[Review]

Language in Cognition: Uncovering Mental Structures and the Rules Behind Them


Masayuki Komachi
Shizuoka University*

Keywords: cognitive science, generative grammar, psycholinguistics, the unification problem

1. Introduction

Language in Cognition: Uncovering Mental Structures and the Rules Behind Them is a valuable introductory textbook that invites the reader into the expansive world of cognitive science. Although the focus of the book is on cognitive science, many insights from linguistic studies are taken up to shed light on the essential nature of human beings (“humaniqueness” to use Hauser’s (2008) term). According to the author, great achievements have been made in the past several decades in 1) the scientific approach to mental life as a product of the brain, and 2) the biological approach to language as a natural object. Based on the fruits of previous works, the author offers instruction in how to do scientific research in general, and also portrays the current state of affairs in the massive enterprise of elucidating human nature.

The book primarily attempts to provide beginners in linguistics with a chance to examine the accumulated knowledge of linguistics from the broader perspective of human intellectual history. It also attempts to convince them that, in order to move forward from the current state of affairs in cognitive science, it is more important to formulate good questions than to pursue better answers. The author is successful in achieving these goals. Despite the depth of the subject matter and the breadth of arguments in the relevant fields (essentially led by a series of works by Chomsky

* I am indebted to Miwa Isobe, Steve Urick, and two anonymous reviewers for helpful comments and suggestions. This work was supported in part by a Grant-in-Aid for Scientific Research (C) (No. 23320099). All remaining errors are my own.
the arguments are written comprehensibly and most of them demand little background knowledge.

In addition, for advanced students with sufficient linguistic background, the book can serve as a roadmap which will help them consider their own research interests in a broader context. This is made easier by the detailed notes and study guide at the end of the book. It will also help researchers and students from relevant fields consider the results of linguistic studies and re-examine human nature within the larger enterprise of cognitive science. It is remarkable that the author realizes these goals with such a small number of pages. This accomplishment reminds one of the linguistic idea of the “infinite use of finite means.”

2. An Overview

The book consists of four parts, with three chapters for each part. At the beginning and end of the book are the important prologue and epilogue chapters. They provide the historical and intellectual background of cognitive science, which is the scientific study of human mental life mentioned above. This field has been led for the past several decades by the significant breakthroughs of a few subfields which involve studies of language, vision, and memory. The book, therefore, explains the current understanding of linguistic research, highlights issues to be addressed, and portrays the landscape of future directions in cognitive science.

The author early on announces his “unabashed” commitment to a “Chomskyan” view of language and cognitive systems (p. xiv). This strong commitment, permeating the entire book, can be characterized as an internalist view of language and a minimalist approach to cognitive systems. The former is a basic viewpoint of cognitive science of language, which posits the object of inquiry to be inside the mind. The latter is a series of efforts to conflate less significant concepts in accounting for various aspects of human cognition.

The internalist view of language is established in Part I, following the goals described in the prologue chapter. The main thesis is that human beings are “biologically equipped with the ability to develop” a cognitive capacity for linguistic behavior (p. 3). The basic concept for this is introduced as I(nternalized)-language, which departs from the ordinary use of the word language, and refers to the natural object internalized in the mind. This key concept comes along with five research questions regarding
the knowledge of language, its acquisition, its use, its neurobiological basis, and the evolutionary beginnings of language, which are originally posed by Chomsky (1986, 1988) and summarized by the author as in (1) (p. 12):

(1)  a. What is the best characterization of our Knowledge of Language?
    b. How is that Knowledge acquired?
    c. How is that Knowledge put to use?
    d. How is that Knowledge implemented in the brain?
    e. How did that Knowledge emerge in the species?

Given these questions, linguistics has developed in significant ways, interacting with other subfields of cognitive science. The rest of Part I is devoted to placing this research program within the intellectual history of human beings, with reference to behaviorist psychology, the Cartesian tradition in philosophy, and traditional computationalism in the foundations of mathematics. The poverty of the stimulus argument (Chomsky (1980)) and the argument for “biological foundations” (Lenneberg (1967)) are also introduced to demonstrate that linguistic capacity is genetically endowed only to human beings as a species.

