Chapter 5

Pattern Matching Analysis Meets English Syntax in Way of the Moravcsik-Wirth Scheme

5.0 Introductory Notes

In previous chapters, I have performed several analyses based on pattern matching method, but they were done basically for expository purposes. Indeed, they were far from satisfactory from a descriptive point of view, in that they, at best, touched on only a few of the properties of English syntax. Thus, some readers might have already begun to wonder, What does pattern matching analysis provide if any? How useful is it? In what respect is it different from other frameworks? Such questions are reasonable. A best way to answer them is, as usual, to familiarize readers with the newly proposed method. This chapter is intended to meet such demonstrative purposes.

Before starting, I remark that all analyses to be presented in this chapter are more or less provisional. Some of them are very sketchy, and sufficient details will not be provided. This is mainly because most of them are still under development, and await revisions.

Such deficiency notwithstanding, most, if not all, of the analyses to be presented in this chapter are going to offer a new perspective on English syntax, thereby providing circumstantial evidence for the claim that the proposed framework has good deal of descriptive power and explanatory potential.

5.0.1 Why follow the Moravcsik-Wirth scheme?

It is unrealistic to attempt to faithfully compare the proposed framework with other contemporary approaches to syntax. It is possible to limit my focus on the comparison with major ones, such as **generalized phrase structure grammar** (Gazdar, *et al.* 1985), **head-driven phrase structure grammar** (Pollard and Sag 1987, 1994), **lexical-functional grammar** (Bresnan 1978, Bresnan and Kaplan 1982),

unificational grammar (Kay 1985; Shieber 1986), **categorical grammar** (Buszkowski, *et al*., *eds*. 1988; Oehrle, *et al*., *eds.* 1988), **tree-adjoining grammar** (Joshi 1985; Joshi, Levy, and Takahashi 1975), **Montague grammar** (Davis and Mithun, *eds*. 1979; Montague 1970, 1973), **relational grammar** (Blake 1990; Perlmutter, *ed*. 1983; Perlmutter and Rosen, *eds.* 1984; Postal and Joseph, *eds.* 1990), **McCawley's "highly revisionist version of transformational grammar** that probably no one other than [him] accepts in all its details and to which [he] refuse[s] to give any name" (1988: x), **government-binding framework** (Chomsky 1981, 1986*a, b*), **minimalist program** (Chomsky 1995), **word grammar** (Hudson 1981, 1990), **cognitive grammar** (Langacker 1987, 1991*a*, *b*). Yet it is unrealistic and unreasonable to do so. First, it is impractical. Considerations for reader's convenience strongly discourages it. Second, and more importantly, such attempt is sure to be biased, largely due to possible misunderstandings on my part. Plainly, the proposed framework is influenced by all of such theories and frameworks, directly and indirectly, at least because I am acquainted with them. Each influence should be mentioned to be faithful.

For practical reasons of this sort, I decided to rely on a useful comparison scheme defined in Moravcsik and Wirth, *eds*. (1980). Though somewhat outdated now, the scheme was originally designed to provide a frame of comparison among dozens of grammatical theories, some major and some minor, that were in competition around the date the edited book was published.

In Moravcsik and Wirth, *eds*. (1980), all expositions of grammatical theory were requested to provide more or less detailed analyses of seventeen sentences such as follows:

(1)
1. *The woman walked.*
2. *Every woman walked.*
3. *The farmer killed the duckling.*
4. *The duckling was killed by the farmer.*
5. *Who killed the duckling?*
6. *A farmer killed every duckling.*
7. *John killed a duckling with an axe.*
8. *The woman believed that John killed the farmer.*
9. *The woman believed John to have killed the farmer.*
10. *The woman believed the farmer to have been killed by John.*
11. *The farmer was believed by the woman to have been killed by John.*
12. *The farmer gave the axe to John.*
13. *The farmer gave John the axe.*
14. *The axe killed the duckling that John loved.*
15. *John killed the woman and Bill, the farmer.*
16. *John loved the woman and he killed the farmer.*
17. *John loved the woman and killed the farmer.*

This Moravcsik-Wirth scheme is concerned with the following phenomena, where

i:*j* encodes the contrast between the i^{th} and j^{th} examples.

1:2, 3:6	**quantification over subject and object**
3:4, 9:10, 9:11	**active/passive correspondence**
3:5	**wh-question**
3:7	**adjunction**
7:14	**middle formation**
8:9	**exceptional case marking** (or **subject-to-object raising**)
12:13	**dative shift/alternation**
14	**relative clause formation**
15, 16, 17	**conjunction of S and VP**
15, 17	**gapping**, and/or **conjunction reduction**

Although very useful for comparative purposes, it is hardly truthful if I do not note that the Moravscik-Wirth scheme does not exhaust major syntactic phenomena of English. It is better to recognize that the scheme reflects densely the *Zeitgeist* of the linguistics in America in late 70's, and to that extent, it is biased. However, this does not spoil its usefulness.

5.0.2 Remarks on the Moravcsik-Wirth scheme

Despite its usefulness, the Moravcsik-Wirth comparison schemes misses a number of important syntactic phenomena. Notably, it does not cover a bunch of phenomena related to the so-called (syntactic) movement, such as question formation, *tough*-construction, and right node raising, to identify only a few. So, the scheme will be supplemented by providing additional cases if suitable.

A final note: Even if most, if not all, analyses to follow are successful, I will never claim that the proposed framework is an excellent framework. It only shows that it has passed a few of the many necessary hurdles.

5.1 Pattern Matching Analysis of *SV* and *SVO* Constructions

In this section, we address the structure of some basic patterns of English, presenting detailed analyses of 1 and 3 in (1).

5.1.1 An analysis of *The woman walked*

Let me begin by examining the syntactic structure of *The woman walked* (= (1)1). To this sentence, pattern matching analysis gives the following analysis in terms of a **composition/decomposition table** (C/D table for short).

(2)
0.	***the woman***	***walked***
1.	***the woman***	*V*
2.	*S*	***walked***

The composition/decomposition table in (2) describes essential properties of the syntax for (1) in terms of **superposition of subpatterns**, ***the woman*** *V* and *S* ***walked***, encoded in 1 and 2 in (2), respectively. Superposition takes place when there are local **matching** among subpatterns. The C/D table above claims:

(3)
i. ***the woman*** in 1 matches *S* in *S* ***walked*** in 2; and
ii. ***walked*** in 2 matches *V* in ***the woman*** *V* in 1; and
iii. ***the woman walked*** in 0 is the result of these matches.

One of the distinguished properties of the proposed encoding scheme is, as I argued in previous chapters, that it specifies a set of **co-occurrence statements** that need not be ordered for composition. In fact, the number *i* assigned to a statement is to indicate that it encodes the contextually determined dependency structure of the i^{th} unit of pattern 0, and therefore has nothing to do with the order of composition and decomposition.

Seen from a different angle, it can be that it describes the syntactic structure of (1) as a relaxation of the two constraints, or a solution of the two equations, (4)i and ii below.

(4)
i. *S* = ***the woman***/__ ***walked***
ii. *V* = ***walked***/***the woman*** __

Here, constraints are expressed in the format that is made compatible with that of "rewrite rules" of the form $A \rightarrow Z/X$ __ *Y*.

In passing, let me note that the proposed view of syntax as **a system of co-occurrences** is a straightforward reinterpretation of the reintepretation of rewrite rules argued in **generalized phrase structure grammar** (Gazadar, *et al*. 1985).

It is clear, however, that this encoding makes implicit some important points related to internal structure of *S* and *V*. By making use of **subindexing**, we can give a more adequate encoding such as the following:

(5)
0.	***the***	***woman***	***walked***
1.1	***the***	*N*	
1.2	*(D)*	***woman***	*V*
2.		*S*	***walked***

Here, ***the woman***, which is treated as a simplex subject NP in (2), is segmented into ***the*** *N*, 1.1, and *(D)* ***woman***., 1.2. Generally, *(X)* indicates the optionality of *X*'s realization. Effects of this differentiation will be discussed below.

In the last C/D table, new lables *D* (for determiner) and *N* (for head noun) appear. This is one of the effects of **scale change**. I will return to this issue later.

Furthermore, it is also possible to extend the subindexing system to obtain the following:

(6)

0.	***the***	***woman***		***walk***	***-ed***	
1.1	***the***	*N*				
1.2	*(D)*	***woman***		*V*		
2.1		*S*		***walk***		
2.2		*S*	[	*V*	***-ed***	]

Here and elsewhere, symbol "-" serves as the adjacency marker, by which *V-ed* is encoded as a morpho(phono)logical unit. A convention is assumed that, in ... *x* -***y*** ..., with or without a pair of brackets, ***y*** is an affix that combines with its target *x* to form a "prosodic" word ***xy***. As usual, all other positions are relative.

The C/D table in (6) specify the following co-occurrence statements, or "constraints", to be satisfied simultaneously.

(7)

i. Subpattern 1.1 in (6) states that *the* demands a head noun *N* to follow it. Semantically, it is assumed that *D* = ***D*** *N* is an operator which either (i) modifies an intrinsic index *i* of a head noun N_i (e.g., ***woman***$_i$) by resulting in $i \Rightarrow r$ to derive a referentially fulfilled phrase (e.g., ***the woman***$_r$); or (ii) assigns an extrinsic referential index *r* to *N* to derive a referentially fulfilled noun phrase (e.g., ***the woman***$_r$).

ii. Subpattern 1.2 states: (i) *woman*, as *(D)* ***woman***, permits a determiner *D* to precede it; and (ii) *woman*, as ***woman*** *V*, demands a tensed verb *V* to follow it.

iii. Subpattern 2.1 states that *walk*, as *S* ***walk***, demands a postceding unit to realize its *S*.

iv. Subpattern 2.2 states that *-ed*, as inflection marker *V-**ed***, demands a pattern *S V* to precedes it, and it attaches to the (stem of) *V*, thereby giving subject-verb agreement.

It should be noted that there exists an asymmetry between specifications in 1 and 2. *D* in 2 is bracketed, while *N* in 1 is not. The reason is two-fold. First, *woman* admits some preceding unit to be categorized as its *D*, but it does not demand it, because *D* need not be realized. Second, *N* in 1 is necessary to exclude expressions like (8)a, contrasted to a′ (= (1)1) and b.

(8)

a. **The walked*.

a′. *The woman walked*.

b. *Woman is powerful than man these days*.

The unacceptability of (8)a indicates that *N* in ***the*** *N* may not fail to be realized, though this is not true of some demonstratives like *this*, *that*, whose specifications would be ***this*** *(N)*, ***that*** *(N)*. The acceptability of (8)b indicates that *D* need not be realized in *(D)* ***woman***.

Admitting item-basedness, it should be noted that more generally, specifications at left- and right-hand sides of an item function differently. Those at the right-hand side encode "demands" from a word on other words. Those at the left-hand side encode "admissions" to other units.

5.1.2 Is determiner the head of a noun phrase?

Before getting into details of this analysis, let me make a note on a technically controversial point involved in this analysis, i.e., whether heads of noun phrases are determiners or head nouns or both. For pros of "determiners as heads", see Hudson (1984, 1990) from the perspective of word grammar, Hewson (1991) from the perspective of dependency grammar, Abney (1987) and Fukui (1986) from the Government-Binding theoretical perspective. For cons, see van Langendonck (1994).

If determiners are the heads of noun phrases, and accordingly *the* heads *the woman*, then we should replace subpattern 3 in (6):

(9)	0.	***the***	***woman***	***walk***	***-ed***
	1.	***the***	*N*		
	2.	*D*	***woman***	*V*	
	3.1′	*S*		***walk***	
	3.2′	*S*		*V*	***-ed***

As indicated, 3.1 and 3.2 by 3.1′ and 3.2′.

In my view, however, enough evidence is not provided to decide on either determiners as heads or nouns as heads. Rather, I find it more reasonable to assume that both can be heads, countenancing the hypothesis of "dual heads":

(10)	0.	***the***	***woman***	***walk***	***-ed***
	1.	***the***	*N*		
	2.	*(D)*	***woman***	*V*	
	3.1	*S′*	*S*	***walk***	
	3.2	*S′*	*S*	*V*	***-ed***

Here, *S′* and *S* are "split" heads such that *S′* matches a determiner like *the*, and *S* matches a head noun like *woman*. In some cases, *S′* even serves as a "dummy" head. Extraposition is a good example of this.

The head status of *S′* relative to *V* is, of course, an "inheritance" from the subject status of determiners in NP structure. Note that in *(D)* ***N*** *X*, *(D)* is the internal subject of ***N*** (e.g., *woman*), just like *S* is the subject of *V*. Thus, *S′* is the

subject of the subject (e.g., *woman*) of *V* (e.g., *walked*).

Note that 'subject' is a functional notion. Thus, there is no contradiction in the statement that a noun is the subject of a verb, whereas a determiner is the subject of a noun, though this reveals an inconsistency in the notional system adopted in this thesis: only the subject of a verb is labeled *S*. More consistency is obtained by writing N_S (for "noun as subject") instead of *S*; and likewise, D_S (for "determiner as subject") (or possibly A_S (for "adjective as subject")), instead of *D*. This explicitness is reasonable, but I decided to avoid it, because it is impractical; it only increases the complexity of the presented material.

Unfortunately, however, more complicatedness is suggested. It is possible that ***the*** demands *V* to follow, either in addition to ***woman***, or instead of ***woman***. As far as we take into consideration declensions in determiners in other "inflectionally rich" languages, such as German, Russian, the following encoding seems the most plausible of all possibilities, though there is not enough evidence to make a decision.

(11)	0.	***the***	***woman***	***walk***	***-ed***
	1.	***the***	*N*	*V*	
	2.	*D*	***woman***	*V*	
	3.1	*S′*	*S*	***walk***	
	3.2	*S′*	*S*	*V*	***-ed***

Here, both *the* and *woman* demand *V* to follow, as requested by split head hypothesis. This can be taken to correlate with the morphological differentiation:

(12) i. ***the*** *N V* (for nominative form)
ii. *S R* ***the*** *N* (for accusative and dative forms)
iii. *N* ***the*** *N* (for genitive form)

This is exactly what is observed in the morphology of many Germanic languages. Take for example the declension of *der*, masculine definite article of German. Its paradigm can be described as follows:

(13) i. ***der*** *N V* (for nominative form)
ii. *(S) R* ***den*** *N* (for accusative form)
iii. *(S) R* ***dem*** *N* (for dative form)
iv. *N* ***des*** *N* (for genitive form)
iv′. *(S) R* ***des*** *N*

If there is a counterpart of ***the*** *N* of English, it must be {***der***, ***den***, ***dem***, ***des***} *N*.

