

B. F. SKINNER'S VERBAL BEHAVIOR: A RETROSPECTIVE APPRECIATION¹

KENNETH MACCORQUODALE

THE UNIVERSITY OF MINNESOTA

In his *Annual Review* chapter on the learning literature for 1957, Kendler observed, in obvious bemusement, that "Skinner is an enigma. . . . Never in the history of psychology has one person authored two such contrasting books. *Verbal Behavior* is practically void of facts and filled with speculation. *Schedules of Reinforcement*, on the other hand, is filled with facts and void of speculations" (Kendler, 1959, p. 59). *Contemporary Psychology* acknowledged the importance of *Verbal Behavior* by giving it two prestigious reviewers, Charles Osgood and Charles Morris, representing psychology and semantics, respectively. Both expressed doubt that Skinner's atheoretical system is adequate for verbal behavior, although the point of the book was to show that it is. Such dubiety is perfectly familiar to Skinnerians, and one with which many otherwise orthodox Skinnerians probably secretly sympathize in the case of verbal behavior, suddenly becoming closet mentalists, so to speak.

In spite of their own reservations, both Osgood and Morris were aware of the book's importance. Osgood said: "*Verbal Behavior* is certainly one of the two or three most significant contributions to this field in our time . . . full of insights into human behavior" (Osgood, 1958, p. 212). Morris wrote: "Skinner's book is both elegant and admirable" (Morris, 1958, p. 213). Both predicted a promising future for the book. As Osgood put it: ". . . if the bird proves a little too big for its nest, that merely demonstrates the viability of fledglings" (Osgood, 1958, p. 214). Morris put it more sedately: "It is an impressive book, and its influence will be deservedly great" (Morris, 1958, p. 214).

So it has indeed been, although in a somewhat oblique way. Its influence was partly mediated, of all things, by Chomsky, of all people, who wrote a third, relentlessly negative, review (Chomsky, 1959) that is as well-known among psychologists as the book itself, and even more widely read, to judge by the subsequent uncritical acceptance of its misconceptions concerning *Verbal Behavior's* content.

In this retrospective review, which will be frankly but, I hope, critically favorable, I will attempt to clarify why *Verbal Behavior* is vulnerable to some misunderstanding, and then to reconstruct the salient points of the book's argument, since I feel that it is its own best justification. Along the way I will comment on those aspects which have, in my experience, raised the most sensible questions. *Verbal Behavior* deserves a careful reading, both for the insights it contains concerning speech, which are considerable, and for the light it casts upon the analysis of behavior as a scientific system, wherever applied.

Verbal Behavior is in part vulnerable to misunderstanding because its intentions and its claims to validity are not firmly specified at the outset. It is neither a grand new theory, nor a new microtheory; it has no new experimental evidence, no cumulative records, no analyses of variance. Many readers, accustomed to having their psychology as well-laced with nearly raw data as possible, simply did not know how to categorize it, although Schoenfeld (1969) has reminded us that *Verbal Behavior* is most like Kantor's *Psychology of Grammar*, against which it might be evaluated. But, alas, Kantor's is not a familiar book.

Skinner characterized *Verbal Behavior* as an "extension to verbal behavior", and "an exercise in interpretation rather than a quantitative extrapolation of rigorous experimental results" (Skinner, 1957, p. 11). In an earlier

¹Dedicated to B. F. Skinner in his sixty-fifth year. Reprints may be obtained from the author, Dept. of Psychology, 112 Elliott Hall, University of Minnesota, Minneapolis, Minnesota 55455.

version he had called it, rather more informatively, a *plausible reconstruction* of how an accomplished speaker's verbal behavior could have been conditioned and maintained by the same kinds of controlling variables and reinforcing contingencies that have been shown to condition and maintain nonverbal behavior, without recourse to new principles, new variables or, above all, to hypothetical entities, either as causal mediators or as attributes of speech as a dependent variable.

I think that *Verbal Behavior* is best conceived as a *hypothesis* that speech is within the domain of behaviors which can be accounted for by existing functional laws, based upon the assumption that it is orderly, lawful, and determined, and that it has no unique emergent properties that require either a separate causal system, an augmented general system, or recourse to mental way-stations.

