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PREVIEW

A THEORETICAL INVESTIGATION OF
NOAM CHOMSKY'S THEORY OF
GENERATIVE GRAMMAR AND
B. F. SKINNER'S THEORY OF
VERBAL BEHAVIOR

by

Dale Kennedy

A DISSERTATION

Presented to the Faculty of
The Graduate College in the University of Nebraska-Lincoln
In Partial Fulfillment of Requirements
For the Degree of Doctor of Philosophy
Department of Psychological and Cultural Studies in Education

Under the Supervision of Professor Lyle Eddy

Lincoln, Nebraska

April, 1977

TITLE

A Theoretical Investigation of Noam Chomsky's Theory of Generative Grammar
and B.F. Skinner's Theory of Verbal Behavior

BY

Dale Ernest Kennedy, Ph.D.

APPROVED

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ACKNOWLEDGEMENTS AND PREFACE

This dissertation is hardly a masterpiece. But if I am ever capable of such, it is because two gentlemen, Sing-Na Fen and Lyle Eddy, decided I ought to be and consequently made me work at my writing until I was forced to look upon it dispassionately. A teacher-student relationship, when it comes to writing, is no matter of friendly exchange. A writer has not learned writing until he can rewrite at will. The irony is that a writer of any prospect will abandon his first works, his first phrases and style, only with the same perseverance most patients exhibit when having their teeth pulled. You cannot be truly moved to rewrite well until you are willing to recognize the shortcomings of any works you write. There are so shamefully many possible shortcomings that it is disheartening. Much writing, rewriting, criticism and resistance must pass before one can truly separate the accuracy of the thought from the style. Writing is a practice; it is an art with many levels of mastery. First efforts are not enough if one truly wants to write. I salute you two gentlemen for your perseverance, for your discipline, and mostly for the standards to which you have held me. I feel a part of your traditions because of this.

In the end, however, you have been more tolerant than my wife. I have learned, against my will, a standard grammar. She will not allow me to use the sex-indefinite plural pronoun for the third person nouns, such as "individual," "child,"

"person," etc. It is my hope that there are some such uses that escaped her notice, but this is not likely. She is as accurate as an IBM compiler. If there are any remaining "grammatical" flaws, it is because she hasn't patience to read the same work ad nauseum.

This work is about language; a lot of it is about grammar. The use of language and the grammar displayed in this work, therefore, take on a curious twist. If I have truly learned anything about language and grammar, it should manifest itself in the writing and text of this dissertation. If, when you, my reader, have finished this manuscript, believe this to be true, you have been kinder to it than I. This has been a learning exercise. If you wish to judge what I know of the use of language, read something else that I have written.

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Chapter I

Opening Remarks

Language is a good thing about which to be concerned. It is a good part of how we are known to other people and even more a part of how we come to understand other things. Our estimation of people is no better than the words we choose when describing them, and equally, our understanding is no better than how we tell others in words what we have come to know. For instance, I once heard someone remark in a concerned manner about their kitten, "He's so nervous," making a clear solicitation for advice and counsel for a disconcerting state of affairs. One can imagine the pitied kitten, fidgeting at a board meeting, smoking cigarettes, and constantly touching its face and hair. What this person saw was the usual active, intelligent cat, but since this was their first cat, the vocabulary they used to structure their understanding of the kitten's behavior was drawn from human uses. Because the kitten was "nervous" and not "active," and because "nervous," when used to refer to human

behavior connotes discomfort, tenseness, and other irritating feelings, the kitten was an object of concern and worry. Unfortunately, a similar misdirected logic is applied toward children. We have some margin of control over the language we use, but constant supervision is necessary. Otherwise the language we use will do more to shape us than we it. Knowing something about language is a good thing to be concerned about.

The progress of twentieth century scientific inquiry into language will not provide the unindoctrinated much relief in their efforts to understand language. When a program of scientific inquiry has one result, then what trust we have in science transfers to its single result. Inquiry into language, however, has had two distinct results with quite special differences. There has been, as a result of inquiry into language, the mathematical linguistics founded by Noam Chomsky and pursued by others, and the approaches of behavioral psychology, with notable developments due to Charles Osgood and B. F. Skinner, to name only two. The approaches of behavioral psychology are themselves somewhat divided in how they eventually structure an understanding of language, just as are the approaches of the linguists. But among the behaviorists there are family resemblances that none have in common with mathematical linguistics, and vice versa.

