

On Structure-Dependent Grammars: A Reply to Mabry

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In a recent paper, Mabry (1993) examines various aspects of Skinner's (1957) treatment of grammar, and he compares it with cognitivist approaches. Mabry gives convincing reasons for concluding that Skinner's approach is superior. But Mabry virtually ignores one of the most important features of grammatical behavior, namely, its structure dependence. Since Chomsky's main argument against Skinner's treatment of verbal behavior is based on this feature, Mabry's analysis must be expanded to include a behavior-analytic treatment of it. Only then can real progress be made in bringing cognitivists closer to functional analyses of verbal behavior. A brief outline of a behavior-analytic explanation of structure dependence is given in the present paper.

In a recent paper, Mabry (1993) examines various aspects of Skinner's (1957) treatment of grammar, and he compares it with cognitivist approaches. Mabry gives convincing reasons for concluding that Skinner's approach is superior, and he suggests that the ignorance of Skinner's treatment has probably negatively influenced the reception of a functional analysis of verbal behavior, both inside and outside the field of behavior analysis.

Although Mabry's analysis is of great importance, it is not sure whether it will have much impact on cognitivists. The reason is that Mabry virtually ignores Chomsky's main argument against Skinner's treatment of verbal behavior, namely, the claim that grammar is structure dependent, and that structure dependence cannot be accounted for in Skinner's system. To be sure, Chomsky often formulates the argument in terms of a person's competence. However, the argument is actually based on performance data. It therefore must be considered by behavior analysts. But although Chomsky has repeated the argument on several occasions (e.g., 1959, pp. 55-57; 1965, pp. 55-59; 1968, p. 30, pp. 51-53, p. 79; 1975, p. 199,

pp. 152-155, pp. 172-174),¹ Mabry does not deal with it to any significant extent. He only mentions that "it never appeared to Skinner to presume to put a limit on what a child, or adult, was capable, as is said to be done by phrase structured grammars" (p. 84).

Mabry has probably ignored Chomsky's argument because Chomsky frequently justifies his assumption of a structure-dependent grammar by appealing to intuitions of grammatical wellformedness. Since these intuitions do not have a clear behavioral expression, they can easily be dismissed. However, the argument is actually much stronger, because structure dependence is also required in order to account for verbal phenomena that do have a clear behavioral expression.

Consider, for example, so-called passive statements such as *The book is held by Mommy* or *The lecturer is interrupted by John*. There is abundant behavioral evidence showing that speakers often emit verbal responses consisting of "new" passive statements — that is, passive statements which they have not previously heard. Since these responses are new, their emis-

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¹Chomsky does not always explicitly mention Skinner's treatment. He sometimes includes it among so-called empiricist systems, such as those developed by Quine (1960, 1974).

sion cannot have been previously reinforced. Similar facts hold for listeners. Effective listeners can "understand" passive statements even if they never have heard them. Analogous conclusions hold for other sentence forms such as questions or negatives. People correctly emit interrogative or negative responses. Yet, these forms are often "new" in the sense that their emission was not previously reinforced. And again, similar facts hold for listeners. Concentrating on passive forms, it is obvious that people do not individually learn each of the hundreds or perhaps thousands of passive statements they can produce or understand. People acquire the "passive capacity" by a process of generalization from a limited number of examples. These examples manifest the particular relation between active and passive statements. But these generalizations are not based on physical similarity. Consider, for instance, the statement,

(i) *The man who holds the painting holds the book.* The corresponding passive statement is,

(ii) *The book is held by the man who holds the painting.* It is not difficult to see that the generalization from (i) to (ii) is not based on physical similarity, as is shown, for example, by the two occurrences of *holds*. These occurrences are physically identical, yet, they receive a different treatment: the first is unchanged, while the second becomes *is held*. Rather, the generalization from (i) to (ii) is based on the structural properties of (i) which, among others, establish the clause *who holds the painting* as an independent unit that is transposed unchanged in the passive transformation.²

²Chomsky (1975) gives the following example of a structure-dependent generalization. A generalization based on word order and other physical properties would transform,

(iii) *The man who is tall is in the room,* into the question,

(iv) *Is the man who tall is in the room?* But "children make many mistakes in language learning, but never mistakes such as exemplified in (iv)" (Chomsky, 1975, p. 31). Rather, they unerringly form the correct question,

(v) *Is the man who is tall in the room?* (if they can handle the example). That is, the child treats the clause *who is tall* as an independent unit, and this unit is determined by the structure of (iii).

