Meaning and Verbal Behavior in Skinner's Work from 1934 to 1957

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This paper explores the historical development of Skinner's treatment of meaning from 1930 to 1957. Twelve papers published between 1934 and 1957, and parts of *The Behavior of Organisms* and *Science and Human Behavior* related to verbal behavior, were analyzed. Before 1945 meaning was taken as a property of the verbal response, and from 1945 on, meaning was supposed to be found among the determiners of a verbal response. We argue that these different conceptions of meaning were related to distinct aspects of Skinner's explanatory system. Finally, the notion of meaning presented by Skinner in 1945 is related to the theoretical breakthrough represented by Skinner's assertion of the three-term contingency. This idea permitted verbal behavior to be analyzed in terms of its functions.

Key words: verbal behavior, meaning, Skinner, radical behaviorism, explanatory system.

Critchfield, Buskist, and Saville (2000) examined citations of 37 selected articles published in *The Analysis of Verbal Behavior (TAVB)* and found that Skinner's book *Verbal Behavior* (1957) was the most frequently cited source. Comparing their results with those of other publications, the authors concluded that no other source in any journal came near the relative citation frequency of *Verbal Behavior* in *TAVB*. According to Critchfield et al. (2000) the prominence of the citations of Skinner's book in some of the published empirical studies may show its influence on research. However, as the number of behavior analytic studies on verbal behavior increase there is no reason to believe that the book would serve as a primary source for the development of new studies. When and if this happens the concepts embedded in *Verbal Behavior* would be disseminated and the book would "have achieved the ultimate success by rendering itself dispensable" (Critchfield et al., 2000, p. 183¹).

Nevertheless, there is still a long way to go before *Verbal Behavior* "renders itself dispens-

able," and for different reasons. According to Michael (1984), *Verbal Behavior* is a difficult book because it contains a behavioral analysis of verbal behavior as its subject matter. Sundberg (1998) recognizes advances on verbal behavior research, but stresses a failure to analyze verbal behavior, and a need to further include verbal behavior in behavioral analyses. It is the analysis of verbal behavior that will allow behavior analysts to approach topics common in psychology and linguistics (Sundberg, 1998).

In a somewhat different line of analysis, Leigland (1996, 2002) argued for a research program in the functional analysis of psychological terms. Such a program would reveal "the behavioral character of traditional terms" (Leigland, 2002, p. 94) and would show that although behavior analysts reject mentalistic explanations, they could still study phenomena associated with terms such as mind, cognition, etc. Among the traditional terms to be functionally analyzed, Leigland (1996) lists

¹Using a broader database Critchfield, Buskist, Saville, Crockett, Sherburne, & Keel (2000) argue for the relevance and impact of *Verbal Behavior* on experimental research conducted by behavior analysts. The authors found that among the 98 most cited sources, *Verbal Behavior* was the second most cited source on "articles reporting new data and emphasizing human operant behavior published from 1990 to 1999 in four periodicals" (p. 256).

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meaning as a main candidate for a possible analysis.

The point of departure is that the comprehension of Skinner's conception of verbal behavior may be furthered by the comprehension of Skinner's functional analysis of the term meaning. In *Verbal Behavior* Skinner (1957) criticizes the "traditional treatment" of meaning as an explanation of behavior (pp. 13, 14), and proposes a new formulation, by which "meanings are to be found among the independent variables in a functional account [of verbal behavior]" (p. 14).

It is worth emphasizing that Skinner's (1957) functional analysis of the term meaning is the basis for his criticism of the use of words "as tools or instruments" (p. 7). This criticism, and Skinner's position on the matter, is further discussed in *Verbal Behavior* under the topic "The same 'word' in different kinds of verbal behavior" (pp. 187–199). The issue about "the use of words," by its turn, seems to be intimately related to Skinner's discussion of the unit of analysis for verbal behavior. In *Verbal Behavior*, Skinner rejects the word as the unit of analysis for verbal behavior. He actually rejects any unit of analysis defined only by its form: "What is needed for present purposes . . . is a unit of behavior composed of a response of identifiable form functionally related to one or more independent variables. In traditional

terms we might say that we need a unit of both 'form and meaning'" (Skinner, 1957, p. 20).

