

COORDINATION AND CONCORD

COORDINATION AND CONCORD  
IN GENERALIZED  
CATEGORIAL  
GRAMMAR

LEO JOSEPH ORNST, B.A., M.A.

DISSERTATION

Presented to the Faculty of the Graduate School of

APPROVED BY  
The University DISSERTATION COMMITTEE:

in Partial Fulfillment  
of the Requirements  
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**by**

**LEO JOSEPH OBRST, B.A., M.A.**

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**DISSERTATION**

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The University of Texas at Austin  
in Partial Fulfillment  
of the Requirements  
for the Degree of**

**DOCTOR OF PHILOSOPHY**

**THE UNIVERSITY OF TEXAS AT AUSTIN**

**May, 1993**

Dedication

To my wife Cherie and family and especially  
my good dogs, Sparky, Tody, and Mac,  
for their love.

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by

Leo Joseph Obrst

1993

## **Dedication**

To my wife Christy and family and especially  
my good dogs, Spanky, Lady, and Mac, my life of Texas has  
proven a most fertile labor for their love.

The cubation of many minds drawn  
to language and its scientific study. I am fortunate that mine was among  
them for a while. The combination of rigorous theory, critical thinking,  
and the meticulously detailed analysis of language encouraged there in  
large part fostered this thesis.

The members of the Department of Linguistics at the University of Texas at  
Austin. I owe the greatest debts of gratitude to my two co-chairpersons  
Manfred Krifka and Juliette Levin, who offered me unstinting emotional  
and intellectual support, cogent and helpful criticism, and, finally,  
endless patience. Manfred Krifka provided my greatest inspiration, as  
assiduous scholar, mentor, and human being. His astute sense of what  
constitutes a science of language inspired and sustained me these past few  
years. Juliette Levin always provided insight and encouragement when I  
found myself with very little of either. I thank you both for your critical  
intelligences and your warm hearts. All of the good points and none of  
the flaws of this thesis can be attributed to you.

My colleagues and students at the University of Texas at Austin.

I am thankful that my committee members Robert Harms and  
Robert Wall shared their respect for and proficiency at critical evaluation  
and mathematical reasoning with me, along with their unwavering  
intellectual honesty, in their capacities as teachers, astute linguists, and

friends. I would also like to thank my other committee member, for providing an antidote to the near despair I occasionally experienced. The Department of Linguistics at the University of Texas has proven a most fertile laboratory for the incubation of many minds drawn to language and its scientific study. I am fortunate that mine was among them for a while. The combination of rigorous theory, critical thinking, and the meticulously detailed analysis of language encouraged there in large part fostered this thesis.

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friends. I would also like to thank Brian Phillips, my other committee member, for providing an antidote to the near despair I occasionally experienced in the last few years, by his steadfast encouragement and friendship.

*I am also very grateful for the scholars and teachers I was able to learn from. My intellectual growth during my graduate education owes much also to those persons outside of the Department of Linguistics who provided me with many of the ideas and much of the excitement for studying theoretical and computational linguistics. I especially thank Robert Simmons and my fellow hackers at the Artificial Intelligence Laboratory, Koos Vanderwilt, Marcos Lapolla, and Ezat Karimi. I owe a great deal to Kent Wittenburg who, as my teacher of computational linguistics and project leader at MCC, instilled in me his own strong interests in categorial grammar and formal linguistics, and provided me assistance during some difficult years. My other friends and co-workers at MCC are also due a debt of gratitude by me, including Elaine Rich, Tony Aristar, and especially Jim Barnett and William Bohrer, with whom I shared some of the most eventful times of my graduate life, in trips to Laredo, catfish fries at the Manchaca Fire Station, camping at Pedernales Falls with wet dogs, and just laughs and good talk.*

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My parents, Leo and Dorothy Obrst, deserve the greatest honor, respect, and love that I am capable of, for their love and support through the years, and this they receive from me with deep gratitude.

## COORDINATION AND CONCORD

### IN CATEGORIAL GRAMMAR

Last but never least, I am deeply grateful to my wife Christy, for her love and encouragement, who put up with many hardships to see this day finally arrive, and who may still not believe it.

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Lee Joseph Obri, Ph.D.

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Co-Supervisors: Manfred Krifka and Juliette Levin

This dissertation investigates the interaction between coordination and agreement, including the resolution of distinct features of the individual conjuncts of a coordinated NP and the mechanism for the concord which holds between such an NP and its agreement partner, typically the subject and its verb. A wide range of phenomena in English and other languages which finely delineate the problems of these intersecting components are described, including verb-coded coordination, disagreement, and cover-class agreement. These phenomena are analyzed in terms of Generalized Categorial Grammar, as given coherence by Moortgat (1988) and van Benthem (1986, 1988, 1989), but based upon the type calculus invented by Lambek (1958), in a formulation of the implicational intuitionistic logic using sequents developed by Gentzen (1935). Various extensions to the theory are explored, along with discussions of their necessity.

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The thesis is proposed and defended that much of the confusion over the interaction of coordination and concord is eliminated by viewing subject/verb agreement as the result of an operation of either function composition between a type-lifted subject and the verb, or a special form of function application over the subject NP by the verb: one that is effectively a composition between the subject and a privileged argument of the verb. This privileged argument is posited to be an incorporated pronominal, itself a lexically un- or partially-specified function. Additional data are analyzed attesting to the intrinsic relationship between subject/predicate agreement, pro-drop forms, pronominal cliticization, and stressed full personal pronouns, which are seen furthermore to be linked semantically and pragmatically by issues of reference and topicality.

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## 1. Introduction

A range of linguistic phenomena characterized as coordination has persisted as a problem for linguistic theories up to the present day. Current theoretical frameworks propose hypotheses about the syntax and, to a more limited extent, the semantics and pragmatics of coordinate constructions, but they do not do so both systematically and cogently. Furthermore, of those hypotheses proposed as explanatory, few are related in a natural and coherent way to the core (or corpus) of their respective theories. The few islands of clarity and generality which do exist belong to the sheaf of theories subsumed under the rubric of Categorial Grammar, especially the versions which have extended the formal operations of the classical theory of Ajdukiewicz, Bar-Hillel, and others, to include function composition and type-shifting. The particular theory investigated and extended in this thesis is Generalized Categorial Grammar, given coherence by Moortgat (1988) and van Benthem (1986, 1988, 1989) but based upon the type calculus invented by Lambek (1958), in a formulation of the implicational intuitionistic logic using sequents developed by Gentzen (1935, 1969). The linguistic theory of Generalized Categorial Grammar based on the Lambek/Gentzen Calculus provides a powerful vehicle for a remarkably descriptive and explanatory account of coordination phenomena in natural language.

Among the phenomena of coordination that have proven especially difficult for linguistic theories to give an account of is that of the types of strategies that languages employ to resolve feature conflicts among the individual conjuncts of a (typically) noun phrase coordination, for the purpose of marking or indexing agreement on the verb or other linguistic element in a sentence. The determination of the form of the concord holding between a coordinated noun phrase and its concording expression is a problem whose solution must involve many subtheories of the grammar of a language: coordination, concord, the notion of subject and other grammatical relations, feature resolution, the role of pronouns, and the nature of the interaction among the components of morphology, syntax, semantics, and pragmatics, especially with regard to notions of reference and topicality.

Accordingly, this dissertation investigates the interaction between coordination and agreement, including the resolution of distinct features of the individual conjuncts of a coordinated NP and the mechanism for the concord which holds between such an NP and its agreement partner, typically the subject and its verb. A wide range of phenomena in English and other languages which finely delineate the problems of these intersecting components are described, including verb-coded coordination, disagreement, and cover-class agreement. These phenomena are analyzed in terms of Generalized Categorial Grammar. Various extensions to the theory are explored, along with discussions of

their necessity. The thesis is proposed and defended that much of the confusion over the interaction of coordination and concord is eliminated by viewing subject/verb agreement as the result of an operation of either function composition between a type-lifted subject and the verb, or a special form of function application over the subject NP by the verb: one that is effectively a composition between the subject and a privileged argument of the verb. This privileged argument is posited to be an incorporated pronominal, itself a lexically un- or partially-specified function. Additional data are analyzed attesting to the intrinsic relationship between subject/predicate agreement (typically, verbal inflection), pro-drop forms, pronominal cliticization, and stressed full personal pronouns, which are seen furthermore to be linked semantically and pragmatically by issues of reference and topicality.

The format of this dissertation is as follows. In chapters two and three, I describe the phenomena of coordination and concord respectively, exhibiting typical constructions of each, and elaborating on the theoretical characterizations that have been proposed for each in the literature. In chapter three, I also introduce the kinds of phenomena which demonstrate the interaction of coordination and concord, ranging from a form of coordination between explicit and implicit elements which has been termed ‘verb-coded coordination’ to cover-class and disagreement phenomena, employing examples from a multitude of languages. In chapter four, I describe in detail the theoretical framework

assumed (and subsequently extended) for the treatment of the phenomena, that of Generalized Categorial Grammar, and investigate the nature and possible categorizations of the pronoun, whose incorporation into the verb is argued to be the cause and locus of agreement. In chapter five, I present an extensive analysis of the data described in chapters two and three within the framework furnished by Generalized Categorial Grammar, and investigate some complications which thereby require extensions to the framework. As part of this analysis, it is argued that the notion of pronominal incorporation into the verb has great relevance for the interaction between coordination and concord, and the machinery of this incorporation is described. Throughout this thesis, I discuss crucially related issues concerning subjecthood, word order inversion, the pronominal role in concord, the nature of linguistic categories and types, especially with respect to the pronominal continuum (inflection, cliticization, full pronoun), pragmatic concerns of information structure (topic, comment, etc.) and prosody, as these directly affect the coordination/concord phenomena and the proposed theoretical extensions. Finally, in chapter six, I look at some of the theoretical implications of the pronominal incorporation hypothesis, especially with regard to cliticization, and conclude with a brief meta-theoretical discussion of the scientific methodology of linguistics.

1. John gave to Mary a and Bill an to Susan a piece of cake.

(Gapping and Right Node Raising)

## 2. Coordination

### 2.1 Coordination Preliminaries

Coordinate constructions in natural languages are those typically containing a conjunction (e.g., “and”) or a disjunction (e.g., “or”), and have been characterized in numerous ways. Under one characterization, “coordination is a union of phrase markers.”<sup>1</sup> A second characterization states that “coordination is a construction consisting of two or more members which are equivalent as to grammatical function, and bound together at the same level of structural hierarchy by means of a linking device.”<sup>2</sup> Of course, depending upon how these two statements are elaborated, they may, in fact, be the same characterization.

The union or linking of two or more constituents in a coordinate construction is not necessarily explicitly marked by a conjunct or disjunct, but may be graphically marked by place-holding punctuation, or only implicitly linked -- by juxtaposition.<sup>3,4</sup> Furthermore, elements of one or more conjuncts may be ellided, as the following examples illustrate, and yet the constructions are indeed subsumed under the rubric of coordination. In the following, ‘^’ marks an implicit element.

1. John gave to Mary ^ and Bill ^^ to Kevin a piece of cake.

coordination. This section will briefly characterize coordination and introduce some of the major theoretical approaches.

2. John gave a dollar to Mary and ^ a dime to Bill.

(Conjunction Reduction/Left Node Raising)

3. This is the man who hit John and was hit by Mary.

(Across-The-Board rule application)

Because coordinate phenomena are found within every syntactic category and across not a few, coordination shares the problems associated with those categories. Obviously, it would be beyond the scope of this thesis to address all of the forms of coordination and the specific asymmetries and problems associated with each. Instead, the concentration will be on coordinated NP constructions which enter into an agreement relation with the predicate. The prototypical form investigated is that of subject/verb agreement, but on occasion reference will be made to object/verb agreement forms and other constructions which directly relate to the analysis and theory developed for the prototypical forms. One also wants to be able to state generalizations which hold over all coordinate forms and abstract away from the problems internal to each and which are thus shared by other syntactic and semantic phenomena. Initially, therefore, I will describe the coordinate phenomena in a relatively theory-neutral manner, utilizing the literature, and summarize some pivotal analyses that have been offered in the past, from the perspective of a general theory of

coordination. This section will briefly characterize coordination and introduce the principle of conjunct likeness, a generalization long noted as holding of coordinate forms. This section will be necessarily incomplete, underscoring the fact that this thesis is not primarily concerned with coordination, but with the interaction of coordination and concord.<sup>5</sup> Following this section, specific syntactic theories of coordination are described, ranging from a functionalist perspective to categorial grammar. The chapter concludes with a discussion of the semantics of coordination.

## 2.2 Characterizing Coordination

Dik (1968) describes the linking devices of coordination as two: either juxtaposition (accompanied perhaps by a specific intonation pattern, in spoken language, or graphemically represented by punctuation, in written language) or the presence of one or more particles. Both forms of coordination can function in one of four roles: alternative, adversative, casual, and consecutive, as the following sentences respectively illustrate for juxtaposition.<sup>6</sup>

### 4. Alternative:

- a. English: Five, six minutes later the bomb exploded.
- b. Dutch: Morgen overmorgen het maakt mij niet uit.

“Tomorrow, the day after tomorrow, I don't care.”

c. Latin: Serius ocius.

Sooner later

“Sooner or later.”

d. Chinese: Ni chi fan chi mian

You eat rice eat noodles

“Will you eat rice or noodles?”

#### 5. Adversative:

a. English: It's not cheap, it's expensive!

b. Latin: Iudicium hoc omnium mortalium est: fortunam a deo petendam, a se ipso sumendam esse sapientiam.

“This is the opinion of all mortals: fortune must be asked from God, (but) one has to rely on oneself for wisdom.”

#### 6. Causal:

We shall stay at home: it's too warm.

#### 7. Consecutive:

It's too warm: we shall stay at home.

When coordinate particles are present, in terms of linear patterning in the speech stream or sentence of written text, these occur either before or after a coordinate element, hence are typed prepositive or postpositive.

Furthermore, both types allow three possibilities:

- 1) each coordinate element is associated with a particle,

[ALL]

2) all elements except the first are associated with a particle,

[NON-FIRST]

3) there is just one particle for the entire coordinate

construction [ONE]

Dik (1968) notes that when the latter case holds, almost universally the particle occurs before or after the last element of the construction.

## 8. Prepositive

a. All: (Hungarian, Dik, 1968, p.46b)

a fej a torz ees a veek-tagok

and head and trunk and limbs

“the head, the trunk, and the limbs’

b. Non-first: (Syrian Arabic, Cowell, 1964, p.364)

biddna sī badle w-s abbat u- ?dmṣān,

We want thing suit and shoes and shirts,

w- sī ḫwayyet ḥgrād

and thing a few

“I (lit. “we”) want a suit and (a pair of) shoes and shirts,

and a few [other] things.”

c. One: John, Paul, George, and Ringo

## 9. Postpositive

- a. All: (Turkish, cited by Payne, 1985, p. 40)

bed de sen de kardesin de  
 I and you and brother your and  
 “Both I and you and your brother”

- b. Non-first: ?

- c. One: (Latin, Bennet, 1912:109)

populi provinciaeque liberatae sunt

people provinces and were freed

“People and provinces were freed.”

## 10. Juxtaposition (Only)

- a. (Pacoh, cited by Payne, 1985, p. 25, Dik, 1968, p. 42)<sup>7</sup>

Nhang tirap ~~na~~ tilet calloh acog

We ~~na~~ prepare baskets ~~na~~ spears knives

“We prepare baskets, spears, and knives.”

## 11. Mixed Prepositive and Postpositive

- a. (Latin, Dik, 1968, p. 42)

dum ~~of the~~ Augustus seque et domum  
 as long as Augustus himself/and and house

~~When et pacem sustentavit~~

~~and peace upheld~~

~~"As long as Augustus upheld himself, his house, and peace"~~

(Tacitus, Annales 1:4, cited by Dik, 1968, p. 42)

In English the set of coordinate particles consists of two subsets: coordinate and correlative.<sup>8</sup> Correlatives are generally characterized by their need to co-occur with another, typically coordinate, particle in a coordinate construction. Examples such as (12) and (13), at least for spoken language, do not really contradict such a generalization, since these can be explained as instances of correlatives co-occurring with juxtaposition.

12. Both John Jim came.

13. Neither Bill Rich Reggie Sandy came to the party.

Moreover, to objections that the correct characterization of correlatives is in terms of their binary, rather than n-ary, nature, i.e., that they bind two elements in a coordination, examples (14) and (15) are clear evidence that such is not the case.

14. Both John and Bill and Jimmy and Ed and Harry came.

15. Either Mary, Cindy, Harry, or Jane, or Cathie would be fine for the part.

When considering examples such as these, however, there remains the intuition that, either syntactically or semantically, a binary, alternative or contrastive, distinction is being made.

Payne (1985) offers a featural analysis of coordination that tries to capture these kinds of distinctions. The features he employs are essentially semantic in nature, consisting of the set borrowed from Dik (with a notion of markedness on the positive values):

$\{[+/- \text{Adversative}], [+/- \text{Separate}], [+/- \text{Emphatic}]\}$

When these are used with a typology corresponding to the primitive logical operations of conjunction, disjunction, and negation, i.e.,

Conjunction       $p \text{ and } q$

Disjunction       $p \text{ or } q$

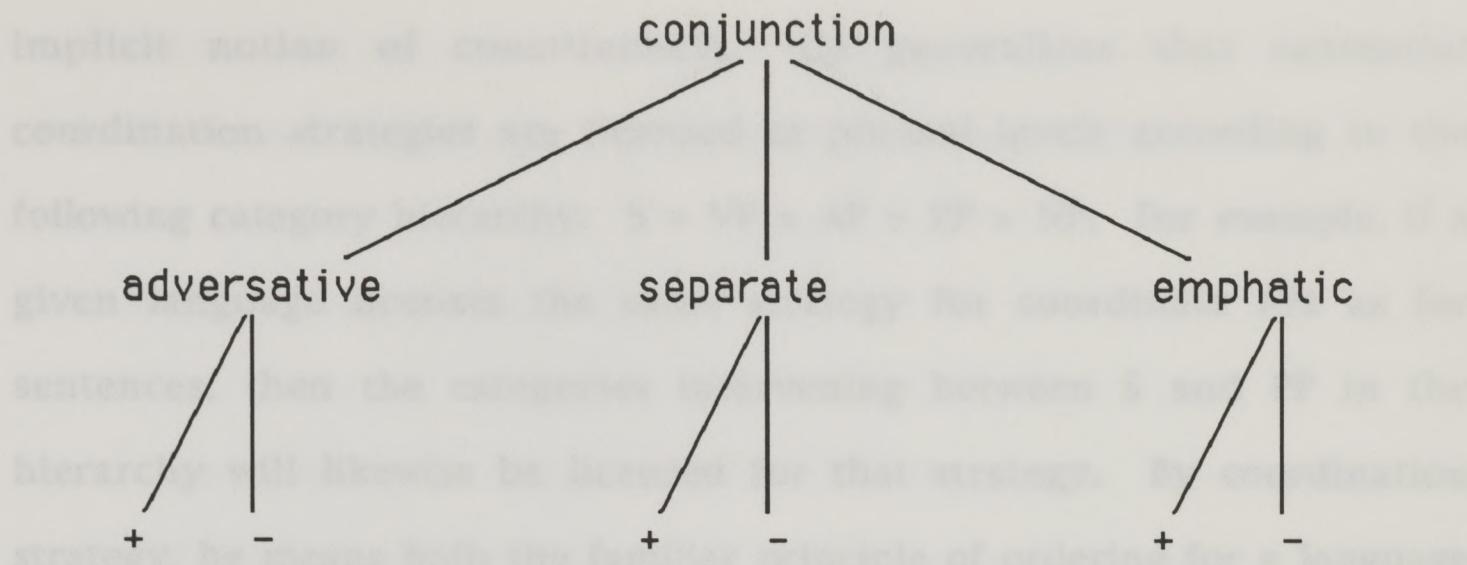
Presection       $(\text{not } p) \text{ and } q$

Postsection       $p \text{ and } (\text{not } q)$

Rejection       $(\text{not } p) \text{ and } (\text{not } q),$

$\text{not } (p \text{ or } q)$

a classificatory scheme for coordinate constructions is derived (conjunction, shown below):



### Payne's Conjunction Types

The logical classifications (conjunction, disjunction, preselection, etc.) all employ the three feature types of adversative, separate, and emphatic. Correlatives, for example, occur in three forms (conjunction - 'both ... and', disjunction - 'either ... or', and rejection - 'neither ... nor'); all, however, would be marked [+Separate]. This descriptive scheme is intended to hold in general over languages. The only two subtrees we are interested in, in this thesis, are those rooted in conjunction (shown above) and disjunction (and various elliptical constructions related to them, eg., gapping and right-node-raising).

As we have seen, Payne does not explicitly grapple with the question of constituency of the elements of a coordinate construction, i.e., a requirement that all elements be single constituents, but he does differentiate between the strategies used by various languages with respect to sentential and phrasal coordinations, and does assume an

implicit notion of constituency. He generalizes that sentential coordination strategies are licensed at phrasal levels according to the following category hierarchy:  $S > VP > AP > PP > NP$ . For example, if a given language licenses the same strategy for coordinate PPs as for sentences, then the categories intervening between  $S$  and  $PP$  in the hierarchy will likewise be licensed for that strategy. By coordination strategy, he means both the familiar principle of ordering for a language with respect to coordinate particle/coordinate element (cf. prepositive, postpositive, juxtaposition, etc.), and the kind and range of coordinate particles permitted (e.g., a correlative interpretation and distribution using the same simple conjunctive particle). Unfortunately, adherence to this categorial hierarchy and the coordination strategies are most marked for the non-conjunction types of coordination. The behaviour of the conjunction type varies most freely.

Though he does not specify it precisely, Payne does observe that a “likeness” prerequisite exists for certain forms of coordination, which prerequisite overlaps with the notion of constituency: a similarity in topic and structure between the conjuncts holds, at least at the sentential level. As we shall see, this “likeness” constraint for elements of a coordination has been expressed in multiplicitous ways by the various theorists through the years, as identity of syntactic constituency, as identity of syntactic category, as identity of values of some set of semantic features,

etc.<sup>9</sup> The next section introduces the investigation into this characteristic of the “likeness” of the conjuncts of a coordinate construction.

### 2.2.1 Coordination of Likes

An important characteristic of coordinate structures, the recognition of which has had great impact not only on many linguistic sub-theories, but also on the objects of linguistic inquiry themselves, is the Principle of Conjunct Likeness.<sup>10</sup>

#### 16. Principle of Conjunct Likeness:

The conjuncts of a coordinate structure must be alike.

The nature of the likeness has been variously described as a relation of identity or similarity, defined in terms of phonology, syntax, semantics, or pragmatics, i.e., phonological string-identity, syntactic category likeness, semantic type likeness, equality (or subsumptive inequality) of bar-level (in some formulation of X-Bar Theory), focus-ability gradient, intonation contour, etc.

Examples typically used to demonstrate the existence of the Principle are those like the following, some of which are obviously problematic for a purely syntactic account of coordination and argue for

similarity not identity as the primary criterion of the notion of likeness, as we shall examine later (implicit elements are indicated by '^'):

### 17. Adhering to a Principle of Likeness

- a. Both old men and the three young women wearing shorts

[NP] [NP]

- b. came in the same car.

[Syntactic category identity.]

- b. John is a Republican and full of shit.

[Predicative NP] [Predicative AP]

[Semantic type identity/similarity.]

- c. The resource fork of this file is damaged or in an unknown format.

[Across-The-Board rule] [Participial Adj.] [PP]

[Semantic type identity/similarity.]

- d. That Martha knew George and her pronounced lisp were

[S'] [NP]

two factors in her unpopularity.

[Syntactic category/Semantic type similarity.]

e. \*I must cook a, and eat the, potato.

[Indefinite determiners are not focusable by stress.]

f. John went to the store and Bill  $\Delta$  to the mall.

[Gapping: absolute object identity]

g. John ran  $\Delta$  and Bill walked to the store.

[Right Node Raising: absolute object identity]

h. John and Vera went to the theater when I met/ kicked

them/

\*him and her.

[Anaphoric/discourse referent granularity:

syntactic/discourse coindexing.]

i. This is the man who  $\Delta$  hit John and  $\Delta$  was hit by Mary.

[Across-The-Board rule application: grammatical function

identity, thematic role inequality.]

j. John went to the movies last Saturday night and

Sally did too/

so did Sally/

?Sally  $\Delta$  too/

[VP Ellipsis: phonological/syntactic/discourse coreference?]

k John wanted to try to persuade Harry to go to dinner tonight and

Sally

wanted to try to persuade Harry to go to dinner tomorrow

\_\_\_\_\_the party (tonight)

\_\_\_\_\_ to leave

Mildred (to go to dinner tonight)

coerce him (Harry to go to dinner tonight)

to forget it (to persuade Harry to go to dinner  
tonight)

didn't (want to try to persuade Harry to go to dinner tonight)

[VP Ellipsis: phonological/syntactic/discourse coreference?]

Many languages have more or less strict 'likeness' requirements.

In Hindi and Urdu, for example, there are strong constraints on the coordinate NP. The conjuncts must be similar syntactically and semantically; the following kinds of constructions are disallowed. 11

(A-b) are thus disallowed because they violate the first constraint; (c-d) are disallowed because they violate the second constraint; (e-f) require that each conjunct match with respect to 'approximation', or 'approximation'. In the latter two examples, no conjunct can be coordinated with an approximate conjunct. This notion of approximation

## 18. Coordinate Likeness Violations in Hindi-Urdu

a. \* shiiluu ne zor se aur bacce ko piiTaa (Syn.cat violation)

Shilu is hard and hit 'the child'

b. \* raam aur seb acche haiN (Sem. cat. violation)

Ram and apple are good

c. \* yah langRaa aam khaTTaa hai par vo dasherii aam

this langra mango is sour

but that dasheri mango  
is sourish

d. \* yah saaRii piili hai par vo saaRii piili piili hai

this saari is yellow but that sari is yellowish

According to Abbi (1979), these requirements must be met:

1) the two NPs must be semantically related, i.e., should be

some pragmatic motivation for the coordination; and

2) the two contrasting verbs (or adjectives) in must represent distinct

concepts which are manifested in two different lexical units.

(A-b) are thus disallowed because they violate the first clause above. (C-d) are disallowed because they violate the second constraint above, which requires that each conjunct match with respect to 'exactness' vs. 'approximation': in the latter two examples, an exact conjunct is coordinated with an approximate conjunct. This notion of 'approximation'

seems to indicate that the concepts represented by the two verbs or adjectives cannot overlap or be in an entailment relation, a principle observed in English, as noted by Lang (1977) and Wierzbicka (1980), in sentences such as:

\*John is talkative and loquacious.

\*I gave my wife a flower and a rose.

\*We and I like potato chips.

It should be noted that rule (1) is a very plausible pragmatic rule in other languages, such as English. In Hindi-Urdu, Abbi seems to suggest, such a rule is grammaticalized.

In Grebo, a Kru language spoken in Liberia, however, three separate conjunctions having differing properties are used for nominal coordination, enabling a speaker to relax the 'likeness' constraints (Kemp, 1986).<sup>12</sup> Two are coordinating conjunctions, the *n̄ikɔ* (both intervening between the individual conjuncts), and one (paired with *kɔ*) is correlative, *hɛ*, which is placed after the final NP.<sup>13</sup> The conjunction *n̄i* is used if the conjuncts do not form a naturally cohesive semantic unit, a notion I take to mean a unit acting semantically as a group or mass/collective entity (hence non-distributive), examples of which in English would be 'Ham and eggs is my favorite breakfast', and 'The

husband and wife (couple) is walking to town'. Some examples of *ní* usages from Kemp (1986) are:

### 2.3.1 A Grammatical Functional Account

#### 19. Grebo Conjunction Examples

a. fr̩ ð ní h̩mā

bread CONJ hammer

'bread and a hammer'

b. klà ní tūmlé mūnā káò

Kla CONJ Tumle go+PAST house

'Kla and Tumle went home.'

c. bāa klà ní ãmō yidá sīklé nā

neither Kla CONJ 1p-EMP NEG+PAST cigarettes smoke

'Neither Kla nor we smoked the cigarettes', or

'Maybe Kla and we didn't smoke the cigarettes.'

In the next section, we will examine a number of accounts of the phenomena of coordination, including one from a functionalist perspective, several mainstream, transformational-generative accounts from the framework's inception through to the analysis of Goodall (1984), the Generalized Phrase Structure Grammar (GPSG) view, and then finally we will review the analysis of coordination in the framework of categorial grammar, the theoretical perspective adopted in the remainder of this thesis.

## 2.3 Theories of Coordination

### 2.3.1 A Grammatical Functional Account

One of the first intensive studies of coordination after the shift in linguistic paradigm from structuralism to the transformational-generative account, but grounded in late-structuralism, Dik (1968) analyzed the phenomena in terms of an equivalence in grammatical function between conjuncts bound together by a conjunction at the same structural level. In most past analyses, Dik noted, the equivalence relation was formulated as a requirement that the members of the coordination belong to the same (and often, ill-defined) class or category. These classes or categories were analyzed from two perspectives independent of the older, Bloomfieldian distinction between exocentric and endocentric: internal vs. external categorization. Categories or classes could be characterized based on the internal grammatical structure of the constructions, i.e., on the hierarchy, ordering, and nature of the constituents of a particular construction, on the one hand. On the other, categories could be viewed in terms of the external grammatical structure of their linguistic elements, i.e., on their distribution and the ways in which an element as a whole can combine with others in higher-order constructions.

~~Internal~~ Rejecting both the internal and external views, citing (Bos, 1962) as contravening the former and the existence of obvious counter-examples such as (20 - 23) as refuting the latter, Dik focuses on the equivalence in grammatical function holding between the conjuncts of a coordinate construction as *prima facie* the distinguishing factor of coordination.

~~24 Some further points on grammatical functions~~

20. Harriet and several boys in her class visited the Planetarium.

[Singular noun and plural NP]

~~the categories of the sentence and should, consequently, be written below it~~

21. Harriet and her visited the Planetarium.

[Noun and Pronoun]

~~24 Some further points on grammatical functions~~

22. She felt alive and at peace with the world.

[Adjective and PP]

~~25. Some further points on grammatical functions~~

23. Maior (sc. fater) et qui prius imperitarat.

(Livius, "Ab Urbe Condita" 21:31, Dik (1968, p. 27))

"The elder (brother) and who previously had reigned."

[Adjective and relative clause]

The notion of a grammatical function is a primitive of grammatical theory, along with the notions of constituent and category. Grammatical relations are not relations between categories, but relations between

irreducible grammatical functions. A grammatical function is a “plus-value acquired by a constituent when used in a certain pattern” (Dik, 1968, p. 148) and may be partially correlated, but not reduced, to formal features such as word order or particular morphemes. Furthermore, grammatical functions cannot be equated with relations between categories because the same relations between categories may correspond to different functional relations (example 24, below) and, moreover, the same functional relations may hold for categories exhibited by different configurations (25). “Grammatical functions are necessarily properties of the categories IN the structure and should, consequently, be written into it directly” (Dik, 1968, p. 160), that is, they are functions from categories to a (higher-order) category in which the grammatical function is fulfilled.

#### 24. Same Categories, Different Grammatical Functions

- a. The man hit the ball.
- b. The ball hit the man.

#### 25. Different Categories, Same Grammatical Function

- a. The old man in the red hat hit the ball.
- b. John hit the ball.
- c. He hit the ball.

It should be observed that Dik's characterization of categories is essentially disjunctive, i.e., categories do not stand in a relation of subcategorization to each other. Nowhere is there the notion, proposed by

later theories, of projections of categories (as in X-Bar Theory) or (partial) extensions of categories (as in GPSG) or a lattice of categories (as in some accounts of Categorial Grammar). These elaborations of the notion of category are clearly at least weakly equivalent to the notion of subcategorization, in its sense of specifying subtypes of a type. Dik would seem to argue, however, that even with such a notion of category, as, for example, a higher-order category which subsumed noun, pronoun, and the various forms of noun phrases, there is still a need for an independent notion of grammatical function (subject, object, head, modifier, etc.) that cuts across categories. This is apparently the case in (20), but nowhere is it disproved that a subcategorization scheme could not as capably describe the same data.

For our purposes, the important components of the grammar Dik proposes to describe the facts of coordination are two: 1) a (grammatical) functional rule schema, and (2) the incorporation of the schemata into the rest of the rule system of the grammar.<sup>14</sup>

## 26. Functional Rule Schemata

Coordination Type	Schema	Expansions
i. Binary Coordination:	$\&(2F)$	
Juxtaposition:		$F_1 F_2$
Binary Particle:		$co_1 F_1 co_2 F_2$
		$F_1 co_1 F_2 co_2$
ii. N-ary Coordination:	$\&(nF)$	
Juxtaposition:		$F_1 F_2 \dots F_n$
N-ary Particles:		
n occurrences:		$co_1 F_1 co_2 F_2 \dots co_n F_n$
by application of Occam's Razor or some		$F_1 co_1 F_2 co_2 \dots F_n co_n$
need for n-1 occurrences:		$F_1 co_2 F_2 \dots co_{n-1} F_{n-1}$
Functions, Categories, and Subcategorization:		$F_1 F_2 c_2 \dots F_{n-1} c_{n-1}$
1 occurrences:		$F_1 F_2 \dots co_n F_n$
duplication removed? Let us next turn to Chomskian		$F_1 F_2 \dots F_n co_n$
school formulations of coordination.		

The above schema must be incorporated into the rest of the grammar in two ways: 1) for each function specification in every Function rule in the grammar, the coordination schema must optionally be applied to derive a coordinate function specification;<sup>15</sup> 2) where each category is assigned a function or a subcategorization, the coordination schema must optionally be applied to derive a coordinate Member function specification.<sup>16</sup>

Though perhaps descriptively expressive, Dik's solution to the problem of coordination grows extremely unwieldy. One aspect of this unwieldiness of course derives from the use of rule schemata, which acts as a multiplier across the non-coordination portion of the grammar, creating n-additional rules for each (non-coordination) Function rule, each (non-coordination) Category rule, and each (non-coordination) Subcategorization rule, where n is the number of rules in the expanded coordination rule-schemata. It is not the need for rule-schemata itself which is problematic here. As we shall see, most every phrase structure formulation of a solution to coordination encounters a similar proliferation.<sup>17</sup> What does seem to be amiss with Dik's scheme, however, by application of Occam's Razor or some other notion of parsimony, is the need for multiple applications of the coordination schemata -- at the Function, Category, and Subcategorization Rule levels. Is a simpler account possible? Can the grammar be reorganized and some (all?) of the duplication removed? Let us next look at the mainstream Chomskian school formulations of coordination theory, and see whether descriptive adequacy and theory-internal simplicity are met.

### 2.3.2 Mainstream Chomskyan Analyses: ST and EST

The earliest analyses in mainstream transformational-generative grammar posited a transformational derivation for coordination.<sup>18</sup> In the view of Gleitman (1965), for example, transformational rules applied to

delete portions of a coordinate structure and then restructure what remained of the phrase. Every coordinate form was derivable from an underlying sentential representation. The underlying representation of (27), for example, would be that shown in (27').

