore, the clausal and nominal complement cannot be coordinated under *looks like* despite the phonological homophony of the expletive and the non-expletive taking variant. As a result, the acceptability of (156) cannot be attributed to a null noun in the second conjunct as proposed for (151).

An alternative analysis that would encompass the acceptability of both (151) and (156) is a grammaticality illusion analogous to the phenomena of agreement attraction, illusory negative polarity or self-embeddings. First of all, it would account for why speakers' judgments differ—Sag et al. (1985, p. 165 ft. 30) report that some speakers uniformly reject these sentences. I will leave this possible analysis for future research and only flag that pursuing this option would also explain why some speakers also accept a minimal equivalent with a different complementizer:

(157) Coordination of DP & CP

? You can depend on [_{DP} my assistant] and [_{CP} whether he will be on time].

The final possibility I would like to flag is that the size of the first conjunct may be assessed in the wrong way. For example, the sentence in (150)a could be a coordination of two verbs phrases with the verb in the second conjunct being null or elided but semantically related to the verb in the first conjunct (here *depend*) while also having different sub-categorization properties such that it can select for a CP:

(158) Coordination of VP & [VP [CP]]

You can [_{VP} depend on [_{DP} my assistant] and [_{VP} <verb> [_{CP} that he will be on time]]].

While stipulative, in many ways this approach resembles the null noun analysis. However, to the best of my knowledge, such an approach has not been discussed in the literature.

In the next section, I discuss further examples that are often placed under the same umbrella of coordination of unlikes and argue that in fact, they do not all constitute one natural class.

3.3.3 Law of the Coordination of Likes (and masqueraders)

There is a long-standing observation that even in coordination where conjuncts are of unlike categories, there is a preference or a tendency for conjuncts to be “alike” at some level of abstraction. This observation is usually referred to as the Law of Coordination of Likes (Williams, (1978) and subsequent work by George (1980) and Williams (1981)). I will show that LCL is not a syntactic constraint and thus is unrelated to the issue of c-selection. There are reported examples that keep the syntactic categories constants and yet contrast in acceptability:

(159) Contrast in acceptability between two examples of coordination on unlike syntactic categories (Goodall, 1987, p. 45)

- a. John is both muscular and a genius.
- b. * John is both muscular and a guitarist.

Note that each of the conjuncts, an adjectival phrase and a nominal phrase, can independently be a predicate. Thus, ruling out (159)b is orthogonal to the problem of c-selection (see the discussion in 3.3.2). The unacceptability of (159)b may be explained via pragmatic constraints. (159)b becomes acceptable if the right pragmatic context is provided. For example, in the world where guitarists are rarely muscular, it would be felicitous to utter (159)b. Let me now provide a few other examples from the literature that are labeled as violations of LCL that may nevertheless turn out to be explained based on other (non-syntactic) constraints:

(160) Unacceptable examples of unlike coordination (Goodall, 1987)

- a. * John kissed Louise tenderly and Mary yesterday.
- b. * Elaine took Mary to the airport and Jane.
- c. * [The boys] and [I believe that the girls] like ice-cream.

Although all examples in (160) contain a coordination of unlike syntactic categories, recall that the acceptability of (159)a and (149) suggests that “alike” in LCL does not actually mean identical syntactic categories. Some of the work on LCL, including Goodall (1987, pp. 43–46) and Bruening

and Al Khalaf (2020), instead derive it from c-selection of archi- or super-categories like Predicate, Manner, Time, etc. or [Pred(icate)] vs. [Mod(ifier)]. I argue that it is not necessary to adopt this analysis. First, these syntactic archi-categories are merely stipulative and restate the problem rather than explain it. In other words, there is no independent generalization regarding archi-categories such that we would be able to make meaningful predictions. Second, the examples in (160) may be ruled out on other grounds. (160)a coordinates one conjunct containing a manner adverb and another conjunct containing a temporal adverb. It bears some resemblance to the notion of archi-categories; however, I treat these as a pragmatic constraint on juxtaposing different types of modifiers, one which is particularly strong for gapping examples (McCawley, 1993; Wierzbicka, 1972). Similarly to (159)b richer context causes the example to become felicitous:

(161) Juxtaposing modifiers in a conjunction

- a. CONTEXT: We're playing a mystery-solving game like Clue where we need to match the perpetrator with the victim and the instrument, manner, time, etc. of the murder.
 Colonel Mustard killed the cook tenderly and the driver late at night.
- b. CONTEXT: We're watching a reality show like the Bachelor and we're trying to remember what happened between the Bachelor and each female contestant.
 John kissed Louise tenderly and Mary yesterday.

To summarize, we have seen so far that some conjunction examples require a particular context in order to be properly licensed by pragmatics. In other words, so far, we have seen no *syntactic* constraint on coordination of likes.

The next example, (160)b, is ruled out if we assume that conjuncts are initially built as full clauses—the predicate in **Elaine took Jane* is missing an argument. Alternatively, if we analyze

the verb *take* as having two argument structure frames, one transitive and one ditransitive, we may rule out this sentence by trying to perform UNION and fusion over different lexical terminals.⁵⁰

Finally, the unacceptability of (160)c is likely a processing issue. Similar examples are often cited in the literature on Right-Node-Raising and are shown to be widely acceptable:

(162) Acceptability in coordination and Right-Node-Raising (Grosz, 2015)

- a. [CNN claims that some man₃ ___] and [the BBC argues that some woman₇ ___] is likely to be assassinated *t*_{3/7} by the serial killer.
- b. [Sue's proud that Bill ___] and [Mary's glad that John ___] traveled *t*_{Bill/John} to Cameroon.

In sum, examples labeled as violating LCL do not seem like a natural class. I argue that they represent an array of constraints that are orthogonal to the assumed syntactic structure for coordination. Recall, however, that at the beginning of this chapter I mentioned an example that perhaps comes closest to being a real example of unacceptability due to mismatching identity between conjuncts, one that cannot be explained via pragmatics or processing effects:

(163) Unacceptability of coordination of expletive and non-expletive subjects

- * It and snow rained and fell.

As noted earlier, however, I must leave the proper account of examples like (163) for future research. I will now turn to discuss a variety of observations regarding coordination that had sometimes been claimed to serve as evidence in favor of one or the other syntactic structure approach. I will show that they are, at best, inconclusive.

⁵⁰ I am assuming that the phonological syncretism does not allow them to act as both at the same time—an interesting contrast to examples where syncretism does salvage certain mismatches as in the classic examples by Pullum and Zwicky (1986).

3.3.4 Ban on extraction

One of the most prominent observations about coordination was dubbed by Ross (1967) as the Coordinate Structure Constraint (CSC). He observes a restriction on movement of a single conjunct (or any of its subparts) out of a coordinate structure:

- (164) Movement out of a coordinate structure
- a. * What did you eat a sandwich and ___ ?
 - b. * What did you eat ___ and horseradish?

This restriction on movement does not hold for non-coordinate examples:

- (165) Movement out of a non-coordinate structure
- What did you eat ___ ?

In fact, in some constructions movement can take place over unboundedly long distances (modulo memory limitations):

- (166) Unbounded movement of a noun phrase in English (Ross, 1967, p. 12)
- a. The government prescribes the height of the lettering on the covers of the reports.
 - b. the reports, the height of the lettering on the covers of which the government prescribes
 - c. the reports, lettering on the covers of which the government prescribes the height of
 - d. What does the government prescribe the height of the lettering on the covers of?

On the other hand, it is also not the case that movement is completely unrestricted. In the same work where he described CSC, Ross identified a broader class of phenomena, which he called islands, that syntactic movement is unable to exist.

- (167) Restriction on movement out of an island (Ross, 1967, p. 16)
- a. I chased [_{DP} the boy [_{CP} who threw a snowball at our teacher]].
 - b. * Here is the snowball which I chased the boy who threw at our teacher.

We observe that while movement in principle can be unbounded, there are some constructions which restrict any long-distance movement. Ross's explanation for the restriction of movement in

(167) was the theory of bounding, which, among other explanations for this phenomenon, gave rise to the theory of Subjacency (Chomsky, 1973) and Phase Theory (Chomsky, 2000, 2001, 2001). One might investigate whether the same deep property that restricts movement in (167) is also operative in (164). In other words, do (164) and (167) belong to the same class of phenomena involving syntactic restrictions on movement? For example, the CSC persists even when one changes the categories involved, whereas the phenomenon in (167) does not. In short, Coordinate Structure Constraint on movement is somewhat unique among other constraints on movement.⁵¹ However, such a specific constraint lacks explanatory power and is suspicious from the perspective of Minimalism. Further, the CSC is largely uniform across languages, suggesting we are dealing with a core property of coordination rather than a quirk of the English construction. Let us first review the explanation for the CSC in a three-dimensional parallel-structure model of coordination. According to this analysis, coordination is a result of UNION of two syntactically well-formed sentences. Thus, in order to derive a coordination like (164)a, we would need to provide the UNION operation with the following two underlying clauses:

(168) Subcomponent clauses of (164)a before their UNION

- a. * What did you eat a sandwich?
- b. What did you eat ___?

Since the sentence in (168)a is not well-formed itself, performing a UNION operation over this conjunct will result in ungrammaticality. In other words, the requirement of well-formedness of

⁵¹ It has been proposed by some that the CSC is in fact a semantic effect rather than a syntactic one (Munn, 1993).

subcomponents of UNION explains the CSC. Further, note that this restriction also accounts for the grammaticality of the Across-the-Board extraction, i.e., a gap in both conjuncts:⁵²

(169) Across-the-Board extraction—surface coordination and its subcomponents

- a. What did you eat ___ and drink ___ ?
- b. What did you eat ___ ?
- c. What did you drink ___ ?

Let me now contrast the above explanation of the CSC with how other models of the structure of coordination, both clausal and subclausal types, attempt to explain it. An example of an early explanation of the ungrammaticality of a conjunct extraction (but not its subpart) relied on a category label of the entire Coordination being the same as the category label of its conjunct. For example, a coordination of two DPs would be labeled as a DP itself. Then, the A-over-A constraint would prohibit extraction of a single conjunct given the presence of a higher constituent of the same category (Chomsky, 1964; but see Ross, 1967 for an alternative approach). A-over-A, however, would not explain all of the CSC data. We would therefore need additional mechanisms restricting extraction out of coordination. For example, in the adjunction models, one could invoke the notion of adjunct islands. Again, adjunct islandhood does not explain all of the data because even in the adjunction approach, one conjunct is still not an adjunct. Alternatively, the CSC might not be a syntactic constraint but rather a semantic one requiring identity of semantic types (Munn, 1993). In sum, there is a variety of proposals explaining (parts of) the CSC that are dependent on

⁵² I assume that the unacceptability of **What did you eat ___ and ___ ?* is a result of a restriction on tautology, i.e., UNION of two identical clauses *What did you eat ___ ?* I stay agnostic as to whether this restriction results in ungrammaticality of the structure or whether the unacceptability is rooted in a different module of grammar like semantics.

the particular structure being analyzed. The parallel-structure approach analyzes the CSC as an effect of a syntactic well-formedness constraint on the input clauses, and such an analysis is on par with other possible analyses, if not superior to them. I will now move on to discuss the types of data that are typically taken to be evidence in favor of asymmetry in coordination, and show that these are at best inconclusive.

3.3.5 Constituency

First, consider the following data (Ross, 1967, pp. 90–91):

(170) Two independent clauses and their coordination

- a. John left. He didn't even say good-bye.
- b. John left and he didn't even say good-bye.

Example (170)a shows two non-coordinated sentences while (170)b is the same pair of sentences but conjoined by *and*. Now consider (171) where the two parts of the coordination are uttered by two separate speakers:

(171) Conjuncts uttered across two speakers (adapted from Ross, 1967, pp. 90–91)

- a. A: John left.
B: And he didn't even say good-bye.
- b. * A: John left and.
B: He didn't even say good-bye.

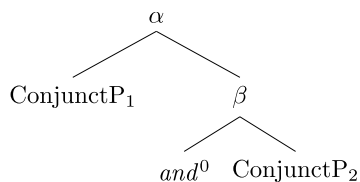
(171)a shows that the linking element *and* may be followed by a conjunct without being preceded by a conjunct, i.e., *and* together with the following clausal constituent form a larger unit on their own. In contrast, (171)b shows that the same linking element *and* may not be preceded by a conjunct without being also followed by a conjunct like in (170)b. The same results are obtained for extraposition:

(172) Clausal coordination and extraposition (Munn, 1993, p. 15)

- a. John bought a book yesterday, and a newspaper.
- b. * John bought a newspaper yesterday a book and.
- c. * John bought a book and yesterday, a newspaper.⁵³

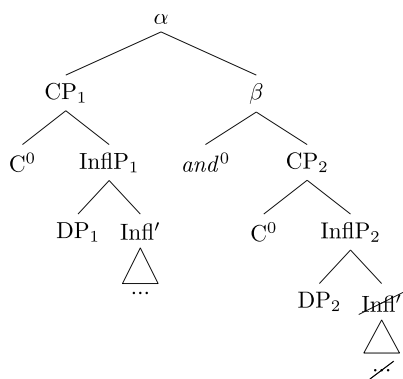
In sum, the linking element forms a unit with the following conjunct to the exclusion of the preceding conjunct. This observation is often taken as evidence of the syntactic constituency of the linking element and the following conjunct, to the exclusion of the first conjunct:

(173) Hypothesized syntactic constituency in a coordinate structure in English



This structure is straightforwardly accommodated by a two-dimensional model of coordination, especially a WYSIWYG one as described in 3.2.2. In the clausal coordination model described in 3.2.2, we arrive at a similar result after deletion:

(174) Syntactic constituency in a coordinate structure in English (underlying clausal conjunction model)



⁵³ This is a CSC violation: extraposition of exactly a single conjunct. Note that the first example in this triad is not, strictly speaking, extraction of exactly a conjunct: it might either be an example of truncation (see (79)) or extraposition of &P in the Munn adjunction model or &' in the Kayne's Spec-Comp model.

Goodall’s parallel-structure model of coordination approaches this observation very differently. Each conjunct in his model is a syntactic constituent but neither conjunct is in a closer relation with the linking element. At the level of UNION there is no designated syntactic node that hosts the linking element *and* at all. *And* is the output of linearization of unfused nodes at PF. The framework of Distributed Morphology (Harley & Noyer, 1999) calls such post-syntactic operations *dissociated node insertion* (Embick & Noyer, 2007, p. 309)—insertion of morpheme without a syntactic-lexical content, such as theme vowels. Thus, the issue of constituency is dependent on what we take the linking element to be—a single syntactic node present at the level of structure building, or a PF artifact. Data from other languages suggests that the facts in (170)-(172) are language-specific, and that the surface position of the linking element cannot always be its underlying syntactic position. Tsez shows the linking element on all conjuncts (175), while Latin dislocates the linking element to the right of what would otherwise be its inter-conjunct position:

(175) Coordination in Tsez (Benmamoun et al., 2009, p. 71)

Kid-**no** uži-**n** b-ik’is.
 girl.ABS.II-**and** boy.ABS.I-**and** IPL-went
 ‘A girl and a boy went.’

(176) Coordination in Latin

bon-i puer-i _i bon-ae **que**i puell-ae
 good-M.NOM.PL boy-M.NOM.PL _i good-F.NOM.PL **and** girl-F.NOM.PL
 ‘good girls and good boys’

Tsez data shows us that the linking element does not always appear only once as in English, so we cannot conclude that a linking element is always in a closer relation with one conjunct (and specifically the last one, as is the case in English). Latin data shows that the surface position of the linking element may be misleading in that morphophonological processes might ultimately determine its surface location. Taken all together, these data suggest that we cannot take (170)-(172) to be indicative of a universal structure of coordination. Even some of the early works on

coordination postulated a sequence of three operations (Ross, 1967, pp. 165–166): (i) insertion of one node with the linking element as a result of a general coordination transformation, (ii) copying and adjoining that node onto each constituent, and in some languages (e.g., English) (iii) morphological deletion of the linking element on some constituents (e.g., English retains the linking element only on the final constituent unless other constituents are focused;⁵⁴ Tsez retains the linking elements on all constituents). Let me provide an example of this hypothesized type of derivation of coordination in English:

- (177) Derivation of coordination in English (Ross, 1967, pp. 165–166)
- a. Base sentences
Witches fly.
Wizards crawl.
 - b. General transformation & insertion of the linking element
[and [Witches fly] [Wizards crawl.]]
 - c. Copying and adjoining of the linking element onto each conjunct
[[and] Witches fly] [[and] Wizards crawl.]
 - d. Morphological adjustment of the linking elements—language specific
[[~~and~~] Witches fly] [[and] Wizards crawl.]
 - e. Surface sentence
[Witches fly] [[and] wizards crawl.]

Although stipulative, this proposal does account for the constituency tests as well as the morphophonological behavior of the linking element cross-linguistically.

The issue of constituency has been taken as consequential for the issue of whether coordination is hierarchical or flat. The facts in (170)-(172) are often taken to be indicative of a hierarchical structure (Munn, 1993); however, I have also shown that these facts are not language-universal.

⁵⁴ Ross (1967, p. 166) suggests that English construction *both* <conjunct1> *and* <conjunct2> as well as *either* <conjunct1> *or* <conjunct2> are instances of the linking element not deleting on the first conjunct.

The field has not yet reached a consensus in this regard, with many arguments in favor of either model over the years (see Zhang (2009, pp. 9–11) for references), creating a well-known paradox. The data discussed in subsequent subsections is representative of some of this debate. I will now turn to another phenomenon taken to be evidence in favor of hierarchical structure in coordination.

3.3.6 Quantificational binding and binding principles

Consider the evidence from quantificational binding first (Munn, 1993, p. 16):⁵⁵

(178) Quantificational binding

- a. No man_i and his_i dog went to the meadow.
- b. * His_i dog and no man_i went to the meadow.

In (178) one conjunct contains a quantified noun phrase and the other conjunct a possessive pronoun that is bound by the quantified noun phrase. The contrast in (178) shows that the surface order of these two conjuncts co-varies with the acceptability of the sentence—a quantified noun phrase must precede a bound possessive pronoun and cannot follow it. Binding is usually assumed to require a c-command relation (Reinhart, 1976, 1983). I will assume the following definition of c-command:

(179) Working definition of c-command

- α c-commands β iff the first branching node dominating α also dominates β
- α, β = constituents

The contrasts in acceptability in (178) may then be attributed to asymmetric c-command:

⁵⁵ Munn observes that there is a confound, i.e., the unacceptable example in (178) might be ungrammatical due to an independent constraint, i.e., Leftness Condition that states that a pronoun cannot be interpreted as a bound variable of a quantifier to its right (Chomsky, 1973). Despite this confound, variable binding is still used in the literature to argue for asymmetry in the structure of coordination (e.g., Benmamoun et al. (2009)). For the sake of completeness, I discuss variable binding as well as the Principle C effect in (183).

(180) Asymmetric c-command

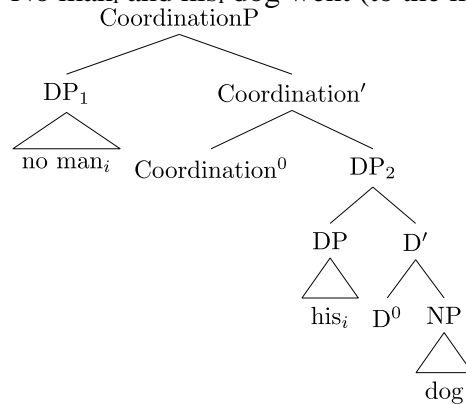
α asymmetrically c-commands β iff α c-commands β and β does not c-command α

Let me now show how the three models of coordinate structure would or would not account for the contrasts in (178) based on asymmetric c-command. We will see that only the subclausal two-dimensional model successfully rules in the acceptable examples and rules out the unacceptable ones.

In (178)a *no man* successfully binds *his* in an asymmetric c-command relation resulting in acceptability, while in (178)b it does not, thus violating the conditions for bound variables. This configuration is straightforwardly modeled in a subclausal two-dimensional coordination (181). In contrast, in a clausal two-dimensional model, each conjunct would have further clausal projections, thus *every man* would not bind *his* without making further stipulations regarding removal of higher projections (182).

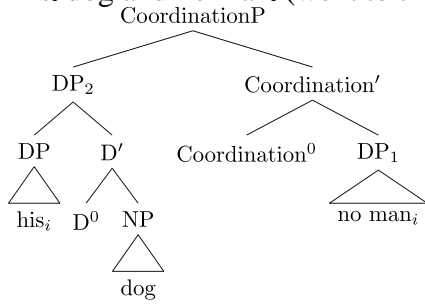
(181) Quantificational binding in two-dimensional subclausal model (WYSIWYG)

a. No man_i and his_i dog went (to the meadow).



no man_i c-commands *his_i*
expected acceptability

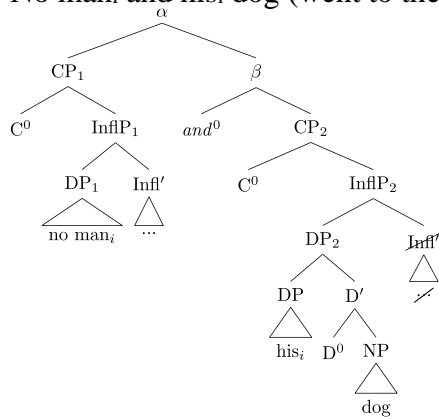
b. * His_i dog and no man_i (went to the meadow).



no man_i does not c-command *his_i*
 expected unacceptability

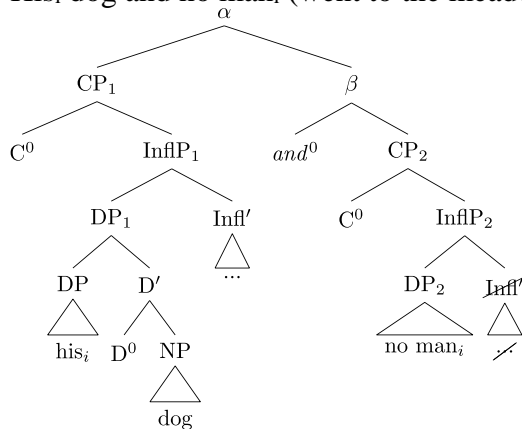
(182) Quantificational binding in a two-dimensional clausal model (conjunction reduction)

a. No man_i and his_i dog (went to the meadow).



no man_i does not c-command *his_i*
 unexpected acceptability

b. * His_i dog and no man_i (went to the meadow).



no man_i does not c-command *his_i*
 expected unacceptability

In other words, we would be able to correctly rule out (182)b based on the structure alone but ruling in (182)a would remain a problem—we need to generate the acceptable example, but the structure does not immediately meet all the conditions necessary for binding and c-command.

In turn, in the parallel-structure model, UNION operation followed by fusion results in the symmetric c-command relation between conjuncts.⁵⁶ Thus, (182)a would be ruled in but (182)b would be, as well, contrary to fact.

A parallel problem arises for R-expressions and Principle C of the Binding Theory:

(183) Binding of R-expression (adapted from Munn, 1993, p. 16)

- a. John_i's dog and he_i/him_i went to the meadow.
- b. * He_i and John_i's dog went to the meadow.

The contrast in (183) shows that a possessor that contains an R-expression must precede a coreferential pronoun rather than follow it.⁵⁷ Here, we can explain the contrast by attributing the unacceptability of (183)b to a violation of Principle C, which states that an R-expression cannot be bound—by embedding *he_i* deeply in the coordinate structure we ensure it does not bind *John_i*.

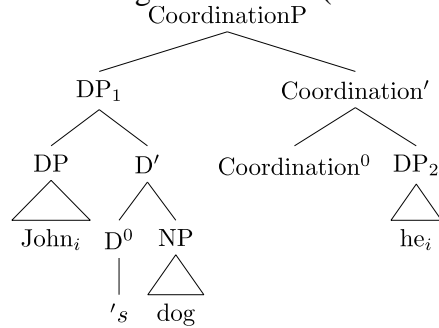
Again, the two-dimensional subclausal model lends itself to such configuration upfront:

⁵⁶ While I focus here on analyzing the binding facts using the parallel-structure model, the same analysis could apply to a larger set of proposals involving a symmetrical (flat) structure of coordination.

⁵⁷ There is experimental evidence showing that speakers' judgments regarding Principle C violations might be subject to some processing factors in a way that is not attested for Principle A or B (Gordon & Hendrick, 1997). It is crucial therefore that the constructed examples targeting Principle C take into account these factors. I leave detailed research into this topic for the future.

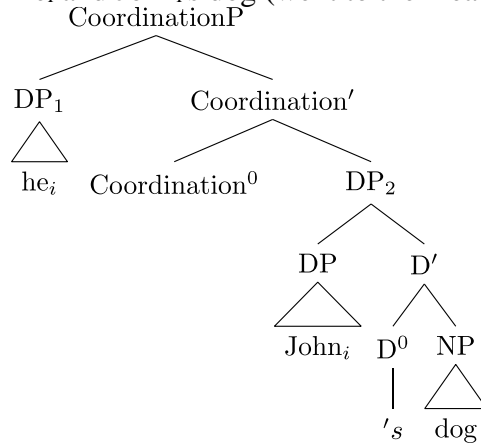
(184) R-expression binding in two-dimensional subclausal model (WYSIWYG)

a. John_i's dog and he_i/him_i (went to the meadow).



he_i does not c-command *John_i*
 expected acceptability

b. * He_i and John_i's dog (went to the meadow).



he_i c-commands *John_i*
 expected unacceptability

In contrast, a clausal two-dimensional model with its extra clausal projections would correctly rule in (183)a but it would not immediately rule out (183)b. Further stipulations would be necessary to correctly account for the unacceptability of the latter example. Finally, in the parallel-structure model, where the coordinate structure is symmetric, we would not be able to rule in (183)a—post UNION and fusion of identical nodes (particularly CPs) *John* is always c-commanded by *he*, regardless of the order. Nevertheless, in the same model (183)b would be correctly ruled out.

Taking stock, on the assumption that binding amounts to c-command plus co-indexation, the data from quantificational binding and Principle C of the Binding Theory in a coordinate structure suggest that the two conjuncts are *not* in a symmetric c-command relation. Instead, the first

conjunct *asymmetrically* c-commands the second. Asymmetric c-command would necessitate a hierarchical structure that is more straightforwardly represented by a two-dimensional subclausal model of coordination, but not the clausal or parallel-structure models. However, the assumption that quantificational binding as well as the three standard binding principles rely on c-command is not uncontested. For example, Barker (2012) and Bruening (2014) argue that c-command is not the relevant relation in these two domains, each arguing for a different alternative. Bruening specifically proposes that the relevant notion is *precede-and-command* (precedence and phase-mate-hood) rather than c-command (constituency and dominance):

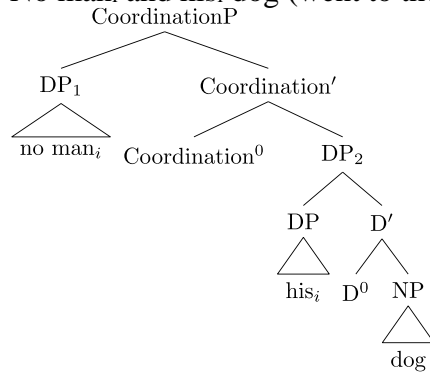
(185) Binding definition and phase-command definition (Bruening, 2014, pp. 343–344)

- α binds β iff α and β are coindexed and α precedes and phase-commands β.
- α phase-commands β iff there is no ZP, ZP a phasal node (CP, vP or DP/NP), such that ZP dominates α but does not dominate β.

Let us evaluate now how this view accounts for the contrast in quantificational binding in (178) and R-expression binding (i.e., Condition C) in (183). In quantificational binding, we need to ensure that binding is obtained, and thus that both relations—precedence and phase-command—are satisfied. When either of these relations is violated, binding does not obtain. In (186), precedence is satisfied based on the surface word order. As for phase-command, in a two-dimensional subclausal model of coordinate structure it is also satisfied—there is no phasal DP, vP or CP node that dominates the DP₁ *no man* to the exclusion of DP₂ *his dog*:

(186) Quantificational binding in two-dimensional subclausal model (WYSIWYG)

No man_i and his_i dog (went to the meadow).

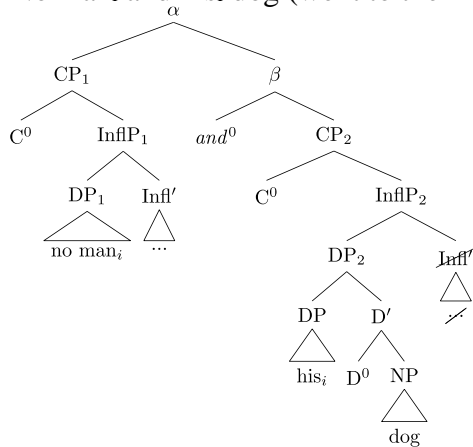


no man_i phase-command *his_i*
 expected unacceptability

The two-dimensional clausal model again contains more projections, particularly a CP₁ node that dominates the first conjunct but not the second:

(187) Quantificational binding in a two-dimensional clausal model (conjunction reduction)

No man_i and his_i dog (went to the meadow).



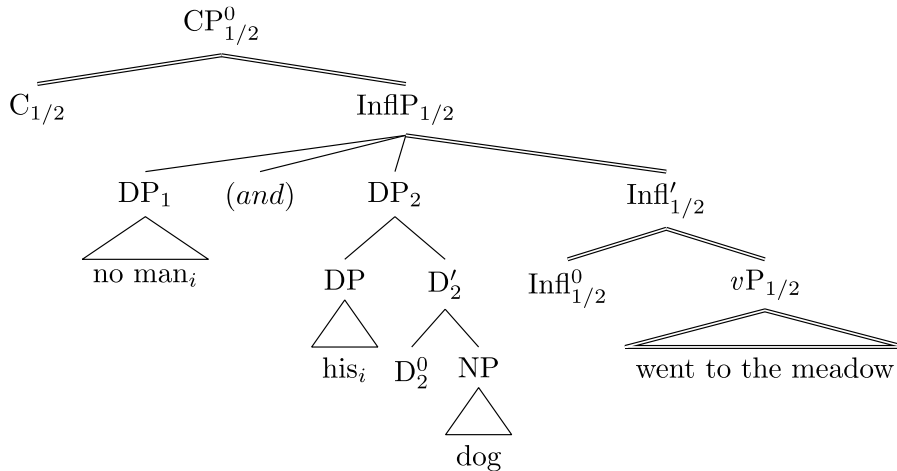
no man_i does not phase-command *his_i*
 unexpected acceptability

Phase-command is not satisfied; binding does not obtain. Thus, we cannot account for the acceptability of (187).

In the parallel-structure model, even with the additional clausal projections, the CP nodes have fused as a result of the UNION operation, thus the first conjunct is no longer exclusively dominated by a phasal node the same way it is in a two-dimensional clausal model:⁵⁸

(188) Quantificational binding in a three-dimensional model (parallel-structure)

No man_i and his_i dog went to the meadow.



no man_i phase-command *his_i*
 expected acceptability

This means that binding obtains and (188) is correctly ruled in.

The minimal contrast to this correctly ruled-in sentence is **His_i dog and no man_i went to mow a meadow*. Here, the conjunct order is reversed. We can attribute the unacceptability of this sentence to a violation of the precedence relation—binding does not obtain, and the example is correctly ruled out regardless of the approach to the syntactic structure of coordination.