Despite a number of potential merits of this sort, it is not clear what effects follow from the encoding of *the* in (12). So, I want to make implicit the effects of context-sensitive encoding of determiners in what follows.

5.1.3 A link to unificational categorial grammar

In its attempt to capture crucial aspects of grammar in terms of unification, my approach is similar to what can be very loosely called the "unificational categorial grammar", to cover such a large body of approaches as Kay (1985), Shieber (1986), Buszkowski, *et al*., *eds*. (1988), Oehrle, *et al*., *eds* (1988). Let me clarify this point by taking determination as an example.

Following the tradition, by formula $x = y/z$, we intend that x is a "functor" that operates on a unit of category z to result in a unit of category y. To illustrate, English indefinite article *a* (and *an*) can be characterized as such a functor in that *a* has internal semantics [*I*/*C*], where *C* stands for "class", and *I* for "instance", respectively. Thus, it is possible to illustrate, with a few revisions, how internal meaning of *a woman* is derived by relying on such notation as follows:

(14) a. *a* *woman* → *a woman*
b. [*I*/*C*] [*C*] [*I*]

Here, "cancellation" is the basic mechanism, according to which a form of the type [C], combined with another form of the type [*I*/*C*], "cancels off" [/*C*] to form a form of the type [*I*]. Thus, *a* [*I*/*C*] serves as "instance indentifier" in that it combines with *woman* [C] to form *a woman* [*I*], which is an individual.

Incidentally, it is not surprising to see that this aspect can be characterized fairly well in the model of pattern matching if, as in the following, it is stipulated that it is exactly the *N*-slot in ***a*** *N* that gives [/*C*] to *a*. To illustrate this, I appeal to the following composition/decomposition.

(15) 0. ***a*** ***woman*** [*I*]
1. ***a*** *N* [*I*/*C*]
2. *(D)* ***woman*** [*C*]

Note that this revision adds no new information to the basic mechanism of pattern matching. What is done is specification of a reasonable interpretation of it. Thus, it may be claimed that pattern matching method already implements effects of "functional composition" in straightforward way.

5.1.4 An analysis of *The woman didn't walk*

The simple analysis presented in (2) illustrates an important pattern *S V* constituting a ***matrix***, which is shared by all patterns of *S V X*, where $X = \{O, ...\}$. Let me briefly explore into this basic pattern for other properties.

What happens if we have the following negative sentence to describe?

(16) a. *The woman didn't walk.*
b. *The woman couldn't laugh.*

To (16)a, PMA gives an analysis as follows:

(17)	0.	***the woman***	***did***	***not***	***walk***
	1.	***the woman***	*V*		*(O)*
	2.	*S*	***did***		*V*
	3.	*S*	*U*	***not***	*(V)*
	4.	*S*	*(U)*	*(Adv)*	***walk***

Crucial in this analysis is the implicit claim that *walk* matches *V* in subpattern 2 (and possibly *O* in 1 and *(V)* in 3). Of course, this point is very controversial. Crucially, how is *walk* still a main verb of this sentence while it is an object of *did*? But, the answer is indirectly given by what subpattern 4 encodes.

5.1.5 The effects of relativized categorization

Note that it does not really matter whether subpattern 2 is *S* ***did*** *O* or *S* ***did*** *V*, on the one hand, and whether subpattern 4 is *S (U)* ***walk*** or *S V* ***walk***, on the other. Crucial here is that *walk*, in contexts like this, is a special case of *O*, and similarly *did* in such contexts is a kind of *V*. Without recognizing this, it sure to fail to capture the parallelism *S* ***did*** *V* ~ *S* ***did*** *O*, which is illustrated by the following data.

(18) a. *The woman did remember the story.*
b. *The woman did a lot of work.*

Additionally, the following is ambiguous as to whether *it* denotes a VP or a NP.

(19) *The woman did it.*

Thus, it is better to be careful in distinguishing mere mnemonics form ontology.

5.1.6 So-called *do*-support, and its relevance to shifter

Subpattern 2 in (17), in conjunction with subpattern 3, encodes the effects of so-called ***do*-support**, which is effective in that the following is clearly out.

(20) a. **The woman walked not.*
b. ***The woman washed dishes not.*

This indicates that *S V* ***not*** does not specify enough, in contrast to subpattern 3 in

(17).

*S **did not** V* is a **cataphoric shifter** of the form $\delta(X_i)\ Y\ X_i$, where $\delta(V_i)$ = ***did*** serves as a cataphor of V_i (e.g., *walk*). As we will see in Section 5.3.2, such shifters are licensed by *Y*, and *S **did not** V* is licensed by ***not*** in this case. In this regard, it needs attention that virtually nothing may intervene between *V* and ***not*** in subpattern 3; otherwise, there could have been such odd expression as:

(21) a. **The woman did walk not*.
b. **The woman did rapidly not walk*.
b′. *The woman did not walk rapidly*.
b″. ?*The woman did not rapidly walk*.

Note that exclusion of surface forms like these will become harder and more complicated if (17)3 is replaced by (17)3′:

(17)	0.	***the woman***	***did***	***not***	***walk***
	3′.	*S*	*V*	***not***	

This is because both *did* and *walk* are verbs. Thus, the correct meaning of (17)3 is that *not* must immediately follow *U*, and even tends to attach to it, though it is not a morphological pattern which presupposes adjacency.

This is the property that leads to the contraction ***didn't***. To account for this, I stipulate a condition, though provisionally:

(22) **Contraction condition:** two adjacent subpatterns *b* = *abcde* and *d* = *adcde* undergo contraction only when *c* is conditioned, intrinsically or extrinsically, to be empty.

Of course, this is a haste generalization for us to check its validity in a future research.

5.1.7 An analysis of *The farmer killed the duckling*

Let us now turn to (1)3 which illustrates a dominant pattern *SVO*. To this sentence, pattern matching method gives an analysis specified as follows:

(23)	0.	***the***	***farmer***	***killed***	***the***	***duckling***
	1.	***the***	*N*	*(V)*		
	2.	*(D)*	***farmer***	*V*		*(O)*
	3.		*S*	***killed***	*O*	
	4.		*(S)*	*(V)*	***the***	*N*
	5.		*S*	*V*	*(D)*	***duckling***

Description of this sentence is of great importance because it instantiates a most

basic pattern: *SVO*.

This analysis has a few controversial points of the sort mentioned above. First, it is not decided whether subpattern 5 is *S V D* ***duckling*** or *S V* ***duckling***, or furthermore *S V (D)* ***duckling***, which encodes optionality of *D* at a higher level. More clearly, subpattern 4 in (23) may be 4′ in the following.

(24)	0.	***the***	***farmer***	***killed***	***the***	***duckling***
	1,2,3.	***the***	***farmer***	***killed***	*O*	
	4′.		*S*	*V*	***the***	*N*
	5.		*S*	*V*	*(D)*	***duckling***

This analysis claims that, as determiner of object, ***the*** *N* in 4′ is related to its own *S* and *V*. In other words, its relation to *S* and *V* of a (transitive) clause is of "inherence" rather than of "inheritance".

As noted earlier, English provides little evidence whether (23)4 or (24)4′ is adequate. But there are some overt effects in morphologically rich languages like German, Russian, Latin, which case marking is reflected in the shape of determiners. One example in (13) was discussed to examine the declension of German masculine definite article *der*. Such evidence notwithstanding, it is still an open question whether (24)4′ is better than (23)4, since it is not strongly motivated by facts of English syntax.

I am aware that this is a rather technical complication, but the decision is largely motivated by a desire to capture the so-called **subject/nonsubject asymmetry**. One is illustrated by the examples below:

(25) a. **Himself was laughed at (by John)*.
a′. *He$_i$ himself was laughed at (*by John$_i$)*.
b. **Ourselves are hardly believable*.
b′. *We ourselves are hardly believable*.

Nonsubjects are differentiated from subjects as follows:

(26) **The subject/nonsubject distinction:** Given a pattern *P* = *X Y Z*,
i. *Y* is subject of *Z* if *X* = *Ø*, and *Z* = *V* or *P*
ii. otherwise, *X* is a nonsubject, in other words, if *X* = *(S) V*, *(S) P*, or *(O) P*.

As will be shown later, there are a number of syntactic phenomena that seem to refer to **matrix** *S V*, or rather **generalized matrix** *O R*/*S R* __ *(O)*, rather than to **clause** *S V O*. For this reason, encoding of nonsubjects by making reference to *S V* __ , *S P* __ is quite useful.

5.1.8 An analysis of reflexive forms

Another complication arises when **reflexivization** is taken into account. Consider the following contrast:

(27) a. *The farmer$_i$ killed himself$_j$*. (*i=j*, **i≠j*)
b. *The farmer$_i$ killed him$_j$*. (**i=j*, *i≠j*)

In cases like this, *S* ***kill*****(*****ed*****)** *O* should encode a relation between two entities e_i and e_j (for *S* and *O*) such that $i = j$ with $i \neq j$ by default:

(28)	1,2.	***the***	***farmer***	*V*			*(O)*	
	3.		S_i	***killed***	O_j			
	4.1		*S*	*V*	[	***him***	*N*	]
	4.2		*S*	*V*	[	*(D)*	$\textbf{\textit{-self}}_{i=j}$	]

It is assumed that $j \neq i$ in S_i ***killed*** O_j **by default.**

Here, ***him*** *N* is treated as a determiner and *N-****self*** is treated as a head noun, under assumption of ***-self*** being *O* of *kill*. The basic function of *-self* is to override the default index O_j in subpattern 3 to make it $O_{j=i}$.

The analysis in (28) is far from well justified. Compare this with (29):

(29)	1,2.	***the***	***farmer***	*V*		*(O)*		
	3.		S_i	***killed***	O_j			
	4.1		*S*	*V*	[	***him***		]
	4.2		*S*	*V*	[	*O*	$\textbf{\textit{-self}}_{i=j}$	]

By assuming *O-****self*** rather than *N-****self***, this claims, controversially, that it is *-self*, rather than *X-*, that serves as a determiner in *X-self*. It is not yet clear whether (28) or (29) is preferable, but this one seems preferable as long as *O-****self*** automatically implements an otherwise mysterious ban on expressions such as follows:

(30) a. **Himself was killed by the farmer*.
b. **Herself is believed by Beth to be more beautiful than any one*.

Unacceptability of those expressions is an automatic consequence from the incapability of *X-self* to appear at non-object positions.

5.2 Pattern Matching Analysis of Quantification

Discussions in this section are devoted to quantification, interpreted as a special case of determination in the sense to be defined below.

5.2.1 An analysis of *Every woman walked*

Turn to the analysis of (1)2, which is a quantified version of (1)1 examined earlier.

(31) 0. ***every*** ***woman*** ***walked***
1. ***every*** *N* *(V)*
2. *(D)* ***woman*** *V*
3. *S* ***walked***

Because the difference is that *woman* is quantified by *every*, essentials are basically equivalent to (6). There is an implicit difference, of course, in semantics, which could not be described properly in terms of co-occurrence matrix; what follows is at best suggestive.

Quantification is understood here as a special kind of **determination** that is comparable to the semantic operation of ***the*** N_i. We understand determination by determiner *D* is a predication *D* = ***D*** N_i that holds of an arbitrary instance in a (sub)set *N′* of *N* (= {*x*| woman(*x*)} in this case).

Determination by ***every*** N_i, or possibly ***every*** N_i *V*, in subpattern 1 is so complex that a set of references is imposed on *(D)* ***woman*** *V* in subpattern 2. This contrasts with the "simple" determination by ***the*** N_i, or ***the*** N_i *V*, in (6). The difference is that referential index *i* is "instantiational" in ***the*** N_i, whereas *i* is "distributional" in ***every*** N_i.

Some complications arise about the treatment of *every*; therefore, it is not unreasonable to give an alternative analysis:

(32) 0. ***every*** ***woman*** ***walked***
1. ***every*** *S* *(V)*
2. ***woman*** *V*
3. *S* ***walked***

This analysis contrasts with (31) in its specification for *every*. Putting aside whether *V* or *(V)* is adequate for 1, it is really problematic whether *every* operates on a simple *N* or rather *S*. The same is true of other determiners such as *the*, and *a*.

Of course, this *D* = ***D*** *S (V)* analysis is sure to face problems such as its incapability in accounting for the following formations.

(33) a. **Every a woman walked*.
b. **Any the men laughed*.

Despite this, I believe that there is not enough evidence for or against the analysis under question. So, I want to leave this problem open, and very arbitrarily decide on ***every*** *N (V)*, largely based on its analogy to adjectives.

5.2.2 Polarization in pattern composition

By taking into consideration some side-effects of pattern composition, it is likely that certain well known effects in quantification can be captured in terms of pattern composition.

The following two pairs of partial compositions, result from **polarization in pattern composition**, encode two readings of (1)2, (i) "for a set of women, everyone of them walked", and (ii) "for walk, everyone of the women did it".

(34)	2.	*(D)*	***woman***	*V*	Operator
	1,3.	***every***	*S*	***walked***	Presupposition
(35)	3.		*S*	***walked***	Operator
	1,2.	***every***	***woman***	*V*	Presupposition

Here, subpatterns at top correspond to "binders", and subpatterns at bottom correspond to prepositions that contain "bound variables", *S* in the former case, and *V* in the latter case.

It is suggested that pattern matching analysis can dispense with the level of so-called **logical form** (LF), in its flexibility in handling pattern composition. From the perspective of pattern matching analysis, nothing is needed to be assumed except polarization, where a given set of subpatterns are grouped into two extreme "poles", one of which contains a binder, and another contains at least one bound variable, though it is not clear why the following polarization does not make sense.

(36)	1.	***every***	*N*	*(V)*	Operator
	2,3	*(D)*	***woman***	***walked***	Presupposition

Details are to be discussed in Chapter 5, where I discuss Fauconnier's theory of **mental spaces** (1994, 1997).

5.2.3 An analysis of *A farmer killed every duckling*

Turn to (1)6 now. This contrasts with (1)2 and 3, and illustrates another case of quantification in that quantified noun is object.

(37)	0.	***a farmer***	***killed***	***every***	***duckling***
	1.	***a farmer***	*V*		*(O)*
	2.	*S*	***killed***		*O*
	3.	*(S)*	*(V)*	***every***	*N*
	4.	*S*	*V*	*(D)*	***duckling***

Details relevant to quantification are implicit. To make them explicit, I appeal to the following representation, which I arrive at by polarization.