27. John, Mary, Kevin and Bill went to the store.

(implicitly: John AND Mary AND Kevin and Bill ...)

27'. John went to the store, and Mary went to the store, and  
via Kevin went to the store, and Bill went to the store.

The phrase "went to the store" would be removed from three of the conjoined clauses above by application of a deletion rule, and the elements of the sentence that then remained would be moved together to form the output string. This same underlying "sentential" analysis applied to all forms of coordination: gapping, right-node raising,<sup>19</sup> conjunction reduction, etc. One problem with this approach can be immediately seen: what of plural coordinate NPs such as in (28) which can have either a distributive or a collective reading or both? Does one's theory want to say that the underlying representation from which the sentence is derived is (28')?

28. John and Bill met in the park.

[Plural nps and distributive/collective verbs]

28'. John met in the park and Bill met in the park.

In a sequence of analyses (Fidelholtz, 1964, as cited by Dik, 1968), (Peters, 1966), (Lakoff and Peters, 1966), (Dougherty, 1970, 1971)<sup>20</sup> coordination began to be seen as consisting of two types: sentential conjunction and phrasal conjunction. Sentential conjunction was derived via transformational rules; phrasal conjunction was the result of the application of base, phrase structure rules, in fact, rule schemata -- as noted in the discussion of Dik's theory, previously. In the phrasal analysis, (28) would not be derived via transformation from (28'), but the complex NP "John and Bill" would be directly generated in the base by an application of a rule schema such as:

NP -> NP and NP

Gapped sentences such as (29) continued to be explained as derived from (29').

29. John went to the store and Bill ^ to the mall.

29'. John went to the store and Bill went to the mall.

where the underlined material was deleted. The assumption at that time was that the deletion transformation worked on “single constituents” and that those constituents were underlyingly the same, but it has become unclear through the intervening years what the true notion of constituency is here, and whether the criterion of “sameness” is correct, or indeed whether any statement capturing the similarity relation can be made. Gapped sentences, for example, need not have underlying elements which are the same with respect to identity of substring, word order, syntactic category, syntactic features, etc.<sup>21</sup> If (30.a), for example, is derived from (30.b), as the deletion account would have it, the conjuncts clash with respect to both substring and syntactic feature identity.

### 30. Gapping and Deletion of Identical Substrings/Syntactic Features

- (30) a. I am going to the office, John ^ to the mall, and the twins ^ to school.
- b. I am going to the office, John is going to the mall, and the twins are going to school.

### 31. Gapping and Non-Identity of Syntactic Categories of the Remnants

- a. Kim is rather foolish, and Lou ^ a complete idiot.
- b. Kim is rather foolish, and Lou is a complete idiot.

(31) shows that, while the “deleted” portion in the second conjunct is stringwise identical to the corresponding element in the first conjunct,

the conjuncts themselves do not share the same syntactic category, being an AP and an NP, respectively.<sup>22</sup>

There are further problems with word order. For example, the elements of one conjunct may occur in inverted order, while the other conjunct may have missing elements, as the following two examples attest to (one in German, the other in slightly archaic English):<sup>23</sup>

32. Da kam der Jäger und schoß das Reh.  
 Then came the hunter and ^ shot the deer.
33. Then came the dawn, and ^ dispelled the gloom.

In both examples, the first conjunct occurs in inverted order, the subject following the verb. The second conjunct has no overt subject. Wunderlich (1988) calls this phenomenon (after Höhle, 1983) “subject gap in fronted finite verb coordination” (SGF-coordination) and has analyzed it as VP coordination. As will be seen in the next section, word order also interacts with grammatical relations to create problems for theories of coordination.

### 2.3.3 Goodall's Theory of Parallel Syntax

Goodall (1984) notes that additional problems were encountered with the phrasal analysis. For example, in coordinations containing a

conjunct in the active voice and a conjunct in the passive, as in (34), a strict phrasal analysis would require conjoined VPs.

34. John threw a rock and was hit by a bottle.

But since the underlined conjunct above is usually taken to be underlyingly NOT a (base-generated) VP, but a construct to which a transformation has applied to move "John" from object position to subject position, a base phrase structure rule to conjoin VPs could not have been responsible for the coordination.

The theory of coordination that Goodall advances over these past analyses -- the sentential, the phrasal, and hybrid analyses<sup>24</sup> -- draws upon a notion of three-dimensional syntactic structure embedded in the theoretical framework of Government-Binding Theory (Chomsky, 1982). Coordination is the union of phrase markers, i.e., constitutes a structure containing two or more distinct terminal strings.<sup>25</sup> To build the theory, Goodall first modifies the concept of reduced phrase markers developed by Lasnik and Kupin (1977). In their view, reduced phrase markers are a proper subset of those phrase markers characterizable as trees.<sup>26</sup> In fact, reduced phrase markers, not syntactic trees per se, are what the various syntactic modules of the grammar operate on, at the syntactic representation levels of the GB grammar, i.e., PF, LF, and S-Structure. Although the formal definitions will be given below, it should be borne in

mind that Goodall's representation intuitively corresponds to a representation of nodes which can dominate unordered sets of other nodes. Clearly, such a theory may have difficulties with linguistic processes that inherently impose order on the elements, such as the word "respectively" imposes on the conjuncts or disjuncts of a coordinate construction. As will be seen, this is indeed the case.

A **reduced phrase marker<sub>1</sub>** is a set composed of a string of terminals and "monostrings" [defined in (31)] such that (1), the set minimally contains a single non-terminal and a string of terminals, and (2), every pair of distinct strings in the reduced phrase marker are (pairwise) related by a RPM-dominance or RPM-precedence relationship.<sup>27</sup>

Goodall modifies the notion of reduced phrase marker to relax the requirement that each pair of distinct strings relate in a dominance or precedence relation. His redefinition is the following: a reduced phrase marker<sub>2</sub> is a set composed of a string of terminals and monostrings such that (1), the set minimally contains a single non-terminal (dominating the phrase marker) and a string of terminals, and (2) all members of the

### 35. Reduced Phrase Marker Auxiliary Definitions

(Paraphrased Slightly)

a. Monestring: a string of symbols  $\phi$  of  $(N \cup T)^*$ ,

where  $N$  is the set of non-terminals

and  $T$  is the set of terminals,

such that  $\phi \in T^* \cdot N \cdot T^*$ . That is, a

monestring contains one and only one

non-terminal, preceded and succeeded

by any number of terminals.

b. RPM-Dominance: a monestring  $\phi$  RPM-dominates

a monestring  $\psi$  iff the terminals in  $\phi$

are a subset of the terminals in  $\psi$ .

c. RPM-Precedence: a monestring  $\phi$  RPM-precedes

a monestring  $\psi$  iff the non-terminal in  $\phi$

dominates terminals to the left of and distinct

from the terminals dominated by the non-terminal

in  $\psi$ .

Goodall modifies the notion of reduced phrase marker to relax the requirement that each pair of distinct strings relate in a dominance or precedence relation. His redefinition is the following: a **reduced phrase marker** is a set composed of a string of terminals and monosteings such that (1), the set minimally contains a single non-terminal (dominating the phrase marker) and a string of terminals, and (2) all members of the

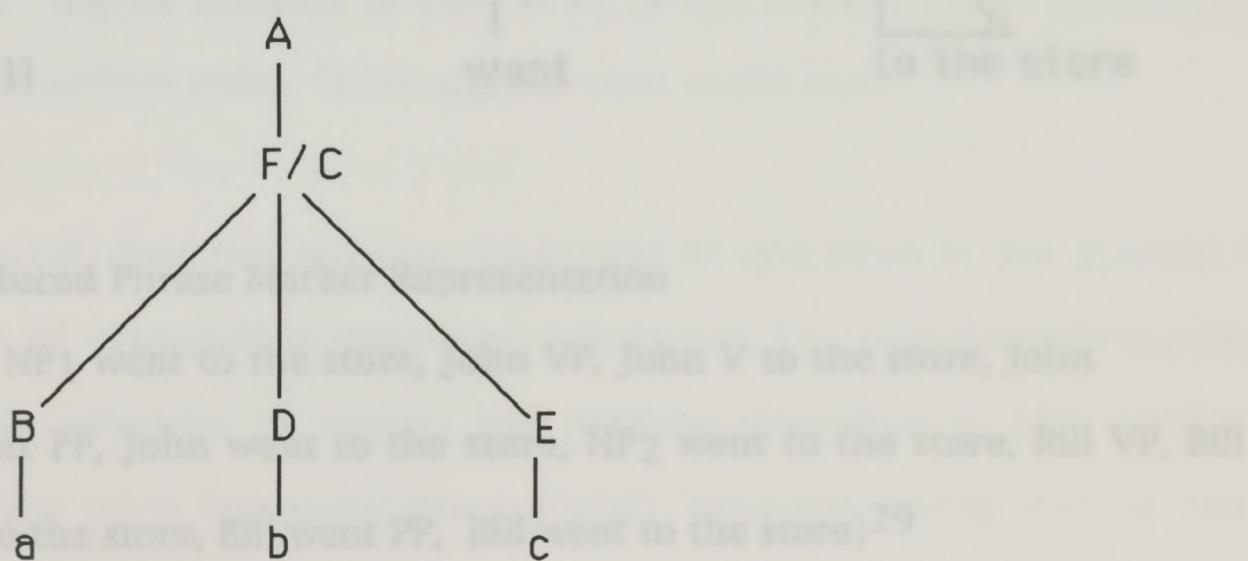
set which are not terminals are monostrings, each of which must be in a particular relation to a portion of the terminal string (in effect, the relation guarantees that the nonterminal of the monostring dominates a portion of the terminal string).<sup>28</sup> Under the first definition of reduced phrase marker, the following is ill-formed because the pair aC and Fc are not in either a RPM-dominance or RPM-precedence relationship.

(Goodall's (24)): *Diagram for the sentence and the sentence's reduced phrase marker representation.*

36. { A,	Bbc,	aC,	aDc,	abE,	Fc,	abc }
$\overbrace{\quad\quad\quad\quad\quad\quad}^{\text{Non-Term}}$	$\overbrace{\quad\quad\quad\quad\quad\quad}^{\text{Monostrings}}$	$\overbrace{\quad\quad\quad\quad\quad\quad}^{\text{Terminal}}$				

Under Goodall's redefinition, the above is well-formed. The tree-like diagram corresponding to (36) would appear as (37).

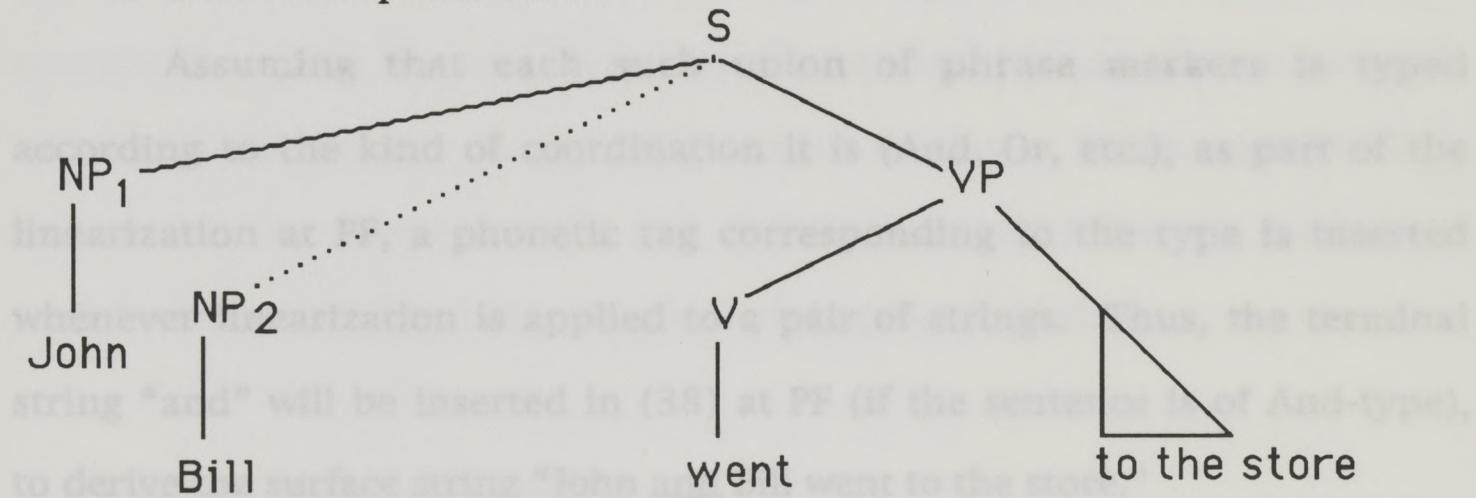
37. Tree Equivalent to RPM (36)



His redefinition thus allows for non-trees like the above, where two (or more) non-terminals neither precede nor dominate each other, hence the use of the term “parallel structure” to describe such structures. These redefined reduced phrase markers enjoin an analysis of coordination as “a union of (reduced) phrase markers.” (38) is an example, where the simple conjoined sentence is “John and Bill went to the store”; depicted are a tree-like diagram for the sentence and the sentence's reduced phrase marker representation.

**38. John and Bill went to the store.**

a. Tree-like Representation



b. Reduced Phrase Marker Representation

{S, NP<sub>1</sub> went to the store, John VP, John V to the store, John

went PP, John went to the store, NP<sub>2</sub> went to the store, Bill VP, Bill V to the store, Bill went PP, Bill went to the store}<sup>29</sup>

Under this view of coordination, the conjuncts of a phrase or sentence are essentially unordered with respect to the rest of the terminal string of the sentence/utterance at D-structure (a.k.a. Deep Structure). After base generation, another component of the grammar, PF (Phonetic Form), requires these terminal strings to be ordered into a sequence, simply for those strings to be expressible in a temporal (linear) speech stream. Hence, Goodall posits a “Linearization Principle” (Goodall, 1984, p. 36) which forces all terminals to be ordered in a precedence relation with respect to one another at PF, NOT within any syntactic component of the grammar.<sup>30</sup>

Assuming that each such union of phrase markers is typed according to the kind of coordination it is (And, Or, etc.), as part of the linearization at PF, a phonetic tag corresponding to the type is inserted whenever linearization is applied to a pair of strings. Thus, the terminal string “and” will be inserted in (38) at PF (if the sentence is of And-type), to derive the surface string “John and Bill went to the store.”

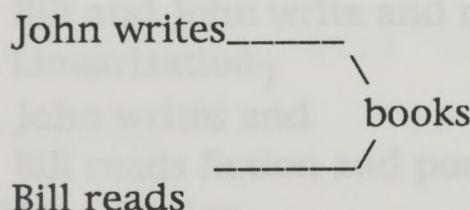
Goodall does not mention what kind of operation in the grammar this rule(s) of conjunction placement represents, i.e., coordination-typing (presumably syntactic in nature, but perhaps operating at LF?) forcing the insertion of a (phonetically-realized) terminal string during the linearization process at just those loci where pairs of terminal strings had to be ordered with respect to each other. In addition, the claim is made

that these replacement rules vary according to coordination (type?), with and-conjunction, for example, optionally inserting “and” strings immediately before the last member of the set of conjunct strings requiring linearization (i.e., “series conjunction”) or between each member. Furthermore, the replacement rules vary across languages, in both insertion point and range of options available.<sup>31</sup>

There are additional problems with Goodall's analysis. For example, under his union of phrase marker hypothesis, “respectively” conjunction constructions fall out as a simple matter of course, without the required presence of the string “respectively.” Respectively-coordinations are instances of pairs of unordered elements consisting of two (or more) words. In (39), the output sentences “John and Bill write and read books (respectively)” and “John writes and Bill reads books” can both be linearizations of the same underlying representation.

### 39. Respectively-Coordination

#### a. Pre-linearization Representation



#### b. Linearization<sub>1</sub>

John writes and Bill reads books.

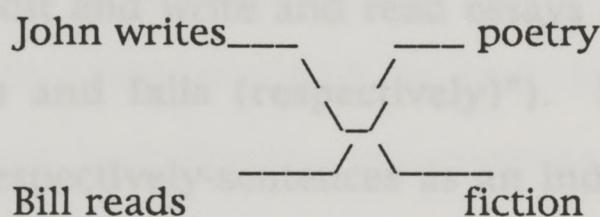
c. Linearization<sub>2</sub>

John and Bill write and read books (respectively).

If (39.a) is a legitimate pre-linearization, and (39.b-c) are legitimate linearizations of it, then presumably (40.a-m) are similarly legitimate.<sup>32</sup>

40. Respectively-Coordination

a. Pre-linearization Representation



b. Linearization<sub>1</sub>

John writes poetry and  
Bill reads fiction.

c. Linearization<sub>2</sub>

John writes fiction and  
Bill reads poetry.

d. Linearization<sub>3</sub>

John and Bill write and read poetry and fiction (respectively).

e. Linearization<sub>4</sub>

John and Bill write and read fiction and poetry (respectively).

f. Linearization<sub>5</sub>

Bill and John write and read poetry and fiction (respectively).

g. Linearization<sub>6</sub>

Bill and John write and read fiction and poetry (respectively).

h. Linearization<sub>7</sub>

John writes and  
Bill reads fiction and poetry.

i. Linearization<sub>8</sub>

John writes and  
Bill writes poetry and fiction.

j. Linearization<sub>9</sub>

Bill reads and  
John writes fiction and poetry.

k. Linearization<sub>10</sub>

Bill reads and

John writes poetry and fiction.

l. Linearization<sub>11</sub>

Bill reads and

John writes fiction and poetry (respectively).

m. Linearization<sub>12</sub>

Bill reads and

John writes poetry and fiction (respectively).

Other examples would further muddy the waters (e.g., "John and Bill and Mary edit and write and read essays and poetry and fiction summers and winters and falls (respectively)"). Rather than view the derivation of such respectively-sentences as an indication of success or the strength of the theory, view it as an indication of weakness. I conjecture that no syntactic component of the grammar generates such respectively-strings because such readings are of questionable legitimacy --unless they are explicitly accompanied by the "respectively" string.<sup>33</sup> Furthermore, somehow in the derivation of (39.c) from (39.a), the tense information on the verbs has been lost. Apparently, as part of the linearization process at PF, strings are reanalyzed syntactically in order to enforce (reinforce?) agreement rules -- to my mind, similarly of questionable validity.<sup>34</sup> The grammar appears here to be on the verge of veering off unconstrainedly.<sup>35</sup>

### 2.3.4 Coordination in GPSG

To ensure the coordination of likes, most formulations of coordination have proposed variables over categories.<sup>36</sup> Generalized Phrase Structure Grammar (GPSG), however, proposes variables as minimally specified categories. For coordinate constructions, the superordinate category of the coordination consists of feature-value pairs which are determined in part by the feature-value pairs of the individual conjunct categories and in part by the general theory's set of rule schemata and feature conventions, restrictions, and defaults. These feature-values, moreover, contribute both syntactically and semantically to their constitutive structures.

The variables so introduced by phrase structure rules or, more particularly, by rules of Immediate Dominance (i.e., rules of subtree admissibility conditions rather than standard rewrite rules) and rules of Linear Precedence (which specify the ordering relation between categories or, more formally, between sisters in a subtree)<sup>37</sup> are minimally specified categories insofar as GPSG views syntactic categories not as indivisible, fixed units, but as “bundles” of features, some of which have unspecified values. In the case of coordination schemata, the category introduced on the left-hand side of the immediate dominance schema (i.e., the “mother” node, as is X in the example below) depends upon the feature values of the categories on the right-hand side (the

"daughters," here marked by the placemarker H to signify their designation as heads). There are two coordination ID schemata in GPSG to capture the facts of English: a Binary Coordination Schema and an Iterating Coordination Schema.

#### 41. Coordination ID Schema (Gazdar et al, 1985, p. 171)

##### a. Binary Coordination

$$X \rightarrow H[CONJ \alpha_0], H[CONJ \alpha_1]$$

where CONJ is the feature 'conjunction,'  $\alpha$  is an element of the set of pairs {<both, and>, <either, or>, <NIL, but>}, with  $\alpha_0$  denoting the first member of the pair and  $\alpha_1$  denoting the second].

##### b. Iterating Coordination

$$X \rightarrow H[CONJ \alpha_0], H[CONJ \alpha_1]^+$$

where CONJ is defined as for Binary Coordination, '+' is an iterative operator signifying at least one but possibly additional iterations of the second component of the schema,  $\alpha$  is the value of that feature selected from the set {<and,NIL>, <NIL, and>, <neither,nor>, <or,NIL>, <NIL, or>}.  
To formalize the creation and manipulation of complex structures,

The above schemata are part of universal grammar in the sense that presumably no language can have other than binary or unlimited coordination, although the actual values for  $\alpha$  will be language-specific.

There are two other, nonlexical ID rules for elaborating the individual conjuncts in a coordination:

of the Head features of the category created by taking the

#### 42. Coordination Nonlexical ID Rules (Gazdar et al, 1985, p.171)

$$a. X[\text{CONJ NIL}] \rightarrow H$$

$$b. X[\text{CONJ } \alpha] \rightarrow \{\text{[SUBCAT } \alpha \text{ ]}\}, H$$

where  $\alpha$  is a member of {and, both, but, neither, nor, or},

and SUBCAT(egorization) is a feature appearing only on preterminals.<sup>38</sup>

In addition, rules of Linear Precedence are understood as language dependent; the following is the LP rule for English (Sag et al, 1985, p. 137):

#### 43. Coordination LP Rule

$$[\text{CONJ } \alpha_0] < [\text{CONJ } \alpha_1]$$

where  $\alpha_0$  is in {both, NIL, either, neither} and  $\alpha_1$  is in

{and, but, nor, or}.

To formalize the creation and manipulation of categories, GPSG distinguishes HEAD and FOOT feature instantiation principles (Sag et al, 1985, p. 131, 146):

#### 44. Head Feature Convention

- i. The Head feature specifications on each head are an extension of the Head features of the category created by taking the intersection of the mother with the free feature specifications (those which can legitimately appear on extensions of that category) on that head, where by the extension of a category is roughly meant the superset of the set of all the feature/value pairs of the category, both atom-valued and category-value feature/value pairs.
- ii. The Head feature specifications on the mother are an extension of the Head features of the category created by taking the intersection of the heads with the free feature specifications on the mother.

#### 45. Foot Feature Principle

- The Foot features instantiated on the mother in a tree fragment are identical to the unification of the Foot features instantiated on the daughters.<sup>39</sup>
- It should be noted that these feature conventions describe what are permissible flows of feature specifications (mentioned in ID rules) through the phrase structure tree. These feature specifications are intersection.<sup>40</sup> Unification, the other, previously-mentioned operation of

constrained by two devices: Feature Co-occurrence Restrictions and Feature Specification Defaults.

Feature Co-occurrence Restrictions are stated in a form as represented by the following example: FCR n: [NFORM] -> [-V, +N] where n is a cardinal number serving to index the rule in the list of all FCRs, NFORM is a feature representing the noun paradigm, '->' is material implication, and V and N are primitive categorial features representing verbals and nominals, respectively. This FCR states that a feature specification for NFORM is only relevant to nouns (because only nouns have the feature/value pairs [-V], [+N]).

A Feature Specification Default specifies a default value for a feature. For example, FSD 7: [CONJ], simply states that the default for a category is not to have the feature CONJ, whose possible values we have already noted. CONJ, therefore, can only be specified (instantiated as a feature with a value) by an explicit ID rule.

Coordination, therefore, is not an independent sub-system of the grammar, but employs the same means available to other syntactic phenomena: the feature values instantiated on a mother node consist of the intersection or generalization of the feature values of its daughter nodes. Generalization here is similar to the operation of set intersection.<sup>40</sup> Unification, the other, previously-mentioned operation of

GPSG, is defined as follows: the unification<sup>41</sup> of a set of categories (Sag et al, 1985, p. 122) is

the smallest category which is an extension of every member of the set, if such a category exists, otherwise the unification is undefined.

where an extension formally is the following:

A category C<sub>2</sub> is an extension of a category C<sub>1</sub> iff:

- i. Every atom-valued feature-pair in C<sub>1</sub> is in C<sub>2</sub> , and
- ii. For every category-valued feature-value pair in C<sub>1</sub>, the value of the feature in C<sub>2</sub> is an extension of the value of that feature in C<sub>1</sub>.

As previously observed, the notion of extension is thus similar to the notion of superset except that features can have, not only atoms, but categories as values. The set of category-valued features are: AGR(eement), RE(flexive/ reciprocal), WH(-elements), and SLASH (to signify a gap or missing item in a constituent).

It should be noted that one feature, SLASH, is particularly important here because it is considered to be both a Foot and Head feature, and as such is never instantiated on a lexical head but

can be instantiated on the sister of a nonlexical head just in case it has also been instantiated (with identical value) on that head.

(Sag, 1985, p. 147)

Furthermore, if SLASH is instantiated on a phrasal conjunct, by the definition of the Head Feature Convention (HFC) and the Foot Feature Principle (FFP), then SLASH must be instantiated (and with the same value) not only on the mother node of the coordinate structure but also on all the other conjuncts, thus ensuring that only the Across-the-Board (ATB) exceptions of Ross's (1967) Coordinate Structure Constraint (CSC) result.

<sup>46. C</sup> Unlike SLASH which is both a Foot and Head Feature, a Foot Feature if instantiated on the mother must also be instantiated on at least one daughter. In addition to SLASH, GPSG recognizes only two other Foot features (REciproc and WH-feature).

In a subsequent section on the theory of Agreement in GPSG, we will see in detail how this theory of coordination interacts with the agreement process.

### 2.3.5 Coordination in Categorial Grammar

The modern analysis of coordination in a categorial grammar framework emerges from Steedman (1982, 1985) and has been elaborated in Steedman (1987, 1988, 1990, 1991), Wittenburg (1986), etc. Because the categorial framework will subsequently be generalized in this thesis, only a brief description of the theoretical apparatus is recounted here.

## 47. Combinational Rules (Steedman, 1985)

Primarily in Steedman (1985), a theory is developed owing much of its machinery to combinatorial logic (Curry and Feys, 1958; Hindley and Seldin, 1986). Combinatorial logic is a formalism comparable (and equivalent) to the lambda calculus, except that bound variables are dispensed with. Combinators are operators which allow functions to combine; typical combinators defined in the literature are the following:

## 46. Combinators (Hindley and Seldin, p. 20)

C - commutation operator	$(Cf)(x,y) = f(y,x)$
B - composes two functions, eg.	$(B(f,g))x = f(gx)$
I - the identity operator	$If = f$
K - forms constant-functions	$(Ka)x = a$
S - a stronger composition function	$(S(f,g))x = f(x, gx)$
W - a 'diagonalizing' operator	$(Wf)x = f(x,x)$

Steedman is initially attracted to logical combinators because their usage does allow the elimination of bound variables (hence, empty categories, traces, etc., as in Government and Binding theory, for example), and so admits of increased computational (and presumably, human processal or performative) efficiency. In the framework he develops (referred to as Combinatory Categorial Grammar), the proposed combinational operators for natural language include the following:

usual, Moortgat (1988) style, categorial representation: in Steedman's

47. Combinational Rules (Steedman, 1987)

a. Functional Application Rules ( $>$ ,  $<$ )

Forward ( $>$ ):  $X/Y \quad Y \Rightarrow_X$

Backward ( $<$ ):  $Y \quad X\backslash Y \Rightarrow_X$

b Simplified Coordination Rule ( $<\&>$ )

$X \text{ conj } X' \Rightarrow_{\Phi}^n \text{and}^c X''$

c. Forward Coordination Rule ( $>\&$ )

$\text{conj } X \Rightarrow [X]\&$

d. Forward Coordination Rule ( $<\&$ )

$X [X']\& \Rightarrow_{\Phi}^n \text{and}^c X''$

e. Forward [Backward] Composition ( $>B$ )<sup>42</sup>

$X/Y \quad Y/Z \Rightarrow_B X/Z$

f. Generalized Forward [Backward] Composition ( $>B^n$ ) [ $<B^n$ ]

$X/Y \quad Y/\dots Z \Rightarrow_B^n X/\dots Z$

g. Subject Type-Raising ( $>T$ )<sup>43</sup>

$NP \Rightarrow_T S/(S\backslash NP)$

In the above rule set, (c) and (d) are supposed to be specializations of the syncategorematic rule (b); in (b)  $X$ ,  $X'$ , and  $X''$  are syntactic categories of the same type, but with different semantic interpretations, the subscript  $n$  of the operator  $\Rightarrow_{\Phi}^n \text{and}^c$  indicating the number of arguments for type  $X$ .

Recall that slash-categories in the categorial scheme is a shorthand for functional categories. There is a slight notational variation here from the usual, Moortgat (1988) style, categorial representation: in Steedman's

usage, the slash similarly represents directionality of the combination, but the category to the right of the slash represents the argument (domain) of the function, and the category to the left of the slash represents the result (range).<sup>44</sup>

A Right-Node-Raising example utilizing the  $\langle \& \rangle$  operator is displayed below.

#### 48. Right-Node-Raising with $\langle \& \rangle$ (Steedman, 1987, p. 214)

I      cooked      and      ate      the beans  
 NP    (S\NP)/NP    conj    (S\NP)/NP    NP

$\langle \& \rangle$

(S\NP)/NP

>

As will be in S\NP the Generalized Categorial framework, such rules as Function Application, Composition, and Type-Raising are derivable as theorems in S-calculus, derivable from a simpler framework of axioms (actually, a sole axiom of type identity and logical inference). In certain cases, type-raising is required to lift a conjunct's type to a type compatible with the other conjunct.

#### 2.4 Semantics of Coordination

Because the semantics of coordination has proven an especially fecund field for the development of categorial theory, this section will

#### 49. Right-Node-Raising with Type-Raising (Steedman, 1987, p.220)

Harry	found	and	I	cooked	the mushrooms
NP	(S\NP)/NP	conj	NP	(S\NP)/NP	NP
_____ >T		_____ >T			
S/(S\NP)		S/(S\NP)			
_____ >B		_____ >B			
S/NP		S/NP			

In Gazdar (1979), a formal semantics for boolean coordination was proposed. Before investigating this, however, it should be mentioned that  $\&$  (Ague (1970, 1974) developed a program for a S/NP formal semantics that included coordination, which was phrased in terms of a many-valued logic. The program was based on a two-valued logic, observing a strict connectivitity. For example, see in Flory, et al., 1981, As will be seen in the Generalized Categorial framework, such rules as Function Application, Composition, and Type-Raising are stateable as theorems in the calculus, derivable from a simpler framework of axioms (actually, a sole axiom, of type identity) and logical inference (deduction) rules.

#### 2.4 Semantics of Coordination

Because the semantics of coordination has proven an especially fecund field for the development of categorial theory, this section will

briefly describe the contributions toward such a semantics. Initially posed for specifically boolean coordination, the semantics has been generalized to other types and, as will be detailed, to non-boolean coordination.<sup>45</sup>

#### 2.4.1 Boolean Coordination

In Gazdar (1980), and in von Stechow (1974), a formal semantics for boolean coordination has been proposed. Before investigating this, however, it should be noted that Montague (1970, 1974) developed a program for a logical semantics that included coordination, which was phrased in terms of syntactic and associated semantic rules, the latter formulated in an intermediate (in principle, dispensable) intensional logic, observing a strict compositionality. For example, as in (Dowty, et al., 1981, pp. 198-200, reproduced below), where coordination is treated syncategorematically (i.e., introduction of the coordinate particles ‘and’ and ‘or’ by rule, rather than categorematically as basic symbols), for conjoined sentences and verb phrases, the syntactic-category and semantic type-translation rules for ‘and’ are:

#### 50. PTQ-like Syncategorematic Rules for AND Coordination

##### a. Sentential Coordination

1. Syntactic Rule [S11a.]: If  $\phi, \psi \in Pt$ , then  $Fg(\phi, \psi) \in Pt$ ,  
where  $Fg(\phi, \psi) = \phi \text{ and } \psi$ .

2. Translation Rule [T11a.]: If  $\phi, \psi \in P_t$ , and  $\phi, \psi$  translate into  $\phi', \psi'$ , respectively, then  $Fg(\phi, \psi)$  translates into  $[\phi' \wedge \psi']$ , where  $P_t$  denotes phrases of category t, i.e., sentences.

### b. Verb Phrase Coordination

#### 1. Syntactic Rules:

[S12a.] If  $\phi, \psi \in P_t$ , then  $Fg(\phi, \psi) \in P_{IV}$ .

[S13.] If  $\phi, \psi \in P_T$ , then  $Fg(\phi, \psi) \in P_T$ .

where  $P_{IV}, P_T$  denote phrases of category IV and T, respectively, i.e., intransitive verbs and term phrase (noun phrases).

#### 2. Translation Rules:

None for AND-coordination. [Though a simple, distributive rule could be furnished; see below.]

Note in the above, there are no translation rules listed for Verb Phrase Coordination. Dowty et al. (1981, p. 199) point out that Montague (1970, 1974) offers no translation rules for conjunction over these categories because of the lack of a definition of plurality in the grammar of PTQ ('A Partial Treatment of Quantification in English', Montague (1974)). One could envision a distributive version of such a rule:

If  $\phi, \psi \in P_\gamma$  and  $\phi, \psi$  translate into

$\phi', \psi'$ , respectively, then  $F_\gamma(\phi, \psi)$  translates into  $\lambda \gamma [\phi'(\gamma) \wedge \psi'(\gamma)]$ .

Gazdar (1980), however, does formulate semantic rules for coordination, phrased directly rather than in an intermediate intensional logic, and defined using generalized union and intersection, set operators:<sup>46</sup>

### 51. Semantics for Coordination

Given model  $M$ ,  $M(\alpha)$  the ‘denotation of the constituent rooted in category  $\alpha$  with respect to the model  $M$ ’  
 (Gazdar, 1980, p. 408),

$$a) \forall M, \forall \alpha M([\alpha \alpha_1 \dots \text{and } \alpha_n]) = \bigcap_{1 \leq i \leq n} M(\alpha_i)$$

$$b) \forall M, \forall \alpha M([\alpha \alpha_1 \dots \text{or } \alpha_n]) = \bigcup_{1 \leq i \leq n} M(\alpha_i)$$

b) Under the formulation in (51a), for example, the sentence “Bill and Sally walked to the store” will be true iff the intersection of the properties of Bill and the properties of Sally has as a member the property of ‘walking to the store’. It should be noted that (51) is specifically framed for Boolean coordination, i.e., coordination of types which end in ‘t’ (truth value), that is all types  $(\alpha, t)$ ,  $\alpha$  ranging over any (possibly null) type; this is so because Gazdar assumes the Montague type scheme for NPs (of type  $(e, t)$ ), VPs, and sentences, all of which are functions to truth values or (for sentences) true values.  $\alpha$ , of course, must be identical in all conjuncts of a coordinate expression, i.e., ‘ $(e, t) \wedge (t, t)$ ’ is disallowed.