It is obvious that when *Verbal Behavior* was published Skinner's treatment of the term meaning was completely coherent with his explanatory system and with his treatment of verbal behavior at the time.² Nevertheless, as it happened with Skinner's explanatory system and, more specifically, with Skinner's treatment of verbal behavior, the analysis of the term meaning, as it appears in 1957, was the result, albeit not a mechanically determined one, of a long process. The present paper aims at tentatively exploring the development of Skinner's analysis of the term meaning, from 1934 until 1957. This analysis should allow for the identification of some of the sources that may have controlled Skinner's own verbal behavior, leading him to eventually discard the role traditionally assigned to meaning in the treatment of verbal behavior.

Method of Analysis

Although Skinner's work on verbal behavior has been expertly discussed (Knapp, 1980, 1998; Lee 1984; Leigland, 1997; Michael, 1984),³ it is generally recognized following Skinner's own words (Skinner, 1979b, 1983) that the publication of *Verbal Behavior* (Skinner, 1957) was the result of a long process of elaboration, and that this process deserves analysis. There are different possibilities for the study of Skinner's analysis of verbal behavior or, in this case, of meaning. The present paper presents a systematic exploration of Skinner's published work.

In order to analyze the historical development of Skinner's treatment of meaning, the present authors examined twelve papers⁴ on verbal behavior published between 1934 and 1957. In addition, parts of *The Behavior of Organisms* (1938b) and *Science and Human Behavior* (1953) selected through the books' indexes were also examined.

²There is an intimate relation between the development of Skinner's explanatory system of behavior and his treatment of verbal behavior. This is best seen in the discussion of some of his most basic principles of behavior, such as the unit of analysis for the study of behavior, and for the study of verbal behavior. His assertion on the issue is enlightening: "the analysis of non verbal behavior has clarified the nature of such a unit [of analysis] under laboratory conditions in which the expedience of the unit may be submitted to rigorous checks. An extrapolation of this concept to the verbal field is central to the analysis represented by the rest of this book." (Skinner, 1957, p. 20). Such an intricate relationship did not allow Skinner to ignore the peculiarities involved in the treatment of verbal behavior, and required him to address well established terms of various disciplines of the field of language, such as meaning, reference, thinking, and so on. Skinner's (1972) article "A Lecture On 'Having a Poem'" is a good example of some of the typical issues discussed by the various language fields that Skinner had to deal with when discussing verbal behavior.

³The special section of the 1998 edition of *The Analysis of Verbal Behavior* (Current status and future directions of the analysis of verbal behavior) is a good example of the efforts of behavior analysts on this matter.

⁴The twelve papers are: Skinner (1934/1972, 1936b, 1937a, 1937c, 1938a, 1939/1972, 1941, 1942, 1943, 1945, 1948), Cook & Skinner (1939).

Excerpts of fourteen publications (noted with an asterisk in the reference list) were selected when they either (a) referred explicitly to meaning, or (b) were interpreted as related to meaning. The authors identified excerpts exhibiting either of these characteristics in seven of the fourteen publications. Once selected, the excerpts were labeled in order to highlight their relevant features. The resultant analysis of this procedure is presented here.

Evolution of the Notion of Meaning

In his first published paper directly related to verbal behavior ("Has Gertrude Stein a secret?" 1934/1972⁵) Skinner criticizes Gertrude Stein's literary work. In this paper Skinner was not directly concerned with a behavioral analysis of Stein's verbal behavior. Nevertheless, meaning was a central issue. Skinner (1934/1972) discusses Stein's literary work based on his analysis of the meaning in Stein's writing, and discards a portion of it due to its lack of meaning. "I do not believe in the importance of the part of Miss Stein's writing, which does not make sense" (p. 368). For Skinner the part of Gertrude Stein's writing that does not make sense is the part related to automatic writing.⁶

Two distinctly different treatments of meaning may be found in the paper. In one of them Skinner discusses the meaning of Stein's writings in terms of the *antecedent conditions for the production of the text*, assuming that its lack of meaning might have been related to a supposedly absent past behavioral history. Speaking about Gertrude Stein's book *Tender Buttons*, Skinner (1934/1972) says:

The reader—the ordinary reader, at least—cannot infer from the writing that its author possesses any consistent point of view. There is seldom any intelligible expression of opinion, and there are enough capricious reversals to destroy the effect of whatever there may be. There are even fewer emotional prejudices. The writing is cold. Strong phrases are almost wholly lacking, and it is so difficult to find a well-rounded emotional complex that if one is found it may as easily be attributed to the ingenuity of the seeker. Similarly, our hypothetical author shows no sign of a personal history or of a cultural background; *Tender Buttons* is the stream of consciousness of a woman without a past. The writing springs from no literary sources. (p. 362)

