

Book review

Chris Barker and Chung-chieh Shan

Continuations and Natural Language

Reviewed by Yusuke Kubota

Institute for Comparative Research in Human and Social Sciences

University of Tsukuba

1-1-1 Tennoudai

Tsukuba Ibaraki, JAPAN 305-8571

phone: +81-29-853-4185

email: kubota.yusuke.fn@u.tsukuba.ac.jp

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This book presents the results of a long-term collaboration by the two authors, Chris Barker and Chung-chieh Shan, on the application of the notion of ‘continuation’ in the study of natural language syntax-semantics interface. ‘Continuation’ is a notion originally developed in theoretical computer science, and in its application to natural language grammar, it is essentially a tool for explicitly representing the ‘larger (syntactic) context’ in which some piece of linguistic expression is interpreted. As one might expect, this is useful for analyzing linguistic expressions that take scope outside of the immediate syntactic environments in which they occur (such as quantifiers), enabling one to capture explicitly the way they interact with scope-sensitive phenomena such as binding of pronouns and the licensing of negative polarity items (NPIs).

The book consists of two parts: Part I deals with ‘order-sensitive’ phenomena (weak crossover (WCO), superiority, NPI licensing and donkey anaphora) involving ordinary generalized quantifiers, and Part II deals with more complex types of scope taking (‘parasitic scope’) in symmetrical predicates (*same*, *different*, etc.) and sluicing. Both parts present analyses of linguistic phenomena in explicit fragments of English, but, as explained below, the fragments in the two parts are somewhat different.

Part I of the book develops a version of Combinatory Categorical Grammar (CCG) (but one that is substantially different from the widely known version by Mark Steedman (Steedman 2000,

2012)—B&S themselves provide a lucid comparison in Chapter 11) called the ‘tower grammar’, designed for the analysis of ‘order-sensitive’ phenomena. This fragment recognizes (generalized versions of) the familiar type raising (or type lifting) rule and related rules as axioms, and is presented using the newly invented ‘tower notation’. This new notation greatly enhances the presentation (to see this, compare Shan and Barker (2006), which presents the same fragment using combinators alone). Part I moreover contains many exercises, useful for checking one’s understanding of the material.

The key empirical claim in Part I is that phenomena such as WCO, superiority and NPI licensing all involve sensitivity to ‘evaluation order’ (which in many (but not all) cases coincides with surface word order). Familiar contrasts such as *Every student_i loves his_i mother* vs. **His_i mother loves every student_i* (WCO) are accounted for by the way in which certain linguistic phenomena—binding in this case—are sensitive to the ‘order of evaluation’. Specifically, the fragment is set up in such a way that quantificational binding is possible only if the binder linearly precedes the bindee, signaling, as it were, the presence of the bindee in the rest of the sentence. Technically, this order sensitivity is captured by specifying which of the different ‘combinatory rules’ are posited as licit rules in the fragment (this point becomes important in the comparison with the NL_λ system introduced in Part II).

An intriguing property of this account of WCO and related phenomena is that an apparent exception to order sensitivity in reconstruction environments (*Which of his_i relatives does every man_i admire most?*, which is fully grammatical despite the pronoun linearly preceding its binder) is accommodated naturally: one merely needs to assume that the ‘trace’ of *wh*-movement can be of a higher-order type, inheriting the ‘bindability’ of the fronted expression containing the pronoun (represented explicitly in the syntactic and semantic types of the fronted expression, which the

trace inherits via an independently motivated mechanism for extraction).

In Part II, the tower grammar disappears, and B&S instead present a variant of Type-Logical Grammar (TLG) called ‘ NL_λ ’, which by itself does not encode order sensitivity (the dilemma here essentially lies in the fact that the simple option of controlling order sensitivity by admitting only some of the combinatory rules is unavailable in NL_λ , since what correspond to those rules are *theorems* in NL_λ and not axioms). Aside from order-sensitivity being removed from the grammar, the main difference between the two fragments is that NL_λ is capable of handling scope-taking behaviors that are more complex than that of generalized quantifiers, as exhibited by the ‘parasitic scope’ (Barker 2007) of symmetrical predicates such as *same* and *different*, which require ‘double’ continuations (i.e. contexts that are simultaneously missing two linguistic expressions rather than one). This fragment is applied to the analyses of symmetrical predicates and sluicing. Part II also contains a chapter at the end (Chapter 17) which studies the formal properties of NL_λ , building on the literature of substructural logic (Restall 2000).

The book has many attractive features. Most of all, the clear and easy-to-access presentation of a highly technical material (facilitated greatly by the tower notation—but the presentation of TLG in Part II is also superbly clear and reader-friendly) is notable. Also, the rather slim volume (228 pages) covers an unusually wide range of empirical phenomena. The authors are moreover careful in noting where they have updated their own analysis published in previous work. The prose is crisp, and the narrative is engaging from the beginning to the end. All of these are rare accomplishments for a book of this sort whose primary purpose is to present an innovative theoretical approach.

But no book is perfect, and this one is no exception. While the broad empirical coverage and the elegance in which several challenging empirical phenomena (such as donkey anaphora and

reconstruction effects) are handled are admirable, there are a couple of key issues and fundamental questions which seem to have deserved more thorough examinations. I discuss these points below in the hope that doing so will stimulate future research on these important open questions. Due to space limitations, I will mostly focus on the tower grammar in Part I, which in my view embodies a more controversial claim about the grammar of natural language. But I'd like to note that Part II also contains an innovative theoretical approach and insightful (but also potentially controversial) linguistic analyses, and that it is well worth examining in detail.