## 2.4.2 Generalization to Other Types

Partee and Rooth (1983) (and also Keenan and Faltz (1984)) take Gazdar's (1980) semantic rule for coordination as a representative point of departure, and generalize the intersection and union operators (of sets) to that of meet and join operators, respectively, over boolean algebras.

### 52. Generalized Semantics for Coordination (Partee & Rooth, 1983, pp.

363-364)

#### a) df. conjoinable type:

- i. t is a conjoinable type
- ii. if b is a conjoinable type, then for all a,  $\langle a, b \rangle$  is a conjoinable type

#### b) df. meet ( $\sqcap$ ) and join ( $\sqcup$ ):

##### Meet:

$X \sqcap Y = X \wedge Y$ , if X and Y are truth values,

otherwise  $\{ \langle z, x \sqcap y \rangle : (\langle z, x \rangle \in X) \& (\langle z, y \rangle \in Y) \}$

if X, Y are functions (sets of ordered pairs).

##### Join:

$X \sqcup Y = X \vee Y$ , if X and Y are truth values,

otherwise  $\{ \langle z, x \sqcup y \rangle : (\langle z, x \rangle \in X) \& (\langle z, y \rangle \in Y) \}$ ,

if X, Y are functions.

**c) Rules:**

if  $\phi, \psi$  are a single functional type,  $z$  a (typed) variable  
not occurring free in  $\phi$  or  $\psi$ ,

i. Abstraction Equivalence:

$$\phi \sqcap \psi = \lambda z[\phi(z) \sqcap \psi(z)]$$

If the type  $\phi \sqcup \psi = \lambda z[\phi(z) \sqcup \psi(z)]$  to be  $((e,t),t), e$ , then the incorrect  
primary

ii. Distributivity of Arguments: stated for conjoined extensional

verbs, but  $\phi \sqcap \psi(\alpha) = \phi(\alpha) \sqcap \psi(\alpha)$  interpretation would be licensed for  
conjoined  $\phi \sqcup \psi(\alpha) = \phi(\alpha) \sqcup \psi(\alpha)$  all wanted and needed a "pie" meaning

"There is" iii. Distributivity of Abstraction: and needed it"). It, however,

(functional)  $\lambda v\phi \sqcap \lambda v\psi = \lambda v[\phi \sqcap \psi]$  and in their minimal type and a strategy  
is observed  $\lambda v\phi \sqcup \lambda v\psi = \lambda v[\phi \sqcup \psi]$  the lowest type possible, and rules for

According to their analyses (Ibid, p. 378-382), however, there are  
inappropriate interpretations available, given the PTQ type theory. For  
example, if transitive verbs are of type (NP,IV), i.e.,  $((e,t),t),(e,t))$ ,  
functions from noun phrase interpretations to sets of entities, then  
according their schema, by applications of equivalence (52.c.i) to a  
sentence containing extensional verbs such as "Bill baked and ate a pie"  
with an initial type assignment of 'N TV TV NP', there is an interpretation  
'Bill baked a pie and Bill ate a pie' with possibly two separate pies.

53. Bill baked and ate a pie.

— — — —  
N TV TV NP

$\lambda p \lambda b [ \text{baked}(((e,t),t),(e,t))' (p((e,t),t))(be) \wedge \text{ate}'(p)(b)$

If the type of TV was modified to be  $((e,t),t),e$ , then the incorrect primary interpretation would be eliminated for conjoined extensional verbs, but an incorrect primary interpretation would be licensed for conjoined intensional verbs (eg., "Bill wanted and needed a pie" meaning "There is a pie such that Bill wanted it and needed it"). If, however, (functional) lexical items are entered in their minimal type and a strategy is observed to interpret always at the lowest type possible, and rules for type-lifting are available, then these kinds of problems are eliminated. Hence, they propose that term phrases, intransitive verb phrases, and transitive verb phrases have the following respective types (in a purely extensional framework):<sup>47</sup>

#### 54. Types and Type-Shift Possibilities (Partee & Rooth, 1983)

<u>Base Type</u>	<u>Higher Types</u>
a. Terms (proper nouns, sing. pronouns): e where $\gamma \in \{(e,t), (\gamma,t)\}$ , i.e., $((e,t),t)$ eg., 'John', 'he'	$(\gamma, t)^{48}$

b. Intransitive Verbs:  $(e,t)$   $((\gamma,t), t)$

where  $\gamma \in \{(e,t), (\gamma,t)\}$ , i.e.,  $((e,t), t), t$

eg., 'sleep', 'appear'

c. Transitive Verbs:  $(e, (e,t))^{49}$

eg., 'catch', 'seek', 'surprise'

Rather than stipulate these higher types, however, they propose the following rules to lift the basic types (abstracting away from shifts to intensional types):

55. Rules of Type Shifting: (Partee & Rooth, 1983, p. 380)

a. Argument-to-function flip-flop:

For types  $a$  and  $b$ ,  $\alpha'$  of type  $a$ , the interpretation  $\alpha''$  of type  $((a,b), b)$  is:  $\alpha'' = \lambda P[P(\alpha')]$ , where  $P$  is of type  $(a,b)$ .

b. Entity-argument-to-term phrase argument:

For type  $a$  'ending in type  $t$ ',  $\alpha'$  of type  $(e,a)$ , the interpretation  $\alpha''$  of type  $((e,t), t), a$  is:

$$\alpha'' = \lambda P \lambda v_1 \dots \lambda v_n [P(\lambda u[\alpha' (u)(v_1) \dots (v_n)])],$$

where  $P$  is of type  $((e,t), t)$ ,  $u$  is of type  $e$  and  $v_1 \dots v_n$  are

of types such that  $\alpha' (u)(v_1) \dots (v_n)$  is of type  $t$ .

Of significance here is the departure from strict compositionality ala Montague, whereby each syntactic rule has an accompanying semantic rule. More power and flexibility is placed within the semantic

module, permitting rule-governed shifting of the semantic types from lexically specified base types. Now, for each syntactic category assignment, a (possibly infinite) family of semantic type assignments are available -- all, however, available compositionally, by rule.

The essential characteristic of all these formulations of a semantics for boolean coordination is the ability of the function to distribute over the conjunct arguments. Both Gazdar and Partee and Rooth define semantic schemas for 'and' in terms of a generalized 'intersection' operator applying to boolean types. The intersection operator (for sets, or meet operator for boolean algebras), by definition 'distributes' over the arguments, ensuring that each argument individually having the function applied to it, is true. For example, "Bill and Sally walked to the store" is true iff "Bill walked to the store" and "Sally walked to the store" are both true. There must be an element in the intersection of the properties of Bill and Sally which is the property of 'walking-to-the-store'.

There are, however, coordinate constructions which do not have this distributivity property. So-called sum or group interpretations and collective or reciprocal predicates do not. In the next section, we investigate proposals for a non-distributive, collective or group, semantics for non-boolean coordination.

### 2.4.3 Non-Boolean Coordination

Link (1983, 1984, 1986), Hoeksema (1983, 1988), Landman (1989), and Krifka (1989) have investigated the requirements for a semantics of non-boolean coordination. Some examples of non-boolean coordination are the following sentences.

- Join semilattice to form another semilattice. Recall that a complete join semilattice is a partially ordered set with a greatest lower bound. Consider 'Lattices and Unification'.
- 56. Non-Boolean Examples**
- Bill and Sally met at the park.
  - Tom and Dick carried the piano upstairs.
  - John and Mary are similar.
  - My country has a green and white flag.

In all of these sentences, the conjuncts of the coordinate form partake as a group (collectively) in the function. ‘Bill and Sally met at the park’ does not entail that ‘Bill met at the park’ and ‘Sally met at the park’, nor vice versa.

Most but not all languages of the world employ the same linguistic morpheme for both boolean and non-boolean forms of conjunction, i.e., distributive and collective versions, and without regard to the kinds of conjuncts (i.e., whether sentences, predicates, names, etc.)<sup>50</sup>

In Link (1983, 1984), and extended in Link (1986), there are two kinds of conjunctive coordination (two kinds of ‘and’): a distributive, boolean coordination and a collective, non-boolean coordination which he characterizes as an application of the operator  $\oplus$ , the i-sum or individual-sum operator, which operates over atomic individuals in a structured domain called a complete join semilattice to form another non-atomic individual. Recall that a complete join semilattice is a partially ordered set with a lowest upper bound (LUB) but not necessarily with a greatest lower bound (GLB) (cf. definitions in section entitled ‘Lattices and Unification’).

The lattice domain for individuals, according to Link (eg., Link 1984, p. 247, FN 1; Link, 1986, p. 1) is not to be thought of as a set representation where the atomic individuals are either elements or singleton sets (per Landman, 1989, for example) and their i-sum a subset of the domain D containing these elements or singleton sets, i.e., ‘Bill’ and ‘Sally’ corresponding respectively to the sets  $\{b\}$ ,  $\{s\}$  (or to the elements  $\{b, s\}$ ), and ‘Bill  $\oplus$  Sally’ corresponding to the set  $\{\{b\}, \{s\}\}$  (or to the set  $\{\{b, s\}\}$ ). Instead, the domain with these three elements would be viewed as the set  $\{b, s, b \oplus s\}$ .<sup>51</sup> The ordering relation on the lattice can be viewed as the part-of relation. It must be emphasized again that the non-atomic individual in the lattice is just as much an individual as the atoms, i.e., it may possess properties which are not possessed by the individuals in the i-part relation. The denotations of so-called ‘group’ noun phrases like ‘the committee’ are also i-sums, but unlike plurals (either

morphologically marked as such or conjuncts), they do not have i-parts, hence are atomic individuals.<sup>52</sup>

Hoeksema (1983,1988), alternatively, analyzes non-boolean (non-intersective) coordination in terms of set formation, i.e., generalized quantifiers of groups and individuals (where a generalized quantifier is viewed as a second-order predicate denoting a collection of sets). In Hoeksema (1983, p. 76), he argues against treating collective coordination as the result of a sum-operator, either Link's i-sum or a mereological sum-operator such as advocated by Leonard and Goodman (1940) and Massey (1976), because of the fact that collective coordination (but not intersective) lacks the property of associativity: '(Gazdar and Pullum) and Chomsky denounced each other's theory' is not equivalent to 'Gazdar and (Pullum and Chomsky) denounced each other's theory'.<sup>53</sup> He formulates a semantics for collective coordination as follows:

#### 57. Hoeksema's Collective Coordination (Hoeksema, 1983, p. 76.)

Let  $Q_1$  and  $Q_2$  be atomic quantifiers.<sup>54</sup>  $Q_1 \& Q_2$  is the function f:

$\text{POW}(U) - (\text{POW } (U_I) - \{\emptyset\}) \rightarrow 2: f(A) = 1 \text{ iff } X \cup Y \in A,$  where X is a minimal element of  $Q_1$ , Y a minimal element of  $Q_2$ , POW is the power set operation, U is an infinite universe of groups (sets of two or more individuals) and finite  $U_I \subseteq U$  of individuals.<sup>55</sup>

The effect of (57) is that in the sentence “Gazdar and Pullum and Chomsky denounced each other’s theory”, ‘Gazdar and Pullum’ will denote the non-atomic (plural) quantifier  $x$ :  $x(A) = 1$  iff  $\{g, p\} \in A$ , ‘(Gazdar and Pullum) and Chomsky’ the non-atomic quantifier  $y$ :  $y(A) = 1$  iff  $\{\{g, p\}, c\} \in A$ , and ‘Gazdar and (Pullum and Chomsky)’ the non-atomic quantifier  $z$ :  $z(A) = 1$  iff  $\{g, \{p, c\}\} \in A$ , and hence  $y \neq z$ .

In Hoeksema (1988), these insights are modified slightly. The model for the domain of individuals is still that of sets: a structure  $E$  of entities closed under the operation of group formation, i.e., groups are sets of two or more elements of  $I$  individuals,  $I$  finite but  $E$  infinite. One nice result of such an interpretation of the domain of individuals is that coreferential NPs cannot be conjoined (*Ibid*, p. 30): for example, “John and John are similar” is ungrammatical because the group set  $\{j, j\}$  representing the denotation of ‘John and John’ is undefined. As he notes, however, there are complexities here, for other coreferential NPs are, in fact, permissible. Witness examples such as “Dr. Jekyll and Mr. Hyde are the same person.” A related example from Czech is the following.

### 58. Czech Coreferential Conjunctions (Vanek, 1977, p. 42)<sup>56</sup>

a. Jan a      mü bratr      {jsou jedna a ta samá osoba.

\*je}

‘John and my brother {are one and the same person.’

\*is}

b. Jan a Jan samotny'    {(je) zavinil.  
 \*(jsou) zavinili.}

'John and John alone    {has caused              it.'  
 \*have caused}

Hoeksema (1988) also shows that by using a version of the Lambek Calculus, a non-directional Gentzen-style system utilizing type-sequences, the non-boolean conjunction operator of type  $(e \rightarrow e) \rightarrow e$  can be raised to type  $(\tau \rightarrow \tau) \rightarrow \tau$  [where  $\tau = (e \rightarrow t) \rightarrow t$ ] by (application of) the following:

### 59. Lambek Non-Directional Calculus (cf. van Benthem, 1986, p. 127-128)

a. Axiom:  $\alpha \Rightarrow \alpha$  (where  $\alpha$  is a single type)

b. Inference Rules:

1. Function-elimination (comparable to Modus Ponens or function-application; where  $\alpha, \beta$  are single types)):

$$\alpha (\alpha, \beta) \Rightarrow \alpha \qquad (\alpha, \beta) \alpha \Rightarrow \alpha$$

2. Function-introduction (Conditionalization or lambda-abstraction; where  $A$  is a non-empty sequence of types):

$$A \alpha \Rightarrow \beta \qquad \alpha A \Rightarrow \beta$$

$$\frac{}{A \Rightarrow (\alpha, \beta)} \qquad \frac{}{A \Rightarrow (\alpha, \beta)}$$

3. Replacement (A, B, C are sequences of types):

$$A \Rightarrow \beta$$


---

$$B A C \Rightarrow B \beta C$$

4. Transitivity:

$$A \Rightarrow B \quad B \Rightarrow C$$


---

$$A \Rightarrow C$$

In particular, conjunct nouns of type e can yield a result of type  $(e \rightarrow t) \rightarrow t$ , that of generalized quantifiers; this is the traditional Montagovian rule of type-lifting.

#### 60. Lifting Type e to $(e \rightarrow t) \rightarrow t$

Prove:  $e \Rightarrow (e \rightarrow t) \rightarrow t$  [interpretation:  $x_e \Rightarrow \lambda x_e . P_{e \rightarrow t}(x)$ ]

Proof:

if  $[e \ e \rightarrow t \Rightarrow t]$ , then  $[e \Rightarrow (e \rightarrow t) \rightarrow t]$

[letting e be A,  $e \rightarrow t$  be  $\alpha$ , t be  $\beta$

in function-introduction rule]

i)  $e \ e \rightarrow t \Rightarrow t$  [by function-elimination]

ii) therefore  $[e \Rightarrow (e \rightarrow t) \rightarrow t]$  [by ii. and function-intro]

But what if we wish to raise non-boolean ‘and’ to an arbitrary type  $(\tau \rightarrow \tau) \rightarrow \tau$ , where  $\tau$  is any type at all? We are not permitted to lift from type e

to the types of categories such as adjectives  $(e \rightarrow t) \rightarrow (e \rightarrow t)$ , adverbs  $((e \rightarrow t) \rightarrow (e \rightarrow t)) \rightarrow ((e \rightarrow t) \rightarrow (e \rightarrow t))$ , and transitive verbs  $e \rightarrow (e \rightarrow t)$ . Such a type inference exceeds the formal power of the Lambek calculus because the type derivations [e.g., from  $(e \rightarrow e) \rightarrow e$  to  $((e \rightarrow t) \rightarrow (e \rightarrow t)) \rightarrow ((e \rightarrow t) \rightarrow (e \rightarrow t)) \rightarrow ((e \rightarrow t) \rightarrow (e \rightarrow t))$ ] do not preserve the property of count-invariance, defined as:

### 61. Count-Invariance Property of Lambek Calculus

(Moortgat, 1988, p. 44; van Benthem, 1986, p. 133)

If a sequent  $A_1, \dots, A_n \Rightarrow B$  is derivable in L, then for basic categories X, X-count  $(A_1, \dots, A_n) = X\text{-count}(B)$ .

Krifka (1989) proposes a solution which generalizes to all types, and merges the definitions of boolean and non-boolean ‘and’. He does so by generalizing two notions: the operation of conjunction and an inclusion relation  $\sqsubseteq$ . The inclusion relation traces its heritage to van Benthem (1983).

### 62. Generalized Boolean and Non-Boolean Coordination

(Krifka, 1989, [31])

a. Recursive (partial) def. of a gen. conjunction  $\sqcup$ :

i. if  $\alpha, \alpha'$  are of type e, then  $\alpha \sqcup \alpha' = \alpha \oplus \alpha'$

ii. if  $\alpha, \alpha'$  are of type t, then  $\alpha \sqcup \alpha' = \alpha \wedge \alpha'$

iii. if  $\alpha, \alpha'$  are of type  $(\sigma)t$  and  $\beta, \beta'$  are of type  $\sigma$ ,

$$\text{then } \alpha(\beta) \sqcup \alpha'(\beta') \equiv \alpha \sqcup \alpha'(\beta \sqcup \beta')$$

where  $\equiv$  is a general inclusion relation (eg. set inclusion for type et)

b. Semantic interpretation: (cf. Krifka, 1989 [35, 34])

If  $\alpha, \alpha'$  are of type  $(\sigma_1) \dots (\sigma_n)\tau$ , if  $u, u'$  and  $u''$  are variables of type  $\sigma_1$  and  $u_2 \dots u_n$  are variables of type  $\sigma_2 \dots \sigma_n$ ,  $v$  is a variable of type  $\tau$ , all not occurring free in  $\alpha, \alpha'$ , then

$$\text{i. } \lambda u'' \lambda u_2 \dots \lambda u_n$$

$$[\sup(v, \exists u, u'[u'' = u \sqcup u' \wedge [\alpha(u) \sqcup \alpha'(u')](u_2) \dots (u_n)])]$$

$$\equiv \alpha \sqcup \alpha'$$

where **sup** (for ‘supremum’) is an operator taking as arguments a variable type and a sentence, and yielding the maximal value of the variable for which the sentence is true.

For boolean types (i.e.,  $\tau = t$ ), (i) amounts to being:

$$\text{ii. } \lambda u'' \lambda u_2 \dots \lambda u_n \exists u, u'[u'' = u \sqcup u' \wedge [\alpha(u) \sqcup \alpha'(u')](u_2) \dots (u_n)]$$

$$\equiv \alpha \sqcup \alpha'$$

In his view of coordinated non-Boolean types, the inclusion relation is required because the only meaning possible is a limiting one for the complex expression, an approximation or bound on the extension that may, for example, contain an idiomatic meaning which is not recursively specifiable.

*4. Furthermore (61a.iii) and (62), we obtain the final*

An example of an complex boolean coordinate expression having rule (62) applied to it is the following (with interpretation):

63. extremely and moderately expensive dresses  
 $((\text{et}), \text{et}), ((\text{et}), \text{et}) \quad (((\text{et}), \text{et}), ((\text{et}), \text{et}) \quad (\text{et}), \text{et} \quad \text{et}$   
 $[\alpha = (\sigma(\tau)) \quad [\alpha' = (\sigma(\tau)] \quad [\beta'' = \sigma]$

1. by (61a.iii),  $\alpha, \alpha'$  are of type  $((\text{et}), \text{et}), ((\text{et}), \text{et})$ , and  $\beta''$

[which can be partitioned into  $\beta, \beta'$  such that  $\beta'' = \beta \sqcup \beta'$ ] is of type  $(\text{et}), \text{et}$  [where  $\sigma = \tau = (\text{et}), \text{et}$ ], and so  $\alpha(\beta) \sqcup \alpha'(\beta') \equiv \alpha \sqcup \alpha'(\beta'')$ .

2. by (61b.ii), then the interpretation is:

$\lambda P''. \lambda x . \exists P, P'[P'' = P \sqcup P' \wedge [\text{extremely}(P) \sqcup \text{moderately}(P')] \equiv \text{extremely} \sqcup \text{moderately}]$

3. and the interpretation of

$[\text{extremely}(P) \sqcup \text{moderately}(P')](x)$

is itself an approximation, i.e.,

$\lambda z''. \exists z, z'$

$[z'' = z \sqcup z' \wedge [\text{extremely}(P)(z) \sqcup \text{moderately}(P')(z')]]$   
 $\equiv \text{extremely}(P) \sqcup \text{moderately}(P')$

4. Substituting (3) above into (2), we obtain the final

interpretation of 'extremely and moderately':

$$\lambda P''. \lambda x . \exists P, P'$$

$$[P'' = P \sqcup P' \wedge$$

$$\lambda z''. \exists z, z'$$

$$[z'' = z \sqcup z' \wedge [\text{extremely}(P)(z) \sqcup \text{moderately}(P')(z')]](x)]$$

$\equiv$  extremely  $\sqcup$  moderately

5. and so, the interpretation of 'extremely and moderately

expensive' is:

$$\lambda P''. \lambda x . \exists P, P'$$

$$[P'' = P \sqcup P' \wedge$$

$$\exists z, z'$$

$$[x = z \sqcup z' \wedge [\text{extremely}(P)(z) \sqcup \text{moderately}(P')(z')]]$$

The (**expensive**)

are partitions of the 'expensive' property and partitions of dress entities  
(or properties) such that some dresses are extremely expensive and some  
dresses are moderately expensive.

$$[\text{expensive} = P \sqcup P' \wedge$$

$$\exists z, z'$$

$$[x = z \sqcup z' \wedge [\text{extremely}(P)(z) \sqcup \text{moderately}(P')(z')]]$$

Footnotes to chapter 2

6. Hence, the interpretation of 'extremely and moderately

<sup>1</sup> Chomsky (1972) discusses this change in analysis, which will be more fully described later in this thesis.  
 $\lambda x . \exists P, P'$

<sup>2</sup> See Dik (1969), p. 43, note 1. It is defined in terms of an equivalence relation between elements, usually requiring each to belong to the same class or category.

$\exists z, z' [ \text{expensive} = P \sqcup P' \wedge \dots ]$

<sup>3</sup> Constituency structure analysis does not necessarily exclude a correspondence between the two, see the discussion of homophony between constituent and parsing-distributional constituency.

=

<sup>4</sup> I take the notion of disjunction to be the conjunction of two conjuncts, i.e. a simultaneous assertion of the separate meanings of the two elements combined by the rule. Van Riemsdijk (1974) uses the term 'disjunctives' instead of 'disjunctions'. Note that this notion example 'Item-structure grammar' is not to be confused with the notion of 'conjunction' in logic.

$\exists P, P'$

$[ \text{expensive} = P \sqcup P' \wedge \dots ]$

<sup>5</sup> Combining the elements combined by the rule. Van Riemsdijk (1974) uses the term 'disjunctives' instead of 'disjunctions'. Note that this notion example 'Item-structure grammar' is not to be confused with the notion of 'conjunction' in logic.

$\exists z, z' [ \text{dresses} = z \sqcup z' \wedge [ \text{extremely}(P)(z) \sqcup \text{moderately}(P')(z') ] ]$

The final expression in (63.6) can roughly be rendered as: there are partitions of the 'expensive' property and partitions of dress entities (or properties) such that some dresses are extremely expensive and some dresses are moderately expensive.

<sup>6</sup> It is beyond the scope of this thesis to discuss the history of theoretical discussions on the nature of the equivalence relation. For a brief history of the history of the equivalence relation in the history of theoretical linguistics, see van Oirschot (1987), "The Transformation of the Equivalence Relation", pp. 1-101.

<sup>7</sup> All examples in 4-7 are taken from Dik (1969). For a discussion of the syncategorematicity of 'and' and 'but' in the context of discourse relations, see Munn & Thomason (1987).

<sup>8</sup> See also Dik (1969), p. 43-45, and Jones (1970), p. 103. Jones notes that in some languages deriving the same meaning from different sources is called 'syncretism'.

## Footnotes to Chapter 2

<sup>1</sup> Chomsky (1982), Goodall (1984). In fact, the latter citation elaborates this characterization to posit the need for three-dimensional syntactic structures, which analysis will be more fully described later in this thesis.

<sup>2</sup> See Dik (1968). Equivalence here is defined in terms of an equivalence relation between the conjuncts, usually requiring each to belong to the same class or category.

<sup>3</sup> Constituency here is used loosely. It does not imply a rigid, constituent-structure syntactic analysis, nor does it exclude a categorial-grammatical analysis which dispenses with an isomorphism between grammatical and parsing-derivational constituency.

<sup>4</sup> I take the operation of juxtaposition to be the concatenation of two conjuncts with the simultaneous insertion of an implicit syncategorematic ‘and’. Such syncategorematic usages associate the meaning of the implicit or overt ‘combining’ word with the rule of combination, not with the elements combined by the rule. Montague (1974) used such rules, as did K. Pike (Pike and Pike, 1982). Note that this notion has more to do with ‘Item-and-process’ grammars as that, for example, of Hockett (1954), as recounted by Schmerling (1983), than ‘Item-and-arrangement’ grammars exemplified by phrase-structure grammars. We shall see that the Categorial variant of the syntactic conjunction rule  $(X \setminus X)/X$  and its accompanying semantic application of ‘and’-ness, per analyses such as Krifka’s (1989), for example, is an instance of such a ‘Item-and-process’ rule.

Additionally, it should be noted that the copula in many languages assumes a comparable syncategorematic role, that is, placed there semantically by rule, and the relevant syntactic operation on the (overt) surface is concatenation (juxtaposition): ‘John doctor’, meaning “John is a doctor.”

<sup>5</sup> It is beyond the scope of this thesis to recapitulate the entire modern history of theoretical speculation on coordination. For such a summary, see van Oirschot (1987), “The Treatment of Coordination: 1957-1985” (Chapter 1), pp. 5-101.

<sup>6</sup> All examples in 4-7 are taken from Dik (1968), p. 30-34. See also FN 4 on the syncategorematicity of juxtaposition. For a thorough discussion of discourse relations, see Mann & Thompson (1986).

<sup>7</sup> See also Dik (1968), p. 43-43, and Payne (1985), pp. 25-27, who also notes that in some languages observing the juxtapositional form of

coordination, when verb phrases are conjoined, only one of the VPs is inflected, though all are interpreted as if they were similarly inflected. His example (p. 27) is from Yagnobi, an Iranian language spoken in Tadzhikistan:

Man	a-saw-im	wa-tiras
I	past/go/1st-SG	past/fall
"I went and fell."		

<sup>8</sup> These are generally accepted distinctions. Payne (1985), however, as will be seen, slices up the world differently. In his attempt to establish a complete feature-analysis of coordination, correlatives are distinguished by the specification [+Separate].

<sup>9</sup> The principle was recognized at least as far back as Peter of Spain, in the middle ages, according to Wierzbicka (1980), pp. 223-285. The identity (similarity) requirement has been called the "Constituency Hypothesis," "Coordinate Structure Constraint," "Law of the Coordination of Likes," "Coordinate Constituent Constraint," "Across-the-Board Convention," "Grammatical Functional Equivalence," "Type Subsumption", etc.

<sup>10</sup> Cf. FN 9.

<sup>11</sup> Abbi (1979, 1980). See also Kachru (1981) for a description of semantic and pragmatic aspects of conjunction in Hindi-Urdu.

<sup>12</sup> The tone markings here are the following:

high: ' mid-high: ' mid-low: - low: `

<sup>13</sup> The correlative schema is: NP k ɔ̄ (NP k ɔ̄)\* NP h ɛ̄

<sup>14</sup> His grammar consists of four types of rules:

i. Subcategorization Rules (Unary)

- a. independent linguistic entity -> S
- b. np -> np[sing]

...

ii. Function Rules (N-Ary, continuous and (context-sensitive) discontinuous forms)

- a. sentence-combination -> Question + Answer
- b. S[declarative] -> Subj + Pred(Obj (Indirect Obj))
- c. NP -> Modifier + Head

...

iii. Category Rules (Unary)

- a. Question -> S[interrogative]

b. Subject -> NP

...

iv. Specification Rules (Unary)

a. noun[proper] -> John

b. personal-pronoun[1st person singular] -> I

...

The order the rules apply are fixed:

Subcategorization > Function > Category > Specification.

See Dik (1968, pp. 178-186) for a more detailed description of these rule types and their interactions.

<sup>15</sup> Rule schemas are in effect meta-rules (per GPSG, etc.) which cause Function Rules (cf. footnote 14) to (optionally) expand to include multiple rather than single grammatical functions, as in the following example:

i. Function Rule i. (before schema application):

S -> Subj + Pred

ii. Function Rules i. (after schema application):

S -> Subj & Subj + Pred

S -> Subj Subj & Subj + Pred

...

<sup>16</sup> For each Category and Subcategorization Rule for plural NPs, for example, the coordination schema would optionally apply:

i. Function Rules i-n. (before schema application):

NP [pl] -> Det + Head

...

ii. Function Rules (i+k)-(n+k). (after schema application):

NP[pl] -> Det + Head

NP[pl] -> Member & Member

Det + Head Det + Head

Np[pl] -> Member Member & Member

Det + Head Det + Head Det + Head

...

...

<sup>17</sup> As far back as Fidelholtz (1964), where a general coordination rule schema of the form

X -> X(&X)<sup>n</sup> (n >= 0), (X ranging over every syntactic category)

was proposed, and as recently as (Gazdar et al, 1985) and (Sag et al, 1985, p. 136) where the GPSG schema took the form

$$\begin{array}{ll} \text{Iterative:} & X \rightarrow H[\text{CONJ } \alpha_0], H[\text{CONJ } \alpha_1]^+ \\ \text{Binary:} & X \rightarrow H[\text{CONJ } \beta_0], H[\text{CONJ } \beta_1] \end{array}$$

where  $X$  is any syntactic category on the left-hand side of a rule,  $H$  is a Head category, CONJ is the conjunction feature, and  $\alpha$  and  $\beta$  the value of the CONJ feature, ranging over sets of pairs of coordination particles

and (Bresnan et al, 1987), where the LFG schema is:

$$X \rightarrow \begin{array}{ccccc} X & & \text{Conj} & & Y \\ \downarrow \varepsilon \uparrow & & & & \downarrow \varepsilon \uparrow \end{array}$$

where  $X, Y$  range over syntactic categories, and “ $\downarrow$ ” signifies the f-structure corresponding to the right-most  $X$  c-structure node and  $Y$ , respectively, and “ $\uparrow$ ” the f-structure corresponding to the left-most  $X$  c-structure node, thus

$$\begin{array}{c} X \\ \downarrow \varepsilon \uparrow \end{array}$$

signifying the f-structure corresponding to the right-most node  $X$  is an element of the f-structure corresponding to the left-most node  $X$ , and the f-structure corresponding to  $Y$  is an element of the f-structure corresponding to the left-most node  $X$ .

18 The first form of an unrestricted rule of Conjunction Reduction, for example, was formulated in Chomsky (1957).

19 Intermittently through the course of the past 30-odd years in transformational-generative analyses, Right Node Raising has been considered either ungrammatical or of questionable grammaticality, as Dik (1968) notes, citing Lees (1964), and Chomsky (1957). Furthermore, see Bresnan (1987), who questions the acceptability of some forms of Right Node Raising that other researchers have found grammatical. Some of this quibbling is no doubt due to the practice of basing a hypothesis or theory at least partially upon the evidence of one's intuitions of a reading(s) of a natural language string.

20 Also, cf. Chomsky's (1965, pp. 224-255) comments on rule schemata.

21 In fact (in two-strata theories positing deep and surface structure), even underlying identity of the elements does not suffice to ensure

surface grammaticality. Ross (1967, 1970), for example, observes the ungrammaticality of sentences such as (paraphrased from Ross (1970), 4.c):

- i. \*Susan wants Bob to shave himself and Mary to wash himself.
- ii. Susan wants Bob to shave himself, and Mary wants Bob to wash himself.

Under some formulations of Gapping, however, (i) would appear to be derivable from (ii).

<sup>22</sup> They do share the semantic feature of being predicative, but a discussion of this correspondence will be elaborated later.

<sup>23</sup> (32) is from M. Krifka (p.c.).

<sup>24</sup> He says nothing about the grammatical functional theory proposed by Dik (1968).

<sup>25</sup> It should be noted that much of the theoretical machinery Goodall exploits is similar to that found in, for example, Williams (1978). In this article, Williams extends the notion of Peters and Ritchie (1973) of "well-formed labeled bracketing" and "factor" to allow for complex "simultaneous factors", a notion closely corresponding to that of "phrase structure marker", complete with factorization rules (deletion or reduction) expressed in the transformational framework of EST/REST. Williams here is more interested in a cohesive account (nee explanation) of Across-The-Board Rule Application in coordinate forms (cf. (i) below), but the correspondences to Goodall's theory are striking. Williams, to further illustrate, proposes a "linearization" scheme which will linearize at surface structure the parallel coordinate structures formed in "ATB format."

ATB Rule application derives (a) from (b) by, in this case, an application of *Wh-Movement* in one fell swoop.

- i. Who John saw and Bill hit
- ii. COMP [ [John saw who] S and ]  
[Bill hit who] S ]S

<sup>26</sup> The usual assumption is made that phrase markers are equivalent to syntactic trees. Cf. Goodall (1984), pp. 9-18, wherein the following definitions and their modifications are recounted.

<sup>27</sup> Technically, the relation R, defined to be the disjunction of the relations

RPM-dominance and RPM-precedence, is an asymmetric, non-transitive relation on the set of strings.

<sup>28</sup> Cf. Goodall (1984), pp. 21- 23. His name for the relation between a monostring and a portion of the terminal string is is a\* and is formally defined as (p. 11):

is a\* :: y is a\* φ in an arbitrary set P , where  $y = xAz$ , if  $xyz \in P$ .

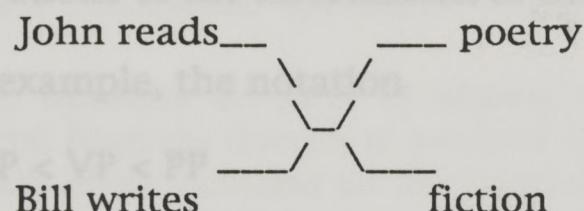
<sup>29</sup> For our purposes, the PP here is assumed to be simple, i.e., a leaf non-terminal.

<sup>30</sup> See Footnote 22.

<sup>31</sup> Recall Dik's (1964) classification of coordination into prepositive, postpositive, and juxtaposition forms.

<sup>32</sup> (D-F.) presumably could also have been derived from the underlying form (i).

i.



<sup>33</sup> It is unclear what the interpretation would be if complex sentences such as this did contain an overt "respectively." I submit that the preferred interpretation of (i), for example, is (ii), where "respectively" maps the members of the nearest leftward coordinate form onto/into the entire (leftward) preceding complex predicate, rather than (iii), in which "respectively" maps the members of the nearest leftward coordinate forms onto/into the separate (simple predicate) members of the (leftward) preceding complex predicate. (Relative to the above statement, note that it is more usual to say that the predicate/function gets mapped onto the arguments, rather than the reverse.)