(38) 3×4. *S* *V* ***every*** ***duckling***
1×2. ***a farmer*** ***killed*** *O*

O in 1×2 serves as the variable bound by *every duckling*.

By this representation, it is easy to confirm that quantificational effects are transposed on ***duckling*** by way of superposition of 3 and 4, and then it is transposed on ***killed*** and ***a farmer*** by way of superposition 1 and 2. Other kind of feature percolation mechanisms will not be needed.

5.3 Pattern Matching Analysis of *Wh*-related Phenomena

In this section, I will discuss a few *wh*-related phenomena, but the treatment of *wh*-related phenomena in the Moravcsik-Wirth scheme is scarce. In view of their importance in English grammar, more facts will be added.

5.3.1 How are gaps treated?

Before launching into analysis, however, it will be helpful to make some preliminaries remarks on **gaps** and **syntactic movements**.

Pattern matching analysis rejects to appeal to syntactic movement, but it does not refuse to appeal to gaps. This sounds as contradictory, but it is not. First, metatheoretically, there is a wealth of evidence to suggest that gaps are "psychologically real". In a sense, there are gaps everywhere some material is felt to be "missing".[1] Theoretically, there is no necessity to assume that gaps are what only movements create. Gaps should be independently motivated.

Specifically, my analysis assumes that gaps are **lexically unrealized pattern glues**. Such glues can be interpreted as **underspecified lexical material, semantically and phonologically**, based on a gratuitous (mis)interpretation of underspecification theory (Archangeli 1984, 1988).

5.3.2 Shifters

To meet the special interest (and worry) of how pattern matching analysis deals with so-called **syntactic movement**, I will address discussions in this section to issues related, directly or indirectly, to them. I will try to deal with them in terms of special kind of subpattern called **shifters**, whose most general formulation would take the following form.

(39) A subpattern *P* is a **shifter** if either A or B comprises *P*.
A. ... X_i ... *Y* ... δ(X_i) ... , where δ(X_i) serves as an **anaphor** of X_i
B. ... δ(X_i) ... *Y* ... X_i ... , where δ(X_i) serves as a **cataphor** of X_i

where $\delta(X_i)$ is a special operation, which either suppresses realization of X_i and makes a gap $\emptyset$, or replaces X_i by a pro-form (e.g., *it*).

A more general statement would be:

(40) Subpatterns A and B are shifters when $Z_k = \delta(X_i)$

A. $\ldots X_i \ldots Y_j \ldots Z_k \ldots$

B. $\ldots Z_k \ldots X_i \ldots Y_j \ldots$

As noted earlier, shifters are licensed by Y_j. We will not be concerned with further details of shifters here.

5.3.3 Why are there displacements of materials?

Why are there movements? This is presumably an ultimate question of syntax. I suspect that there is a most general form of constraint that necessitates movement, which I quite tentatively formulate as follows.

(41) **The "no two identical words in a sentence" constraint:**
By default, *$X\ W_i\ Y\ W_i\ Z$, whatever X, Y, Z, and W may be

This constraint is far from accurate, in particular with what is "identical", but I suspect that a more adequate formulation of this simple principle would justify the existence of all displacement phenomena, anaphoric or cataphoric. I guess this constraint stems from a general constraint on the lexical selection from a parse set.

5.3.4 An analysis of *Who killed the duckling?*

Now, turn to (1)5, which illustrates *wh*-question by contrasting with (1)3. To this sentence, I give an analysis:

(42)	0.	***who***	***killed***	***the***	***duckling***	***?***
	1.	***who***	*V*		*(O)*	
	2.	*S*	***killed***		*O*	
	3.	*S*	*V*	***the***	***duckling***	***?***

But this analysis hides important details of *who*. To see this, it is useful to appeal to the following analysis at a finer resolution:

(43)	0.	***who***	***Ø***	***killed***	***the***	***duckling***	***?***
	1.1	***who***	*N*				
	1.2	*(D)*	***Ø***	*V*		*(O)*	
	2.		*S*	***killed***		*O*	
	3.		*S*	*V*	***the***	***duckling***	***?***

Here, relevant effects of determination are implemented by subpatterns 1.1 and 1.2, which, by superposition, combine to *who*.

It is fairly reasonable to assume that, like some other determiners like *this*, *that* (but not *the*, *a*), *who* incorporates a null head noun into it. To see this, it is sufficient to notice the following use of ***this*** in (44)a, contrasted to ***this*** *N* in (44)b an c.

(44) a. *This is the most important paper in this research area.*
b. *This paper is the most important paper in this research area.*
c. *This paper is most important in this research area.*

If morphological details are concerned, the following analysis can be utilized.

(45)	0.	***wh***	***-o***	***killed***	***the***	***duckling***	***?***
	1.1	***wh***	*N*				
	1.2	*(D)*	***-o***	*V*		*(O)*	
	2.		*S*	***killed***		*O*	
	3.		*S*	*V*	***the***	***duckling***	***?***

Here, ***who*** is viewed as an amalgam of a *wh*-determiner and a head noun, though morphological details are rather speculative.

5.3.5 An analysis of *What did the farmer kill?*

For comparison, consider the following cases of *wh*-questions.

(46) a. *What did the farmer kill?*
b. *What duckling did he killed?*

The following is an analysis given to (46)a.

(47)	0.	***what***	***did***	***the farmer***	***kill***	***Ø***
	1.	***what***$_i$	*(U)*	*S*	*V*	δ_i
	2.		***did***$_i$	*S*	V_j	
	3.			***the farmer***	*V*	*(O)*
	4.			*S*	***kill***	*O*
	5.			*S*	*V*	***Ø***

To justify details of this analysis, in particular, ***what***$_i$ *(U) S V* $\delta(X_i)$ in 1, a special kind of subpatterns called **shifters** are introduced.

5.3.6 Relevance to the "vacuous movement" hypothesis

It should be noted that the analysis presented in (43) has nothing to do with so-called "vacuous movement hypothesis" (Chomsky 1986*b*). According to the hypothesis, the relevant LF representation of (1)5 = *Who killed the duckling?* is (48)i rather than ii.

(48) i. $[_{C^2}\ [_{Spec}$ who $][_{C^1}\ [_{C}\ ][_{IP}$ ***t*** killed the duckling]]
ii. $[_{C^2}\ [_{Spec}\ ][_{C^1}\ [_{C}\ ][_{IP}$ who killed the duckling]]

t is the "trace" of *who*.

Despite superficial similarity, the analysis presented in (43) has nothing to do with representations like (48)i and ii. As I will discuss in the next chapter, most, if not all, LF movements, I claim, correspond to effects of the columnwise unification of subpatterns. In this case, effects attributed to vacuous movement are exactly effects of unification of ***who*** (= 1), with or without ***Ø***, and *S* ***killed the duckling*** (= 2×3), as illustrated in the following:

(49) 1. ***who*** *V* *(O)* Operator expression
2×3. *S* ***killed*** ***the*** ***duckling*** Presupposition

As indicated, *S* in 2×3 is the counterpart of *t* in (48), and serves as the "variable bound" by ***who***, under the assumption that subpattern 1 = ***who*** *V (O)* serves as a domain expression.

5.3.7 Relevance to the *wh*-island effect

Consider the contrast among (50)a, b, and b′ below, which illustrates the so-called ***wh*-island effect**, and is considered to support the vacuous movement hypothesis.

(50) a. **How do you wonder* [*who fixed the car* ***t***] *?*
a′. ?**How do you wonder the story?*
b. *How do you wonder* [*he fixed the car* ***t***] *?*
b′. **How do you wonder* [*you fixed the car* ***t***] *?*

Though provisionally, the account of this set of facts alluded to the vacuous movement hypothesis goes as follows, provided that the deviance of (50)b′ is pragmatic.

To begin with, a pattern matching analysis to (50)b is given.

(51) 0.	***how***	***do***	***you***	***wonder***	***Ø***	***he***	***fixed***	***the car***	***Ø***
1.	***how***$_i$	*(U)*	*S*	*V*	δ_i				
2,3,4,.		***do***	***you***	***wonder***	*C*				
5.			*S*	*V*	***Ø***$_i$	*S*	*V*		δ_i
6,7,8.						***he***	***fixed***	***the car***	
9.						*S*	*V*		***Ø***

In this example, two anaphoric shifters are bridged between ***how*** and ***Ø*** at the tail of the sentence.

The account of the unacceptability of (50)a is based on a sort of irresolvable conflict for $Ø_i$ in subpattern 5 between ***how*** and ***who***. If ***how*** is linked to $Ø_i$ in 5 (by the shifter in subpattern 1), then ***what*** is made dangling, and is out, as encoded by *6,7,8 in the following analysis for (50)a.

(52)	0.	***how***	***do***	***you***	***wonder***	***Ø***	***who***	***fixed***	***the car***	***Ø***
	1.	***how***$_i$	*(U)*	*S*	*V*	δ_i				
	2,3,4,.		***do***	***you***	***wonder***	*C*				
	5.			*S*	*V*	***Ø***$_i$	*S*	*V*		δ_i
	*6,7,8.						***who***	***fixed***	***the car***	
	9.						*S*	*V*		***Ø***

If, alternatively, ***who*** is linked to $Ø_i$ in 5 (by C-matching between 4 and 5), then subpattern 1 should be *1:

(53)	0.	***how***	***do***	***you***	***wonder***	***who***		***fixed***	***the car***	***Ø***
	*1.	***how***$_i$	*(U)*	*S*	*V*					δ_i
	2,3,4,.		***do***	***you***	***wonder***	*C*				
	5,6,7,8.			*S*	*V*	***who***		***fixed***	***the car***	
	9.					*S*		*V*		***Ø***

Admittedly, assumptions to account for the awkwardness of *6,7,8 in (52), on the one hand, and of *1 in (53), on the other, need to be justified. Leaving the former for later discussions, let me concentrate here on the latter.

Note that the awkwardness of 1 in (53) needs to be contrasted with the analysis in which is the pattern matching analysis of (54).

(54) *?Why do you wonder who fixed the car?*

(55)	0.	***why***	***do***	***you***	***wonder***	***who***		***fixed***	***the car***	***Ø***
	?1.	***why***$_i$	*(U)*	*S*	*V*	*O*				δ_i
	2,3,4,.		***do***	***you***	***wonder***	*C*				
	5,6,7,8.			*S*	*V*	***who***		***fixed***	***the car***	
	9.			*S*	*V*					***Ø***

The difference between (50)b and (54) is based the lexical difference between *how* and *why* in "adjuncthood".

(56) i. *how* is more likely to be a direct or indirect argument of *wonder*, in that *how* is more likely to realize *O* (or a gap *Ø* in it) in *S* ***wonder*** *O*, where

who (fixed the car) realizes *O*, than to realize *Adv* in *S* ***wonder*** *O Adv*.

ii. *why* is more likely not to be a modifier of *wonder* in that *why* is more likely to realize *Adv* in *S* ***wonder*** *O Adv* than to realize *O* (or a gap *Ø* in it) in *S* ***wonder*** *O*.

Analyses so far strongly suggest that LF movement accounts of relevant phenomena are far from optimal, at least from the perspective of pattern matching. But this does not imply that this approach is superior in every respect. In fact, this analysis fails to account for the exceptional acceptability of the following.

(57) *?What do you wonder* [*who saw* ***t***] *?*

I have no plausible treatment of this fact now at this time.

5.3.8 An analysis of *The axe killed the duckling that John loved*

Now, turn to (1)14. This example illustrates **relative clause formation** and **instrumental subject formation**. To this sentence, the following analysis is given.

(58)	0.	***the axe***	***killed***	***the duckling***	***that***	***John***	***loved***	***Ø***
	1.	***the axe***	*V*	*(O)*				
	2.	*S*	***killed***	*O*				
	3.	*S*	*V*	***the duckling***				
	4.			X_i	***that***	*S*	*V*	δ_i
	5.					***John***	*V*	*(O)*
	6.					*S*	***loved***	*O*
	7.					*S*	*V*	***Ø***

The sentence under question is an example of **relative clause formation**. It makes use of the **anaphoric shifter** X_i *Y* $\delta(X_i)$, encoded by subpattern 4. Here, X_i encodes the antecedent of $\delta(X_i)$ = *Ø*, given that X_i ***that*** *S V* $\delta(X_i)$ is an instance of anaphoric shifter. As we have seen in Section 5.3.2, all anaphoric shifters take the form of X_i *Y* $\delta(X_i)$, where *Y* = *(C)(S V)*^{n} *V*, and semantic and pragmatic constraints on the well-formedness of *Y* determine their functioning.

As discussed earlier, PMA countenances a gap, ***Ø***, in 7 as a legitimate element of a pattern and a subpattern. There is no conclusive ground not to do so. For one thing, the gap is what subpattern 4 expects, and what ***John*** *V (O)* in 5 and *S* ***love*** *O* in 6 demand.

Putting aside the details of the shifter, I note briefly that *that* functions differently from cases like *S* ***believe that*** *S V*, where *that* behaves like the determiner of *V*. In this case, *that* determines a "missing" unit *X*, with or without intervening *V*.

5.3.9 Relevance to Extraposition phenomenon

More interestingly, though, the shifter subpattern is more generally employed in constructions such as **extraposition**, *there*-**construction**, and **reference-point construction** in the sense of Langacker (1992):

(59)	δ(*X*)	*Y*	*X*
a.	*it*	*is surprising*	*that everybody ignored this fact.*
b.	*it*	*amuses him*	*for you to love her.*
c.	*there*	*is a policeman*	*in the store.*
d.	*we*	*have skunks*	*around here.*

It should be noted that subpattern δ(*X*) *Y X* has abstract semantics in it in that a set of selectional restrictions are imposed on *Y*, in addition to a few restrictions on δ(*X*) and *X*. Trivially, all the following are unacceptable for reasons that will not be pursued in this thesis.

(60)	δ(*X*)	*Y*	*X*
a.	**It*	*laughed loudly*	*the boy in front of the next door*
b.	**It*	*melted*	*that the bomb explodes next Sunday.*

But it is clear that this set of facts has relevance to another phenomenon called **right dislocation**, as exemplified by the following.

(61) a. *He laughed loudly,* ***the boy in front of the next door.***
b. *That was our great joy,* ***that huge pumpkin pie that the host served for us.***

While I do not subscribe to the idea that licensing for δ(*X*) *Y X* is ultimately reducible to right dislocation, it deserves mentioning that this property may have bearings on the well known fact that *Y X* segmentation is weaker than δ(*X*) *Y* segmentation, thereby giving apparent constituency of $[_S\ [_S\ \delta(X)\ Y]\ X]$.