The first issue with the tower analysis of the 'order-sensitive' phenomena concerns the idea that the same notion of 'evaluation order' is at the core of a range of phenomena including WCO, superiority and NPI licensing. This is a bold and controversial claim, and given the intricacies of each of these phenomena, it is evident, even from the relatively small samples of data provided by B&S alone, that the actual empirical patterns are not as neat as the theory predicts them to be. One specific example of such discrepancy between data and analysis can be found in the pair of examples in (138) on p. 75 ?*John sent his_i grade to no one's_i mother* vs. **John sent anyone's grade to no one's mother* (the judgments are B&S's), both of which are predicted to be ungrammatical by B&S's approach for fundamentally the same reason: NPI licensing and binding are both sensitive to the same left-to-right evaluation order scheme built into the tower system. B&S do not offer any comment on the different degrees of acceptability exhibited by these examples. Such a discrepancy by itself does not of course preclude a uniform analysis, but since the alleged uniform behavior is central to the empirical hypothesis advocated in this part of the book, at least a brief comment on possible confounding factors seems to have been called for.

The second issue, related to the first one, pertains to the status of these order-sensitive constraints within the grammar. As is well-known and as B&S themselves acknowledge, the effects of

at least some of these constraints, most notably, WCO, are pretty weak. And it is not entirely clear whether they should be captured by encoding them directly in the grammar itself or should instead be taken to arise from processing factors. B&S express their own take on this issue most clearly in the following passage:

The result is a theory in which a certain aspect of processing is represented in terms of a competence grammar. In this sense, then, we treat crossover and other order effects simultaneously as processing defaults and as part of the competence grammar that composes well-formed expressions. (p. 117)

This is certainly a possible position, but one that is at odds with the standard view in generative grammar which treats competence and performance as distinct. To see how radical a view this potentially is, note that once one freely extends this perspective to similar controversial issues hotly debated in the current literature, such as the status of syntactic island constraints (cf., e.g., Hofmeister and Sag (2010); Hofmeister et al. (2012a,b); Sprouse et al. (2012a,b)), the very issue itself threatens to become pointless: there is no need for a debate since, after all, islands are part of the grammar and at the same time embody processing constraints. Fine, that *is* a coherent position, but do we gain any new insights about the nature of island constraints by simply acknowledging this possibility? Even limiting our attention to WCO and related phenomena, given that the elusiveness of the exact relation between the competence grammar (in the traditional, narrower sense) and the processing component is precisely what makes these ‘order-sensitive’ phenomena so challenging for traditional approaches, it is regrettable that B&S chose to say only very few words on this issue.

Aside from the above two issues, there is one fundamental question left open: throughout the book, the exact relation between the two fragments presented in the two parts remains unclear.

NL_λ is more powerful than the tower grammar, but the former is not simply an extension of the latter since as it is NL_λ lacks control over evaluation order. There is a two-page ‘Afterword’ section at the end of the book which briefly touches on this issue, where B&S comment on the possibility of incorporating order sensitivity to NL_{CL} , a reformulation of NL_λ introduced in Chapter 17 for the purpose of studying its formal properties. The book ends there and the reader is left wondering what to make of this rather abrupt comment offered at the very end of the book. Do B&S mean that NL_{CL} with the added restrictions is the version of continuation-based grammar that they would ultimately endorse? To be sure, B&S emphasize, right at the beginning of Part II, that by presenting two different versions of continuation-based grammar, their intention is not to argue for a particular *theory*, but rather to illustrate the utility of the notion of continuation in linguistic analysis. But to the extent that the ‘continuation hypothesis’ is an empirical hypothesis, one would like to know the answer to the above question. In particular, one important sub-question that is left unaddressed is whether it is possible to incorporate order sensitivity to NL_λ directly, via the standard technique of ‘modal control’ (Moortgat 1997) in TLG and by adding more structural postulates in it. Learning only that NL_{CL} can be so regimented is unsatisfying since (though closely related to NL_λ) NL_{CL} is a purely formal fragment which lacks NL_λ ’s transparent correspondence to the more familiar movement-based architecture of grammar, as well as to related approaches in TLG such as Displacement Calculus (Morrill et al. 2011) and Hybrid Type-Logical Categorical Grammar (Kubota and Levine 2015). If imposing such restrictions on NL_λ directly is not straightforward, that itself would be a useful thing to know; in that case, one would like to know more about where the key difficulty lies. Such a discussion would not only have been useful for the evaluation of NL_λ itself, but would also have had far-reaching ramifications to the whole family of related approaches (including the standard movement-based architecture).

To conclude, despite the issues noted above, I'd like to emphasize once again the virtues of the present book: it is masterfully written and very engaging, and the new perspectives it offers on well-known challenging empirical problems are refreshing. To be sure, some of these refreshing ideas are quite controversial, but that gives us all the more reason to study them carefully. It is a must-read for anybody interested in empirical issues related to scope, binding and quantification, as well as the general architecture of the syntax-semantics interface of natural language.

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