- i. John and Bill write and read fiction and poetry (respectively)
- ii. John writes and reads fiction, and Bill writes and reads poetry.
- iii. John writes fiction, and Bill reads poetry.

Furthermore, the apparent inability of multiple instances of "respectively" to appear in sentences such as (i), precludes sentences like

(iv-vi), which ostensibly could furnish an interpretation like (iii). Note, however, that (v-vi) are more acceptable than (iv).

- iv. \*John and Bill write and read fiction and poetry, respectively, respectively.
- v. ?John and Bill respectively write and read fiction and poetry, respectively.
- vi ?John and Bill respectively write and read, respectively, fiction and poetry.

<sup>34</sup> Agreement is a problem for many theories, especially regarding the interaction of agreement processes with coordination. See Obrst (1987), in which are addressed some of the issues concerning NP-coordination and subject-verb agreement, from the perspective of GPSG.

<sup>35</sup> Nonetheless, a computational implementation has been done. See Fong and Berwick (1985).

<sup>36</sup> Large portions of this section appeared in an expanded format in Obrst (1987), where the intent was to investigate the adequacy of the GPSG notion of the equality of daughter nodes, with respect to their contributions to the information of the superordinate node.

<sup>37</sup> For example, the notation

NP < VP < PP

means that NP must precede VP and PP, and VP must precede PP.

<sup>38</sup> See Gazdar et al (1985), p. 31-35, for a more complete discussion of the feature SUBCAT. Suffice it to say, SUBCAT is the feature in GPSG responsible for determining the possible syntactic subcategorization information of a verb. Integers which index rules allowing a relevant item to be introduced (such as a Noun object argument for a particular verb possessing the SUBCAT feature) are the values of this feature. Furthermore, the SUBCAT feature is only permitted to appear on preterminal symbols, a constraint implemented by Feature Co-occurrence Restrictions (FCRs), a notion to be described more fully in the body of the text, further on. FCRs are rules, typically stated as conditionals or biconditionals, which seek to specify "part of the definition of the notion 'legal extension of a [syntactic] category'" (Gazdar et al, 1985, p. 28). The SUBCAT FCRs are thus (Gazdar et al, 1985, p.33):

FCR7: [BAR 0] = [N] & [V] & [SUBCAT]  
 FCR8: [BAR 1]  $\supset$   $\neg$ [SUBCAT]  
 FCR8: [BAR 2]  $\supset$   $\neg$ [SUBCAT]

where BAR represents the usual X-Bar nomenclature of 'level' of syntactic category. Hence, rules will exist such as the following for intransitive verbs

VP -> V[SUBCAT 1] (abbreviated as VP -> V[1])

and the lexical entries for a verb will accordingly contain the SUBCAT specification or index of the rule detailing the kind of verb it is. The verb 'sleep', for example, would have the specification [SUBCAT 1], pointing to the above rule introducing the intransitive verb.

<sup>39</sup> The operation of unification can be understood here as set union; a more complete definition will be given presently.

<sup>40</sup> See Kartunnen (1984, p. 29) for a discussion of the operations of generalization and unification.

<sup>41</sup> Unification will be described later and more formally within the section on the foundations of categorial grammar. The core notion, described well by C. Pollard (1984, p. 47-48) is that for a given domain, there is a unification operation

which operates on pairs of objects (or, more generally, subsets of objects) from the domain to produce the least informative object in the domain which contains all the information in each of the members of the pair (or set). In mathematical terms, the underlying domain bears a partial ordering (a transitive, reflexive, and antisymmetric relation corresponding to the degree of informativeness; the unification of some set of objects from the domain is just their least upper bound (lub) with respect to the partial reordering, provided such exists. In case the lub fails to exist, we speak of unification failure; this occurs when two or more of the objects to be unified contain mutually inconsistent information.

See also Pereira and Shieber (1984) for an early description of the operation within a specifically linguistic framework.

<sup>42</sup> These correspond to the B operator of Curry's combinatorial logic.

<sup>43</sup> The operator(s) corresponds to Curry's C<sub>\*</sub>, which is the rightwardly introduced C combinator (Curry, 1977, p. 187).

<sup>44</sup> In Moortgat (1988)'s notation, the argument (domain) parallels the direction of the slash, i.e., to the left of the backward slash, to the right of the forward slash, a notation I personally find more perspicuous.

<sup>45</sup> There are other accounts of the semantics of coordination which cannot be presented here at this time. I have in mind especially Lang (1984), which is essentially a semantico-pragmatic analysis of coordination.

<sup>46</sup> Intersection:

$$X \sqcap Y = X \cap Y, \text{ if } X \text{ and } Y \text{ are not functions,} \\ \text{otherwise } \{ \langle z, x \cap y \rangle : (\langle z, x \rangle \in X) \& (\langle z, y \rangle \in Y) \}$$

Union:

$$X \sqcup Y = X \cup Y, \text{ if } X \text{ and } Y \text{ are not functions,} \\ \text{otherwise } \{ \langle z, x \cup y \rangle : (\langle z, x \rangle \in X) \& (\langle z, y \rangle \in Y) \}.$$

Gazdar (1980, p. 408)

<sup>47</sup> The type 's' of Montague (1970), signifying a pair indexing the (possible) world and time, is not included here; generally, however, the type  $(s, \gamma)$  can be substituted for any type  $\gamma$ .

<sup>48</sup> I have generalized the typing scheme here to admit  $\gamma$  variable types; in actuality, Partee and Rooth (1983) permit merely one lifting operation, per base type, since there does not seem to be a linguistically motivated need for yet higher-order types.

<sup>49</sup> The higher type  $((s, ((e,t),t)),(e,t))$  is proffered by Partee and Rooth (1983), but then the linguistic necessity for it is downplayed.

<sup>50</sup> Lasersohn (1992), p. 403, notes a possible exception. In Chinese, the particle 'gen' is used for NP conjunction, but 'you ... you' for predicate conjunction. He believes this variance is not due to the boolean, non-boolean distinction, however.

<sup>51</sup> Hoeksema (1988, p. 24) argues that nothing is gained by avoiding the use of sets and using sums instead for plural objects, as Link (1983) and Link (1984) emphasizing an "ontological abstinence" have suggested, since sets are no more abstract than sums.

<sup>52</sup> See also Barker (1992) for arguments that group noun phrases can be considered atomic individuals.

53 The lack of associativity, according to Hoeksema (1988, p. 26-27), also argues against the analysis of Landman (1989), in which the model for the domain of individuals is defined in terms of singleton sets: singleton sets are the atoms.

54 A quantifier Q is atomic (Hoeksema, 1983, p. 75) iff

its minimal elements are atoms of the boolean algebra generated by the power set of the domain on every model. ... minimal elements ... are [those] projected onto 1 by Q that have no proper subset that is also projected onto 1.

Quantifiers here are the extensions of NPs.

55 Actually, in Hoeksema (1983), U is considered finite; in Hoeksema (1988), U is allowed to be infinite.

56 According to Vanek (1977), these examples suggest that there must be both a referential index and an item index (notating the identity of a lexical item, and which includes phonological identity). But regard, however, the following English sentence, comparable to (58b), which shows that phonological identity is not required:

- i. John and he alone has/\*have caused it.  
John and only ?he/him has/\*have caused it.

'John' and 'he' are not phonologically identical. This, I think, clearly demonstrates that agreement is more than a purely formal phenomenon, but must include some semantic component. The word 'only'/'alone' seems to rule out a possible plural interpretation, which would force plural agreement on the verb, behaving much like a reflexive:

- ii. John<sub>1</sub> and John<sub>2</sub> have caused it. [1 ≠ 2]  
John<sub>1</sub> and he<sub>2</sub> have caused it. [1 ≠ 2]
- iii. John<sub>1</sub> and he<sub>2</sub> himself<sub>3</sub> has caused it. [2 = 3, 3 = 1, so 1 = 2]

One can also construe a preliminary discourse context which would validate the plural agreement:

- iv. Ed tried to refuse/deny responsibility for the current situation,  
but John and he/him alone have caused it.

### **3. Concord**

#### **3.1 Concord Preliminaries**

Concord is a morphosyntactic process in which distinct linguistic elements share certain features, typically syntactic, which either originate from one element in particular (called a source or controller) and propagate to other elements (called targets or controllees), or originate from multiple sources and engage in a merging of information, which process thereby results in a mutual selection of forms. 'Concord' is the term employed in this thesis, rather than the similarly used term 'agreement', primarily because the term has a wider denotation, subsuming agreement, but also including phonological-syntactic phenomena such as found, for example, in Bantu and other African languages, which seem to possess some properties of phonological harmony systems.<sup>1</sup> If the term 'agreement' is sometimes used in this thesis as being synonymous with 'concord', the reader is still advised to bear in mind the wider meaning.

Concord finds expression among many categories and comprises multiple features. The typical categories participating in a concord relationship are the following pairs (where the left member is that generally taken to be more the source of the information, the right more the target or sharer in the information), in a list not intended to be

complete: {<NP, Verb>, <Noun, ADJ>, <Noun, Determiner>, <NP, Predicate Nominal/Adj>, <DET, ADJ>, <NP, Prep>, <Verb, Verb>, <possessor, possesed>}.<sup>2</sup>

The kinds of linguistic information, called features, which are shared by elements in concord relationships range greatly and include the following (given with their typical possible values): gender or noun-class (masculine, feminine, neuter, human, animate, rational); number (singular, plural, dual, trial, paucal, multiple (or abundant), collective); person (first, second, third, inclusive, exclusive, obviative, non-obviative), typically but not always contingent on valuations of humanness and animacy; negativity (present or not); definiteness (or indefiniteness).

Only the concord process called subject-verb agreement, including the categories of NP and verb, will be examined in this thesis, since the primary focus is on coordination constructions and the resolution of the information of individual conjuncts. The features involved in this concord relationship, as will be seen, are taken from the above list, with some variation.

The organization of this chapter is as follows. The interaction between subject coordination and verbal concord is first described. This section necessarily contains a brief discussion of the syntactic and semantic features and values which indicate the agreement relationship.

Some of these agreement features are rarely found in the kinds of constructions which most illuminate the interaction between coordination and concord which this thesis investigates; nevertheless, these features are given for purposes of completeness. Where coordinate examples are not available, simple non-coordinate examples are given.

Following this description, four recent theories of concord are discussed: GPSG, GB, Lapointe's theory, and the information-based theory of Pollard and Sag. Other feature formalisms appropriate to agreement phenomena are then briefly mentioned.

The chapter concludes with a discussion of issues that affect agreement (and thereby also coordination): the morphological processes of incorporation and cliticization, and the notion of topicality.

### **3.2 Interaction Between Coordination and Concord**

#### **3.2.1 Coordinate Subject NP and Ordinary Verbal Agreement**

This section delineates the kind of coordination phenomena to be investigated in this thesis, NP coordination, and its interaction with predicate agreement. This form of coordination is of special interest because it requires the resolution of the categories and features of the individual NP conjuncts for the purpose of obeying the Coordinate

Likeness Principle, of core utility in the theory of Generalized Categorial Grammar espoused here. That such a resolution does occur is overtly demonstrated with respect to the primary concord phenomenon investigated, subject-predicate agreement; i.e., a coordinate NP subject consisting of individual NP conjuncts, each of which may have associated with it a distinct set of features, merges the conjuncts' values, and this merging is clearly marked by the concording inflection of the verb. Accordingly, in this section we also review the nature of the agreement relationship.

(Kloss)

The ordinary case of such coordinate feature resolution is exemplified by sentences such as the following:

#### 64. Ordinary Coordinate Feature Resolution

- a. The man and the woman are walking to town.

SG                    SG                    PL

- b. You and I are walking to town.

2-SG            1-SG            PL

- c. ?ana w- ?ente mərrū h sawa

1-SG    2-MASC-SG    1-PL

'I and you will go together'

(Syrian Arabic)

d. Jan a Věra (jsou) šli do biografu.

\*šly

MASC FEM MASC-PL

\*FEM-PL

'John and Vera went to the movies.'

(Czech)

e. Isela nenkosi bafikile.

SG-5/6 SG-9/10 PL-1/2

'The thief and the king arrived.'

(Xhosa)

In (a) the two singular features of the conjuncts are resolved to a plural specification on the verb, as evidenced by the (auxiliary) verb's inflection; hence, number is a feature that resolves. In (b) the same resolution is evident, demonstrating, moreover, that pronouns can also participate in the process. In English, the person feature is not overtly marked except on pronouns and a small class of first-person-singular verb forms ("am"), but the feature person does indeed resolve in those languages which possess overt person markings, as (c) shows. In (c) the combination [1st, sg] and [2nd, sg] resolves to [1st, pl]. (D) and (e) show that gender is an additional feature which participates in the resolution process: in (d), with [masc., sg] and [fem., sg] resolving to [masc., pl], in (e), with [5/6, sg] and [9/10, sg] resolving to [1/2, pl], where 5/6, 9/10, and 1/2 are noun classes or genders.<sup>3</sup>

These three features (person, number, gender) are those most commonly found in the subject/verb agreement relation in languages, but additional, syntactic or semantic features may participate. In some languages features of animacy, humanness, rationality, definiteness, negativity, and case (or its absence) are salient in agreement.<sup>4</sup>

Case agreement is unusual in the subject/verb forms (I know of no such cases, but see the discussion below) and much more typical in the determiner/noun/adjective forms of agreement. There is, however, some relationship between the case (or caselessness) of the subject and verbal agreement. We shall see that in fact some theorists assume that case and verbal agreement are complementary, in the sense that this form of agreement occurs only where no case is assigned or licensed, or, conversely, case assignment is blocked by the presence of agreement. The former view is espoused by, for example, Falk (1991): "Agreement seems to be triggered by lack of Case rather than the other way around." Chomsky (1981) is an adherent to the latter view, i.e., Caselessness is licensed by agreement. Note, furthermore, that these generalizations apply only to subject-verb agreement; many case-bearing languages with object agreement will demonstrate the coexistence of case and agreement features, as in, for example, Hungarian.

## 65. Object Agreement and Case in Hungarian

(Mel'čuk, 1988, p. 128)

a. Ez + t a pohár + t kér + i

this ACC the glass ACC request PRES-OBJ-3SG

definite

'[He] requests this glass'

b. A törött pohár helyett egy másik + at  
the broken glass instead-of a other ACC

request + Ø

PRES-3SG

'[He] requests another glass, instead of the broken one'

As (65) demonstrates, the transitive verb depends upon its object (whether the object is definite or indefinite) as to which conjugational form of the verb is selected (the objective or the objectless form). If the object is definite, then the objective form of the verb is used; if the object is indefinite, the objectless form is used. Furthermore, the object depends on the verb for its case. This correlation between object definiteness and verbal agreement is one found systematically across the languages of the world which possess object-agreement.<sup>5</sup>

example

One possible exception to the general rule that Case is not a relevant feature in subject-verb agreement may be a language such as

the Australian Walmatjari (Hudson, 1978) cited in Faarlund (1988), p. 202, which has ergative morphology but nominative/accusative syntax:

#### 66. Walmatjari and Possible Case Agreement

pari-tjara	pa-lu-pinja	njanja	manin-wanti-lu
boy-DU-ABS	AUX-SUBJ:PL-OBJ:DU	saw	woman-PL-ERG

'The women saw the two boys.'

In (66), if the agreement marker 'lu' on the auxiliary is taken to be 'ergative' or a coalesced 'ergative-plural' (contrary to the auxiliary's given gloss), that is, assuming that the identical marker on the subject is glossed correctly, then one could say that the subject and verb share a case feature.<sup>6</sup>

With respect to the feature of definiteness, we here include examples primarily because this thesis observes a recurring pattern: in many languages, definiteness, topicality, and the occurrence of agreement and overt pronominals are intimately associated. In most Bantu languages, for example, subject-verb agreement is obligatory, but verb-object agreement is optional and depends upon the definiteness of the object. This generalization is illustrated by the following Zulu example.

67. Zulu Optional Definite Verb-Object Agreement (Bosch, 1981)<sup>7</sup>

a. Definite Object Agreement

Nga-YI-thenga ingubo.

I bought the blanket.

\*I bought a blanket.

b. Definite Object Non-agreement

Ngathenga ingubo.

I bought the/a blanket.

This state of affairs contrasts with Swahili, another Bantu language, which requires verb-object agreement if the object is semantically human or animate and the object is interpreted as being 'old information,' as (68) makes clear.

68. Swahili Obligatory Human and Animate (Old Information)

Verb-Object Agreement (Bosch, 1981)

a. Juma a-li-MW-ua fisi

Juma killed the hyena.

where 'fisi' = class5, animate; '-mw-' = oblig., obj. agree. morph.

b. Juma a-li-M-busu Fatuma

Juma kissed Fatuma.

where 'Fatuma' = class 1; '-m-' = oblig., obj. agree. morph.

c. Fatuma a-na-(YA)-panda maua

Fatuma grows flowers.

where 'maua' = class6, inanimate; '-ya-' = optional.

Furthermore, we note that in some semantic/pragmatic theories of definiteness based on novelty and familiarity (such as Heim (1982), Christopherson (1939)), there is a very close correlation between "old information" (or Comment, that is, reference to a previously introduced Topic), and definiteness, e.g., that definites refer back to objects already established in the discourse. Hence, when adhering to such a semantic/pragmatic theory, one would like to say that in the Swahili example, the very same agreement relation holds between the verb and its object, except that in this case, the relation is obligatory, rather than optional as it is in Zulu. Furthermore, this relation also applies when the object is coordinate and the feature content of the conjuncts must be resolved. Were we to formulate a rule concerning the agreement relation and its obligatoriness/optionality in these two languages (with possibly wider scope over Bantu languages in general, a topic to which we will return later), the following might be appropriate:

## 69. Zulu/Swahili Agreement Rule

<u>Relation</u>	<u>Rule</u>
Verb      NP [object]	Zulu:
$\alpha$ Gender $\beta$ Gender	$(\gamma=+) \rightarrow ((\alpha=\beta) \vee \neg(\alpha=\beta))$ <sup>8</sup>
-Da $\gamma$ Definite	Swahili:
$\delta$ Animate	$((\gamma=+) \wedge (\delta=+)) \rightarrow \alpha=\beta$

### Feminine

The Dravidian languages Tamil and Telugu have a similar agreement relation, except that the form of agreement is Subject-Verb and is phrased in terms of a semantic feature of rationality on the NP. (H) exemplifies the agreement relation in Tamil and Telugu. Note first that in Tamil (Corbett, 1991, p. 8), nouns are either rational or non-rational and, if the former, either masculine or feminine. In Telugu, the agreement forms closely parallel the personal pronouns, as the following table shows (Corbett, 1991, p. 153).

According to Corbett (1991, p. 270), the only distinction between the agreement processes in the two languages is Telugu's non-distinguishing of feminine and neuter genders in the singular.

## 70. Telugu Agreement Forms and Personal Pronouns

SG \_\_\_\_\_ PL \_\_\_\_\_

agreement pronoun agreement pronoun

### Masculine:

-Du vaadu -ru vaaLLU

'elder son' 'he' 'older brother' 'they (m f)'<sup>1</sup>

### Feminine:

-di adi -ru vaaLLU

'elder daughter' 'it', 'she' 'they (m or f)'

aaviDa

'she' [partly formal, formal]

### Neuter:

-di adi -yi avi

'it', 'she' 'they (n)'

According to Corbett (1991, p. 270), the only distinction between the agreement processes in the two languages is Telugu's non-distinguishing of feminine and neuter genders in the singular.

## 71. Rationality Subject-Verb Agreement in Tamil and Telugu

(Corbett, 1991, pp. 269-271)

TAMIL:

a. 1 MASC, 1 FEM:

akkaa-vum	aŋŋan-um	neettu
elder.sister-and	elder.brother-and	yesterday
va-nt-aa ɿka		
come-PAST-3RD.PL.RATIONAL		

'Elder sister and elder brother came yesterday.'

b. ALL NEUTER:

naay-um	puune-yum	va-nt-atu ɿka
dog-and	cat-and	come-PAST-3RD.PL.NEUT
'The dog and the cat came.'		

c. 1 RATIONAL, 1 NEUTER:<sup>9,10</sup>

*raaman-um	naay-yum	va-nt-atu ɿka
Raman-and	dog-and	come-PAST-3RD.PL.NEUT
'Rama and the dog came.'		

TELUGU:

a'. 2 RATIONALS:

aayanaa	aaviDaa	vaccaeru
he.and	she.and	came.3RD.PL.RATIONAL
'He and she came.'		

## b'. 2 NEUTERS:

73.0 kukkaa pillii vaccaeyi

dog.and cat.and came.3RD.PL.NEUTER

'A dog and a cat came.'

## c'. RATIONAL &amp; NONRATIONAL:

aaviDaa kukkaa vaccaeru

she.and dog.and came.3RD.PL.RATIONAL

'She and the dog came.'

In these examples, 'neuter' is equivalent to non-rational. A schematic display of the apparent resolution principle involved here is the following:

## Sg 72. Subject-Verb Agreement Resolution in Tamil and Telugu

NP NP =>VERB

$\alpha$ Number  $\beta$ Number +PL

$\gamma$ Rational  $\delta$ Rational +Rational, if  $(\gamma = \delta = +) \vee$  colloq.

$(\gamma \vee \delta = +)$

$\epsilon$ Gender  $\zeta$ Gender -Rational, if  $(\gamma = \delta = -)$

with proviso:  $\epsilon = \zeta = \text{null}$ , if  $(\gamma = \delta = +)$

Negativity can also be a feature involved in verbal agreement, including its spread through a coordinate construction, as displayed in (73).<sup>11</sup>

the Topic, such as *nanum*, *fisce*, and *nane*.

be 73. Old English Negative Concord (Carlson (1983), p. 76)<sup>12</sup>

Ac he ne sealde nanum nytene ne nanum fisce nane  
 and he neg give no beast neg no fish no  
 sawle.

soul

'And he did not give beasts or fish souls.'

(negativity)

It should be noted that generally only a few parts of speech demonstrate negative concord, including only indefinite NPs, never definite ones (Krifka, p.c.). These facts about negative concord may be more easily explained if one adopts a view of negation much like that of Sgall et al (1986, p. 83-91), in which

it is primarily the relationship between topic and focus that is negated: In the unmarked case, a negative sentence states that its focus does not hold about its topic. This can be compared with what logicians call 'internal' negation (i.e., negation with a narrow scope). If, however, the sentence is without topic, then its negation becomes the counterpart of 'external' (wide scope) negation.

Sgall et al. (1986, p. 83)

that is, as pragmatic not semantic negation. And if it is taken that definites correspond (or refer back) more to Comment forms (i.e., Non-Topic or previous Topic) and indefinites more to Topic forms, then what may be occurring in languages which demonstrate negative concord is a syntactic/pragmatic delineation of the scope of negation with respect to

the Topic. Such an approach, however, is only suggested here and will not be elaborated on.

Finally, in an apparently extremely rare case, the feature tense can participate in verbal agreement, as (74) demonstrates, although it is unclear what impact tense has upon coordinate subject (or object) forms.

#### 74. Object-Verb Tense Agreement in Lardil (Hale, 1973)<sup>13</sup>

- a. Mangata wungithur wangalkur  
 child steal(future) boomerang(future)

'The child will steal a boomerang.'

- b. Ngawa pethur yaramankur  
 dog bite(future) horse(future)

'The dog will bite the horse.'

Some examples from Breton in Anderson (1982), pp. 575-577, are:

Now, we turn our attention from these simple cases of ordinary verbal agreement and their interaction with coordination to more complex phenomena, where word order differences, lexical syncretism, implicit coordination, comitativity, and disagreement figure prominently. From the perspective of ordinary agreement detailed in this section, these complex phenomena seem anomalous.

### 3.2.2 Word Order Variations

Within this classification of complex agreement or agreement anomaly is found a vast range of kinds of constructions. Most languages which have verbal agreement systems suffer some distortion to these when word order and/or the category of the subject is varied.

*Note that Examples of the latter are the Celtic languages (Breton, Welsh, Gaelic, etc.) Harlow (1991), for example, states that (in the Celtic languages)*

pronominal subjects in VSO clauses trigger person and number agreement on the verb. Non-pronominals do not. Preverbal subjects (of both sorts) fail to trigger agreement. You also get absence of agreement when the (post-verbal) subject is a WH-trace (although you get it back again in Welsh if the clause has a negative complementiser).

Some examples from Breton in Anderson (1982), pp. 575-577, are:

#### 76. Welsh Post-Verbal Pronominal Subject Agreement

##### 75. Breton Preverbal Subject Non-Agreement

- a. Bemdez    e    lennan/lenn/lennop/lennont/lenno

Every day prt I-read/he-reads/we-read/they-read/he-will-read  
eul levr.

a book

'I read/he reads/we read/they read/he will read a book every day.'

'They read the book.'

b. Bemdez e lenn Yannig/ar vugale eul levr.

Every day prt 3sg-reads Johnny/the kids a book.

'Johnny reads/the kids read a book every day.'

c. Me a lenno/\*lennin eul levr warc'hoaz.

I prt 3sg/1sg-will-read a book tomorrow

'I will read a book tomorrow.'

Note that in (b) and (c)<sup>14</sup>, where an overt NP or pronoun is present preverbally, there is no agreement, the verb instead mandatorily being inflected for [3rd, sg].

*Because these languages are of order VSO, the preceding of the Subject relatively A postverbal null or overt pronominal subject, however, will trigger agreement, as the following Welsh examples demonstrate (Rouveret, 1990, p. 47):*

## 76. Welsh Post-Verbal Pronominal Subject Agreement

a. Darllenasant [NP e] y llyfr.

read-PRET-3PL the book

'They read the book.'

b. Darllenasant hwy y llyfr.

read-PRET-3PL they the book

'They read the book.'

A graphic representation of Harlow's generalizations is the following:

77. Agreement in Celtic Languages Including Welsh (VSO languages)

- a. VERB-pers-num      SUBJ-pronom-pers-num      OBJ
- b. VERB      SUBJ-non-pronom-pers-num      OBJ
- c. SUBJ-pronom-pers-num      VERB      OBJ
- d. SUBJ-non-pronom-pers-num      VERB      OBJ
- e. VERB      SUBJ-wh-trace-pers-num      OBJ
- f. VERB-pers-num      SUBJ-wh-trace-pers-num      OBJ-negative

Because these languages are of order VSO, the preposing of the Subject relative to the verb is, for example, the equivalent to postponing the Subject in SVO languages such as English. Hence, the lack of agreement evidenced by inversion (in c-d, above) is comparable to well-known inversion anomalies in English and French.

78. English Verbal Agreement and Predicate Nominatives

- a. The sex lives of Roman Catholic nuns does not, at first blush, seem like promising material for a book. [Newsweek] (Reid, 1991, p. 194)
- b. The following list of plants and animals are typical New York swamp dwellers. [printed display placard, The Bronx Zoo]

\*The following list of plants and animals is typical New York swamp dwellers. (Reid, 1991, p. 199)

## 79. French Subject/Verb Inversion (Sasse, 1987) p. 560

[his 50]

Il est arrivé des bonnes nouvelles.

it has arrived PARTITIVE good news

'Good news have arrived.'

In (78a), for example, one would like to say either that an outright misprint has occurred or that the apparently anomalous singular agreement form of 'does' derives from the semantic paraphrase

$\lambda X. \text{Not}(\text{Promising material for a book is } X) \wedge$

$X = \text{'the sex lives of Roman Catholic nuns'}$

and in this form, either 'material' is the underlying subject (and hence forces an ordinary singular value on the verb) or that 'the sex lives of Roman Catholic nuns' is interpreted as a mass nominal, i.e., in a group or non-distributive manner, as a singular entity. The latter interpretation thence corresponds to more commonplace examples such as 'Ham and eggs is my favorite breakfast'.

Word-order inversion effects are also evident in Syrian Arabic. In ordinary SVO order, the subject conjuncts merge their feature values of person and number (and gender) in much the same manner as occurs in English (80a): first person overrules second and third person, second

person overrules third person, two singulars enjoin plural (and masculine overrules feminine) agreement on the verb. When the subject occurs postverbally (80b), however, or occasionally if the subject which precedes the verb is an abstract, gerundial construct (i.e., derived from a verb) (80c), typically the verb will agree only with the nearest conjunct.

#### 80. Syrian Arabic Agreement (Cowell, 1964; Obrst, 1987)

##### a. Ordinary Subject/Verb Agreement (Resolution of Conjuncts)

1. ?ana w- ?ente mərrū h sawa

I and you (m-sg) will go (1pl) together

'You and I will go together'

2. wlā ?ana wlā huwwe laḥ a-nkū n əhni k

Neither I nor he will be (1pl) there

'Neither he nor I will be there'

##### b. Subject/Verb Inversion (Nearest Conjunct Agreement)

1. txarraž fī ha ?aṭebba

has graduated (m-sg) in it(f) doctors (m-pl)

w- ?avokātiyye w- əmhadsīn

and lawyers(m-pl) and engineers(m-pl)

'Doctors, lawyers, and engineers have graduated there'

2. bikūn      əhnī́k    hḗ?et      əl-wazā́ra

will be (m-sg)   there   cabinet (pl)   the ministers (m-pl)

wəl-əmazzafīn      wal- ?akāber

and the officials (m-pl)   and the big shots (m-pl)

'The cabinet ministers, officials, and big shots will be there'

3. bəl-əkrū́ m      byəltá?a      l-wā wi

in the vineyards (pl)   is found (m-sg)   the jackal (m-sg)

wət9lab      wəd-ḍabə9

and the fox (m-sg)   and the hyena (m-sg)

'In the vineyards are found the jackal, the fox, and the hyena'

4. rəh̄t      ?ana      w- ?abi      la-nzū́ rkon

went (1sg)   I and   father (m-sg)   to see you

### c. Abstract Gerundial Construct (Nearest Conjunct Agreement)

1. kə́ir      min      il-sahar

much   from   the staying up late (m-sg)

wal-ḍirasat      bitxarrib      il-s.ih.hat

and the studying (f-sg)   ruins (f-sg)   the health

'So much staying up late and studying ruins one's health'

2. kə́ir      min      il-ḍirasat      wal-sahar

much   from   the studing (f)   and the staying up late (m)

bixarrib      il-s.ih.hat

ruins (m-sg)   the health

'So much studying and staying up late ruins one's health'

The Slavic languages also display anomalous agreement when inversion occurs. In Russian, for example, the verb can agree either with the nearest conjunct of the subject (81a) or with the resulting value after resolution of the features of all the subject conjuncts (81b), regardless of relative verb/subject order. If the subject precedes the verb and includes a plural conjunct, however, the verb must be plural (81c).

#### 81. Agreement in Russian (Corbett, 1983, p. 123, 99)

##### a. Nearest Conjunct Agreement

###### 1. Verb/Subject Order:

Na	sosednum	stule	ležala (sg)	furažka (sg)	s	vysokoj
On	a nearby	chair	lay	a cap	with	high
tul'ej	i	brošennye	poverx	nee belye	perčatki (pl)	
crown	and	thrown	over	it	white	gloves

'On a nearby chair lay a cap with a high crown and thrown over it, white gloves'

###### 2. Subject/Verb Order:

... otkaz	... vozmusenie (sg) ...	orgorcilo (sg) ...
rejection	resentment	grieved

**b. Resolution of All Conjuncts - Agreement**

**1. Verb/Subject Order:**

V magazine prodajutsja (pl)	vodka (sg), vino (sg)
In the shop are sold	vodka wine
saxar (sg), krupi (pl), pečen'e (sg), konfety (pl),	
sugar groats biscuit(s) sweets	
maslo (sg), konservy (pl), mužskaja i ženskaja	
rastitel'noe	
vegetable oil tinned foods men and women's	
odežda (sg) v nebol'som vybore, posuda (sg) ...	
clothing in restricted choice crockery	

**2. Subject/Verb Order:**

... astma (sg) i sil'naja blizorukost' (sg) ne	
asthma and severe short-sightedness did not	
pozvolili (pl)	
permit	

**c. Preverbal Subject with a Plural Conjunct**

Ego ruki (pl), život (sg), koleni (pl), i daže odna

His hands stomach knees and even one

ščeka (sg) byli (pl) v grjazi

cheek were muddy

In many languages with subject-verb agreement, anomalies are also evident when presentative or existential constructions are used. For

example, if the pleonastic 'there' pronoun begins a copular/predicative sentence containing a coordinated noun phrase which acts as the succedent of the pronoun, typically a wide variety of agreement patterns are acceptable.

## 82. Agreement in Presentative and Existential Forms in English

a. There is/are a doctor and a lawyer coming to the meeting today.<sup>15</sup>

b. There is/are three girls and one boy coming to the meeting.

c. There is/are one boy and three girls coming to the party.

A coherent theory of agreement and coordination must demonstrate principles which license such anomalies based upon word order.

### 3.2.3 Verb-Coded Coordinations

In a series of papers, Schwartz (1987, 1988) has identified a pattern of coordination that occurs in very many languages, a pattern she terms "verb-coded coordination" (VCC). A VCC is a coordinate NP (typically subject) of which only one conjunct is overt, the other being implicit in the inflection of the verb. What this means is that the person/number/gender inflection on the verb represents the resolution of the features of the overt NP and the features of the implicit pronominal. An example here will help illustrate what is meant.

**83. Verb-Coded Coordination in Bulgarian**

infle otgehme s majka mi na pazar  
 went+1PL & mother 1POSS to market  
 'my mother and I went to the market'

In (83), the explicit subject NP conjunct 'majka' ('mother') coordinates with an implicit pronominal whose existence is evidenced solely by the plural inflection on the agreeing verb 'otgehme'. Such constructions are by no means rare in languages. Additional examples from Modern Irish are the following, from McCloskey (1986b), pp. 248-249.

**84. VCC-type Agreement in Modern Irish**

- a. Bhios féin agus Tomás ag caint le chéile.  
 be(PAST 1st SG) EMPH and Thomas talk(PROG) with each other  
 'Thomas and I were talking to one another.'
- b. eatorra agus Martáin  
 between(3rd PL) and Martin  
 'between them and Martin'

(84a) is a case in which the inflection on the verb indicates only the implicit pronominal's features and not the resolution of the features of the implicit pronominal and the explicit noun, an instance of Nearest Conjunct resolution (discussed below). (84b) shows that the same kind of

agreement relationship can hold between a coordinated pronominal and a nominal when they are objects of a preposition (and the preposition is inflected like a verb).

A related kind of construction (which may be alternatively considered a verb-coded coordination or an instance of disagreement) has been noted in the Yuman language Maricopa by Gill (1991) and Gordon (1983). Maricopa is a language without any visible 'and' conjunction, with coordination in some cases indicated by juxtaposition of the conjuncts and inferred from the agreement features of the verbal inflection.

### 85. Maricopa Inferred Subject Coordination (Gill, 1991, p. 99)

- a. Johns<sup>s</sup> Bills<sup>s</sup> v?aawuum  
John-nom Bill-nom 3-come-pl-fut  
'John and Bill will come.'
- b. John Bill ñi ?yuuk  
John-acc Bill-acc pl:obj-1-see-sg-real  
'I saw John and Bill.'