Additionally, it is notable that contextuation attenuates such constraints.

(62) a. ??*The police made laughed loudly the boy.*
b. **The police made him laughed loudly the boy.*

Interestingly, there is a positional differentiation of δ(*X*): it must be covert, or a "gap", in anaphoric context like in B, whereas δ(*X*) can be an "expletive", if overt, pronoun such as *it* in cataphoric context like A.

(63)						
A.			*(S V)*	δ(*X*)	Y_2	*X*
B.	*X*		Y_1	δ(*X*)		

Y_1 and Y_2 are of different configurations. While Y_2 takes δ(*X*) as its subject, thereby

making X an adpositional element, Y_1 takes $\delta(X)$ as its object or its analogue.

This suggests an account of **topicalization** like (64)a and **left dislocation** like (64)b.

(64)	X	Y	$\delta(X)$
a.	*Jim,*	*we all love*	*Ø.*
b.	*Jim,*	*we all love*	*him.*

I want to suggest that use of *him* as $\delta(X)$ is exceptional to the same extent that use of *he* as $\delta(X)$ in (61)a is exceptional. I suggest that uses of gap and personal pronouns are not the same, though there is important commonalities. For one thing, a gap is specialized for $\delta(X)$ in anaphoric context, while an expletive such as *it* is for $\delta(X)$ in cataphoric context.

5.3.10 Extraposition of relative clause

Related to the extraposition of the form $\delta(X)\ Y\ X$ is **extraposition of relative clause**, as the following pair illustrates.

(65) a. ***A bomb*** *exploded* ***that the police failed to remove***.
b. ***A bomb that the police failed to remove*** *exploded.*

Early generative analysis (Rosenbaum 1967) of this kind of extraposition consists in derivation of *a*-versions from *b*-versions by shifting *that*-clause or *for-to* complement rightward, provided that *b*-versions are derived from *c*-versions by *it*-introduction.

(66) a. *It seems obvious* ***that the companies will fall merge*** .
b. **It* ***that the companies will fall merge*** *seems obvious*.
c. ***That the companies will fall merge*** *seems obvious.*

(67) a. *It is hard* ***for you to meet the woman.***
b. **It* ***for you to meet the woman*** *is hard.*
c. ***For you to meet the woman*** *is hard.*

Despite such formal similarity, there is a crucial difference: in normal extraposition, what stays is expletive *it* to match $\delta(X)$, whereas in extraposed relative, what stays is a full noun phrase (e.g., *a letter*). It is not clear whether such NP matches $\delta(X)$. Thus, I would like to suggest that this kind of extraposition can be characterized as $X\ Y_1\ \delta(X)\ Y_1\ \delta(X)$, which is itself a composition of two occurrences of B in (63):

(68)

B_1:	X		Y_1	$\delta(X)$			
B_2:				X		Y_1	$\delta(X)$
a.	*A bomb*	*exploded*		*Ø*	*that they failed to remove*		*Ø*

This configuration contrasts with the following:

(69)

	X		Y_1	$\delta(X)$	(Y_2)
a.	*A bomb*	*that they failed to remove*		*Ø*	*exploded.*

This suggests that the similarity between the extraposition of *that*-complement or *for-to* complement and the extraposition of relative clause is superficial rather than substantial. The former makes use of cataphoric link B illustrated in (63) whereas the latter of anaphoric link A in (63).

Moreover, let me note that relative clause extraposition has certain bearings on particle movement, which I will discuss briefly in Section 5.7.7.

It is unclear, however, whether this is the best description. This configuration should be compared with the following, where not carrier gap is assumed, and we allow only one occurrence of B, such that X = *a bomb*, Y = *V C S V to V*, and $\delta(X)$ = *Ø*.

(70)

B:	X	V	C	S	V	*U?*	V	$\delta(X)$
a.	*A bomb*	*exploded*	*that*	*they*	*failed*	*to*	*remove*	*Ø*

I cannot argue for this analysis strongly, but let me note that this resembles the analysis of right node raising construction presented in (138).

5.3.11 Instrumental subject formation

Differently seen, (1)14 is also a case of what may be called **instrumental subject formation**, with resemblance with **middle formation** such as *This jacket breaks easily*.

I am far from confident about how this fact should be reflected in co-occurrence matrix. My best is to appeal to the following, somewhat artifactual matrix which has "minus" (–) positions:

(71)

0.	***Ø***	***Ø***	***the axe***	***killed***	***the duckling***
–2.	***S***	*V*	*(O)*		
–1.	*S*	***V***	*O*		
1.	*S*	*V*	***the axe***	*V*	*(O)*
2.	*(S*	*V)*	*S*	***killed***	*O*
3.	*(S*	*V)*	*S*	*V*	***the duckling***

Subpatterns 2 and 3 in this analysis illustrate **dual subject**.

Despite obvious artifactuality, though, it is quite easy to see that S_{-2} refers to, or alludes to, someone who "used" the axe to kill the duckling, with implicit *V* being roughly *use*.

Though controversial, I find this analysis is analogous to the behavior of ***O M P O*** in cases like the following, though the matrix denoted by *S V* here does not possess "control" over ***O M P O***.

(72)	*S*	*V*	O_1	*M*	*P*	O_2
a.	*there*	*are*	*a lot of bees*	*swarming*	*in*	*the garden.*
a′.			*a lot of bees*	*are swarming*	*in*	*the garden.*
b.	*we*	*have*	*a lot of skunks*		*around*	*here.*
b′.			*a lot of skunks*	*exist*	*around*	*here.*

Example b is cited from Langacker (1993).

If the proposed analysis is correct, then instrumental subject formation has nothing to do with raising. Rather, it is **matrix reversing** in that matrix *S V* in *S V* O_1 *P* O_2 is reversed around O_1 so that *S V* $\boldsymbol{O_1}$ ***V′ S′ P*** $\boldsymbol{O_2}$ is generated, where ***S′*** is usually gapped.

For comparison, consider (73)a, in contrast with b, which Lambrecht (1988) (misleadingly) calls a syntactic amalgam.

(73) a. ?*There was a farmer had a dog.*
a′. ?*There was a farmer had a dog in his garden.*
b. *There was a farmer who had a dog.*

Example (73)a is taken from Lambrecht.

It is interesting to note that this construction resembles (72) except that *M* is VP, though this fact is only suggestive, and shows nothing factual.

5.4 Pattern Matching Analysis of Adjunction

Discussions in this section are devoted to the description of adjunction.

5.4.1 An analysis of *John killed a duckling with an axe*

Let us turn to (1)7, which illustrates adjunction of *with an axe*. To this sentence, the following analysis is given.

(74)						
	0.	***John***	***killed***	***a duckling***	***with***	***an axe***
	1.	***John***	*V*	*(O)*		
	2.	*S*	***killed***	*O*		
	3.	*S*	*V*	***a duckling***		
	4.	*S*	*V*		***with***	*O*
	5.	*S*			*P*	***an axe***

The modifier status of *with an axe* is described by positing that it is, as indicated by 4, *S V* ***with an axe***, where *S* and *V* will be ***John*** and ***kill*** after composition.

5.4.2 Effects of unit sharing

The behavior of modifiers illustrates very well the crucial role that **unit sharing** plays in the proposed description of syntax, owing basic insights to Hudson's (1984) analysis of relevant phenomena.

In (74), *S V* ***with*** *O*, encoded in 4, shares matrix *S V* with *S V* ***a duckling***. Their difference is in argumenthood. While *S V* ***a duckling*** encodes an "argument" of *kill*, *S V* ***with*** *O* functions as an "adjunct" of *S* ***kill*** *O*. However, explaining where such differences come from is outside the scope of this thesis.

5.4.3 Effects of relativized categorization

Under the principle of relativized categorization, a most controversial point is what subpattern 4 encodes, which claims that ***kill***, matching *V*, is an "auxiliary" in relation to *with*, especially when used in the sense of *use*. Observe *John killed a duckling (by) using an axe*. More explicitly, the following parallelism is claimed, though it is not certain whether *it* constitutes *U* or not.

(75)		*S*	*V*	*(O)*	*P*	*O*
	a.	*John*	*killed*	*it*	*with*	*an axe*
	b.	*John*	*laughed*		*without*	*end*
		S	*U*		*V*	*O*
	c.	*John*	*would*		*spoil*	*our party*

Differently put, we hold that VP-modifiers like *S V* ***with*** *O* are virtually "defective" verbs that do not inflect for tense (and person). Incidentally, prepositions in Swahiri agree with their "subjects" for person.

5.4.4 Distinction between NP- and VP-adjuncts

It will be helpful to take a note on the distinction between NP- and VP-modifiers. Consider the following cases:

(76) a. *John killed a duckling with long legs.*
a′. *John killed a duckling that had long legs.*
a″. *John killed a duckling whose legs are long.*
b. *John killed a duckling with intention.*
b′. *John intentionally killed a duckling.*

In (76)a, ***a duckling*** *S*-instantiates *S* ***with long legs***, as the following table shows.

(77)	0.	***John***	***killed***	***a duckling***	***with***	***long legs***
	1.	***John***	*V*	*(O)*		
	2.	*S*	***killed***	*O*		
	3.	*S*	*V*	***a duckling***		
	4.			*S*	***with***	*O*
	5.			*S*	*P*	***long legs***

Here, *S* ***with long legs*** functions as an N(P)-modifier. The difference between NP- and VP-modifiers comes from the fact that, in VP-modifiers, *S* is shared by all relationals, as shown in (74), whereas, in NP-modifiers, it is not so in the last case.

Basic modification structure of (76)a is the same as (76)a′, where the relative clause, *that had long legs*, is made use of, as indicated below.

(78)	0.	***John***	***killed***	***a duckling***	***that***	***Ø***	***had***	***long legs***
	1.	***John***	*V*	*(O)*				
	2.	*S*	***killed***	*O*				
	3.	*S*	*V*	***a duckling***				
	4.			X_i	***that***	S_i	*V*	
	5.					***Ø***	*V*	*(O)*
	6.					*S*	***had***	*O*
	7.					*S*	*V*	***long legs***

The difference is whether *S R* ***long legs*** makes reference to time, as encoded by 6 and 7 in the last analysis, or not, as encoded by 4 and 5 in the above one.

In (76)b, by contrast, relevant modification is V(P)-modification, and it has to be described as follows.

(79)	0.	***John***	***killed***	***a duckling***	***with***	***intention***
	1.	***John***	*V*	*(O)*		
	2.	*S*	***killed***	*O*		
	3.	*S*	*V*	***a duckling***		
	4.	*S*	*V*		***with***	*O*
	5.	*S*			*P*	***intention***

Here, *S V* ***with intention*** functions as a VP-adjunct.

Note that the difference between (77) and (79) is lexical, and not syntactic. But, if we access the internal structure of *intention*, we can provide the following analysis.

(80)	0.	***John***	***killed***	***a duckling***	***with***		***intent***	***-ion***		
	1.	***John***	*V*	*(O)*						
	2.	*S*	***killed***	*O*						
	3.	*S*	*V*	***a duckling***						
	4.	*S*	*V*		***with***			*O*		
	5.1					[S_i	***intend***		O_j]	
	5.2	*S*			*P*	*S*	*V*	***-ion***		

By accessing S_i *intend* O_j, encoded in 5.1, it is possible to state that S_i is ***John***, and O_j is ***to kill a duckling***, or *to do it*. This would account for the paraphrase of *The duckling killed a duckling with intention* by (81)a.

(81) a. *John intended to kill a duckling and did it.*
b. ?**John intended to kill a duckling and did so.*

But this analysis cannot provide a good account of the low acceptability of (81)b.

5.4.5 An analysis of *X move Y on(to) Z*

Note incidentally that differentiation between the NP- and VP-modifiers is semantically determined. Consider the following cases.

(82) a. *Move the book on the desk.*
b. *Move the book on the desk* ***onto the chair***.
c. *Move the book* ***on the chair*** *onto the desk*.

Sentences like (82)a are claimed to be ambiguous whether they have readings of type (82)b or (82)c. Clearly, existence of "implicit" arguments (put in bold face) causes such ambiguity.

PMA need not appeal to phrase structure or transformation on account of this kind of ambiguity. To (82)b, the following description is given.

(83)

0.	***Ø***	***move***	***the book***	***on***	***the desk***	*on*	*-to*	*the chair*
1.	***Ø***	*V*	*(O)*					
2.	*S*	***move***	O_i				*(P)*	
3.	*S*	*V*	***the book***					
4.			S_j	***on***	*O*			
5.			S_j	*P*	***the desk***			
6.1					S_k	*on*		*O*
6.2					S_k	*P*	*-to*	*O*
7.					S_k		*P*	*the chair*

Here, ***Ø*** in 1 corresponds to the implicit subject in imperatives. Incidentally, *O*-sharing is exemplified by *on-to* which is analyzed as a composite preposition, where *on-* functions in the same way as *under-* functions in *under-go*. For relevant details of *under-go*, see Appendix A.

This analysis claims that *on the desk* functions as a modifier of *the book*. Crucial in this analysis is the role of subpattern 2 = *S* ***move*** *O (P)*, which encodes the argument structure of *move*. For comparison, the structure of (84) is presented.

(84) a. *Put the book on the desk on(to) the chair*.
b. **Put the book*.

Next, a pattern matching analysis of this sentence is presented.

(85)

0.	***Ø***	***put***	***the book***	***on***	***the desk***	***on***	***-to***	***the chair***
1.	***Ø***	*V*	*(O)*					
2.	*S*	***move***	O_i				*P*	
3.	*S*	*V*	***the book***					
4.			S_j	***on***	*O*			
5.			S_j	*P*	***the desk***			
6.1					S_k	***on***		*O*
6.2					S_k	*P*	***-to***	*O*
7.					S_k		*P*	***the chair***

The difference between put and move is the optionality of *P* in *S V O P*.

It should be noted here that, *O P* in *S V O P*, or more generally *O R* in some of the instantiations of *S V O R*, works as a **generalized matrix**. To give a few examples of this, we have the following.

(86) a. *Let* ***him leave*** *now*.
b. *Find* ***it invaluable****, please*.

The idea of the generalized matrix is similar to the idea of **small clause**, but there are crucial differences between them. I will discuss this issue in Section 5.6, where I examine (1)9 = *The woman believed John to have killed the farmer*, which il-

lustrates so-called "exceptional case marking" construction.

Returning to the original issue, the analysis in (83) is compared with the following analysis, which is give to (82)c.

