ARE THE GRAMMATICAL SENTENCES OF A LANGUAGE A RECURSIVE SET?

ABSTRACT. Many believe that the grammatical sentences of a natural language are a recursive set. In this paper I argue that the commonly adduced grounds for this belief are inconclusive, if not simply unsound. Neither the native speaker's ability to classify sentences nor his ability to comprehend them requires it. Nor is there at present any reason to think that decidability has any bearing on first-language acquisition. I conclude that there are at present no compelling theoretical grounds for requiring that transformational grammars enumerate only recursive sets. Hence, the fact that proposed transformational grammars do not satisfy this requirement does not, as some have claimed, represent a shortcoming in current theory.

Most linguists and not a few philosophers believe that the grammatical sentences of a natural language are a recursive set. The most commonly adduced ground for this belief has to do with the native speaker's supposed ability to decide whether or not a sentence (string) over the vocabulary of his language is grammatical. Other grounds appeal to formal requirements levied by empirically adequate theories of sentence comprehension and first-language acquisition. Although these grounds are clearly empirical, they are thought to be so evident as to be unimpeachable. This belief would be innocuous were it not that those who hold the belief typically believe as well that because natural languages are recursive, the class of transformational grammars characterizing those languages must be constrained so as to generate (enumerate) only recursive sets. Thus, the property of generating only recursive sets has come to be regarded as an important formal constraint on the class of empirically adequate grammars of natural languages.

While I would not wish to deny that natural languages may prove to be recursive, I shall argue in this paper that the commonly adduced grounds for believing this to be the case are inconclusive, if not simply unsound. I conclude that there are at present no compelling grounds for requiring that transformational grammars enumerate only recursive sets. Hence, the fact that proposed transformational grammars do not satisfy this requirement does not, as some grammarians have claimed, represent a shortcoming in current theory.
I. THE DECIDABILITY ARGUMENT

Most arguments advanced in support of the view that natural languages are recursive are based on a straightforward application of Church's thesis: the grammatical sentences of a natural language are a recursive set because there exists an effective procedure (i.e., an algorithm) for deciding whether an arbitrary sentence (string) over the vocabulary of that language is a grammatical sentence of that language. Robert Wall's brief argument for the view is typical: "It is reasonable to suppose [ . . . ] that for any arbitrarily given string of phones, morphemes, words, or whatever, a person who commands a natural language grammar G can determine, if he is given enough time and memory aids, whether or not the string is grammatical. This amounts to saying that the speaker-hearer has available to him a decision procedure for membership in L(G) and, if so, the language is a recursive set." Such arguments hardly merit the title, since they assume precisely the claim that requires argument, namely, that native speakers have available to them an effective procedure for deciding membership in their language. As far as I know, only Hilary Putnam has provided an explicit argument for the availability of such a procedure. His argument runs as follows:

(1) Native speakers of a language can classify sentences as grammatical or ungrammatical, given no input except the sentences themselves.

(2) A Turing machine is a reasonable model for the human brain that effects this classification.

(3) Hence, native speakers instantiate an effective procedure when classifying sentences as grammatical or ungrammatical.

From (3) it follows that there exists an effective procedure for deciding membership in the set of grammatical sentences of a language; hence, by Church's thesis, that set is recursive.

The ingenuity of this argument lies, of course, in its psychological turn: psychological considerations are adduced in support of a conclusion about a formal property of natural languages. But here also lies its weakness. Putnam concedes that his argument involves a 'mild idealization,' particularly as regards (2). There are, he says, many considerations which point to the idea that a Turing machine plus random elements is a reasonable model for the human brain. In the present context the role of random elements can