I have chosen in this work to focus attention primarily on what I take to be these two fundamental programs of inquiry into language. But to do justice to detail I will concentrate on only one example of each approach. I have chosen Noam Chomsky's theory

of generative grammar and B. F. Skinner's theory of verbal behavior. There are strong historical reasons for selecting these two theories. Both Chomsky and Skinner published major works upon the subject of language in 1957.¹ Chomsky, however, also published a thoroughly critical review of Skinner's work, dismissing it in occasionally unkind ways.² Skinner read its first few pages and in turn dismissed the review, finding it missing the point from the very beginning.³ Most of the linguistics community agreed with Chomsky; and still further, some psychologists found Chomsky's mathematical linguistics a fascinating tool for investigating language, partly at Chomsky's suggestion, and partly because there were a good many ways they could involve mathematical linguistics in their research designs.⁴

¹Chomsky, N., Syntactic Structures; Skinner, B. F., Verbal Behavior.

²Chomsky, N., "Review of Verbal Behavior," Language, 1959, pp. 26-58.

³Skinner, B. F., "On 'Having' a Poem," Saturday Review, July 15, 1972; a thorough reply to Chomsky's review can be found in Macquordale, K., "On Chomsky's Review of Skinner's Verbal Behavior," Journal of the Experimental Analysis of Behavior, January, 1970, pp. 883-99.

⁴Slobin, D., Psycholinguistics, and D. McNeill, "Developmental Psycholinguistics," are notable cases in point. This brand of psychology is to be distinguished from the behavioral psychology discussed in this work by its disdain for S-R formulations and its search for the "psychological reality" of the constructs described by linguistic analysis. It has more or less accepted the premise that a psychology of language should found itself upon the outcomes of linguistic inquiry. Further references to psychology in this work should be understood to mean the behavioral approaches.

The impression one gets from the controversy and the summary dismissal of Skinner's approach is that there are two mutually exclusive and incompatible theories of language, each structuring radically different understandings of the same phenomenon, language. The problem to which this work is addressed is to determine how much of this blanket impression is only apparent conflict, and how much is genuine conflict. It is my thesis that in large measure the theories have independent concerns, and that therefore students of language are not necessarily required to reject one in accepting the other. The conflict that does arise occurs because of the special use of mathematical linguistics in a model for explaining the origins and course of language behavior. Call this model the rule-guided model. It represents a theory of psychology, just as does Skinner's theory. This special use is explicitly promoted by Chomsky, but it will eventually be clear that his personal advocacy in this matter does not mean that the entire program of mathematical linguistics is in direct conflict with Skinner's approach. A legitimate degree of independence and diversity of concern between the two can be demonstrated.

The Two Theories

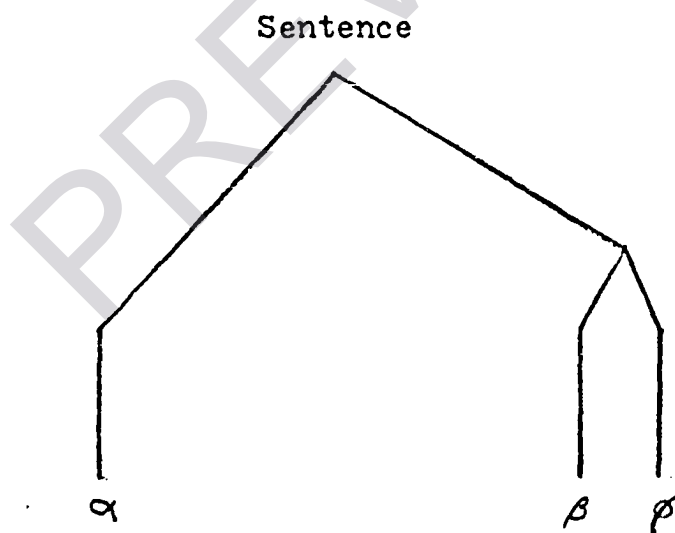
Prior to the advent of Chomskian linguistics, the prevailing movement in the field had come to be known as structural linguistics. The approach of this movement was to ground a knowledge of language on empirical fact. Instead of basing linguistic categories and grammar on the word meaning and the practices of well-