In (85a), observe that there is no conjunction particle, but the plural number on the verb, along with the nominative case ending on the two nouns, indicates that this is a coordinated subject. In (85b) (where

'real' abbreviates 'realis'), a verb with a null-subject but with singular inflection and the noun case assignments indicate a conjoined object.

An alternative strategy in Maricopa is to employ a subordinate verb with switch-reference marking on the matrix verb to enable a comitative-like inference of coordination.

#### 86. Maricopa Inferred Subject Coordination (Gill, 1991, p. 104)

a. Johnš Bills ū ðaavk

John-nom Bill-acc 3-accompany-sg-real

'John is accompanying Bill.'

b. Johnš Bill ū ðaavk v?aaavuum

John-nom Bill-acc 3-accompany-sg-ss 3-come-pl-fut

'John and Bill will come.'

c. Johnš Bill ū ðaavm ni?yuuk

John-nom Bill-acc 3-accompany-sg-ds pl:obj-1-see-real

'I saw John and Bill come.'

(86a) is a straightforward non-coordinated sentence. In (86b), however, the matrix verb 'v?aaavuum' with plural marking and the subordinate verb 'ū ðaavk' with the switch-reference marker for 'same-subject' enjoin an interpretation of the nouns as conjoined subjects. In (86c) the switch-reference marker for 'different-subject' on the subordinate verb and the distinct case markings on the nouns indicate

that 'John' is the subject of the subordinate verb and 'Bill' the object (apparently of both the matrix and subordinate verbs), with a literal interpretation ostensibly rendered as 'I saw John accompanying Bill'. The interpretation, nevertheless, is that of a conjoined object.

These kinds of constructions will figure prominently in the categorial theory of incorporation presented later in this thesis.

### 3.2.4 Syncretism and Neutralization

This section describes constructions in which the subject coordinate form enjoins agreement on the verb, but the verbal form selected is syncretic, meaning that the language encodes two sets of incompatible features (morphosyntactic forms) onto the same surface form (lexeme), in effect neutralizing the distinction. In the following Spanish example, the first person singular form is identical to the third person singular; hence one would say in this case that the features of first person and third person are not distinguished in the singular.

#### 87. Spanish Imperfect Indicative and Syncretism (1st Conjugation)

Person	Singular	Plural
1	amaba	amábamos
2	amabas	amabais
3	amaba	amaban

## 88. Ordinary Agreement in Xhosa

Roberts and Wolontis (1972) analyze some coordinate forms in the Bantu languages Xhosa in which syncretism occurs. In the Bantu languages in general, the features first and second person are relevant only to certain noun classes (the animate classes); most noun classes have only third person nouns. The noun class is identified by a marker associated with the noun, such as '1/2'. This is the usual notation employed in Bantu studies, the first number identifying the singular noun class, the second identifying the associated plural noun class (alternatively: odd numbers are usually singular, even numbers plural). One peculiarity with the use of this notation is that the value for plurality on the given examples is thus redundantly specified.

## resolution of noun class markers

Ordinarily, the subject agrees with the verb in Xhosa, selecting a concording prefix according to the noun class (gender) of the subject for the verb. A verb agreeing with a subject of noun class 1/2, for example, will have the prefix 'ba-' (88).

7/8	9/10	21-77% PL
<i>'The hands and the ears are beautiful.'</i>		
b. <i>Mandla - mendiye - nqalo</i>		
<i>'The hands and the ears are small.'</i>		

88. Ordinary Agreement in Xhosa (Roberts & Wolontis, 1972, p. 231)

Before concording:

-fundisi na -fazi -buyile

SG-1/2 SG-1/2 PL-1/2

teacher and woman returned

After concording:

Umfundisi nomfazi babuyile.

'The teacher and the woman returned.'

If the conjuncts are of different noun classes, however, there may or may not be a compatible verb or adjective form (89a-b), especially since, with few exceptions (to be examined in the next section), there is no resolution of noun class in Xhosa.<sup>16</sup>

89. Agreement and Syncretism in Xhosa (Roberts & Wolontis, 1972, p. 233)

a. \*Izandla neendlebe zihle

7/8 9/10 zi=7/8 PL

'The hands and the ears are beautiful.'

b. \*Izandla neendlebe zintle

7/8 9/10 ziN=9/10

'The hands and the ears are small.'

c. Izandla      neendlebe      zinchane.

7/8      9/10

'The hands and the ears are beautiful'

(89c), nevertheless, is acceptable because the surface form 'zinchane' is syncretic, i.e., it is indistinguishable between noun class 7/8 and 9/10. According to Voeltz (1971), 'zi-ncinane' is the 7/8 concording form for the verb, and 'zin-ncinane' is the 9/10 form. A rule of degemination occurs to the latter to derive 'zinchane', which is then indistinguishable from the former form.

Coordinated nominals from distinct noun classes demonstrate syncretic verbal agreement forms in Chichewa also. In (90), for example, a human noun is conjoined with a non-human noun, and the agreement forms are identical: the human requiring the class 2 form 'a-kusowa', the non-human requiring the class 7 form 'a-kusowa'.

#### 90. Syncretism in Chichewa (Corbett, 1991, p. 277)

a-na    ndi    ma-lalanje    a-kusowa

child    and    oranges    be missing

1-sg    7-pl    <2 v7>-pl

Another example of syncretism is disjunctive second person singular and third person plural subjects in English:

## 91. Coordinate Subjects and Syncretism in English

Either you or they are going to be called on in class.

### 3.2.5 Cover Class and Overriding Agreement

In some languages, the form of agreement that a verb takes with respect to the coordinate NP subject possesses features which are anomalous insofar as these are not present on any of the individual conjuncts nor do they represent a simple resolution of those individual conjunct features. For want of better terminology, this form of agreement is called “cover class” or “overriding” agreement, primarily because the prototypical examples of this agreement occur in the resolution of certain Bantu noun classes (genders), although Caucasian languages such as Archi also exhibit similar phenomena.

As described in the previous section with respect to Xhosa, verbs in the Bantu languages typically will agree with their subjects in person (if applicable) and noun class; predicate adjectives will agree with their subjects in person, number, and noun class. Verbal agreement ordinarily is not problematic, unless the individual conjuncts are from incompatible noun classes or otherwise have features which cannot resolve. The following examples are pertinent.

## 92. Xhosa Anomalous Agreement (Robert &amp; Wolontis, 1972, p. 237-238)

- a. \*Isela negwala afikile.
- SG-5/6 SG-5/6 PL-5/6
- +Hum +Hum
- 'The thief and the coward came.'
- b. Isela negwala lifikile.
- SG-5/6
- c. Isela negwala bafikile
- PL-1/2
- d. Isela nenkosi bafikile.
- SG-5/6 SG-9/10 PL-1/2
- 'The thief and the king arrived.'
- e. Amasela namagwala afikile
- PL-5/6 PL-5/6 PL-5/6
- Izicaka neentombi zifikile.
- PL-7/8 PL-9/10 PL-7/8
- 'The slaves and the girls came.'
- ?Amasela namagwala bafikile.
- PL-5/6 PL-5/6 PL-1/2
- ?Izicaka neentombi bafikile.
- PL-7/8 PL-9/10 PL-1/2

Unlike the resolution of inanimate conjuncts, which straightforwardly resolve to the plural (noun class) form for marking the verb, the resolution of humans from the same noun class does not enjoin plural agreement on the verb (92a). According to Roberts and Wolontis (1972), these are derived from non-conjunctions, presumably comitatives, and hence display agreement with one conjunct only (92b). An alternative to this form of “nearest/farthest conjunct” agreement is the selection of a form of the verb embodying the “cover class” of the individual conjunct noun classes, the class 1/2 (92c). Furthermore, if the conjuncts are singular, human, and also from different noun classes, the cover class 1/2 is used (92d). If they are plural, however, the use of the cover class is blocked (92e).

The same kind of phenomenon is found in other Bantu languages, such as Dzamba, Likila, Lingala, Luganda, and Swahili (Bokamba, 1985; Corbett, 1991). In these languages, there are two cover classes: the cover class 1/2 for humans (animate, in Swahili) as in Xhosa (93), and the cover class 7/8 for ‘things’ (94). The only alternative to the use of the cover class is the nearest conjunct strategy, in which there is no resolution (94a.3, 94b.2).

93. Human Cover Class in Luganda (Corbett, 1991, p. 273, citing Givón 1970, p. 253-254; 1971, p. 38-39)<sup>17</sup>

- a. et-kazi, aka-ana ne olu-sajja ba-alabwa  
 fat woman small child tall man were seen  
 5-sg 12-sg 11-sg 2-pl

94. Cover Class for 'Things' in Dzamba and Swahili (Bokamba 1985, p. 38-45; cf. Corbett, 1991, p. 276)

a. Dzamba

1. í- zo-ombi n'é:ngbongbo bi-bi-bunga.

the ax and the machete lose

5-sg 7-sg 8-pl-Fut

'The ax and the machete will be/get lost.'

2. í-Mu-ngate n'í-bó-mpe bi-etez-i

the manioc and the manioc leaves arrived

3-sg 14-pl 8-pl

'The manioc and the manioc leaves arrived.'

3. í-zo-ombi n'é:ngbongbo e-bi-bunga

the ax and the machete will lose

5-sg 7-sg 7-sg

'The ax and the machete will be/get lost.'

### b. Swahili

1. Ki-ti na m-guu wa meza vi-me-vunjika (vyote)

chair and leg of table broke (all)

7-sg 3-sg 8-pl

'The chair and the table's leg are broken.'

2. Ki-ti na m-guu wa meza u-me-vunjika

chair and leg of table broken

7-sg 3-sg 8-pl

'The chair and the table's leg are broken.'

Because the cover classes in the Bantu languages refer to features usually classified as semantic (such as animacy and humanness), and because there are ordinarily only two such classes, the resolution of conjuncts from different grammatical noun classes is said to be semantic in nature, that is, to enjoin an agreement form on the verb which is compatible with the referents of the conjuncts. As such, it is probably advisable not to consider these as 'cover classes', but simply as semantic extensions to the ordinary grammatical noun class system.

### 3.2.6 Disagreement

This section considers agreement phenomena which can be described, for want of a better word, as examples of "anti-agreement" or "disagreement". The use of this terminology should, however, be taken

loosely; the only real conceptual significance is that certain constructions in languages demonstrate anomalies with respect to either proximity of conjunct, or range of features participating in the agreement process depending upon conjunct category. The latter kinds may make a distinction between nominal and pronominal categories, for example. The former embody a feature resolution strategy for coordinate NPs which focuses on only one of the conjuncts, rather than all of them taken together. Corbett (1983) characterizes these as the "closest or nearest conjunct" and the "farthest conjunct" strategies. Hence, for example, the verb will "disagree" with the nearest conjunct in a language which employs the "farthest conjunct" resolution strategy. Both of these phenomena should be distinguished from semantic distributive-collective disagreement, which, as we shall see, in effect negates the values of the features (or a subset of these) in certain circumstances, as in Arabic inanimate plural forms: if the referents of an inanimate plural subject are interpreted distributively, the verb is (masculine) plural; if the referents are interpreted collectively, the verb is feminine singular. Note that there is necessarily some overlap between the phenomena of this section and those of other sections, especially with regard to inversions in word order.

Some examples of disagreement constructions in which the featural flow for purposes of enjoining agreement on the verb is taken to be from a special or designated conjunct, are displayed below from the

Slavic languages and Spanish. An example displaying variation in featural flow, dependent upon conjunct category, is given from Arabic.

Modern Standard Arabic shows a distinction between pronominal and non-pronominal NP subjects, with respect to the range of features entering into the agreement relation with the verb. When the subject is pronominal, the pronoun and the verb agree in person, number, gender, and humanness, as in the following example (95a) (Fassi Fehri, 1984, p. 6, 8).

### 95. Verbal Agreement in Standard Arabic

#### a. With Pronominal Subject

hum ja:?'u:

they came(3-pl-masc)

'As for them, they came'

#### b. With Verb-Initial Non-pronominal Subject

1. ja:?'ati l-bana:tu

came(fem) the girls

'The girls came'

2. \*ji ?na l-bana:tu

came(fem-pl) the girls

'The girls came'

96. 3. \*ja: ?u:            l- ?awla:du

Arabic came(masc-pl) the boys

'The boys came'

c. With Preposed Non-Pronominal Subject

1. al-bana:tu ji ?na

the girls came (f. pl)

2. 'The girls came.'

2. \*al-bana:tu ja: ?at

the girls came (f. sg)

b. 'The girls came.'

1. Gatalan

In the (b) examples, however, the non-pronominal NP can only agree with the verb with respect to the gender feature. In the (c) examples, where the subject is preposed (from the normal VSO order), the non-pronominal NP agrees with the verb in both number and gender.

'The boys and the girls killed the cat'

In Palestinian Arabic (van Oirschot, 1987, p. 232), and Syrian Arabic (Cowell, 1964), however, nominals do enjoin person, gender, and number agreement on the verb. The following examples are from Palestinian Arabic: ; when the order is VSO, however, the strategy employed is for the verb to agree only with the nearest conjunct, as in (96.b.1-2).

Steinberg and Caskey (1988) describe a similar situation in Spanish, but attempt to show there are constraints on the kind of syntactic

96. Coordinated Nominal Subjects and Agreement in Palestinian

Arabic (van Oirschouw, 1987, p. 232, Mohammad Mohammad)

a. SVO order:

1. ?el-walad we-l-banaat gataluu ?el-bisse

the boy and the girls killed-3-pl-masc the cat

'The boy and the girls killed the cat'

2. ?el-banaat we-l-walad gataluu ?el-bisse

the girls and the boy killed-3-pl-masc the cat

'The boy and the girls killed the cat'

b. VSO (Inverted) order:

1. Gatalen ?el-banaat we-l-walad ?el-bisse

killed-3-pl-fem the girls and the boy the cat

'The girls and the boy killed the cat'

2. Gatal ?el-walad we-l-banaat ?el-bisse

killed-3-sg-masc the boy and the girls the cat

'The boys and the girls killed the cat'

When the sentential order is ordinary SVO, the feature values of the conjuncts merge to plural number and (by default) masculine gender, as in (96.a.1-2) above; when the order is VSO, however, the strategy employed is for the verb to agree only with the nearest conjunct, as in (96.b.1-2).

Steinberg and Caskey (1988) describe a similar situation in Spanish, but attempt to show there are constraints on the kind of syntactic

construction licensing the nearest conjunct strategy for agreement, a constraint identified by them as the Proximity Principle ("in conjoined structures, elements will agree with their 'neighbors' first," where 'neighbors' are not necessarily adjacent).<sup>18</sup> The examples in (97) are ambiguous insofar as it is unclear where the number agreement of the verb originates: from a resolution of the number values of all the conjuncts or simply from the nearest conjunct. The participles offer no assistance in the analysis, moreover, since either value of gender (masculine or feminine), originating from one of the conjuncts, is acceptable.

*bound*

97. Spanish (Steinberg & Caskey, 1988, p. 292)

- a. Los caminos y plazas fueron constuídas por los  
 M-PL M-PL F-PL 3-PL F-PL  
 the roads and plazas were built by the  
 españoles.  
 Spaniards

- b. Los caminos y plazas fueron constuídos por los  
 M-PL M-PL F-PL 3-PL M-PL  
 the roads and plazas were built by the  
 españoles.

*examples, 'todos los' ('all the') modifies both conjuncts, one masculine and one feminine, hence has semantic but not syntactic scope over 'The roads and plazas were built by the Spaniards.'*

In (98), however, they note that once an agreement form is chosen, then subsequent forms in the sentence must be consistent with that choice:

98. Consistent Agreement in Spanish (Steinberg & Caskey, 1988, p. 295)

- a. Todos los libros y revistas usadas serán

M-PL M-PL M-PL F-PL F-PL 3-PL

All det books and magazines used will-be

uncuadernadas/?os

F-PL/?M-PL

bound

'All the books and magazines used will be bound.'

- b. Todos los libros y revistas usados serán

M-PL M-PL M-PL F-PL M-PL 3-PL

All det books and magazines used will-be

uncuadernados/\*as

M-PL/\*F-PL

bound

'All the used books and magazines will be bound.'

In these examples, 'todos los' ('all the') modifies both conjuncts, one masculine and one feminine, hence has semantic but not syntactic scope over both (as evidenced by the dischordant agreement forms of the nominals); the postnominal adjective 'usadas/usados' ('used') similarly

modifies both conjuncts but agrees only with the nearest. The (rightward occurring) verb in either case, however, must agree with the (leftward) adjective that is selected.

There are also instances of verbs agreeing with the farthest, rather than nearest, conjunct. According to Corbett (1983) (cf. also Obrst, 1987, p. 90), among the Slavic languages in which this form of agreement is attested are Old Russian (for some combinations of nouns) and Slovene and Serbo-Croat constructions in which the coordinate subject precedes the verb; as illustrated in the following examples.

In (99a), the verb 'prevzela' is marked feminine singular in agreement with the farthest conjunct 'žens'.

#### 99. Agreement with Farthest Conjunct in Slovene, Serbo-Croat

(Corbett, 1983, p. 100-101)

a. Slovene (Corbett 1983, p. 101, 188, 208-9), as cited by Obrst (1987, p.

91. Groza(fem-sg) in strah(masc-sg) je prevzela(fem-sg)

Horror and fear has seized

vso vas

the whole village

'Horror and fear has seized the whole village.'

Hence, the verb in the example agrees with the first conjunct because there is no resolution of the values of the two conjuncts.

b. Serbo-Croat

3.2.7 Ona stalna, duboko urezana svjetla(neut-pl) i  
 Those constant, deeply cut lights and  
 sjene(fem-pl) koje je naslikao umjetnikov kist  
 shades which has painted the artist's brush  
 bila(neut-pl) su jaca(neut-pl) od realne svijetlosti  
 were stronger than real light  
 'Those constant, deeply cut lights and shades which the artist's brush  
 has painted were stronger than real light.'

In (99a), the verb 'prevzela' is marked feminine singular in agreement with the farthest conjunct 'Groza'. Similarly, in (99b), 'jaca' with a neuter plural value agrees with the farthest conjunct 'sjene', not the nearest 'bila'. Corbett (1983, p. 101, 188, 208-9), as cited by Obrst (1987, p. 91, 94-5), explains this is due to the following two rules observed by the southern Slavic languages:

- i) if the coordinate NP subject contains mixed feminine and neuter genders, the verb will be marked masculine;
- ii) a neuter plural never occurs on the verb when a resolution strategy has occurred.

Hence, the verb in the example agrees with the first conjunct because there is no resolution of the values of the two conjuncts.

### 3.2.7 Semantics of Distributive vs. Collective

A number of languages mark how the coordinated NPs are to be interpreted with respect to distributive vs. collective predication by modification of the ordinary form of agreement with the verb. An example is Syrian Arabic. As noted earlier, Syrian Arabic resolves person, number, and gender values of the conjuncts in much the same manner as in English, with a couple of exceptions. Masculine is typically the (default) gender value assigned to the verb under all circumstances except two or more conjuncts are feminine; in this case, the verb will be feminine. The second exception occurs with inanimate (and, occasionally, animate) plural subjects: if these are viewed distributively, the verb is marked masculine plural; if viewed collectively, the verb is marked feminine singular (Cowell, 1964; cited in Obrst, 1987, p. 82).<sup>19</sup>

#### 100. Agreement and Collective Interpretation in Syrian Arabic

##### a. Inanimate

h-k ə?əb      wes-ṣuwar      wəl-kwā nāt

the books (pl)    and the pictures (pl)    and the records (pl)

xālye

is expensive (f-sg)

‘Books, pictures, and records are expensive.’

## 3.2.2 Coordination

## b. Animate

hal- əmxallafā t halli žabthon

'purely' these envelopes that which (def) you brought (pl)

əkbire

'is too large (f-sg)

'These envelopes you brought are too large.'

A similar situation holds in both Dutch and American (but not British English), per Hoeksema (1983, p. 72), Obrst (1987, p. 82), with respect to the marking of plurality on the verb:

## 101. Agreement and Collective Interpretation Dutch, American English,

and British English

a. Dutch: Het committee komt samen (sg) ...

b. American English: The committee gathers ...

c. British English: The committee gather ...

The section of this thesis on the semantics of boolean and non-

boolean coordination describes the concepts involved with these forms.

### 3.2.8 Comitatives

Comitative particles are often classified along with the typical ‘purely’ coordinate particles (eg. ‘and’, ‘or’) as conjunctions, although they have as primary meaning the notion of accompaniment, i.e., ‘with’ and ‘and also’. As such, a comitative particle acts as a subordinating particle, a local head to a de-focussed conjunct which is engaged in an accompaniment relationship to a focussed conjunct; in fact, comitative particles are generally outright prepositions, possessing all of the properties of prepositions, including case-assignment. Often, however, it is hard to distinguish a comitative from an ordinary coordinate construction, especially in languages in which the particle marking the comitative semantic relationship is homophonous to that marking the coordinate relationship.

In English, as reflected in examples (100a-b) below, both ‘with’ and ‘and’ are acting as comitative particles. (B), in particular, highlights both the homophony problem and two primary properties of comitatives: 1) comitativity is almost always a relationship between two NPs, and 2) the prepositional-phrase-like nature of comitatives permit them to appear optionally far away from the primary (focussed) conjunct in the surface string, in an oblique position.

102. Comitative Examples in English and Spanish

English:

- a. John is going to the store with Mark and Mary.
- b. John is going to the store and Mark and Mary.

Spanish (Steinberg & Caskey, 1988, p. 294)

- c. Queremos tomar una [gaseosa con fernet] bien  
 1-PL F-SG F-SG M-SG  
 want drink det lemon-soda with bitters very  
 helada  
 cold

'We want to drink an ice-cold lemon soda with bitters.'

- d. Necesitamos comprar [[gaseosa] y [fernet]] más  
 1-PL a F-SG y M-SG  
 want and buy lemon-soda and bitters more  
 baratas  
 M-PL and Vera Bitters  
 cheap

'We have to buy cheaper lemon soda and bitters.'

The Spanish examples show a construction (102c) in which the adjective 'helada' agrees not with the complement of the comitative particle 'con', but with the direct object 'gaseosa'; and a construction

(102d) in which the object conjuncts linked by the coordinate *y* particle, ‘gaseosa’ and ‘fernet’, enjoin a plural value on the (jointly) modifying adjective ‘baratas’.

The situation is rather more complicated in some languages. In Czech (Vanek, 1977), for example, there are three conjunctive particles, ranging in effect from coordinate ('a', 'and') to coordinate/comitative ('i', 'and, with, and also') to comitative ('s', 'and', 'with'). Following Šmilauer (1947, p. 367), Vanek calls 's' a 'hypotactic' rather than a 'paratactic' particle (as is 'a' and 'i'), because its phrase alone can optionally appear rightward in the sentence, outside of the NP.

b. *Mary saw the accident with John.*

### 103. Czech Coordinate and Comitative Conjunctions

(Vanek, 1977, p. 24)<sup>20</sup>

a. Jan a Věra (jsou) šli do divadla.

'John and Vera 3rd/pl-went to the theater.'

b. Jan i Věra (jsou) šli do divadla.

'John and Vera 3rd/pl-went to the theater.'

c. Jan (je) šel do divadla s Věrou.

'John went to the theater with Vera.'

d. Jan s Věrou (jsou) šli do divadla.

'John with Vera went to the theater.'

Because the comitative conjunct typically does not participate in the agreement relationship (104b., above), this thesis will not be directly

In some theories, the comitative conjunct is still considered a semantic agent of the sentence's meaning, but not its discourse/pragmatic 'actor' (cf. Foley & Van Valin, 1984, p. 85-86). In fact, Foley & Van Valin (1984) observe that only the semantic roles of actor-agent and undergoer-theme can participate in the comitative relationship, an observation evident in the following examples:<sup>21</sup>

### 3.2.9 Case Anomalies

#### 104. Restricted Pragmatic/Semantic Roles of the Comitative

(Foley & Van Valin, 1984)

a. \*The hammer opened the door with the crowbar.

reading: 'the hammer and the crowbar opened the door'

b. ?Mary saw the accident with John.

c. ?\*Fred killed the dog with the cat.

d. \*Milt hit the desk with the chair.

[Non-instrumental reading]

All of these examples disallow the comitative because the relevant conjunct is, in their terminology, neither actor-agent nor undergoer-theme: 'crowbar' is an effector, not an agent or a theme; 'John' is an actor-locative; 'cat' is a patient, not an agent or a theme; 'chair' is a locative.

Because the comitative conjunct typically does not participate in the agreement relationship (104b., above), this thesis will not be directly

concerned with the comitative construction; care, however, must still be observed not to conflate these distinct but related phenomena, comitativity and coordination. The mechanism behind the occurrence of nearest conjunct agreement, for example, may be attributed to the comitative nature of the other conjuncts in the sentence.

### 3.2.9 Case Anomalies

Icelandic so-called ‘quirky case’ or ‘exceptional agreement’ exemplifies this class of subject/verb agreement anomaly. As Simpson (1982, p. 9-10) has noted, in Icelandic, it seems to be the case that “passive participles and matrix predicate adjectives agree not with the quirky case subject (if there is one), but rather have NOMINATIVE case, neuter gender, and singular number” (also cited by Bouchard (1983), p. 192). The same conclusion has been reached by Zaenen & Maling (1982). Examples from Rögnvaldsson (1982) illustrate these “impersonal” verb forms:<sup>22</sup>

#### 105. Impersonals in Icelandic

- a) Mér likar petta.

Me (dat) likes (3sg) this.

‘I like this.’

- b). Peir            sja            stulkuna    og  
 they (nom) see-3pl    the girl    and  
 { \*finnast-3pl  
 finnst-3sg}    hun alitleg.  
 finds-3sg    she attractive.
- 'They see the girl and find her attractive.'
- c) Peim            likar            maturinn    og  
 Them (dat) likes-3sg    the food    and  
 { \*bordar-3sg  
 borda-3pl}    mikid.  
 eat-3pl    much.
- 'They like the food and eat much.'

In (105a), a form of disagreement, the [1st, sg] Dative subject requires the unmarked, 'impersonal' inflection on the verb, [3rd, sg]. In 'conjunction reduction' coordinate forms such as (105b) and (105c) in which ordinary and impersonal verbs are coordinated, the impersonal verb will always be [3rd, sg]. Similar anomalies are attested in Hindi and Marathi, per Falk (1991).<sup>23</sup>

Agreement anomalies with respect to Case may be related, as has been suggested in the literature (Chomsky, 1981; Falk, 1991), to either the lack of a case-licensor or the presence of one (ordinarily non-nominative) which interferes with the normal agreement process. This

thesis will not directly address problems with the interaction of agreement and Case-assignment, but will highlight discordancies where these exist and have direct impact upon the theory of incorporation presented here.

Though necessarily incomplete, this section has served to describe the largest classes of both ordinary and anomalous agreement phenomena found among the languages of the world as they affect the interaction with subject coordination. A theory of agreement and coordination must be able to interestingly accommodate, if not explain in all particulars, ordinary behavior and such anomalies. Furthermore, one mark of a cogent theory is the possession of sufficient richness and extensibility to so accommodate new data which perturbs previous generalizations without thereby also needing to break the scientific compact on the testability and predictability of hypotheses: in a reasonable theory, hypotheses must be stateable in a way which can be disproved or at least made to show a lacking in credence. A theory which contains hypotheses which can never be disproved, but which always generalizes those hypotheses to accommodate new facts without also explaining the coverage, is a theory of disjunctions and a system in which eventually much of the theoretical energy will be expended purely in maintaining internal consistency. Such a theory is in danger of being divorced from its underpinnings, empirical reality, becoming a free-floating

metaphysical system only, and so not having essentially anything meaningful to say.

In the next section, some recent theories of concord are discussed and their formal apparatus displayed. These must be viewed in light of the previous paragraph, as theories sufficiently rich to handle the facts and yet also able to be refuted. This meta-perspective will not be expounded upon in the remainder of the text (except in a final section on meta-theoretical considerations), but must be kept in mind for a healthy skepticism.

### 3.3 Recent Theories of Concord

This section describes in some detail various contemporary theories of agreement processes in formal linguistics. The emphasis throughout is on specifically subject/predicate agreement, since it is this form of agreement which crucially demonstrates the resolution process (of disparate feature values) undergone by coordinate constructions. In addition, this section discusses the distinction between agreement (and more generally, anaphoric) and pronominal incorporation processes which some theories have made.

### 3.3.1 Agreement in GPSG

~~A simple example illustrating a simple process of subject/verb agreement utilizing all the appropriate subsystems of GPSG appears.~~

The GPSG theory of grammatical concord is based on an extension to principles originally formulated by Keenan (1974) and Keenan and Faltz (1978, 1984), and modified by Bach and Partee (1980), principles which have been condensed to a single Control Agreement Principle.<sup>24</sup>

~~rules~~

Control in GPSG is taken to be a relation between two categories in a tree in which one, the functor-category, is controlled by the other, the argument-category, i.e., the agreement target and the controller, respectively.<sup>25</sup> For our purposes, the subject NP is the controller of the target VP, and so the verb will agree in features that are determined by the NP. The agreement is formally transacted using a category-valued feature called AGR which, in effect, carries the information of the subject NP -- more specifically, the non-Foot Head features and the inherited Foot features of the NP -- to the VP node. Technically, only these two kinds of features are permitted because the Foot Feature Principle does not regulate the behavior of inherited Foot Features, those "explicitly specified in ID rules or which have arisen through the operation of metarules" (Gazdar et al (1985), p. 80), but only instantiated Foot Features. Furthermore, only these two kinds of features determine the semantic types relevant for a theory of control (cf. Gazdar et al (1985) p. 85-88).

~~VIAGRA NPI PER 1, -PLU)~~

~~NP~~

At this point, an example illustrating a simple process of subject/verb agreement utilizing all the appropriate subsystems of GPSG appears to be warranted (recalling the GPSG Theory of Coordination, as presented in an earlier section).

*mother Assume that applying the following Immediate Dominance (ID) rules is made clearer by the following tree diagram, in which each node is appropriately associated with its feature specifications.*

$$\begin{aligned} S &\rightarrow X^2, H[-\text{SUBJ}] \\ VP &\rightarrow H^0, NP \end{aligned}$$

*107. GPSG Agreement Example Tree Notation*  
 where  $X^2$  is any minimally specified category of bar-level 2 (in X-Bar notation);  $H[-\text{SUBJ}]$  designates the head daughter of the mother node  $S$ , which does not contain a subject specification;  $H^0$  similarly designates a head daughter category of bar-level 0, signifying it is a lexical head, generates the following subtrees:

#### 106. GPSG Agreement Example

a. S

NP[PER 1, +PLU]

VP[AGR NP[PER 1, +PLU]]

b. VP[AGR NP[PER 1, +PLU]]

V[AGR NP[PER 1, +PLU]]

NP

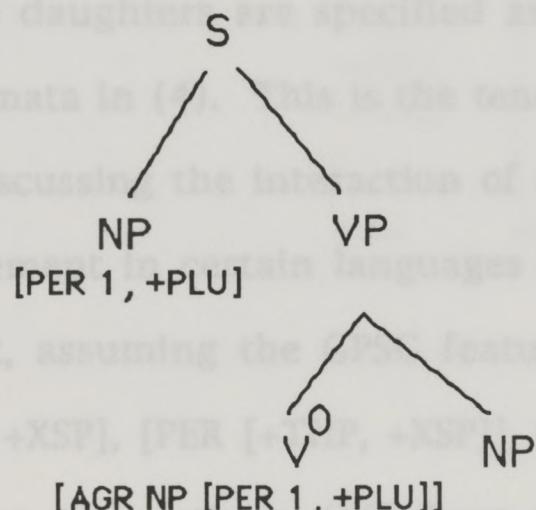
## 108. GPSG Syntax

Furthermore, also assume a Linear Precedence rule:

$$\text{NP} < \text{VP}$$

The two subtrees with respect to the two ID rules meet the requirements of the Head Feature Convention, since the set of free Head Features on the mothers of both (106a) and (b) are instantiated on the head daughters. This is made clearer in the following tree diagram, in which each node is appropriately annotated with its feature specifications.

## 107. GPSG Agreement Example: Tree Notation



Since there are no Foot features present, the Foot Feature Convention does not apply. The above tree could represent the following strings, among others:

## 108. GPSG Strings

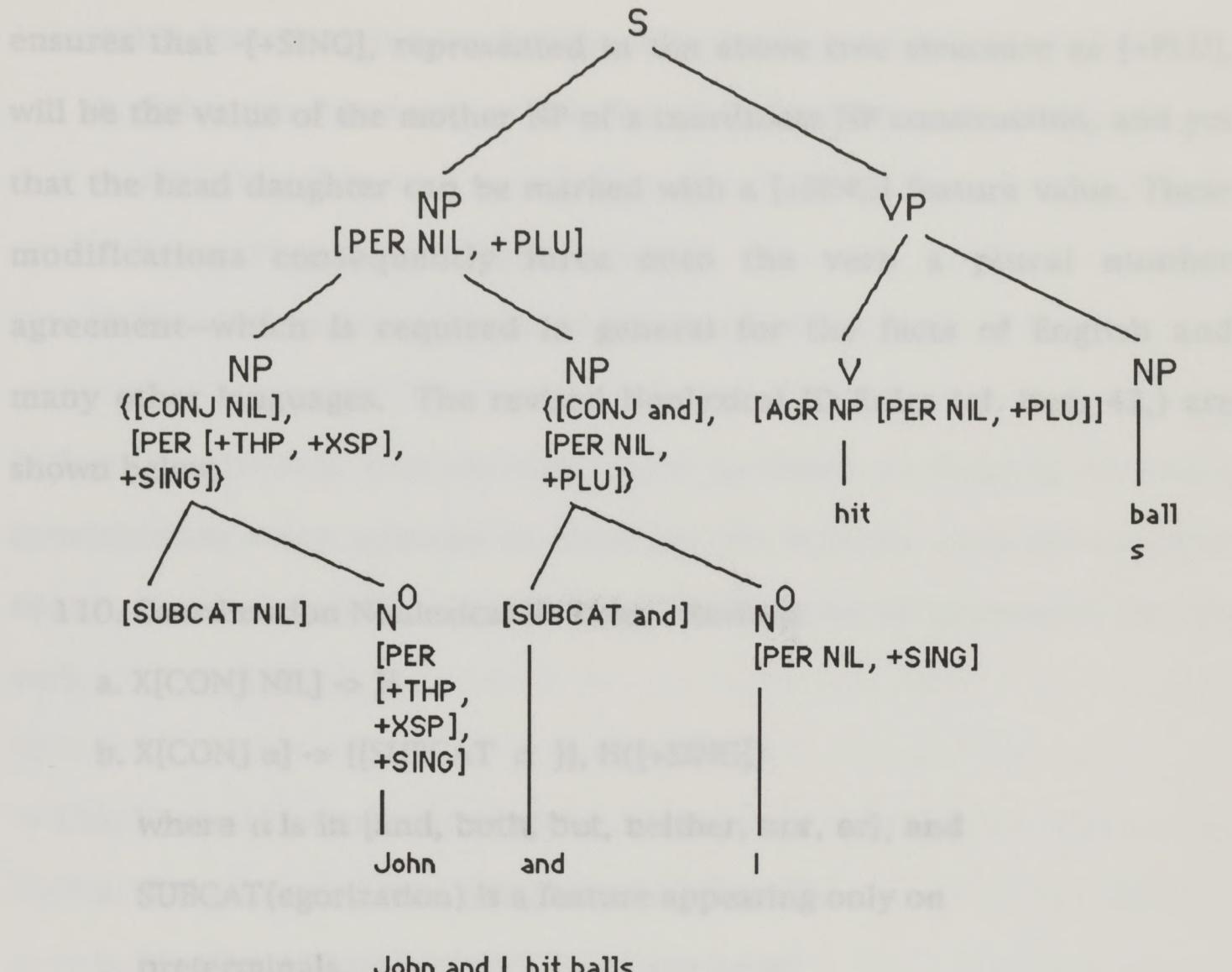
- a. We are hitting the ball.
- b. We hit balls.
- c. We hit the ball.