Let us now turn to R-expression binding. Here we need to ensure that nothing binds the R-expression. In other words, either the precedence or the phase-command relation needs to fail to

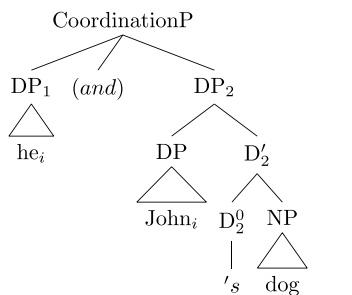
⁵⁸ Recall that even though the original proposal by Goodall (1987) did not talk about phases I adapted it in 3.2.1.1 and argued that it is compatible with Phase Theory.

hold for the sentence to be well-formed. In *Johni's dog and hei/himi went for a walk*, no coindexed expression precedes the R-expression *John*, and thus no binding obtains. We are able to rule in this sentence based on this fact alone (regardless of the approach to the structure).

In turn, in **Hei and Johni's dog went for a walk*, the R-expression *Johni* is preceded by a coreferential *his*. Now we need to check whether phase-command obtains as well. Both in a two-dimensional subclausal model and in the parallel-structure model with fused nodes (189), there is no phasal node that dominates the DP *he* to the exclusion of DP *John*—phase-command obtains.

(189) Binding of R-expression in a two-dimensional subclausal model (WYSIWYG)

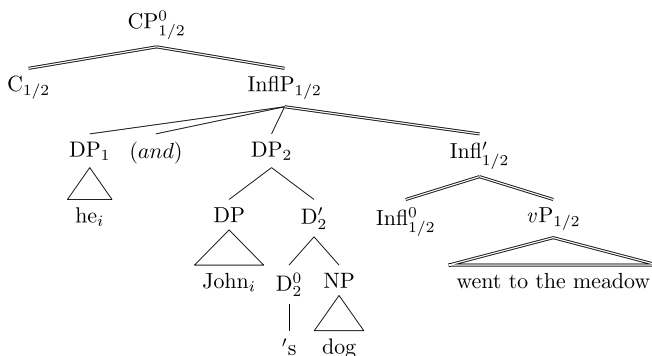
**He_i and John_i's dog (went to the meadow).*



he_i phase-commands *John_i*
 expected unacceptability

(190) Binding of R-expression in the parallel-structure model

**He_i and John_i's dog went to the meadow.*



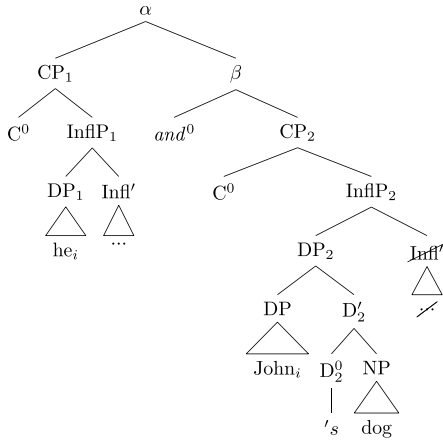
he_i phase-commands *John_i*
 expected unacceptability

Thus, *John* is bound, and the example is correctly ruled out in these two models.

As for a two-dimensional clausal model of coordination, the additional clausal structure above the DP *he* prevents phase-command between *he* and *John*, thus binding does not obtain:

(191) Binding of R-expression in a two-dimensional clausal model

**He*_i and *John*_i's dog (went to the meadow).



*he*_i does not phase-command *John*_i
unexpected unacceptability

Under this model of coordination, we cannot correctly rule out the sentence in (191) based on the binding facts alone.

Below is a summary of the precede-and-phase-command diagnostic as applied to the WYSIWYG and the parallel-structure approaches:

(192) Binding as precede-and-phase-command (in principle, greyed information is redundant)

	PRECEDENCE	NO PHASAL NODE	
no man _i and his _i dog	✓	✓	=BINDING
*his _i dog and no man _i	x	✓	=NO BINDING
John _i 's dog and he _i /him _i	x	x	=NO BINDING
*he _i /him _i and John _i 's dog	✓	✓	=BINDING

In sum, on the assumption that binding requires the precede-and-phase-command relation rather than c-command, both the two-dimensional subclausal and parallel-structure models are equally suited to account for the data on quantificational building and Principle C of binding in a coordinate structure. Thus, this data does not necessitate an asymmetric structure—the main difference

between the two models. I will now go over some other data that constitute apparent evidence in favor of asymmetric structure.

3.3.7 Typology of unbalanced case marking in a coordination

An asymmetric structure for coordination also seems well-suited to explain the typological correlation between headedness and case asymmetry in coordinate structures. Johannessen (1998) observes that there are many languages where the two conjuncts carry different case markers. For example, in Norwegian, when a coordination is in subject position, the first conjunct is marked with nominative case (typical for subject position), while the second is marked with accusative case (atypical for subject position):

- (193) Case marking in a coordinate structure in subject position in Norwegian (Berntsen and Larsen 1925: 268 cited in Johannessen, 1998, p. 1)

Han og meg var sammen om det.
he.NOM and me.ACC were together about it.
'He and I were in it together.'

Further, in Turkish, when a coordination is in a position typically marked with dative (e.g., indirect object position), the first conjunct is unmarked while the second conjunct is marked with dative (the case expected given the position of the coordination in a sentence):

- (194) Case marking in a coordinate structure in a dative position in Turkish (Johannessen, 1998, p. 23)

güzel anne ve çirkin babasına
beautiful mother and ugly father.POSS.3SG.DAT
'to his beautiful mother and ugly father'

What these two patterns have in common is that there is one conjunct marked with the case typical for the syntactic position that the entire coordination is in, while another conjunct is either marked with the atypical case or unmarked (also atypical). Johannessen observes that in 26 out of a sample of 32 languages with either type of typical-atypical case marking order, the direction of asymmetry corresponds to the verb-complement word order, where the typically case-marked conjunct

precedes the atypically marked conjunct in language whose verb precedes its complements and vice versa:

(195) Correlation of verb-complement order and unbalanced case-marking order in a coordinate structure

WORD ORDER	verb-object	object-verb
ORDER OF UNBALANCED CASE MARKING IN COORDINATION	typical-atypical	atypical-typical
EXAMPLES OF LANGUAGES	Gã, Norwegian, Palestinian Arabic, Welsh	Amharic, Japanese, Swahili, Turkish

The correlation sketched in the table above may be interpreted in the following way: Norwegian being left-headed (verb precedes its object) correlates with typical (nominative) marking on the left conjunct, while Turkish being right-headed (verb follows its object) correlates with typical (dative) marking on the right conjunct. However, there are two possible problems in interpreting this correlation. The first possible problem concerns other typological correlations with headedness and word order that turn out to be accidental. For example, Greenberg Universals 5 states: “If a language has dominant SOV order and the genitive follows the governing noun, then the adjective likewise follows the noun” while Universal 17 states: “With overwhelmingly more than chance frequency, languages with dominant order VSO have the adjective after the noun” (Greenberg, 1963). In other words, the noun-adjective order correlates with word orders of both OV and VO types. We must conclude that noun-adjective word order is therefore not determined by the headedness as indicated by the relative verb-object order. In light of this, there exists the distinct possibility that the correlation in (195) is also accidental.

The second possible problem concerns Johannessen’s assumed analysis of case-assignment, which is not undisputed. Johannessen assumes that case-assignment happens in a local Spec-Head configuration. However, there is a lot work questioning this configuration for case assignment.

One such example is work on dependent case assignment like accusative in Sakha (Baker & Vinokurova, 2010), which questions both the notion of locality and Spec-Head. Another example is work on languages with ergative-absolutive alignment showing that at least in a subset of these languages (so-called low absolutive languages) case assignment takes place at a distance (Aldridge, 2004; Legate, 2008).

Further, the analysis of case-marking in coordination seems to be much more complicated. First, Johannessen does not discuss the possibility of “suspended affixation” as proposed for Turkish (Lewis, 1967). The dative suffix in (194) may be analyzed not as attaching only to the second conjunct but the entire coordination. Identifying and removing such cases from Johannessen’s typology would not constitute a counterevidence to her proposal but simply weaken the correlation. Moreover, Johannessen observes that some of the world’s languages exhibit balanced case marking in coordination, both ordinary (e.g., both conjuncts receive the case marking typical for the position the entire coordination is in) as well as extraordinary (e.g., both conjuncts receive the same case marking but one that is atypical for the position the entire coordination is in). She accounts for extraordinary balanced case-marking by stipulating that the structure of the coordination itself prevents the regular case-assignment pattern from obtaining, and the observed atypical case-marking is a default. Indeed, it has been argued before (Sobin, 1997) and after Johannessen’s work (Schütze, 2001) that accusative is a default case-marking in English. What remains unexplained is how exactly *ordinary* case-assignment happens, on the assumption that the structure is asymmetric, and case-assignment requires a head-specifier relation. Perhaps the case-marking in coordination at least in English and Norwegian, as Johannessen observes, is subject to heavy prescriptive norms. However, this casts some doubt on the robustness of the typological survey (since it is hard to determine a priori which languages are or are not subject to such norms).

In sum, while the observation about the correlation between headedness and case-marking on conjuncts is very intriguing and invites further explanation, I will not treat it as evidence in favor of asymmetric structure or as evidence against flat structure.

Let me now provide an interim summary of the empirical phenomena related to (a)symmetry in coordination. We have seen so far (i) constituency tests suggesting a closer relationship of the linking element *and* and the second conjunct in English, (ii) asymmetries in quantificational binding and Principle C of the Binding Theory and (iii) asymmetries in case-marking on conjuncts. I have shown that the evidence based on these tests is inconclusive. The parallel-structure model is not clearly inferior to the adjunction model and mostly superior to the two-dimensional clausal model in accounting for this set of facts.

Before I move on to discuss phenomena from the interface of syntax and semantics that are analyzed differently within the three approaches to coordination, let me mention the relevance of the findings so far for a closely related empirical domain, i.e., comitatives (Camacho, 2000, a.o.). Comitatives occur in many of the world's languages (Aissen, 1989 for Tzotzil; Camacho, 1996 for Spanish; Dylą & Feldman, 2008 for Polish; Hale, 1975 for Navajo; Kornfilt, 1990 for Turkish; McNally, 1993 for Russian; Zhang, 2007 for English):

(196) Comitative construction in Spanish (Camacho, 2000, p. 366)

Ø Con Juan vamos al cine.
pro with Juan go.1PL to-the movies
'Juan and I are going to the movies.'

(197) Comitative construction in Polish

Ø Z Jankiem idziemy do kina.
pro with John go.1PL to-the movies
'John and I are going to the movies.'

- (198) Comitative construction in Tzotzil (Aissen, 1989, p. 519)
 Ø Libatotikotik xchiʔuk li Xune.
 pro we.went with DEF Xun
 ‘I went with Xun.’

Comitatives constitute a long-recognized puzzle as they display some properties of coordination (resolved agreement) as well as a clear(er) asymmetry between conjuncts (the *with*-phrase behaves like an adjunct). I leave it for future research to determine whether the parallel-structure approach could be applied to comitatives despite the apparent asymmetry involved. If applicable, that would suggest that the resolution mechanism is shared between the two constructions. If not, that would point to a possibility of teasing apart the resolution mechanism from the structure itself. As flagged in 3.3.1, one of the elements of my hypothesis regarding the nature of resolution is that grammar lacks an internal resolution mechanism for coordinations because it lacks a dedicated projection (e.g., &P) where resolution could take place—a view that is easily explained by the parallel-structure approach. However, if there are constructions in language that truly contain a dedicated projection (e.g., ComP for comitatives), they would serve as a good test bed for this hypothesis. In other words, we might expect that such a projection can serve as the locus of some grammar-internal resolution mechanism. I return to this issue in 5.6.5 after I present some empirical findings regarding cases of variability and ineffability of resolution in 4.5.2 and 4.5.3.

3.3.8 Theta roles

Theta Theory (and in particular Theta Criterion) was an early motivation for underlyingly clausal models of coordination. For example, judging from the surface strings alone, it seems as though one (non-coordinated) DP can receive a theta role from a coordination of two predicates (199)a and one predicate can assign a theta role to a coordination of two DPs (199)b:

(199) Apparent mismatch of theta role assigners and assignees

- a. Pat sang and danced.
- b. Pat and Mat danced.

In the early generative grammar frameworks, full sentences were necessary to establish theta relations. For example, in (200) the verb *invite* needed to be a sister of its complement noun *Pat* to satisfy the Theta Criterion. This data lead to various models of two-dimensional clausal coordination like the ones described in 3.2.2:

(200) Derivation of nominal coordination

- underlying form: [I invited Pat] and [I invited Mat].
- deletion of overlapping material: [I invited Pat] and [~~I invited~~ Mat].
- surface form: I invited Pat and Mat.

This derivation is reminiscent of how any passive sentence was analyzed at the time—as derived from its active paraphrase. The derivational analysis of passive was another argument in favor of the derivational analysis of coordination. Consider the case below:

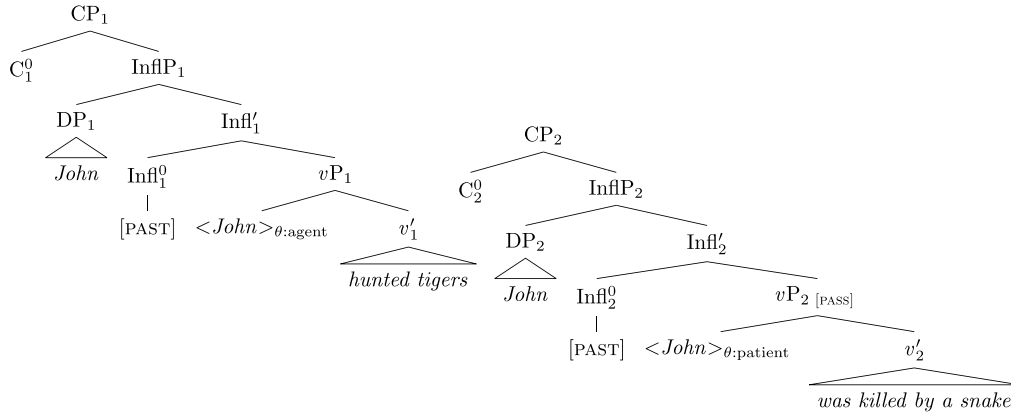
(201) Coordination of active and passive sentences

- underlying form: [John hunted tigers] and [a snake killed John].
- passive transformation: [John hunted tigers] and [John was killed by a snake].
- deletion of overlapping material: [John hunted tigers] and [~~John~~ was killed by a snake].
- surface sentence: John hunted tigers and was killed by a snake.

The surface form of the conjunct [was killed by a snake] is passive, therefore it was assumed it must have been transformed from the underlying active variant. In the underlying form of this sentence the verb *kill* selects for its logical object, *John*. Given the syntactic theory of the time, it could not be the case that the logical subject of *hunt* in the first conjunct satisfied this requirement. This derivation further motivated the analysis of subclausal coordination as derived from the underlying clausal coordination. In sum, the locality and the timing of application of the Theta Criterion together with the assumptions about the structure of passive pointed to the analysis of coordination as underlyingly clausal.

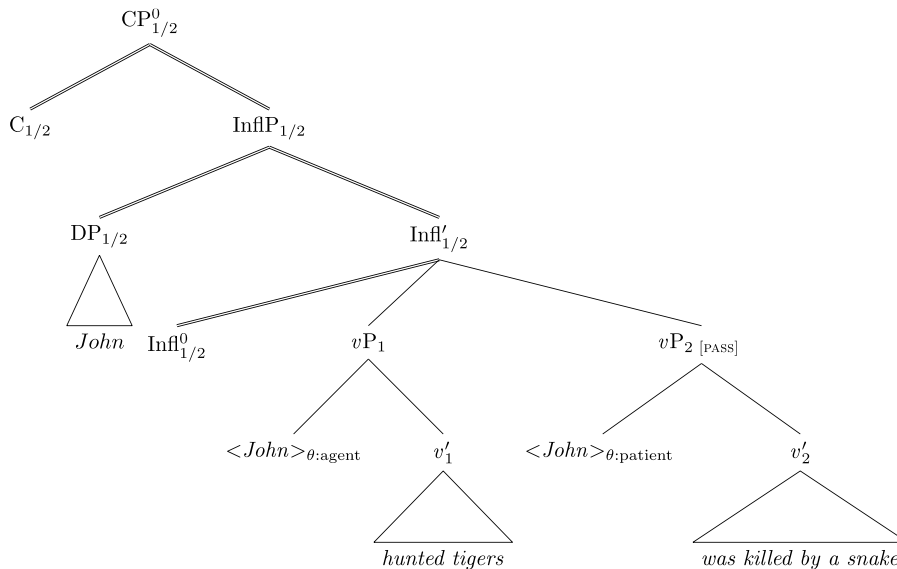
Recall that we have adapted the parallel-structure model in 3.2.1.1 such that any moved material leaves a copy in the base position of its first MERGE (as well as any subsequent, intermediate one).

(202) Active and passive sentences as input to UNION



Thus, theta roles can be read off at LF based on these copies if we assume that they do not fuse:

(203) Output of UNION of (202)



Therefore, the Theta Criterion does not constitute an obstacle to the parallel-structure model of coordination.

3.3.9 Plurality

Let us now consider evidence for semantics treating coordination as a whole. This evidence is based on the behavior of collective expressions that require their argument to be plural. We observe

that plural as well as coordinated DP arguments are acceptable with such expressions, but non-coordinated singular DPs are not:

(204) Collective predicate with a plural, coordinated and singular DP arguments

- a. The children met/gathered/collided.
- b. Hansel and Gretel met/gathered/collided.
- c. * Hansel met/gathered/collided.

If the plurality requirement of collective predicates were to apply in syntax, then (204) is indeed evidence against the analysis of coordination as a derived syntactic object, since the relevant collective expressions would be illicit in the individual clauses being coordinated. Alternatively, if the plurality constraint were to apply in LF, crucially over the output of syntax, the unacceptability of the individual sentences above would not be informative with respect to the analysis of coordination. In other words, we need to establish whether such expressions refer to formal/syntactic plurality or interpretative/semantic plurality. *Committee*-type nouns (formally singular, semantically plural) and pluralia tantum noun (formally plural, semantically singular) suggest that collective predicates care about the semantic plurality only:

(205) Collective predicates with a committee-type argument

- a. The couple has met.
- b. The group has scattered.

(206) Collective predicate with pluralia tantum

- a. * As for Pat, the butterfingers finally have collided.
- b. * As for this pair of scissors, these scissors have scattered.

Munn argues that not all plurality requirement is about semantic plurality, i.e., some predicates require syntactic plurality:

(207) Apparent syntactic plurality requirement⁵⁹

- a. The neighbors are similar.
- b. Pat and Mat are similar.
- c. * Pat is similar.
- d. * The couple is similar.

I argue that even the predicate in (207) does not have a formal plurality requirement. Rather, the unacceptability of (207)d is due to other constraints on the use of such predicates, in this case establishing a comparison base. With a proper context providing such base, even the formally singular but semantically plural nouns like *furniture* may serve as an argument of such a predicate:

(208) Formally singular noun and plurality requirement

This designer is so unimaginative! His furniture is always similar.
(under the interpretation that the furniture itself is the standard of comparison, not something else in the discourse)

In sum, the acceptability of coordination of two singular DPs with predicates that require semantic plurality suggest that semantic interpretation may apply over the output of UNION. I have not been able to find a natural-language predicate so far that requires formal plurality (see also ft. 68 in Munn, 1993, p. 143); the previous claims seem to be explained on other grounds. Let me now turn to the final set of data that suggests the possibility of multiple points in the derivation where the syntactic structure receives semantic interpretation, i.e., pre- and post-UNION.

⁵⁹ Note that *similar* has also another subcategorization frame in which it takes a PP complement *similar to X*. In such a frame (207)c would be a well-formed follow up response in the following dialogue: A: Mat is hard working. B: Pat is similar <to Mat>. In such a scenario, <to Mat> is the standard of comparison. We can ensure that the examples below are not of this subcategorization frame with the correct interpretation.

3.3.10 Scope

Recall the ambiguity of interpretation in a sentence with a quantifier and a coordination (example (109) in the discussion of LF Transfer in 3.2.1.1):

(209) Scope-taking quantifier and coordination

Nobody saw Pat and Mat.

- a. SCOPE OVER ENTIRE COORDINATION: There is no individual such that this individual saw both Pat and Mat (but there are individuals who saw just Pat or just Mat).
- b. SCOPE OVER EACH CONJUNCT: There is no individual such that this individual saw Pat and there is no individual such that this individual saw Mat (and it entails that there is also no individual that saw both Pat and Mat).

Scope ambiguity is relatively uncommon in discussions of coordination models. Scope ambiguity does not fall out in any natural way under the WYSIWYG approach. Deriving a coordinate structure under the WYSIWYG approach does not involve any transformations—there is no difference in base-generated, intermediate and derived representation of a coordinate structure. Thus, we cannot attribute the difference in interpretation due to a difference in the underlying structure at different levels of a derivation. I discussed in section 3.2.1.1 how the parallel-structure model might be adapted to handle such examples. As an additional complication, some speakers report that there are examples where the quantifier seems to take scope only over the entire coordination and not over each conjunct:

(210) Non-ambiguous scope and coordination

At most 3 boys danced and sang.

- a. SCOPE OVER ENTIRE COORDINATION: There are at most 3 boys such that each of them both danced and sang.
- b. (unavailable)
#SCOPE OVER EACH CONJUNCT: There are at most 3 boys that danced and there are at most (possibly different) boys that sang. In total there can be at most 6 boys that performed.

There are also speakers for whom both scope interpretations are available. For such speakers, the interpretation in (210)a is still more readily available than the one in (210)b, but the follow up *In fact, none of the boys who danced also sang* is felicitous and forces the interpretation in (210)b. Let me discuss three possible sources of this difference in judgements. First, it may be the case that the interpretation of scope over each conjunct in (209)b is an illusion, or is arrived at via some exceptional mechanism that is different from the mechanism deriving scope in (209)a (and such an exceptional mechanism is not available in (210)b). In that case, a WYSIWYG approach would not need to stipulate some additional mechanisms for scope, while the parallel-structure approach would need to ensure that the LF interpretation is computed only post-UNION. Second, it may be the case that the interpretation of scope over each conjunct in (209)b is available by default and something else in (210)b makes it less accessible (or makes the interpretation in (210)a more salient). In that case, a WYSIWYG approach would need to stipulate any additional mechanisms for scope, while the parallel-structure approach would need to ensure that the LF interpretation can be established either pre- or post-UNION (or via reconstructed copies). Finally, it might be the case that speakers' grammars differ (for an example of how differences in individual grammars affect the scope interpretations, see Han et al., 2016). Since such a scenario is always possible, it strengthens the need to treat such examples with caution and ensure that in constructing a model of coordinate structures we do not mix and match judgements from different speakers. I leave this issue for future research. In the meantime, I would like to connect the scope problem with another issue, i.e. lexeme selection—which the WYSIWYG approach, in contrast to the parallel-structure approach, cannot account for straightforwardly.

We observe a similar ambiguity with the l-selection examples from section 3.3.2, which offered strong support for the clausal approach to coordination:

(211) Scope-taking quantifier and coordination of I-selected PPs

Nobody has any concerns for Pat and about Mat.

- a. SCOPE OVER ENTIRE COORDINATION: There is no individual such that this individual has concerns about both Pat and Mat (but there are individuals who has concerns about just Pat or just Mat).
- b. SCOPE OVER EACH CONJUNCT: There is no individual such that this individual has concerns about Pat and there is no individual such that this individual has concerns about Mat (and it entails that there is also no individual that has concerns about both Pat and Mat).

The ambiguity of the quantifier scoping over an entire coordination vs. individual conjunct is straightforwardly modeled in a clausal approach to coordination such as the parallel-structure approach where scope can be calculated at two points in the derivation, pre- and post-UNION. On the other hand, the WYSIWYG approach would require further analysis of how a quantifier can take scope within each conjunct in (211)b.

Furthermore, the fact that even in examples that require I-selection a quantifier can scope over the entire coordination suggests we are not dealing with two complementary derivations for the coordinate structure. For an analogy, consider the data from restrictive relative clauses in English that have been argued to be structurally ambiguous between the head-internal, raising structure and the matching structure, which has both an internal and an external head (e.g., Carlson, 1977). The head-internal, raising structure correctly accounts for one set of empirical facts - the idiomatic interpretations and the binding of reflexives in relative clauses (e.g., Schachter, 1973):

(212) Idiomatic interpretation and a raising structure of a relative clause (Hulsey & Sauerland, 2006, p. 113)

- a. John was satisfied by the amount of headway that Mary made.
- b. John was satisfied by the λx Mary made the_x amount of headway

(213) Binding of reflexives and a raising structure of a relative clause (Hulsey & Sauerland, 2006, p. 113)

- a. Mary liked the picture of himself that John sent.
- b. Mary liked the λx John sent the_x picture of himself.

On the other hand, the same structure would incorrectly predicts Condition C violations—behavior that is unattested in relative clauses. In turn, matching structure is able to correctly account for the absence of Condition C effects (Sauerland, 2002).

- (214) Absence of Condition C effects and a matching structure of a relative clause (Hulsey & Sauerland, 2006, pp. 113–114)
- a. Which is the picture of John_i that he_i likes?
 - b. the picture of John_i λx. he_i likes the_x picture of him_i

Ultimately, based on the facts of incompatibility of idiomatic interpretation with extraposition Hulsey and Sauerland argue that both structures are attested for relative clauses and they give rise to distinct effects like the ones seen above:

- (215) Unavailability of the idiomatic interpretation with extraposition out of relative clauses (Hulsey & Sauerland, 2006, p. 113)
- a. *Mary praised the headway last year that John made.
 - b. Mary praised the pot roast yesterday that John made.

We could hypothesize then that the same holds for coordinate structures, i.e. that we face a structural ambiguity between parallel-structure and WYSIWYG. Under such analysis, we could propose the following division of labor: parallel-structure derives examples with l-selection and WYSIWYG derives examples with high scope. Recall that while the parallel-structure approach may also derive high scope by positing post-UNION interpretation, the WYSIWYG approach cannot derive l-selection examples in any straightforward way. Given the overlap of l-selection and high scope facts within a single example like (211) I conclude that the parallel-structure approach is necessary in any case, rendering the WYSIWYG approach redundant.

3.4 Summary of the chapter

The goal of this chapter was to compare three main approaches to structure of coordination—the three-dimensional clausal approach (parallel-structure), the two-dimensional subclausal approach

(WYSIWYG) and the two-dimensional clausal approach (conjunction reduction). I delimited the scope of investigation given the possibility of different underlying structures giving rise to different types of coordination (conjunction/juxtaposition vs. cause-and-effect, for example). As for list-like coordination, i.e., the kind typical for DP coordination, I argued that the evidence from resolved agreement and I-selection point to the superiority of the parallel-structure approach over the WYSIWYG and clausal reduction approaches. I further discussed other phenomena and showed that these may also be explained by the parallel-structure approach in addition to other approaches, and contrary to some previous claims. Based on this data, I argue that adopting the parallel-structure model of coordination, despite the power of the UNION operation, is justified. Finally, the parallel-structure approach eliminated the possibility of phi-feature resolution under coordination from taking place on a dedicated coordination projection as there is not such projection (e.g., &P). If resolution was syntactic, it would need to take place on a head external to the coordination itself, and equipped with an agreement probe like, Infl^0 or v^0 . Before I move on to the next chapter, let me recognize that this chapter by no means addresses all issues that come up when proposing a major addition or change to the syntactic system. The parallel-structure approach to coordination is radically different from the more common (but, as I argued, not necessarily more accurate) WYSIWYG approach. I flagged some of the issues (e.g., timing and size of the material sent off for interpretation, data structure available to UNION) and I recognize that there are many more remaining. A useful avenue of researching these problems further would be a review on coordination within the framework of Tree Adjoining Grammar where lexical items are full sentential trees (Sarkar & Joshi, 1996).

4 Resolution

In this chapter, I discuss phi-featural *resolution*: the computation of phi-features of conjuncts in a coordinate structure that results in the subsequent exponence of one set of phi-features as an agreement morpheme. I first extend the agreement model described in chapter 2 from non-coordinated arguments to coordinated arguments. Next, in section 4.3, I summarize the observed typological tendencies of agreement involving resolution in a pre-theoretical, descriptive way. After this summary, section 4.4 attempts to develop a grammar-based model of resolution that produces exactly one set of instructions to be carried out by the performance system. I will ultimately abandon this attempt due to the challenges it faces when we consider all data. However, before I do so, I try to explain the tendencies from 4.3 by combining an independently motivated model of the structure of phi-features with logical operations like summation/intersection, etc. I will argue that in principle at least some resolution could be deterministic based on such operations and thus, could be grammar-internal. Nevertheless, I will also show that there are some examples of resolution behavior which would require a fair deal of stipulation in order to be modeled as grammar-internal operations. I present three types of empirical evidence that challenge a syntax-based model of resolution involving summation/intersection of formal features or other logical operations. First, I discuss data involving arithmetic-performing resolution. Furthermore, I show that phi-feature resolution under conjunction does not pattern like other mechanisms of reducing phi-feature information (e.g., omnivorous agreement, Person Case Constraint effects, disjunction). Finally, I show examples of variability and ineffability of resolution—behavior that is unexpected from a syntactic operation that for one input structure usually produces exactly one output structure. At the end of the chapter we will be able to reject the hypothesis regarding grammar-internal resolution.

4.1 Where resolution applies: Setting the limits

Before I proceed to the next section, a clarification is in order. We observe something resembling resolution, i.e., computation over multiple sets of phi-features that result in one set of phi-features in domains outside agreement morphology. For example, it might apply to a pronoun. Consider the following two sentences:

(216) Phi-matching across clauses

- a. Miss Scarlet_i and Col. Mustard_j were in the study. They_{i+j} weren't in the kitchen.
- b. Mr. Boddy_k and me_l were in the hall. We_{k+l} weren't in the kitchen either.

In the first clause of each of the examples above we have a coordination of two entities. Then, in the following clause, these entities are referred to by the means of a single pronoun. The phi-features of the pronoun in the second clause depend in some manner on the phi-features of the coordinated entities. In other words, the pronoun in the second clause shows resolution of phi-features under coordination. Note that there is no agreement relation (in a formal sense) between the coordination and the co-referring pronoun as the two are in separate clauses (see (15) for a constraint on formal agreement). For this reason, I will refer to the resolution of phi-features in the pronoun whose antecedent is a coordinate structure as *phi-matching* (see also section 2.6.4). The point of this example is to show that resolution might in fact be a broader phenomenon that is independent of agreement. To further illustrate this point, consider languages that allow a semantic vs. formal mismatch in phi-features of a given noun or a pronoun (see also section 2.6.2). For example, pluralia tantum such as *scissors* in English may refer to a singleton object and nevertheless formally behave as a plural (*These scissors are/*is blunt*). Furthermore, there are different positions in a sentence where phi-features can be expounded, i.e., show co-variation with the phi-features of the pronominal controller. Phi-features of a noun (3SG.F *wrózka* 'fairy') can be

exponed on an attributive modifier (*zielona* ‘green’), on a predicate (*mieszkała* ‘lived’), on a relative pronoun (*która* ‘which/who’), or on a personal pronoun (*ją* ‘her’):

- (217) Noun controlling phi-features on an attributive modifier, predicate, relative pronoun and personal pronoun

To zielon-a wróżk-a,
DEM green-NOM.SG.F fairy(F)-NOM.SG.F
‘This is a green fairy...’

któr-a mieszka-ł-a w lesie.
which-NOM.F.SG live-PST-F.3SG in forest(M3).LOC.SG
...that lived in the woods.

Widziałam ją wczoraj.
see.PST.F.1SG 3SG.F.ACC yesterday
‘I saw her yesterday.’