In Part II, the Principles-and-Parameters (P&P) approach to Universal Grammar (Chomsky (1981)) is introduced to deal with the question of diversity among languages. The variety of languages seems to be paradoxical given the species-specificity of the language facility. Within this approach, the linguistic capacity consists of the language-universal component of principles and the language-particular component of parameters; each parameter is designed to have possible values and each language has particular values for each parameter, resulting in unique combinations of parameter values for languages. The P&P approach, therefore, provides a way of solving the question of diversity by serving as a scientific alternative to the ancient myth of the tower of Babel. This approach also contributes to an account of language acquisition: children are born with the P&P-style linguistic capacity, and all they have to do is to find the values of the parameters for the language they are about to acquire.

The author points out, however, that language learning is more complex than the P&P approach suggests, and he proposes that the mechanism for language learning must be equipped with something more than the simple P&P mechanism. For one thing, the mechanism must be “tolerant” so that learners can postpone dismissing a hypothesis about the target language until they encounter a sufficient number of exceptions to a hypothesized rule. For example, the simplest past tense morphology in English (which
can be stated as “add -ed to a bare form”) cannot be superseded by the sub-regularity among some “irregular” past tense forms (e.g. the similarity among brought, thought, and taught).

The learning mechanism should also be somehow preprogrammed to focus on the relevant data. Consider the head parameter for example. English is typically a head-initial language in that the most important element of the constituent is placed at the beginning of the phrase, but it also has Noun-Noun compounds such as peanut butter, where the head comes at the end. Obviously, learners of English should not focus on this in setting the value of the head parameter since this phenomenon would serve as evidence for the atypical “head-final” value.

Moreover, the author suggests incorporating the view that language learning is guided by some principles which are sensitive to domain-general properties such as probability, while maintaining that such principles should also be linguistically restricted in a highly specified way. This can be taken as an effort to get past the simple dichotomy between empiricism and rationalism in language learning.

The author begins Part III by challenging the traditional view of meaning that looks for “the meanings of meaning” outside the mind, such as in the truth conditions of sentences and referents in the world. Instead, using Hauser’s (2008) concept of “humaniqueness,” he offers the view that the human-specific components of thought are derived by combining concepts inside the mind, and these concepts can be taken as the meanings of words. “Humaniqueness” can be characterized as the ability 1) to operate symbolic representations detached from raw sensory and perceptual input, 2) to (re)-combine different types of information, and 3) to apply a rule to various problems. The author suggests that all instances of “human-specific” behavior are substantiated by these distinct properties, pointing out, following Spelke (2003), that, although all animals share some cognitive abilities (such as categorizing food, playing, or understanding social situations around them), only humans show more complex behavior (such as cooking, inventing complex games, or making laws). He further suggests that those properties of “humaniqueness” are abstractly connected to the fact that only humans have language.

Given such a characterization, the author reflects on the competence-performance distinction, that is, the relationship between static grammatical knowledge and its dynamic real-time use. He suggests reviving the so-called derivational theory of complexity (DTC) as the null hypothesis in order to make the relationship more transparent. The idea of DTC is sum-
marized by the author as follows: “all other things being equal, [...] the more complex a representation [...] the longer it should take for a subject to perform any task involving the representation [...]” (p. 137).

Consider the sentences in (2) below, for example. In the framework of Chomsky (1957), passive sentences such as (2a) are analyzed to be derived through applying the “passive transformation” stated in (3) to the strings for active sentences as in (2b).

(2) a. Sincerity is admired by John.
   b. John admires sincerity.

(3) If \( S_1 \) is a grammatical sentence of the form \( NP_1-Aux-V-NP_2 \), then the corresponding string of the form \( NP_2-Aux+be+en-V-by+NP_1 \) is also a grammatical sentence.