accepted writers, as traditional grammarians had done, the structural linguists sought more objective indicators, like positions within sentences, the possibility of adding suffixes or prefixes, and the formal relationships between various units of analysis, etc. This practice permitted verification of whatever generalizations might result. Accompanying this was an emphasis on field work, the systematic collection of linguistic data directly from communities of speakers. This is an important feature to make note. The linguistic data obtained by the structural linguist were extracted from their context of use. Once apart from this context, the data were subjected to mechanical analysis internal to the fundamental units so extracted. However, in the process of extracting the data, the linguist was able to make use of such factors as the occasion of the utterance, the response of listeners, and other spatio-temporal facts in deciding what sequences of sounds were candidates for fundamental units. The results of the out-of-context mechanical analyses were dependent upon these in-context judgments. In other words, the linguistic generalizations were controlled by the data-collection procedures. Chomsky's work, however, goes one step further.

Chomsky views the problem to which he addresses his approach as the construction of a general theory of grammar, that is, devising a system of rules that will permit the construction of all the sentences of any language and none of the non-sentences. For this he needs only accepted samples of sentences and non-sentences of a language. His efforts are directly controlled by the general-

izations obtained from structural analyses and only indirectly then by the data-collection procedures. He has moved to a more general level, one that is consequent to structural inquiry into many particular languages. He is less concerned with the problems of collecting good linguistic data, accepting what has already been done, and instead considers problems relating to the nature of grammars. His contribution in this area is the generative grammar.⁵

The leading features of the generative grammar are the base component and the transformation component. The base component generates a deep syntactic structure which is represented as a tree diagram with branches ending in abstract symbols.



⁵The term "generative" is doubly ambiguous. It could have a sense of temporal or psychogenetic factors, but it is not intended to. It denotes a logical mechanism. Still, Chomsky talks about the rules of the grammar generating or producing sentences. This is not correct either. Rules do not have a "life force"

The reader is probably familiar with some pedagogical version of sentence diagramming, possibly similar to tree diagrams, but ending in words, not abstract symbols. One reaches the level of words after the operation of the transformation component. Deep structures fall within the ranges of certain transformational rules, depending on the nature and order of the terminal line of abstract symbols. The transformation rule then stipulates a structural change in the deep structure and then generates the surface structure, what we would understand as the words of the sentence.

This sort of organization is a response to a special dimension that Chomsky adds to the problem of constructing a grammar. He considers languages to have infinitely many possible sentences, an infinite extension in the classic logical sense. The grammar is not simply a set of criteria which indefinitely many sentences might meet, but rather it is a mechanism which is capable of producing all possible sentences. The requirement for such a mechanism is questionable, but it is, I believe, not part of the subject matter of this work except to note this, it does lend itself to the belief that the rules of grammar represent rules in the head of the language users who, because of them, can produce grammatical utterances. I intend to discount this belief on a number of grounds.

apart from their human users. In actuality, they represent a "road map" of directions, which we can use given certain conventions about a vocabulary of symbols. These ambiguities lend themselves nicely to later misuses of the generative grammar, e.g., its role in the rule-guided model for explaining language behavior.

However, as Chomsky poses the problem, the grammarian is faced with the task of constructing a grammar that is capable of accounting for all, and infinitely many, possible sentences of a language. To accomplish this, the grammarian uses the mathematical procedures of recursion, mechanisms which, given a limited domain of entities upon which to operate, will generate an unlimited range. The transformation rules which make up the transformation component of the generative grammar represent this recursive mechanism and are the features which distinguish a generative grammar from previous conceptions of grammar.

To carry out Chomsky's program is to give a structural description of the properties of language apart from the context in which the language is used. It is, in effect, to provide a logical model of the form of language. In this sense, the object of the linguist is analogous to the object of the biological morphologist who attempts to describe and classify life-forms on the basis of similarities and differences in the physical structure of those life-forms. The emphasis is on form, not the origins of form.

The approach of behavioral psychology has the alternate emphasis. The psychologist is interested in how the forms of behavior originate and how they are sustained or modified. Language represents only a special class of behavior, and therefore, the general aspects of the approach are thought to be applicable to language as well as to behavior in general.

The basic analytic apparatus of this approach is the functional equation. Behavior is viewed as a dependent variable and is considered to be a function of various independent variables. The form that behavior takes, then, and how that form is sustained or modified, is consequent to the nature of the independent variables, and to changes in them. There are differences among psychologists about the manner in which the independent variables are conceived and the way in which they are evaluated. But the concern with the genesis of behavior and the use of the functional approach remain common denominators.