The multiple sites where resolution can apply have motivated Corbett’s hierarchy discussed in 2.6.2:

- (218) Phi-features exponence hierarchy (Corbett, 1979, p. 203)⁶⁰
attributive - predicate - relative pronoun - personal pronoun

Corbett (1979) observes that there are languages that in cases of mismatching phi-features, such as *scissors*, might expone either set of features, e.g., either formal plural or semantic singular. Further, he observes that a language might have a restriction as to which set of features (formal, semantic or either) may be exponed on what part of a sentence, attributive modifier, predicate, relative pronoun, personal pronoun. For example, Polish *para* ‘couple’ allows semantic or formal features to control a personal pronoun, but only formal features can control an attributive modifier, predicate, or relative pronoun. In turn, Spanish *Su Majestad* ‘his/her majesty’ allows semantic or formal features to control phi-feature morphology of a personal pronoun, a relative pronoun, or a

⁶⁰ I use the term *phi-exponence* in place of *agreement* used by Corbett which encompasses both agreement in the strict sense as I use here as well as phi-matching.

predicate, but only formal features to control phi-feature morphology of an attributive modifier. Finally, Corbett observed that these positions can be monotonically ordered as in (218) such that if a language allows both sets of features to control any position, we also expect that the same language allows both sets of features to control a given position to its right in the hierarchy (but not necessarily to its left). In other words, there is an implicational relation between these positions and their ability to expone either set of features.

As far as resolution is concerned, one might ask whether we are dealing with one mechanism for all positions exponing phi-features or is there more than one mechanism, e.g., a syntactic mechanism and a semantic one. If there is more than one resolution mechanism, does it exhibit the same entailment relations across the four different positions exponing phi-feature agreement in (218)? For example, it is logically possible that the positions that require formal agreement (e.g., attributive modifiers and predicates) also involve a formal resolution mechanism while the positions that allow semantic agreement (e.g., personal pronouns) may involve a semantic resolution mechanism, either in addition to the formal mechanism or in its stead. While in this thesis I will not be able to resolve this question in a conclusive way, I would like to offer some considerations that will allow us to narrow the scope of the present investigation so that we can control for possible confounds.

First, as already mentioned, the positions listed in (218) differ in terms of being able to be targeted by the formal operation AGREE (with constraints discussed in section 2.1). In particular, AGREE cannot establish a relation with a target that is in a separate domain, e.g., a phase. For example, AGREE on a head X^0 cannot establish a relation with a pronoun that is in a different clause. Yet all these positions may in principle be targeted by semantic phi-matching. While in principle resolution could be independent from the formal operation of AGREE, I will limit my investigation

to non-pronominal agreement, i.e., positions that are targeted by AGREE. Second, I am also setting aside attributive-modifier agreement and resolution. Some researchers, most notably Norris (2014, 2017), emphasize that agreement in the verbal domain and modifier agreement (which Norris calls *concord*) arise via a partially different set of grammatical operations, which is an argument against considering them together here. In addition, there are empirical obstacles to a consideration of modifier agreement with coordination. An attributive modifier surfacing with coordination exhibits structural ambiguity—it may either modify a single conjunct or an entire coordination, for example:

(219) Structural ambiguity of a nominal modifier in a coordination

scary witches and wizards

a. [scary [witches and wizards]]

b. [[scary witches] and wizards]

In the example above, we see that the same string may have two distinct structures: (219)a shows a structure where the adjective modifies the entire coordination, while (219)b shows a structure where the same adjective modifies just the first conjunct. While the context might be rich enough to force or eliminate a particular reading, it can be done only in a carefully controlled elicitation and experimental setting. Since some of my evidence relies on data reported elsewhere, I would not be able to always control for the intended interpretation. For this reason, I will further narrow down the investigation to predicate agreement.

There is an additional distinction within predicate agreement that Corbett's hierarchy does not make and to my knowledge, neither does much of other literature on semantic vs. syntactic agreement and on agreement with coordinations. The distinction I am referring to is that of true phi-agreement vs. cliticization and clitic doubling (Anagnostopoulou, 2016; Kramer, 2014b; Preminger, 2009; Yuan, 2017, 2019 a.o.). Languages may exhibit true phi-agreement in one

context (e.g., subject or ergative morphology) and cliticization in another (e.g., object or absolutive morphology); see Preminger (2014) for Mayan, Kramer (2014b) for Amharic, Yuan (2019) for Inuktitut, a.o. For instance, Kramer (2014b) argues that apparent object agreement in Amharic is in fact clitic doubling. Her arguments are as follows: (i) object markers in Amharic are largely optional, (ii) they index specific DPs, and (iii) they trigger a semantic effect of emphasis. These properties are opposite of what canonical agreement is argued to be by Corbett (2006, pp. 14–27; but see Preminger, 2019b for why the diagnostics (i)-(iii) might be inadequate).

There are quite a few analyses of cliticization, and it is not the goal of this thesis to discuss them in detail. Depending on the assumptions regarding cliticization, one might set it aside or include it in the investigation of resolution as pursued in this thesis. Some analyses of cliticization state that a clitic is essentially a type of a pronoun (Kramer, 2014b; Preminger, 2014 a.o.). Under such an approach, one might expect that it could then pattern like other pronouns in Corbett’s hierarchy in being more likely to control semantic agreement. On the other hand, many analyses of cliticization rely on the formal AGREE relation (Anagnostopoulou, 2003; Béjar & Rezac, 2003; Ormazabal & Romero, 2007; Preminger, 2019b; Rezac, 2008; Roberts, 2010), which leads to an expectation that clitics are instances of true phi-agreement that also relies on AGREE.

There are several reasons to include clitics in the investigation reported in this thesis. Recall the occasional but cross-linguistically robust variability or ineffability of agreement morphology with a coordination:

(220) Examples of variability in agreement with coordination

- a. That the president will be reelected and that he’ll be impeached is/are equally likely. (McCloskey, 1991)
- b. My friend and colleague is/are writing a book. (Heycock & Zamparelli, 2005)

Such variability/ineffability has been observed equally in languages that have true phi-agreement and clitics. For example, what is typically called ‘agreement’ is actually is an instance of clitic doubling in some Bantu languages (Kuria in Diercks et al., 2005; Chichewa in Mchombo, 2002) as well as possibly Biak and Fijian (Daniel Harbour, p.c. discussed later in 4.5.2.) On the practical side, we do not know whether in some of the languages for which this variability/ineffability has been observed, the morphology exponing phi-features is true agreement or cliticization.

The ineffability of agreement/possible cliticization on the verb contrasts with the resolution properties of bona-fide personal pronouns. Not only do these pronouns lack variability in resolution but they also serve as a repair strategy for variable/ineffable agreement (question marks in the brackets in (221) indicate speaker variability between accepting both forms or neither). Speakers who do not accept the variant in (221)a often resort to an avoidance strategy in which they produce a personal pronoun referring to the same group indicated in coordination as in (221)b. In the presence of such a non-coordinated ‘resolved’ pronoun there is no variability or ineffability.

(221) Variability in German in agreement with coordinated pronominal conjuncts

- a. (??) Du und er geh-**t/-en**.
 2SG and 3SG go-**2PL/-3PL**
 ‘You (sg) and him go.’
- b. Du und er, ihr geh-**t/*-en**.
 2SG and 3SG 2PL go-**2PL/*3PL**
 ‘You (sg) and him, you (pl) go.’

Based on these considerations, I include cliticization data in the present analysis, at least until there is robust evidence that cliticization behaves differently than true phi-agreement with respect to resolution, or until we have strong evidence for distinct resolution mechanisms (even if we were not yet able to fully predict when one or the other applies). In sum, in the following sections, I focus on resolution that has consequences on clitic and true phi-agreement on a predicate and set aside modifiers and pronouns (both relative and personal).

4.2 Extending the agreement model to coordinated arguments

Chapter 2 gave an overview of different models proposed for agreement, including syntactic, morphological, morphophonological, and semantic approaches. I argued that the syntactic-PF model below is the optimal one as it accounts for the empirical data and at the same time fits our current models of grammar in general:

(222) Agreement steps in a canonical/typical agreement scenario—competence model

SYNTAX		MORPHO(PHONO)LOGY	
RELATION	RESULT	RELATION	RESULT
AGREE-LINK	1 set of syntactic instructions	AGREE-COPY	1 set of PF instructions

This model was proposed mainly for agreement with non-coordinated arguments. As for agreement with coordinated arguments, it is parsimonious to adopt an extension of the model above.

At first glance, agreement with non-coordinated arguments and agreement with coordinated ones seem to be quite similar. First, they seem to be equally systematic; both types of agreement seem to give rise to equally robust patterns across and within languages where phi-features non-coordinated arguments co-vary with the predicate agreement:

(223) Systematicity of agreement with coordinated arguments

- a. Grimhilde and me are enjoying some apples.
- b. * Grimhilde and me is enjoying some apples.
- c. * Grimhilde and me am enjoying some apples.

According to many grammatical descriptions, similar systematicity of agreement is attested in languages with slightly richer agreement morphology than English. Consider Polish. Polish agreement morphology distinguishes between all combinations of person and number features. In the example below, the only acceptable variant is the one reflecting the phi-features of both conjuncts (person: 1 > 3; number: sg + sg = pl).

(224) Systematicity of agreement with coordinated arguments in Polish

- a. Baba Jaga i ja lubi-my jabłka.
 Baba Jaga(3SG.F) and 1SG like-1PL apples
 ‘Baba Jaga (a witch) and me like apples.’
- b. * Baba Jaga i ja lubi-ą jabłka.
 Baba Jaga(3SG.F) and 1SG like-3PL apples
 Intended: ‘Baba Jaga (a witch) and me like apples.’
- c. * Baba Jaga i ja lubi-∅ jabłka.
 Baba Jaga(3SG.F) and 1SG like-3SG apples
 Intended: ‘Baba Jaga (a witch) and me like apples.’

Second, AGREE-LINK with coordinated structures obeys the same constraints as AGREE-LINK with non-coordinated arguments (repeated from chapter 2):

(225) AGREE constraints

- DOMAIN: agreement probe looks for a potential agreement controller within some domain, e.g., a phrase;
- PROBE agreement probe is parametrized to look for an agreement controller
- RELATIVIZATION: that is marked with a particular case value; further it may be parametrized to look for a particular value of a phi-feature;
- MINIMALITY: once agreement probe identifies the agreement controller, it copies the feature value(s) of the entire phrase, therefore if the phrase is complex (it contains multiple nouns), agreement probe will copy the feature value(s) of the structurally highest head.

Let me discuss these constraints in some detail as it applies to coordination. They include domain restrictions, probing for a particular phi-feature, and sensitivity to the structural position of the agreement goal.

Domain restrictions. Setting long-distance agreement aside and concentrating on clause-internal agreement, coordination does not exceptionally change the pattern of agreement in a higher clause.

A matrix verb that takes a CP complement does not change this pattern of agreement regardless of whether the embedded clause includes a coordinate structure or not. Consider the Polish verb stem *wydawa-* ‘seem’ which combines with a CP introduced by the complementizer *że* ‘that’. This verb agrees with a null expletive subject (default agreement) and does not allow long-distance

agreement, (6b, d). Its agreement properties do not change if the embedded clause has a coordinated subject, as shown by (6a) and (6c). In other words, it is not the case that when the embedded subject is a coordination, it can exceptionally control matrix agreement.

(226) Strict agreement within a CP

- a. Wydawa-ł-o się, że Baba Jaga tańcz-y.
seem-PST-**3SG.N** REFL that Baba Jaga(F).NOM dance-NPST.3SG
'It seemed that Baba Jaga was dancing.'
- b. *Wydawa-ł-a się, że Baba Jaga tańcz-y.
seem-PST-**3SG.F** REFL that Baba Jaga(F).NOM dance-NPST.3SG
Intended: 'It seemed that Baba Jaga was dancing.'
- c. Wydawa-ł-o się, że Baba Jaga i Małgosia tańcz-ą.
seem-PST-**3SG.N** REFL that Baba Jaga(F).NOM & Małgosia (F).NOM dance-PRES.3PL
'It seemed that Baba Jaga and Małgosia are dancing.'
- d. *Wydawa-ł-y się, że Baba Jaga i Małgosia tańcz-ą.
seem-PST-**NVIR** REFL that Baba Jaga(F).NOM & Małgosia (F).NOM dance-PRES.3PL
Intended: 'It seemed that Baba Jaga and Małgosia dancing.'

Probing for a particular phi-feature. An agreement probe that is relativized to a particular feature, whether this feature is on a non-coordinated or coordinated argument, always behaves the same way. For example, in languages where agreement controller is always an unmarked argument (e.g., an expression in the nominative case), this condition applies equally to coordinated and non-coordinated arguments.⁶¹ Consider the Polish examples below. Predicate agreement is always controlled by a nominative argument. I follow Citko (2011, pp. 122–125) in assuming that the

⁶¹ A notable possible exception is English where we see resolution even though one conjunct is not nominative, even though such forms do not usually allow agreement (see Schütze, 2001 for why accusative might be a default case in this example; see Sobin, 1997 for a careful exploration of this pattern):

(viii) Baba Jaga and **me** are witches.

(ix) *Me am a witch.

dative-marked argument is in the subject position in the psych predicate below rather than there being a null expletive element like in the raising predicates in (226). However, even if one claimed that neuter agreement in these examples is not default, but instead is controlled by a 3SG neuter expletive, the observation about the invariability of agreement regardless of the simplex or coordinated status of arguments still stands. First, we observe that a simplex nominative-marked argument controls agreement, either in a subject or another argument position:

(227) Agreement with nominative subject argument

Jaś- \emptyset lubi-ł- \emptyset /*-a Bab-ę Jag-ę.
 Jaś(M)-NOM like-PST-3SG.M/*-3SG.F Baba(F)-ACC Jaga(F)-ACC
 SUBJECT
 ‘Jaś liked Baba Jaga.’

(228) Agreement with nominative non-subject argument

Jas-iowi podoba-ł-a/*- \emptyset się Bab-a Jag-a.
 Jaś(M)-DAT like-PST-3SG.F/*-3SG.M REFL Baba(F)-NOM Jaga(F)-NOM
 SUBJECT
 ‘Jaś liked Baba Jaga.’

Replacing the single noun phrases in argument position with a coordination of noun phrases does not change which argument controls agreement—it is still the nominative-marked argument:

(229) Agreement with nominative coordination argument in the subject position

Jaś- \emptyset i Krzys- \emptyset lubi-l-i/*lubi-ł-a Bab-ę Jag-ę.
 Jaś(M)-NOM & Krzys(M)-NOM like-PST-VIR/*like-PST-F Baba(F)-ACC Jaga(F)-ACC
 SUBJECT
 ‘Jaś and Krzys liked Baba Jaga.’

(230) Agreement with nominative argument in the subject position

Bab-a Jag-a lubi-ł-a/*lubi-l-i Jas-ia i Krzys-ia
 Baba(F)-NOM Jaga(F)-NOM like-PST-F/*like-PST-VIR Jaś(M)-ACC & Krzys(M)-ACC
 SUBJECT
 ‘Baba Jaga liked Jaś and Krzys.’

(231) Agreement with nominative coordination in the non-subject position

Jas-iowi podoba-ł-y/*- \emptyset się Bab-a Jag-a i Małgosi-a.
 Jaś(M)-DAT like-PST-NVIR/*-3SG.M REFL Baba(F)-NOM Jaga(F)-NOM & Małgosia(F)-NOM
 SUBJECT
 ‘Jaś liked Baba Jaga and Małgosia.’

(232) Agreement with nominative argument in the non-subject position

Jas-iowi i Krzys-iowi podoba-ł-a/*podoba-ł-i się Bab-a Jag-a.
Jaś(M)-DAT & Krzyś(M)-DAT like-PST-F/*like-PST-VIR REFL Baba(F)-NOM Jaga(F)-NOM
SUBJECT
'Jaś and Krzyś liked Baba Jaga.'

Furthermore, in Polish if there is no nominative argument in the clause, there is default agreement:

(233) Default agreement in a clause without a nominative-marked argument

Bab-ie Jadz-e by-ł-o/*-a wesół-o.
Baba(F)-DAT Jaga(F)-DAT COP-PST-3SG.N/*-3SG.F happy-ADV
Baba Jaga was happy.

Again, we see default agreement even if the non-nominative marked argument is coordinated:

(234) Default agreement in a clause without a nominative-marked argument

Bab-ie Jadz-e i Małgos-i by-ł-o/*-y wesół-o.
Baba(F)-DAT Jaga(F)-DAT & Małgosia(F)-DAT COP-PST-3SG.N/*-NVIR happy-ADV
Baba Jaga and Małgosia were happy.

Structural position of the goal. Finally, once an agreement probe identifies the agreement controller, it copies the feature value(s) of the entire phrase. If the agreed-with phrase is complex, for example if it contains dependent nouns or modifying relative clauses, agreement does not probe down into those dependent sub-constituents and instead copies the feature value(s) of the structurally highest phrase:

(235) Agreement with the highest phrase - subordination⁶²

- a. [The witch [with [cats]]] has some apples for us.
- b. * [The witch [with [cats]]] have some apples for us.

⁶² One may argue that agreement probe does not see the features of the subordinated phrase [a cat] not because of the hierarchy but because of the non-nominative case marking that, as I showed above, an agreement probe might be parametrized for. However, English seems to allow agreement with non-nominative arguments:

(x) Me and him are good friends.

(xi) The witch and him and good friends.

(236) Agreement with the highest phrase - subordination

- a. [The witch [that we know]] is better than the witch we don't.
- b. * [The witch [that we know]] are better than the witch we don't.

In contrast, if the highest phrase is a conjunction, in most scenarios, agreement will expone all the coordinated features:

(237) Agreement with the highest coordinated phrase

- a. [The witch and the wizard] have some apples for us.
- b. * [The witch and the wizard] has some apples for us.

Thus, a complex coordinate phrase behaves differently with respect to agreement than a complex phrase with a subordinated PP or a CP. Specifically, two conjoined phrases appear to serve as an atom for the purposes of the agreement probe, neither being more prominent.⁶³ For example, when coordination is in the subordinated position with respect to a structurally higher noun, the features of the coordination will not be copied onto the agreement probe, just like they would not be if the subordinate phrase was simplex:

(238) Agreement with the highest phrase - subordination

- a. [The witch with [a cat and a dog]] has some apples for us.
- b. * [The witch with [a cat and a dog]] have some apples for us.

To summarize, in addition to the theoretical parsimony of extending the agreement model in (222) with non-coordinated arguments to coordinated arguments, the empirical behavior of agreement with coordinated arguments seems to corroborate this move. Agreement with coordinate structures resembles agreement with non-coordinated structures in terms of systematicity (speakers usually

⁶³ Despite this atomicity of coordination, some researchers have argued for syntactic hierarchy between the two conjuncts (Munn, 1993; Johannessen, 1998; Zhang, 2009 a.o.); I refer the reader to the discussion in chapter 2.

agree on the appropriate agreement morphology), domain restrictions, probing for a particular phi-feature, and probing for the goal in the appropriate structural position within its phrase.

Extending the model to coordinated arguments will require an additional step. A single agreement probe is limited to expounding exactly one set of phi-features.⁶⁴ Therefore, if the agreement controller contains more than one set of phi-features, as in cases of coordination of multiple noun phrases, these sets of phi-features need to be *reduced* down to exactly one set. Descriptively, languages employ two strategies for reducing this phi-featural information. The first strategy is to select one conjunct with one set of features and expone this set as agreement morphology while ignoring all other conjuncts with their sets of features. This strategy is often constrained to particular constructions. For example, single conjunct agreement in Standard Arabic is found only with post-verbal subjects, never with pre-verbal subjects:

⁶⁴ At least in the languages under consideration here agreement morphology can express only one set of phi-features, regardless of the complexity of the controller, e.g., whether it is a coordinate structure or not. There are certainly languages in which this is not true, such as Basque or Georgian or Bantu languages. In these languages, the agreeing verb has the capacity to express the phi-features of more than one agreement-controller simultaneously; though here, too, coordinated arguments count as one agreement controller rather than two (whether the agreement in question is resolved or not).

(239) SV vs. VS asymmetry and single conjunct agreement in Standard Arabic (Aoun et al., 1994, pp. 207–208)

- a. ʕumar w ʕali mšaw.
 Omar(M) and Ali(M) left.PL
 ‘Omar and Ali left.’
- b. * ʕumar w ʕali mša.
 Omar(M) and Ali(M) left.M.SG
 Intended: ‘Omar and Ali left.’
- c. Mša ʕumar w ʕali
 left.M.SG Omar(M) and Ali(M)
 Omar and Ali left.’

An alternative, more widely available strategy of reducing phi-featural information in cases of coordination is to compute a new set of phi-features based on the sets of phi-features of *all* conjuncts.⁶⁵ I will refer to this inclusive computation of phi-features of conjuncts in a coordinate structure, that later get expounded as a single agreement morpheme as *resolution*:

(240) Working definition of *resolution*

Computation of phi-features of conjuncts in a coordinate structure that results in one set of phi-features to be later expounded as an agreement morpheme.

In the next section, I will go over the typological tendencies in resolution that eventually will allow us to identify the possible logical operations involved (e.g., union, intersection). This discussion will show that in principle at least some phi-feature resolution could be deterministic and grammar-based. I use the term *deterministic* to contrast with *variable* and *ineffable*. In other words, I use the term *deterministic* when a given mechanism (function) outputs exactly one form (or set of

⁶⁵ To my knowledge, there are no instances of in-between cases of resolution based on more than one conjunct but not all, e.g., in a coordination of three conjuncts, a computation of a novel set based on the phi-features of just two conjuncts is not attested.

instructions), and *non-deterministic* when it outputs less or more than one form.⁶⁶ This conclusion will segue into the discussion of different possible loci of agreement (syntax, post-syntax, and outside of the grammar entirely).

4.3 Cross-linguistic resolution tendencies in noun phrase coordination

Cross-linguistically, we observe some tendencies in the output of phi-feature computation under coordination, particularly for person and number (Corbett, 2006, p. 239). Given the existence of such tendencies we might try to explain why these particular patterns occur instead of other logically possible ones or why there are tendencies at all. Let me first sketch the main tendencies observed in this domain.

As a reminder, I focus solely on resolution whose consequence is verbal agreement morphology. Some work on phi-features that I will be referring to describes the phi-feature systems of different languages based on the behavior of the pronouns (e.g., Harley & Ritter, 2002). We also observe a type of resolution in the pronominal domain. For example, in English when referring to a group consisting of a speaker and an addressee, we resolve this conjunction as a pronoun *we*. However, I treat the two domains, i.e agreement and pronouns, as independent. This means that even if a language has a pronoun referring to exactly two non-participants, a dual pronoun, it does not necessarily mean that this language also has dual agreement morphology controlled by such a pronoun or by a coordination of two singular nouns.

⁶⁶ Thank you to Norbert Hornstein and Adam Litter for pointing out that the use of this term might be confusing given its meaning in computer science. I tried to replace it with a more neutral term, however, ultimately, I found it the most transparent. For this reason, I chose to define it rather than replace it.

4.3.1 Person

The majority of the world's languages have a three-way person distinction that reflects a typical speech act situation (Corbett, 2012, p. 123)—speaker(s), addressee(s) and non-participant referent(s) that is/are neither speaker nor addressee. In a language with such a three-way distinction, it is quite common for a coordinate structure with two conjuncts of different person features to show predicate agreement resolving this conflict of person information along the following hierarchy:

(241) Person resolution hierarchy - cross-linguistic tendency (Zwicky, 1977, p. 718)

1 (speaker) > 2 (addressee) > 3 (neither speaker nor addressee)

The hierarchy reflects the tendency whereby a conjunction of 1st person (e.g., a speaker pronoun)⁶⁷ and 2nd person (e.g., an addressee pronoun) typically resolves to 1st person:

(242) 1st and 2nd person pronoun resolving to 1st person in Polish

- a. Ja i ty lubi-my tańczyć.
1SG and 2SG like-1PL dance.INF
'Me and you like to dance.'
- b. My i wy lubi-my tańczyć.
1PL and 2PL like-1PL dance.INF
'We and you all like to dance.'

Similarly, 2nd and 3rd person usually resolve to 2nd person:

⁶⁷ Besides bona fide pronouns, phrases like 'yours truly', some honorifics, and epithets may also refer to the speaker or an addressee. Because the syntactic status (category, formal features) of such phrases is still disputed, I set these aside in the following discussion (but see Collins & Postal, 2012).

(243) 2nd and 3rd person pronoun resolving to 1st person in Polish

- a. Ty i on lubi-cie tańczyć.
2SG and 3SG.M like-2PL dance.INF
'You and him like to dance.'
- b. Wy i oni lubi-cie tańczyć.
2PL and 3PL.MH like-2PL dance.INF
'You all and them like to dance.'

In sum, person resolution is fairly robust within a language (speakers tend to agree on the acceptable agreement morphology) and across languages (resolution follows the same hierarchy).

There are other distinctions within person features that are, to my knowledge, not usually described with respect to resolution. The first distinction is *obviation* (also called fourth person) (Corbett, 2012, p. 125). Obviation is a distinction within the 3rd person (i.e., not a speech participant) between *proximate*, i.e., a foregrounded 3rd person, and *obviative* i.e., backgrounded 3rd person. I leave resolution in obviation for future research.

Another distinction within person category is *clusivity* (Corbett, 2012, p. 124). Clusivity is a distinction within 1st person between *inclusive*, i.e., including the hearer, and *exclusive*, i.e., excluding the hearer. This distinction interacts with number—inclusive necessarily refers to more than one speech participant, at minimum the speaker and the hearer. I return to the question of clusivity resolution in the next section after I describe the typological tendencies in number resolution.

4.3.2 Number

Many languages distinguish between singular and plural number categories. These labels are used for two types of distinctions: atomic vs. non-atomic (like English) and minimal vs. non-minimal (like Rembarrnga). I will focus on atomic vs. non-atomic systems first and then return to the minimal vs. non-minimal systems. In a system with a singular (atomic) vs. plural (non-atomic)

distinction, coordination of DPs of any number resolves to plural. There are also languages that have a three-way number category distinction, i.e., singular-dual-plural (e.g., Upper Sorbian, Slovene; Indo-European; Tonkawa, Coahuiltecan; Chinkook, Penutian). In turn, in this system, coordination of a singular DP and a singular DP resolves to dual. Coordination of DPs with any other number resolves to plural (Corbett, 2000, p. 198).

(244) Cross-linguistic tendency of resolution in a singular-plural language

When conjoining two DPs, resolve their phi-features to plural.

(245) Cross-linguistic tendency of resolution in a singular-dual-plural language

When conjoining two singular DPs, resolve their phi-features to dual.

Elsewhere, resolve to plural.

We can refine the two statements above. Under the assumption that all syntactic structure is binary, coordination always combines at most two DPs at a time. Surface coordination of three DPs is, in fact, a recursive combination of two coordinations (e.g., [[DP₁ & DP₂] & DP₃]). Thus, the rules in (244) and (245) do not actually need to state *When conjoining two DPs...* since the only way to conjoin phrases is to conjoin two of them. We can restate the rules then so that the resolution itself does not need to refer to the number of conjuncts:

(246) Cross-linguistic tendency of resolution in a singular-plural language (revised)

(under the assumption that all conjunction is binary)

When conjoining DPs, resolve their phi-features to plural.

(247) Cross-linguistic tendency of resolution in a singular-dual-plural language (revised)

(under the assumption that all conjunction is binary)

When conjoining singular DPs, resolve their phi-features to dual.

Else, resolve to plural.

Similarly, these simple resolution rules can be stated in the form of formal features (which will be discussed in more detail in 4.4) without appealing to the cardinality of the referent. In other words, resolution computation does not need to formally distinguish between *witches* [plural] referring to three witches vs. four witches.

This observation is desirable from the point of view of syntax. There are no syntactic rules that make reference to the order of constituents, their cardinality, or rules counting nodes or performing some arithmetic operations. For example, there is no rule that states that a phrase must move three nodes up, or that an order of all constituent needs to be reversed. Instead, all or almost all syntax is structure-dependent, i.e., it refers to constituency and structural relations. Bošković (2002) contrasts structure dependency and “simple counting” and offers some examples of properties that support the former:

(248) Examples of syntactic properties and their reference to structure, not order

WH-FRONTING There are languages which do not front any *wh*-words and leave all of them in-situ, (e.g., Mandarin), front exactly one *wh*-word and leave other ones in-situ (e.g., English), or front all of the *wh*-words (e.g., Romanian) (Bošković, 2002).

SUPERIORITY EFFECTS There are languages where all multiply-fronted *wh*-elements obey Superiority effects (e.g., Bosnian-Serbo-Croatian), none of the multiply-fronted *wh*-elements do (e.g., Russian), or only the highest one does (e.g., Bulgarian). There are no languages where exactly two *wh*-elements obey Superiority while further fronted *wh*-elements do not (Bošković, 2002).

These and other syntactic operations or relations make use of the notions of ‘none’, ‘all’ or exactly one/structure highest constituent and lack any reference to order or cardinality. One can counter that there are empirical phenomena which, while seemingly syntactic, nevertheless make reference to the order or number of constituents. Some examples are given in (33) below. This list, which is by no means exhaustive, nevertheless suggests that these apparent counterexamples are amenable to a non-syntactic explanation.

(249) Examples of apparent counterexamples of syntactic properties making reference to the order or number of constituents

FIRST/SECOND CONJUNCT AGREEMENT Predicate agreement is controlled by the linearly closest conjunct in a string rather than structurally highest. Most accounts treat this phenomenon as a PF phenomenon but some argue for its syntactic nature (Willer Gold et al., 2018).

SECOND POSITION CLITICS Some languages (e.g., Bosnian-Serbo-Croatian) have a requirement to place a person clitic after the first element in a sentence, e.g., a prosodic word, even if it breaks up a constituent structure. Most accounts place this phenomenon at the interface of syntax and phonology (Schütze, 1994).

SELF-EMBEDDING Speakers tend to accept to sentences with up to one center-embedding. However, it has been shown that this limit is likely a processing limitation rather than a constraint on grammar since manipulating such factors as local vs. non-local person pronouns or subject vs. object relativization improves the acceptability of a string without manipulating the number of center embeddings (Gibson, 1998).

An important question that arises is whether these types of logically-conceivable operations that refer to number or order of the constituents are unattested in natural language for a principled reason. This generalization has been explained via the generative capacity of natural language, i.e., what class of a formal grammar it represents in the Chomsky-Schützenberger Hierarchy—finite-state, context-free, context-sensitive or recursively-enumerable (Chomsky, 1959; Chomsky et al., 1963; Chomsky & Schützenberger, 1963). The very existence of discontinuous dependencies in natural languages shows that natural-language grammar is not a finite-state grammar (Chomsky, 1957). Evidence from cross-serial dependencies in Dutch (Bresnan et al., 1982) and Swiss German (Shieber, 1985) demonstrate that the syntax of natural language is also more powerful than a context-free grammar. This work resulted in a refinement of the original hierarchy and has concluded that natural languages are mildly-context-sensitive. I will assume that syntax cannot include operations beyond what mild-context-sensitivity allows. In order to test whether resolution follows this assumption, we need to look into languages with more complex number-feature systems.