(87)	0.	***Ø***	***move***	***the book***	*on*	*the chair*	***on***	*-to*	***the desk***
	1.	***Ø***	*V*	*(O)*					
	2.	*S*	***move***	O_i				*(P)*	
	3.	*S*	*V*	***the book***					
	4.			S_j	*on*	*O*			
	5.			S_j	*P*	*the chair*			
	6.1					S_k	***on***		*O*
	6.2					S_k	*P*	*-to*	*O*
	7.					S_k		*P*	***the desk***

In this analysis, *on the desk* functions as an indirect argument of *S* ***move*** *O (P)* in that it is licensed by *(P)*.

To make complicated matters clearer, I appeal to the diagram that follows, which graphically illustrates crucial points in the argument structure of *S* ***move*** *O* (P_1 *O)* (P_2*-to O)*.

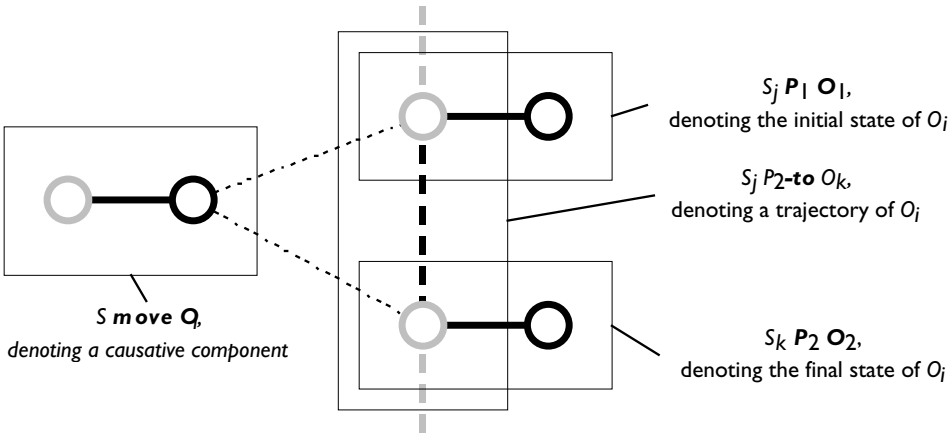

Figure 5.1

The crucial difference is presumably which argument is "activated" in different speech situations, by presupposing covert arguments in the argument structure of *move*. Thus, the key is the specification of argument structure. I write it as *S* ***move*** O_i P_1 O_1 P_2 O_2, encoded by 2 in either case. I assume that S_j denotes the initial state of O_i, and S_k denotes the final state of O_i. O_i's motion is caused by *S*. The complexity of the specification trades off with the simplicity of my account.

5.5 Pattern Matching Analysis of Active-Passive Correspondence

In this section, I will try to provide a detailed analysis of passive, based on (1)4 = *The duckling was killed by the farmer*. I note here that the analysis proposed within the framework of PMA is quite controversial: it contains a lot of difficulties.

5.5.1 An analysis of *The duckling was killed by the farmer*

Now, turn to (1)4, which contrasts with (1)3 in terms of the **active-passive correspondence**. At the scale of word-external syntax, PMA gives the following analysis to this sentence:

(88)	0.	***the duckling***	***was***	***killed***	***by***	***the farmer***
	1.	***the duckling***	*V*	*(O)*		
	2.	*S*	***was***	*AdN*		
	3.	*S*	*V*	***killed***	*(P)*	
	4′.			*S*	***by***	*O*
	5′.			*S*	*P*	***the farmer***

One of the crucial questions about passive is the following:

(89) **Question of Passive.** Why can *X be V-en (Z) (by Y)* be (re)interpreted so that *Y* as an "agent" and *X* as a "patient" in an act (or action) denoted by *V*?

This feature is implicit in the description in (88). So, even if this analysis is adequate on the scale of words, it is not so revealing, because it fails to describe the source of such (re)interpretation.

In this analysis, *killed*, as indicated in subpattern 3, is treated as a simplex, i.e., a special kind of *AdN*, or possibly a special kind of *O*, in that subpattern 3 matches general patterns *S V AdN (P)* and *S V O (P)*. In other words, this analysis does not refer to the internal structure of *killed*.

Admittedly, the analysis given above is rather superficial. More generally, it seems that no analysis on "larger" scales like this is unable to provide insights into passive. The reason is that its semantics (rather than its syntax) has to make reference to the internal structure of *V-en* (e.g., *killed*). So, it is necessary to revise (88) as follows:

(90)	0.	***the duckling***	***was***	***killed***	***by***	***the farmer***
	1.	***the duckling***	*V*	*(O)*		
	2.	*S*	***was***	*B*		
	3.	*S*	*V*	***killed***	*(P)*	
	4.			*S V O*	***by***	O_i
	5.			*S V O*	*P*	***the farmer***

Subpatterns 4 and 5 are modified so that simplex *S* is replaced by complex *S V O*,

and its internal structure is made "visible". I assume that *B* is a special class that subsumes NP, AP, and PP.

5.5.2 What is unusual about passivization?

To make crucial points clearer, let $\mathfrak{A}$ and $\mathfrak{B}$ be the parses of relevant active and passive clauses.

(91) $\mathfrak{A}$= {***the farmer*** *V (O)*, *S* ***kill*** *O*, *S V-****ed***, *S V* ***the duckling***}
$\mathfrak{B}$= {***the duckling*** *V (O)*, *S* ***be*** *O*, *S V-****ed***, *S* ***kill*** *O*, *S V-****en***, S_i *V* O_j ***by*** O_i, S_i *V* O_j *P* ***the farmer***$_i$}

Importantly, $\mathfrak{A}$ and $\mathfrak{B}$ share only *S* ***kill*** *O*; all other subpatterns are different. Thus, the parse sets can be more adequately characterized as follows:

(92) $\mathfrak{C}$= {*S* ***kill*** *O*}
$\mathfrak{A}$= {$\mathfrak{C}$, $\mathfrak{A}'$}
$\mathfrak{B}$= {$\mathfrak{C}$, $\mathfrak{B}'$}
$\mathfrak{A}'$= {***the farmer*** *V (O)*, *S V-****ed***, *S V* ***the duckling***}
$\mathfrak{B}'$= {***the duckling*** *V (O)*, *S* ***be*** *O*, *S V-****ed***, *S V-****en***, S_i *V* O_j ***by*** O_i, S_i *V* O_j *P* ***the farmer***$_i$}

Put differently, passive and active forms are so different that they share only semantics and phonology of subpatterns. Let $\zeta(S)$ denote only semantics and phonology of a set *S*. Clearly, $\zeta(\mathfrak{B}') \supset \zeta(\mathfrak{A}')$.

5.5.3 How does syntax access morphological structure?

The relatedness of passive formation to active formation might be weaker than usually believed. It is not more than they share only *S* ***V*** *O* (e.g., *S* ***kill*** *O*). Thus, really problematic in the active-passive correspondence is that in passive formation, *S* ***V*** *O* is embedded in a word, past participle. Thus, a good theory is in need of the interface between word-external syntax and word-internal syntax.

Fortunately, (88) is not the only analysis that pattern matching is able to provide. Indeed, on another finer morphological scale, the following analysis can be given:

(93)

0.	***the duckling***	***was***		***kill***	***-ed***	***by***	***the farmer***	
1.	***the duckling***	*V*			*(O)*			
2.	*S*	***was***			*B*			
3.1			[*S*	***kill***	*O*]			
3.2	*S*	*U′*	[*S*	*V*	***-ed***]			
4.			S_i	*V*	O_j	***by***	O_i	
5.			*S*	*V*	*O*	*V*	***the farmer***	

U′ is a special kind of *U*, which subsumes *be*, *have*, *get*. Here and elsewhere, *B* encodes nominative complement of *be*, and *S V-**ed*** (rather than [*V-**ed***]$_W$) is treated as a word-size unit without good evidence.

The key to this analysis is the representation of the internal structure of *kill*, encoded by 3.1 and 3.2, which cannot be accessed successfully in terms of word syntax, and described here by appealing to subindexing.

I admit that the analysis presented above is obviously ad hoc in that it crucially relies on the "interface" between syntax and morphology. The proposed analysis is admittedly controversial, but it may be innovative to that extent. Special comments on subpatterns 2, 3, and 4, which are most problematic in this analysis are needed.

For subpattern 2, PMA posits S_i ***was*** B_i (or more exactly S_i ***was*** $B_{j=i}$) rather than S_i ***was*** B_j. This is motivated by the peculiar behavior of verbs of the *be*-class (called usually "linking" verbs). Given general form $V = S_i\ \mathbf{V}\ O_j$, it is observable that O_j is **nominative complement** that differs in a variety of ways from usual object. To implement their peculiar syntactic behavior, it is assumed that *be*-class verbs differ from verbs of other classes in that, $V = S_i\ \mathbf{V}\ O_j$, default indexing of *be*-class verbs is $j = i$, whereas default index of all other (at least) two-place verbs is $j \neq i$.

For subpattern 3 and 4, the passive is basically a cooperation of two subpatterns (i) $S_i\ V\ S_j\ V\text{-}\mathbf{en}_i$ (or $S_i\ V\ O_j\ V\text{-}\mathbf{en}_i$) and (ii) $S_j\ V\ O_i$ ***by*** O_j. Since the function of (i) is less controversial, let us concentrate here the second point.

5.5.4 Availability of $S_i\ V\ O_j\ P\ O_i$

Note that the use of *by* in passive should be distinguished from other usual uses of *by*, in that it makes the internal structure of a verb embedded in a past participle, e.g., *kill*. But how is this kind of use licensed? Where does it developed from? I am not sure what the answer will be, but I will point out an interesting parallelism among a few constructions, illustrated as follows:

(94)

	S_i	V	O_j	P	O_i
a.	*S*	***kill***	***-ed***	***by***	***John***
b.	***there***	***are***	***stray dogs***	***by***	***the tree***
c.	***it***	***is***	***strange***	***that***	***it rains now***
d.	***they***	***have***	***armadillos***	***in***	***Texas***[2]

Constructions in this group are all instantiations of the schema S_i *V* O_j *P* O_i, where we can observe a link in terms of (sloppy) identity between S_i and O_i, with S_i being a "dummy", or "expletive" subject like *there*, *it*, and *we*.

Comparable to this, "cataphoric" realization of S_i *V* O_j *P* O_i is another, "anaphoric" realization of S_i *V* O_j *P* O_i, exemplified by the following examples:

(95)		S_i	*V*	O_j	*P*	O_i
	a.	*S*	***was***	*S*	***kill***	***-ed***
	b.	***this frog***	***has***	***yellow spots***	***on***	***it(*self)***
	c.	***this problem***	***involves***	***intricacies***	***in***	***it(*self)***

Sharing the schema S_i *V* O_j *P* O_i, the constructions in (95) contrast with those in (94). Notably, in (94), S_i is a pronominal, and O_i is a full noun phrase coindexed with S_i. By contrast, in (95), O_i is a pronominal and S_i is a full noun phrase coindexed with O_i.

Differently seen, constructions in (94) and (95) are cataphoric shifter $\delta(X_i)$ *Y* (X_i) and anaphoric shifter X_i *Y* $\delta(X_i)$, discussed in Section 5.3.2. This point is supported by the fact that O_i may not be a reflexive form coindexed with S_i. This fact is trivial, if my prediction that O_j serves as the subject of *P* O_i, while it is the object of S_i is correct.

Despite lack of further justifications, all of these points suggest that S_i *V* O_j *P* O_i, or more generally, X_i *Y* X_i, is itself an established pattern available for passive construction.

5.5.5 Remarks on passive, with special reference to structure preservation

Generally, the real problem raised by the active-passive correspondence is the way syntax interfaces morphology, on the one hand, and the definition of a word, on the other, provided that morphology is concerned with word-internal syntax only.

Note that the problematic status of *V-en* (e.g., *killed*) in *X be V-en (Z) (by X)* could be compared to the behavior of *V-er*, as exemplified below:

(96) a. *The farmer was a* ***killer****.*
a′. *The farmer was the* ***killer*** *(of Mary Horn).*
a″. ?*The farmer was the* ***killer*** *of the duckling.*
b. *Edith Piaff was a famous* ***singer****.*
b′. *Edith Piaff was a best* ***singer*** *of the song.*

For exposition, I call this construction **nominalized agent construction**.

Note that *killer*, as a deverbal nominal, makes use of the argument structure of *kill*. I argue that there is no essential difference between the way *killed* makes use of *kill*'s argument structure in passive formation and the way *killer* makes use of

the argument structure in nominalized agent construction. Their difference is that the formation of *V-en* belongs to **inflectional morphology**, whereas the formation of *V-er* (and *V-or*) belongs to **derivational morphology**.

My point is this: the way *killed* makes use of the argument *kill* is as much obscure as the way that *killer* makes use of it; in fact, it is unclear how the "agent-hood" implied in *kill(er)* and *sing(er)* is derived. If the transformation of passive forms from active forms is allowed, then the following transformation should be also allowed; otherwise, the treatment would be inconsistent.

(97)	*G*:	*X*	*be*	*the*	*V*	*-er*	*(of*	*Y)*
		|			|			|
	F:	*X*			*V*			*Y*
		|			|			|
	G′:	*X*	*be*	*a*	*V*	*-er*	*(*of*	*Y)*

Two related correspondences are described here: one is the correspondence between *F* and *G*, and another is the one between *F* and *G′*. Effects of tense are ignored.

This suggests that if something is unusual in the active-passive correspondence, it is not that grammatical relations are changed in it, but that **the internal and external structures of words are related**. Under this remark, I want to defer providing a definitive PMA analysis of the active-passive correspondence until PMA solves the problem of the syntax-morphology interface successfully.

In passing, a remark on the notion of **structure preservation** in the sense of Emonds (1970, 1976) may be relevant, since the passive is sometimes taken up as its evidence. Note that in the pattern matching analysis of passive, *The duckling was killed by the farmer*, above, effects of structure preservation are implicitly encoded. Notably, subpatterns 3.1 in (93) encodes an active form *S* ***kill*** *O* that subpatterns 3.2, and 4 also make reference to. Also, note that *S* ***kill*** *O*, in 3.1, is exactly what transformational grammarians regard as the "deep structure" of *O* ***is killed (by*** *S)*, or more generally, *O* ***be killed (by*** *S)*, irrespective of whether *S* and *O* are or are not lexically realized. Thus, despite lack of qualification, I claim that it is better to say that structure preservation is not more than one of the effects of the proposed mechanism of pattern composition by superposition, since *S* ***kill*** *O*, in 3.1, is not deformed and even surface-true, at least at the level of morphology.