Skinner's approach has as its major objective the development of a mechanism for the prediction and control of behavior. Consequently, of the possible independent variables of which behavior could be a function, he is most concerned with those variables that can be manipulated, and therefore, experimentally studied. In accounting for behavior, he is quite wary of postulating hypothetical constructs that can neither be observed or manipulated.

In particular, his object is to identify the contingencies of reinforcement which shape and sustain behavior. These contingencies represent the action of the environment upon behavior consequent to the occurrence of any behavior. His analytic unit of behavior, the operant, is defined in terms of these contingencies. In contrast to Chomsky, Skinner's object then is to give an account of the origins or genesis of the forms of language behavior, and like the evolutionary biologist, as distinguished from

the morphologist, he looks to the external and objective events which may or may not play a role in the selection of certain forms or changes in these forms.

The thesis of independent concerns between the two theories is based upon these differences in their primary problems and purposes. The problems they address and the objectives they propose to attain are markedly different. The scope and definition of the data they involve also differ; and the procedures they use in service of their objectives are likewise quite different.

Inasmuch as these factors are different, the initial justification of either theory can be considered independent of the manner in which the other is justified. This does not imply that psychology and linguistics should be considered as totally independent fields, having nothing to do with each other. It is better, instead, to view language as a subject matter in which both structural and functional approaches apply, each focusing on different aspects of the same subject matter but with each approach having the potential to contribute positively to efforts of the other. The point is that these are not alternate approaches to the same aspect of language subject matter. Perhaps, if a level-headed attitude can be maintained, the two approaches will find a progressive interaction that will result in a complete theory of language, where each contributes to a larger justification problem, one concerning the theory of language as a totality,

instead of a linguistic theory of language and a psychological theory of language. The nature of these workings is outside the scope of this work. My objects here are first, to show what measure of relative independence each approach has, and second, to attempt to systematically resolve the remaining conflict that is currently creating the divisions that stand in the way of more progressive settlements of the issue. This is accomplished by displaying in detail the inconsistencies and inadequacies of the rule-guided model of psychology.

Counterpoint

By considering first purposes first, each theory is left with some measure of independent integrity. The potential areas of conflict would arise when either ventures into the other's natural territory, e.g., when Skinner considers matters of form and when Chomsky attempts to account for the genesis of the forms of language. There is issue to both of these potential conflicts, but with regard to form, some accommodation seems possible. The two accounts of language behavior, however, are given in such a way as to create the impression that to hold one is to deny the other its legitimacy.

Clearly enough, to have a theory about the genesis of form requires a working conception of form. Skinner has dealt extensively with this matter. To begin, he accepts the usual transliteration of sound to word; there is a descriptive utility in this. And, just like the linguist, he moves readily to more

abstract categories, but the principles guiding his definition of these abstract categories are different. First, his verbal operants are carefully defined by the relations to the independent variables that control them. Second, his abstract conceptions of form are variable; they can be modified, divided, or even clumped together into larger units. On the other hand, the linguist's units, nouns, verbs, phrases, etc., are relatively standardized and are defined as a result of an analysis internal to the sentences of a language. Skinner's handling of form better suits his operant approach, but this does not bar use of the more traditional renderings of form in psychological inquiry. They are, after all, descriptions of the central variable, language. One could use reinforcement techniques to increase the number of adjectives used in describing objects or correlate transformational complexity with comprehension. Further, when Skinner deals with the primary operants of composition, substituting traditional labels, e.g., nouns, verbs, adverbs, adjectives, and specific grammatical rules, his labels little disturb the import of his analysis.

Skinner, however, does not deal with anything akin to transformations. This notion is a considerable departure even from structural linguistics. It is the need to justify transformations that prompts Chomsky's excursion into psychology. It will be recalled that the transformation component bears a formal relationship to the base component. The base generates deep struc-

tures, the deep structure is in turn operated upon by transformations generating the surface structure. From a linguistic point of view, this formal technique has some advantage of analytic economy and simplicity, but how much better would it be justified, if it could be validly argued that the formal distinction corresponds to some reality external to the sentences to which it is applied. It is this sort of enhancement that is thought to be gained by the role of the generative grammar in the rule-guided model for explaining language behavior, an account of the genesis of the forms of language.