In the case of a subject consisting of a coordinate NP, agreement with the verb is a slightly more complicated process. The Head Feature Convention requires that the coordinate NP mother have a set of feature/value pairs associated with it which is the intersection of the feature/value pairs instantiated on the daughter conjuncts, since all of these daughters are specified as heads according to the Coordination ID Schemata in (4). This is the tenet we will discover to be problematic later in discussing the interaction of coordinated NP subjects and subject/verb agreement in certain languages other than English. Nevertheless, at this point, assuming the GPSG feature/value system for person is [PER NIL], [PER +XSP], [PER [+THP, +XSP]], for first person, second person, and third person, respectively (XSP here stands for "excluding speaker", and THP, "third person") (Sag et al, 1985, p. 153), then the following represents an admissible subtree:<sup>26</sup>

First, (108.b) must be modified so that {-SING} can optionally be instantiated on the head daughter. This modification, with an additional Feature Co-occurrence Restriction, i.e.,

NP[CONJ and] → {-SING},

## 109. GPSG Coordinate Subject



A few points must be noted concerning the above structure (cf. Sag et al, 1985, p. 155).

The given example does not explicitly elicit the first person value on the verb, i.e.,

First, (106.b) must be modified so that [+SING] can optionally be instantiated on the head daughter. This modification, with an additional Feature Co-occurrence Restriction, i.e.,

$$\text{NP[CONJ and]} \Rightarrow -[+SING],$$

### 111. Person Value (as reflected by Verb)

ensures that  $-[+SING]$ , represented in the above tree structure as  $[+PLU]$ , will be the value of the mother NP of a coordinate NP construction, and yet that the head daughter can be marked with a  $[+SING]$  feature value. These modifications consequently force onto the verb a plural number agreement--which is required in general for the facts of English and many other languages. The revised Nonlexical ID Rules (cf. item 42,) are shown below.

### 110. Coordination Nonlexical ID Rules - Revised

- a.  $X[\text{CONJ NIL}] \rightarrow H$
- b.  $X[\text{CONJ } \alpha] \rightarrow \{\text{[SUBCAT } \alpha \text{ ]}, H([+SING])\}$

where  $\alpha$  is in {and, both, but, neither, nor, or}, and

- a. SUBCAT(egorization) is a feature appearing only on
- b. preterminals.

Second, the value of NIL for PERSON on the verb signifies "first person", the unmarked value for person in GPSG, as we have remarked. The given example does not explicitly elicit the first person value on the verb, since English does not overtly mark such a value. However, sentences with an expressed reflexive in object position demonstrate the person value available for agreement (the value of the person feature on the mother NP of the subject), as the following make clear:

### 111. Person Value (as reflected by Reflexive)

- a. We Americans and the British continually get ourselves in trouble.
- b. Either we Americans or you British find ourselves in trouble at any given time.
- c. You and I aren't ourselves these days.
- d. Tom or I find ourselves in trouble much of the time.

A further problem here is that some speakers of English for some constructions use a strategy of obtaining the features from the conjunct nearest to the verb for determining the features of agreement on the verb.

### 112. Nearest Conjunct Strategy

a. (Either) you or I am going to town tomorrow.

b. \*Am/are you or I going to town tomorrow?

More will be said of this phenomenon later.

Although the GPSG theory of coordination as currently formulated (and as has been described up to this point) models most of the facts of NP coordination and subject/verb agreement in English, we shall examine in the coming sections constructions in many languages in which this generalization does not hold, thus further motivating the proposed categorial theory.

representation which result in the observed surface form of speech.

### 3.3.2 Agreement in GB

The theory of agreement proposed in the framework generally called Government and Binding Theory (GB) or, more recently, the Principles and Parameters paradigm (Chomsky, 1981, 1982; Chomsky, 1986, etc.) is the result of the interaction of various modules of the grammar, and is essentially syntactically based. The general GB theory, presupposing that universal grammar concerns the mapping between linguistic structure and meaning, posits two kinds of theoretical entities: a structural framework and a set of subtheories or modules. The structural framework has four levels of representation: D-structure, S-structure, and two daughter levels of S-structure, those of Phonetic Form and Logical Form. There are seven subtheories: Binding Theory (relations between anaphors and pronominals and their antecedents), Bounding Theory (a set of locality conditions on Move/Affect  $\alpha$ ), Case Theory (the assignment of abstract Case), Control Theory (principles determining the antecedents of pronominal anaphors, i.e., PRO), Government Theory (relations of locality between categories), Theta Theory (semantic or thematic roles of verbal arguments), and X-Bar Theory (theory of categorization of phrase markers), and the Projection Principle (representations at each level are projected from the lexicon, and, in particular, properties of theta-marking). It is the interactions among these subtheories, which contain both fixed and language-specific parameters, across the levels of

representation which result in the observed surface forms of natural language.

Though it is clearly an impossible task to describe each of these subtheories in depth within this section, nonetheless by focusing on especially pertinent principles and mechanisms, the general apparatus of agreement in GB can be delineated. The primary theoretical mechanisms which determine agreement in GB are the following, in schematic form:

The primary locus of agreement in Government Binding theory is the abstract node **AGR** (and its X-Bar phrasal projections). AGR is the agreeing element of I (or INFL, the abstract node for inflection) and is coindexed with the subject of I, which it governs and assigns nominative case (cf. Chomsky, 1986b, p. 188).

The sole transformation remaining to GB is **Move/Affect**  $\alpha$  (to be known simply as 'Move- $\alpha$ ' here). Move- $\alpha$  is to be read as: perform any operation on element  $\alpha$  (movement, etc.) as long as all other principles of the grammar hold at all representation levels.

There are three principles posited by Binding Theory (typically characterized as Principles A, B, and C, respectively, as follows):

### 113. Binding Principles

- A. An anaphor (reflexive, reciprocal) must be bound in its governing category.
- B. A pronominal must be free in its governing category (includes the empty pronoun **pro**).
- C. An r-expression (referring or denoting) must be free, where

**df. Governing Category:**  $\alpha$  is a governing category for  $\beta$

iff  $\alpha$  is the minimal category containing  $\beta$ , a governor of  $\beta$ , and a SUBJECT accessible to  $\beta$ .

where

'minimal category' is the category  $\alpha$  closest (in terms of tree path length) to category  $\beta$ , and where the 'subject' of a phrase  $XP$  is the argument of  $X'$  or  $X$  (i.e. 'head') which is directly dominated by  $XP$  in X-Bar theory. (cf. Stowell, 1983)

In addition to these principles, the Empty Category Principle must be observed.

### 114. The Empty Category Principle

$[\alpha \ e]$  must be properly governed,

where ' $[\alpha \ e]$ ' represents an empty-node of category  $\alpha$  (i.e., a trace),

and

**df. Proper Government:**<sup>27</sup>  $\alpha$  properly governs  $\beta$  iff  $\alpha$  governs  $\beta$  and:

[+Anaphoric, -Pronominal] and is referenced specifically by Condition A

of the 1.  $\alpha$  is lexical (i.e.,  $X^0$ , i.e., a non-phrasal node in X-Bar theory), or

2.  $\alpha$  is coindexed with  $\beta$

where 'coindexed' means either theta-coindexing or

chain-coindexing via Move- $\alpha$  (i.e., in either case  $\beta$  is

the antecedent of  $\alpha$ ),

**df. Government:**<sup>28</sup> in the structure  $[\gamma \dots \beta \dots \alpha \dots \beta \dots]$ ,  $\alpha$  governs  $\beta$  iff:

1.  $\alpha$  is an immediate constituent of  $\gamma$

2. where  $\psi$  is a maximal projection (XP), if  $\psi$  dominates  $\beta$ , then  $\psi$  dominates  $\alpha$ ,

where

'maximal projection' is the highest X-Bar category of category X according to the rules:

a)  $X' = X \ X P^*$

b)  $X P = X' \ X P^*$

and 'dominance' is a (hierarchic) relation between two tree nodes such that one is higher in the tree than the other and the lower one is connected to the higher via some unbroken path.

(cf. Bouchard, 1983, p.34)

The statement of the Empty Category Principle thus permits four logical possibilities for empty syntactic entities: t (or trace), variables, pro, and PRO. T (or trace) is an empty anaphor, typically corresponding to NP-trace, as in sentence (115a) below; it possesses the values [+Anaphoric, -Pronominal] and is referenced specifically by Condition A

of the Binding Theory. A **variable** (here, symbolized by *e*) is an empty referring expression, corresponding to WH-trace in WH-extraction constructions as in (115b); it has the values [-Anaphoric, -Pronominal] and is the empty category addressed by Condition C. **Pro** (or little **pro**) is an empty pronominal, [-Anaphoric, +Pronominal] addressed by Condition B and exemplified by (115c). **PRO** (or big **PRO**) is an empty category which is both an anaphor and a pronominal (and so, subject to both Conditions A and B) and is ungoverned, with the values [+Anaphoric, +Pronominal]. **PRO** is the null subject of equi/control forms, and generally the subject of infinitival clauses (see example 115d).

### 115. Inventory of Empty Categories

- a. trace: Bill seems *t* to be happily married.
- b. variable: Who did Bill think *e* saw him.
- c. pro: (Arabic; Fassi-Fehri, 1984, p. 9)
 

pro ntaqada	mu?allifahu
criticized-he	author-his

'he criticized his author'
- d. PRO: Bill tried PRO to leave.

Mention must also be made of the  **$\theta$ -Criterion**. This principle stipulates that every term which requires a theta role (each argument) is associated with one and only one position to which a theta role is assigned; furthermore, each theta role determined by the lexical properties of a

head is uniquely associated with one and only one argument (Baker, 1988, p. 37; Chomsky, 1982).

Lastly, the requirements for a statement of agreement include certain **Case Principles**. Two principles will be described here, one termed the **Case Filter**, the other characterizing the kinds of Case observed. The **Case Filter** requires that an element in a syntactic structure (typically, an NP) be visible for theta-marking (i.e., being assigned a theta-role or its projection) iff it is assigned Case (typically by transitive verbs, prepositions, and tensed INFLs). Case itself is either **Inherent** or **Structural**, the former being assigned to an element at D-structure by some other element which theta-marks it, the latter being assigned at S-structure independently of theta-marking (cf. Speas, 1990, pp. 16-17; Rouveret and Vergnaud, 1980). An additional principle which involves the expression of abstract Case at the level of Phonetic Form is sometimes also referred to, the Principle of PF Identification (Baker, 1988, p. 116; cf. also Marantz, 1984, on generalizing the Projection principle, as cited by Baker), stated as: Every Case indexing relationship at S-structure must be interpreted by the rules of PF.<sup>29</sup>

The usual account of subject-verb agreement in GB employs all of these constructs and is rendered in the following way. Only subjects trigger verbal agreement. The notion of 'subject', however, is not primitive but derived, and derived from a structural relationship. The

abstract node AGR (representing agreement) is assumed to be co-superscripted with the node that it governs. ‘Superscripting’ from Chomsky (1981) is the indexing scheme for assigning nominative Case (noting that ‘subscripting’ or simply ‘indexing’ is the indexing scheme for the binding conditions of the Binding subtheory). Chomsky argues that AGR is co-superscripted at D-structure with the NP it governs (thus ensuring that the features of person, number, and gender of the governed NP are identical for AGR). Since the only NP that AGR can govern, in English and many other languages, is that in a position to the left of the verb in a phrase-structure tree (the verb itself governs the NP in object position), that NP is considered the subject. If there is no NP at D-structure, then Move/Affect- $\alpha$  moves an NP to that position. If there is no NP to be moved, and the language does not possess a rule such as Affix-Hopping (i.e.,  $\text{Agr V} \rightarrow [\text{VP V, Agr}]$ , per Borer (1986), p. 377, a rule which attaches Agr to the verb), or has a stipulation that the rule does not apply in the syntax (English presumably so stipulates), then an empty category which lacks features, called ‘pro’, (or a pleonastic form like ‘there’ or ‘it’) results at S-structure, the level at which agreement is realized or ‘spelled-out’. Because it is co-superscripted with AGR, this pro will enable the same features on AGR at S-structure (cf. Hermon, 1985, pp. 41-43). If pro is a member of a chain with a postverbal NP which has not moved (because pro and the NP are co-superscripted, and they can be, since NPs can be base-generated freely with any superscript), then that NP will receive the postverbal NP being co-superscripted. Because agreement is

nominative case, pro will receive the same features as the NP and force these agreement features onto AGR.

The direct object of the verb will not receive nominative case, even though it was assigned the same superscript as Agr in a sentence such as (Borer, 1986, p.384):

116. Hebrew:

[e]<sup>i</sup> [VP V +Agr<sup>i</sup> NP<sup>j</sup>]

\*'Axalti ha-tapu'ax.

ate-I-sg the-apple-nom

because, Borer argues, by Burzio's generalization (Burzio, 1981), which states that a verb that assigns accusative Case also assigns a θ-role to its subject, and the fact that a verb which assigns (unexceptional) Case to its object also assigns it a θ-role, then it follows that there must be two θ-positions for the sentence, and so two referential expressions for those positions. Hence, the empty category in (116) and the NP constitute a chain, in order for the e to receive a θ-role, and it must be the same θ-role. But because the verb is accusative assigning, it requires two θ-roles. Therefore, the sentence is ungrammatical.

But there is a wrinkle. The above analysis is predicated on pro and the postverbal NP being co-superscripted. Because superscripting is

nondeterministic, it may so happen that the two nodes are not co-superscripted, because Agr and the NP have different superscripts. In which case, there may be variation in the agreement: on the one hand, a chain (of superscripts) will cause Agr to agree with the postverbal NP; on the other hand, there will be no chain and Agr will not agree with the postverbal NP. Presumably, English constructions with pleonastic 'there' exhibit this variation (Borer, 1986, p. 386):

- 117. a. There<sup>i</sup> are<sup>i</sup> many people<sup>i</sup> coming to the party.
- b. There<sup>j</sup> 's<sup>j</sup> many people<sup>j</sup> coming to the party.

(117a) is the case of a chain (superscripts added); (117b) lacks a chain.

Hence, for normal agreement, in example (118a), an S-structure representation, a lexical NP 'he' is co-superscripted with AGR, forcing agreement of features onto AGR; the NP is assigned nominative Case by AGR.<sup>30</sup> In example (118b), in a pro-drop language, a null-subject is similarly co-superscripted with AGR and therefore enjoins agreement; because it is a null-subject, however, there is no external marking of the agreement features at S-structure except upon Agr.

<sup>30</sup> AGR must govern the mother NP<sup>i</sup> node, and thus license nominative case for it. Previously, the coordinate daughter nodes undergo some merging process to combine features and then allow these to percolate to the mother node, but this is nowhere clearly spelled out in the literature. A variant case is that of

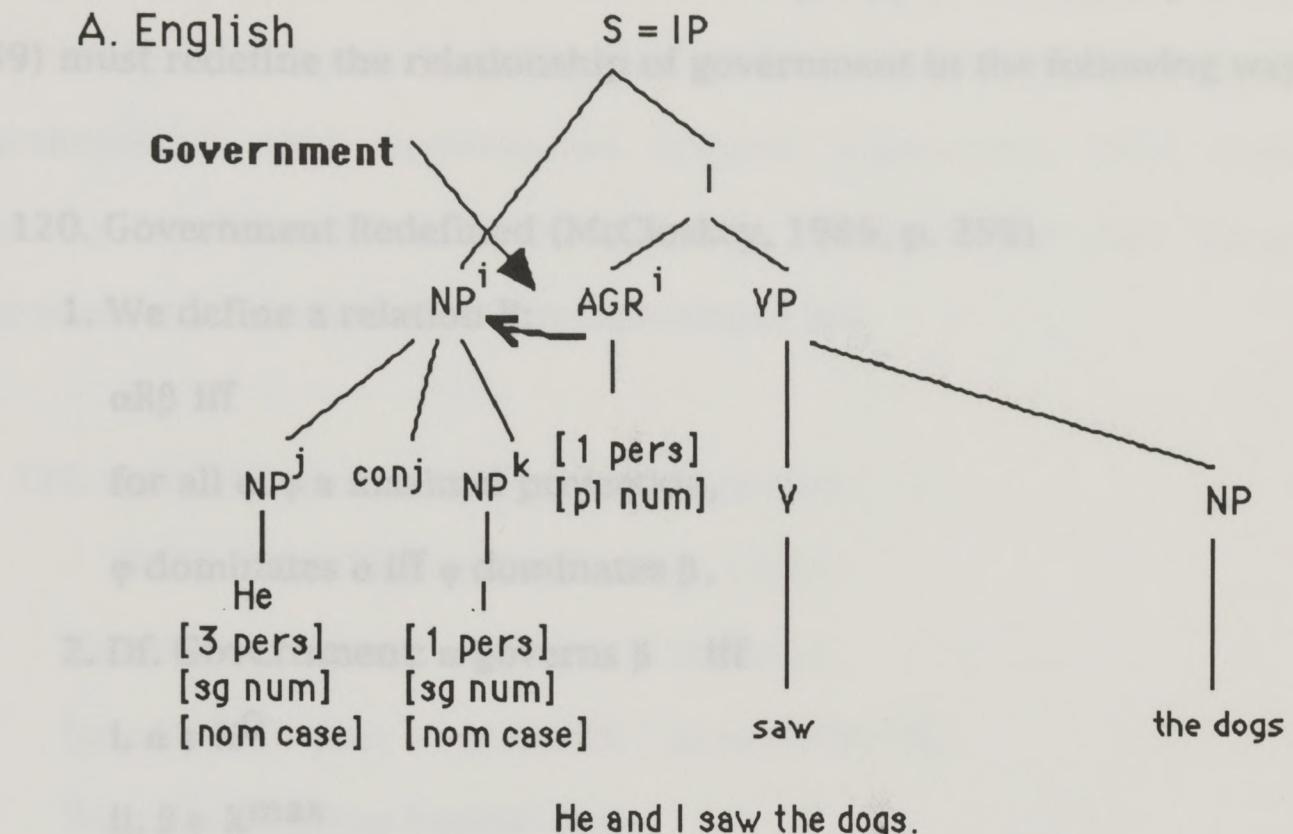


Irish, which will be investigated to some depth later in this thesis. The facts of Irish are complex, but can be rather simply described here: according to McCloskey (1986), the verb will agree only with the nearest conjunct of a coordinate NP subject and then only if that nearest conjunct is pro; if either a full NP or an overt pronoun is the nearest conjunct, then the verb will not agree in person and number with that NP and instead will be in a so-called 'analytic' form, marking only tense. According to McCloskey, the relationship between AGR and the closest pro-conjunct thus must be similar to (119b), with AGR governing only the pro-conjunct and not the mother NP node. The government relationship is not based on terminal element adjacency, but is defined in terms of nodal dominance, headedness, and maximality of category.

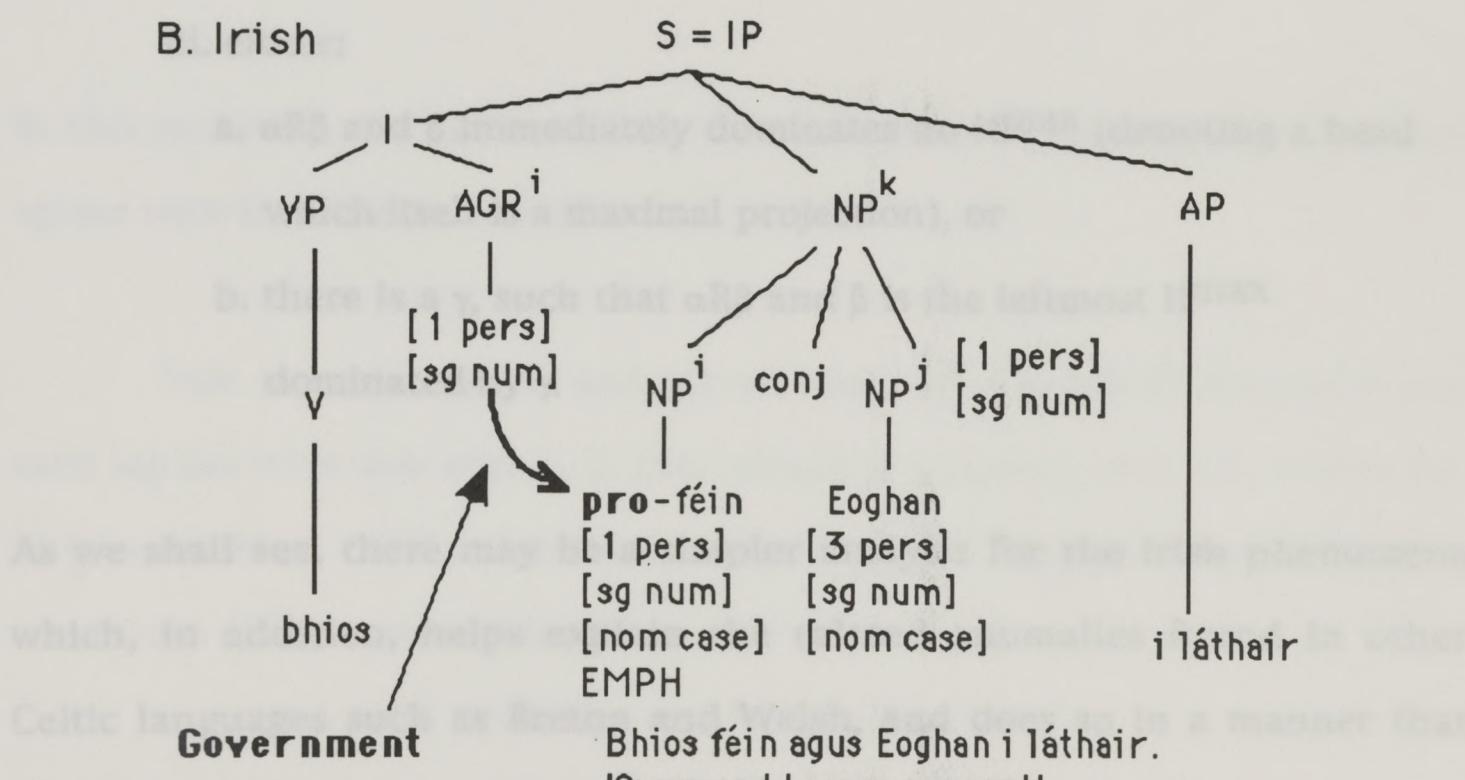
### 119. AGR and Coordinate NP Subject

the essential characteristics of 'clitic subjects' (cf. McCarthy 1993, p.

#### A. English



#### B. Irish



McCloskey (himself observing that the formulation still does not capture the essential characteristic of 'closest' conjunct, cf. McCloskey (1986), p. 259) must redefine the relationship of government in the following way.

**120. Government Redefined (McCloskey, 1986, p. 259)**

1. We define a relation R:

$$\alpha R \beta \text{ iff}$$

for all  $\varphi$ ,  $\varphi$  a maximal projection,

$\varphi$  dominates  $\alpha$  iff  $\varphi$  dominates  $\beta$ .

2. Df. **Government**:  $\alpha$  governs  $\beta$  iff

$$\text{i. } \alpha \in X^0$$

$$\text{ii. } \beta \in X^{\max}$$

iii. either:

- a.  $\alpha R \beta$  and  $\beta$  immediately dominates no  $H^{\max}$  (denoting a head which itself is a maximal projection), or
- b. there is a  $\gamma$ , such that  $\alpha R \beta$  and  $\beta$  is the leftmost  $H^{\max}$  dominated by  $\gamma$ .

As we shall see, there may be a simpler analysis for the Irish phenomena which, in addition, helps explain the related anomalies found in other Celtic languages such as Breton and Welsh, and does so in a manner that affords a bridge to agreement phenomena in non-pro-drop languages such as English.

122 There are disputants to this usual portrayal of agreement in GB-based theories.<sup>31</sup> Falk (1991), for example, argues that nominative case is not the Case assigned by INFL, but rather indicates the absence of Case. Furthermore, this Caselessness triggers agreement, thus explaining “quirky case” in Icelandic, for example, in which the verb agrees with the nominative (or caseless) but non-subject NP:

### 121. Quirky Case and Agreement in Icelandic

(Falk, 1991; Zaenan and Maling, 1982)

Haraldi	voru	gefnir	hestarnir
Harold-DAT	was	given-PL	horses-NOM-PL
'Harold was given horses'			

In this sentence, the subject is the NP possessing dative case, yet the verb agrees with the ‘nominative’ NP.

Falk also cites Hindi and Marathi examples in which the perfective verb agrees with the object, if that object is Caseless, and not otherwise. This condition of Caselessness, moreover, is triggered by “semantic conditions of animacy and definiteness”:

boys	EMG letters	Obj-tore-up	Ans
M.PL	F.PL		M.SG
'The boys tore up the letters.'			

122. Perfective Verb Agreement with Caseless Object in Hindi, Marathi  
 (Falk, 1991, p. 202)

a. Caseless Object

Hindi:

1. ləṛkii ne subəh dərvaze khole

girl ERG morning doors opened

F.SG F.SG M.PL M.PL

'The girl opened the doors in the morning.'

2. ləṛka kursii pər bəṭha

boy chair on sat

M.SG F.SG M.SG

'The boy sat on the chair.'

Marathi:

3. Ti-ni Ravi-laa pustak di -l -a

She-ERG Ravi-DAT booki give-PAST-AGRi

'She gave a book to Ravi.'

b. Objective Case Object

Hindi:

1. ləṛkō ne ciṭṭhiyā ko phar̥ diya

boys ERG letters OBJ tore-up Aux

M.PL F.PL M.SG

'The boys tore up the letters.'

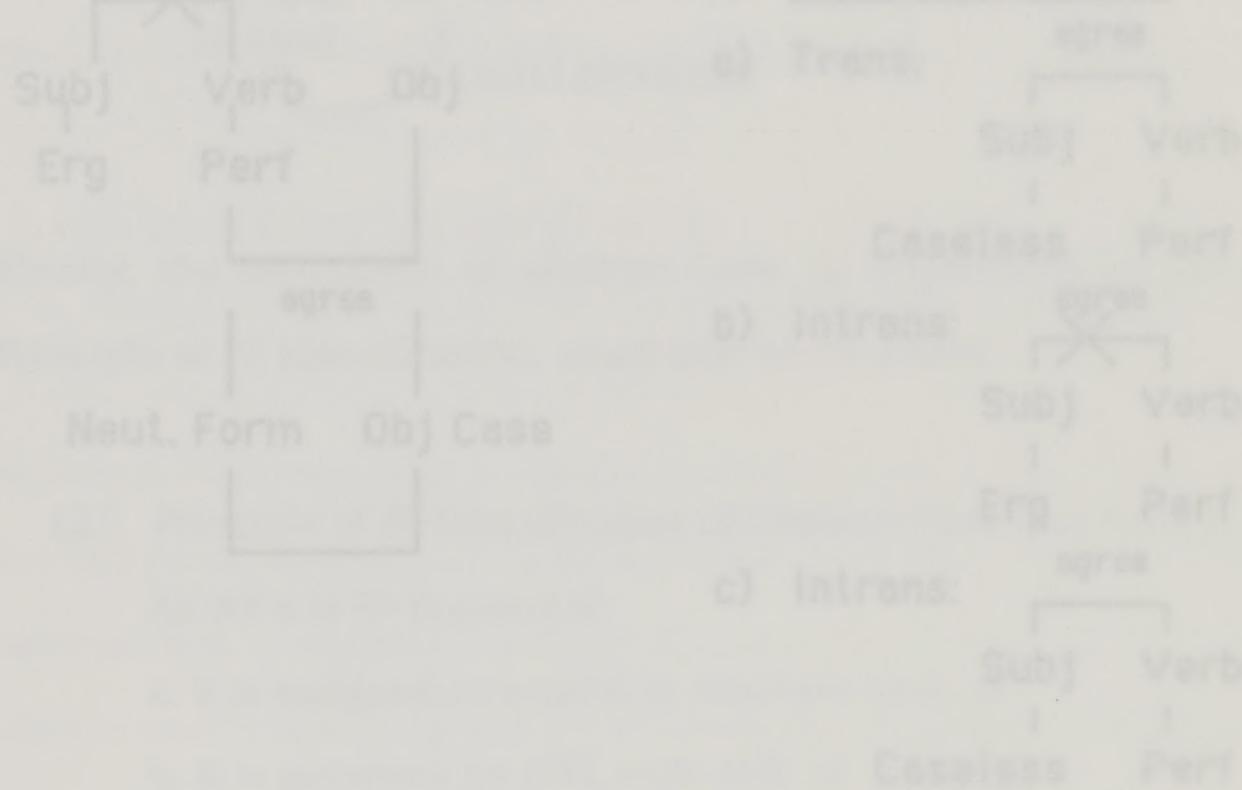
123.

Marathi:

2. Ti-ni      Ravi-laā    chal      -l      -a  
 she-ERG    Ravi-DAT torture    -PAST-AGR (neutral)  
 'She tortured Ravi.'

Subj   Verb

In these examples, the subject is ergative. The neutral form is [3rd person; masc.; sg] in Hindi and [3rd person; neut.; sg] in Marathi. The relevant generalizations are displayed as (123).

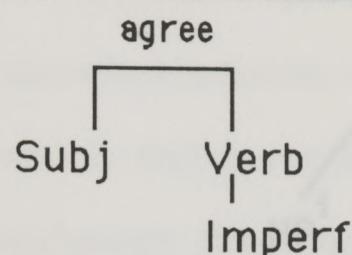


In Falk's formulation, example (118a) above, would thus be

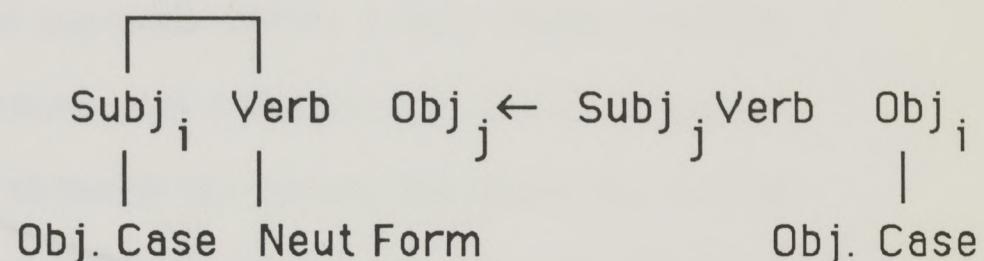
123.

## Hindi-Marathi Agreement

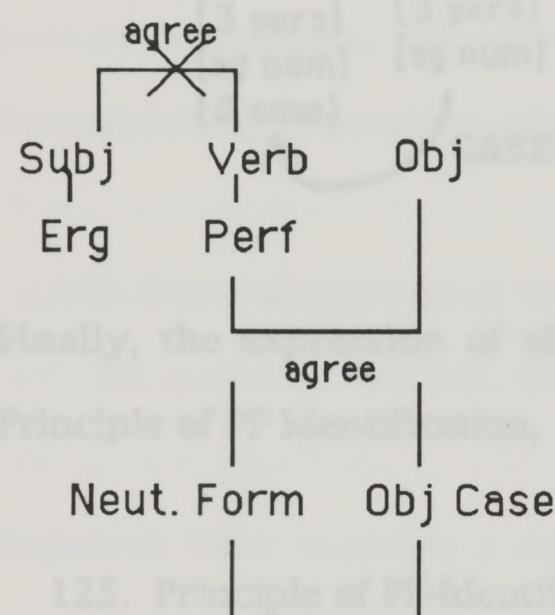
i) Imperfective, Caseless Subj.



iii) Passive

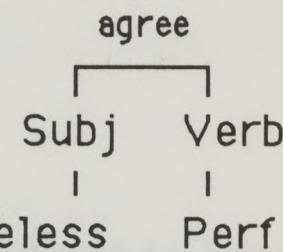


ii) Perfective

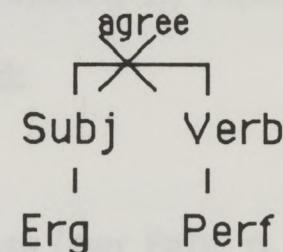


iv) Anomalous Verbs

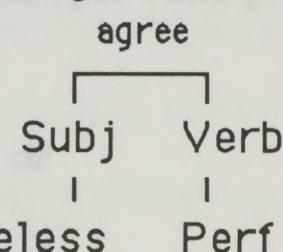
a) Trans:



b) Intrans:

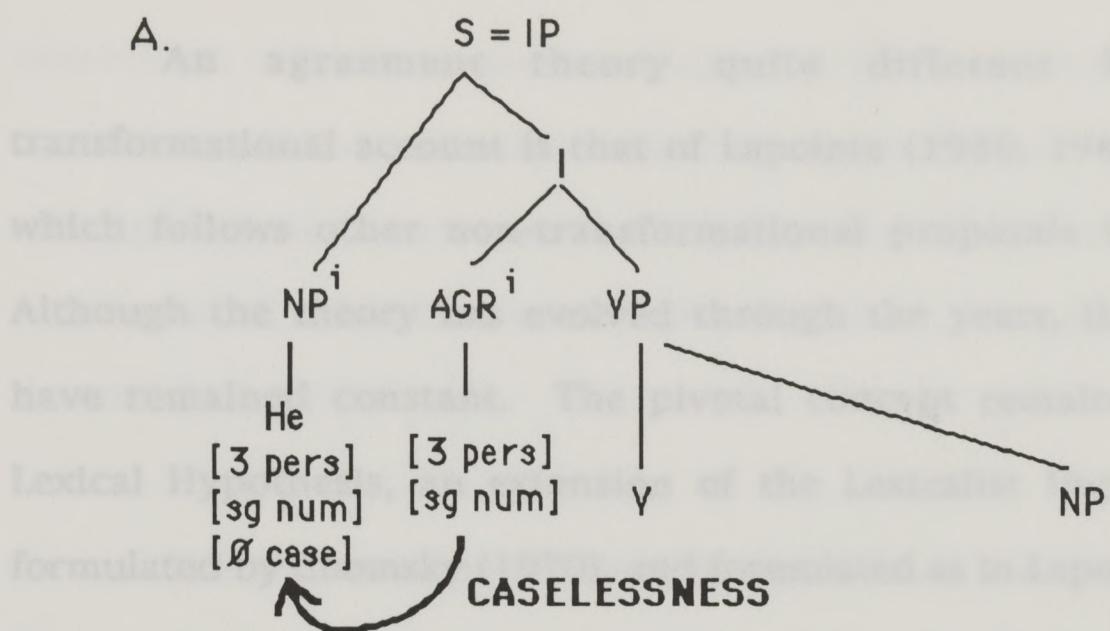


c) Intrans:



In Falk's formulation, example (118a) above, would thus be:

## 124. AGR and the Subject NP (Falk)



Finally, the expression of abstract Case, as formulated in Baker's (1988) Principle of PF Identification, must also be modified:

125. Principle of PF-Identification of Abstract Case (per Falk, p. 210)

An NP  $\alpha$  is PF-licensed if:

- a. It is assigned structural or inherent Case, or
  - b. It is governed by INFL with AGR, or
  - c. It is governed by a V which has the capability of assigning accusative Case and  $\alpha$  meets the appropriate language-specific conditions on animacy and/or definiteness (eg., Hindi), or there is no other Caseless NP in the clause (eg., Icelandic).