In what is arguably revealing of Skinner's second treatment of meaning and his most significant assertion about it is in "Has Gertrude Stein a Secret?" (1934/1972), Skinner speaks of meaning as a property of a word, or text:

There are certain aspects of prose writing, such as rhythm, which are not particularly dependent upon intelligibility. It is possible to experiment with them with meaningless words, and it may be argued that this is what is happening in the present case. (p. 368)

This second treatment of *meaning as a property of a word* is likely related to the distinction between meaning and grammatical form established by Skinner (1934/1972), while discussing Stein's writing:

Grammar is ever present—that is the main thing. We are presented with sentences ... but we often recognize them as such only because they show an accepted order of article, substantive, verb, split infinitive, article, substantive, connective, and so on. The framework of a sentence is there, but the words tacked upon it are an odd company. (p. 363)

The second article that was taken into account was "The Verbal Summator and a Method for the Study of Latent Speech" (Skinner, 1936b). In this analysis, he reports an experiment with a device called a verbal summator: a piece of equipment on which a record played patterns of meaningless speech sounds that were repeatedly presented to the

⁵The paper "Has Gertrude Stein a Secret?" quoted from its republication in 1972, was originally published in 1934.

⁶According to Skinner (1934/1972) Gertrude Stein (and L. Solomons) had experimented with automatic writing. Skinner (1934/1972) summarized these experiments: "In their experiments the authors investigated the limits of their own normal motor automatism; that is to say, they undertook to see how far they could 'split' their own personalities in a deliberate and purely artificial way. They were successful to the extent of being able to perform many acts (such as writing or reading aloud) in an automatic manner, while carrying on at the same time some other activity such as reading an interesting story" (pp. 359, 360).

subject who was asked to listen to them until he/she ascertained what was being said. Skinner (1936b) stated:

The verbal summator is a device for repeating arbitrary samples of speech obtained by permuting and combining certain speech sounds. One of its uses is comparable with that of the ink-blot and free-association tests. The speech sample does not fully represent any conventional pattern in the behavior of the subject but it functions as a sort of ink blot. (p. 71)

According to Skinner (1936b), there is a basic association that describes normal speech; a relationship between spoken word and referent: "The elicitation of normal speech is generally related to past or present external stimuli. We usually talk *about* something, and it is frequently assumed that external stimuli control the frequencies with which words occur" (p. 86). It is this relationship between word and referent that is broken by the verbal summator, and it is this feature of the equipment (or procedure) that makes it interesting. According to Skinner (1936b): "The summator is designed to obtain verbal responses in vacuo, so to speak. Stimuli which dictate the elicitation of one response rather than another are eliminated so far as possible" (p. 90).

The experiment with the verbal summator, therefore, was planned to create special conditions for the emission of verbal responses that would be products of an "environmental vacuum," thereby breaking up the environmental control over the responses. The question to be asked is what is left as a controlling variable of the verbal response when this "environmental control" is broken.

In normal speech the responses "refer to" external stimuli—to whatever is being "talked about." In the case of summated behavior these stimuli are eliminated so far as possible. The resulting difference is that where the particular form occurring in normal speech can generally be accounted for by pointing to a particular stimulus, in summated speech the occurrence must be attributed to the special strength of the response itself. (Skinner, 1936b, p. 103)

Skinner's answer to the question above seems to be that when the control of events or

objects over the verbal response is withdrawn, the most important determiner of the verbal response becomes a condition of the subject, which he called the *reflex reserve*.

Skinner's *The Behavior of Organisms* (1938b) is the best available publication to understand the concept of reflex reserve. In this book, Skinner stated that the description of the changes in successive elicitations of a reflex "is such that we may speak of a certain amount of available activity" and then talked about "the total available activity as the reflex reserve" (p. 26). It is the concept of reflex reserve that allows Skinner (1936b) to talk about "the special strength of the response *itself*" (p. 103) (*italics added*), when discussing the determiners of the verbal response with the verbal summator, "since the strength of a reflex is proportional to its reserve" (Skinner, 1938b, p. 27). Skinner's (1936b) description of the control exerted by the reflex reserve over the verbal response is suggestive: "What there is for us to talk about is eventually not so important as what we have to say" (p. 86).