Let me now turn to the second type of number distinctions observed in languages like Ilocano (Thomas, 1955), Kalihna (Hoff, 1968), and Rembarrnga (McKay, 1978, a.o.). Descriptively, these languages have at least a three-way distinction in number that traditionally might be labeled as singular-dual-plural.⁶⁸ Consider an agreement paradigm in Ilokano:⁶⁹

(250) Agreement paradigm in Ilocano—traditional description (Corbett, 2000, p. 168)

	SINGULAR	DUAL	PLURAL
1 EXCLUSIVE (JUST SPEAKER)	-ko		-mi
1 INCLUSIVE (SPEAKER AND ADDRESSEE)		-ta	-tayo
2 (ADDRESSEE)	-mo		-yo
3	-na		-da

In this paradigm, dual has only one form (one cell) and at the same time singular is “missing” one form. Instead of analyzing a language like Ilocano as having a distinct way of representing singular and dual, it has been proposed that these two categories represent the same formal feature. This more parsimonious representation uses the feature [minimal] which refers to a minimal number for a given pronoun. It contrasts with a non-minimal number value (sometimes referred to as *augmented*):

(251) Agreement paradigm in Ilocano—alternative description (Corbett, 2000, p. 168)

	MINIMAL	NON-MINIMAL/AUGMENTED
1 EXCLUSIVE (JUST SPEAKER)	-ko	-mi
1 INCLUSIVE (SPEAKER AND ADDRESSEE)	-ta	-tayo
2 (ADDRESSEE)	-mo	-yo
3	-na	-da

Languages with such systems provide an interesting opportunity to observe what happens under coordination. Particularly, does coordination of nouns bearing [minimal] features behave

⁶⁸ Thomas (1955, p. 205) points out that ‘dual’ may not be the most adequate label for this category since in Ilocano “that morpheme is restricted to cooperative action by one speaker and one hearer”.

⁶⁹ These forms can appear as a free-standing pronoun or as enclitics on a verb (Rubino, 2001)

analogously to coordination in languages with a singular-plural system in resolving to non-minimal and plural respectively? Although I was not able to find such data in traditional grammars or via personal communication with researchers working on such languages (Maria Polinsky, Daniel Harbour, p.c.), I would like to offer a thought experiment and leave verification of this data for future work.

First, let us entertain the possibility that a coordination of two [3 minimal] conjuncts resolves to [3 non-minimal] and a coordination of a [2 minimal] conjunct with a [3 minimal] conjunct resolves to [2 non-minimal]:

- (252) Hypothetical resolution in a language with [minimal] vs. [non-minimal] number distinction (non-speaker conjuncts)
- a. 3 MIN & 3 MIN = 3 NON-MIN
 - b. 2 MIN & 3 MIN = 2 NON-MIN

Based on this data we could conclude that a language has a number resolution rule analogous to the one found in a language with a singular-plural number system as in (246); recall that we assume all conjunctions to be binary:

- (253) Hypothetical resolution rule in language with a [minimal] vs. [non-minimal] number distinction

When conjoining DPs, resolve their phi-features to non-minimal.

Further, this rule would predict the following resolution data in a language with clusivity distinction:

- (254) Hypothetical resolution in a language with [minimal] vs. [non-minimal] number distinction in a language with clusivity distinction
- a. 1 INCLUSIVE MIN & 2 MIN = 1 INCLUSIVE NON-MIN
 - b. 1 EXCLUSIVE MIN & 2 MIN = 1 EXCLUSIVE NON-MIN

Setting aside the issue of person resolution, in both possible coordinations of person and number features in (254) we would expect resolution to [non-minimal]. From a semantic point of view (but also from the formal featural point of view discussed in section 4.4), the output of resolution in

(254)b might seem odd given that the meaning of a coordination of [1 EXCLUSIVE minimal] & [2 minimal] is one speaker and one hearer. In a language with a [minimal/non-minimal] number distinction, the combination of one speaker and one hearer is encoded by 1 INCLUSIVE *minimal*, not *non-minimal* (and not EXCLUSIVE). If instead we observed that 1 EXCLUSIVE minimal & 2 minimal resolves to minimal (1 INCLUSIVE) we would need to revise the rule in (253) and explain why it cannot apply in this coordination, in a language with such a system. If this turned out to be true, it could possibly constitute a challenge to the view that (all) resolution is syntactic, i.e., it operates over formal phi-features. As stated before, I leave the verification of this thought experiment for future work.

Let me now turn to languages with more than three number categories. As the complexity of the formal phi-system increases, it provides us with more opportunities to test the behavior of resolution—its degree of systematicity and the type of operations it requires. For example, languages with more than two number categories constitute an empirical domain for verifying whether resolution ever involves doing arithmetic in a way that cannot be stated over formal features. If we found such data, it would serve as evidence for resolution being non-syntactic in nature. Therefore, we will look into languages where the number system has an additional category of trial (exactly three) or paucal (especially with an exact range of cardinalities). Overall, such languages are rare. Due to this fact, we may not be able to reliably make any generalizations and identify cross-linguistic tendencies. There are some languages with a singular-dual-trial-plural system, where trial marks a cardinality of exactly three. There are also some languages with a singular-(dual)-paucal-plural distinction where paucal has the meaning of ‘several’, with a subset of languages having a strict upper bound for the cardinality of this category (e.g., five). It would be informative to see how the handful of these languages that do have trial or paucal marking on

the verb, resolve number in a coordinate structure. Particularly, it would be informative to see whether resolution in such systems tracks the cardinality of conjuncts (e.g., *Hansel, Gretel and The Witch sang*.TRIAL.) and/or the cardinality of the reference (e.g., *Two children and the Witch sang*.TRIAL.). In section 4.5.4, I present data showing that resolution in some of the languages listed above does indeed track the cardinality of the reference in coordination.

4.3.3 Grammatical gender & noun classes

Here I assume a definition of grammatical gender as a noun class which shows morphophonological co-variation on other elements in the sentence (Hockett, 1958). Nouns might be grouped based on some real-life property (e.g., female-denoting referents, animals, etc.) or completely abstractly. Identifying cross-linguistic gender and noun-class resolution tendencies is more complex compared to resolution in person or number. For one thing, the systems are largely idiosyncratic, e.g., noun class distinctions in Bantu languages do not map to noun class distinctions in Algonquian languages, and there are gender assignment differences even within a single language family. Moreover, even despite the apparent similarity of labels for some gender/noun-class categories e.g., masculine and feminine, they do not have the same status in each language whose gender is described using such labels. For example, neuter in Indo-European is sometimes only a default and not a fully-fledged gender category, when compared to masculine and feminine (Lithuanian in Adamson & Šereikaitė, 2019), while sometimes it is not only a default but also a gender category on par with masculine and feminine (e.g., Polish, Russian). Further, in some IE languages it is not neuter that is the default but masculine (e.g., South Slavic). Similarly, in some IE languages coordination that involves two neuter noun phrases resolves to masculine (despite the availability of neuter plural agreement elsewhere), while in other IE languages it cannot resolve to masculine:

(255) Serbian/Croatian: coordination of neuter noun phrases (Wechsler & Zlatić, 2003)

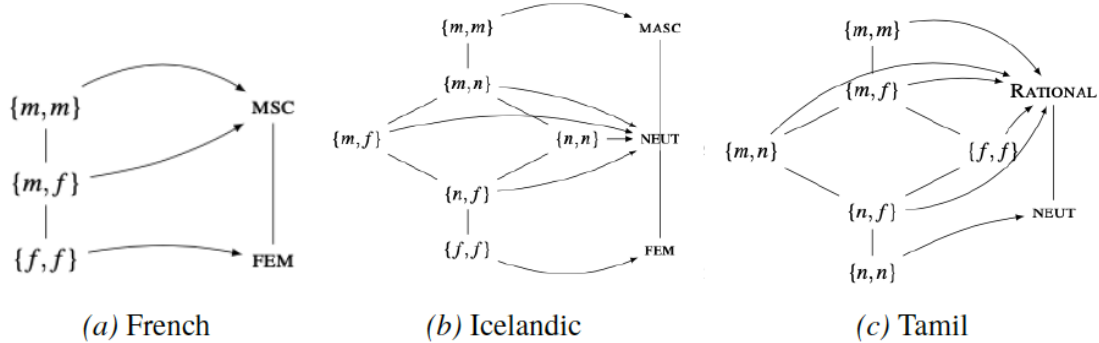
Ogledalo i nalivpero su bili /*bila na stolu.
mirror.N.SG and fountain pen.N.SG AUX were.M.PL /*were.N.PL on table
'The mirror and the fountain pen were on the table.'

(256) Polish: coordination of neuter noun phrases

Lustro i pióro *byli /były na stole.
mirror.N.SG and fountain pen.N.SG *were.VIR /were.NVIR on table
'The mirror and the fountain pen were on the table.'

Despite the idiosyncrasies of gender systems across languages, we do observe that *within* a language these systems are hierarchically organized. For example, Adamson and Šereikaitė (2019) propose that in Lithuanian, surface feminine is the most specified gender value, surface masculine is the underspecified gender value, and surface neuter is the absence of gender features all together. Furthermore, gender is often closely tied to number features. Greenberg's (1963) Universal 32 states that "whenever a verb agrees with a nominal subject or object in gender it also agrees in number." Based on Greenberg's claim of syntactic nature of gender and its systematicity, we *do* expect to identify cross-linguistic tendencies in gender resolution at some level of abstraction. While we may not be able to make precise generalizations of the same sort we were able to make for person in 4.3.1 and for number in 4.3.2 based on typology, there is an interesting observation regarding the monotonicity of gender resolution rules that seems fairly robust cross-linguistically, at least based on initial reports. Moradi (2020) observes that gender categories and their binary combinations can be ordered such that the resolution of these combinations preserves this order. In more simple terms, the resolution mappings in graphs like (257) are predicted to never "cross" each other. For example, monotonicity predicts that there is no Icelandic' system where every resolution rule is the same as in Icelandic proper, except that the coordination of {n,f} that resolves to masculine.

(257) Monotonicity of gender resolution (Moradi, 2020)



It is important to observe that monotonicity does not predict how the gender categories will be ordered in the first place (contrast neuter>feminine is Icelandic but feminine>neuter in Tamil). In fact, it is not impossible that a speaker orders gender categories (and their combinations) based on the observed resolution rules rather than vice-versa. Nevertheless, it is worth pointing out that monotonicity has also been observed in other morphosyntactic phenomena such as the Person Case Constraint and Gender Case Constraint, and for morphological phenomena such as stem suppletion, person pronoun syncretism, case syncretism, and noun stem allomorphy (Graf, 2019). One may therefore take monotonicity to characterize a natural class of phenomena, i.e., phenomena that are motivated by grammar-internal mechanisms. Moradi's analysis comes closest to a cross-linguistic modeling of gender resolution. I leave it for future research to establish how this analysis intersects with the proposal put forward in this thesis.

I have summarized certain cross-linguistic tendencies in phi-feature resolution under coordination for person, number and, to some extent, grammatical gender/noun class. I will now discuss how these tendencies can or cannot be modelled formally.

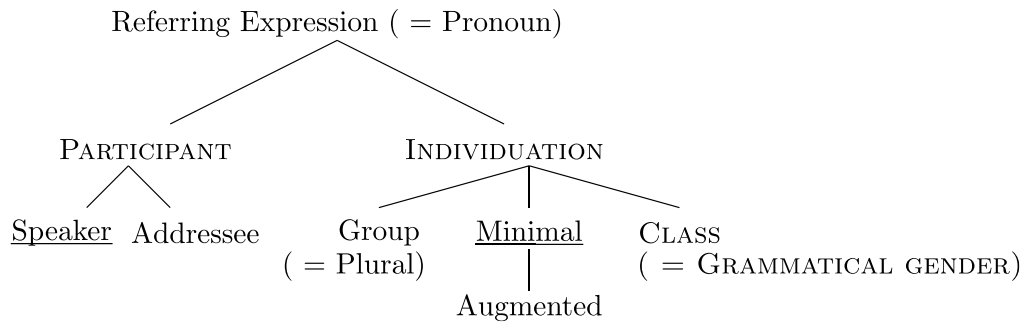
4.4 An attempt at a grammar-based model of resolution

In the previous section, I described typological tendencies in agreement resolution. Given the apparent robustness of cross-linguistic patterns together with the apparent certainty of speakers' judgments, it is often assumed, without much questioning, that resolution is grammar-based. In this section, I first describe how independent existing theories of phi-features allow us, in principle, to model and explain some resolution tendencies as an integral part of grammar. However, I will ultimately reject such a model because upon closer inspection, resolution does not behave like a grammar-based mechanism.

After presenting a sketch of how feature resolution may be modeled using grammatical tools, I will return to arguments against such a grammar-based approach. I will present an argument against a syntactic and morphological treatment of resolution, based on data from Biak and Fijian. I will then add two further empirical arguments against syntactic/morphological resolution: (i) the contrast between agreement with coordinations and other known cases where agreement relies on features of multiple arguments, and (ii) inter- and intra-speaker variability reported in a considerable number of unrelated languages. By elimination, we arrive at the need to model resolution as an extra-grammatical mechanism.

The tendencies in person-feature resolution are readily explained once we adopt the feature-geometric architecture of person feature representation proposed by Harley and Ritter (2002) for pronouns:

(258) Feature-geometric representation of phi-features (adapted from Harley & Ritter, 2002)



In a representation like the one above, nodes and subnodes correspond to natural classes. The PARTICIPANT node has subnodes, Speaker and Addressee. Person features are encoded on the PARTICIPANT node. All the features are privative, so there is no negative value of any (sub)nodes, e.g., [-Speaker]. The geometry is meant to represent the entailment relations where, for example, having a Speaker subnode entails having Participant node but not vice-versa. Having a Speaker subnode then corresponds to what we descriptively call 1st person, while the Addressee subnode corresponds to 2nd person. The two subnodes are not mutually exclusive and in some languages, the presence of both subnodes is possible, giving rise to 1st inclusive person. Finally, lack of a PARTICIPANT node corresponds to 3rd person.

Under this representation of subnodes/features, we can analyze the resolution of a person feature as the result of percolation of individual subnodes/features from each conjunct followed by a conjunction or summation of these features:

(259) Person resolution hierarchy (Zwicky, 1977, p. 718)

1 (speaker) > 2 (addressee) > 3 (neither speaker nor addressee)

Therefore, in the Polish example of coordination in (260), the first conjunct *ja* contributes (at least) the Speaker feature while the second conjunct *ty* contributes the Addressee feature:

(260) Resolution of 1&2 person conjunction → 1 person⁷⁰

Ja	i	ty	lubi-my	tańczyć.
1SG	and	1SG	like-1PL	dance.INF
Speaker		Addressee	{Speaker, Addressee}	
'Me and you like to dance.'				

Both of these features are agreed with and in a language without a clusivity distinction, like Polish, the Speaker feature is generally more prominent, which is in line with its cross-linguistic default status under the PARTICIPANT node. For this reason, the conjunction would be resolved as 1PL. On the other hand, in the Polish example in (261), there is no Speaker feature percolation from any conjunct. Instead, there is an Addressee feature on the first conjunct *ty* and no PARTICIPANT node, i.e., no person features whatsoever on the second conjunct *on*. The summation of the two results in the Addressee feature being agreed with:

(261) Resolution of 2nd & 3rd person conjunction → 1st person

Ty	i	on	lubi-cie	tańczyć.
2SG	and	3SG	like-2PL	dance.INF
Addressee		∅	{Addressee}	
'You and him like to dance.'				

The same person feature percolation holds for the plural counterparts of these data, as person and number are independent under the feature-geometric representation in (258).

⁷⁰ To be precise, in Harley and Ritter's system, the Speaker subnode being a universal default, does not need to be specified initially in a language without clusivity distinction. The Speaker subnode can be inserted as a default under an empty INDIVIDUATION node. An empty INDIVIDUATION node is not the same as the lack of INDIVIDUATION node which results in 3rd person interpretation. This distinction makes a difference when nodes are counted to assess markedness. However, for our purposes here, nothing will change if I explicitly represent the Speaker node in these diagrams. (If Polish had clusivity distinction, resolution in (260) would represent inclusive 1st person).

The feature geometry in (258) is descriptively accurate and makes correct empirical predictions. In addition, it is undergirded by conceptual argumentation. Harley and Ritter propose that the geometric representation of features follows from the grammaticalization of cognitive notions such as deixis, countability and taxonomy. For example, the referent of 1st and 2nd person pronouns changes throughout the discourse along with the changing discourse roles (i.e., who is a speaker at a given moment and who is the addressee). Morphosyntactically, both of these pronouns contain the PARTICIPANT node. Conversely, the referent of the 3rd person pronoun does not change when the discourse role changes. Accordingly, 3rd person pronoun has no PARTICIPANT node in the morphosyntax. In sum, the conceptual distinction between changing vs. stable discourse roles motivates and constrains the geometric representation. Further, Harley & Ritter argue that 1st person being the universal default subnode of the PARTICIPANT node is reflected in its uniform early acquisition as compared to other person features. The link between the formal status of phi-features and their cognitive grounding is particularly relevant for the purposes of this thesis, because it allows us to *not* confine phi-features, and their resolution, solely to the formal system. While I do not argue that the Harley & Ritter geometry itself should be subsumed under some general cognitive mechanisms (see Preminger, 2014 chapter 7 for why it could not work for example for omnivorous agreement in Kaqchikel) but rather that the effects of geometry on coordination resolution may be subsumed in this manner. This approach to phi-features is a reminder that a language-related phenomenon may be simultaneously systematic and domain-general. I will return to this point in the following chapter.

To summarize, while person systems differ across languages, they are constrained by the universal morphosyntactic architecture of features, which creates an appearance of consistency. In fact, if we assume such a universal architecture of features, plus a universal resolution strategy of these

features (summation), there is no room for language-specific resolution rules. This universal architecture is an attractive possible explanation for why from a bird's eye view, person resolution is very uniform across languages. However, as Corbett (2006, p. 242) notes, "person resolution is not quite as simple as grammars often imply." Before I turn to the discussion of number resolution, let me foreshadow the discussion in the following chapter, where I show that this robustness of person resolution is only apparent. Even in familiar languages such as German (Fanselow & Féry, 2002; Findreng, 1976; Reis, 2017; Timmermans et al., 2004), Dutch (Timmermans et al., 2004), and French (Grevisse, 1964), we find consistent examples of "non-canonical" resolution. Examples of this sort allow us to separate the universality of the phi-feature geometry from the nature of resolution mechanisms.

Now consider the node for number, i.e., INDIVIDUATION. The INDIVIDUATION node contains two subnodes: Group, corresponding to what is descriptively called plural, and Minimal, which is descriptively called singular or minimal. The Minimal subnode is also a universal default for INDIVIDUATION, i.e., in the absence of any subnodes (a bare INDIVIDUATION node), Minimal is inserted. In a language with a singular-plural distinction, the singular is always underspecified, i.e., there is never a contrast between explicit Minimal vs. explicit Group nodes, but rather underspecified (eventually filled later in the derivation) vs. specified Group. In contrast, in languages with a dual distinction, the two subnodes are contrastive, i.e., they can cooccur and yield a dual. Thus, Minimal is always present in a representation of singular or dual number.⁷¹

⁷¹ The number of abstract nodes does not necessarily predict the number of surface morphemes (i.e., context specified for Vocabulary Insertion might nuance this one-to-one mapping). For this reason, examples where e.g., a dual

Given the system just sketched, how could number resolution tendencies be modelled? On the surface, the resolution rules for both singular-plural languages and singular-dual-plural ones may seem simple and easy to capture using standard morphological insertion-like rules (repeated (244) and (245)):

(262) Resolution in a singular-plural language (descriptive)

When conjoining two DPs, resolve their phi-features to plural.

(263) Resolution in a singular-dual-plural language (descriptive)

When conjoining two singular DPs, resolve their phi-features to dual.
Else, resolve to plural.

Let me now explain how we could try to use the system of geometric feature-representations to account for resolution in language with a singular-plural distinction, where any conjunction of DPs resolves to plural. In modeling resolution, we would want to limit ourselves to tools and primitives known to operate in grammatical systems. To be specific, an elegant and explanatory grammar-based resolution model should adhere to principles whereby syntax and morphology do not “do” arithmetic.⁷²

I set aside the possibility that CoordinationP or the Coordination head is somehow inherently specified for plural—there are many examples of conjunction that do not resolve to plural (CPs, PPs, etc.):

agreement is not a simple stacking of singular and plural morphemes is not an issue (but see Nevins, 2011 for why dual is more marked than plural according to a variety of diagnostics).

⁷² Another possible desideratum for principles of syntax and morphology would be not using negation. However, at least according to some analyses, 3sg agreement morpheme *-s* in English is a morphological exponent of the absence of phi-features (Preminger, 2014) and as such, the Vocabulary Insertion might require using negation.

(264) CP conjunction and singular agreement (McCloskey, 1991, p. 565)

That UNO will be elected and that sanctions will be lifted **is** now likely.

For the purpose of the discussion below, I will assume that these types of conjunctions do not contain an INDIVIDUATION node at all. Setting those cases aside, we still observe that a simple summation operation like the one applied in person resolution will not suffice. Namely, the summation of an INDIVIDUATION node on one conjunct and an INDIVIDUATION node on another conjunct (or even a Minimal subnode on one conjunct and a Minimal subnode on another conjunct) would be predicted to resolve to bare INDIVIDUATION (or Minimal, but it does not). Furthermore, changing the universal default from Minimal to Group does not yield the desired results either. For instance, in examples where singular DPs are conjoined. Another option is that there is an idiosyncratic rule that holds across languages whereby the presence of more than one INDIVIDUATION node results in plural, through the insertion of a Group subnode:

(265) Resolution in a singular-plural language (attempt at a formalization of (262))

If a conjunction contains INDIVIDUATION node, add a Group subnode.

This rule, stipulative as it may be, does account for a large set of languages. However, it faces limitations as soon as we start considering languages with further number distinction.

Now, we need to ensure that (263) does not entail that resolution can rely on basic arithmetic. Resolution rules state that conjoining a singular feature with *exactly one more* other singular feature will have to result in the feature value [dual]. Crucially, adding one more conjunct, with any feature, does not result in dual. We can model this pattern without counting nodes, if we restrict the model of coordination to recursive binary conjunction and granting the Group subnode special privileges:

(266) Resolution in a singular-dual-plural language (attempt at a formalization of (263))

If a conjunction (always binary) contains INDIVIDUATION node but does not contain a Group subnode, add it.

Else, remove any Minimal subnodes.

In a conjunction with more than two conjuncts, where we need to arrive at a plural resolution regardless of the phi-features on each conjunct, the following steps have to take place: First, the system scans two conjuncts, at the deepest level of embedding, and resolves their features in such a way that a Group subnode (and perhaps a Minimal one as well) is inserted. Once the Group subnode is present, the next step, one that integrates the next member of the conjunction, ensures that the resolution follows the Elsewhere rule. The rule in (266) again is highly stipulative and as is, lacks explanatory power. However, similar to the rule in (265), it does cover the necessary data.

Let me briefly turn to the possibilities for modeling gender/noun-class resolution. As already discussed in 4.3.3, the gender/noun-class feature is highly idiosyncratic, one that does not seem to be based on universal values (it is of course possible that we have not modeled it at the right level of abstraction yet). Given the lack of a gender/noun-class model comparable to the person and number models described above, we cannot model the resolution of this feature with the necessary level of precision. Note, however, that Harley and Ritter (2002)'s model in (258) bundles gender (CLASS) as a subpart of number (INDIVIDUATION), due to the cross-linguistic observation that the two often stand in a very tight relationship with one another. At least in their feature geometry, such clustering means that there can be no CLASS node without an INDIVIDUATION node.⁷³ This leads to a prediction that if number resolution cannot succeed (for any reason), gender resolution cannot succeed either.

⁷³ For a different model of gender representation, see e.g. Kramer (2014a).

To conclude, in this section I tried to explain the cross-linguistic tendencies in phi-feature resolution under coordination summarized in 4.3. I assumed an independently-motivated model for the architecture of phi-features that, given its explicitness and constraints, allows one to make predictions about the system in general. The tendencies in person resolution are neatly captured if we model resolution as summation of the features, whereby all nodes/subnodes/features present on the conjuncts percolate onto the resolving element (e.g., &P) and then are read off that element in the same way as they would be read off any other referring expression. In contrast, we could not achieve the same level of simplicity when it comes to modeling number resolution. For instance, a conjunction of two of the same Minimal subnodes does not result in a Minimal node but rather an insertion of a different subnode, namely, Group. The rules needed to capture number resolution patterns can be formulated but they are stipulative and do not shed light on the reasons why the attested language-universal tendencies in number resolution exist at all. Finally, the level of complexity of the stipulated rules for number resolution grows as we increase the level of complexity of the available number distinctions, going from a singular-plural system to singular-dual-plural and especially singular-dual-trial-plural.

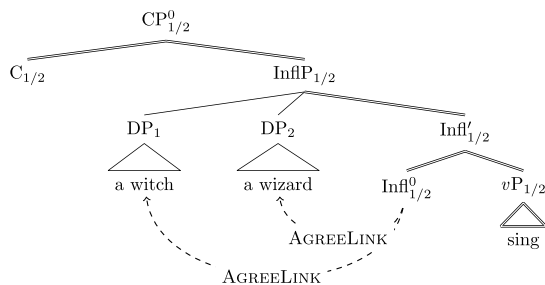
4.5 Against a syntactic and morphological approach to feature resolution under coordination

In this subsection, I present three types of empirical evidence against a syntactic and morphological treatment of resolution—its distinctness from other syntactic phenomena that involve computation over multiple sets of phi-features, its arithmetic capabilities, and finally, the often-ignored cases of variability of the output of resolution under coordination that constitute apparent “exceptions” to otherwise deterministic syntactic rules.

4.5.1 Resolution is unlike other phenomena reducing multiple sets of phi-features

Let me now present an argument against a syntactic treatment of resolution. This argument relies on a comparison between coordination and other attested phenomena that deal with multiple phi-features where only one set is exponed. In order for the comparison to go through, we first need to ensure that we are dealing with phenomena that belong to a well-defined natural class where features on the same head undergo some syntactic computation. Recall that the model of coordination based on parallel-structure (see chapter 3) does not contain a dedicated Coordination projection to which phi-features from the individual conjuncts could percolate. Instead, agreement targets with their phi-features are each individually linked to the agreeing probe, e.g., Infl⁰:

(267) DP subject coordination and AGREE-LINK under the parallel-structure approach



I will now show that other syntactic phenomena, namely omnivorous agreement and Person Case Constraint (PCC) effects, produce different output when compared with the resolution of phi-features under coordination. This difference is surprising on a theory in which resolution effects are also analyzed as multiply-valued agreement.

4.5.1.1 Omnivorous agreement

Recall the phenomenon of omnivorous agreement (mentioned in chapter 2), where agreement morphology expoes the phi-features of the argument higher on the phi-feature hierarchy among the two core arguments in the clause, regardless of its grammatical function. Consider data from Kaqchikel (Mayan family, K'ichean group):

(268) Omnivorous agreement in Kaqchikel Agent Focus (Preminger, 2014, p. 40)

- a. Ja rje' x-e-tz'et-ö rja'.
 FOC 3PL COM-3PL.ABS-see-AF 3SG
 'It was them who saw him.'
- b. *Ja rje' x-∅-tz'et-ö rja'.
 FOC 3PL COM-3SG.ABS-see-AF 3SG
 Intended: 'It was them who saw him.'
- c. Ja rja' x-e-tz'et-ö rje'.
 FOC 3SG COM-3PL.ABS-see-AF 3PL
 'It was him who saw them.'
- d. *Ja rja' x-∅-tz'et-ö rje'.
 FOC 3SG COM-3SG.ABS-see-AF 3PL
 Intended: 'It was him who saw them.'

The example above shows that in a particular construction called Agent Focus (Aissen, 2017), the 3rd plural agreement marker *-e-* is controlled by either the subject or the object. In other words, in a configuration where one argument is 3PL and one is 3SG, regardless of their grammatical roles, the 3PL will always control agreement on the predicate. Collapsing all the logical possibilities for the phi-features of the two arguments in the Agent Focus construction, we arrive at the following hierarchy:

(269) Agreement hierarchy in Agent Focus in Kaqchikel

1, 2 > 3PL > 3SG

According to this hierarchy, when one argument in the Kaqchikel Agent Focus construction is 1st or 2nd person and the other argument is 3rd person, it is the features of the participant argument that are exponed, not 3rd person.

Agreement in the Agent Focus construction has received a good deal of attention in linguistic theory, and one particular analysis is relevant for the comparison with phi-feature resolution under coordination. In Coon et al. (To appear) and Coon & Keine's (2020) work on Feature Gluttony, they propose that in the K'ichean Agent-Focus construction, Infl^0 agrees with both arguments, but expones only one set of features based on the hierarchy in (269).

On the assumption that the resolution of phi-features under coordination also takes place on Infl⁰, let us now check whether coordination resolution also adheres to the hierarchy in (269). The key data comes from sentences where two arguments bear 3SG features:

(270) Omnivorous agreement in Kaqchikel Agent Focus with two 3SG arguments

- a. *Ja ri a Lu' x-e-tz'et-ö rja'.
 FOC the CLF Lu COM-3PL.ABS-see-AF 3SG
Intended: 'It was Lu who saw him.'
- b. Ja ri a Lu' x-∅-tz'et-ö rja'.
 FOC the CLF Lu COM-3SG.ABS-see-AF 3SG
 'It Lu who saw him.'

In the example above, we see that an Agent Focus construction with two 3SG arguments is possible and that in such a construction, the agreement morphology on the predicate is necessarily 3SG. Now, let us turn to an example of coordination of two 3SG noun phrases in Kaqchikel. We observe that agreement resolves to 3PL in line with the typological rules of coordination of [sg] & [sg] rather than resolving to 3SG as is the case with a multi-valued Infl head in Kaqchikel:

(271) Resolution in coordination in Kaqchikel (Brown et al., 2006, p. 197)

- Jeb'el x-e'-etz'-an ri a Lolmay chuqa' ri a Lu'.
 good COM-3PL.ABS-play-AP the CLF Lolmay and the CLF Lu'
 'Mr. Lolmay and Mr. Lu played well.'

In sum, the multiply-valued Infl⁰ in an Agent Focus construction is different from the multiply-valued Infl⁰ probing a coordination. In order to model this distinction, we would need to specify the rules of resolution at the level of each individual construction. While allowing for distinctions based on individual constructions accounts for the data, it does not provide any explanation for the distinction.

4.5.1.2 Person Case Constraint

Let me now provide another example: Person Case Constraint effects, where a single head is analyzed as agreeing with multiple sets of features, but this time the result is ineffability. A number

of Spanish dialects have a restriction on the person specification of objects in a ditransitive frame; in particular, a combination of 1 and 2 persons is not allowed (Perlmutter, 1971):⁷⁴

(272) PCC effect in Guatemalan Spanish (1>2) (Rodrigo Ranero, p.c.)

* Maria me te presentó.
 Maria 1SG 2SG introduced
Intended: ‘Maria introduced me to you.’

Under the same Feature Gluttony approach applied to omnivorous agreement, the PCC is analyzed as a derivation where both objects agree with the same head, e.g., v^0 , and particular combinations of features (here 1, 2) are not allowed due to morphological restrictions. The result is ineffability. We might wonder what happens in the same language when this particular combination of features is subject to resolution under coordination. The coordination of 1st & 2nd person pronouns does not result in ineffability:

(273) Coordination of 1st and 2nd persons in Guatemalan Spanish (Rodrigo Ranero, p.c.)

Tu y yo somos amigos.
 2SG and 1SG COP.1PL friends
 ‘You and I are friends.’

