Chapter 7

Conclusion

7.1   Overview of Previous Chapters

Chapter 1, **Introduction**, introduces the proposed framework, called tentatively pattern matching analysis, to readers who are presumably not familiar with it. Discussions in this chapter are methodological and are intended to clarify the goals of the proposed framework, with minimum background mentioned. To summarize, I have argued, at some length, for the following theses.

(1)   I.   **Description before explanation thesis.** Phenomena of natural language syntax, NL syntax for short, must be "described" before they are "explained". This motivation forbids us to appeal, in clearly circular fashion, to Universal Grammar to explain them.

   II.   **Proper description thesis.** If the goal is to offer an adequate description of NL syntax, it must be a proper one, and for this reason one may not "reduce" the phenomena of NL syntax to other aspects of language and/or cognition, no matter how clear their correlations are.

   III.   **Realistic description thesis.** A proper description of NL syntax may not be simply a "formal" one. A formal description only serves as a "caricature" of NL syntax.

   III′.   Furthermore, the realisticness of descriptions so provided must be as much "objective" as possible. This excludes rather "subjectively judged" realisticness of descriptions provided by most descriptions in terms of "image schemas".

   IV.   **Connectionism-compatibility thesis.** I take a realistic description of NL syntax to be compatible with as many connectionist results and theories as possible, and it must be so "substantially" rather than "terminologically", which some notable cognitive approaches seem to be. More explicitly, constructs used to describe phenomena of NL syntax should be "connectionist-compatible", and be "connectionist-savvy", if possible. I expect that the idea of subpatterns, which are a natural extension of "wickelphones" in the sense of Rumelhart and McClelland (1986), meets this requirement.

As I have clarified, the framework of pattern matching analysis is proposed to demonstrate that integration of these motivations can be realized.

Chapter 2, **A Pattern Matching Analysis from a Practical Point of View**, attempts to facilitate readers to intuitively grasp the framework of pattern matching analysis. I presented pattern matching analyses of *Ann asked Bill what to pick up* and *Ann asked him the way*. Presumably, discussions in this chapter are most accessible and profitable, because they are suitably informal and practical.

Chapter 3, **Conceptual Foundations of Pattern Matching Analysis**, lays out the framework in more technical detail, and supplements sketchy descriptions in Chapter 2. Discussions in this chapter are still far from satisfactory from a technical point of view (and are to be supplemented by those in Appendices A and B, though they still are incomplete in important respects). In this chapter, I have concentrated on arguments against the necessity for the base component, whereby content-free phrase markers are generated, on the one hand, and against the belief that syntactic structure is a tree structure, on the other. For the first point, I argued more specifically that systems like (the categorial subcomponent of) the base component are dispensable, if surface-true generalizations, which I call subpatterns, are postulated. Due to overlaps, subpatterns can combine by themselves to complete patterns, one of which is sentences. For the second point, I stated that syntactic structure is more complex than a tree structure and less complex than a power set lattice with respect to precedence. In no interpretation, though, did this thesis prove this "hard" conjecture.

Chapter 4, **Pattern Matching Analysis in Relation to Semantics**, supplements some discussions in Chapter 3, focusing on the relation of syntactic description to semantic and pragmatic descriptions (and phonological description in a predictable way). I addressed one independent chapter to this specific issue, because I found it to be one of the fundamental and most controversial issues in linguistics. Discussions in this chapter are to suggest that syntactic structure, if it is construed as a pattern, is "irreducible" to either semantic structure and/or conceptualization, or symbolization of it by phonological structure in the sense of Langacker (1997). To defend this controversial position, I suggested that the "emergence", or "self-organization", in connectionist networks with hidden units may be a key to the understanding of the emergence of grammatical categories like *S*, *V*, *O*, which play a crucial role in our framework.

Chapter 5, **Pattern Matching Analysis Meets English Syntax in the Way of Moravcsik-Wirth Scheme**, is the core of this dissertation. It demonstrates, I believe, how well pattern matching analysis deals with some notable syntactic phenomena of English. I have presented pattern matching analyses for the seventeen sentences given below, which Moravcsik and Wirth, *eds.* (1980) proposed to facilitate fair comparisons among different theoretical frameworks in linguistics (in North America).

   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.*

The Moravcsik-Wirth comparison scheme is very useful, but it is hardly true that it exhausts even major syntactic phenomena of English. To fill important gaps in data coverage, I added pattern matching analyses of some phenomena that I found necessary and suitable.