What notion of meaning may be inferred here? Meaning seems to be taken here (as it was in "Has Gertrude Stein a Secret?" 1934/1972) as *a property of a word* given by its referent or by the word itself. Or else, if usually a word is spoken depending on its referent (a specified stimulus) in other contexts (as it happens with the verbal summator) a spoken word is the result of its strength as part of a reflex reserve. In both cases, the meaning of the word is derived from relationships between word and referent. Once this relationship is established, meaning may be embedded in the word. This is what Skinner seems to be saying in the following passage:

The behavior of a subject in "reading into the sounds some meaning of his own" is part of the experience of most people. The paranoid who overhears criticisms of himself and the mystic who hears voices from the other world are only extreme cases of these familiar phenomena. (Skinner, 1936b, p. 104)

Skinner's possible conception of meaning as a property of the word and the notion that reference is expressed by the relation between referent and word seem to be substantiated by articles that target the discussion of variables related to the dynamics of verbal behavior:

"The Distribution of Associated Words," published in 1937(a); "The Alliteration in Shakespeare's Sonnets: A Study in Literary Behavior" (1939/1972); and "A Quantitative Estimate of Certain Types of Sound-patterning in Poetry" (1941).

In "The Distribution of Associated Words" (1937a) Skinner discussed the distribution (frequencies of occurrence) of words given as responses (called response-words) to a set of 100 spoken words (called stimulus-words), by a group of 1,000 subjects. Speaking of the relation between semantics and the obtained frequency of response-words, Skinner says:

A semantic selection could be made by choosing all the words in a sample that fall within some meaning category, e.g., all words referring to color . . . A stimulus-word is capable of evoking a large number of associated responses, although it is more likely to evoke some than others. The common property of being evoked by a single word serves to group these responses together semantically. (p. 71)

By asserting the grouping of words by a semantic property Skinner seems to contend (once again) that there is a relation between word and referent, and that this relationship modulates the evocative control of a stimulus-word over a response-word.

In "The Alliteration in Shakespeare's Sonnets: A Study in Literary Behavior" (Skinner, 1939/1972), and in "A Quantitative Estimate of Certain Types of Sound-patterning in Poetry" (Skinner, 1941) Skinner is interested in the dynamics of verbal behavior. He discusses such dynamics focusing on a process called formal strengthening (or formal perseveration): "the emission of a verbal response temporarily raises the strength of all responses of similar form" (Skinner, 1939/1972, p. 385).

⁷"Alliteration is one of the most familiar forms of sound-patterning in poetry and prose. It is said to exist when two or more syllables beginning with the same consonant occur near each other in a given passage." (Skinner, 1939/1972, p. 385). In the *Webster's Third New International Dictionary* (1993) alliteration is defined as "The repetition, usually initially, of a sound that is usually a consonant in two or more neighboring words or syllables" (p. 56).

In "The Alliteration in Shakespeare's Sonnets: A Study in Literary Behavior" (Skinner, 1939/1972) Skinner investigated, as the title clearly indicates, the occurrence of alliteration in Shakespeare's sonnets, asserting that alliteration⁷ is related to formal strengthening. His results did not indicate a clear process of alliteration, and Skinner (1939/1972) affirmed:

So far as this aspect of poetry is concerned, Shakespeare might as well have drawn his words out of a hat. The thematic or semantic forces which are responsible for the emission of speech apparently function independently of this particular formal property. . . . If "formal strengthening" proves to be a real characteristic of normal speech, we shall have to look for the key to Shakespeare's genius in his ability to resist it, thereby reversing the usual conception of this kind of poetic activity. (p. 390)

In this passage Skinner assigns to a grammatical feature of the verbal response, to a figure of speech, or to what he calls a formal process (alliteration) the role of a possible controlling variable of Shakespeare's verbal behavior. Therefore, Skinner seems to assume that two distinct sets of variables, form and meaning, are both determinants of verbal behavior. Moreover, Skinner (1939/1972) claims, at least in this one circumstance, the subordination of form to meaning: "Shakespeare's 'philosophy of composition' might well be expressed in the words of the Duchess, who said to Alice, 'And the moral of *that* is, Take care o the sense, and the sounds will take care of themselves'" (p. 390).