The word *hypothesis* may be unwelcome and incautious in this context, but it seems to me to fit precisely, and to put *Verbal Behavior* on familiar ground, where it can be evaluated against relevant criteria. Like all hypotheses, this one asserts more than the author has yet demonstrated experimentally, and it sounds dogmatic. We expect and tolerate this in hypotheses. I do not know when a hypothesis is premature. Usually they are published after they have been experimentally tested, which *Verbal Behavior* has not been. Neither has it stimulated many relevant experiments on its own terms. What little research has followed is highly focussed upon the effects of reinforcing verbal responses having preselected grammatical properties, such as plural nouns. In spite of the fact that there is no formal response property likely to sustain response induction in such classes, the reinforcement operation has proven surprisingly (and perhaps disconcertingly) powerful.

For his part, Skinner seems not hopeful for an eventual experimental test of the hypothesis, principally because of the vicissitudes of identifying and controlling all of the variables presumably at work, and because of the practical impossibility of knowing any speaker's relevant ontological history. The available longitudinal observations of adult-child interactions in naturalistic settings provide very, very restricted samplings of the speech of a very small number of rather elderly children, and represent monumental labor. Parentheti-

cally, they also contain much information to reassure Skinner, although they are not experimental either.

These practical constraints upon the experimental testability of *Verbal Behavior* do not transmute it, or the analysis upon which it rests, into a theory, pure speculation, or metaphysics. *Verbal Behavior* is, actually, full of relevant empirical observational, naturalistic data. Although they are not experimental and were not generated for the purpose of testing the hypothesis, they do constitute a test of it, in that they are consistent with it and do not contradict it. In this respect, however, they are precisely as powerful as an experimental test would be.

Supposing that *Verbal Behavior* is a hypothesis, what may we demand of it? Not that it must have been proved, of course, nor be consistent with our common preconceptions concerning the relation between mind and speech. These are not the aims of a hypothesis. We can expect that existing terms and processes in the underlying explanatory apparatus will be plausibly applied to speech conceived in purely behavioral terms, without modification in any defining characteristics and without invoking new, *ad hoc* variables.

Verbal Behavior is vulnerable also because its preconceptions concerning speech are at such variance with tradition. Speech is the last stronghold of mentalism. Now Skinner is telling us that it is not needed even there. One's initial conviction that a purely functional account is viable for all behavior depends heavily upon acquaintance with Skinner's methodological papers, which many readers simply lack. They are referred to *Science and Human Behavior* (Skinner, 1953) for rehabilitation, a surprising but exactly appropriate choice, although Skinner says of *Verbal Behavior* that "the present account is self-contained" (Skinner, 1957, p. 11).

The morale of even the most devoted functional analyst may need some bolstering as the analysis relentlessly proceeds to encompass speech. He may wince at hearing himself called a mere "locus—a place in which a number of variables come together in a unique confluence to yield an equally unique achievement" (Skinner, 1957, p. 313), and something to be "got rid of" (Skinner, 1957, p. 312), so far as his autonomous control over his own speech is concerned. One wonders about him. If he is

not willing to entertain the *possibility*, at least, that the analysis is sufficient for his own speech, and may diminish the importance of his *self*, why did he start out on this path in the first place? The destination is clearly not a surprise, however much the assertion that we have already arrived at it may be. Why does he deny more than locus status to the rat or pigeon? What does he suppose happens to the effects of his own past reinforcements and to the evoking power of his environment when he suspends natural science and takes over control of his speech?

A third aspect of *Verbal Behavior's* vulnerability is that the explanatory processes described are usually not identified by their technical names. This stratagem was no doubt meant to make things easier and more palatable for the nonscientific reader, but it disconcerts the scientific one, who wonders if a technical term which seems apt in a given context has been avoided for some reason which eludes him. Chomsky curiously complained that Skinner borrows the technical vocabulary to create a spurious atmosphere of objectivity; I have concluded quite the opposite, and would have preferred more.

Speech as Behavior

There is something paradoxical in the mere existence of a separate treatment of speech, since the purpose of the effort is to show that neither the form of the behavior nor the necessary explanatory system is in any way separate or unique. Verbal behavior is, in effect, a subclass, not a new class, of behavior. By Skinner's definition, any behavior is verbal if it is "reinforced through the mediation of other persons" (Skinner, 1957, p. 2). The traditional topographical verbal repertoires—speaking, writing, and gesturing—are reinforced by persons whose mediating behavior has been "*conditioned precisely in order to reinforce the behavior of the speaker*" (Skinner, 1957, p. 225. Italics in original). At first blush, this seems an unnecessarily oblique way of defining the domain, but it is appropriately functional and consistent with the hypothesis. Moreover, it reveals itself, on close inspection, to be a sanitized way of isolating those repertoires that are traditionally said to be symbolic. What is symbolic about verbal behavior is, first, that it is without direct, mechanical reinforcement contingencies, but second, that

it is responded to discriminatively by other, appropriately conditioned, people in ways which are reinforcing to the speaker. This fact gives verbal behavior essentially all of its unique characteristics.

