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REVIEWS

The vastness of natural languages. By D. TERENCE LANGENDOEN and PAUL M.
POSTAL. Oxford: Blackwell, 1984. Pp. ix, 189. $35.95.

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This book is an argument that NLs (natural languages—but see below) do
not form recursively enumerable sets: indeed, that they are too big to be con-
sidered sets at all. One consequence is that constructive (generative) grammars
are inadequate for describing NLs. In broader terms, L&P take linguistics to
be 'a logico-mathematical discipline' (159, fn. 1).

Chap. 1, 'Set-theoretical background', emphasizes issues of cardinality. The
general term 'collection' is used to include both sets and aggregates (e.g. the
collection containing everything) which are too big to be considered as members
of other collections without giving rise to inconsistency. The latter are called
'megacollections'. Cantor's Theorem, which plays a role in what follows, is
sketched. As applied to sets, it says that the power set P(A), the set of all
subsets of A, is of a higher cardinality than A.

Chap. 2, 'The received position about NLs and their grammars', is an initial
attack—on the grounds that adequate arguments have not been given—against
traditional assumptions that sentences are finite in length, and that the sen-
tences of an NL form (at least) a recursively enumerable set.

Chap. 3, 'Sentence size bounds', contains two kinds of arguments that NL
sentences may be not only infinitely long, but also of any transfinite length.
The first holds that it would be arbitrary to set any bound, finite or transfinite,
on sentence size, and that 'transfinite size laws complicate the theoretical ac-
count of NLs no less than finite size laws, and are equally subject to Occam's
razor' (42). L&P thus fail to see a distinction between imposing a specific
numerical limit on sentence size and simply requiring sentences to be finite in
length. The second kind of argument, illustrated in the following typical passage
(43), is circular:

> 'But ... objects having all the defining conditions of sentencehood in an NL ARE sentences of
> that NL. Therefore, ANY restriction, finite or transfinite, on the length of NL sentences yields
> a framework unable to describe infinitely many well-formed sentences in every NL.'

This assumes that being finite in length is not a defining condition of
sentencehood.

The main point of Chap. 4. 'The analogy with Cantor's results', is the 'NL
Vastness Theorem', which states that NLs are megacollections, and hence of
no fixed cardinality. This theorem depends on a principle which L&P 'take as
a truth about all NLs' (53), viz. that NLs are closed under coördinate com-
pounding. That means that, for any set of sentences in a language L, the sen-
tence formed by conjoining all the members of that set is itself a sentence of
L. (The assumption that NL sentences may be infinitely long is crucial here—

since it is entailed by this closure principle, plus the fact that languages have infinite subsets.)

To get from here to the Vastness Theorem, note that one can, using the closure principle, project from any set S of sentences a set S* with the same cardinality as P(S). Recall that every member of P(S) is a subset of the sentences of S. Let S* contain the sentences in S, which correspond one-to-one to the singleton sets of P(S), plus one conjoined sentence corresponding to each (non-empty) non-singleton member of P(S). Now consider an infinite set Q of non-conjoined sentences of a language L. By the closure principle, all the sentences in the set Q* must also belong to L. If Q is of cardinality $\aleph_0$ (the cardinality of the natural numbers), then Q* will be of a higher cardinality (in fact $\aleph_1$, the cardinality of the real numbers). But from Q* we can form the set (Q*)*, which will be of a yet higher cardinality. And again, by the closure principle, each sentence in (Q*)* must also belong to L. And so forth. QED.

The major consequence given in Chap. 5, 'Implications', is the non-existence of any constructive (generative) grammar for any NL (the 'NL Non-constructivity Theorem'). This is because a constructive grammar will enumerate the sentences of the language it generates, which is inconsistent with the non-recursive enumerability of NLs which follows from the Vastness Theorem. L&P list twenty-seven grammatical frameworks which they claim are thus falsified, ranging from Generalized Phrase Structure Grammar to Tagmemics. Only one framework survives, with a few emendations; and that is (surprise!) the Arc Pair Grammar of Johnson & Postal 1980—since it is non-constructive, giving necessary and sufficient conditions for sentence well-formedness, rather than generating sentences. L&P see their results as no less momentous for linguistics than Gödel's incompleteness proof was for mathematics (79)—a conclusion which is, perhaps, a tad premature.

In this chapter L&P also derive the vastness results again, this time from Katz's 'effability principle' (NLs can express any proposition—cf. Katz 1972, 1981), plus the assumption that facts, and hence propositions expressing them, form megacollections. The final section takes a preliminary look at issues of psychological reality.

In Chap. 6, 'Ontological escape hatches', L&P attempt to show that no ontological position consistent with linguistic theory can dismiss transfinite sentences. They take themselves to be 'platonic realists' (following Katz 1981, 1984), and as such they have no problem with megasentences.[1] Nominalism they dismiss as inconsistent with modern linguistic theory generally. There remain several varieties of what they refer to as 'conceptualism' (in a somewhat novel usage). Under 'standard conceptualism', megasentences are acceptable if they can be shown to be characterized by a psychogrammar (mentally represented grammar). L&P sketch a linguistic performance model—described as 'natural' (116) and 'realistic' (120)—which contains a non-constructive grammar of a specific language, G(NL$_i$), plus a 'Constructor', which generates all the finite sentences of any possible NL. In production, the Constructor receives a logical form LF, and constructs sentences until it has found all those with a matching LF. These are submitted to G(NL$_i$), which determines whether they belong to NL$_i$. Comprehension works similarly, with the Constructor receiving

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[1] One tends to wish that L&P had seen fit to apply Occam's razor, which they flourish so vigorously in Chap. 3, to this overgrown platonic beard in which their theorems are nested.

a phonetic form. This sketch is as difficult to take seriously as the rest of the book. Why would creatures evolve with such a language mechanism, instead of one employing simply a generative grammar of the usable portion of NL_i?