In 1941 Skinner published another article discussing formal processes of verbal behavior; "A Quantitative Estimate of Certain Types of Sound-patterning in Poetry," in which he examined a poem by Swinburne, looking for the occurrence of alliteration and assonance.⁸ Once again, Skinner did not find any clear in-

⁸Skinner (1941/1972) characterizes assonance as "a perseverative strengthening of vowels" (p. 73). Skinner's definition is similar to two of the definitions of assonance in the *Webster's Third New International Dictionary* (1993): "1: Resemblance of sound in words or syllables . . . 2A: Relatively close juxtaposition of similar sounds especially of vowels" (p. 133).

dications of alliteration or assonance when the repetition of consonants and vowels in Swinburne's poem was compared to what could be considered chance levels of repetition in normal speech. Once again, Skinner (1941) established a distinction between meaning and form—formal strengthening or formal perseveration—and took both to be the determiners of verbal behavior, and once again Skinner seemed to take meaning as the most important of them: "As in the case of Shakespeare, it is difficult to interpret repetitions of whole words. These involve formal perseveration, but presumably the meaning of the passage is of considerable importance in determining the second emission in each case" (p. 66).

Therefore, Skinner's approach to meaning and referent, from 1934 to 1941, seemed to be different from the one that would characterize his perspective in 1957. Until 1941, Skinner: (a) took meaning as a property of the verbal response (either a text or spoken word); (b) described the relation between the verbal response and its antecedent stimuli as a relation of reference; and (c) assumed that meaning was one of the determiners of verbal behavior and that as such, meaning could account for verbal behavior.

An Important Change

Skinner's treatment of verbal behavior changes drastically in the paper "The Operational Analysis of Psychological Terms" (1945). If compared to the earlier published articles (Skinner, 1934, 1936b, 1937a, 1939, 1941) on verbal behavior, the 1945 paper presents a sudden change of perspective. And this is not just one more change, but also one that announces Skinner's upcoming position in 1957.

In 1945, Skinner criticized the traditional theories of language and outlined the most important features of his definition of verbal behavior and his *new* treatment of meaning and reference. The present authors' position is that three features of Skinner's definition of verbal behavior presented in 1945 are crucial to understand the changes in his position.

The first crucial characteristic is the definition of verbal behavior as behavior acquired and maintained by mediated reinforcement: "Verbal behavior may be distinguished, and conveniently defined, by the fact that the con-

tingencies of reinforcement are provided by other organisms rather than by a mechanical action upon the environment" (Skinner, 1945, p. 277).

The second critical aspect of Skinner's treatment of verbal behavior in 1945 is that meaning does not appear as an isolated variable that may determine verbal behavior; on the contrary, the meaning of a verbal response, says Skinner (1945), is found only when the controlling variables of a verbal response are discovered:

Meanings, contents, and references are to be found among the determiners, not among the properties, of response. The question "What is length?" would appear to be satisfactorily answered by listing the circumstances under which the response "length" is emitted (or, better, by giving some general description of such circumstances). If two quite separate sets of circumstances are revealed, then there are two responses having the form "length," since a verbal response-class is not defined by phonetic form alone but by its functional relations. (pp. 271–272)

Finally, the third decisive characteristic of Skinner's perspective about verbal behavior, as it was presented in 1945, is his assertion that the control of an object or event over a verbal response (or a word) is best described as stimulus control. Therefore, to define a term (a verbal response) is to describe a contingency of which the verbal response is part (p. 272).

It is only in 1945 that Skinner argued publicly that a theory of language (of verbal behavior) could not be independent of a theory of human behavior, and further, that traditional theories of language were weak because they lacked a theory of human behavior. "The weakness of current theories of language may be traced to the fact that an objective conception of human behavior is still incomplete. The doctrine that words are used to express or convey meaning merely substitutes 'meaning' for 'idea'" (Skinner, 1945, p. 270).

After 1945, Skinner's position about meaning and reference did not go through any more drastic changes. Accordingly, in *Science and Human Behavior* (Skinner, 1953) he criticized the description of verbal behavior through notions such as "to symbolize or to express ideas or meanings, which are then communicated" (p. 307). Skinner also defined verbal behavior,

as he did in 1945, as mediated behavior (p. 299), and, again, treated the issue of meaning as a matter of discovering the controlling variables of a verbal response (p. 210).