⁷⁴ A similar ineffability of 1 and 2 person arguments is found in Kaqchikel Agent Focus construction already discussed in 4.5.1.1:

- | | | | | |
|--------|--|-----|-----------------------------|------|
| (xii) | *Ja | rat | x-in/at/Ø-ax-an | yin. |
| | FOC | 2SG | COM-1SG/2SG/3SG.ABS-hear-AF | 1SG |
| | <i>Intended:</i> ‘It was you(sg) that heard me.’ | | | |
| | | | | |
| (xiii) | *Ja | yin | x-in/at/Ø-ax-an | rat. |
| | FOC | 1SG | COM-1SG/2SG/3SG.ABS-hear-AF | 2SG |
| | <i>Intended:</i> ‘It was me that heard you.’ | | | |

Presenting this example would serve the same purpose as the Spanish one here. Nevertheless, I have not been able to find a crucial example with coordinated 1st & 2nd persons in the literature nor elicit it directly from the native speaker consultants during the pandemic restrictions. In the meantime, the Spanish examples provide the necessary contrast in the behavior of multiply-valued agreement probes.

In sum: on the one hand, the model of coordination I have argued for in chapter 3 entails that resolution, if it occurs in syntax, takes place on the head with the agreement probe, i.e., a head external to the resolution, e.g., Infl⁰. On the other hand, Infl⁰, at least in some languages, is already tasked with a different way of handling an overabundance of phi-featural information.⁷⁵ We are then faced with a conundrum unless we give up the analysis of resolution as grammar-based in the first place—which is the core of the proposal in this thesis. Before I turn to the details of this proposal in Chapter 5, let me discuss more issues with maintaining that Infl⁰ is the locus of phi-featural resolution.

4.5.1.3 *Disjunction*

Differences in feature resolution between conjunction and disjunction present yet another problem:

⁷⁵ There is an alternative analysis of PCC effects that does not rely on Feature Gluttony, and instead relies on licensing of local pronouns (e.g., Preminger, 2014). In such an analysis, local person pronouns need to be licensed via AGREE and in a sentence like (272), the 1st person pronoun is agreed with and licensed, and the search conducted by the agreement probe is halted. Thus, the lower pronoun with a 2nd person feature cannot be agreed with and cannot be licensed. This results in ungrammaticality. If all local person pronouns need to be licensed, then we must conclude that in the grammatical (273) with the coordination of 1st & 2nd, the agreement probe either exceptionally did not halt upon encountering one of the person pronouns or that coordination is special in licensing local person pronouns as its conjuncts. This leads to a prediction that coordination would obviate PCC restrictions:

(xiv) ‘Maria introduced Ana and me to you.’

(xv) ‘Maria introduced me to you and Ana.’

I do not know of any studies that report such effects. Depending on the judgments for data like (xiv) and (xv), they could potentially constitute an interesting challenge for PCC analyses that rely on local person licensing. I leave this puzzle for future research.

(274) Agreement in conjunction vs. disjunction

- a. Shea and Alexis dance well.
- b. Shea or Alexis dance*(-s) well.

Crucially, it is not the case that singular agreement in disjunction is failed agreement—when one of the disjuncts is 1SG pronoun, plural agreement seems obligatory:

(275) Agreement in disjunction of 1SG and 3SG

- a. Me or Shea are going to help you.
- b. * Me or Shea am going to help you.
- c. * Me or Shea is going to help you.

Assuming that both disjunction and conjunction are examples of coordination and share the same syntactic structure (den Dikken, 2006; Han & Romero, 2004; Hong, 2013; Smith et al., 2018), the difference between them lies in the lexical specification of the linking element *and* vs. *or*. Recall the assumption from chapter 3 that the linking element is inserted post-syntactically (as a result of linearization of the output of UNION), thus if it was to play any role in resolution, it would have to do so late in the derivation as well. Given that there is currently no analysis that posits a formal relation between this late-inserted linking element and Infl^0 (where phi-features from the conjuncts have been copied to), I set aside the possibility that the exact identity of the linking element plays a role. Let me now sketch an alternative approach, still assuming that the syntactic structure of disjunction and conjunction is the same, and that resolution of phi-features under coordination takes place on Infl^0 . In this approach Infl^0 would refer to the logical relation between the two conjuncts, i.e., conjunction vs. disjunction, and based on this information deploy a different set of

rules.⁷⁶ Foreshadowing the discussion in 4.6, such an analysis is not possible under a derivational model like Single Output syntax, where morphophonology and semantics are not directly linked in a way that bypasses syntax.

An alternative to analyzing surface disjunction as representing one underlying phenomenon is to propose that disjunction is structurally ambiguous (Marušič & Shen, 2020) between a WYSIWYG structure (discussed in section 3.2.2) and the result of clausal conjunction followed by ellipsis (also discussed in section 3.2.3). Structural ambiguity would account for the availability of multiple resolution strategies within a single language. For example, in Slovenian the disjunction of a feminine (plural) and a neuter (plural), agreement may take one of the three forms: masculine, feminine or neuter:

⁷⁶ Another version of this proposal is to set aside the findings and arguments for resolution on Infl^0 , from chapter 3, and revive the analysis in terms of a designated Coordination Phrase. If such a phrase exists, its head could be specified for conjunction vs. disjunction, and such a specification could cause a difference in the operative resolution rules. While it would be slightly more elegant to analyze flavors of Coord^0 as the locus of the difference instead of Infl^0 , we would lose insights gained by adopting the analysis in chapter 3, and we would still have a fairly idiosyncratic specification of $\text{Coord}_{\text{and}}^0$ vs. $\text{Coord}_{\text{or}}^0$ that serves no other purpose in syntax than to deploy different resolution rules. In other words, such an analysis would capture the data but not help us understand why such a distinction is drawn in syntax.

(276) Variability in Slovenian in agreement with coordinated nominal conjuncts (Marušič et al., 2015, p. 52)

- a. Krave in teleta so odšl-i na pašo.
cows(F) and calves(N) AUX.PL went-M.PL on graze
'Cows and calves went grazing.'
- b. Krave in teleta so odšl-e na pašo.
cows(F) and calves(N) AUX.PL went-F.PL on graze
'Cows and calves went grazing.'
- c. Krave in teleta so odšl-a na pašo.
cows(F) and calves(N) AUX.PL went-N.PL on graze
'Cows and calves went grazing.'

Masculine is analyzed as default agreement in a WYSIWYG structure, while the feminine and neuter agreement variants would arise due to an elliptical structure. Under such an analysis, the surface feminine agreement would arise as a result of underlying clausal conjunction followed by an ellipsis of InflP in the second conjunct as in (277)a.⁷⁷ Similarly, the neuter agreement would arise as a result of clausal conjunction but followed by an ellipsis of InflP in the first conjunct:

(277) Possible analysis of single conjunct agreement in (276)

- a. Krave so odšl-e na pašo in teleta <so odšl-a na pašo.>
cows(F) AUX.PL went-F.PL on graze and calves(N) <AUX.PL went-N.PL on graze>
'Cows and calves went grazing.'
- b. Krave <so odšl-e na pašo> in teleta so odšl-a na pašo.
cows(F) <AUX.PL went-F.PL on graze> and calves(N) AUX.PL went-N.PL on graze
'Cows and calves went grazing.'

⁷⁷ This analysis would further require some reorganization to derive the correct surface word order. For example, the linking element *and* and the remnant of the ellipsis in the second clause, i.e., a neuter noun phrase in (277)a would need to tuck (N. Richards, 2001) in between the feminine noun phrase and its InflP in the first clausal conjunct. The alternative analysis would be to maintain that there is a subclausal conjunction in (276)b but the features of the second conjunct are inaccessible to the agreement probe (e.g., they do not percolate). This analysis would still be consistent with the possibility of structural ambiguity that gives rise to the surface optionality—a view that I argue here we have no evidence for.

In section 3.3.1.1 on single conjunct agreement, I showed that we cannot rule out the possibility of structural ambiguity (and particularly clausal reduction by ellipsis). Yet this analysis will still not account for all the data. In English (275), plural is neither the default nor the outcome of single-conjunct agreement. Furthermore, according to my own observations, speakers are not always confident in their choice of a preferred variant of agreement under disjunction, an issue that I will address in the next subsection. In the meantime, let me recap the argument from disjunction, based on the assumption that syntactic resolution would need to take place on Infl⁰. I have used evidence of distinct outputs for the resolution of conjunction and disjunction to argue that were it syntactic, resolution would need to be more powerful than a typical syntactic mechanism. Thus, we have seen another piece of evidence against the treating resolution of phi-features under coordination as a syntactic operation.

Let us finish this subsection with another related piece of evidence from Ride-Node-Raising (RNR). RNR constructions are an example of coordination where material on the right edge of the sentence, i.e., following the coordination, is in fact interpreted in multiple places—as part of each conjunct:

(278) Right-Node-Raising and agreement (Grosz, 2015, p. 6)

Sue's proud that Bill and Mary's glad that John have travelled to Cameroon (together).
First, examples like (278) necessitate an analysis where resolution is not on CoordinationP like in WYSIWYG approaches, since *Sue's proud that Bill and Mary's glad that John* is not a constituent to the exclusion of *have travelled to Cameroon*. In other words, there cannot be CoordinationP that exhaustively dominates *Sue's proud that Bill and Mary's glad that John* and can be the locus of resolution. Further, note that under the ellipsis analysis described for disjunction, above, we would predict the necessity of singular agreement, contrary to what we observe in RNR. Last but

not least, observe that many native speakers accept both variants of agreement in the minimally contrastive example below:

(279) Right-Node-Raising and agreement (Grosz, 2015, p. 6)⁷⁸

- a. Sue's proud that Bill and Mary's glad that John have travelled to Cameroon.
- b. Sue's proud that Bill and Mary's glad that John has travelled to Cameroon.

If we assume that both (278) and (279) have the same syntactic structure, and the only logical place for resolution is Infl⁰ (i.e., there is no CoordinationP), we are forced to conclude that resolution in RNR does not behave like resolution in the more typical cases of conjunction. Not only do we observe the possibility of singular agreement despite Infl⁰ being double AGREE-LINKED with *Bill* and *John*, but we also see variability, which will be the focus of section 4.5.2.

4.5.2 Resolution varies across and within speakers

In this subsection, I will discuss optionality in agreement variants, as well as inter- and intra-speaker variability, which together point to the grammar-external nature of feature resolution under coordination. Each of these examples of variability in feature resolution has received independent and often idiosyncratic explanations in the literature. Typically, variability is treated as an

⁷⁸ Grosz reports that he elicited judgments from 50 native speakers of English on these kinds of examples, where an RNRed element shows agreement presumably controlled by noun phrases in the conjuncts. While the results are reported only in a footnote, he says that there is variation across speakers as to the preference of one or the other variant. While more investigation is needed to determine whether speaker variation arises from a difference in grammars, I suspect that this is another example of variability due to a non-deterministic extra-grammatical resolution strategy. Although I limit myself to the investigation of simple conjunction in this thesis, I flag variability in agreement in related phenomena to show that the problem of resolution becomes even more apparent the farther one gets from canonical cases of agreement with conjunction.

exception to the otherwise invariable and systematic nature of resolution mechanisms. I will offer examples of variability from very different domains—not because I am trying to compare disparate domains but rather because I want to emphasize the frequency of “exceptions” to the purportedly grammar-based phenomenon of phi-feature resolution under coordination. While I will provide counterarguments to some of the existing accounts of these apparent exceptions, each individual case study warrants more attention than it is afforded here. Nevertheless, when taken together, these apparent exceptions allow us to paint a coherent picture of significant variability across speakers and in the performance of individual speakers.

On the one hand, there are cases where phi-feature resolution is so robust and systematic as to seem grammar-based. For example, coordination of a 1SG pronoun with a 2SG pronoun in English shows no variability in the resulting agreement morphology:

(280) Lack of variability in English in agreement with 1SG and 2SG pronouns

You and me **are**/*is/***are** friends.

Given this robust interspeaker convergence, and the confidence that speakers have in the acceptability of one form of agreement, we take it for granted that these examples represent utterances generated directly by the grammar. However, as one departs from simple cases, variation among speakers and scenarios becomes visible. Examples (281)-(287) below are minimal pairs differing on the surface only in number morphology on the copula. I discuss them in turn to show what type of variability we are dealing with.

Consider first the following pair:

(281) Variability in English in agreement with coordinated clausal conjunct (McCloskey, 1991)

That the president will be impeached and that he'll be reelected **is/are** equally likely.

Semantic and pragmatic factors have been reported to have an effect on the preference of one form or another. McCloskey (1991) observes that the plural variant occurs only in pragmatic contexts

where the two clausal conjuncts are incompatible with each other, e.g., in the face of world knowledge militating against simultaneous reelection and impeachment of the same person. On the other hand, the singular-agreement counterpart is available whether the two propositions are compatible or not.⁷⁹ It is doubtful that these two nearly-identical surface strings are syntactically different. Whether feature resolution were to take place on Infl⁰ or on Conj⁰, it would need to have access to pragmatic/semantic information related to the entire sentence and discourse, which points to the grammar-external nature of the phenomenon. Many of the observed “exceptions” to the otherwise general rules of resolutions receive are amenable to a tentative analysis in terms of semantic resolution. However, see the discussion in section 4.6 on the prospects for such an analysis in general.

Concerning the next pair of sentences in (282), Heycock & Zamparelli (2005) argue explicitly that there is no difference in their syntactic structure. In other words, the difference between the two possible forms of the copula does not amount to a difference between, e.g., NP coordination and DP coordination. And yet there is a clear difference in the interpretation: the singular variant allows only a joint reading, where one person, who is both a friend and a colleague, is writing; while the plural variant allows only a split reading, where there are two people, one is a friend and the other, a colleague, who are writing a paper.

(282) Variability in English in agreement with coordinated nominal conjuncts (adapted from Heycock & Zamparelli, 2005)

This friend and colleague **is/are** writing a paper.

⁷⁹ Chichewa present an interesting analogous *noun class* resolution problem with compatible vs. incompatible infinitival conjuncts. See section 4.1.1 of Corbett and Mtenje (1987).

Heycock and Zamparelli propose that the contrast in agreement morphology is a result of differences in semantic featural specifications, which lead to a difference in interpretation. Crucially, they argue that there is no structural ambiguity involved, as both examples involve DP-internal conjunction of the shape schematized in (283) and reject the possibility that the plural/split-reading variant in (284) is an instance of conjunction where the D^0 of the second conjunct is phonologically null:

(283) Proposed structure for the conjunction in both variants of (282)

[_{DP} D^0 [_{&P} [_{NP}] [_{&⁰} [_{NP}]]]]

(284) Rejected structure for the conjunction in (282)⁸⁰

[_{&P} [_{DP} D^0 [_{NP}]] [_{&⁰} [_{DP} \emptyset^0 [_{NP}]]]]

Heycock and Zamparelli observe that a mixed reading is available for a sentence like the one below:

(285) Mixed reading in English in agreement with coordinated nominal conjuncts (adapted from Heycock & Zamparelli, 2005)

My friends and colleagues are writing a paper.

Besides the two extreme interpretations where all my friends writing a paper are also my colleagues or where none of them are (i.e., the two sets of people do not overlap), there is also an availability of mixed reading where some, but not necessarily all friends who are writing a paper are also my colleagues. Such an interpretation could not be captured by an analysis in which two different syntactic structures map directly onto split vs. joint interpretations.

⁸⁰ Recall from chapter 3 that I assume that there is no such syntactic object as an &P. Under the parallel-structure approach to coordination, the contrast between (283) and (284) stems out of fused vs. unfused (and parallel) D^0 's due to UNION.

Furthermore, Heycock and Zamparelli observe that in a true coordination of two DPs, as manifested by the split reading and the presence of an overt second D^0 , as in (286) below, it is acceptable to have a personal pronoun like *him* inside the second conjunct, where that pronoun is co-indexed with the antecedent *man* from the first conjunct. The antecedent does not locally bind the pronoun since the latter is properly contained within its own, separate DP ([the woman next to him]), and thus the pronoun obeys Condition B. However, if there was a possibility of coordinating DPs in which the second D^0 was a phonologically null determiner (holding constant the split reading), it would not explain the unacceptability of the minimal counterpart in (286)b:

(286) Binding under a split reading

- a. the man_i and the woman next to him_i
- b. * the man_i and woman next to him_i

We can explain the contrast in (286) in terms of difference in the amount of structure in coordination. In the case of coordination of two DPs, we expect the pronoun in one conjunct to be properly contained in its own, separate DP domain (which “shields” it from Condition B violations). On the other hand, if (286)b where there is no overt determiner in the second conjunct, was indeed still a DP by the virtue of referring to two distinct individuals (split reading), we would expect the same binding outcome as in (286)a. The fact that we see the contrast, suggests that the absence of the overt determiner indeed corresponds to the difference in the underlying structure. Heycock and Zamparelli argue that the underlying structure of coordinations with one shared determiner is the one in (283) regardless of the reading being split or joint. While the semantic consequences of the choice of agreement variant are clear, similarly to the example of CP coordination in (281), we will not be able to conclude that some semantic feature, not present in the syntax, dictates the morphophonological form of agreement (see the discussion against a semantic approach in section 4.6).

The final example of variability in agreement morphology in English comes from Sobin (1994, 1997), who shows that the minimal pair in (287) occurs under yet a different set of conditions:

(287) Variability in English in agreement with coordinated nominal conjuncts in an expletive-*there* construction (Sobin, 1997)

There **is/are** a cat and a dog in the yard.

Furthermore, Sobin observes that the acceptability of either variant is influenced by factors that are not typically modelled as influencing syntax. For example, if the two conjuncts differ in number, i.e., one is plural and one is singular, their relative order will influence the acceptability rating of the plural variant:

(288) Variability in English in agreement with coordinated nominal conjuncts in an expletive-*there* construction (Sobin, 1997)

a. There **are** a cat and dogs in the yard. (lower acceptability)

b. There **are** cats and a dog in the yard. (higher acceptability)

Similarly, a contracted singular copula as in (289)b increases the acceptability of the singular variant compared to the uncontracted equivalent in (289)a:⁸¹

(289) Variability in English in agreement with coordinated nominal conjuncts in an expletive-*there* construction (Sobin, 1997)

a. There is a cat and dogs in the yard. (lower acceptability)

b. There's a cat and dogs in the yard. (higher acceptability)

However, the variability in expletive-*there*-construction is not limited to coordination - it occurs also with non-coordinated plural noun phrases:

⁸¹ A possible analysis of these facts that does not invoke the notion of prescriptivism is treating 's morpheme as a syncretic lexical item for both singular and plural agreement. However, (289)b still does not receive a high rating expected by a string generated by the grammar (3.67/5). Furthermore, we would predict 's followed by a non-conjoined plural np to also receive a fairly high acceptability rating contrary to the facts (2.58/5).

(290) Variability in English in agreement with a non-coordinated plural noun phrase in an expletive-*there* construction (Sobin, 1997)

There **is/are** cats in the yard.

A similar observation for expletive-*there*-construction was made by Green (1985) who noted that none of the 19 consultants replicated their own acceptability judgements across two elicitations. Sobin argues that the examples above represents a tension between a grammatical output in the singular variant and ‘a grammatical virus’ in the plural variant i.e., a prescriptive rule overriding the grammatical output. Thus, the variability in (289) is orthogonal to the presence of the coordination. As such, this data is compatible even with the claim that resolution of phi-features under coordination is grammar-internal—the claim I am arguing against in this thesis. For this reason, I will not consider this data as relevant for upcoming proposal. The variability in (288), on the other hand, might be unique to coordination. To establish whether the locus of variability is the order of conjuncts or simply the linear distance between the agreeing copula and a plural noun phrase and a plural-marked noun, we would test sentences that add material to the left of a non-coordinated noun phrase:

(291) Additional material between an agreeing copula and a non-coordinated plural noun (phrase) in an expletive-*there* construction

There **was/were** some weird-looking cats in the yard.

There **was/were** all of a sudden cats in the yard.

If it turns out that the effect of order of conjuncts is not replicated when linear distance is manipulated in ways that do not involve coordination (as in (291)), it could serve as another piece of evidence in favor of the grammar-external resolution mechanism I am proposing in this thesis. In such a scenario, investigating this effect further might prove instrumental in pursuing the next step within the broader landscape, i.e., the modeling of this grammar-external resolution mechanism.

Let me take stock of what I have shown so far with the above examples. The variability in surface agreement morphology arises due to special linguistic circumstances (e.g., pragmatics, semantics) and non-linguistic circumstances (e.g., interspeaker variation, world knowledge). None of these factors are strictly syntactic. Furthermore, the variability discussed so far has been limited to number agreement in English. Moving to languages with richer phi-systems, I will show that such variability also occurs for gender and person agreement and is not a quirk of English coordination. The following discussion will corroborate what we have seen so far: other linguistic and non-linguistic factors have an effect on the emergence of variability in agreement, and on the relative preference of one variant over another.

As just noted, similar variability has been observed for languages with richer phi-systems, especially ones with grammatical gender/class distinctions, such as Slavic (Bajec, 1955; Marušič et al., 2015 a.o.) and Bantu (Carstens, 2019 for Xhosa; Corbett & Mtenje, 1987 for Chichewa). I will begin by presenting variability in grammatical gender resolution in Polish which I discuss in the greatest detail.

Polish is typically described as having a four-way gender distinction in singular and a two-way distinction in plural:

(292) Number and gender categories in Polish

	MASCULINE			FEMININE	NEUTER
	HUMAN	ANIMAL	INANIMATE		
SINGULAR	MH and MA		MI	F	N
PLURAL	VIRILE		NON-VIRILE		

According to the usual analysis of Polish gender (Laskowski, 1998; Willim, 2006), if we superimpose the four categories within the singular domain and two categories within the plural domain, we arrive at a five-way gender distinction—MH, MI, MA, F and N (see Harbour, 2016 for a

similar approach in other languages). Note however, that there is no single domain of language that makes this five-way distinction (e.g., there are no five distinct forms of agreement forms or five distinct forms of concord in nominative or accusative). Furthermore, the formal distinction within masculine is described in terms of animacy since in most cases it tracks the animacy meaning of the referent, but there are some nouns that display a formal vs. semantic mismatch both in animacy and in coarser gender. Nevertheless, it is unclear whether this semantic feature ever controls concord or agreement (as opposed to phi-matching with a pronoun as described in 2.6.4). For example, *babsztyl* ‘nasty woman’ is semantically feminine but this feature does not ever determine concord or agreement:

(293) Unavailability of semantic control of agreement or concord in Polish

- | | | | |
|----|-----------|-----------------|---------------|
| a. | Ten | babsztyl | przyjechał-Ø. |
| | DEM.NOM.M | nasty.woman.NOM | arrive.PST-3M |
| b. | * Ta | babsztyl | przyjechał-a. |
| | DEM.NOM.F | nasty.woman.NOM | arrive.PST-3F |
| c. | * Ten | babsztyl | przyjechał-a. |
| | DEM.NOM.M | nasty.woman.NOM | arrive.PST-3F |
| d. | * Ta | babsztyl | przyjechał-Ø. |
| | DEM.NOM.F | nasty.woman.NOM | arrive.PST-3M |

Based on the singular nominative position alone, we cannot determine whether the masculine formal feature is animate or inanimate—the forms of agreeing modifiers or verbs are syncretic. Nevertheless, the accusative form of a singular modifier narrows it down to masculine animate:

(294) Masculine animate singular accusative modifier (= indicates human/animal syncretism) in Polish

Kocham tego babsztyl-a.
 love.1SG DEM.ACC.MH=MA nasty.woman-ACC.MH=MA
 ‘I love this nasty woman.’

The form of concord and agreement in the plural may at first glance appear to be determined by the semantic feminine feature:

- (295) Plural control and agreement in Polish
- a. Te babsztyl-e przyjechał-y.
 DEM.NVIR nasty.woman arrive.PST-NVIR
- b. * Ci babsztyl-e przyjechał-i.
 DEM.VIR nasty.woman arrive.PST-VIR

I contend that non-virile concord and agreement is in fact determined by the masculine *animal* feature. A parallel conclusion can be drawn for other human-denoting nouns whose semantic feature does not match the formal feature (*babsko* ‘nasty woman’, formally N, *chłopisko* ‘a big man’, formally N)—the syncretism in the grammar might give rise to the appearance of semantic agreement, however one would need to explain why it is available only in some parts of the grammar (e.g., only in plural). In sum, semantic features in Polish do not readily determine agreement or concord.

Let me now turn to the description of feature resolution under coordination. The resolution rule in coordination of two noun phrases is usually stated in the following way:

- (296) Phi-feature resolution rule for nominal conjunction (deterministic) (Prażmowska, 2016; Willim, 2012)

If **any** of the conjuncts is either MH or VIRILE—resolve to VIRILE
If **none** of the conjuncts are either MH or VIRILE—resolve to NON-VIRILE

- (297) Phi-feature resolution examples

- a. Gucio i Maja był-i/*-y na łące.
 Gucio(MH) and Maja(F) COP.PST-**VIR**/**-NVIR** on meadow
 ‘Gucio and Maja were in the meadow.’
- b. Tekla i Maja był-y/*-i na łące.
 Tekla(F) and Maja(F) COP.PST-**NVIR**/***-VIR** on meadow
 ‘Tekla and Maja were in the meadow.’

However, variability in resolution is attested, and several researchers have addressed it (Corbett, 1991; Kopcińska, 1977; Matushansky, 2016; Prażmowska, 2016; Zieniukowa, 1979 a.o.)

(298) Uncertainty of agreement form with a conjunction in Polish (Zieniukowa, 1979)—F&MI coordination

Bratowa i tort **byli/były** już w drodze.
Sister-in-law(F) and cake(MI) **were.VIR/were.NVIR** already in way
'The sister-in-law and a cake were already on their way.'

According to the rule in (296), only non-virile should be acceptable; virile should be unacceptable due to the absence of a MH or VIR conjunct. Observe that it is also not the case that MI in the example above is exceptionally treated as MH. There are other examples of variability where neither of the conjuncts carry a formal masculine feature:

(299) Uncertainty of agreement form with a conjunction in Polish (Zieniukowa, 1979)—F&N coordination

Matka i niemowlę patrzy-**ły/-li** na siebie nawzajem.
mother(F) & newborn(N) look-**PST.NVIR/-PST.VIR** on self each.other
'A mother and a newborn baby were looking at each other.'

Similar to the examples of variability in number resolution in English, the existing analyses of variability in grammatical gender resolution in Polish approach this variability by referring to semantic (interpretable) features. Consider one proposed adaptation of the rule in (296):

(300) Eligibility for a given agreement variant (Prażmowska, 2016, p. 78)

- a. A conjunct with interpretable gender makes the subject eligible for either virile or non-virile agreement, i.e.:
masculine conjunct(s) for virile agreement;
feminine conjunct(s) for non-virile agreement.
- b. A conjunct with uninterpretable gender makes the subject eligible for both variants of agreement or only for non-virile agreement, i.e.:
[+human] conjunct(s) for both virile and non-virile agreement;
[-human] conjunct(s) for non-virile agreement.

First, note that the grammatical gender system in (292) is reorganized but only for the purposes of resolution under coordination. This reorganization is laid out later in (302). Second, note the notion of “eligibility” as opposed to the more typically assumed “determination” of a syntactic rule. With the notion of eligibility Prażmowska allows for variability in resolution as features of one conjunct may introduce eligibility for virile and features of another conjunct may introduce

the eligibility for non-virile. Moreover, not all eligibility is equal, i.e., we need another set of *ordered* rules partially “trumping” some eligibility:

(301) Revised Gender Resolution Rules for Polish (Pražmowska, 2016, pp. 78–79)

- a. An interpretable masculine gender feature on any conjunct always makes a coordinate subject eligible only for virile agreement, regardless of the features of the other conjunct(s). This rule trumps all the remaining rules.
- b. Subject to Rule (301)a, an interpretable feminine gender feature on any conjunct makes a coordinate subject eligible for non-virile agreement.
- c. Subject to Rule (301)a, uninterpretable gender and the [+human] feature on any conjunct make a coordinate subject eligible for both virile and non-virile agreement.
- d. Subject to Rule (301)a, uninterpretable gender and the [–human] feature on any conjunct make a coordinate subject eligible for non-virile agreement.

The chart below represents the output of eligibility and resolution rules based on different combinations of conjuncts:

(302) Agreement variants resulting from the interactions between the proposed eligibility (Pražmowska, 2016, p. 80)

	INTERPRETABLE MASCULINE	INTERPRETABLE FEMININE	UNINTERPRETABLE HUMAN	UNINTERPRETABLE NON-HUMAN
INTERPRETABLE MASCULINE	VIR	VIR	VIR	VIR
INTERPRETABLE FEMININE	VIR	NVIR	VIR, NVIR	NVIR
UNINTERPRETABLE HUMAN	VIR	VIR, NVIR	VIR, NVIR	VIR, NVIR
UNINTERPRETABLE NON-HUMAN	VIR	NVIR	VIR, NVIR	NVIR

Crucially, this proposed system predicts no optionality or variability in the following coordinations:

(303) Predicted non-variability per (302)

- a. Whenever one conjunct in semantically masculine (virile).
- b. Whenever both conjuncts are semantically feminine (non-virile).
- c. Whenever both conjuncts are uninterpretable [-human] (non-virile).
- d. In a coordination of a semantic feminine and an uninterpretable [-human] (non-virile).

Despite all these complications, this system still faces problems of empirical adequacy. First, we observe that this approach undergenerates. We have already seen a counterexample to (303)d in (298).⁸² At the same time, this approach runs into an overgeneration problem. Note that there are three cells in (302) which without further constraints should give rise to full optionality:

(304) Predicted variability per (302)

In a coordination of a semantic feminine and an uninterpretable [+human].

In a coordination of an uninterpretable [-human] and an uninterpretable [+human].

Whenever both conjuncts are uninterpretable [+human].

It is therefore unclear whether we expect all speakers to equally accept both virile and non-virile variants of agreement in all these scenarios. Note that the traditional descriptions of the resolution rules in Polish such as the ones in (296) do not predict any variability, probably because the two variants are not observed systematically enough to form the basis of a rule. In a sense such resolution rules would be analogous to optional transformations from earlier theories of generative grammar (Chomsky, 1957). For example, the passive transformation was optional. In other words, while the transformation itself was a syntactic operation, the decision whether to apply the

⁸² Prazmowska also recognizes that this approach needs to set aside all animal-denoting nouns. It is unclear how they would fit in this system.

transformation or not was not determined by syntax itself but rather an external module. If we equate these optional transformations to the “eligibility” and non-deterministic Resolution Rules, we already observe that extra-grammatical module is needed to make a choice between two eligible variants despite all the non-trivial additions to the grammar to account for the data. Finally, it is not clear how eligibility accounts for the occurrence on ineffability as we will see in 4.5.3 (in many languages including Polish).

Let me summarize and remark on certain parts of Prazmowska’s proposal so we can better see their consequences for the theory of phi-features and resolution in Polish and beyond. First, Prazmowska’s account adds novel dimensions to the basic set of formal phi-features such as (i) (non-)interpretability (feminine gender needs to be further specified for interpretability but neuter still is not) and (ii) humanness (only for neuter gender). Despite the seeming parallelism of the extension for feminine (interpretability in cases of humans) and for neuter (humanness), collapsing them to create one category or dimension, e.g., interpretable non-masculine, would remove a distinction between the resolution rules in (301)b and (301)c. In other words, we would lose the account of variability in coordination of feminine human + neuter human such as (299), or we would allow variability in coordination of two feminine humans (unattested). Thus, we need to maintain what is an otherwise unmotivated distinction. A further idiosyncrasy of this revised system of formal features is that it has consequences only for coordination. In other words, neuter [+human] vs. [-human] does not make a difference in agreement or concord in Polish if a noun bearing such a feature is non-coordinated. Second, the revised resolution rules in (301) are possibly problematic to formalize. They are only partially ordered with no clear elsewhere rule. This is unlike typical morphological rules, e.g., Vocabulary Insertion rules (Halle & Marantz, 1993). Last but not least, even this system does not account for the totality of the relevant linguistic behavior.