As an explanatory system of language behavior, the rule-guided model has some similarity to the explanatory systems of behavioral psychology. Language behavior is the dependent variable which is a function of independent variables that, in some way, conjoin to bring about language behavior. It differs in that it includes among the independent variables one special variable, which I will call the ideal competence variable. This variable is absent among the independent variables used by behavioral psychology. It is thought to refer to some very special property of the language user, a "real," unobservable structure which is necessary to the production of language behavior, guiding it, so to speak. The other independent variables account for the departure of performance from what one would expect, given ideal competence. The basic problem of this approach is how to specify the ideal competence variable. The usual solution is got in circular ways.

The rule-guided model finds it necessary to connect the sophisticated structural description of the dependent variable, in a rather point-by-point way, to the independent variable. The usual independent variables seem to have little to do with a notion of structural description and seem, therefore, inadequate in themselves to account for why the behavior can be described in such a sophisticated way. Adding an ideal competence variable to the antecedent clause is presumed to resolve this. The circularity arises because this variable is specified by the same generalizations the descriptive, structural analysis produces.

Other than a deep-set conviction about the necessity of innate structures, the argument for the ideal competence variable comes down to this: there is a complexity in the description of behavior that is absent in the specification of the independent variables of that behavior. One either has to accept such a peculiarity or one can put that same kind of complexity among the independent variables, thus making the structural description seem like a logical outgrowth of an independent structure in the organism performing the behavior. Performing the circular maneuver assures that the structural description of the dependent variable will be a logical outgrowth of the independent variables. It is like taking the physical characteristics of the fully grown human being, shrinking them on an appropriate scale, and coming up with the homonucleus, the little man within the fully grown man. This tactic makes us none the wiser about how a structural

complexity in a dependent variable arises from the independent variables.

Summary and Strategy

To recount, we have a historical conflict between two theories, two approaches to the study of language, that appear to be irreconcilable, and have been so treated by students of language since 1959. The problem is to decide how much of the conflict is real and how much is mistaken, and to deal directly with the genuine issue. To do this will require a systematic contrast between the two theories in order to show exactly how, and to what degree, they can be considered relatively independent. Once this is accomplished, the real conflict will have been isolated, namely the conflict between the explanations of language behavior as provided by the rule-guided model and by the functional analysis of Skinner's approach. With this result, a decision problem can be set up between the two kinds of explanation where the competing positions of the two can be compared in a series of specific and general issues. Although the readers are free to judge the adequacy of this last review for themselves, it is my conclusion that the rule-guided model has little in its favor, even if one is willing to momentarily look past its dubious circularity.

The first result is preparatory to the second, and, consequently, its conduct is of the first importance. Most of the technical aspects of this work are devoted to carrying out this purpose in a systematic and comprehensive fashion. This work

will be done by following a kind of analysis that I have termed a logic of systematic contrast. In brief, the logic sets up a method for extracting the separate positions of the two theories upon lines of comparison or contrast. Once the theories are so arranged, the analysis may either lead to conclusions which reduce one theory to the other, or unify them in a synthetic scheme, or affirm one and eliminate the other, or simply specify the dimensions upon which they differ. The logic will provide the basis for demonstrating the relative independence between Skinner's and Chomsky's theories, and will also serve in framing the decision problem for judging between the respective merits and defects of the rule-guided model and the functional explanations of language behavior.

In addition, distinction between a theory's program of inquiry and its structure will be used to separate out various aspects of theories. The program of inquiry for any theory consists of the goals and objectives it formulates in response to its problematic concerns; its scope, how it defines the basic datum and its range of data; and the procedures which it uses in service of its goals and objectives. The theory-structure represents how the theory is organized: its basic axioms or concepts, its descriptive vocabulary, and its logic of propositional generation, i.e., the means by which the theory is extended to new cases. Theory-structure originates in the program of inquiry; it is the culminating effect of inquiry. Consequently, when confronted with differences in theory-structure, a good part of understanding those

differences involves looking at the origins of the differences. This principle of separate origins is helpful in developing a fuller understanding of the differences to be found between Skinner and Chomsky. It also helps clarify the problem of relative independence. It suggests that one should first address oneself to differences in programmatic inquiry. If theories diverge at this level, then quite possibly they deserve some measure of independent justification.

PREVIEW