Finally, in *Verbal Behavior* (1957) Skinner once more defined verbal behavior as he did in 1945: "as the behavior reinforced through the mediation of other persons" (p. 2). Nevertheless, in 1957, for the first time Skinner affirmed that the definition "needs . . . certain refinements" (p. 2). Such refinements refer to the mediation that occurs through the behavior of the other person when verbal behavior is in question. The mediation that characterizes verbal behavior is such that the other person, the listener, responds "in ways which have been conditioned *precisely in order to reinforce the behavior of the speaker*" (p. 225). This condition excludes instances when the mediating other "participates merely in his role as a physical object" (p. 224), when the other's responses are unconditioned, or incidentally conditioned.

In *Verbal Behavior* meaning doesn't explain verbal behavior and is rendered as unnecessary (and even misleading). Meaning is also taken as a useless notion at the descriptive level of verbal behavior; the concept of contingency as an interaction between subject and environment encompasses all the dimensions of behavioral phenomena. An appropriate description of the behavioral phenomenon called verbal behavior transforms meaning and reference into superfluous and unfortunate notions.

Skinner's Analysis of Verbal Behavior

How can one understand the apparently sudden (and extremely important) change identified in Skinner's treatment of *meaning* in 1945? Skinner's argument (1945) that traditional theories of language were faulty because they lacked a sound theory of human behavior seems to be a clue to the answer. Or else, the identification of key features and changing points on Skinner's explanatory system over time should show how the main characteristics of Skinner's changing system of behavior based his interpretations of verbal behavior or, better, of meaning.

Therefore, the present authors searched for the conditions for Skinner's formulation of verbal behavior in the development of his explanatory system as it appears in his published work. Thirty-three published articles (includ-

ing those regarding verbal behavior already mentioned) and three books, *The Behavior of Organisms*, *Science and Human Behavior*, and *Verbal Behavior*, were examined in order to identify such conditions. Table 1 shows the information used to carry out the present interpretation. Different periods characterized by distinct hallmarks on Skinner's system of behavior were identified. Each row corresponds to one of these periods. The left column shows the limits (in years) of each period and what the present authors considered as the main feature of the period if one considers Skinner's work as an evolving explanatory system of behavior. The aspects that controlled the present interpretation and understanding of the development of Skinner's explanatory system, from 1931 to 1957, in each period are shown in the middle column. Those aspects related to Skinner's treatment of meaning in each corresponding period are presented in the right column. The year of the publications where each feature is most prominent is also indicated.

Although every aspect listed in Table 1 is important to understand the published material analyzed and the development of Skinner's explanatory system from 1931 to 1957, they were grouped into six distinct periods for convenience. The first period covered the years from 1931 to 1937, when Skinner *proposed and developed his research program for a science of behavior*. Skinner's program was based on the concept of the reflex which constituted the first hallmark of the system ("The Concept of the Reflex in the Description of Behavior," 1931), and during the following years his publications dealt with basic concepts of the program such as stimulus class, response class, and reflex reserve, which allowed for the integration of his experimental results. The progressive distinction between operant and respondent responses also occurred in this period: Beginning with a distinction between two types of *conditioning*, Skinner went on to distinguish between two types of *reflexes*, until, finally, he established two types of *responses*.

The proposal of an explanatory system of behavior, from 1938 to 1941, was identified as a second period in Skinner's work. Operant behavior was then affirmed both as a new subject matter for a science of behavior, and as the basic concept of such a science. Nevertheless, concepts such as reflex reserve and reflex strength, proposed in the years before 1938,

Table 1
The Development of Skinner's Explanatory System and Skinner's Treatment of Meaning.

Period	Hallmarks of the explanatory system	Meaning
1931–1937 Proposal and development of a research program for a science of behavior	Research program based on concept of reflex (1931) Two types of conditioning (1932) Extinction ratio: origin of the concept of reflex reserve (1933) Two types of conditioned reflexes (1935b) Classes of Responses and of Stimuli (1935a) Reflex reserve: an effect of conditioning (1936a) Two types of responses, respondent and operant (1937a)	Two treatments of meaning: property of response, and of antecedent conditions (1934/1972) Referent-word relation: basic relation of normal speech (1936b) Response reserve determines verbal response when there is no referent-word relation (1936b) Referent-word relation: modulates effect of stimulus-word over response-word (1937b)
1938–1941 Proposal of an explanatory system of behavior	Operant behavior: subject matter and basic concept (1938b) Basic processes: relations among conditioning, drive, emotion AND reflex strength and reflex reserve (1938b) Verbal behavior: reinforced by the mediation of another organism and distinguishes humans from other species (1938b) Operant reserve: its limits and explanatory power (1940)	Verbal response: its form is subordinate to meaning (1939/1972) Meaning: property of the text/word (1941) Meaning and form as properties of the verbal response (1941)
1945 Proposal of a new unit of analysis for the science of behavior	Unit of analysis: three term contingency (1945) Public and private events are not of distinct natures (1945) Verbal behavior: is reinforced by other organisms rather than a mechanical action upon the environment (1945)	Meaning found among the determiners of the response (1945) Stimulus control describes the control of an object over a verbal response (1945)
1947–1950 Proposal of a new research program for a system of behavior	The need for a theory to account for human behavior (1947) Basic processes: relations among reinforcement, difficulty of response, emotion, motivation, schedules of reinforcement, probability of reinforcement, antecedent stimuli (also stimulus-stimulus relations) AND response rate (probability) (1950) Reflex reserve abandoned (1950)	