On the one hand, we see that it undegenerates, and on the other hand, it still allows for variability that is further governed by external systems (true grammatical optionality). In sum, I treat this account as a promising attempt to predict empirical behavior (that still needs to be systematically tested), however, I do not adopt the claim that this modeling is part of syntax or morphology.

Let me now turn to another example of gender resolution variability in another Slavic language. This example differs from the Polish one in that the variability has been more widely recognized and studied. In the Slovenian example below, conjoining two plural nouns of feminine and neuter genders results in three options for agreement morphology: in (305)a, neuter agreement with the second conjunct; in (305)b, feminine agreement with the first conjunct; and in (305)c, masculine agreement as a default.

(305) Variability in Slovenian in agreement with coordinated nominal conjuncts (Marušič et al., 2015, p. 52)

- a. Krave in teleta so odšl-i na pašo.
cows(F) and calves(N) AUX.PL went-M.PL on graze
'Cows and calves went grazing.'
- b. Krave in teleta so odšl-e na pašo.
cows(F) and calves(N) AUX.PL went-F.PL on graze
'Cows and calves went grazing.'
- c. Krave in teleta so odšl-a na pašo.
cows(F) and calves(N) AUX.PL went-N.PL on graze
'Cows and calves went grazing.'

One variant (masculine) could be default agreement in a WYSIWYG structure without a resolution rule, one (feminine) could be highest conjunct agreement available in Slovenian, and the last variant (neuter) could be single conjunct agreement in a clausal reduction by ellipsis structure. To the best of my knowledge, currently there is no independent evidence for distinct syntactic structures that map onto distinct agreement variants. In the absence of such work, I will treat the above example as the same phenomenon as the variability in number resolution we have seen in English or variability in gender resolution in Polish.

The last related example of resolution variability I present in this subsection comes from noun classes in Chichewa, a Bantu language. Bantu languages are famous for having a complex noun class systems with as many as 17 categories of class × number. The assignment of nouns into distinct formal classes is fairly complex and it is based on semantics, phonology and morphology. Sometimes the semantic vs. morphological considerations for noun class assignment are at odds. For example, human-denoting nouns largely belong to noun class 1; diminutive nouns largely belong to noun class 7. A diminutive human-denoting noun like *kamwana* ‘small child’ usually shows noun class 7 agreement (unless agreement is linearly far enough from its controller, then noun class 1 agreement is allowed, in line with Corbett’s hierarchy in (52)). The number of distinct categories involved allows for a logical possibility of a large set of resolution rules (e.g., 10 noun classes translates to 10² binary combinations, i.e., the possibility of 100 distinct rules). Furthermore, the complexity of noun class assignment may complicate these rules even further if the rules themselves refer to more than just the abstract noun class (e.g., the phonological form of a noun, its animacy).

(306) Chichewa noun classes and subject agreement morphology (Corbett & Mtenje, 1987, p. 6)

NOUN CLASS (WATKINS SYSTEM)	SINGULAR PLURAL	
	1	a
2	u	i
3	li	a
4	u	a
5	i	zi
6	chi	zi
7	ka	ti
8	pa	
9	mu	
10	ku	

As far as number is concerned, resolution straightforwardly returns plural for any coordination of nouns. But it does not have to be the plural morpheme of the corresponding noun class. For

example, a coordination of two singular non-human conjuncts from class 2 does not resolve to plural class 2 but to plural class 5/6:

(307) Resolution of singular non-human noun class 2 conjuncts in Chichewa (Corbett & Mtenje, 1987, p. 19)

- a. Mpeni ndi mphika **zi**-ku-sowa
knife(CLASS2) and pot(CLASS2) **SUBJ.5/6PL-PRES-missing**
'A knife and a pot are missing.'
- b. * Mpeni ndi mphika **i**-ku-sowa
knife(CLASS2) and pot(CLASS2) **SUBJ.2PL-PRES-missing**
Intended: 'A knife and a pot are missing.'

(308) Resolution of singular non-human noun class 3 conjuncts in Chichewa (Corbett & Mtenje, 1987, p. 19)

- a. Lalanje ndi tsamba **zi**-ku-bvunda
orange(CLASS3) and leaf(CLASS3) **SUBJ.5/6PL-PRES-rotting**
'An orange and a leaf are rotting.'
- b. * Lalanje ndi tsamba a-ku-bvunda
orange(CLASS3) and leaf(CLASS3) **SUBJ.3PL-PRES-rotting**
Intended: 'An orange and a leaf are rotting.'

Overall, Corbett and Mtenje identify a strong tendency for plural class 5/6 resolution for singular non-human denoting nouns of any class. Nevertheless, they also report a few exceptions. For example, a coordination of 'a garden' (noun class 2), 'a cow' (noun class 5) and 'a hoe' (noun class 3) may be resolved to plural 5/6 class, but it is not the only possible form (they however do not report what the alternative is). Furthermore, when the conjuncts are themselves plural as opposed to singular, corresponding agreement (i.e., using the same noun class as the conjunct themselves, instead of class 5/6) sometimes is *possible* and sometimes *preferred*:

(309) Variability in Chichewa in agreement with coordinated nominal conjuncts (Corbett & Mtenje, 1987, p. 20)

- a. Mipeni ndi miphika **i**-ku-sowa.
knives(CLASS2) and pots(CLASS2) **SUBJ2.PL-PRES-missing**
'Knives and pots are missing.'
- b. Mipeni ndi miphika **zi**-ku-sowa.
knives(CLASS2) and pots(CLASS2) **SUBJ5/6.PL-PRES-missing**
'Knives and pots are missing.'

(310) Resolution of singular non-human noun class 3 conjuncts in Chichewa (Corbett & Mtenje, 1987, p. 20)

- a. ? Malalanje ndi masamba **zi**-ku-bvunda
 oranges(CLASS3) and leaves(CLASS3) **SUBJ.5/6PL-PRES-rotting**
 ‘Oranges and leaves are rotting.’
- b. Malalanje ndi masamba a-ku-bvunda
 oranges(CLASS3) and leaf(CLASS3) **SUBJ.3PL-PRES-rotting**
 ‘Oranges and leaves are rotting.’

Corbett and Mtenje suggest a separate rule for coordinating plural non-human denoting nouns—if their corresponding plural agreement markers match (either under phonological syncretism or due to being from the same noun class), that plural marker will be used, otherwise plural 5/6 *zi-* will be used. A parallel rule applies to human-denoting nouns. When all conjuncts are singular, the preferred resolution is plural noun class 1, regardless of the formal noun classes of the conjuncts. But when the same conjuncts are plural, a same-class agreement marker is allowed (but it is not always obligatory). In a nutshell, we still cannot account for the variability. Furthermore, Corbett and Mtenje note a vast amount of speaker variability and some larger areas (e.g., the exceptional role of animacy in noun class 1) that seem to require more idiosyncratic rules. As far as mixing human- and non-human-denoting conjuncts, Corbett and Mtenje note that speakers avoid producing agreement with such coordinations altogether. I delay the discussion of ineffability until the end of this subsection.

Although the Slavic and Bantu language families are very different from each other, their overlap in the behavior of agreement morphology with coordination is quite striking. This overlap has been observed previously by Corbett (1991, 2006) and Carstens (2019). Both families have rich grammatical gender/class systems, and a fairly complex logical space of possible combinations of conjuncts. For a language with very few combinations, e.g., English, one may plausibly learn all the combinations from the Primary Linguistic Data available to the language learner, and so the appearance of systematicity emerges. The same would not be feasible for Chichewa.

Finally, similar variability has been reported for person resolution (Reis, 2017; Timmermans et al., 2004). Some coordinations of person pronouns in German and Dutch are observed to give rise to variable agreement on the predicate:

(311) Variability in German in agreement with coordinated pronominal conjuncts (Timmermans et al., 2004, p. 919)

- a. Du und er geh-**t**.
2SG and 3SG go-**2PL**
'You and him go.'
- b. Du und er geh-**en**.
2SG and 3SG go-**3PL**
'You and him go.'

The resolution of person features tends to be the most robust of all phi-features (Corbett, 2006), as I discussed in section 4.3.1—in cases of coordination of different persons the resolution is almost always towards the higher person (e.g., 2>3). Nonetheless, in example (311)b we see that the speakers sometimes also accept resolution towards the lower person (in this case, 3>2).⁸³

We also observe variability in person resolution in Russian:

(312) Variability in in person resolution in Russian (Polina Pleshak, Maria Polinsky, p.c.)

- My i lojal'nye čitateli ne ispytyvaj-**ut/-em** ničego krome vostorga
1PL and loyal readers.NOM not feel-**3PL/-1PL** nothing except excitement.GEN
'We and the loyal readers feel awe and only awe.'

Admittedly, there are far fewer reports of variability in person resolution across languages than number or gender/noun class. I will return to this observation in the next chapter where I attempt to explain the very source of this variability. In the meantime, I will turn to more empirical data, this time involving ineffability. So far, I have shown examples where the literature reports that two

⁸³ We also see resolution towards a lower person in reflexives in Dutch (Timmermans et al., 2004). Since my main focus is predicate agreement, I do not discuss this data here.

or more variants of agreement morphology are available for a particular sequence. Now, I will show that within the same languages, there are also coordinations for which no agreement morphology emerges as acceptable.

4.5.3 Resolution may be ineffable

In a subset of the languages where we observed multiple acceptable variants of agreement morphology, we also observe the inverse of this phenomenon: cases where a general descriptive rule predicts a certain variant of agreement morphology to occur with some combination of conjuncts, and yet this variant is not accepted by speakers, at least under certain circumstances. For example, in Chichewa, a coordination of an animate class 5 noun with an inanimate class 5 noun could in principle be covered by two rules: either the rule for plural inanimates, resulting in class 5 agreement morphology as in (310)a, or the rule for plural animates, resulting in class 1 agreement morphology. However, some speakers do not accept either variant:

(313) Lack of acceptable resolution in one combination of conjuncts in Chichewa (Corbett & Mtenje, 1987, p. 33)

* Mbala imodzi ndi zinthu a-/zi-li apo.
thief(CLASS5) one and things(CLASS5) CLASS1-/CLASS5/6-be there
Intended: ‘A thief and things are there.’

Next, consider a coordination of a 1SG pronoun and a 2PL pronoun in German. According to the descriptive rule, this should resolve to 1PL (1>2 and SG+PL=PL). However, this variant is not accepted by speakers (314)a, and neither are variants that agree with just one of the conjuncts(314)b-(314)c:

(314) Lack of acceptable resolution in one combination of conjuncts in German (Fanselow & Féry, 2002, p. 288)

- a. * Ich und ihr irr-en uns.
1SG and 2PL err-1PL REFL.1PL
Intended: ‘You all and I are wrong.’
- b. * Ich und ihr irr-e mich.
1SG and 2PL err-1SG REFL.1SG
Intended: ‘You all and I are wrong.’
- c. * Ich und ihr irr-t euch.
1SG and 2PL err-2PL REFL.2PL
Intended: ‘You all and I are wrong.’

This ineffability is not a quirk of the phonology of the predicate when combined with the relevant agreement morphology. For example, resolving the phi features by using a plural pronoun standing in apposition with the coordination, rather than resolving them directly as predicate agreement, seems to fix whatever the problem might be despite the fact that the agreement morphology on the predicate is the same as the putative agreement morphology in (314):

(315) Resolution by pronoun in one combination of conjuncts in German

- Ich und ihr, wir irr-en uns.
1SG and 2PL 1PL err-1PL REFL.1PL
‘Y’all and I, we are wrong.’

The example in (315) shows that there is a particular agreement form that is expected based on the coordination’s reference, however this agreement form cannot be directly controlled by this coordination.

Similarly, the problem is not in a particular combination of conjuncts: placing the same combination of conjuncts in a non-agreeing position, e.g., an object, again fixes ineffability:

(316) Coordination of 1SG and 2PL in a non-agreement position in German

- Er ist größ-er als ich und ihr zusammen.
3SG COP.3SG.PRES big-COMP than 1SG and 2PL together
‘He is bigger than me and you all together.’

Interestingly, this ineffability is not fixed by the use of a default form of the predicate. Languages often have a default form of agreement that is used when syntactic agreement fails for some reason

(Preminger, 2014)—for example, when the subject does not have phi features at all or when its features are inaccessible to the external syntax (e.g., with clausal subjects or due to structural intervention). German uses 3rd person singular morphology on a predicate with a clausal subject:

(317) Agreement with a phi-featureless clausal subject

[Dass ich mich irr-e] ist eher unwahrscheinlich.
 [That 1SG REFL.1SG err-1SG] COP.3SG.PRES PART improbable
 ‘That I’m wrong is improbable.’

However, this default variant still does not fix the problem seen above:

(318) Default form as resolution in one combination of conjuncts in German (Fanselow & Féry, 2002, p. 288)

* Ich und ihr irr-t sich.
 1SG and 2PL err-3SG REFL.3SG
 Intended: ‘You all and I are wrong.’

Polish also exhibits ineffability with some combinations of conjuncts. Consider a coordination of a masculine human conjunct and a numerically-quantified noun phrase where the noun phrase is non-virile:

(319) Ineffability of agreement controlled by coordination

- a. ?? Czarodziej i pięć czarownic przyleci-eli do zamku.
 wizard(MH).NOM & five witch.NVIR.GEN fly-VIR to castle
 ‘A wizard and five witches flew to the castle.’
- b. * Czarodziej i pięć czarownic przyleci-ały do zamku.
 wizard(MH).NOM & five witch.NVIR.GEN fly-NVIR to castle
 ‘A wizard and five witches flew to the castle.’
- c. * Czarodziej i pięć czarownic przyleci-ało do zamku.
 wizard(MH).NOM & five witch.NVIR.GEN fly-3SG.N to castle
 ‘A wizard and five witches flew to the castle.’

This particular combination of conjuncts could in principle be covered by two distinct rules of coordination, similarly to what Corbett and Mtenje suggest for the Chichewa examples above. The first rule, already stated in (296), refers to the presence of a conjunct carrying the MH feature - in this scenario, we expect a VIR agreement morpheme. However, a distinct rule, regarding agreement with phrases whose features are inaccessible for agreement, coordinated or not, would lead us to

expect a 3SG.N agreement morpheme. The second conjunct in (319), a noun phrase with the numeral 5, is an example of a phrase with phi-features inaccessible to the agreement probe (see Lyskawa, 2020 for details on how the structure of these phrase makes the phi-features inaccessible). Thus, the second rule could apply here as well. As we see from the examples in (319) neither agreement variant is acceptable. Finally, it is also not the case that NVIR agreement variant controlled by the linearly closest NVIR noun phrase is exceptionally allowed, despite being a plausible last resort strategy.

In sum, there are some combinations of conjuncts for which no agreement morphology seems to be accepted by speakers. However, treating all cases of ineffability of resolution as categorically distinct from cases of variability also discussed in this section might be a mistake.⁸⁴

If one was to analyze resolution as a semantic phenomenon, there would be no clear reason why semantics would give rise to ineffability as we have seen here. When semantic and formal features mismatch in non-coordinated arguments, we do not observe ineffability but, at most, variability in some constructions.

As a final note, observe that, in some ways, such ineffability may resemble morphological gaps, where certain combinations of lexical roots and inflection are ineffable (Jakobson, 1948; Gorman & Yang, 2019; Mendes & Nevins, 2019 and references therein):

⁸⁴ My preliminary survey of German speakers showed that for the same sentence one speaker will accept no variants of resolution and strongly prefer a different way to construct a sentence without a coordination or agreement morphology, while another speaker will accept all logical variants of agreement. Yet another speaker will have a strong preference for one variant over another but change their mind the next day.

(320) Morphological gaps in Brazilian Portuguese (Mendes & Nevins, 2019)

	PRESENT INDICATIVE		PRESENT SUBJUNCTIVE	
1SG	vot-∅-o	*V	vot-∅-e	*V
2SG, 3SG, 1PL	vot-a-∅	demol-e-∅	vot-∅-e	*V
2PL, 3PL	vot-a-m	demol-e-m	vot-∅-em	*V
INFINITIVE	vot-a-r 'to vote'	demol-i-r 'to demolish'	vot-a-r 'to vote'	demol-i-r 'to demolish'

The table above shows inflected forms of two verbs: a non-defective $\sqrt{\text{VOT}}$ 'to vote', and a defective $\sqrt{\text{DEMOL-}}$ 'to demolish'. All cells in the inflectional paradigm for the non-defective $\sqrt{\text{VOT}}$ are filled, i.e., all forms are effable. However, for $\sqrt{\text{DEMOL-}}$, some cells are empty, i.e., these forms are *ineffable*. The morphological gap phenomenon is therefore different from the phi-feature resolution problem under discussion here. In the latter phenomenon, a form of the inflected verb as predicted by some general rule is unacceptable in one context but perfectly acceptable in other parts of the language as seen in (315). However, both phenomena raise the same question: why does ineffability arise at all? The sources of ineffability in morphological gaps and feature resolution under coordination are likely to be different. These patterns of ineffability therefore constitute tentative further evidence against the notion that syntactic instructions can always be mapped onto the performance system in a one-to-one fashion. I leave this comparison for future research.

4.5.4 Resolution does arithmetic

Recall from the discussion in section 4.3.2 that modeling number resolution as insertion of a morphosyntactic node with formal features—and a grammar-based operation—would be possible for languages with a singular-plural or even a singular-dual-plural distinction. I have also suggested that such systems are perhaps too simple of a testing ground in which to detect the possibility of operations atypical for grammar-based mechanisms, in particular, arithmetic

counting. If number resolution is grammar-based, its output should be consistently the same whenever it receives the same sets of formal features as input. If number resolution is based on arithmetic counting, i.e., adding the cardinality of the referents in coordination, then we expect that the output of resolution may differ depending on e.g., the cardinality of reference in coordination, despite keeping the formal features constant.

To tell these two options apart, we need languages with a more complex number system, one that includes a trial and/or a paucal category (in addition to the familiar singular, dual, and plural). As mentioned already, such languages are rare and therefore there has been considerably less focus on them. Nevertheless, they do provide empirical evidence for arithmetic counting in resolution. In particular, Harbour (2020) reports that in two Austronesian languages, Biak and Fijian, that have a paucal number category, resolution is sensitive to the cardinality of the reference established in the discourse:

(321) Conjunction of paucals and discourse-sensitive resolution in agreement in Biak (Harbour, 2020, pp. 1–2)

- a. Inai **sko**-ya ma roma **sko**-i **sko**-fnak kayame.
 girl 3PAU-DET and boy 3PAU-DET 3PAU-play together
 ‘The (three) girls and (three) boys played together.’ (total of six children)
 (cardinality of the referents established in the discourse)
- b. Inai **sko**-ya ma roma **sko**-i **si**-fnak kayame.
 girl 3PAU-DET and boy 3PAU-DET 3PL-play together
 ‘The (nine) girls and (nine) boys played together.’ (total of eighteen children)
 (cardinality of the referents established in the discourse)

(322) Conjunction of paucal and discourse-sensitive resolution in agreement in Fijian (Harbour, 2020, p. 2)

- a. **Eratou** cakacakavata o **iratou** na qasenivuli kei **iratou** na gone.
3PAUS work ART.PN 3PAU ART.N teacher and 3PAU ART.N child
'The (three) teachers and (three) children are working.' (total of six people)
(cardinality of the referents established in the discourse)
- b. **Era** cakacakavata o **iratou** na qasenivuli kei **iratou** na gone.
3PLS work ART.PN 3PAU ART.N teacher and 3PAU ART.N child
'The (nine) teachers and (nine) children are working.' (total of eighteen people)
(cardinality of the referents established in the discourse or with an explicit numeral
before each conjunct not shown here)

The two examples above show that resolution is sensitive to the semantic cardinality of the referents in a conjunction, rather than the formal features (which are kept constant across these pairs of examples). In (321)a we observe a coordination of two noun phrases, each formally marked with paucal morphology. Although there is no numeral overtly present anywhere in the sentence, the context is one in which these conjuncts refer to three individuals each, i.e., their cardinality is three (note that 3 in the gloss indicates the person feature, not the cardinality). This adds up to six individuals in total. In Biak, a cardinality of six is within the range of the formal feature [paucal]. We observe paucal agreement morphology on the predicate. In contrast, in (321)b we observe the same formal paucal features on the conjuncts, however, the utterance is given in a context in which the conjuncts refer to nine individuals each. This adds up to a total of eighteen individuals. This cardinality is outside the range of [paucal]. Most crucially, we observe plural agreement morphology on the predicate, not paucal morphology like in (321)a. Given that Biak paucal category refers to cardinalities of up to 10, we can describe the difference in agreement morphology between (321)a and (321)b as a difference in the total number of individuals involved. There is no way to arrive at this distinction via a combination of formal features. Resolution in this case performs an arithmetic computation, i.e., it actually counts the number of referents involved in the discourse and expones it via agreement accordingly. This behavior, i.e., performing an

arithmetic computation, points to the fact that resolution is not syntactic. This is the second piece of empirical evidence that we have seen so far against a syntactic analysis of resolution.⁸⁵

Finally, it might be tempting to entertain the possibility that this distinction in resolution outcomes is based on particular discourse information since the features [paucal] and [plural] have a clear semantic interpretation, and this interpretation somehow plays a role. While the idea that meaning is behind the choice of paucal vs. plural agreement morphology on the predicate is not controversial, the resolution mechanism itself is unlikely to be semantic. I discussed the possibility of discourse- or semantically-based resolution in section 2.6. Now, I provide the final piece of empirical evidence against a syntactic analysis of resolution.

4.6 Against a semantic approach

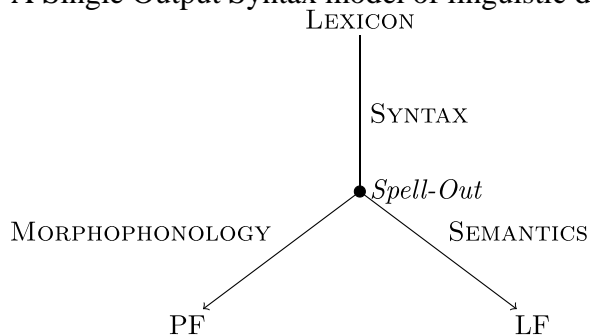
I will now discuss conceptual reasons why resolution of phi-features under coordination cannot be a purely semantic phenomenon. Semantic explanations of resolution are pervasive in the literature. I already described one explicit version of such an explanation in section 4.5.2: the analysis of Polish gender resolution by Prażmowska (2016). Prażmowska's account involves semantics in a limited way, namely, it proposes that some features like [human] that were traditionally thought

⁸⁵ An alternative explanation of these facts is that syntactic resolution of number actually takes place, but it gets overridden by other pressures and results in morphology that does not reflect the original syntactic computation. In other words, one of the members of each pair above is acceptable and grammatical while the other member of each pair is also acceptable but not grammatical (grammaticality illusion). Since data of the sort Harbour (2020) has presented are very limited and based on individual elicitations with just one speaker of each language, it is impossible to rule out this option, at least at this stage.

to be restricted to semantics, are in fact present and active in syntax. I have shown above why such approach, despite its added power, still undergenerates—it does not account for all the data (in particular, it does not address an entire class of animate animal-denoting nouns and some other examples reported in the literature). The semantic approaches I describe in this section rely on semantics to a greater degree but also face a number of issues.

The first conceivable semantic approach to resolution would be positing a direct link between morphophonology and semantics. If we return to Prazmowska’s account, the feature [human] or [animate] would not need to be syntactic; it could remain a semantic property, as traditionally described in grammars, but would nevertheless determine the morphophonology of resolved agreement form. The argument against this approach is similar to the argument against semantic agreement that bypasses syntax, laid out in the beginning of chapter 2. To recapitulate, the argument relies on the disconnect between the morphophonological and semantic components. This disconnect follows from the bifurcation of linguistic derivations into morphophonology on the one hand and semantics on the other hand, and crucially the absence of a direct link between the two modules that bypasses syntax, as shown in (323):

(323) A Single Output Syntax model of linguistic derivations



In such a model, which has otherwise been proven productive, an operation that takes place only in semantics, i.e., after the bifurcation into morphophonology and semantics (Spell-Out), could not

manipulate morphophonology, i.e., it could not result in some morphophonological exponence. Thus, resolution cannot be semantic in the sense of bypassing syntax. (For a reference to alternative models that posit a direct link between morphophonology and semantics and to work showing why these models are inadequate, see fn. 4 in chapter 2.)

Another approach to resolution of phi-features under coordination could be a collaboration of syntax and semantics such that syntax generates multiple resolution variants and semantics subsequently filters out all but one derivation. Although to my knowledge, there is no explicit account of this type in the literature on resolution, I will now attempt to construct the most plausible version of one and then show why it still does not account for all the data.

Let us imagine that syntactic resolution is unconstrained, i.e., it greatly overgenerates. This approach allows us to not stipulate any rules since all logically-possible outputs are generated by syntax. The burden is then on semantics to correctly eliminate the derivations incompatible with real-world interpretations. For example, recall Harbour’s data from Biak presented section 4.5.4:

(324) Conjunction of paucals and discourse-sensitive resolution in agreement in Biak (Harbour, 2020, pp. 1–2)

- a. Inai **sko-ya** ma roma **sko-i** **sko-fnak** kayame.
girl 3PAU-DET and boy 3PAU-DET 3PAU-play together
‘The (three) girls and (three) boys played together.’ (total of six children)
(cardinality of the referents established in the discourse)
- b. Inai **sko-ya** ma roma **sko-i** **si-fnak** kayame.
girl 3PAU-DET and boy 3PAU-DET 3PL-play together
‘The (nine) girls and (nine) boys played together.’ (total of eighteen children)
(cardinality of the referents established in the discourse)

I argued above against a claim that in (324)a syntax performs a resolution operation that outputs feature [paucal] that is then reflected in morphophonological form of agreement, while in (324)b syntax outputs [plural]. Such analysis would require equipping syntax with an extremely powerful

tool that allows it to make use of the cardinality of the referents and then conduct an arithmetic count.

However, consider an alternative approach—let us imagine that syntactic resolution in both examples is exactly the same, and specifically, that resolution outputs all phi-features available in a given language—[singular], [paucal], [plural], etc. Subsequently, semantics evaluates each derivation and picks the one with the right truth value. For example, the discourse scenario in (324)a is satisfied by the truth value of [paucal]-resolution-output derivation while (324)b is satisfied only by the truth value a [plural]-resolution-derivation. All other derivations are filtered out. While this approach is successful at modeling resolution that involves semantically interpretable features, it cannot be extended to non-interpretable features. For example, grammatical gender on inanimate nouns as well as most noun classes in Bantu languages cannot be evaluated by semantics in the same fashion, i.e., class 5 in Chichewa does not refer to a predicate that holds of individuals in the real world or in a semantic model, in the same way that [paucal] in Biak does (at least in some examples). In short, the existence of purely formal features would require positing an additional mechanism of resolution or semantic interpretation, e.g., a default. Such a default mechanism would work in languages like Polish where coordination of inanimate noun phrases, regardless of their grammatical gender, controls NVIR agreement morphology on the finite verb or auxiliary. However, the same default mechanism would not work in a language where resolution of inanimate noun phrases under coordination differs depending on the grammatical gender of these noun phrases—a pattern we observe e.g., in Serbian:

(325) Serbian: coordination of neuter noun phrases (Wechsler & Zlatić, 2003)

Ogledalo i nalivpero su bili /*bila na stolu.
mirror.N.SG and fountain pen.N.SG AUX were.M.PL /*were.N.PL on table
'The mirror and the fountain pen were on the table.'

(326) Serbian: coordination of feminine noun phrases (Despić, 2016, p. 16)

Knjiga i olovka su pale sa stola.
book.F and pen.F are fell.F.PL off table
'A book and a pen fell off the table.'

In turn, once such a default is available, it is unclear why ineffability of the kind described in 4.5.3 would ever arise. It is also conceivable that there are two mechanisms for resolution: the semantic mechanism for interpretable features, of the sort described here for Biak, and the grammar-external mechanism of the sort argued for throughout this thesis. However, we have seen evidence for the involvement of a grammar-external mechanism in at least some cases. Since a fully grammar-external mechanism can replicate the output of a putative semantic mechanism for the restricted set of cases where a semantic mechanism seems to be operative, it follows that appealing only to a grammar-external mechanism would be more parsimonious overall.

4.7 Summary of the chapter

In this chapter, I have summarized some typological tendencies in resolution of phi-features under coordination. I have shown that these tendencies could in principle be combined with the current models of phi-feature systems and logical or morphosyntactic operations like conjunction and node insertion to derive a grammar-based resolution operation. Given the assumptions of the previous chapter, such resolution would have to take place on a head specified with the agreement probe like Infl^0 or v^0 . However, I then presented three types of evidence against such grammar-internal modeling of resolution. First, I showed that the output of resolution under coordination is unlike the output of other mechanisms of reducing phi-featural information—omnivorous agreement or Person Case Constraint—despite being situated on the same external head. Second, I showed that in languages with rich enough phi-systems we are able to detect resolution mechanism that involve higher-order operations besides conjunction of formal features, i.e., arithmetic computation of the

cardinality of referents. Last but not least, I have shown that the typological tendencies are not nearly as robust as we would expect them to be if they were underpinned by a grammar-internal mechanism—variability and ineffability is attested in resolution scenarios in many of the world’s languages, and for all types of phi-features (gender/noun-class, number, and even person). In the next chapter, I synthesize the parts of the main proposal presented throughout this thesis and discuss their consequences.

5 Proposal

In this chapter, I make an explicit proposal regarding the source of resolution of phi-features under coordination. I claim that such resolution is *grammar-external*, not *grammar-internal*, in contrast to what is usually assumed in the literature (Heycock & Zamparelli, 2005; Marušič & Shen, 2020; Prazmowska, 2016 a.o., but cf. Reis, 2017 for an alternative approach). I will first recap the problem under investigation, i.e., what resolution is and what the logical possibilities for its source are. I also summarize the empirical observations regarding resolution from chapter 4. In chapter 4, I presented three main types of empirical arguments against a grammar-based analysis of resolution. In this chapter, I will revisit these arguments and argue further that a range of apparent solutions, in the form of enriching the grammatical toolbox, are unwarranted. Instead, I discuss positive arguments in favor of a grammar-external source for resolution, based on other language phenomena also requiring similar grammar-external mechanisms (phi-matching, honorifics). In section 5.3, I lay out the proposal that all phi-feature resolution under coordination is grammar-external. I further propose that this absence of grammar-based resolution is due to the list of phi-featural information being constrained to external heads (like Infl^0 or v^0) rather than a designated coordination projection. I make the claim that external heads cannot be the source of the resolution mechanism for phi-features under coordination. In other words, the proposed extra-grammatical resolution mechanism is not restricted to just some combinations of phi-features in a subset of languages where we observe surface variability or ineffability of resolution, but rather any time we observe agreement controlled by coordination. The consequences of this proposal are discussed in 5.5. First, agreement controlled by coordination is a novel instance of conventional usage of a type where grammar provides no instructions and performance systems have to “improvise”. Second, even the occasionally systematic behavior of agreement controlled by coordination cannot

be (straightforwardly) used as evidence in favor of particular theories of grammatical systems, like the structure of phi-systems (e.g., Adamson & Šereikaitė, 2019 on the source of neuter in Lithuanian), coordination (e.g., Munn, 1993 on the asymmetrical syntactic structure of coordination) or agreement (e.g., Sauerland, 2003 on semantic agreement). The final section of this chapter outlines possibilities for falsifying the current hypothesis.