By far the longest section of this chapter (indeed, of the entire book) is devoted to an attack on what L&P term 'radical conceptualism', which they identify with Chomsky's more recent views on language. They want to show that it is 'a totally inadequate conceptual framework; it cannot justify an exclusion of transfinite sentences because it cannot justify anything at all' (126). Basically, L&P's position is that grammatical theory proper is concerned only with NLs—that it is 'not a theory of human language learning or any other psychological/biological domain' (12, fn. 14). This is, in part, because most NLs are in fact unlearnable by human beings:

> '... evidently the infinite set of possible finite "lexicons" of finite morphemes includes infinitely many with, e.g., more elements than the number of electrons in the known universe, and infinitely many with individual lexical items of a size greater than is humanly storable. Hence storage limitation considerations alone suffice to show that many, in fact, most, finitely spe- cifiable NL grammars are not in fact learnable by real human beings. Thus, even if it made sense to say that the grammars of attested NLs describe competence or any psychological object at all, this notion collapses in the face of the fact that most finite NL grammars cannot even correspond to any POTENTIAL human knowledge.' (150–51)

L&P introduce the expression 'NL' simply as an abbreviation for 'natural language' (vi); but by this point, if not before, one is likely to take it as a special term for some distinct kind of object. The issue would then seem to be just a question of interests. Chomsky is primarily interested in the human language faculty; L&P are not. Nevertheless, L&P attack Chomsky's position, using judiciously selected quotes and interpreting them in the most obtuse way possible. For example, they devote several pages to the following statement by Chomsky (1981b:295): 'the theory of transformational grammar (t.g.) that I have been investigating for about the past 10 years permits only a finite number of grammars in principle ...' They argue (140) that this shows Chomsky's approach to be 'a false account of NLs' because, given the infinite number of possible lexicons, an infinite number of distinct NL grammars must exist. But why did they choose to reproduce this obscure comment of Chomsky's, rather than the following fuller statement of his claim—with which they surely must have been familiar, and which makes this attack entirely pointless?

> 'If these assumptions are correct, then U[niversal] G[rammar] will make available only a finite class of possible core grammars, in principle. That is, UG will provide a finite set of parameters, each with a finite number of values, APART FROM THE TRIVIAL MATTER OF THE MORPHEME OR WORD LIST, which must surely be learned by direct exposure for the most part.' (Chomsky 1981a:11; emphasis added)

Chomsky has, in effect, already responded to L&P's book by distinguishing the epiphenomenal nature of the notion 'language' from the reality of grammars. L&P trivialize this point by assuming that Chomsky rejects languages as real because they are not physical objects (139); they state further that 'no other reasons [for this rejection] are given' (148). But Chomsky DOES give reasons— which do not include the non-physical nature of language—and in a passage (Chomsky 1980:122– 3) which L&P would have needed an extreme case of tunnel vision not to have seen, since they refer (136) to material on the very same page:

> 'In discussing languages and grammars in the preceding lecture I mentioned that it might turn out that grammars do not generate languages at all. Given the epiphenomenal nature of the notion "language", this would not be a particularly disturbing discovery. It would mean that the real systems that are mentally represented do not happen to specify recursively enumerable languages. This might happen for many possible reasons. It might turn out that the grammar has parameters that must be fixed in terms of other systems (say, the conceptual system) for actual representations of sentences to be generated, and these other systems might have all sorts of exotic properties. Or the rules of grammar might be inherently indeterminate in some respect, even though formulated with perfect precision. In this case, "language" would simply not be a well-defined notion (in the sense of "recursively defined") ...'

Chap. 7, 'The characterization of transfinite sentences', argues that 'the exclusion of transfinite sentences from the proper domain of linguistics would actually be quite absurd' (157). This is because, granting megasentences at least a 'platonist' existence, they must be part of the domain of some field of inquiry; and since 'the laws/principles governing transfinite sentences are the same as those governing finite sentences' (162), linguistics is the obvious field in which to put them. The final section takes a look at such pressing issues as what to do about rules (e.g. that governing the choice between English *a* and *an*) which depend on words having immediate neighbors, in densely packed sentences.

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Word grammar. By RICHARD HUDSON. Oxford & New York: Blackwell, 1984. Pp. 267. $34.95.

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Despite the limitations suggested by its name, 'word grammar' is offered as a novel and comprehensive theory of linguistic structure. Hudson, in adopting it to replace his earlier (1976) and very different theory of daughter-dependency grammar, laments the difficulty of being right the first time; but he is confident that word grammar represents a great improvement on the former model. Perhaps because his current theoretical outlook has affinities to my own, I certainly agree that he is right about many more things this second time around. Though numerous points of H's conception and analysis are open to serious question, I can recommend his monograph as a thoughtful and detailed attempt to formulate a radical alternative to theories in the generative tradition. It is not without flaws, and is hardly likely to stop the generative juggernaut in its tracks; but for those who are so inclined, it provides a useful exercise in employing very different modes of thought for conceptualizing the problems of linguistic description.

Word grammar is one of several current approaches that make a serious attempt to analyze language and linguistic semantics as integral facets of cog-