(*cont.*, p. 171)

Table 1 (cont.)

Period	Hallmarks of the explanatory system	Meaning
1953 Extension of the system of behavior to human behavior	Behavior science extended to the analysis of human Behavior (1953) Verbal behavior: involves social reinforcement (1953)	Meaning found among the determiners of behavior (1953) Only one treatment of meaning: for verbal and non-verbal behavior (1953)
1957 Verbal behavior constitutes the explanatory system of human behavior	Verbal behavior: reinforced through the mediation of other persons and shaped and sustained by others who are especially prepared to provide such reinforcement (1957)	Meaning: "is not a property of behavior as such, but of the conditions under which behavior occurs...are to be found among the independent variables in a functional account rather than as a property of the dependent variable." (1957, pp. 13, 14)

were maintained. The old concepts of reflex reserve and reflex strength were, then, turned into concepts by which the main effects of conditioning, drive, and emotion could be described.

The proposal of a new unit of analysis for the science of behavior was characterized as the third period, in the year 1945. The three-term contingency as a basic unit to analyze behavior was already announced in the 1945 paper, and the extension of such an instrument of analysis to verbal behavior and, through verbal behavior, to private events was asserted.

The proposal of a new research program for a system of behavior is clearly stated in the 1950 paper "Are Theories of Learning Necessary?" Already in 1947 ("Experimental Psychology"), Skinner had made what could be taken as an announcement for the need of a theory of behavior. However, it was not until 1950 that he proposed the sketch of a new research program based on new concepts: Especially important here is that probability took the place of the concept of reflex reserve—a concept finally abandoned—in Skinner's explanatory system of behavior. This fourth period, therefore, could be seen as a reformulation, and extension, of the 1931 research program.

The publication of *Science and Human Behavior* in 1953—here assigned as the fifth period in Skinner's explanatory system—was certainly a hallmark in Skinner's work. Skinner (1953) explicitly and systematically *extends his analysis of behavior to all human behavior*; and by doing so, he characterizes verbal behavior as operant mediated behavior. However, it is not until 1957 that Skinner's second research program, initially proposed in 1950, is finally completed. In his book, *verbal behavior is included as a constitutive part of his explanatory system for human behavior*.⁹ Therefore, the present authors consider the book *Verbal Behavior* (1957) as the sixth period in the development of Skinner's explanatory system. The question that remains to be answered is: Will this interpretation of the changes in Skinner's explanatory system reveal anything about changes on his treatment of meaning?

The first aspect to be noted is that Skinner's

⁹Richelle (1981) offered the interpretation that Skinner's *Verbal Behavior* (Skinner, 1957) could be read as a research program.

initial conception of meaning was presented when his explanatory system was still based on the concept of reflex. It is worth mentioning that Skinner's treatment of meaning did not seem to change during this whole period. Furthermore, Skinner's emphasis on the relationship between referent and word (or between the effect of a stimulus-word over a response-word) when dealing with the notion of meaning should not be surprising for it is compatible with the formulation of behavior in terms of a reflex relation.

This apparently close relationship between Skinner's treatment of meaning and his explanatory system could suggest that the introduction of the concept of operant behavior, in the second period here identified (1938–1941), would be followed by a change on his treatment of meaning. However, this did not happen. Nevertheless, this second period is important to the present analysis. As early as 1938 (*The Behavior of Organisms*), in the chapter on "Periodic Reconditioning," when discussing that "outside of the laboratory very few reinforcements are unfailing" (p. 116), Skinner presented a definition of verbal behavior as mediated behavior: "This is particularly true in the verbal field, which may be defined as that part of behavior, which is reinforced through the mediation of another organism" (p. 117).