5.1 The problem

Recall from chapter 4 how we defined resolution:

(327) Definition of resolution (working definition)

Computation of phi-features of conjuncts in a coordinate structure that results in one set of phi-features to be later expounded as an agreement morpheme.

Consider an example below:

(328) Resolution of phi-features under coordination

- a. Pat is a handyman.
- b. Pat and Mat are handymen.

In (328)a, the copula takes the form *is* because it is controlled by a 3SG argument *Pat* which itself bears 3SG phi features. In (328)b, the copula takes the form *are* because it is controlled by a coordination *Pat and Mat*. Coordination does not inherently bear 3PL or other phi-features in the way *Pat* in (328)a bears such features. The noun phrases within conjuncts *Pat* and *Mat* each bear a 3SG feature, but we do not see this feature expounded on the copula as some computation has taken place. Notice now that the working definition in (327) does not itself specify what kind of computation we are dealing with. In principle, such computation could be grammar-internal, e.g., (morpho-)syntactic or semantic, as commonly assumed or claimed in the literature, or it could be grammar-external, e.g., governed by domain-general systems the same way choosing a lexical word for a referent is.

(329) Logical possibilities of the source of resolution

- a. Grammar-internal, e.g.:
 - Syntax
 - Morphology
 - Semantics
- b. Grammar-external

The reason for the common assumption or claim of a grammar-internal source of resolution is two-fold. First, when one restricts oneself to looking at particular languages or particular subparts of the space of possible phi-feature combinations, resolution may appear to be empirically very robust and systematic. It seems that in most naturally-appearing examples, speakers agree and consistently produce one form of agreement whose morphophonological shape depends on the properties of conjuncts and coordination itself. Polish agreement morphology distinguishes between all combinations of person and number features. In the example below, the only acceptable variant is the one reflecting the phi-features of both conjuncts (person: 1 > 3; number: sg + sg = pl):

(330) Systematicity of agreement with coordinated arguments in Polish

Baba Jaga i ja lubi-my/*-a/*-∅ jabłka.
 Baba Jaga(3SG.F) and 1SG like-1PL/*-3PL/*-3SG apples
 ‘Baba Jaga (a witch) and me like apples.’

The second reason for assuming that resolution is grammar-based is that it is closely tied to phi-features, coordination and agreement, each of which is a decidedly grammar-internal process or phenomenon. In chapter 2, I presented arguments for a particular two-step model of agreement that spans syntax and morphology:

(331) Competence model of agreement

SYNTAX		MORPHO(PHONO)LOGY	
RELATION	RESULT	RELATION	RESULT
AGREE-LINK	1 set of syntactic instructions	AGREE-COPY	1 set of PF instructions

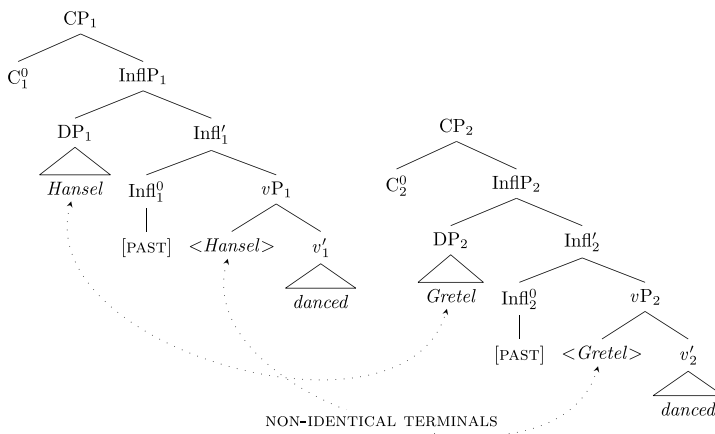
In chapter 4, I noted that all else being equal, the same model of agreement has to extend to examples where agreement is controlled by a coordination, and noted that an additional step of

resolution needs to be added in such a derivation. The next question is *when* resolution takes place in this derivation. This question could inform what the source module of resolution is, however, I will show shortly that it is also partially independent. I start by considering the possibility of resolution within the pipeline of a derivation presented in (331), i.e., directly before or after AGREE-LINK or AGREE-COPY. After I establish the order of individual steps, I return to the question of the module responsible for resolution.

Recall that in chapter 3 I argued for a particular syntactic derivation of coordination—a late syntactic operation of UNION over two syntactically well-formed sentences:

(332) UNION with non-identical subjects

- a. INPUT TO UNION: Hansel danced.
- b. INPUT TO UNION: Gretel danced.
- c. OUTPUT OF UNION: Hansel and Gretel danced.



I adapted Goodall's (1987) approach to the syntactic structure of coordination such that AGREE-LINK takes place before UNION:

(333) AGREE-LINK derivation with coordination

SYNTAX					
RELATION	RESULT	RELATION	RESULT	RELATION	RESULT
structure building	2 independent sentences	AGREE-LINK	2 independent sets of syntactic instructions	UNION	coordination of two clauses (identical heads are fused)

Since at a pre-AGREE-LINK stage of the derivation there is no UNION, and thus there is no coordination, we were forced to eliminate the logical possibility of resolution being ordered before AGREE-LINK step.

(334) First logical possibility for agreement derivation with coordination—rejected

SYNTAX		MORPHO(PHONO)LOGY			
RELATION	RESULT	RELATION	RESULT	RELATION	RESULT
resolution	reduction from 2 sets of phi-features to exactly 1	AGREE-LINK	1 set of syntactic instructions	AGREE-COPY	1 set of PF instructions

We are thus left with two options—(i) resolution as a post-AGREE-LINK-pre-AGREE-COPY step, or (ii) resolution as a post-AGREE-COPY step. If resolution was situated between AGREE-LINK and AGREE-COPY, we would need to analyze it as syntactic or morphological. Shortly, I return to a discussion of why this forces us to reject the model where resolution is located at this point along the derivational path.

(335) Second logical possibility for agreement derivation with coordination—ultimately rejected

SYNTAX		SYNTAX/MORPHO(PHONO)LOGY		MORPHO(PHONO)LOGY	
RELATION	RESULT	RELATION	RESULT	RELATION	RESULT
AGREE-LINK	1 set of syntactic instructions per clause	resolution	reduction from >1 sets of instructions/phi-features to exactly 1	AGREE-COPY	1 set of PF instructions

Finally, we are left with the final option, i.e., post-AGREE-COPY resolution. In this location, resolution could in principle be a late morphophonological operation or entirely external to the grammar.

(336) Third logical possibility for agreement derivation with coordination—ultimately adopted

SYNTAX		MORPHO(PHONO)LOGY		MORPHO(PHONO)LOGY /GRAMMAR-EXTERNAL	
RELATION	RESULT	RELATION	RESULT	RELATION	RESULT
AGREE-LINK	1 set of syntactic instructions per clause	AGREE-COPY	1 set of PF instructions per conjunct	resolution	reduction from >1 sets of phi-features to exactly 1

Note that in (335) and (336), we have not yet noted explicitly the grammatical module in which resolution takes place. These diagrams are merely intended to reflect an ordered sequence of steps in a derivation that outputs a set of instructions for the performance systems. If we are able to independently establish or eliminate particular modules as sources of resolution, it could also inform us about the ordering of resolution with respect to other operations. Let us now recall the four logical possibilities for the modular locus of resolution:

(337) Logical possibilities of the source of resolution (repeated from (329))

- a. Grammar-internal, e.g.:
Syntax
Morphology
Semantics
- b. Grammar-external

As stated earlier, syntax (in particular, late in the syntactic derivation, post AGREE-LINK) and morphology (in particular, early in the post-syntactic derivation, before AGREE-COPY) commonly assumed points in the derivation for resolution to occur (among other things, because its robustness in certain domains is reminiscent of morphosyntactic computations). On either of these views, resolution takes place between the two agreement steps, AGREE-LINK & AGREE-COPY. However, in chapter 4, I presented an argument against such an analysis—(i) arithmetic abilities of resolution not expected from a morphosyntactic formalism, (ii) the differing behavior of conjunction resolution when compared to other phenomena that involve considering multiple sets of phi features (disjunction, omnivorous agreement, the Person Case Constraint), and (iii) cross-linguistically attested examples of inter- and intra-speaker variability as well as ineffability. Another common approach to resolution is via semantics. This approach is sometimes also invoked as a solution to the unusual behavior of resolution that resists modeling in morphosyntactic terms. In chapter 4 I also discussed why a semantic approach does not get off the ground given common assumptions about the organization of modules in a linguistic derivation. In a nutshell, there is no

direct link from semantics to morphology that bypasses syntax such that semantics alone could inform the morphophonological form of agreement. By elimination, we arrive at the final possibility of resolution being grammar-external, i.e., grounded not in the competence system but outside of it. To complement the empirical and conceptual arguments from chapter 4 that lead us to reject the hypothesis regarding grammar-based resolution, I now discuss positive arguments in favor of the alternative option, i.e., grammar-external resolution.

5.1.1 Sample derivation with grammar-external analysis of resolution

To illustrate the proposal, let me provide a sample derivation of a sentence with coordination that controls agreement morphology on a predicate like the one below. I will gloss over irrelevant details (e.g., copies of moved phrases, abstract representation of lexical roots) and focus on building a coordination structure, resolving phi-features and attempting to agree with such a structure.

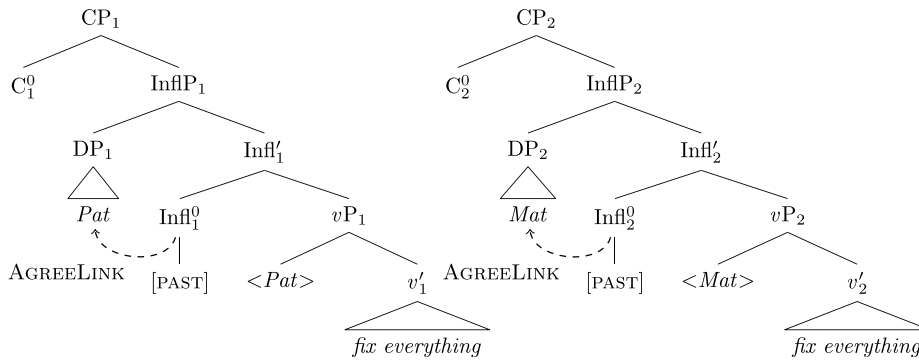
(338) Coordination controlling agreement
Pat and Mat fix everything.

The derivation starts with building two separate sentences:

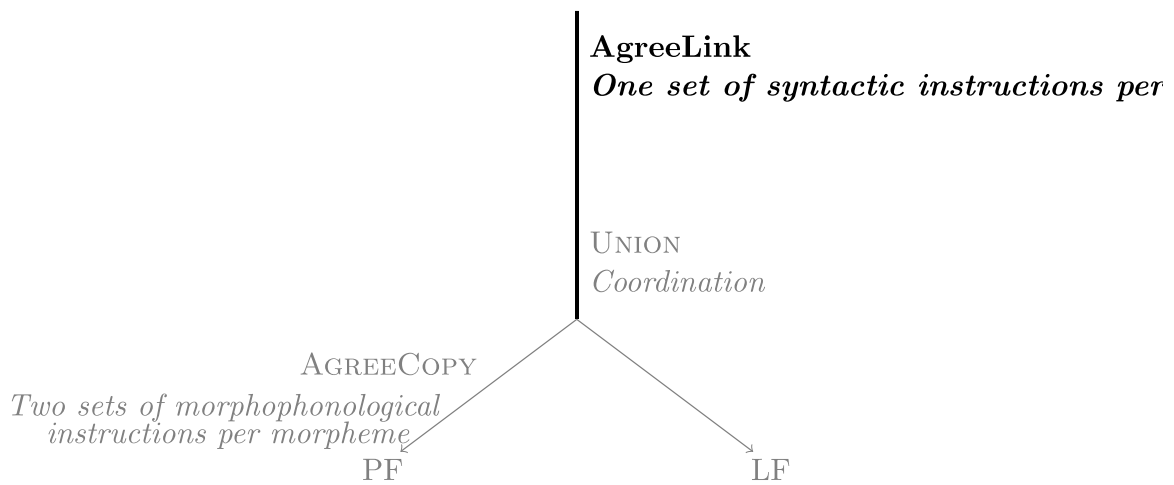
(339) Input sentences
a. Pat fix everything.
b. Mat fix everything.

Within each of the sentences, an agreement probe establishes the AGREE-LINK relation:

(340) Structure of input sentences with the AGREE-LINK relation

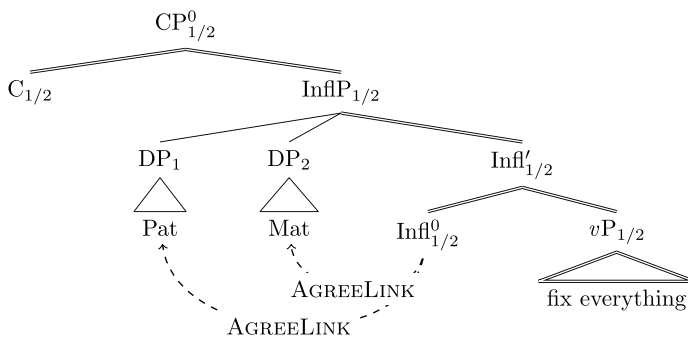


(341) Step (340) in a linguistic derivation (dark lines indicate what has taken place, lighter ones foreshadow next steps)

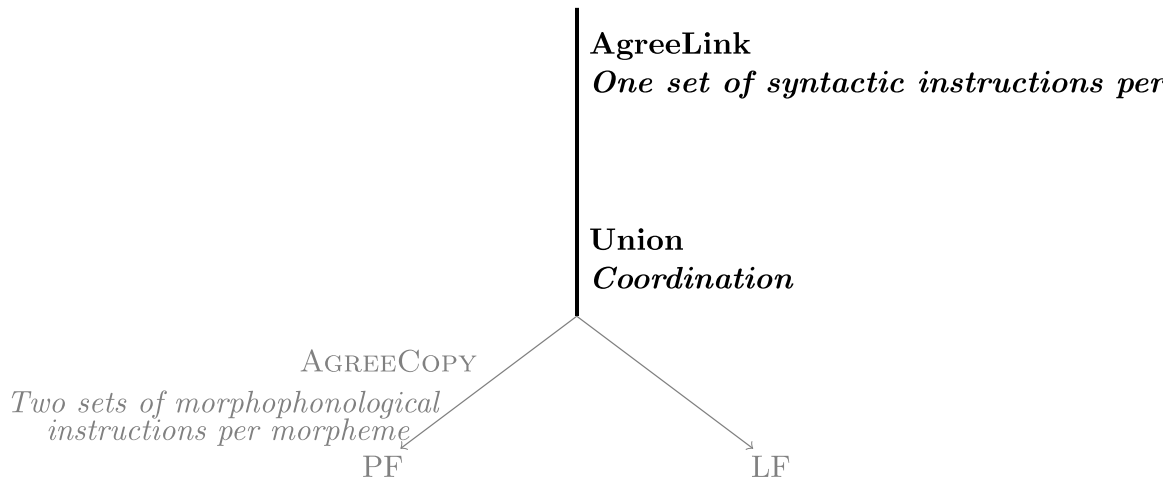


Upon completion of the syntactic structure, UNION of the two clauses takes place—identical nodes fuse (indicated with double edges below) and non-identical nodes continue to be in parallel planes (indicated with single edges below):

(342) Input to Linearization with fused identical heads and parallel non-identical heads



(343) Step (342) in a linguistic derivation (dark lines indicate what has taken place, lighter ones foreshadow next steps)

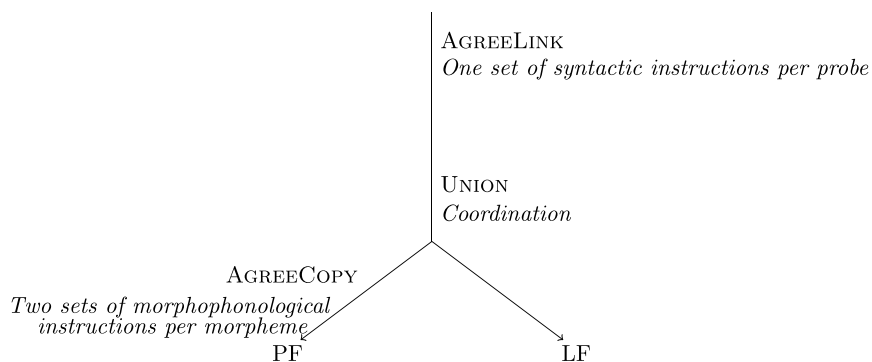


The resulting structure is then shipped off for linearization as well as the second step of agreement, i.e., AGREE-COPY at PF.

(344) AGREE-COPY

Pat [3 sg]
 Mat [3 sg]
 Infl⁰ {[3 sg], [3 sg]}

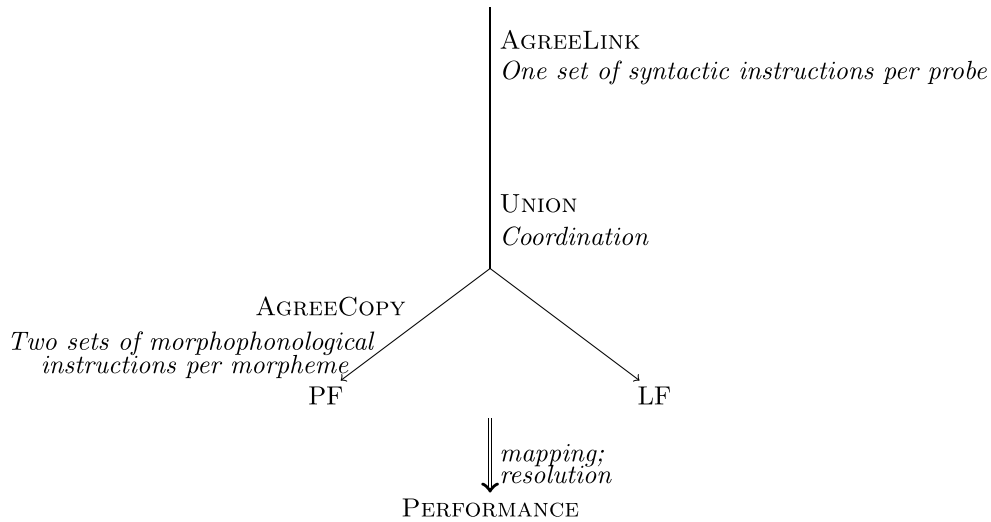
(345) Step (344) in a linguistic derivation (dark lines indicate what has taken place, lighter ones foreshadow next steps)



Note that there has been no resolution of the features copied onto Infl⁰, i.e., Infl⁰ is specified with two sets of phi-features, one from each conjunct. This by itself does not constitute a problem for the morphophonological module. The next step is mapping the current output of the competence system onto performance. This is where performance needs to execute exactly one set of phi-instructions, i.e., one morphophonological form of a morpheme. In order to do so, the performance

systems need to *resolve* the two sets of morphophonological instructions provided by the output of the competence system down to exactly one.

(346) Resolution of phi-featural instructions upon mapping to performance



With resolution taking place upon mapping to performance, i.e., outside of the strict grammar-internal system, we have arrived at a surface sentence with one agreement morpheme controlled⁸⁶ by the entire coordination.

In sum, I have proposed that resolution of phi-features under coordination cannot be grammar-internal and thus, it must be grammar-external. I have provided an example of a derivation of a sentence where coordination controls agreement morphology. The coverage of the current proposal ends here, i.e., I do not provide details on the extra-grammatical resolution mechanism. This in itself calls for an extensive investigation into the surface behavior of resolution as well as

⁸⁶ I am using the term ‘controls’ in a non-formal sense, i.e., without making a claim about a formal link in the competence system between the surface morpheme and the coordination. See the introduction to chapter 2 for the distinction in terminology between ‘controlling agreement’ and ‘determining agreement’.

comparison with other language phenomena for which grammatical output might be not fully specified. I provide some preliminary discussion in subsequent sections.

5.2 Arguments in favor of a grammar-external analysis of resolution

Independently of the analysis of resolution, there is already a need for grammar-external mechanisms to interact with agreement and phi-features in other language phenomena. Consider a trivial example like a speaker constructing an intended message and having to make a choice between *pencil* and *pencils* based on how they perceive a given referent. Both perception of a referent as singular or plural (or other categories) as well as mapping that perception onto a lexical categories are clearly a grammar-external mechanisms. A slightly more complex example of such extra-grammatical categorization and mapping onto lexical items involves various systems of honorification in the world's languages. Consider a relatively simple example: Polish uses a designated set of pronominals *Pan* (SG, MASC), *Pani* (SG, FEM), *Państwo* (PL), instead of the typical second person pronouns *ty* (SG) and *wy* (PL), under certain circumstances. When choosing between using *Pan/Pani/Państwo* and *ty/wy*, the speaker needs to consider for example aspects such as age of the addressee, familiarity with the addressee and social and professional rank. For example, to address an elderly stranger, one would use *Pan/Pani*, while when addressing a familiar peer, the speaker would use *ty*. The boundaries within the familiarity dimension, age dimension and the social status dimension are not codified using any formal linguistic features. *They are grammar-external*. A speaker needs to learn from the ambient context where these boundaries are and how they interact (e.g., when a speaker addresses a peer as “unfamiliar” in the honorific sense). Crucially, the choice between these sets of pronominals has consequences on agreement. The pronouns *ty/wy* control 2nd person agreement, while *Pan/Pani/Państwo* control 3rd person agreement, despite referring to the addressee. Therefore, the choice of the pronominal expression,

governed by a grammatical-external mechanism, does have a consequence for grammar-internal mechanisms like agreement.

On the one hand, the choice between polite forms and regular pronouns is governed by factors that are clearly not encoded by formal linguistic features, and thus, the choice has to be grammar-external. On the other hand, it might seem that the choice of agreement morphology when it is controlled by coordination *could* be encoded by formal features. In section 4.6.3, I discussed one such attempt for Polish by Prażmowska (2016). Prażmowska proposes the use of features such as [\pm human] and [\pm interpretable gender]. However, even invoking these seemingly syntactic features does not explain all of the resolution behavior. For example, two lexical items with the same formal features might nevertheless show a contrast in the choice of resolved agreement form. Consider the example below:

(347) Variable resolution of feminine and neuter (Zieniukowa, 1979)

Matka i niemowlę patrzy-ły/-li na siebie nawzajem.
mother(F) & newborn(N) look-PST.NVIR/-PST.VIR on self each.other
'A mother and a newborn baby were looking at each other.'

Even adopting an extended featural representation for the conjuncts above, i.e., [feminine human] & [neuter human] (which would have an effect only on resolution under coordination and no other parts of the Polish grammar), does not explain why some speakers report a contrast with the following example that differs only in the choice of lexical items:

(348) Resolution of feminine and neuter

Matka i dziecko patrzy-li/??-ły na siebie nawzajem.
mother(F) & child(N) look-PST.VIR/??-PST.NVIR on self each.other
'A mother and a child were looking at each other.'

The contrast in acceptability of both forms between (347) and (348) shows that not all coordination of feminine human and neuter human conjuncts are equally likely to show optionality between

resolution to virile and non-virile. Recall the predictions from Prażmowska’s system from section 4.6.3:

(349) Agreement variants resulting from the interactions between the proposed eligibility (Prażmowska, 2016, p. 80)

	INTERPRETABLE MASCULINE	INTERPRETABLE FEMININE	UNINTERPRETABLE HUMAN	UNINTERPRETABLE NON-HUMAN
INTERPRETABLE MASCULINE	VIR	VIR	VIR	VIR
INTERPRETABLE FEMININE	VIR	NVIR	VIR, NVIR	NVIR
UNINTERPRETABLE HUMAN	VIR	VIR, NVIR	VIR, NVIR	VIR, NVIR
UNINTERPRETABLE NON-HUMAN	VIR	NVIR	VIR, NVIR	NVIR

There are some combinations of features that Prażmowska’s system itself predicts to be fully variable. In other words, we need other mechanisms to further constrain the variability to account for examples such as (348). Based on the contrast between (347) and (348), we observe that the availability of both forms is dependent on the choice of a particular lexical item, *niemowlę* ‘baby’ vs. *dziecko* ‘child’, despite the two sharing the same formal feature (the simpler, traditional representation [neuter], or the expanded Prażmowska-style representation [neuter human]). Based on the corpora available for Polish (SUBTLEX-PL in Mandera et al., 2014; NKJP in Peżik, 2012), *dziecko* is a much more frequent word than *niemowlę*. Reference to word frequency is a factor characteristic of grammar-external mechanisms. Another factor characteristic of grammar-external mechanisms that plays a role in determining the acceptability of certain agreement forms under

coordination is linear distance. Consider the following example of ineffability in coordination in Chichewa:

(350) Lack of acceptable resolution in one combination of conjuncts in Chichewa (Corbett & Mtenje, 1987, pp. 33–34)

- a. * Munthu ndi ng’ombe zi-ku-yenda.
 Person(CLASS1) and cow(s)(CLASS5) CLASS5/6-PRES-walk
 ‘A person and cow(s) are walking.’
- b. * Munthu ndi ng’ombe a-ku-yenda.
 Person(CLASS1) and cow(s)(CLASS5) CLASS3-PRES-walk
 ‘A person and cow(s) are walking.’

Adding material, here a numeral one or higher, between the coordination and the verb expounding agreement improves acceptability of some (but not all) of the variants:

(351) Salvaging ineffability with linear distance in Chichewa (Corbett & Mtenje, 1987, p. 34)

- a. Munthu ndi ng’ombe **imodzi** a-ku-yenda.
 Person(CLASS1) and cow(s)(CLASS5) **one** CLASS3-PRES-walk
 ‘A person and one cow are walking.’
- b. Munthu ndi ng’ombe **zi-tatu** a-ku-yenda.
 Person(CLASS1) and cow(s)(CLASS5) **CLASS5/6.three** CLASS3-PRES-walk
 ‘A person and three cows are walking.’
- c. * Munthu ndi ng’ombe **zi-tatu** zi-ku-yenda.
 Person(CLASS1) and cow(s)(CLASS5) **CLASS5/6.three** CLASS5/6-PRES-walk
 ‘A person and three cows are walking.’

In sum, once we observe that lexical frequency and linear distance play a role in some language behavior, it is reasonable to hypothesize that some underlying mechanism behind this language behavior is grammar-external.

Some further domains where we could look for positive data that would support my claim are languages acquisition and clinical linguistics. For example, we might be able to capture a stage of language development where the command of omnivorous agreement contrast with the command of resolution of phi-features under coordination even though one of the phenomena is more complex. Furthermore, we might be able to find a patient with language disorder whose grammar

is intact but resolution of phi-features under coordination does not follow the tendency observed in that language. While I leave research on positive evidence for grammar-external resolution mechanism for future research, let me summarize complementary evidence against the alternative claim.

5.3 Arguments against a grammar-internal analysis of resolution revisited

In chapter 4, I reviewed a number of arguments against a grammar-internal analysis of resolution. I discussed why, given the commonly assumed Single Output syntax or inverted-Y models of the linguistic derivation, resolution could not be a semantic mechanism that follows a bifurcation into PF and LF, because a mechanism cannot determine morphophonological shape of agreement. I have also shown that the surface behavior of resolution of phi-features under coordination does not resemble the behavior of other syntactic operations that deal with multiple sets of phi-features and a single, agreement-exponing head—omnivorous agreement in Kaqchikel exponing singular agreement when agreeing with two singular arguments, and the Person Case Constraint in some dialects of Spanish leading to ineffability when agreeing with 1st and 2nd person arguments. Finally, I have shown that even within coordination we see a difference in resolution behavior between conjunction and disjunction. Accounting for all this diverse behavior and maintaining that it all has a source in syntax, goes against typical assumptions about this very module. The other types of arguments from chapter 4 similarly showed that the behavior of resolution is not straightforwardly explained by typical syntactic or morphological tools—resolution into distinct number categories like paucal and plural, in languages with rich enough phi-systems to observe it, show a dependence of resolution on the meaning of conjuncts instead of their formal features. In other words, resolution does arithmetic. Last but not least, we observe inter- and intra-speaker variability and ineffability in the world’s languages which is not expected of typically deterministic

syntactic functions. The conclusion of this chapter was that a standard theory of grammar cannot straightforwardly account for all this behavior.

There are two possible counter-responses to such a conclusion that I will briefly address here. The first possible response is to propose enriching the syntactic or morphological toolbox. Such an attempt was done, for example, by Prażmowska (2016; discussed in 4.6.3) in response to variability in Polish resolution not captured by traditional rules. Prażmowska's proposal involved a novel phi-feature system for Polish, whose consequences are only manifested on the surface in the behavior of resolution under a very specific set of circumstances. For example, the [neuter human] feature on a noun, that would otherwise be typically analyzed as [neuter], has consequences on morphology *only* when (i) it is coordinated with some other noun, (ii) the features of the other noun do not trump [human neuter] features (i.e., it is not masculine human), (iii) the coordination is marked with nominative, and (iv) the clause is in a tense that expones gender agreement morphology (past). If any of these four conditions are not met, [neuter human] feature will not have any effect. More research is necessary to establish how one would acquire such a feature.

A second element of Prażmowska's proposal, and a second possible response to my proposal, is a move towards a probabilistic grammar. Prażmowska introduces the notion of *eligibility* rather than a typical singular output for a syntactic mechanism—nouns with certain features trigger a particular option for resolution rather than narrow it down from a logical space of possibilities. I argued that such change in modeling syntactic operations is non-trivial. Consider what eligibility would do to another syntactic operation like movement. Most analyses of movement attribute it to being triggered, e.g., wh-movement is triggered by a [wh] feature on C^0 . It is not an optional operation. Even for movement that is presumably variable in a language, it is not usually variable

at an intra-speaker level. For example, V-to-T raising in Korean is a movement that is categorical for some speakers and banned for others, but there is no speaker for whom this movement is optional (Han et al., 2016). Note that in the end, syntactic resolution with eligibility for two agreement forms arrives at nearly the same end result as no syntactic mechanism at all, as proposed here, without all the necessary stipulations. In other words, eligibility for two agreement forms still does not explain what makes certain variants more likely to occur in some contexts and perhaps grammar-external mechanism of sorts needs to be proposed in such a case anyway.

We have seen some consequences of an analysis that involves enriching a syntactic toolbox. The empirical gain comes at a cost of theoretical parsimony, and yet does not get us any closer to the explanatory adequacy. I argue that resolution, given its surface behavior, cannot be modeled using typical grammar-based tools. It is, therefore, grammar-external. It is, necessary to also make explicit that I do not propose that any phenomenon that resists a straightforward analysis using obvious odd-the-shelf grammatical tools is therefore grammar-external. It is by all means, a valuable heuristic to approach a seemingly systematic language phenomenon with standard or even innovative grammatical tools. Such an approach was initially adopted for the phenomenon of phi-feature resolution under coordination as well. However, at some point the costs of this rigidity outweighed the benefits of it.

5.4 Proposal

Having laid out the empirical and conceptual evidence for the source of resolution of phi-features under coordination, I will now summarize the main proposal of my thesis.

(352) Summary of the main proposal

- a. Resolution of **all phi-features** under coordination is grammar-external.
- b. Grammatical architecture, where the semantic module is separate from syntax and morphology, and where semantics does not feed agreement, together with the parallel-structure of coordination, **conspire against the possibility of a grammar-internal resolution** mechanism.
- c. The output of grammar-internal computation of phi-features under coordination is a case of **not-full-specification** in a sense that it does not output exactly one set of instructions required by the performance system. The grammar-external resolution mechanism is then invoked.
- d. The output of grammar-external resolution mechanisms **may or may not result in inter- and intra-speaker variability and/or ineffability**—the more complex a grammaticalized phi-system in a language, the more opportunity for observing variability, but it may also be observed in fairly a simple system like English.