The verbal repertoires which reinforcement mediators have been conditioned to discriminate are such that "in studying speech we have to account for a series of complex muscular activities which produce noises. In studying writing or gesturing, we deal with other sorts of muscular responses" (Skinner, 1957, p. 13), and nothing more. Gone are intention, ideas, information, reference, meaning, and all other conceptual dimensions attributed to verbal behavior. As usual the muscles are not named; since speech is operant, what counts is effect, not form. Direct quotation and transcription suffice for adequate recording of speech. These may seem crude as scientific data, but in fact they stimulate the recipient of the report in much the same way that they stimulated the observer of the original behavior.

The Response Unit

In the analysis of verbal behavior it becomes necessary to respect the difference between the operant and a response, a distinction which tends to become blurred in discussions of non-verbal laboratory behavior. The bar press and the key peck appear to be identifiable on purely formal grounds. A response is what repeats and can be counted. However, the recycling aspect of bar pressing and key pecking is an intentional artifact of the experimental situation which does not occur in verbal behavior, whose formal properties tell us nothing about where the boundaries of its component responses are located. The verbal response can best be identified as whatever is strengthened in a verbal operant or, put another way, whatever is strengthened as a consistent effect of a controlling variable. Linguistically a response may be a phoneme, word, or phrase. Quite obviously, then, at present writing the verbal response is definable only abstractly, but the method for deriving an example from actual speech is available. It is empirical and non-arbitrary.

Common sense and our preconceptions tell us that once a verbal response has been conditioned it is available for "use" in a rather wide variety of circumstances. The conception of the verbal operant encourages no such pre-

diction. According to *Verbal Behavior*, if the response *milk* has been conditioned to milk as a stimulus, it will not *therefore* be strengthened as a request by an appropriate state of deprivation, unless of course the two situations have some elements in common to sustain a form of generalization from one to the other. Skinner is very clear about this. However *a priori* probable it may seem that the speaker who "knows the word for milk" will automatically be able to ask for it by name, he may very well not. Correct or not, Skinner's prediction is interesting because it is deduced from the analysis; he is not merely composing a technical paraphrase of common sense.

Considering how familiar the concept of the operant is, it reemerges as a surprisingly apt and powerful entity when applied to verbal behavior. It would tell us, if we knew what operants a speaker "has", precisely what we need to know in order to predict, control, and understand why he speaks. A lexicon of the responses in his repertoire would tell what he might say, but not the conditions under which he would say them. A record of response *orders*, no matter how precisely recorded and internally analyzed, and no matter how conceptualized and categorized in terms of surface and underlying grammars, can reveal nothing concerning the structure of controlling variables. These are illuminated by knowledge of the circumstances in which they have occurred. In fact, questions concerning both the meanings and the grammars of such puzzling response specimens as *They are eating apples* are answered by identifying their controlling variables.

We probably have come to use the terms *operant* and *response* interchangeably because it is reassuring to do so. A response, as a unique, dated occurrence, is unquestionably objective, and easily satisfies our insistence upon natural science dimensionality for all of our terms. The operant, on the other hand, is a relation, and therefore dubious. But all of an operant's component parts, the antecedent and response terms, are objective and measurable, and so is the fact that one follows the other with a specifiable frequency. Nothing is imaginary.

The objectivity of some of the responses mentioned in *Verbal Behavior* may be suspect. For example, much speech is said to be covert or subvocal, and is ordinarily unobservable.

However, covert behavior is presumed to have muscular locus, with reduced but real and instrumentally measurable amplitude. It is at least potentially observable, although the operant research tradition has left these repertoires almost completely uninvestigated.

Covert speech is said to occur in a situation that would otherwise strengthen the corresponding overt form. Its covertness is separately accounted for as due to some additional threat of punishment for speaking aloud. It tends also to be the form of speech addressed to the self, since the effort-reinforcement ratio can thus be reduced without loss in probability or amount of reinforcement. In *Verbal Behavior* it plays two important roles. It is a common form of the dependent variable, and on occasion it is said to be a causal variable. In the latter role, it is likely to be incorrectly viewed as an explanatory fiction. Properly speaking, it is an hypothesized and presumably demonstrable event, not an hypothetical, theoretical one.