### 3.3.3 Lapointe's Theory of Agreement

An agreement theory quite different from the usual transformational account is that of Lapointe (1980, 1981, 1988a, 1988b), which follows other non-transformational proposals in many respects. Although the theory has evolved through the years, the essential points have remained constant. The pivotal concept remains the Generalized Lexical Hypothesis, an extension of the Lexicalist Hypothesis originally formulated by Chomsky (1970), and formulated as in Lapointe (1981):

#### 126. Generalized Lexical Hypothesis

No syntactic rule can refer to an element of morphological structure.

Lapointe here assumes a model of the grammar consisting of relatively autonomous modules including a lexical system (morphological/lexical operations), a syntactic system (phrase structure and transformational rules), and a level for the representation of logical forms for linguistic expressions. These modules interact via primarily two, directed mapping interfaces: lexical insertion of morphological structure for words, and semantic translation of the syntactic structures into logical forms. It is at these two junctures that agreement processes operate.

The two junctures characterize the two kinds of agreement Lapointe has analyzed as occurring in natural language: general

agreement (or “universally authorized agreement”, which operates in the semantic mapping interface) and restricted agreement (i.e., other sorts of agreement, which is more morphological, occurring during lexical insertion). Subsumed under general agreement are the phenomena of case government, adjectival concord, and verb agreement. In the remainder of this section, only the theory of general agreement will be described.

The General Agreement Hypothesis, as it has evolved, purports to be a statement of the specific relationship between the syntactic structures of language and their logical representations. Given below are two formulations of this hypothesis, the first stating the generalization, the second providing a formal definition.

### 127. General Agreement Hypothesis

#### a. Generalization: (Lapointe, 1981, p. 128)

1. Different morphological forms of words make distinct

contributions to the semantic representation of those words.

2. General agreement phenomena arise as a result of the

interactions of the semantic representations of the agreeing words.

b. Formal definition: (Lapointe, 1988a, p. 79)<sup>32</sup>

Let  $\alpha, \beta \in \sigma$ , where  $\sigma$  is a syntactic structure (SS), such that  $\alpha$  is a lexical or pronominal category,  $\beta$  is a noun (N) or a verb (V), and  $\alpha, \beta$  are logically connected. Let  $\alpha$  be marked for the morphological features  $[F_1, \dots, F_n]$  which are all features of  $\beta$ . Then for each  $F_i$ ,  $\alpha$  bears the same value for  $F_i$  that  $\beta$  bears. That is,  $AGR(\alpha, \beta | [F_1, \dots, F_n])$ , read as “ $\alpha$  agrees with the controller  $\beta$  in features  $[F_1, \dots, F_n]$ .”

Syntactic structures (SS) in the above formulation are defined as being directly generated by phrase structure rules, within an  $\bar{X}$  system of categories. Note further that (127b) implicitly characterizes agreement as a directional process, with the feature set flowing from a controller to a target.

Associated with each syntactic phrase structure rule is a semantic translation rule, which produces as output a logical form. These translations rules, and hence the output, are stated in terms of a predicate logic, originally (Lapointe, 1981) with additional restricted quantifiers (these being a class of quantifiers represented  $Qx: \psi$ , each having an associated restriction expressible as a wff of the logic, i.e.,  $(Qx: \psi)\phi \leftrightarrow \psi * \phi$ , where  $* = \rightarrow$ , when  $Q = \forall$ ; otherwise  $* = \wedge$ ), later (Lapointe, 1988a) revised to incorporate generalized quantifier theory (per Barwise and Cooper, 1981). It is with respect to the latter formulation (Lapointe, 1988a) that the

remainder of this exposition will refer. Note that there is nothing extraordinary about these mapping rules: they represent a typical implementation of strict compositionality, associating with each terminal and nonterminal syntactic constituent a semantic interpretation expressed in a (nonintensional) first-order logical language. The translation conventions follow Barwise and Cooper (1981), i.e., given the usual logical symbols (with determiners such as 'a' , 'every', etc., classified as logical specifiers), and nonlogical symbols (class or set terms exemplified by common nouns and adjectives, verbs as relations, and names), there are rules for combining these to form more complex logical expressions.

#### 128. Syntax-to-Semantics Mapping Rules (Lapointe, 1988a, p. 75)

<u>Syntactic Forms</u>	<u>Logical Forms</u>	<u>Notation</u>
determiners	logical specifiers	the'
nouns, adjectives	class/set symbols	house'
		house' ⊕ small'
names, NPs	quantifiers	Bill', [the'(house')]
verbs	relation symbols,	run'(y),
		◊[run'(y)] <sup>33</sup>
	argument variables	
sentence	well-formed formula	[Bill'] ◊[run'(y)], [the'(woman')] ^ ◊[run'(y)]

The sentence 'The girl loves the boy', for example, has the following derivation (with accompanying mapping rules):

*2. Logical Expressions (Logowise, 1982, pp. 77-78)*

129. The girl loves the boy

- a.  $m(\text{the}) = \text{the}'$  [‘ - signifying the semantic interpretation]
- b.  $m(\text{girl}) = \text{girl}'$
- c.  $m(\text{love}) = \text{love}'(x,y)$
- d.  $m(\text{boy}) = \text{boy}'$
- e.  $m(\bar{N}_1) = m(N_1) = \text{girl}'$
- f.  $m(\bar{N}_2) = m(N_2) = \text{boy}'$
- g.  $m(NP_1) = [\text{the}' (\text{girl}')]$
- h.  $m(NP_2) = [\text{the}' (\text{boy}')]$
- i.  $m(VP) = m(\bar{V}) = [\text{the}' (\text{boy}')] \hat{y} [\text{love}'(x,y)]$

where ' $\hat{y}$ ' is a so-called 'capped-variable' used in complex set terms much like a lambda-abstracted variable, i.e., identifying the argument slot of the relation saturated by the argument value; here, in fact, assume that

$$\begin{aligned} [\text{the}' (\text{boy}')] \hat{y} [\text{love}'(x,y)] &== \lambda y. \lambda x. [\text{love}'(x,y)] ([\text{the}' (\text{boy}')]) \\ &= \lambda x. [\text{love}'(x, [\text{the}' (\text{boy}')])] \end{aligned}$$

j.  $m(S) = [\text{the}_1' (\text{girl}')] \hat{x} [\text{the}_2' (\text{boy}')] \hat{y} [\text{love}'(x,y)]$

The agreement process is then defined in terms of a binding relation in the logic, linking the controller and the target. This relation turns on a notion of logical-connectedness, defined as follows.

### 130. Logical Connectedness

#### a. Logical Expressions (Lapointe, 1988a, pp. 77-78)

1. Given non-complex set terms  $\alpha', \beta' \in m(\sigma)$ ,  $\sigma$  a syntactic structure,  $\alpha'$  and  $\beta'$  are logically-connected if:
  - a.  $\alpha'$  is a logical specifier or a name, and **binds**  $(\alpha', \beta')$ , or
  - b.  $\exists \gamma. \gamma$  a logical specifier or name,  
**binds**  $(\gamma, \alpha')$   $\wedge$  **binds**  $(\gamma, \beta')$

where

**df. binds**  $(\phi, \psi)$ : logical specifier or name  $\phi$  binds set term  $\psi$

- 1) if  $[\phi(\psi)]$  is a quantifier form, and  $\psi$  is a basic or complex set term (i.e., for the latter,  $\psi = \tau_1 \oplus \tau_2 \dots \oplus \tau_n$  and for some  $i$ ,  $\tau_i = \tau$ ).
- 2) if  $[\phi(\psi)]\xi$  is a well-formed formula ( $\xi$ , a set term), with the proviso that if  $\xi$  is a complex set-term of the form  $\hat{x}[\chi]$ , then  $\phi$  also binds all  $x$  in  $\chi$ .
- 3) if  $[\phi]\psi$ , i.e.,  $\phi$  is a name.

#### b. Extension to Lexical elements:

1. Given  $\alpha, \beta \in \sigma$ ,  $\sigma$  a syntactic structure as above, and where  $\alpha, \beta$  are lexical or pronominal categories that correspond to  $\alpha', \beta'$  as defined above, then  $\alpha$  and  $\beta$  are logically connected whenever  $\alpha'$  and  $\beta'$  are.
2. Given  $\zeta = \alpha$  or  $\beta$ , as defined above, then  $\zeta$  corresponds to  $\zeta'$ :
  - a. if  $m(\zeta) = \zeta'$ , and

b. either  $\zeta$  is a lexical category or a lexical pronoun, or  $\zeta$  is a pronominal element of a lexical item  $w$  which determines the pronominal semantic categories of  $\zeta'$ , an argument of  $m(w)$ .

With this definition of logical-connectedness, the following constituents of example sentence (129) are thus logically-connected:

### 131. Logically-connected Elements of (129)

- a. in (129g), the' & girl'
- b. in (129h), the' & boy'
- c. in (129j), all of the following:
  - 1. the<sub>1</sub>' & girl'
  - 2. the<sub>1</sub>' & x
  - 3. the<sub>2</sub>' & boy'
  - 4. the<sub>2</sub>' & y
  - 5. girl' & x
  - 6. boy' & y
- d. the lexical items 'the' & 'boy' (129a, d), 'the' & 'girl', (129b, c)
- e. the lexical items corresponding to (129j), i.e., 'the<sub>1</sub>' & 'girl', 'the<sub>2</sub>' & 'boy', and 'girl' & '-s', this latter third-singular marker being the pronominal element for the x-argument of love'(x, y) in  $m(\text{love})$ .

It is clause (130b.2.b) which thereby licenses subject-predicate agreement in the formal definition of agreement in (127b). Furthermore, note that Lapointe presumes that the morphosyntactic cooccurrences of the controller and controllee (or target), which constitute the core notion of agreement, are semantic in nature, by way of being interpretations of markers associated with lexical items. His theory thus has nothing to say about purely formal agreement, suggesting instead that there may indeed be non-semantic agreement (eg., gender agreement in many languages), but that it has its roots in at least one semantic base. In addition, the theory does not address instances of agreement in which the referent of the controller, rather than the markers associated with (the lexical entry of) the controller, determine the values of the agreement features on the controllee.

When the theory of agreement is taken with a principle of markedness (which ranks the possible values of features in a plausibly universal, sequence or hierarchy) and a metric of appropriateness (eg., it is “least complex in a grammar for nouns not to overtly express animacy” (Lapointe, 1988a, p. 84)), a coherent model of the universal agreement process is purportedly derived.

### 3.3.4 The Agreement Theory of Pollard and Sag

Pollard and Sag (1987, 1988), Sag and Pollard (1991), and Pollard (1991), develop a theory of agreement as part of a general information-based theory of the syntax and semantics of natural language, a previous incarnation of which was referred to as Head-driven Phrase-Structure Grammar (HPSG). In their view, agreement processes can be understood in two ways: 1) derivationally, i.e., as a directional process in which features and their values are either moved or copied from one location (typically, a nominal node) to another (typically, non-nominal) location, or 2) in an information-based way, i.e., as an agreement relation between two elements of an utterance which separately specific partial information about a single linguistic object. The first approach to agreement characterizes the theories of traditional transformational grammar (Standard Theory, EST, REST, GB, etc.) and theories like Lapointe's; the second approach characterizes the newer theories, mostly developed during the 1980s, among which are GPSG, Head-Driven Phrase Structure Grammar (HPSG), LFG, and the various unification-categorial variants (Functional-Unification Grammar, Categorial-Unification Grammar, Combinatorial-Categorial Grammar, etc.).

According to the principles of the derivational theories, agreement features are bundles copied or moved from a controller to a controllee (or target), with the controller by definition (usually) the

prior or more important linguistic object. Hence, rules must be critically ordered. This is not the case in information-based approaches. In information-based theories, all linguistic information, including features of agreement, flow monotonically but in unspecified directions, from all linguistic forms to all other related linguistic forms, selecting compatible forms via a process of merging, with the perception of direction being caused by the fact that certain forms specify more information than other forms and, hence, seem more to be the source of the information.

A strong argument against derivational theories and, correspondingly, for information-based theories, according to Pollard and Sag, is the amount of redundancy of linguistic information required in the grammar, primarily in the lexicon. In French, for example, obligatory agreement (of number and gender) between predicate adjectives and their subjects (132a. below) will require a copying (or movement) rule to move the subject's features onto the adjective; such a rule thereby entails multiple entries in the lexicon for first and second pronouns:

### 132. French Predicate Adjective Agreement and Pronouns

(Pollard and Sag, 1988, p. 238-239)

#### a. Predicate Adjective/Subject Agreement

1. Il est heureux. 'He is happy (masc.)'
2. \*Il est heureuse. 'He is happy (fem.)'

3. Ils sont petits. ‘They (masc.) are small (masc. pl.)’

4. Elles sont petites. ‘They (fem) are small (fem. pl.)’

5. \*Elles sont petits. ‘They (fem) are small (masc. pl.)’

b. Multiple (redundant) Pronouns

1. Je suis heureux ‘I am happy (masc.)’

2. Je suis heureus ‘I am happy (fem. sg.)’

3. Tu es heureux ‘You are happy (masc.)’

4. Tu es heureuse ‘You are happy (fem.)’

In (132b), both the first person pronoun ‘je’ and the second person pronoun ‘tu’ must each be listed in the lexicon twice, one for either respective value of gender, assuming that the value moves from the pronoun to the adjective (as in 133a, below). But in their theory, the first and second person pronouns are simply unspecified for the value gender, i.e., has a representation much as in (133b):

### 133. French Pronominal Lexical Representations

a. Derivational Prominal Lexical Entries:

‘je’: [Features: [1 Person] [SG Number][MASC Gender]]

‘je’: [Features: [1 Person] [SG Number][FEM Gender]]

‘tu’: [Features: [2 Person] [SG Number][MASC Gender]]

‘tu’: [Features: [2 Person] [SG Number][FEM Gender]]

b. Information-Based Pronominal Lexical Entries:

'je': [Features: [1 Person] [SG Number][ $\alpha$  Gender]]

'tu': [Features: [2 Person] [SG Number][ $\alpha$  Gender]]

This state of affairs is not unusual, by far, among the languages of the world. A derivational account of German adjectival concord, for example, would need to posit 48 adjectival entries (because there are three values of gender, two of number, and four of case, and then three forms of concord: strong, weak, and mixed) even though only five forms are observed (Pollard and Sag, 1988, p. 245; Sue Schmerling, p.c.). Furthermore, in Latin noun declension, there are 20 possible forms, but only 13 are realized; hence, there must be some coalescing or merging of distinct features.

134. Latin Noun Declension (Myers and Hoffman, 1979, p. 245)

Noun: wolf

Masculine

Sing

Pl

Nom	[1]	lupus		lupi
Gen	[2]	lupi	[5]	lupōrum
Dat	[3]	lupo	[6]	lupīs
Acc	[4]	lupum	[7]	lupōs
Abl		lupo		lupīs

	<u>Feminine</u>	
Nom	[8] lupa	lupae
Gen	[9] lupae	[12] lupārum
Dat	lupae	lupīs
Acc	[10] lupam	[13] lupās
Abl	[11] lupā	lupīs

Given the motivation for a general non-derivational linguistic theory, then, Pollard and Sag propose a theory of agreement in which features constitute essentially non-syntactic, referential parameters, functioning to maintain these discourse entities and their interrelationships, and to distinguish among them. Features encode discourse roles (person) and semantic sortal distinctions (number, for counting purposes; gender for other sorts such as sex, animacy, humanness, and possibly 'shape', per Bantu languages). Although there is grammaticalized gender (as in French and German), in which words are assigned arbitrarily to particular genders, most often linguistic features bear the same (semantic and pragmatic) information as do the real-world (or discourse) referents to which the discourse (or referential) parameters are anchored, i.e., the reference is transferred or inherited.

For example (Pollard & Sag, 1988, p. 243):

### 135. Agreement with Referent of Nominal (English)

The hash browns at table six is/\*are waving his/\*its/\*their hands.

As noted by many others (cf., for example, Givon, 1972), furthermore, it appears to be the content or interpretation of the NP, and not the noun, which influences the feature set of the agreeing predicate, at least with respect to the distributive force of that predicate. In (136), for example, either the singular or the plural form of the verb is acceptable, depending upon whether the verb is interpreted distributively (formerly, the conjunction-reduction reading) or not. Only the plural verb permits the distributive interpretation, paraphrasable as: 'doing phonology problems makes me sick and drinking vodka makes me sick.'

**136. Agreement and Distributivity (English) (Pollard & Sag, 1988, p. 245)**

Doing phonology problems and drinking vodka makes/make me sick.

They cite as evidence the apparently inviolable nature of determiner-noun agreement (*Ibid*, ff. 5), as exhibited by (137a).

**137. Determiner/Noun Agreement (English)**

- a. \*Each cereals is/are my favorite breakfast.
- b. This/\*These man and woman were/\*was walking down the street.<sup>34</sup>

But (137b) shows that there is a problem with this supposed inviolability, in that it appears that, taken alone, the determiner does not agree with the

verb. The only plausible interpretation of the sentence is that the determiner itself distributes over the noun conjuncts, and that then the entire NP receives a collective interpretation, enjoining plural agreement on the verb.

Features thus act as discourse indices for the referential parameters (objects) of which they are constituents, linking (or coindexing) the linguistic forms. But this is not wholly a semantic-based theory. A semantic-based theory would have nothing to say about mismatches between subject-verb agreement features and reflexive features, for example, when the referent of the subject can be considered to have multiple possible values of some of those features. A case in point is illustrated by a sentence in which the subject is a collective noun: '\*The faculty is voting themselves a raise.' 'The faculty is voting itself a raise' and 'the faculty are voting themselves a raise' are perfectly acceptable. Pollard and Sag emphasize here that the number of collective nouns, which is permitted to vary in general, must be consistent once a choice is made, throughout the utterance. The theory thus views agreement as similar to the functionalist notion of cross-referencing.

A representation of a simple sentence, in an HPSG format, is the following. (138a) represents the lexical entries for the words 'he' and 'walk' before merger; (138b) is the resulting sentence after merging the information contained in the lexical entries.

## b. Sentence (for example 138)

138. HPSG Subject-Verb Agreement (Pollard and Sag, 1988a, p. 248, 251)

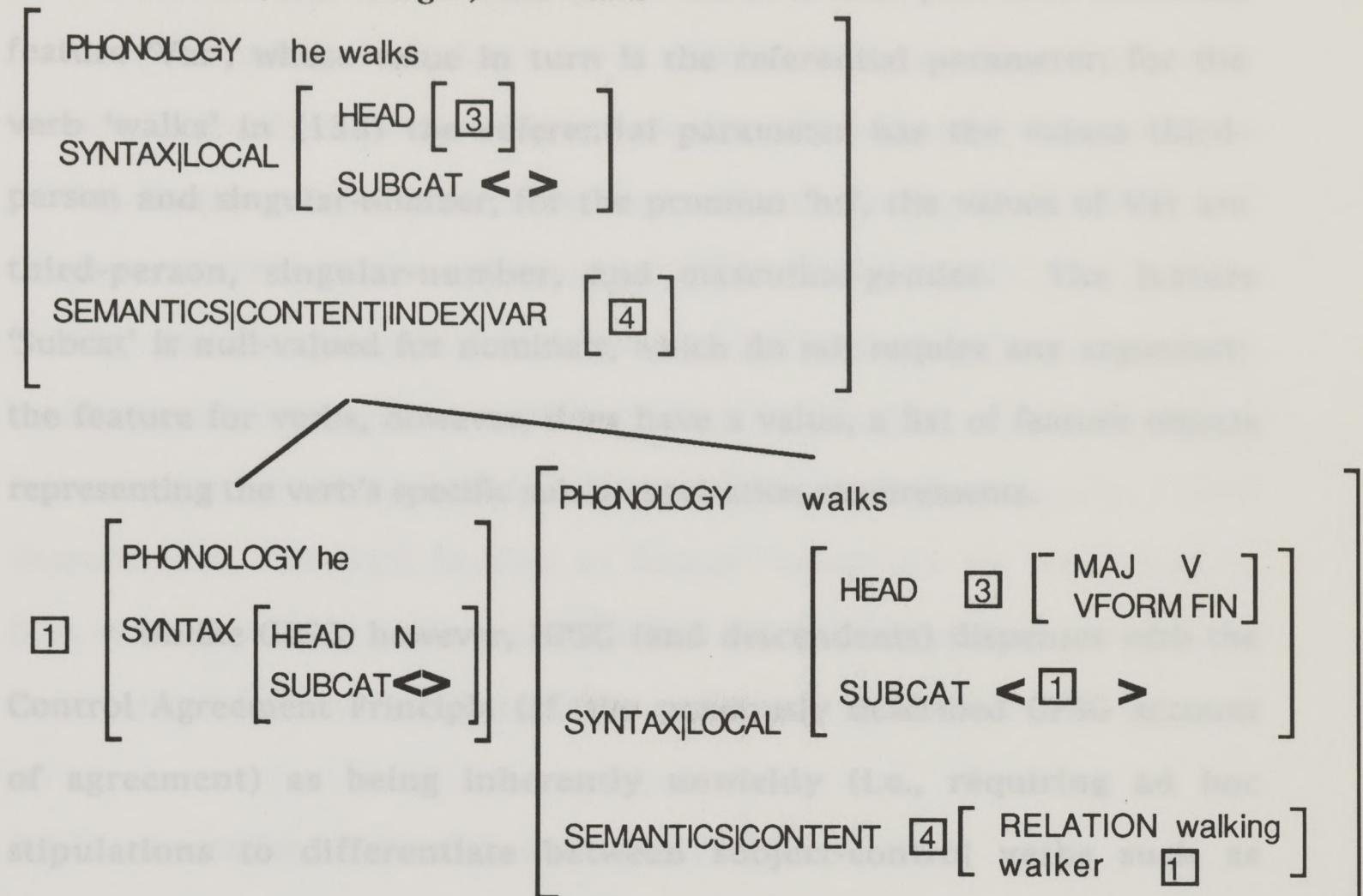
a. Lexical entries:

PHONOLOGY	he
SYNTAX LOCAL	HEAD [ MAJ N CASE NOM ] SUBCAT < >
SEMANTICS CONTENT INDEX VAR	PER 3 NUM SING GEND MASC

PHONOLOGY	walks
SYNTAX LOCAL	HEAD [ MAJ V VFORM FIN ] SUBCAT <
SEMANTICS CONTENT	SYNTAX LOCAL [ MAJ N CASE NOM ] SUBCAT < > SEMANTICS CONTENT INDEX VAR [ PER 3 NUM SING ] RELATION walking walker [ ]

HPSG has many points of correspondence with CGSL, among which is the set of head features (and values) such as Major (category), Case, Vform, Subcat, etc.<sup>35</sup> The features of importance to the theory of agreement, however, are two: those under Semantics in the second illustration, and that of Subcat. The Semantics feature "Content" is meant to represent the literal meaning of the word(s) being plural. It is not

b. Sentence (after merger): 'He walks'



The tag **1** acts as a pointer, signifying a reentrant structure, i.e., that the feature structures so tagged are the exact same object.

HPSG has many points of correspondence with GPSG, among which is the set of head features (and values) such as Major (category), Case, Vform, Subcat, etc.<sup>35</sup> The features of importance to the theory of agreement, however, are two: those under Semantics in the above illustration, and that of Subcat. The Semantics feature 'Content' is meant to represent the literal meaning of the linguistic item, phrased in terms of

situation semantics. The feature ‘Index’ has as at least part of its value the feature ‘Var’, whose value in turn is the referential parameter: for the verb ‘walks’ in (138) the referential parameter has the values third-person and singular-number; for the pronoun ‘he’, the values of Var are third-person, singular-number, and masculine-gender. The feature ‘Subcat’ is null-valued for nominals, which do not require any argument; the feature for verbs, however, does have a value, a list of feature objects representing the verb’s specific subcategorization requirements.

~~demonstrates that the HPSG approach to binding is more general than GPSG's~~

~~first-on~~ Unlike GPSG, however, HPSG (and descendants) dispenses with the Control Agreement Principle (cf. the previously described GPSG account of agreement) as being inherently unwieldy (i.e., requiring ad hoc stipulations to differentiate between subject-control verbs such as ‘promise’ and object-control verbs like ‘persuade (Pollard and Sag, 1988a, p. 254)), overgeneral (permitting agreement where no agreement phenomenon has ever been discovered, as, for example, between adverbs and the adjectives they modify), and misguided. The CAP is misguided, according to Pollard and Sag, because it does not capture the correct, underlying notion of agreement, that it is inherently about referentiality.

### 3.4 Other Feature Formalisms

~~Incorporation, especially with regard to the development of the theory~~

~~Incorpor~~ Mention must be briefly made of other formalisms (in distinction to specifically linguistic theories) which attempt to represent notions

such as the featural substructure of lexical items and thus agreement processes. These include: Kay's (1979, 1983, 1984) Functional Unification Grammar, the first formalism with explicit feature unification, Ait-Kaci (1984), Kasper and Rounds (1986), Porter (1988), Smolka (1988, 1989), and Carpenter (1990); Kaplan and Bresnan (1982), Shieber (1986), and Johnson (1988). The first group of references share the attempt to frame a feature-based, constraint-logic formalism; the latter employ a set of boolean feature equations using features, constants and variables. Smolka (1989) demonstrates that both families of feature formalisms are subsumed by first-order predicate logic with equality. Reference should be made to these sources for further information.

### **3.5 Incorporation, Topicality, and Agreement**

This section reviews some of the background concepts and literature concerning the linguistic process of multiple word coalescence known as incorporation. This section is placed within the chapter describing concord phenomena primarily because the two morphological processes share certain attributes: concord as represented by inflection, for example, is an affixal process in which the participating morphemes generally exhibit some phonological reduction, as is the case in incorporation, especially with regard to the incorporated material.<sup>36</sup> Incorporation is of interest to this thesis because an analysis will be proposed for subject-predicate agreement which crucially employs

pronominal incorporation by the verb within a generalized categorial framework. A large portion of the literature, however, includes types of incorporation only of tangential (immediate) relevance to this thesis and will not be reviewed. A wider scoped approach would investigate in detail the ramifications of the theoretical extensions made to the understanding of pronominal incorporative processes as given later in this thesis to other types of incorporation, such as noun, verb (causatives, applicatives, etc.), and preposition incorporation, as they are usually classified.

Because incorporation and discourse topicality are two concepts apparently intimately involved, this section will also describe some salient findings on the relationship between these.

The morphological process of coalescence which is incorporation can be viewed from a number of perspectives. One might differentiate between incorporation, compounding, affixation, and cliticization as distinct morphological concatenative processes, for example, as is generally done in the literature, though such a distinction is not as clean as supposed. In this view, as observed by Spencer (1991), for example, affixation is the concatenation of a 'satellite' morpheme to a root (or stem). If the realm of morphology is taken to comprise two kinds or strata (and such a so-called 'split morphology' or Weak Lexical hypothesis is itself not uncontroversial, cf. Anderson (1982, 1988), Spencer (1991, p. 178), Corbett (1987), etc.), i.e., lexical and post-lexical phases identifying

derivational and inflectional processes, respectively, then affixes can be either derivational or inflectional, or in some theories both. Derivational affixes traditionally are category-changing or exocentric; inflectional affixes are category-preserving or endocentric.<sup>37</sup> Inflectional affixation is relatively productive in most languages.

Similarly, both clitics and inflectional affixes are used to further morph Compounding is the concatenation of two or more roots, typically all of which are of the same category, forming a compound word of the identical category.

Cliticization is the process in which an affix adheres to a typically fully-formed word or phrase, i.e., a root to which affixation has already applied or a phrase of fully-formed words. Clitics almost always adhere peripherally, either to the beginning or the end of the word or phrase. Another general observation made about clitics is that often they are redundant, adding inflectional information, for example, to a verb which is already inflected. Reflecting this observation, some theorists attempt to define cliticization as redundant affixation to an already (argument-) saturated relation or function. Many have noted that clitics often seem to obey Wackernagel's Law (1892), i.e., occur in second position in a clause, immediately after the first stressed constituent.

Zwicky (1985) attempts to compile a set of tests to distinguish clitics from particles (i.e., independent words), and, particularly relevant to our

purpose here, which demonstrate the similarity between clitics and inflectional affixes. The six metrics he proposes are (Zwicky, 1985, p. 287-288): binding, closure, construction, ordering, distribution, and complexity. Clitics, like inflectional affixes but unlike words, cannot occur in isolation, but must be bound with other elements within a word. Similarly, both clitics and inflectional affixes "close" a word to further morphological operations (though the phenomenon of double cliticization, as will be seen later in this thesis, affords a slight qualification to this statement). One possible variance between clitics and inflectional affixes, however, is in their combinational capabilities: inflections (as we will occasionally call inflectional affixes) typically attach to stems or full words, whereas clitics may sometimes attach to constituents of or an entire phrase. With respect to ordering, both clitics and inflections typically occur adjacent to their morphological companions in a fixed order. Clitics and inflections, however, do have some dissimilarity in distributional properties, with inflections having a rather more limited range in the categories they can occur with, stateable by recourse to a single principle, and clitics having a slightly wider range, but one which is still stateable in terms of a single principle. Finally, both inflections and clitics are in general morphologically simple, as opposed to words, which are complex, i.e., composed of multiple morphemes.

Incorporation can conceptually be distinguished from affixation, compounding, and cliticization by remarking that its primary absorptive sources are the verb and preposition, and the targets or linguistic entities absorbed are noun objects or other verbs whose roots typically can surface as independent words. The incorporating source forms are thus relational or functional by nature, i.e., forms requiring arguments; the incorporated target forms are either arguments or themselves endocentric relations. The entity incorporated usually retains only some of its phonological properties, as such behaving like an affix or clitic, and has its semantic content merged with the semantic content of the incorporator, investing the resulting post-incorporation entity with a semantics generally related to the literal composition of the original individual forms but often given an idiomatic flavor. An example of noun incorporation illustrating such a modification of the semantics of the composed components is the following:

### 139. Noun Incorporation by Verb in Australian Ngandi

(Heath, 1978, cited by Mithun, 1986b, p. 379)

-ŋal- + -geyk- də- => -ŋalgeykd a

saliva to throw 'to spit'

In the terminology of language typology, a distinction is usually made between incorporation and pronominal cliticization, with the former representing constructions such as (139) and the English verb

'baby-sit', i.e., the capturing by the verb of an argument. Here, we need make no such hard distinction, remarking only that by 'incorporation' henceforth is intended 'pronominal incorporation into the verb', related to but separable from the phenomenon of pronominal cliticization.

Sadock (1991, p. 105), for example, distinguishes incorporation from cliticization by stating explicitly that in the former process, a lexeme combines with a 'stem' in the morphology and a phrase in the syntax, whereas in the latter process, a lexeme combines with an 'inflected word'.<sup>38</sup> If we adhere to his view, then inflection is not cliticization but represents a closer or earlier integration (morphologization) with the verb, i.e., incorporation.

An early source for the notion of incorporation is Boas (1911/1966, pp. 70-71), who partially reaffirmed the then prevailing analysis of native North American languages as being characteristically incorporating (and polysynthetic), by which was meant the propensity of the verb to incorporate nominal and pronominal objects. He asserted that this property was true only of the Iroquois, the Caddoan languages, and to a lesser extent, the Tsimshian, Kutenai, and Shoshone languages, and definitely not true of the Chinook.

One of the primary contemporary proponents of an incorporative theory of subject-verb agreement is Givon (1975), who argues that the

phenomena of grammatical agreement, in general, arises from topic-verb agreement, i.e., that subject agreement is derived from topic-shifting. This occurs in languages in which a non-null pronoun used in anaphora replaces a coreferent noun, a process representing topic-agreement. Eventually, the topic becomes reanalyzed as the ordinary subject or object in a non-topicalized sentential form, and, correspondingly, the subject-topic (or object-topic) agreement becomes simply subject (or object) agreement. He observes that "one highly universal aggregate function 'subject'" consistently and near universally pairs the discourse function of 'topic' and the semantic function 'agent'.

*reanalysis based upon topicality, i.e.,*

#### 140. From Topic-Shift to Subject-Agreement (Givon, 1975, p. 154)

Topic Shift ("Marked")      Neutral (Reanalyzed)

The man, he came      =>The man he-came

TOP    PRO                  SUBJ    AG

Employing a generalization of Moravcsik (1974) that languages seem to follow a topic hierarchy of forms, ranging in terms of likelihood of topicality from indefinite object to human object to definite object to subject, Givon decomposes this notion of topic likelihood into ordered binary relations in which +Human, +Definite, and +Involvement\_of\_participant are the respective properties of the more preferred topic. The attribute of person is also factored in, with the ordering in terms of likely topicality decreasing from first to second to

third person. Matched against case distinctions, these imply that the agentive case is preferred to the dative, and the dative to the accusative, with the speaker of a sentence generally being the presupposed point of reference.