Let me expand on the points in (352). First, note that in (352)a I am making it explicit that I am pursuing a strong version of the proposal that resolution is extra-grammatical. In other words, we could restrict the proposal only to a subset of phi features like gender/noun class but maintain that person resolution is grammar-internal. This distinction would track an intuition that resolution of person features is more robust, e.g., that of noun-classes. I would like to challenge this intuition and invoke a counter-observation regarding variability and ineffability in Russian, German and Dutch person resolution from sections 4.5.4 and 4.5.2. I do not know of any attempt to quantify robustness that go beyond such intuitive statements. Furthermore, pursuing the strong version of this proposal frees us from having to explain why person (and perhaps number) is unlike gender. While there are a number of differences, none of them clearly align with the empirical data on resolution. Instead of analyzing person and gender features as qualitatively different objects with respect to resolution, I treat them as part of the same problem. This stance also allows us to search for a uniform account of the grammar-external nature of resolution beyond phi-features themselves and into e.g., their interaction with the clausal syntax.

I propose that the reason for the lack of any grammar-internal resolution mechanism is not that such rule could not be stated. In section 4.4 I showed that based on the availability of phi-featural architecture and logical operations like conjunction, one could state resolution rules without adding any elaborate additions to the syntax. Nevertheless, we observe that the real empirical behavior of resolution does not always reflect rules that are statable in such a way. Thus, in (352)b I propose that the uniqueness of the syntax of coordination, i.e., its parallel-structure and the lack of a designated projection (along the lines of “&P”), together with general assumptions about the architecture of linguistic derivations, are the reasons for this grammatical gap. More research needs to be done to explain why exactly external heads bearing agreement probes like Infl^0 or v^0 prohibit hosting a statable grammar-internal resolution mechanism. For now, we observe that resolution of phi-features under coordination does not behave like other cases of phi-featural reduction taking place on Infl^0 or v^0 (omnivorous agreement and Person Case Constraint discussed in 4.5.1.1 4.5.1.2).

Furthermore, I propose that the lack of a grammar-internal resolution mechanism leads to an overabundance of instructions generated by the competence system and fed into the performance systems. In some sense, it is a case of grammar-internal under-specification—the output of the competence system is not specified enough to be used by the performance system. One might also think about this as over-specification—not in the sense that the instructions are too specific to be executed by the performance systems but rather, in the sense that there are too many of them.

Last but not least, I propose in (352)d that such under-specification, or a gap in grammar, may result in inter- and intra-speaker variability. Such a link between under-specification and variability has been proposed for resolution specifically in German (Reis, 2017) as well as for other phenomena like variability in word order in some Scandinavian languages, and for weak

islands (Sprouse et al., 2016; Kluender, 1998; for an overview, see Culicover & McNally, 1998). One of the most thoroughly studied example is variability in verb placement in Norwegian (Lundquist et al., 2020, p. 3):

(353) Variability in verb placement in Norwegian (Tromsø speakers)

- a. Hva kjøpte Pål til moren sin?
 what bought Pål to mother his
 ‘What did Paul buy for his mother?’

- b. Ka han Pål kjøpte til moren sin?
 what he Pål bought to mother his
 ‘What did Paul buy for his mother?’

Lundquist et al. show that the variability is attested at a per-speaker level and it cannot be attributed to ambiguity or to code-switching between dialects. Similar detailed empirical investigation should be conducted for each of the cases of resolution variability surveyed here, to rule out the possibility of code-switching.

I proposed that variability is only one of the hallmarks of an extra-grammatical mechanism—ineffability, and crucially, invariability, are other surface manifestations of the same phenomenon. In section 5.2, using the example of polite forms, I argued that grammar-external mechanisms can also be systematic. In other words, while invariable and seemingly systematic linguistic behavior is likely to be grammar-based, it is not impossible that in some cases it is grammar-external.

5.5 Consequences

There are a number of consequences of the current proposal, according to which the surface data of agreement regulated by coordination does not represent a typical 1:1 mapping between competence and performance. The first consequence I discuss has a bearing on some theoretical syntactic analyses where agreement with coordination is used as putative evidence in favor of an argument about some syntactic representation or process.

Empirical data from agreement with coordination is often used as evidence for some theoretical claims, e.g., about the structure of phi-systems (e.g., Adamson & Šereikaitė, 2019 on the source of neuter in Lithuanian), the structure of coordination (e.g., Munn, 1993 on the asymmetrical syntactic structure of coordination), or the nature of agreement (e.g., Sauerland, 2003 on semantic agreement). The use of such empirical data for the purpose of theories of syntax, semantics, or morphology is based on the assumption that agreement regulated by coordination arises due to typical grammar-internal mechanisms. Once we challenge this assumption, such data can no longer be treated at face value and used at face value to argue for or against certain theoretical purposes. Let me briefly provide an example from Adamson and Šereikaitė (2019). They show that a coordination of mismatching gender resolves to masculine gender in Lithuanian, regardless of the gender of conjuncts:

(354) Coordination of feminine and masculine in Lithuanian (Adamson & Šereikaitė, 2019, p. 9)

Kėdė ir stalas buvo purvin-ì.
Chair(F) and table(M) were dirty-M.PL
'A chair and a table were dirty.'

Adamson and Šereikaitė propose that when gender features are present in a coordination and accessible to the outside agreement probe (in a typical coordination of nominals), but their values mismatch, the agreement probe will be supplied with masculine specification since it is a grammar-internal default gender value. Under the current proposal, the surface masculine form does not arise due to grammar-internal default gender valuation but rather a grammar-external “repair”

strategy. Thus, this data cannot be treated as a direct diagnostic for the nature of phi-feature representation in Lithuanian (or any other language for that matter).⁸⁷

The second, related consequence of this proposal is that all the data where coordination regulates agreement are a matter of conventional usage. It is therefore not only a frequent convention, i.e., it occurs every time we are dealing with coordination regulating agreement morphology, it is also an inescapable convention. Note, however, that if morphology does not expone phi-features, then resolution does not need to take place at all. For example, if coordination is in a position that does not control agreement (e.g., the object position in English), then resolution does not need to take place. Such examples therefore do not necessitate invoking convention. We also do not expect any variability or ineffability due to resolution.

A related issue concerns partial exponence of phi-features under coordination. For example, in the Polish past tense, predicate agreement expones person, number and gender features:

(355) Coordination controlling person, number and gender agreement in past tense

Pat i Mat naprawi-l-i wszystko.
Pat(MH).NOM & Mat(MH).NOM fix-PST-VIR everything
'Pat and Mat fixed everything.'

However, in the present tense, predicate agreement expones only person and number:

(356) Coordination controlling person and number agreement in present tense

Pat i Mat naprawia-ją wszystko.
Pat(MH).NOM & Mat(MH).NOM fix-PRES-3PL everything
'Pat and Mat fix everything.'

⁸⁷ While I argue here against using the data from coordination for the conclusion that Adamson and Šereikaitė (2019) make, I do not argue against their ultimate proposal that masculine is the default gender value in Lithuanian—they provide other evidence for their conclusion, of a kind that our current claims do not bear on.

Under the current proposal, both are convention strategies regardless of how many different phi-features they expone. The same applies to cases of syncretism. Recall that in German, most instances of pronoun coordination (conjunction or disjunction) that differ in person features result in ineffability and/or variability:

(357) Ineffable agreement with [1sg or 2sg] in German (Fanselow & Féry, 2002, p. 24)

Ich oder du *kann/*kannst/?können kommen
 I or you *can.1SG/*can.2SG/?can1PL come
 ‘I or you can come.’

(358) Ineffable agreement with [1sg and 2pl] in German (Fanselow & Féry, 2002, p. 24)

* Ich und ihr irre/irrt/irren uns/euch/sich/mich
 I and you.PL err1SG/err2PL/err3PL REFL.1PL/REFL.2PL/REFL3SG=PL/REFL.1SG
 ‘I and you are wrong’

(359) Ineffable agreement with [1pl or 2pl] in German (Fanselow & Féry, 2002, p. 25)

* Wir oder ihr werden/werdet das Rennen gewinnen.
 we or you will.1PL/will.2PL the race win
 ‘We or you will win the race.’

(360) Variable agreement with [2sg and 3sg] in German (Timmermans et al., 2004, p. 906)

Du und der Junge laufen/lauft.
 you and DET.M.PL.NOM boy run.3PL/run.2PL
 ‘You and the boy run.’

However, when syncretism covers all logical possibilities of agreement forms, ineffability and variability disappears:

(361) Syncretic agreement with [1pl or 3sg] in German (Fanselow & Féry, 2002, p. 25)

Wir oder die Hunnen werden das Rennen gewinnen.
 we or the Huns will.1PL/3PL the race win
 ‘We or the Huns will win the race.’

Note, however, that I do not equate variability/ineffability with grammar-external resolution on one hand, and invariability with grammar-internal mechanisms on the other. Instead, I propose that all of these examples above, invariable or not, involve grammar-external resolution and thus, are a convention strategy. The distinction and distribution of invariability, variability and ineffability within constructions involving a grammar-external computation might provide an insight into the

mechanics of this computation and as suggested in 5.2, depend at least partially on the structure and complexity of a language's specific phi-feature system. I leave this investigation for future research.

Let me conclude this section with a note that in the absence of a well-defined model of this particular grammar-external mechanism, we expect many more patterns of resolved agreement controlled by coordination than what I summarized in 4.3. For example, we could imagine a language whose strategy is to use a completely different set of morphology to express agreement only in cases of coordination, e.g., alliterative agreement (Abu? style described by Dobrin (1995) and summarized in 2.4) or reduplication (a very powerful, and yet highly learnable pattern). On the one hand, it is likely that such "exotic" patterns indeed exist since only a subset of the 7,000+ languages spoken worldwide have been described in sufficient detail to include information about agreement in sentences with coordination. On the other hand, if we were certain that such patterns do not exist, it would invite an immediate question as to why not. Future research on the topic on what exactly this grammar-external resolution mechanism is might help us get closer to solving this puzzle.

5.6 Possibilities for falsifying the grammar-external hypothesis

It is desirable for any hypothesis to be falsifiable. Thus, in this section I will briefly discuss what the possible evidence might be for falsifying the hypothesis regarding a grammar-external resolution mechanism. The goal is two-fold: first, as stated, to show that the current hypothesis, despite being fairly powerful, conforms to the standard scientific method; second, to spark research into these issues.

5.6.1 All languages vs. some

The current hypothesis is based on empirical data from a variety of languages. However, this sample of languages still constitutes only a handful of the world's languages. So far, we have seen that variability is attested even in languages with a very limited phi-agreement morphology like English:

(362) Examples of variability in agreement with coordination

- a. That the president will be reelected and that he'll be impeached is/are equally likely. (McCloskey, 1991)
- b. My friend and colleague is/are writing a book. (Heycock & Zamparelli, 2005)

If there is a language, or even an idiolect, with true coordination structure (as opposed to, e.g., a comitative structure), whose agreement and morphology shows no substantial variability or ineffability in resolution, and additionally no arithmetic number resolution (of the kind discussed in sections 4.5.4, 4.6), such a language would challenge the proposal.⁸⁸ Particularly, it would challenge the statement regarding across-the-board unavailability of resolution rules on a head hosting the agreement probe if there was even one language where grammar-internal resolution is attested. It would further invite a question of why some grammars would *not* host such resolution rules despite having no deep architectural barriers against it. The issue then would parallel the question of why some language seem to have seemingly arbitrary limits on such core syntactic grammatical operations as embedding (Krause, 2000 for German possessives) or movement (Harris, 1981, p. 17 for Georgian cross-clausal A-bar movement).

⁸⁸ Of course we need to set aside variability that is a true speech error—we expect such variability to occur whether a language has a grammar-internal resolution rule or not.

5.6.2 All resolution vs. some

We might also imagine a situation in which phi-features are largely independent of each other and some, e.g., person and number, are resolved grammar-internally but, e.g., noun classes are not. Recall that case studies used in this thesis received in some cases analyses that attributed their unusual behavior to idiosyncratic issues other than grammar-external mechanisms. For example, one might argue that variability is underlyingly an instance of structural ambiguity. Thorough investigation of each of these cited examples could return a landscape in which we discover that e.g., none of the evidence used to argue for grammar-external resolution of number is analyzed correctly. In such a case, we could end up with a categorical split in the behavior of features, cleaving apart the handling of number from that of gender, for example.

5.6.3 Coordination—structural ambiguity

As mentioned above, structural ambiguity is a potential source of surface variability that would explain the behavior of resolution without the need to resort to grammar-external mechanisms. We have also seen, in chapter 3, that the research on the syntactic structure of coordination is far from settled. Here, I adopted (and adapted) a fairly non-standard analysis of parallel-structure based on old as well as novel empirical evidence. However, I also flagged that, while it is not the most elegant possibility, it might turn out that what looks like coordination on the surface, underlyingly takes many different structures, the parallel-structure discussed here being just one of them.

5.6.4 Complex idiolects or dialectal code-switching

Finally, as mentioned in section 5.4, some of the famous cases of intra-speaker variability like word order in Scandinavian languages have been proposed to be, at least in part, due to idiolectal variation or dialectal code-switching. Sundquist makes an explicit claim of this kind of Middle

Norwegian (2006, pp. 111–112). Lundquist et al. (2020) argue that this is still a logically possible option that cannot be rejected without proper empirical testing. In other words, there exist multiple different grammars such that each of these grammars contain a different set of grammar-based resolution rules (or even different phi-feature representations (Scontras et al., 2018)). Such grammars might be found across speakers (idiolectal variation) or even within a multi-dialectal speaker. Thus, the surface variability is a result of activating a different set of rules. Cases of multiple grammars (languages, dialects or idiolects) within one speaker are argued to be more frequent than some generative linguists tend to assume. For example, under the hypothesis of Universal Bilingualism, Roeper (1999) and Eide & Åfarli (2020) propose that anyone proficient in more than two dialects and/or registers that differ in linguistic properties should be seen as having a constant access to grammars of these dialects and/or registers. As a consequence of this multidialectalism, such a speaker has a potential to switch between the two (or more) dialects and/or registers. Thus, distinguishing between code-switching between two grammars with deterministic outputs and true optionality of outputs within a single code is difficult to rule out. Positing code-switching in the resolution of phi-features under coordination would require a much more detailed investigation than what is currently available in the literature but even with just the discussion of the data and cross-linguistic tendencies in chapter 4, we can already notice that it would get us only so far. For example, the variability in person resolution in German, particularly the variant in (363)b, would constitute an example of a grammar where person resolution does not follow the $1 > 2 > 3$ person hierarchy.

(363) Variability in German in agreement with coordinated pronominal conjuncts (Timmermans et al., 2004, p. 919)

- a. Du und er geh-**t**.
2SG and 3SG go-**2PL**
'You and him go.'
- b. Du und er geh-**en**.
2SG and 3SG go-**3PL**
'You and him go.'

As far as grammatical gender resolution and noun classes are concerned, at least in Polish, to my knowledge, there have been no reports of dialectal variation. If dialectal variation were to be at play in the attested sentences like (364) below, we would expect there to exist a single grammar (possibly one that could even be spoken by some mono-dialectal speakers, somewhere) with the resolution rule opposite to the traditional rule in Polish in (365):

(364) Uncertainty of agreement form with a conjunction in Polish (Zieniukowa, 1979)—F&MI coordination

- a. Bratowa i tort by-**li** już w drodze.
sister-in-law(F) and cake(MI) COP-PST.**VIR** already on way
'A sister-in-law and a cake were already on their way.'
- b. Bratowa i tort by-**ły** już w drodze.
sister-in-law(F) and cake(MI) COP-PST.**NVIR** already on way
'A sister-in-law and a cake were already on their way.'

(365) Traditional phi-feature resolution rule for nominal conjunction (deterministic) (Prażmowska, 2016; Willim, 2012)

If **any** of the conjuncts is either MH or VIRILE—resolve to VIRILE.

If **none** of the conjuncts are either MH or VIRILE—resolve to NON-VIRILE.

(366) Hypothetical phi-feature resolution rule for nominal conjunction giving rise (364)a

Resolve all nominal conjunction to VIRILE.

While there have been no reports of a dialect with a rule resembling (366), to my knowledge, there have also been no attempts to rule it out. Thus, if a dialect that follows the rule in (366) were to exist, that would weaken the proposal put forth in this thesis. Nevertheless, even existence of dialects with distinct resolution rules and discovering code-switching between such dialects would not straightforwardly account for the ineffable data discussed in 4.5.3.

5.6.5 Dedicated projection for grammar-internal resolution mechanism

Recall that I propose to explain the lack of grammar-internal mechanism via the lack of a dedicated projection such as &P. At the end of section 3.3.7, after discussing counterarguments to the asymmetric approach to coordination, I briefly contrasted true coordinate structures with phrases containing comitative structures. In comitative phrases, we observe resolved agreement and a clearer asymmetry between the conjuncts. Some of the work on comitatives proposes that comitatives are not only distinct from coordination but also have their own dedicated projection and category (Camacho, 2000). If there indeed is a construction that does have a dedicated projection *and* shows phi-features resolution, the current proposal would need to be modified in either of the two ways: either the lack of grammar-internal resolution mechanism is not due to the absence of a dedicated projection, or comitatives are the only construction where true grammar-internal mechanism takes place. As a “teaser” for future research in this area I would like to offer the following quadruplet contrasting the agreement morphology between a coordination and a phrase containing a comitative in Polish. Recall from section 4.5.2 that a coordination of *mother and child* exhibits unexpected variability in agreement morphology that is unpredicted by a traditional deterministic rule.

- (367) Agreement morphology acceptability in coordination
- a. (?) Matka i dziecko były już w drodze.
 mother(F).NOM & child(N).NOM COP-PST.NVIR already in way
 ‘A mother and a child were already on their way.’
- b. (?) Matka i dziecko byli już w drodze.
 mother(F).NOM & child(N).NOM COP-PST.VIR already in way
 ‘A mother and a child were already on their way.’
- (368) Agreement morphology acceptability controlled by phrases containing a comitative
- a. (??) Matka z dzieckiem były już w drodze.
 mother(F).NOM with child(N).INSTR COP-PST.NVIR already in way
 ‘A mother and a child were already on their way.’
- b. (?) Matka z dzieckiem byli już w drodze.
 mother(F).NOM with child(N).INSTR COP-PST.VIR already in way
 ‘A mother and a child were already on their way.’

In a sample of three native speakers who provided acceptability judgments for the sentences above, there was no simple variant that all of the speakers unanimously found well-formed. The non-virile variant (367)a, predicted by a traditional rule of resolution under coordination, is found fully acceptable by only one speaker (let me call them Speaker A); the other two speakers (let me call them Speakers B and C) found it well-formed only under a particular real-world scenario, i.e., when both the mother and a child are female. Interestingly, the non-virile variant with a comitative phrase in (368)a became marginally acceptable for Speaker A and B while Speaker C continued to accept it under the same real-world scenario of female referents. The virile variant with coordination in (367)b and well as with a comitative in (368)b are perfectly or nearly-perfectly acceptable for all three speakers. This small pilot study suggests that phrases containing comitatives exhibit inter-speaker variability just like coordination, and at least for some speakers (A and B) the resolution tendencies differ between coordination and comitatives.

Now consider another set of data, this time contrasting ineffable examples of coordination controlling agreement with a parallel comitative. Recall first the ineffability example in Polish already presented in (319):

(369) Ineffability of agreement controlled by coordination

- a. ?? Czarodziej i pięć czarownic przyleci-eli do zamku.
wizard(MH).NOM & five witch.NVIR.GEN fly-VIR to castle
'A wizard and five witches flew to the castle.'
- b. * Czarodziej i pięć czarownic przyleci-ały do zamku.
wizard(MH).NOM & five witch.NVIR.GEN fly-NVIR to castle
'A wizard and five witches flew to the castle.'
- c. * Czarodziej i pięć czarownic przyleci-ało do zamku.
wizard(MH).NOM & five witch.NVIR.GEN fly-3SG.N to castle
'A wizard and five witches flew to the castle.'

None of the agreement variants are acceptable in this construction with this combination of conjuncts despite the fact that there are two independent rules for resolution (one referring to the conjunct with MH features, second referring to the conjunct with inaccessible phi-features like a numerically-quantified noun phrase above). Now consider what happens to agreement effability when the controller is a phrase containing comitative:

(370) Agreement controlled by a phrase containing a comitative

- a. Czarodziej z pięcioma czarownic-ami przyleci-eli do zamku.
wizard(MH).NOM with five.INSTR witch-NVIR.INSTR fly-VIR to castle
'A wizard with five witches flew to the castle.'
- b. * Czarodziej z pięcioma czarownic-ami przyleci-ały do zamku.
wizard(MH).NOM with five.INSTR witch-NVIR.INSTR fly-NVIR to castle
'A wizard with five witches flew to the castle.'
- c. * Czarodziej z pięcioma czarownic-ami przyleci-ało do zamku.
wizard(MH).NOM with five.INSTR witch-NVIR.INSTR fly-3SG.N to castle
'A wizard with five witches flew to the castle.'

Now the sentence is effable, as shown (370)a, and the resolution requires VIR agreement, still disallowing the default 3SG.N expected if the rule regarding inaccessible phi-features were to apply. This preliminary data set suggests that despite many similarities, resolution with comitative phrases is not exactly the same as resolution under coordination. Whether it is the modular source of resolution that differs across the two constructions or whether this difference tells us more about the shared mechanism of grammar-external resolution is a question I leave for future research.

5.7 Summary of the chapter

In this chapter, I summarized and elaborated on the main proposal laid out throughout the thesis. The proposal states that all phi-feature resolution under coordination is a grammar-external phenomenon. The agreement operation starts in syntax, and succeeds in identifying the agreement controller—two independent conjuncts with their own sets of phi-features. This information is not reduced or resolved in any sense. Next, syntax feeds the information to the morphophonological module where the values of all sets of phi-features are copied onto the probe. Again, there is no featural reduction. This concludes a (successful) AGREE operation and its output is shipped off to the performance systems. The instructions that the performance systems receive are not the typical input—the overabundance of information means that the system needs to find a strategy for the resolution. This strategy may be governed by guidelines just like other grammar-external conventions are (e.g., the choice of polite forms based on age, social status and familiarity), however, unlike grammar-based mechanisms, it is not deterministic, and it has access to additional computation mechanisms (e.g., arithmetic, non-formal features). Applying this strategy means that the surface data will sometimes, but not always, be variable or ineffable. More research needs to be performed to establish what governs (in)variability and (in)effability, which in turn might help us understand what the nature of the grammar-external strategy is. One consequence of the proposal of a grammar-external resolution mechanism concerns how data from agreement controlled by coordination need to be treated—as a convention strategy. Finally, I briefly sketched out some possible ways that the current proposal could be falsified—mainly by analyzing data from chapter 4 in alternative ways.

6 Conclusions and future directions

This thesis investigated the ways in which natural language grammars reflect and negotiate the phi-features [person], [number] and [grammatical gender]/[noun class] under coordination. I used the term *resolution* for a negotiation of sets of phi-features that come from each of the conjuncts, rather than one conjunct alone. Resolution is necessary when a coordinate structure is in a position that typically controls agreement morphology on a finite verb or auxiliary (e.g., the subject). The main claim I argue for is that resolution is not a grammar-internal mechanism, as often assumed, but rather a grammar-external one.

Before presenting the empirical evidence in favor of the main proposal, I first justified two crucial assumptions made in this thesis. In chapter 2 I discussed the phenomenon of agreement—morphophonological covariation associated with phi-features. I concluded that agreement is a two-step operation spanning syntax and morphophonology. This two-step analysis is based on the syntactic and morphological properties of agreement. On the syntactic side, agreement makes reference to constituents in a particular syntactic position, feeding other syntactic operations, e.g., movement (Baker, 2008; Chomsky, 1957; Preminger, 2011, 2014 a.o.). On the morphological side, agreement has access to linear and morphophonological information (Arregi & Nevins, 2012; Benmamoun et al., 2009; Bhatt & Walkow, 2013; Dobrin, 1995 a.o.). In syntax, an agreement probe on head X^0 looks for a suitable goal (e.g., a phi-bearing nominal) and establishes a relationship with it. Next, in morphophonology, this link is translated into copying of the phi-feature values from the controller onto the head associated with the probe.

I also showed that agreement is not a semantic phenomenon in a strict sense—it has an effect on interpretation, however there is no purely semantic mechanism that determines agreement

morphology. This approach to agreement allowed us to tease apart agreement from resolution, and to reason more precisely about each step of the derivation involving coordination cases in which coordinations appear to control agreement morphology.

In chapter 3, I examined the syntactic structure of coordination. This chapter justified another crucial assumption, the parallel-structure approach to coordination, one that allowed us to reason where in the structure a grammar-internal resolution mechanism could even be situated. I proceeded to discuss other phenomena (e.g., the ban on extraction, constituency within coordinations, and the interactions of coordination with semantic interpretation) and showed that these may also be explained by the parallel-structure approach, contrary to some previous claims. Based on this data, I argued that adopting the parallel-structure model of coordination, despite the power of the UNION operation, is justified. The parallel-structure approach eliminated the possibility of phi-feature resolution under coordination from taking place on a dedicated coordination projection because, as I argue, no such projection (e.g., &P) exists. If resolution were syntactic, it would need to take place on a head external to the coordination itself, and equipped with an agreement probe like Infl^0 or ν^0 . This conclusion provided the grounds for comparing resolution with other empirical domains where phi-featural information is reduced, in particular omnivorous agreement and Person Case Constraint effects.

In chapter 4, I turned to the investigation of resolution itself. I summarized some of the typological tendencies found in the surface behavior of resolution and I explored what it would mean to model resolution as a syntactic mechanism. Next, I showed three types of empirical evidence that are often ignored in analyses of resolution, but which militate against a grammar-based approach. This evidence involved (i) a comparison to other phenomena that involve an overabundance of phi-featural information (omnivorous agreement and Person Case Constraint effects), (ii) ineffability

and inter- and intra-speaker variability, and (iii) resolution “doing” arithmetic by referring to the cardinality of the referents. The first of these empirical domains suggests that agreement controlled by coordination does not behave like other mechanisms of phi-features information reduction, despite this information being stored on the same head like Infl^0 or v^0 . The second empirical domain suggests that agreement morphology controlled by coordination does not behave like other grammar-based mechanisms but rather like a grammar-external mechanism. In particular, variability cannot be reduced to structural ambiguity or other well-known explanations of optionality, and it seems to be sensitive to factors that are usually thought to be outside the domain of grammar (linear proximity, word frequency). Finally, the third empirical domain shows that agreement morphology controlled by coordination performs powerful operations such as arithmetic, suggesting that the ultimate choice of the agreement form cannot be determined by syntax. Instead, all agreement forms would need to be generated by syntax just to be filtered later based on the real-world reference, a mechanism that would anyway be limited only to a subset of data where phi-features are interpretable (and would fail to extend to cases of, e.g., uninterpreted gender on inanimates).

In chapter 5, I summarized the main proposal in favor of a grammar-external resolution mechanism. I proposed that the reason a grammar-internal mechanism is unavailable is because it would have to take place on the agreeing head (e.g., Infl^0 or v^0), and what we know about agreement between a syntactic head and multiple arguments (e.g., from omnivorous agreement and the Person Case Constraint) renders it ill-suited for the task of coordination resolution. I thus argued that external heads cannot be the source of resolution mechanism for phi-features under coordination. In other words, the proposed extra-grammatical resolution mechanism is not restricted to specific combinations of phi-features in a subset of languages where we observe

surface variability or ineffability of resolution. Rather, it applies any time we observe agreement controlled by coordination. The consequences of this proposal are twofold. First, agreement controlled by coordination is a previously unacknowledged instance of a strategy based on convention feeding the language behavior. In this particular type of a strategy based on convention which is deployed when grammar provides no instructions to the performance systems, those systems have to “improvise”. Second, even cases of systematic behavior of agreement controlled by coordination cannot be (straightforwardly) used for modeling parts of grammar such as phi-systems, coordination or agreement, because they do not (directly) reflect properties of the grammatical computation, in the first place.

The question of the nature of mechanism behind resolution and more broadly, the question of the role of convention in language behavior by no means ends here. Section 5.6 on falsifying the current proposal already lists what else needs to be done to research this topic further. Let me now flag some shortcomings and further questions that the current proposal invites.

The first main question I was not able to cover is whether there is a deep architectural reason for why heads like Infl^0 or v^0 (where an agreement probe copies the phi-feature values of the conjuncts it agreed with) cannot host a grammar-based resolution operation under coordination. Not only is it the case that such heads already host grammar-based operations for reduction of an overabundance of phi-featural information (omnivorous agreement and PCC effects (Coon et al., To appear; Coon & Keine, 2020)), existing models of phi-featural representation (e.g., Harley & Ritter, 2002) provide us with a way to formalize rules for such an operation. It is possible that how the list of phi-feature sets was derived plays a role. I argue that coordination is derived via UNION— Infl^0 agrees with only one set of features and the overabundance of phi-features is due to fusion with another Infl^0 . In contrast, in structures without coordination, there is no UNION, but some

agreement probes allow agreement with multiple sets of phi-features—the overabundance is due to multiple agreement of the very same (unfused) probe.

Furthermore, I was not able to identify in this thesis any link between the proposed grammar-external resolution mechanism and other grammar-external mechanisms that have been argued to give rise to occasional unexpected variability outlined in: variability in surface word order in Scandinavian (Lundquist et al., 2020), and variability in adjunct island effects in English and Italian (Sprouse et al., 2016). While it may be accidental that all of these phenomena all closely related to grammar-internal operations and yet cannot be modelled in such a way without further stipulations, comparing them at some abstract level might shed light on why such phenomena persist in the world’s languages, rather than getting grammaticalized by subsequent generations.

The last high-level question I am not able to provide an answer to is the nature of the grammar-external strategy involved in resolution. If we identified a behavioral profile of such mechanisms, e.g., what factors give rise to (in)variability and (in)effability, we might be able to use it as a diagnostic for other seemingly grammar-based mechanisms as well as understand better the mapping between competence and performance systems. Some of this extensive empirical data collection and analysis in the domain of coordination is already undertaken by various research groups (*Agreement Mismatches in Experimental Syntax: From Slavic to Bantu*, 2020; *Coordinated Research in the Experimental Morphosyntax of South Slavic Languages*, 2020; *Feast and Famine Project*, 2020; e.g., *General Theory of Multivaluation*, 2020). We need to take into consideration that a grammar-external mechanism could be either of a matter of convention (like the choice of polite pronouns based on age, social status, familiarity with the addressee, etc.) or rather could it be more cognition-based (like the choice of plural vs. singular feature to denote some object in the real world).

There are also a number of smaller gaps in the empirical data, related to agreement controlled by coordinations, that I identified throughout this thesis. I have furthermore attempted to sketch what such data might tell us. All of these gaps are more immediately accessible for investigation compared to the big questions above. The first gap sketched in 4.1 concerns the distinction between clitics and true agreement on the one hand, and syntactic phi-agreement and semantic phi-matching on the other hand. If we found some alignment tendency between the two distinctions (e.g., phi-matching with clitics, phi-agreement with true agreement), it might help us explain Corbett's agreement hierarchy as well as provide a novel diagnostic to use in making these distinction. The second gap sketched in 4.3.2 concerned number/person resolution behavior in languages with a minimal vs. non-minimal number distinction.

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