It is often argued that structure preservation is a constraint imposed by Universal Grammar. This kind of arguments may be effective in frameworks that permit syntactic deformation in the name of derivation from deep structure, but it is not so in the proposed framework. Even if structure preservation is ever operative, which I agree is the case, it is unnecessary to stipulate that structure preservation is a "constraint" that Universal Grammar imposes on grammars of human language(s). If the term constraint is admitted to be used in this way, then the form of grammar may be constrained in any way, and it is sure that a set of constraints on constraints become necessary. Such sense of constraint is not explanatory at all

and, ultimately, is of no significance.

5.5.6 What are transformations? Or, do we really have to make our approach transformation-free?

It is not clear whether the proposed analysis is freed from transformations. I rather find it is itself insignificant whether an approach is transformational or not. I recently found that Harris's conception of transformation (1968, 1982) is in some crucial respects compatible with, and even analogous to, our conception of pattern composition, though it is not clear we have transformations in the sense of Chomskian generative linguistics.

What is crucial is not the notion of transformations, but the way of conceiving of underlying structures from which surface formations are derived. We claim that structures underlying surface forms are sets of words, equated with lexically underspecified patterns, instead of complete sentences.

What is of real theoretical importance is not whether an approach is **transformation-free** (or vacuously generalizing all transformations into a simple operation of Move α), but rather **what transformations really are**. In fact, you have transformations if you are admitted to say that subpatterns like $S_i\ V\ S_j\ V$ ***-en***$_i$ and $S_j\ V\ O_i$ ***by*** O_j are **transformers** that operates on a pattern to yield another. This conception of transformations leads inevitably to the idea that transformations affect on **both form and meaning** exactly because **transformers have meanings of their own.**

This makes a point of the greatest importance. Some sort of semantic **invariance** between active and passive formations must be accounted for in terms of constraints on possible interpretation, or "construal", rather than in terms of constraints on possible syntactic formation. Responsible constraints are sure to be basically "cognitive", and I suspect they have the same roots as the phenomenon of "figure/ground reversal".

Note that schema $S_i\ V\ O_j\ P\ O_i$ is merely posited, and not at all accounted for. I base my description of the passive on it. To make my description lead to an explanation, I have to account for why $k = i$ and $j \neq i$ in $S_i\ V\ O_j\ P\ O_{k=i}$, which I have not succeeded yet and have little hope to do so.

No linguistically based generalizations, such as Chomsky's binding theory (1981), could help here. A good theory of syntax should not try to account for why $k = i$ and $j \neq i$ in $S_i\ V\ O_j\ P\ O_{k=i}$ without making reference to correlations between operations in syntactic formation and semantic interpretation.

5.6 Pattern Matching Analysis of Exceptional Case Marking Phenomena

Discussions in this section are devoted to the phenomenon called "exceptional case

marking" construction, exemplified by (1)9 = *The woman believed John to have killed the farmer*, in relation to (1)8 = *The woman believed that John killed the farmer*.

5.6.1 An analysis of *The woman believed that John killed the farmer*

Now, turn to (1)8. I assume that the following C/D table gives an adequate analysis of it. For simplicity, *the woman* is replaced by *she*.

(98)	0.	***she***	***believed***	***that***	***John***	***killed***	***the farmer***
	1.	***she***	*V*	*(O)*			
	2.	*S*	***believed***	*C*			
	3.	*S*	*V*	***that***	*S*	*V*	
	4.			*C*	***John***	*V*	*(O)*
	5.			*C*	*S*	***killed***	*O*
	6.			*C*	*S*	*V*	***the farmer***

Effects of *C* which head subpatterns 4, 5, and 6 are unclear in English, though there are languages such as Dutch, German in which certain overt effects of its presence are found. For example, postposing of finite verbs is presumably one of them. In any case, encoding of *C* in other analyses is omitted for this reason.

Details are far from certain and more research is in urgent, but the basic point in this analysis is this:

(99) Complementizer *that* (categorized as *C*) functions as **determiner of a matrix**, *S V*.

This contrasts with the fact that *that*, as well as *the*, *this* (and possibly *a*) is determiner of *(Q)(AdN) N*. More adequately, the following parallelism is posited:

(100)	CP=	*C*	*S*	*(U)*	*(AdV)*	*V*
	NP=	D_1	D_2	*(Q)*	*(AdN)*	*N*

Roughly, D_1 stands for the class of "predeterminers" like *such* and D_2 for the class of determiners. But this is too simplistic a picture. While it is fairly sure that *a* belongs to D_2, it is unclear whether *the*, *this*, and *that* belong to D_1 or D_2. See the contrast *such a thing (as this)* between **such the thing (as this)*, **such this thing (as it)*. Provisionally, I assume that D_2 comprises all "indefinites" (e.g., *a*, as well as numerals like *two*), whereas D_1 comprises all "definites" (e.g., *the*, *this*, as well as predeterminers like *such*).

In sum, if these assumptions are correct, then it automatically follows that ***that*** *S V* modifies index *I* of *V* as ***that*** *(AdN) N* modifies index *i* of *N* in the way ***the*** *(AdN) N*, ***this*** *(AdN) N* do. Under this, the dependency between *C* and *S*, if any, should be derived from the dependency between *S* and *V*.

5.6.2 Relevance to raising

In relation to (1)9, (1)8, given an analysis just above, poses questions about **raising**. It should be noted here that there was a hot debate in 70's concerning whether or not there is raising of the underlying subject NP (e.g., *John*) to the surface object NP. Postal (1974), among others, argued for raising analysis, and Chomsky (1973), Bresnan (1976), among others, argued against it, by appealing to the rule of **exceptional case marking**. The purpose here is not to review the debate in detail. For a review of the debate, see Bach (1977).[3]

5.6.3 An analysis of *The woman believed John to have killed the farmer*

Under the preliminary remarks above, let us now turn to (1)9, which most linguists think manifests exceptional case marking or subject-to-object raising.

To (1)9, PMA gives the following analysis, where *U* encodes "auxiliary" (relative to the following *V*).

(101)	0.	***she***	***believed***	***John***	***to***	***have***	***kill***	***-ed***	***the farmer***
	1.	***she***	*V*		*(O)*				
	2.	*S*	***believed***	*O*	*to*	*(V)*			
	3.	*S*	*V*	***John***					
	4.			*S*	***to***	*(V)*			
	5.			*S*	*U**	***have***	*V*	*-en*	
	6.1			*S*		*U**	***kill***		*O*
	6.2			*S*		*have*	*V*	***-ed***	
	7.			*S*		*U**	*V*	*-I*	***the farmer***

Subpattern 5, together with 6.2, encodes **present perfect formation**, which I will discuss briefly in Section 5.6.6.

The most crucial point in this analysis is what subpattern 2 encodes, namely the argument structure of *believe*. Its sub(sub)pattern *O to* illustrates a **generalized matrix**, serving as the source of the **exceptional case marking** in the sense of Chomsky (1981). In what follows, I will present an account of how *S **believe** O to (V)*, encoded by 2, has developed from *S **believe that** S V*.

The position of *(O)* in subpattern in 1 is of secondary importance. As indicated, it should match ***to*** rather than ***John***. This has to do with some effects of generalized matrix that will be discussed in some detail in Section 5.7.2.

5.6.4 Pattern simplification

From the PMA point of view, *S **believe** O to*, encoded by subpattern 2 in (101), is the result of a **short circuit in composition**, resulting in **pattern simplification** of *S*

believe that$_I$ *S* V_I (= 2×3 in (98)) into *S* ***believe*** O_I ***to***$_I$ *(V)* (= 2 in (101)). The relevant short circuit is the effect in which properties of complementizer *C* are "transposed" on its licenser, *believe*. Note that *C* is like conjunction *J* (e.g., *and*) in that *C* makes reference to two matrices, *she believe* and *John killed (O)*. Since *C* is a sort of *O* of *believe*, *S* V_I must be converted into $O = O_1\ O_2$, where O_1 is based on S_1, and O_2 is based on V_I. The role of *to* is to assist in the conversion of V_I into O_2.

The relevant simplification is sure to be mediated by the following pattern for *She believed John killed the farmer*, where *that* is absent.

(102)	0.	***she***	***believed***	***Ø***	***John***	***killed***	***the farmer***
	1.	***she***	*V*	*(O)*			
	2.	*S*	***believed***	*C*			
	3.	*S*	*V*	***Ø***	*S*	V_I	
	4.			*(C)*	***John***	*V*	*(O)*
	5.			*(C)*	*S*	***killed***	*O*
	6.			*(C)*	*S*	*V*	***the farmer***

As noted above, effects of the absence of *that* are far from trivial. First, there is a contact effect in that it makes possible for *believe* to access the content of subordinate matrix *S V*.

5.6.5 Relevance to grammaticalization

Based on the assumptions in the previous analysis of (1)8, we could even account for a motivation for this "exceptional" behavior. I have shown two things: i) the form of complementizer *that* is ***that*** *S V*, which is well motivated by the parallelism with ***that*** *(*D_1*) N*; and ii) there is an independent requirement that any tensed verb agrees with *S* to be *V*, overtly or covertly. Accordingly, ***that*** *S V*, if it marks *V*, cannot fail to mark *S*, too, at least directly. The next hurdle to jump over is that verbs like *believe* are more strongly associated to *S* for pragmatic reason. In passing, let me note that this point may be quite interesting from the perspective of **grammaticalization** (Heine, *et al.* 1991; Hopper and Traugott 1993).

Moreover, if such functional change is ultimately neurally motivated, say, in terms of "co-activation optimization by simplification", then the proposed account would be more explanatory than a simple, or rather lazy, stipulation of the (universal) grammar. "$\bar{S}$-deletion" (Chomsky 1981), "S-pruning" (Ross 1967), and other stipulations like them will be merely a superficial characterization of an equilibrium-oriented activity in neural network. Indeed, it is easy to see that "tree pruning" (Ross, *ibid.*) results in "short circuit" of dependency network.

In addition, development of *S* ***to*** *V* and *S* ***have*** *V-****en***, encoded by subpattern 4 and 5 in (101), is another example of grammaticalization. The subpatterns are "grammaticalized" forms of *S* ***to*** *O* and *S* ***have*** *O-****ed***, respectively.

5.6.6 Present perfect formation

Let me digress into the present perfect formation. Consider the following:

(103) *John has finished the thesis.*

PMA gives the following analysis to this formation.

(104)	0.	***John***	***has***	***finish***	***-ed***	***the thesis***
	1.	***John***	*V*		*(O)*	
	1′.	***John***	*V*	*(O)*		
	2.	*S*	***has***	*O*		
	3.1	*S*		***finish***		*O*
	3.2	*S*	*have*	*V*	***-ed***	
	4.	*S*	*U**	*V*	*I*	***the thesis***

Details are far from definitive, especially for subpattern 1.

The crucial role is played by subpatterns 3.2 and 2, the former of which is an **overrider**. Note that subpatterns 1, 3.1, and 4 can combine to form the following:

(105)	1.	***John***	*V*	*(O)*
	3.1	*S*	***finish***	*O*
	4.	*S*	*V*	***the thesis***

In other words, the pattern that {2, 3.2} specifies "overrides" the form that {1, 3.1, 4} specifies.

5.6.7 An analysis of *The woman believed the farmer to have been killed by John*

Now, turn to (1)10. This is a composite of raising and passive. The structural description of this sentence can be given as follows, where, for convenience, *the woman* and *the farmer* are replaced by *she* and *him*, respectively.

(106)	0.	***she***	***believed***	***him***	***to***	***have***	***been***	***(Ø)***	***kill***	***-ed***	***by***	***John***	
	1.	***she***	*V*		*(O)*								
	2.	*S*	***believed***	*O*	*to*	*(V)*							
	3.	*S*	*V*	***him***									
	4.			*S*	***to***	*V*							
	5.			*S*	*(U)*	***have***	*O*						
	6.			*S*		*(U)*	***been***			*B*			
	7.1							[S_i	***kill***	O_j]			
	7.2			*S*			*be*	[S_i	*V*	***-ed***]	*(P)*		
	8.							S_i	*V*	O_j	***by***	O_i	
	9.									*S*	*P*	***John***	

Details of this analysis should be clear from the matrices in (93) and (101) for (1)4 and (1)9. As noted above, PMA treatment of passive is still quite controversial. The most problematic of all is the status of subpatterns 7.1 and 7.2. I cannot provide any justification of why S_i in them can be accessed by *(by) John*, though no gap is observed between *been* and *kill(ed)*. I admit that PMA analysis is wrong if it necessitates such a gap.

5.6.8 An analysis of *The farmer was believed by the woman to have been killed by John*

Let us turn to (1)11. This is the most complex of all. It is a mixture of raising and two occurrences of passive. To this sentence, PMA gives the following analysis:

(107)	0.	***he***	***was***	***believ***	***-ed***	***by***	***her***	***to***	***have***	***been***	***kill***	***-ed***	***by***	***John***		
	1.	***he***	*V*		*(O)*											
	2.	*S*	***was***		*B*											
	3.	*S*	*V*	[***believ***	***-ed***]											
	4.			[S_i	*V*	O_j]	***by***	O_i								
	5.				*S*	*P*	***her***									
	6.				*S*			***to***	*V*							
	7.				*S*			*(U)*	***have***	*V-en*						
	8.				*S*				*(have)*	***been***		*B*				
	9.				*S*					*(U)*	***kill***	***-ed***				
	10.										S_k *V*	*O*	***by***	O_k		
	11.											*S*	*P*	***John***		

Relevant points should be clear from the matrices in (93) and (101) for (1)4 and (1)9. Details of this analysis are controversial for reasons noted above.

5.7 Pattern Matching Analysis of Dative Alternation

Discussions in this section are devoted to **dative shift** and/or **dative alternation** and related phenomena.

5.7.1 An analysis of *The farmer gave the axe to John*

Now, turn to the analysis of (1)12. In contrast with (1)13, this construction illustrates the so-called **dative shift/alternation**.

To this sentence, PMA gives the following analysis:

(108)	0.	***the farmer***	***gave***	***the axe***	***to***	***John***
	1.	***the farmer***	*V*	*(O)*		
	2.	*S*	***gave***	*O*	*to*	
	3.	*S*	*V*	***the axe***		
	4.			*S*	***to***	*O*
	5.			*S*	*P*	***John***

In this construction, too, the notion of generalized matrix plays a crucial role. Note that *O to* is a generalized matrix in *S **give** O to*, and denotes an abstract motion of *O*. I will return to this issue in Section 5.7.4 to discuss it in greater detail.