Here there seems to be a strong relation between the recognition of operant behavior as the subject matter of a science of behavior, and the identification of the distinctive aspect of verbal behavior. Even though Skinner had previously asserted that language is behavior (Skinner, 1936b), the recognition of verbal behavior as unique because of its consequences being mediated seems to have depended on the definition of operant behavior: It was the notion of operant behavior that probably made it easier for Skinner to emphasize the significance of the consequences of the verbal response.

Even though the assertion of operant behavior as the subject matter of a science of behavior was a breakthrough, some of the concepts in Skinner's explanatory system still seemed to impose constraints on his comprehension of behavior. In *The Behavior of Organisms* (1938b) Skinner explicitly affirmed that operant behavior should be embraced by the concept of reflex, using the concepts of reflex strength and reflex reserve to describe changes in operant behavior.

It is thus not surprising that until the publication of "A Quantitative Estimate of Certain Types of Sound-patterning in Poetry," (1941) Skinner regarded meaning the same way he had done in "The Verbal Summator and a Method for the Study of Latent Speech" (1936b). Such perspective was probably made easier by Skinner's emphasis on the study of the products of verbal behavior in the form (topography) of the verbal responses. This kind of treatment was compatible with the notion of response reserve: "The operant reserve is a reserve of responses, not of stimulus-response units" (Skinner, 1938b, p. 230). Thus, until 1941, there seems to be a close relationship between Skinner's explanatory system and his notion of meaning.

The third period of development of Skinner's system is particularly important to the present analysis because it was in that period that a sudden change in Skinner's notion of meaning was identified. A careful look at Skinner's explanatory system shows that what changed in the paper "The Operational Analysis of Psychological Terms" (1945) was the proposed unit of analysis of behavior: In this paper, Skinner asserts explicitly the three-term contingency as the unit of analysis of behavior. This assertion seems to have been a necessary condition for the change in Skinner's notions of meaning and verbal behavior.

This is an important conclusion. When Skinner proposed his first research program in 1931 he committed himself to a functional analysis of behavior. Indeed his explanatory system developed as a functional analysis of behavior, even though it was initially based on the paradigm of the reflex. Coherently, Skinner's early commitment to the analysis of verbal behavior was a commitment to initiate a functional analysis of verbal behavior,¹⁰ which was also based on a reflex paradigm. Therefore the sudden change in Skinner's treatment of meaning was not the result of a new interest in verbal behavior, or on its functional analysis. Such change seems to be due to Skinner's choice of the three-term contingency (1945) as the unit of analysis of behavior: a theoretical breakthrough because it allowed him to do a full-

¹⁰As Skinner himself said in 1957 and in 1979a the first outline of *Verbal Behavior* was drawn in 1934. Indeed, from 1934 to 1945 he published 11 papers on verbal behavior.

fledged functional analysis of *verbal* behavior as *operant* behavior. Skinner talks about it in 1979(b), answering a question about the relationship between his psychological system and philosophical issues:

By 1945, I had long since abandoned a stimulus-response psychology, and I was well along with my book on verbal behavior. I wrote the 1945 paper just after spending a year on my verbal behavior manuscript. As a matter of fact, it was a section of that manuscript which I touched up to fit that particular issue of *Psychological Review*. With a functional analysis of verbal behavior based upon the discriminative stimulus instead of the eliciting stimulus—with, in other words, an analysis of verbal contingencies of reinforcement—I found what I believe it means to know. (p. 47)

CONCLUSION

The close relationship between the development of Skinner's system and his notion of meaning strengthens the present authors' hypothesis that verbal behavior must be taken as a constitutive part of Skinner's explanatory system of human behavior. Therefore, the inclusion of verbal behavior in Skinner's research program (1957) is not a mere extension of his explanatory system. The fundamental categories in the analysis of operant behavior should be verbal and non-verbal behavior. Thus, in understanding human behavior, the basic distinction to be made is between verbal and non-verbal behavior (Lee, 1984), instead of thought and action, private and public behavior, and so on.

In this context, what became known as the Skinnerian notion of meaning, which started in 1945 and was completed in 1957, is exemplar. Such a treatment may reveal some of the reasons for the resistance to Skinner's explanatory system. Once more, Skinner not only destroyed an ingrained explanation of behavior, but also dismantled its very explanatory entity: meaning.

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