In this analysis, passive sentences are more “complex” than active sentences in that the derivation of passive sentences involves the passive transformation, in addition to all the rewriting rules to generate strings of active sentences. From the viewpoint of the DTC, this complexity should affect actual performance; passive sentences take more time in sentence processing than corresponding active sentences. Although some have claimed that this approach has failed (Fodor, Bever and Garrett (1974)), the author attributes its lack of success to the immaturity of grammatical descriptions in the past. Since the latest characterizations of grammatical knowledge are better organized, and easier to use in the analysis of on-line sentence processing than those in the past, the outlook for such a line of research is more promising than it was a few decades ago.

In Part IV, the author makes a strong effort to tackle the problem of “unification” between different levels of description: the hope to obtain a seamless theory that is valid among multiple levels (such as behavior, mind, brain, genome, and evolution). As it stands now, however, the gulfs between these levels seem to be hopelessly wide. This is partly because researchers are tempted to relate concepts of different levels in an overly simplistic way, based on their own naïve views of the different levels. The author, nevertheless,optimistically suggests that concepts at the levels of behavior and mind can be decomposed into more fine-grained components so that researchers at the other levels can easily access the latest theoretical understanding, and undertake interpretation at their levels in more promising ways. Referring to the ambitious work on the faculty of language in the narrow sense by Hauser, Chomsky and Fitch (2002), the author emphasizes that, particularly when comparing different levels, researchers should not focus on language as a whole, but on the more decomposed computations un-
derlying it. This part is the highlight of the book, in that it poses questions which do not have clear answers and invites the reader to work on them.

In the final and important epilogue chapter, the author explores the possibility of extending the core insights by stepping into other cognitive domains such as the sense of morals and the sense of music. In a similar way as with language, humans seem to have an innate system of moral capacities: children have intuitions about moral rules (such as “You shall not murder.” or “You shall not steal.”) and are sensitive to violations of these rules (whether they are intentional or accidental) beginning with the earlier stages of development. Children can apply a moral rule to situations they have never encountered (i.e. the infinite use of finite means); they can acquire moral rules regardless of the exposure to “noisy” instructions by caretakers (i.e. the poverty of the stimulus); and there is some variation concerning which actions can be seen as morally permitted (i.e. the parametric variation). Since the framework of the argument is quite similar to that of language, the author proposes that five questions in (1a–e) can be generalized to moral capacities (what he calls the Moral Organ). They can be stated as in (4):

(4) a. What is the best characterization of our Moral Organ?
   b. How is that Moral Organ acquired?
   c. How is that Moral Organ put to use?
   d. How is that Moral Organ implemented in the brain?
   e. How did that Moral Organ emerge in the species?

Assuming that language can be decomposed into more fine-grained computational subparts as suggested in Part IV, and given the similarity between language and morality, many theoretical and conceptual frameworks from linguistics can be used in forming a theory for the Moral Organ. The author also argues that the same is true for the musical sense (and, possibly some other cognitive capacities), so we might have five similar questions for the music organ (and other organs). Underlying this extension is the minimalist approach to human cognition pointed out at the beginning of this section.

3. Conclusion

To summarize, this book offers many essential concepts and theoretical tools for interpreting the results of studies relevant to the cognitive science of language. The rich theoretical heritage is placed in the broader context of human intellectual history, and research programs for cognitive subfields
are suggested. The goals of this textbook are achieved quite well, and it will prove helpful in introducing newcomers to this field.

The most important claim in the book is that, whatever aspect of human nature we consider, we should not deal with it as a separate issue, but examine it in the broader context of figuring out the essential nature of human beings. This is what the word Chomskyan, emphasized throughout the book, essentially means.

REFERENCES


[received July 28 2011, revised and accepted January 7 2012]
Education Development Center
Shizuoka University
836 Ohya Suruga-ku, Shizuoka-shi
Shizuoka 422–8529
e-mail: omkomac@ipc.shizuoka.ac.jp