The analysis in (108) is most straightforward, with fewest differences from other analyses. A few technical intricacies are found in it. To identity them, let me ask, Does *(O)* in subpattern 4 have to align to ***to***, the fourth unit of this formation? Do two *S*'s in subpatterns in 4 and 5 align to ***the axe***? If the answers are negative, PMA should give the following analysis instead:

(109)	0.	***the farmer***	***gave***	***the axe***	***to***	***John***
	1.	***the farmer***	*V*		*(O)*	
	2.	*S*	***gave***	*O*	*to*	
	3.	*S*	*V*	***the axe***		
	4.	*S*	*V*	*(O)*	***to***	*O*
	5.			*S*	*P*	***John***

This analysis seems superior to (108). First, it seems to capture correctly, crucial effects of generalized matrix, *O to*, in 2. Second, it seems to capture correctly the relation between *the farmer* and *John* that we can describe in terms of **clausemate**. I will discuss these issues in turn.

5.7.2 Distinction of the direct and indirect effects of generalized matrix

To see the first point, let me ask, Why is a generalized matrix a matrix? It is, clearly, because it is an extension of *S V*. Details of *S V* become crucial. Recall that *S* is redundant in *S V*, because, at least semantically, one finds *S* whenever one finds *V*.

So, this redundancy should be carried on the case of generalized matrix. For comparison, consider the following sentence, which, formally, resembles *X* ***give*** *Y* ***to*** *Z*.

(110) a. *Bill invited a few friends to his party.*
b. *Bill brought the old woman to the station.*
c. *This fact leads us to the conclusion.*

These constructions have to do with **caused motion construction** in the sense of Goldberg (1995).

To (110)a, for example, PMA gives the following analysis:

(111)	0.	***Bill***	***invited***	***a few friends***	***to***	***his party***
	1.	***Bill***	*V*	*(O)*		
	2.	*S*	***invited***	*O*	*(P)*	
	3.	*S*	*V*	***a few friends***		
	4.			*S*	***to***	*O*
	5.			*S*	*P*	***John***

This construction weakly shows effects of a generalized matrix. A hearer senses an abstract motion of 'a few friends' 'to' 'his party' designated. But it is better to think that this effect is caused by *S* ***to*** *O* in subpattern 4 (and *S P* ***John*** in 5), which is a "free" adjunct rather than an argument of *invite*. Thus, two domains intersecting on ***the axe***, one of which is of *S* ***invited*** *O*, and another is *S* ***to*** *O* can be identified. This has to do with **clause union** in the sense of relational grammar.

The problem is, How to implement such difference? My solution, albeit rather provisional, is to change the target of *(O)* in *S V (O)*. If *(O)* matches *P* in *S* ***give*** *O to*, as encoded in (109), then PMA can capture the effect of generalized matrix in question. I am very aware that this "solution" is rather tricky and not so revealing; but this is the best solution that PMA can afford for the time being.

5.7.3 Relevance to small clause analysis

As noted in Section 5.6.3, *O* ***to*** manifests the same generalized matrix effects in *S* ***believe*** *O to*, as well as *O to* in *S* ***give*** *O to* in (109). Recall that in (101), repeated here for convenience, *(O)* in ***she*** *V (O)* matches *S* ***to*** *(V)* in 4, which serves as a virtual auxiliary.

(101)	0.	***she***	***believed***	***John***	***to***	***have***	***kill***	***-ed***	***the farmer***
	1.	***she***	*V*		*(O)*				
	2.	*S*	***believed***	*O*	*to*	*(V)*			
	3.	*S*	*V*	***John***					
	4.			*S*	***to***	*(V)*			
	5.			*S*	*U**	***have***	*V*	*-en*	
	6.1			*S*		*U**	***kill***		*O*
	6.2			*S*		*have*	*V*	***-ed***	
	7.			*S*		*U**	*V*	*-I*	***the farmer***

But even if the proposed analysis is correct, it does not mean that there is a node that dominates *O to*, which is identified as a generalized matrix. In this respect, the proposed analysis is different from **small clause analysis**, which posits such a node, SC, to dominate *O to*. The account proposed here is more of a dependency theory which does not assume tree structure. As we have seen in Chapters 2 and 3, syntactic structures need not be represented as trees, and more importantly they could not be.

5.7.4 Abstract motion of *Y* to *Z* in *X give Y to Z*

One of the semantic effects of generalized matrix, *O to*, encoded by subpattern 5 = *S P **John*** (and implicitly 4) in (109) is identification of **abstract motion** of ***the axe*** from the initial position (or state) denoted by *S* to the final position (or state) denoted by *O*. Probably based on this recognition, Goldberg (1995) relates this to **caused motion construction**, suggesting that *give* behaves roughly like a "causative" *make* in *He made her go out*.[4]

The motion metaphor responsible for this seems peculiar to preposition *to*. For indirect evidence, English and Japanese differ in tolerance of such a conceptual metaphor. Observe the oddity of (113)a, contrasted to b, and to (112)a.

(112) *If you have a trouble ____*
- a. *go (in)to John.*
- b. ??*go to the place where John is.*
- c. *consult John.*

(113) *Komatta koto ga attara ____*
- a. **Jon ni ike.*
- a′. **Jon he ike.*
- b. *Jon **no tokoro** ni ike.*
- b′. *Jon **no tokoro** he ike.*
- c. *Jon ni soudan siro.*
- c′. ?*Jon he soudan siro.*

This suggests that *John* in *The farmer gave an axe to John* is conceptualized as a "container" in the sense of Lakoff and Johnson (1980).

5.7.5 Clausemates

There does remain some details to be explained in (109). It should be noted that, as noted above, encodings of *to* and *John* in (108) seem inadequate because they do not capture the contrast below.

(114) a. *Fred gave the admission to himself.*
b. **Fred$_i$ gave the admission to him$_{j=i}$.*

This sort of unacceptability suggests that *X* and *Z* are "clausemates" in *F* = *X* ***give*** *Y* ***to*** *Z*. In other words, *X* and *Z* are within the "domain" of *give*. One could not capture correctly these facts if the referential relation of *Z* to *X* in *F* is encoded in the way indicated in (108).

In contrast to the analysis in (108), the analysis in (109) seems to capture correctly the relation between *the farmer* and *John*. Note that if the position of *S* in 4 and 5 were not specified in the way of (108), I could not have explained why the following expressions are deviant:

(115) a. *?Fred brought two bottles of wine to himself.*
b. *Fred$_i$ brought two bottles of wine to him$_{j=i}$.*

(116) a. **Fred brought two bottles of wine with himself.*
b. *Fred$_i$ brought two bottles of wine with him$_{j=i}$.*

For comparison, note that the contrast shown in (114) differs from the following contrasts.

The first contrast suggests that *X* and *Z* are like clausemates in *X* ***bring*** *Y* ***to*** *Z*. The second contrast suggests that *X* and *Z* are not clausemates in *X* ***bring*** *Y* ***with*** *Z*.

All of this suggests the ambiguity of a domain, and that generalized matrix *Y* ***to*** affects on the clausematehood of *X* and *Z*.

5.7.6 Bonus of underspecification

Good use of underspecification give much of a bonus. Note incidentally that if *S* ***give*** *O to* is replaced by *S* ***give*** *O P*, related cases are sanctioned, such as following:

(117) a. *She gave off good fragrance.*
a′. *She gave good fragrance off (her body).*
b. *Give out complaining.*
b′. *Give complaining out (??of your ??).*

Here, particles like *off*, *over*, *out* are conceived of as "intransitive prepositions" which may miss their objects.

Examples in (117) involve so-called **particle movement**. For expansion of the data coverage, the phenomenon will now be discussed briefly.

5.7.7 An analysis of particle movement

Particle movement is another phenomenon that makes crucial reference to *S V O P O*, as illustrated by the following pair:

(118) a. *Jim didn't write up* ***his last book on the philosophy of science***.
b. *Jim didn't write* ***his last book on the philosophy of science*** *up*.

In standard conception, however, it is particle *up* rather than *his last ...* that moves. This analysis is motivated by the consideration that the English lexicon contains *write up* as a single phrasal verb.

It is obvious, however, that the weight of an intervening NP plays a crucial role in particle movement. Consider the following pair:

(119) a. *Jim didn't write* ***it*** *up*.
b. **Jim didn't write up* ***it***.

As illustrated, *up* cannot follow pronouns like *it*, which is too light.

The fact can be interpreted differently. If the phenomenon is formulated in terms of NP shift, it should be stated that raising of NP is obligatory, provided that *write up* is a composite of *write* and *up*. Alternatively, if it is formulated as *up*-shift, it is necessary to state that *up* may not jump over pronouns like *it*, because they are too light material.

Both analyses have deficiencies, but I find the former can be made less problematic if the representation for *write up* is reworked. For this, PMA posits *X* ***write up*** *Y*, as encoded in the following:

(120)	0.	***X***	***write***	***Ø***	***up***	***Y***
	1.	***X***	*V*			*(O)*
	2.	*S*	***write***			*O*
	3.	*(S*	*V)*	δ(*Y*)	*P*	*Y*
	4.			*S*	***up***	
	5.	*S*	*V*			***Y***

The main trick in this representation is its use of subpattern (120)3, a cataphoric shifter, where δ(*Y*) can be seen as a cataphor bound by *Y*. To see effects of this, note that, without 3, there is no difference between this and the following C/D

table for *S **write** O **up***.

(121)	0.	***X***	***write***	***Y***	***up***
	1.	***X***	*V*	*(O)*	
	2.	*S*	***write***	*O*	*(P)*
	3.	*S*	*V*	***Y***	
	4.			*S*	***up***

The proposed characterization of ***write** Y′ **up** Y* could account for the unacceptability of forms like **write up it*. The story goes like this: since *Y′* is a slot for an anaphoric device, (i) pronouns like *it* fit it, but (ii) it is not allowed for *Y* to be also an anaphor with *Y′* being an anaphor.

Note that an addition of a simple pattern *(S V) X′ P X* in (120) brings drastic effects with it. Introduction of such shifters provide us with the possibility of an integrated account of **heavy NP shift**, **predicate raising**, and **particle movement**. This integration is crucially relied on an abstract pattern denoted by *(S V)* δ(*X*) *Y X*, which guarantees a cataphoric link from δ(*X*) to *X* over *Y*, with as set of semantic constraints on *Y*.

5.7.8 An analysis of *The farmer gave John the axe*

Let us turn to (1)13, which contrasts with (1)12. Without committing to dative shift analysis, it is assumed that the description of this sentence is either (122) or (123), though quite tentatively.

(122)	0.	***the farmer***	***gave***	***John***		***the axe***
	1.	***the farmer***	*V*	*(O)*		
	2.	*S*	***gave***	O_1		O_2
	3.	*S*	*V*	***John***		
	4.			*S*		***the axe***

(123)	0.	***the farmer***	***gave***	***John***	***Ø***	***the axe***
	1.	***the farmer***	*V*		*(O)*	
	2.	*S*	***gave***	*O*	*P*	
	3.	*S*	*V*	***John***		
	4.1			*S*	***Ø***	*O*
	4.2			*S*	*P*	***the axe***

The difference is whether or not a null preposition *Ø* is posited between *John* and *the axe*. Some may find the last analysis less intuitive, but whether this abstractness is countenanced or not involves a number of implications discussed below.

5.7.9 Abstract possession of *Y by Z in X give Z Y*

First, *(O)/**the farmer** V __* should match ***John*** rather than ***the axe***. To justify this, the contrast as follows could be relied on.

(124) a. *John is given the axe.*
b. **The axe is given John.*

It is very difficult to define the notion of direct object, but in whatever terms the notion of direct object is defined, I suspect that it must be a certain *O* that matches the condition *(O)/S V __*.

But which is correct, (122), (123) or both? Controversially, I am inclined to believe that (123) is correct. For one thing, (122) claims that there is no relational term except main verb *give*, which is responsible for the relations of (i) *S* to O_1, (ii) of *S* to O_2, and (iii) O_1 to O_2. By the way, a wealth of semantically based evidence suggests that the relation of O_1 to O_2 is quite analogous to *have*, *receive*. Such effects can be implemented if it is posited that *S **the axe***, in (122)4, encodes **morphologically null genitive**. And this is virtually to posit ***Ø*** = *of* in 4.1 in (123).

Justification as to why *P* may not be overt is of course needed. My best guess is that there exists a constraint on verbs that keeps them taking an *of*-NP as its argument. Only few exceptions like *S **know of** O*, *S **admit of** O* are recognizable.

5.8 Pattern Matching Analysis of Conjunction And Related Phenomena

Discussions in this section are devoted to description of a few phenomena, like gapping, conjunction reduction, related to conjunction.

5.8.1 A preliminary

Before launching into analysis, let me note some preliminaries underlying the proposed analysis. Consider the conjunction of two units, X_1 and X_2, of an arbitrary kind *X*, by conjunction *J*. This gives $X_1\ J\ X_2$. Consider the conjunction of two instances of basic sentential schema, *S V O*. This gives the following general form (*J* = *and*).

(125) $S_1\ V_1\ O_1\ and\ S_2\ V_2\ O_2$

There is an implicit parallelism in this conjunction that can be made explicit by appealing to the following scheme:

(126)
$$\begin{array}{ccc} S_1 & V_1 & O_1 \\ and & and & and \\ S_2 & V_2 & O_2 \end{array}$$

I assume that *and* multiplies freely.

If local identity of terms varies independently, there will be seven cases such as follows:

(127)

A.	S_1	V_1	O_1	A′.	S_1	V_1	O_1
	~~*and*~~	*and*	*and*		*and*	~~*and*~~	*and*
	$S_{2=1}$	V_2	O_2		S_2	$V_{2=1}$	O_2
A″.	S_1	V_1	O_1	B.	S_1	V_1	O_1
	and	*and*	~~*and*~~		*and*	~~*and*~~	~~*and*~~
	S_2	V_2	$O_{2=1}$		S_2	$V_{2=1}$	$O_{2=1}$
B′.	S_1	V_1	O_1	B″.	S_1	V_1	O_1
	~~*and*~~	*and*	~~*and*~~		~~*and*~~	~~*and*~~	*and*
	$S_{2=1}$	V_2	$O_{2=1}$		$S_{2=1}$	$V_{2=1}$	O_2
C.	S_1	V_1	O_1				
	~~*and*~~	~~*and*~~	~~*and*~~				
	$S_{2=1}$	$V_{2=1}$	$O_{2=1}$				

Unrealized *and* is struck through.

Excluding the presumably meaningless case C, the following correspondences can be seen, provided that $\delta(X)$ either replace X by a pro-form (e.g., *he*, *it*, *so*), or creates a gap $\varnothing$.