Because subjects tend to have more of these properties (humanness, definiteness, participation, etc.), and thus more often the topic, an explanation is thereby available for the prevalence of subject-agreement over the various forms of object-agreement. Object-agreement, in Givon's view, is similarly the result of a process of reanalysis based upon topicality, i.e.,

#### 141. From Topic-Shift to Object-Agreement (Givon, 1975, p. 156)

Topic Shift ("Marked")	After-thought TS ("semi-marked")	Neutral (Reanalyzed) ("demarke")
<u>the man</u> , I saw <u>him</u>	=>I saw <u>him</u> , <u>the man</u>	=> I saw- <u>him</u> the man
TOP	PRO	

The apparently close correlation between pronominals and agreement morphemes in the languages of the world is thus situated in a common framework: agreement morphemes are derived from pronominals which have undergone a decrease in topicality and have been absorbed or incorporated into the verb. Evidence is readily available from many pidgins and creoles and from initial language acquisition, all

of which share a common communicative stress, i.e., communicative duress requiring redundancies and over-topicalization strategies.<sup>39</sup> In fact, Givon points out, if a language eventually elaborates a complex agreement system (subject and dative and accusative object agreements), then this system itself becomes a way of signalling transitivity. For example (Givon, 1975, p. 168), New Guinea Highlands Pidgin directly correlates agreement morphemes with arguments of the verb:

**142. Agreement Morphemes as Indicative of Valency**

a. Intransitives:

em i-go      him he-go  
 “He went”

b. Transitives:

em i-har-im John  
 him he-hear-him John  
 “He heard John”

Givon (1988, p. 249) ranks pronominal/nominal forms along a dimension of topicality, ranging from least topical and most predictable or accessible referent to most topical and least predictable or accessible:<sup>40</sup>

**143. Ranking Referential Predicability (in decreasing order)**

a. zero anaphora

- ~~that~~ b. unstressed/clitic pronoun ('agreement')
- ~~or the~~ c. stressed/independent/contrastive pronoun
- ~~every~~ d. full definite noun
- ~~person~~ e. restrictively modified definite noun

~~subject~~ In a discussion of topic-prominent languages vs. subject-prominent languages, while acknowledging the diachronic reasonability of the proposed origin of agreement from resumptive pronouns (with the notion that subjects are essentially grammaticalized topics, i.e., "integrated into the case frame of the verb"), Li and Thompson (1971, p. 487) take issue with Givon's synchronic interpretation of the correlation between incorporated agreement morphemes and full pronominals, stating that

"She had to go to the store yesterday"  
 we know of no evidence against the hypothesis that by the time the pronominal has become a bound agreement morpheme the noun with which it agrees is no longer simply a topic but is integrated into the gram system as a subject. But evidence is difficult to find, since none of the topic-prominent languages that we have investigated have well-developed anaphoric pron. systems.

Haiman (1988) points out some interesting correlations between incorporation and focus. Though there is a great divergence of views on the characterization of both topic and focus (and background, comment, etc.) in the literature, for the purposes of exposition here it is assumed that focus is more local than topic, but that topic in some sense is a more global focusing mechanism. In particular, Haiman (p. 310-311) observes

that incorporation is inhibited in general when either the incorporator or the incorporatee is emphasized by stress (and thereby focussed). For example, in Vallader Romantsch, an SVO language, when an adverb is preposed, the subject must occur postverbally. When the subject is a personal pronoun, it must occur in reduced form (144.a.1); when such a subject is focused, the full form of the pronoun must follow the verb (144.b.3).

#### 144. The Inverse Relation Between Focus and Incorporation in

Romansch (Haiman, 1988, pp. 313)

##### a. Reduced Pronominal Subject

1. Ella ha gnü dad ir in butia mardi.

she has had of to go in store yesterday

'She had to go to the store yesterday'

2. Mardi ha la gnü dad ir in butia.

yesterday has she had of to go in store

'Yesterday she had to go to the store'

##### b. Full Pronominal Subject

1. No pigliain quella in butia

we take that(fem) in store

'We'll take that one to the store'

2. Quella pigliain- a in butia.

that take we in store

'That one we'll take to the store'

3. Quella pigliain- a no.

that take we we

'That one we'll take'

In (3-5), after indicating some details

It thus appears that there is a clear, if not unvarying, relationship between the lack of stress (representing a de-focusing) and phonological reduction of the form.<sup>41</sup>

Bresnan and Mchombo (1987) argue against Givon's (1975) equation of incorporation of the object pronominal in Bantu with agreement. They differentiate between grammatical agreement and anaphoric agreement, characterizing the former as a relationship in which an NP is an argument to the verb and the verb's affix redundantly expresses the featural information of the NP. Anaphoric agreement, to the contrary, is a relationship between a verbal affix, equivalent to an incorporated pronominal argument of the verb, and a coreferential NP which functions as a non-argument, being instead either a kind of adjunct to the incorporated pronominal or a discourse topic/focus.<sup>42</sup> These relationships are graphically depicted as follows:

#### 145. Grammatical vs. Anaphoric Agreement

##### a. Grammatical Agreement

NP1-ARG1\_FEATS V-ARG1\_FEATS(ARG1 ARG2 ... ARG<sub>n</sub>) NP2 ... C<sub>n</sub>

**b. Anaphoric Agreement**

option NP1 V-ARG1(\_\_\_\_ ARG2 ... ARG<sub>n</sub>) NP2 ... C<sub>n</sub>

agreement based upon changes in word order, at least in single instances

In (145a), affixes indexing the verb's first argument cooccur on the verb and the NP representing that argument; in (145b), the verb's first (or nth) argument has been incorporated into the verb and, hence, removed as an argument.

verb):

Accordingly, the minimal difference between the agreement affix and the incorporated object pronominal is “the presence or absence of a semantic attribute in the lexical content of the affix” (Bresnan and Mchombo, 1987, p. 741), much like the difference between a subject NP and a topic NP is the function, not the structural or configurational aspects of the NP and its verb. In fact, the same structural form is employed for both subject and topic. Contrary to Givon, therefore, they argue that the two processes, agreement and pronominalization (or incorporation thereof), are distinguishable. This distinction is expressible in an LFG-style formalism in terms of two properties: 1) the completeness condition, and 2) the principle of functional uniqueness.

The interaction of these principles can be illustrated with reference to, for example, the Bantu language Chichewa. Chichewa marks both subject and object agreement (encompassing person, number, and gender) according to the following generalizations. In finite verb forms,

the subject marker (SM) is obligatory, while the object marker (OM) is optional (146a.1,2). Furthermore, there is variation in the behavior of agreement based upon changes in word order, at least in simple transitive sentences: when there is no verbal object marker, the object, but not the subject, must immediately follow the verb. The subject itself may occur in any order (146b). If the object marker is present, then both the object and the subject can appear in any order (146c) (Su= subject, O = object, V= verb):

#### 146. Subject and Object Agreement in Chichewa

(Bresnan & Mchombo, 1987, p. 744-745)

##### a. Normal Word Order

1. Njûchi zi-ná-lúm-a alenje.

bees SM-PAST-bite-INDIC hunters

"The bees bit the hunters."

2. Njûchi zi-ná-wá-lum-a alenje.

bees SM-PAST-OM-bite-INDIC hunters

"The bees bit them, the hunters."

##### b. Inverted Word Order (subject agreement only)

1. SuVO: Njûchi zi-ná-lúm-a alenje.

bees SM-PAST-bite-INDIC hunters

"The bees bit the hunters."

2. VOSu: Zinálúma alenje njûchi.

3. OVSu: \*Alenje zinálúma njûchi.

4. VSuO: \*Zinálúma njúchi alenje.

5. SuOV: \*Njúchi alenje zinálúma.

6. OSuV: \*Alenje njúchi zinálúma.

c. Inverted Word Order (both subject and object agreement)

1. SuVO: Njúchi zi-ná-wá-lum-a alenje.  
 bees SM-PAST-OM-bite-INDIC hunters

"The bees bit them, the hunters."

2. VOSu: Zináwáluma alenje njúchi.

3. OVSu: Alenje zináwáluma njúchi.

4. VSuO: Zináwáluma njúchi alenje.

5. SuOV: Njúchi alenje zináwáluma.

6. OSuV: Alenje njúchi zináwáluma.

In LFG, the property of functional uniqueness requires that information associated with the same function, wherever in the phrase it occurs, must be consistent; if it is semantic information, furthermore, that information must be unique. If an argument is lexically required, according to the completeness condition, it must be present. In Chichewa, therefore, functional uniqueness disallows the subject marker (ambiguously used for both grammatical and anaphoric agreement) to cooccur with the subject NP argument; but the completeness condition requires that if there is no subject NP, then the pronominal must be understood as the subject marker (*Ibid.*, p. 745, fn 6). With respect to object agreement, however, the use of the object marker is only

anaphorical, that is, an incorporated pronominal, and by the uniqueness principle, it cannot occur with an object NP; therefore, the observed cases of objects occurring in the above examples are not really objects, but topics. Furthermore, if, as seems to be the case, all object NPs are generated in a fixed postverbal position in the VP, then by the uniqueness principle, an object can occur postverbally only if there is no object marker. In the LFG notation, the following rules hold (*Ibid.*, p. 745-746):

#### 147. LFG Rules for Subject and Object Agreement in Chichewa

- a.  $\text{VP} \rightarrow V ( \quad \text{NP} \quad ) ( \quad \text{NP} \quad ) \quad \text{PP}^*$   
 $(\uparrow \text{OBJ}) = \downarrow \quad (\uparrow \text{OBJ2}) = \downarrow \quad (\uparrow \text{OBL}) = \downarrow$
- b.  $\text{S} \rightarrow ( \quad \text{NP} \quad ), \quad \text{VP}, \quad ( \quad \text{NP} \quad )^{43}$   
 $(\uparrow \text{PRED}) = \downarrow \quad \uparrow = \downarrow \quad (\uparrow \text{TOP}) = \downarrow$
- c.  $(\uparrow \text{PRED}) = \text{'PRO'}$  is obligatory for SM
- d.  $(\uparrow \text{PRED}) = \text{'PRO'}$  is optional for OM

The primary problem with such an analysis as enunciated by Bresnan and Mchombo, differentiating between pronominal incorporation and agreement, is that it tends to presume what it would prove (introducing an element of circularity in the argumentation), thereby unsurprisingly inferring it. According to their reasoning, the object marker in Chichewa is not an agreement morpheme but an incorporated pronominal, whereas the subject marker is both an agreement morpheme and an incorporated pronominal, because the

former observes only anaphoric use, while the latter ambiguously observes both agreement and anaphoric use. The obvious assumption here is that there is a real dichotomy between agreement and anaphora, that agreement serves no anaphoric function, even though the same pronominal features used as anaphoric indexes (person, number, gender) universally occur in agreement. They (*Ibid.*, p. 752) take note of this possible misconstrual, and attempt to explain why the subject marker itself, as agreement morpheme, cannot also always be considered an incorporated pronominal, as is the object marker.

The essence of their argument summarizes to the following. Since only argument functions can be governed directly by predators (*Ibid.*, p.752), by the principles of uniqueness, completeness, and coherence (the latter principle attributed to Zaenen (1980), and Fassi-Fehri (1984), stateable as “all functions in f-structure must be bound”, cf. Bresnan & Mchombo (1987), p. 746, fn. 8), these arguments must be syntactically realized within the predictor-headed phrasal structures (i.e., within the constituent scope of the predictor), bound morphologically to the predictor (incorporated), or be unexpressed (and thus controlled non-locally by other anaphoric or functional processes). Now, because only anaphoric relations can be non-local (extra-clausal), and verbs agree only with their local, governable arguments, then non-controlled arguments of the verb, if they are to enter into grammatical agreement with the verb, must be structurally local to the verb.

## Footnotes to Chapter 3

<sup>1</sup> See also the discussion in section 3.2.

But the subject marker cannot just (always) be an incorporated pronominal because incorporated pronominals always serve a referential function under government by the verb (and by uniqueness, an NP cannot also simultaneously serve that function), and the NP cannot therefore be in a government relation to the verb, but only in an anaphoric relation, which is non-local and discourse-level. Topic NPs being generated under S, not VP, are referential, and so the subject marker is either an incorporated pronominal with a referential function or an agreement morpheme with no referential function.

<sup>2</sup> This is the standard notation used for case in the literature.

Having surveyed the characteristics of incorporation as have been enumerated in the literature and discussed certain perspicuous analyses which have been offered to show the relationship of incorporation to notions such as topicality and agreement, we next pass on to an account of the theoretical framework of generalized categorial grammar.

<sup>1</sup> Other possibilities include the following. In German, the nominative case of the main verb determines the case of the subject, and the verb agrees with the subject in gender and number (Baker 1988). In French, the nominative case is used for the subject, the dative for the object, and the dative for the predicate.

<sup>2</sup> See Subj/Verb Agreement and Case in Georgian (Meliashvili 1992, p. 176).

<sup>3</sup> Singular.

<sup>4</sup> Plural.

<sup>5</sup> Dual.

<sup>6</sup> Tertian.

<sup>7</sup> Quaternary.

<sup>8</sup> Quinternary.

<sup>9</sup> Sextenary.

<sup>10</sup> Septenary.

<sup>11</sup> Octenary.

<sup>12</sup> Nonenary.

<sup>13</sup> Decenary.

<sup>14</sup> Undenary.

<sup>15</sup> Dodecenary.

### Footnotes to Chapter 3

<sup>1</sup> See, for example, the language !xo, a Southern Bushman language spoken in southwestern Botswana and the Aminuis Reserve in South West Africa (Traill, 1974). In this language, the head noun determines the shape of forms, with the agreement process crossing from the head noun of the matrix through to the subordinate sentence (as, for example, in the following relative clause), stopping only at the following main verb. Traill states (p. 22) that

the only way to "regularise" this state of affairs would be to adopt an abstract solution in which whole morphemes would be marked as governing their particular harmonies; these class indices would be copied by a syntactic agreement rule (clearly the index is not a phonological feature, hence the rule could not be phonological), and the phonological shape supplied from the lexicon.

<sup>2</sup> The <Verb, Verb> pair is included here, since aspect and tense may be viewed as being 'agreement' features.

<sup>3</sup> This is the typical notation used for noun class in Bantu languages, with the class numeral occurring to the left of the slash representing the singular, that to the right, the plural.

<sup>4</sup> 'Obviation' may constitute another feature, or it may be subsumed by person. See Comrie (1989) concerning employment of obviative and proximate forms in the Algonquian languages. See also Hewson (1991) on Algonquian and Inuktitut.

<sup>5</sup> Below, note comparable situations in Zulu and Swahili. Many other Bantu languages exhibit the same correlation, cf. Wilks (1976), Vitale (1976) et al., but not directly Kikuyu (Bergvall, 1985).

<sup>6</sup> Other possibilities include the Philippine language Cebuano (Bell, 1979; Faarlund, 1988, p. 203) and Georgian. In Georgian, for example, the tense of the main verb determines the case of the subject; at the same time, the verb agrees with the subject in number and person. According to Mel'čuk (1988), the nominative case is used for the present tense, the ergative for the aorist, and the dative for the perfect.

i. Subj/Verb Agreement and Case in Georgian (Mel'čuk, 1988, p. 110)

Singular:

a. Is	amb	+ ob	+ s	rom...
	he-SG.NOM	say	PRES	3SG
'He says that ...'				

- b. Man tka + a rom...  
 he-SG.ERG say AOR.3SG that  
 'He said that ...'  
 ('amb-' and 'tkv-' are suppletive roots of the same verb 'tkma'  
 'to say')
- c. Mas u + tkb + am + s rom ...  
 he-SG.DAT say PERF 3SG that  
 'He has said that ...'

<sup>7</sup> Cf. also Wilks (1976), p. 106.

<sup>8</sup> And, implicitly, of course:  $[\neg(\gamma=+) \rightarrow \neg(\alpha=\beta)]$ . An alternative phrasing to the Rule would employ modal operators for optionality/obligatoriness:

Zulu:  $(\gamma=+) \rightarrow \Diamond(\alpha=\beta)$   
 'If definite, then possibly equal gender values'

Swahili:  $((\gamma=+) \wedge (\delta=+)) \rightarrow +( \alpha=\beta)$   
 'If definite and animate, then necessarily equal gender values'

The distinction between the two rules would thus be an additional constraint in the antecedent and a stricter modal operator in the consequent for Swahili.

<sup>9</sup> See also Example 18 (Coordinate Likeness Violations in Hindi-Urdu), for a similar requirement of semantic likeness for coordination of NPs in Hindi.

<sup>10</sup> Also note that for some speakers, colloquially this is acceptable; most speakers, however, require the use of a comitative form or a paraphrase, as in 'Raman came, with the dog.' (Corbett, 1991, p. 270).

<sup>11</sup> Negative concord also occurs in Slavic languages such as Czech and Finno-Ugric languages such as Hungarian:

- i. Czech (Krifka, p.c.)  
 Ty nikdy nic nevíš ...  
 you never nothing neg-knows neg-when neg what
- ii. Hungarian (Moravcsik, 1978, p. 334)  
 Semmit nem láttam  
 Nothing-acc-neg not saw-I  
 'I saw nothing'

<sup>12</sup> But note that Carlson (1983) (ff. 7) describes this as an instance of 'multiple marking,' rather than agreement, per se, a distinction he

maintains that has to do with which of a set of nodes in a dominance relation  $C(A, B)$  (where  $C$  dominates  $A$  &  $B$ ) correlate with a certain semantic notion (such as plurality): if the semantic notion applies to  $C$  and not  $A$  and  $B$ , then we have 'multiple marking'; if to  $A$  and  $B$  and not  $C$ , then we have agreement. An English example of the former is 'these nine', where the noun is ellided or only implicit. Furthermore, he notes (p. 77) that 'multiple marking' may correspond to Harris' (1945) discontinuous morpheme.

<sup>13</sup> He notes such examples in Lardil and Yanggal, two Australian languages spoken in the Wellesley Islands, citing Klokeid (1976), pp. 575-576.

<sup>14</sup> (C) is a topicalized structure, with the overt pronoun functioning as the topic, per Anderson (1982), p. 576.

<sup>15</sup> The coordinate form is not to be interpreted as being intersective, but as being distributive.

<sup>16</sup> Observe that, in general, predicate adjectives will agree with their resolved coordinate subjects in number; verbs will not.

<sup>17</sup> Note that the noun class 12, though an even number, is singular.

<sup>18</sup> They suggest (p. 295) that the Proximity Principle applies in the following syntactic environments:

<u>PP applies:</u>	<u>PP does not apply:</u>
Attrib. adj.	'Small clauses'
Pred. adj., participials	Comparatives
Pied-Piping in simple RCs	
Topic w/Resumptive pronouns	
Clefts w/Resumptive pronouns	
Passive	

The solution they suggest to the problem of mismatched syntactic/semantic requirements as in example (4), where the quantifier's semantic scope does not correspond to that apparently holding over the syntactic constituents as marked by agreement, is to employ an autolexical analysis in which the parallel disparate word-level and the syntax level representations are mapped to a single linear representation much like phonological representations are in autosegmental phonology. See Sadock (1991) for a fuller exposition of the theory of autolexical syntax.

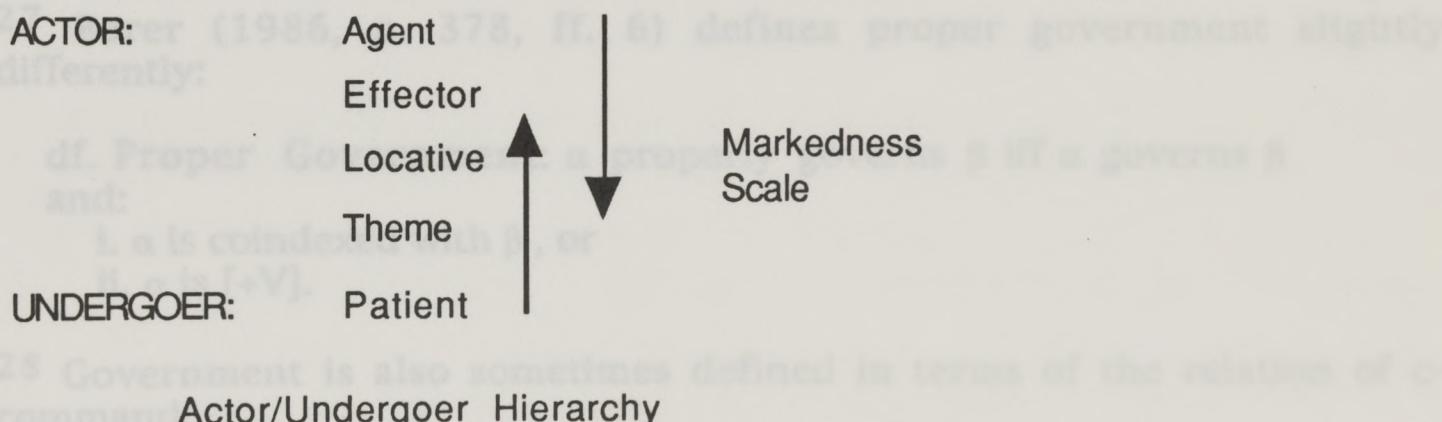
<sup>19</sup> Fassi Fehri (1987, p. 134), however, characterizes verbal agreement in Moroccan, Egyptian (both SVO), and Standard Arabic (VSO) as contingent only on the feature of non-human marked on the conjuncts. According to him, a conjunction of non-humans will cause the verb to be marked with the feminine singular.

<sup>20</sup> Vanek (1977, p. 20) distinguishes the meanings of (a) and (b), noting that the former but not the latter is ambiguous between the following two interpretations (b. having only the second reading):

- i. Jan a Věra (jsou) šli spolu do divadla.  
'Jan and Vera went together to the theater.'
- ii. Jan a Věra (jsou) šli každý zvlášť do divadla.  
'John and Vera went each separately to the theater.'

These circumstances seems to indicate that collective 'and' and distributive 'and' are differentiated in Czech by distinct morphemes. Note also that the (c-d) examples in the body of the text have only the first (i) interpretation, much as one would expect, given the notion of accompaniment characteristic of comitatives.

<sup>21</sup> They characterize an actor/undergoer hierarchy of semantic roles (Foley & Van Valin, 1984, p. 59), where the arrows indicate increasing/decreasing markedness with respect to their origins :



<sup>22</sup> Cf. also Obrst (1987), p. 38. Van Oirsouw (1987), p. 71-72, notes that such constructions are problematic for a non-ad-hoc GPSG analysis.

<sup>23</sup> See the section on Government-Binding theory, where examples from Falk (1991) are discussed.

<sup>24</sup> Much of this section is taken from Obrst (1987).

<sup>25</sup> For a complete description of GPSG control theory, see Gazdar et al (1985), upon which this summary is based.

<sup>26</sup> Kartunnen (1984) analyzes the person feature system differently, employing negative constraints in addition to positive feature specifications in order to make the feature system jibe with the intuition that Third Person is the default or unmarked value in natural language. Within his system, the person values and the negative constraints would be:

i. Person Values

- 1st Person: [+Conversant, +Speaker]
- 2nd Person: [+Conversant, -Speaker]
- 3rd Person: [-Conversant, -Speaker]

ii. Negative Constraints

- 1st Person: -[-Conversant, -Speaker]
- 2nd Person: -[-Conversant]
- 3rd Person: NIL

If the negative constraints are always inherited, then the process of generalization will ensure both that the resolution of feature specification will result in correct agreement on the verb, and that Third Person will receive the unmarked value.

<sup>27</sup> Borer (1986, p. 378, ff. 6) defines proper government slightly differently:

df. Proper Government:  $\alpha$  properly governs  $\beta$  iff  $\alpha$  governs  $\beta$  and:

- i.  $\alpha$  is coindexed with  $\beta$ , or
- ii.  $\alpha$  is [+V].

<sup>28</sup> Government is also sometimes defined in terms of the relation of c-command:

df. Government:  $\alpha$  governs  $\beta$  iff  $\alpha$  c-commands  $\beta$  and there is no category  $\gamma$  such that  $\gamma$  is a barrier between  $\alpha$  and  $\beta$ , where

df. C-command:  $\alpha$  c-commands  $\beta$  iff  $\alpha$  does not dominate  $\beta$ , and for every minimal maximal projection (cf. Aoun and Sportiche, 1983) [alternatively, branching node (cf. Reinhart, 1976)]  $\delta$ , if  $\delta$  dominates  $\alpha$  then  $\delta$  dominates  $\beta$ ,

and

df. Barrier: given  $\zeta$ , the smallest maximal projection containing  $\alpha$ ,

then  $\gamma$  is a barrier between  $\alpha$  and  $\beta$  iff  $\gamma$  is a maximal projection that contains  $\beta$  and excludes  $\alpha$ , and either:

- i)  $\gamma$  is not selected, or
- ii) the head of  $\gamma$  is distinct from the head of  $\zeta$  and selects some XP equal to or containing  $\beta$ ,

where

df. **Selection:**  $\alpha$  selects  $\beta$  iff:

- i)  $\alpha$  assigns a theta role to  $\beta$ , or
- ii)  $\alpha$  is of category  $\gamma$  and  $\beta$  is its IP (maximal projection of Infl),  
or
- iii)  $\alpha$  is of category I (Infl) and  $\beta$  is its VP.

(cf. Chomsky, 1986; Baker, 1988, pp. 56-57)

<sup>29</sup> In GB, abstract Case (Chomsky, 1981) can be expressed as morphological Case, an agreement marker, in terms of adjacency, and in other ways; abstract Case is realized at S-structure in these, language-specific ways. Baker (1988) also argues that incorporation is a realization of abstract Case.

<sup>30</sup> The structure and nature of the abstract nodes vary somewhat in the GB literature. It is proposed in Chomsky (1989), for example, that the representation of S in English should be the following:

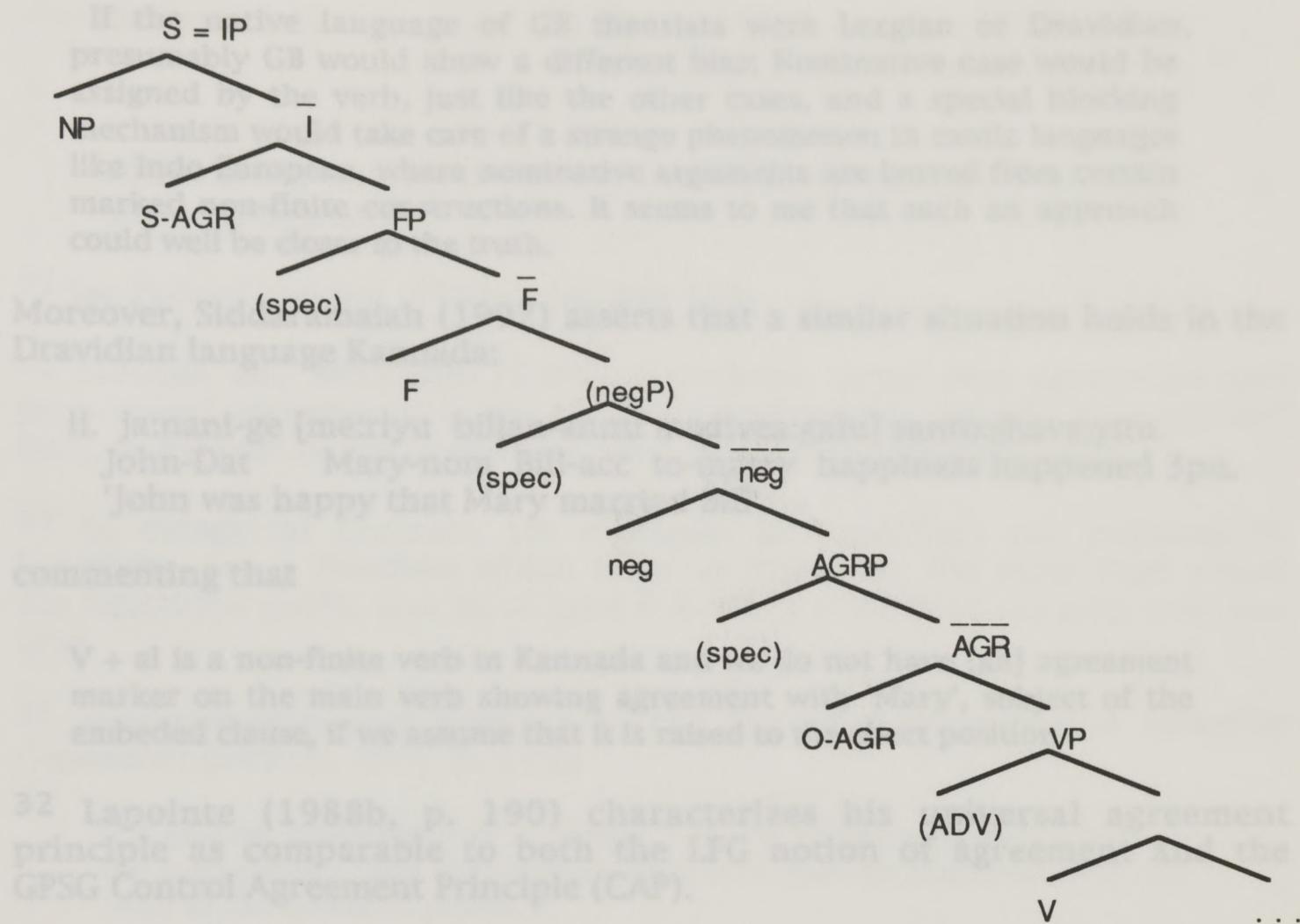
<sup>31</sup> Reflecting on the case of nominative arguments in non-finite clauses in Lezgian, represented by examples such as

1. Dide-0	gada-0	bile	nuu-a-əd	caab
mother-NOM	boy-NOM	already	return-NCNFN-about	surprised
NOM-0A				
be-PAST				

'Mother was surprised that the boy had returned already.'

Harpelmath (1992) comments:

In GB theory, nominative case is not assigned by the verb but by something else (PDT, AGC) that is not present in non-finite clauses. In this way, case assignment is more complicated in finite clauses, although finite clauses would seem to be the unmarked member of the Finite/non-finite opposition.



32 Lapointe (1988b, p. 199) characterizes his principle as comparable to both the LFG notion of GPSG Control Agreement Principle (CAP).

31 Reflecting on the case of nominative arguments in non-finite clauses in Lezgian, represented by examples such as

- i. Dide-0 gada-0 hele xtū-n-al tazub  
     mother-NOM boy-NOM already return-NONFIN-about surprised  
     xa-na.  
     be-PAST  
     'Mother was surprised that the boy had returned already.'

Haspelmath (1992) comments:

In GB theory, nominative case is not assigned by the verb but by something else (INFL, AGR) that is not present in non-finite clauses. In this way, case assignment is more complicated in finite clauses, although finite clauses would seem to be the unmarked member of the finite/non-finite opposition.

If the native language of GB theorists were Lezgian or Dravidian, presumably GB would show a different bias: Nominative case would be assigned by the verb, just like the other cases, and a special blocking mechanism would take care of a strange phenomenon in exotic languages like Indo-European, where nominative arguments are barred from certain marked non-finite constructions. It seems to me that such an approach could well be closer to the truth.

Moreover, Siddaramaiah (1992) asserts that a similar situation holds in the Dravidian language Kannada:

- ii. ja:nani-ge [me:riyu billan-annu madivea:galu] santo:shava:yitu  
 John-Dat Mary-nom Bill-acc to-marry happiness happened 3pn.  
 'John was happy that Mary married Bill'

commenting that

V + al is a non-finite verb in Kannada and we do not have [an] agreement marker on the main verb showing agreement with 'Mary', subject of the embeded clause, if we assume that it is raised to the obect position.

<sup>32</sup> Lapointe (1988b, p. 190) characterizes his universal agreement principle as comparable to both the LFG notion of agreement and the GPSG Control Agreement Principle (CAP).

<sup>33</sup>  $\hat{y}$  is a 'capped-variable'; for a description, see example sentence below.

<sup>34</sup> The example is paraphrased from Dowty (1985, p. 173) and attributed to Corbett (1979). Dowty's interpretation is based on Partee and Rooth's (1983) and Hoeksema's (1983) notions of generalized conjunction:

i. Derivation:

This	man	and	woman	were...
np/N	np\((np/N)	Conj	np\((np/N)	vp
<hr/>				Conj
<hr/>				np\((np/N)
<hr/>				FA
<hr/>				np

ii. Interpretation:

$$\begin{aligned}
 \text{man} &\Rightarrow \lambda D D(\text{man}') \\
 \text{woman} &\Rightarrow \lambda D D(\text{woman}') \\
 \text{man and woman} &\Rightarrow \lambda D D(\text{man}') \cap \lambda D D(\text{woman}') \\
 &= \lambda D [D(\text{man}') \cap D(\text{woman}')]
 \end{aligned}$$

this man and woman  $\Rightarrow \lambda D [D(\text{man}') \cap D(\text{woman}')] (\text{this}')$   
 $= [ \text{this}'(\text{man}') \cap \text{this}'(\text{woman}') ]$

where  $D$  is a variable of the type determiners translate into, and  $\cap$  is the conj. operator.

<sup>35</sup> See Pollard and Sag (1988a), pp. 248-249.

<sup>36</sup> Bresnan and Mchombo (1987), contrarily, argue that agreement and pronominal incorporation are completely separate. As will be examined later, in support of the distinction, they adduce locality arguments.

<sup>37</sup> In categorial theories, for example, all modifiers are endocentric functions, i.e., a function which takes as argument the same type which the functions yields, that is, of type  $f: X \rightarrow X$ ,  $X$  a variable ranging over any type.

<sup>38</sup> Incorporation also adheres to the Strong Constructional Integrity Constraint (Sadock, 1991, p. 103):

If a lexeme combines with a phrase  $P$  in the syntax and with a host in the morphology, then the morphological host must be associated with the head of the syntactic phrase  $P$ .

whereas Clitization adheres to the weak Linearity Constraint:

The associated elements of morphological and syntactic representations must occur in as close to the same linear order as the morphological requirements of the lexemes allow.

<sup>39</sup> Discussing number inflection among pidgins and creoles, Holm (1988, p. 193) notes that in most of the Atlantic creoles (Caribbean and coastal West African creoles based on the European languages, English, Portuguese, Spanish, Dutch, and French), most nouns "can co-occur with a free morpheme which indicates plurality and is homophonous with the third person plural pronoun 'they.'" In other creoles (Sranan Creole-English, Haitian Creole-French), the plural marker also acts as an indicator of definite plurality. Also to be noted here is the general property of creoles and ordinary languages to have a [possessor *his/her/their* possessed] form (Holm, 1988, p. 199). For example, after proper English nouns (*ibid.*, p. 198, citing the Oxford English Dictionary), during the fifteenth through eighteenth centuries, usages such as "Purchas his Pilgrimage" were common. The phenomenon is equally common in other languages which have influenced creoles, as, for example, in Mandinka, which has a

construction exemplified by “Báakari la búngo”, ‘Bakari’s house’, (*ibid.*, p. 199), where ‘ala’ is citation form for ‘his’; in Twi, a comparable example is “Ata ne na”, ‘Ata his mother’. But, per Morse-Gagne (1992), among others, to attribute the origin of the genitive ‘s in English from the ‘his’ form is inaccurate.

40 He draws from this apparent ordering the conclusion that

The less predictable/accessible a referent is, the more phonological material will be used to code it.

This generalization accords well with the information-theoretic principle known as Zipf’s Law (1949), informally expressible as “the most frequently used words and expressions tend to be shorter” (Lyons, 1969, p. 89).

41 If the intonational structure and the surface structure are indeed isomorphic, as has been argued by Steedman (1991), among others, and it is the phonological/intonational structure which thus gets interpreted semantically, then this correlation is not surprising.

42 We observe, however, that these two forms of agreement might be historically related, per Givon, with grammatical agreement arising from anaphoric agreement.

43 The right-hand syntactic nodes of the rule are separated by commas, signifying they are unordered with respect to each other (rules of Immediate Dominance, in the terminology of GPSG).