The generalization from (i) to (ii), and hundreds of analogous examples, show that a significant part of verbal behavior is based on structure-dependent generalizations. These generalizations must therefore be explained by behavior analysts. But such an explanation is not given in Mabry's paper. In Stemmer (1990), it has been shown that the generalization from (i) to (ii) can be explained in a behavior analytic framework (see also Stemmer, 1971, 1973, 1987). But the explanation is far from self evident. It must at least:

- (1) refer to the contingencies by which certain stimuli came to control the relational expressions *x holds y* and *x who y*;
- (2) distinguish between the main and the secondary relational expression in (i);
- (3) appeal to functional generalizations;
- (4) specify the contingencies that give generalizing efficacy to the functional properties that stand behind the functional generalizations.

Since relational expressions give origin to different kinds of structures, a functional generalization that is based on functional properties of the structural components of (i) then accounts for the generalization from (i) to (ii). In particular, the generalization treats differently the first and the second occurrence of *holds*, because the structure of (i), which is determined by the relational expressions *x holds y* and *x who y*, gives them a different status.

Similar explanations account for interrogative or negative responses. They are the product of generalizations based on structural properties of appropriate original statements.

Towards the end of his paper, Mabry briefly mentions Stemmer (1990). He claims that although its conclusions are plausible, they do not reflect Skinner's views. But this claim seems to be incorrect. It is true that the problem investigated in Stemmer (1990), namely, Chomsky's structure-dependent argument, was not explicitly discussed by Skinner. Therefore, Skinner did not explicitly introduce the mechanisms that are necessary for explaining the relevant behavioral data. But as is shown in the paper, each of these mechanisms has been acknowledged by Skinner,

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processes give origin to structures, a function that is based on functional structural components accounts for the transition to (ii). In particular, it states differently the occurrence of *holds*, as in (i), which is determined by expressions *x holds y* from a different status. They account for interesting responses. They are generalizations based on functional appropriate origi-

including functional generalization. There is therefore no reason for concluding that the analysis of Stemmer (1990) does not reflect Skinner's view.

It should be noted that the explanation of structure-dependent behavior given in Stemmer (1990) is a *detailed* one. It specifies the contingencies that give origin to the behavior, the nature of the generalization processes, the contingencies that give generalizing efficacy to the relevant properties, and so forth. *General* explanations of grammatical behavior have previously been given. For example, MacCorquodale attributes the learning of grammatical behavior to the child's ability "to make complex abstractions and to generalize from them to diverse new instances" (1970, p. 93). It is very likely, however, that the main reason why MacCorquodale's paper had only a minimal impact on the cognitivist community is that it merely speaks of abstractions and generalizations in general; it does not specify the nature of the contingencies that give origin to the abstractions and generalizations nor the nature of these processes and the evidence showing their behavioral validity. The explanation is therefore subject to Chomsky's criticism that "talk of generalization in this case is entirely pointless" (1959, p. 56; see also Chomsky, 1965, p. 57-58; Chomsky, 1968, p. 30, p. 38; Chomsky, 1975, p. 142, p. 152, p. 202, and other places).

Clarifying the nature of functional analysis of verbal behavior is important for both

behavior analysts and cognitivists. And Mabry's paper makes an important contribution to this project. However, the range of the topics dealt with in Mabry's paper must be expanded by including a detailed account of the structure-dependent feature of verbal behavior. Since this feature has been the main basis for cognitivist arguments against behavior-analytic treatments, such an expansion is a prerequisite for making these treatments acceptable to cognitivists.

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of his paper, Mabry Stemmer (1990). He and his conclusions are not reflective of Skinner's view. It seems to be incorrect. The problem investigated in this paper, Chomsky's structuralist account, was not explicitly stated. Therefore, it is necessary to introduce the necessary for explanatory behavioral data. But as is each of these mechanisms, as acknowledged by Skinner,