(128)
i. A is realized by either by $S_1\ V_1\ O_1$ *and* $\delta(S_2)\ V_2\ O_2$ (**sentential or VP-conjuction**)
ii. A′ is realized by either
$S_1\ V_1\ O_1$ *and* $S_2\ \delta(V_1)\ O_2$ (***V*-gapping**), or
S_1 *and* $S_2\ V_{1=2}\ O_1$ *and* O_2, *respetively* (***respetively*-construction, or fusion of V_1 and V_2**)
iii. A″ is realized by $S_1\ V_1$ *and* $S_2\ V_2\ O_{1=2}$ (**right node raising of $O_{1=2}$, or fusion of O_1 and O_2**)
iv. B is realized by either
$S_1\ V_1\ O_1$ *and* $S_2\ \delta(V_1\ O_1)$ (***do so/do it* construction**)
S_1 *and* $S_2\ V_{1=2}\ O_{1=2}$ (**NP conjuction, or fusion of VP_1 and VP_2**)
v. B′ is realized by $S_{1=2}\ V_1$ *and* $V_2\ O_{1=2}$ (***V*-conjuction, or simultaneous fusion of *S* and *O***)
vi. B″ is realized by $S_{1=2}\ V_{1=2}\ O_1$ *and* O_2 (**NP conjuction, or simultaneous fusion of *S* and *V***)
vii. C is realized by $S_{1=2}\ V_{1=2}\ O_{1=2}$ (**total fusion**)

Under these notes, turn now to details of conjunction.

5.8.2 An analysis of *John killed the woman and Bill, the farmer*

Let us turn to (1)15. To this sentence, PMA assigns the following analysis, assuming the role of conjunction *and* is to duplicate subpatterns, and that this exemplifies *V*-gapping on *John killed the woman and Bill killed the farmer*.

(129)	0.	***John***	***killed***	***her***	***and***	***Bill***	***Ø***	***the farmer***
	1.	***John***	*V*	*(O)*				
	2.	*S*	***killed***	*O*				
	3.	*S*	*V*	***her***				
	4.	S_1	V_1	O_1	***and***	S_2	V_2	O_2
	5.					***Bill***	*V*	*(O)*
	6.	S_1	V_1	*O*	*J*	S_2	$\delta(V_1)$	O_2
	7.					*S*	*V*	***the farmer***

In this analysis, subpattern 4 encodes conjunction of two clauses S_1 V_1 O_1 and S_2 V_2 O_2, where $V_2 = \delta(V_1)$ and V_1 matches *killed*; and subpattern 6 is an anaphoric shifter accounting for the gap between ***Bill*** and ***the farmer*** in 0. Subpattern 6 claims that $\delta(V_1)$ realizes as ***Ø***. Note that there is no ***killed*** to be deleted by $\delta(V_1)$.

5.8.3 Apposition

Note incidentally that it is possible to describe the same sentence in the following way, where *S (P)* ***the farmer*** is an appositive phrase, with or without a linking element ***Ø***:

(130)	0.	***John***	***killed***	***her***	***and***	***Bill***	***(Ø)***	***the farmer***
	1.	***John***	*V*	*(O)*				
	2.	*S*	***killed***	*O*				
	3.	*S*	*V*	***her***				
	4.			O_1	***and***	O_2		
	5.	*S*	*V*			***Bill***		
	6.					*S*	*(R)*	***the farmer***

Here, *and* conjoins two *O*'s, as encoded by subpattern 4, making ***her*** and ***Bill*** mates of a (local) NP-conjunction.

S (P) ***the farmer*** is a modifier of *Bill* alone. As indicated *R* between *S* and ***the farmer*** need not be posited if *the farmer* is functions as a *B*-class unit like other nominative complements. Compare its function to the following examples:

(131) a. *Dick the Barrel*
b. *Popeye the sailorman*

Incidentally, subpattern 6 in has certain relevance to appositive relatives as follows:

(132)	0.	***John***	***killed***	***her***	***and***	***Bill***	***who was***	***the farmer***
	1,2,3,4.	***John***	***killed***	***her***	***and***	O_2		
	5.	*S*	*V*			***Bill***		
	6.					T_i	***who***$_i$ ***was***	$B_{j=i}$
	7.						*S V*	***the farmer***$_j$

Of course, this expression is appropriate only when the identify of *the farmer* is presupposed in the context.

5.8.4 An analysis of *John loved the woman and he killed the farmer*

Let us turn to (1)16 = *John loved the woman and he killed the farmer*. To this, PMA gives the following analysis:

(133)	0.	***John***	***loved***	***her***	***and***	***he***	***killed***	***the farmer***
	1.	***John***	*V*	*(O)*				
	2.	*S*	***loved***	*O*				
	3.	*S*	*V*	***her***				
	4.	S_1	V_1	O_1	***and***	S_2	V_2	O_2
	5.	S_1	V_1	O_1	*J*	***he***	*V*	*(O)*
	5′.	S_1	V_1	O_1	*J*	$\delta(S_1)$	*V*	*(O)*
	6.					*S*	***killed***	*O*
	7.					*S*	*V*	***the farmer***

In this analysis, *and* conjoins two occurrences of *S V* or *S V O*, as encoded by subpattern 4. In this case, either 5 or 5′ holds, accounting for the fact that *he* in (1)16 may or may not be coreferential with *John*, though, of course, disjoint reference, encoded in subpattern 5, is somewhat unusual.

Subpattern 5′ is an anaphoric shifter. This encoding claims that $\delta(S_1)$ realizes as *he*. In this case, coreference is necessary between *John* and *he*, though it is not so in 5.

5.8.5 An analysis of *John loved the woman and killed the farmer*

Next, turn to (1)17, which contrasts with (1)16. To this sentence, PMA gives the following analysis:

(134)	0.	***John***	***loved***	***her***	***and***	***Ø***	***killed***	***the farmer***
	1.	***John***	*V*	*(O)*				
	2.	*S*	***loved***	*O*				
	3.	*S*	*V*	***her***				
	4.	S_1	V_1	(O_1)	***and***	S_2	V_2	(O_2)
	5.	S_1	V_1	(O_1)	*J*	$\delta(S_1)$	*V*	*(O)*
	6.					*S*	***killed***	*O*
	7.					*S*	*V*	***the farmer***

This analysis is a variation of the one in (133). What is of concern here is whether or not (1)17 can be regarded as the result of deletion of ***he*** in (1)16. My position is that deletion is the effect of $\delta(S_1)$ realizing as ***Ø*** in subpattern 5, and therefore ***he*** is not deleted.

In this respect, it is interesting to note that while (1)16 is ambiguous as to whether *he* refers to the same person as *John*, (1)17 is not.

Such disambiguation effect can be implemented differently. In fact, no matter how well motivated in some respects, the analysis in (134) is not necessary. PMA can give another, if not alternative, analysis to the same sentence, as follows, where *loved her and killed the farmer* is regarded as a single unit sharing a subject (e.g., *John*):

(135)	0.	***John***	***loved***	***her***	***and***	***killed***	***the farmer***
	1.	***John***	*V*	*(O)*			
	2.	*S*	***loved***	*O*			
	3.	*S*	*V*	***her***			
	4.	$S_{1,2}$	V_1	O_1	***and***	V_2	O_1
	5.	*S*				***killed***	*O*
	6.	*S*				*V*	***the farmer***

Presumably, (1)17 is ambiguous in the way that the two analyses contrast.

It is important to note that analyses like this are possible without positing "deletion". In this case, *he* need not be deleted from (1)16 = "... *and he killed the farmer*". The key is the role that subpattern 4 plays. At least apparently, it is possible to say that *S* moves at the beginning of subpatterns 5 and 6. This is what subpattern 4 licenses. So, the difference between subpattern 4 in (134) and subpattern 4 in (135) is crucial. The difference is the position of *S* in 5 and 6.

It is admittedly controversial whether there exist such units as $J = V_1\ O_1$ ***and*** $V_2\ O_2$, which ***loved her and killed the farmer*** (= $2\times3\times4\times5\times6$) instantiates, but it should be recognized that PMA can naturally encode its single unit status under its existence (plus to *S*-sharing). So, as far as I can tell, the strangeness in *J* trades off with the straightforwardness of the proposed analysis.

5.8.6 An analysis of *John loved the woman, and Bill killed *(her)*

I add some analyses that the Moravcsik-Wirth scheme misses. Consider (136)a, in contrast with b.

(136) a. *John loved the woman$_i$, and Bill killed her$_i$.*
b. **John loved the woman$_i$, and Bill killed Ø$_i$.*

This indicates that there are restrictions on δ(*X*) in cataphoric shifters. To see this, consider the following:

(137)	0.	***John***	***loved***	***the woman***	***and***	***Bill***	***killed***	****(her)***
	1.	***John***	*V*	*(O)*				
	2.	*S*	***loved***	*O*				
	3.	S_1	V_1	O_1	***and***	S_2	V_2	O_2
	4.					***Bill***	*V*	*(O)*
	5.					*S*	***killed***	*O*
	6.	S_1	V_1	O_1	*J*	S_2	V_2	***her***=δ(O_1)
	6′.	S_1	V_1	O_1	*J*	S_2	V_2	*Ø=δ(O_1)

It is not clear why ***her*** cannot be left unrealized. Generally, much work has to be done in the future about restrictions on the distribution of pronominals.

5.8.7 An analysis of *John loved, and Bill killed the woman*

I consider (138)a, in contrast with (138)b, to supplement the comparison scheme.

(138) a. *John loved, and Bill killed the woman.*
b. **John loved her$_i$, and Bill killed the woman$_i$.*

This case illustrates so-called **right-node raising** (Ross 1967, Postal 1974).

If a gap is assumed between *loved* and *and*, coindexed with *the woman*, a "right-node raised" phrase, PMA can give to this an analysis as follows:

(139)	0.	***John***	***loved***	***Ø***	***and***	***Bill***	***killed***	***the woman***
	1.	***John***	*V*	*(O)*				
	2.	*S*	***loved***	*O*				
	3.	S_1	V_1	δ(O_2)	*J*	S_2	V_2	O_2
	4.	S_1	V_1	O_1	***and***	S_2	V_2	O_2
	5.					***Bill***	*V*	*(O)*
	6.					*S*	***killed***	*O*
	7.					*S*	*V*	***the woman***

In this analysis, effects of right-node raising are reinterpreted in terms of cataphoric shifter.

Note that subpattern 4 instantiates cataphoric shifter $S_1\ V_1\ \delta(O_2)\ C\ S_2\ V_2\ O_2$ if *J* is a special case of *C*. What is unusual is that O_2 is not overt in subpattern 4.

PMA need not handle right-node raising effect by appealing to gapping, if it countenances the conjunction of two matrices, assuming a "fused" $O_{1,2}$.

(140)	0.	***John***	***loved***		***and***	***Bill***	***killed***	***the woman***
	1.	***John***	*V*					*(O)*
	2.	*S*	***loved***					*O*
	3.	S_1	V_1		***and***	S_2	V_2	$O_{1,2}$
	4.					***Bill***	*V*	*(O)*
	5.					*S*	***killed***	*O*
	6.					*S*	*V*	***the woman***

This seems to manifest **O-sharing**, contrasted to more pervasive ***S*-sharing**.

This analysis is problematic, however. Most crucially, it claims, perhaps wrongly, that there is no gap between *John loved* and *and Bill killed the woman*.

Although there is not good evidence to provide support for either analysis, I am inclined to accept both analyses. I note, however, that the analysis in (140) is conceptually compatible with **fusion analysis** proposed in McCawley (1988). As far as I can see, PMA can countenance the *S V* conjunction in question, encoded by subpattern 4, by introducing generalized matrix.

5.9 Conclusion

This chapter has shown how the proposed framework deals with some notable syntactic phenomena of English in way of the Moravcsik-Wirth scheme (Moravcsik and Wirth, *eds.*, 1980). Syntactic phenomena that I have treated are, among others, (i) quantification over subject and object (by the contrasts 1:2, and 3:6), (ii) active/passive correspondence (by the contrasts 3:4, 9:10, and 9:11), (iii) *wh*-question (by the contrast 3:5), (iv) adjunction (by the contrast 3:7), (v) instrumental subject formation (by the contrast 7:14), (vi) exceptional case marking (by the contrast 8:9), (vii) dative shift/alternation (by the contrast 12:13), (viii) relative clause formation (by the example 14), (ix) conjunction of S and VP (by the contrast among 15, 16, 17), and (x) gapping, or conjunction reduction (by examples 15, 17).

Admittedly, pattern matching based analyses presented in this chapter are far from conclusive and definitive, but I believe that I have succeeded in providing some new insights into even well-studied phenomena.

Even with such insights, it is not stated that the proposed framework is better than others, because there are many other phenomena that raises serious problems to a syntactic theory. Discussions so far did not cover pronominalization, and most of syntactic movements, to name only a few. Most of these are not treated in this thesis, but will be investigated in future research.

Notes

1. For reasons discussed elsewhere, I find that it is groundless to claim, so does Langacker (1987, 1991*a*, *b*) that gaps are not syntactic objects. More specifically, I agree with him (and diagree with most generative linguists) that gaps are semantically based. Despite this, I disagree with Langacker that gaps are purely semantically based and therefore not syntactically based. Both Langacker's and generative positions manifest the mutual exclusion fallancy.

2. This example is taken from Langacker's (1993), where he analyzes it in terms of **reference point construction**. Another example that Langacker gives is the following.

i. *We have a lot of skunks around here.*

This is somewhat deviant in that both S_i and O_i are a pronominal.

3. Many linguists (including Chomsky) now believe that this construction involves the raising of *John* from the subject position of *(to have) killed* to the object position of *believe*; but, it is obscure what α is in (i), especially in contrast with (ii) which clearly lacks justification of the relation betweeen *John* and IP.

i. *The woman believed John*$_i$ [$_{\alpha}$ t_i *to* [$_{VP}$ t_i *have* [$_{VP}$ t_i *killed the farmer*]]]

ii. *The woman believed John*$_i$ [$_{IP}$ PRO$_i$ *to* [$_{VP}$ t_i *have* [$_{VP}$ t_i *killed the farmer*]]]

Of course, basic assumptions are very shifty in that framework.

4. It is not clear from Goldberg's (1995) discussion why *give* is a causative and *find* is not so in sentences like *Fred finds himself to be a superman*. It is hard to understand why she did not distinguish the polysemy of matrix *S V* from the polysemy of the construction *S V O P (O)*, with *O P (O)* being freed from semantic and/or pragmatic overspecifications that she made.