Chapter 6, **What Structures Are "Underlying" Structures?**, supplements discussions in Chapter 4. This chapter addresses problems related to "underlying structure", along with an attempt to reinterpret facts that most linguists believe necessitate "deep structure" and its analogues. By examining a few classical cases, I showed that it is not necessary to view deep structures as "complete" sentences from which surface structures are derived through a number of transformations. Rather, I proposed that one can achieve most, if not all, "effects" of positing deep structures if, as PMA recommends, underlying structures are conceived of as "lists" of subpatterns to be simply "unified" without any deformation (except for ones in semantic dimension). Thus, "derivation" is nothing but "composition" of parts, and should not play any significant role, even if the notion of underlying structure is retained.

For relevance to Fauconnier's (1994) theory of *mental spaces*, I treated a few cases and suggested that some of the effects described in terms of mental spaces are better understood as side-effects of pattern composition. I also provided a detailed pattern matching analysis of Lakoff's (1974) *syntactic amalgams* and suggested that the proposed framework is powerful enough to handle the hardest cases naturally and straightforwardly.

7.2   In Conclusion

So far, it has been shown that pattern matching analysis is able to handle a good number of important syntactic phenomena of English. In doing this, syntactic structures are assumed to be represented by means of an encoding scheme called **composition/decomposition table** (C/D table for short). A C/D table comprises two components, **base pattern** indexed by 0, and **co-occurrence matrix**, indexed by integers 1, ..., n. A co-occurrence matrix comprises n subpatterns to specify n co-occurrence restrictions, or "constraints", to be "relaxed". Thus, pattern compo-

sition can be seen as an instance of "multiple constraint satisfaction system". The proposed encoding scheme, I would like to claim, is the most innovative part in the proposed framework, both technically and conceptually.

Roughly, a base pattern corresponds to a surface form(ation), and a co-occurrence matrix to a "set of deep structures", with slight conceptual modification to the conception of deep structure. In this sense, it is possible to say that a C/D table encodes both surface and deep structures.

Patterns, equated with surface formations, are composed out of subpatterns, equated with words. Pattern composition is carried out by superposing subpatterns, and is based on unification. This feature provides an important bonus, namely its success at dispensing with "phrase markers", as abstract objects generated in the base component of a grammar. This is made possible by making use of redundant specifications. More exactly, structure is determined owing to inherent overlaps among subpatterns.

Pattern matching analysis assumes no movement, no reanalysis, at least overtly, but, nevertheless, it describes most, if not all, of those effects that should describe described. It should be acknowledged, of course, that syntactic phenomena that I have examined in this thesis are so basic that any theory of language syntax should be able to handle them. So, even if pattern matching analysis handled them straightforwardly in most cases and even insightfully in some cases, this is a mere start.

I am well aware that a lot of harder issues remain to be described, which I have not examined yet. For instance, I did not examine most cases of phenomena like *wh*-movement and *tough*-construction, except those described in LF-movement, which are usually described in terms of syntactic movements. Furthermore, there are many other classes of phenomena quite hard to describe. One of the hardest is presumably **anaphoric phenomena**. They are sure to challenge frameworks like the proposed one which do not assume strictly hierarchical representations, since it is widely known that anaphoric phenomena are sensitive to hierarchical structure, as far as they are accounted for "c-command" (Reinhart 1983) which makes reference to tree structure. I am doing intensive research on this issue for its importance. Results will appear in near future.

In addition, it is not clear whether or not PMA successfully treats the effects of **phrasal nodes**. Units like NP, VP are an unofficial makeshift device in PMA. Subject NP is licensed by an implication $S \to N$, where S and N denote subject and noun. This treatment may be too simple. Indeed, no plausible account is provided to the question of why an occurrence of N can be implied by both S and O, on the one hand, and why *to cheat* can match S in *To cheat him is easy enough* despite the fact that there is no overt N in *to cheat*, on the other. Such questions are not addressed in this thesis. Intensive research on them is left for future.

It is not clear whether PMA can handle successfully the description of grammars of so-called **free word-order** languages. I guess that such languages are rich in shifters.

Moreover, I have to admit that, both in quality and quantity, descriptions that I have provided in this thesis are far from complete. So, it is premature, I admit, to make conclusions concerning the results obtained thus far. There is no denying that there are theories that are able to do more than mine. By contrast, what PMA is able and unable to handle is still unclear. So, I cannot be so sure exactly how much I may expect from the theory that I proposed.

Despite this, it is not fair, I claim, to judge the proposed framework on this ground. Pattern matching analysis was born only two years ago or so; it is still in infancy. I believe that we should wait for more results to judge whether the proposed framework is or is not really successful until we have checked whether it is or is not capable of handling far more difficult issues.

Despite a number of obvious deficiencies, though, I find it appropriate to conclude that my first run of research was successful. Results obtained are, I contend, encouraging enough to continue this line of research.