In speech, as in any other behavior, the "basic datum to be predicted and controlled" is the probability that a given response will occur at a given time (Skinner, 1957, p. 28). The range of probabilities considered in *Verbal Behavior* extends *below* the threshold of actual occurrence (overt or covert; this is not the issue) to include responses which are merely *potential* or *incipient*. This range of probabilities is somewhat troublesome, but it does appear to describe what happens. For example, any stimulus object seems to strengthen an *array* of verbal responses. But, while several response probabilities may increase simultaneously, several responses cannot occur at once. Those which lose out must be considered as having been merely incipient or potential. Such probabilities raise several methodological issues which Skinner does not elaborate in *Verbal Behavior*. Some of these must be recalled in later portions of this review (see especially *Autoclitic Behavior*).

Reinforcement

Reinforcement is central to the thesis of *Verbal Behavior*. Skinner obviously supposes that speech is conditioned and maintained only by speech-contingent reinforcement. This is not to say that genetic contributions to speech are absent or negligible. A human organism learns to talk because he is genetically

equipped to do so. If he were not, he would not learn. He inherits his vocal musculature and a strong predisposition to make vocal noise. He learns because he is genetically susceptible to reinforcement and its collateral induction and generalization effects. None of this, however, is speech, which is the product of these genetic capabilities and experience.

There is considerable emphasis in *Verbal Behavior* upon *conditioned generalized reinforcement*. Whatever objectivity speech achieves is due to the availability of such reinforcers, as we shall note later in more detail. Knowledge of generalized reinforcers is more observational than experimental, but, while one might wish for more, there is nothing *prima facie* improbable or *ad hoc* about the role they are said to play in speech.

Another emphasis, on the other hand, is new and initially puzzling. The mediator of much reinforcement for verbal behavior is said to be the speaker himself. He can self-reinforce, as when he delivers to himself a conditioned generalized reinforcer, such as a covert *good* or *that's right* contingent upon some other verbal response in his own speech. A special case is *automatic self-reinforcement*. The dice player calls his point and is said to be automatically self-reinforced for doing so by "hearing good news at the earliest opportunity". "Boasting is a way to 'hear good things said about oneself'" (Skinner, 1957, p. 165). Similarly, the inexperienced reader reinforces himself by making tentative responses until he hears one to which he can respond as a listener.

The idea takes some getting used to, and Skinner for the most part leaves the reader to work it out by himself. A single speaker also becomes accomplished as a listener and reinforcement mediator. If he hears himself say something that is reinforcing in his verbal community, he will not be exempt as a listener from its reinforcing consequences. But since both speaker and hearer are the same, this reinforcement is no longer mediated and non-automatic, hence it is automatic and self-reinforcement. A similar and more conventional version of this process occurs in nonverbal behavior when "the musician playing for himself . . . plays music which, as listener, he finds reinforcing. In other words, he 'plays what he likes' just as the self-reinforcing speaker 'says what he likes'" (Skinner, 1957, p. 165).

It would be a mistake to paraphrase automatic self-reinforcement by saying that such behavior "reinforces itself". It generates stimulus *consequences* that would be reinforcing if they originated from another source, and does not reinforce itself any more than any other behavior does.

The Controlling Variables

If a pigeon is conditioned to peck with food reinforcement when the key is illuminated, pecking is conjointly controlled by food deprivation and illumination, and to alter either is to alter the probability of the response. Considered as verbal behavior, what does the peck "tell" the observer about the pigeon's current motivational and environmental circumstances? Nothing unequivocal. It says, in effect, *The light is on* and *I am hungry*. The laboratory pigeon never gives an objective and disinterested report of its environment. If sufficiently deprived, it may lie and say that the light is on when it is not. It may fail to report that the light is on unless it is *also* deprived.

Verbal behavior is different. Some verbal responses are under essentially exclusive environmental control. Neither their form nor the probability of their emission is affected by the speaker's motivational condition. Other verbal responses are, similarly, controlled by motivational conditions and are essentially independent of environmental influence. This polarization of motivational and environmental variables and the speech they control is an emergent dynamic property of verbal behavior, but it does not depend upon a new term or process in the operant conditioning paradigm, as the reinforcement histories for stimulus and deprivation controlled responses show, according to Skinner's reconstruction.

Motivational Variables: the Mand

Skinner defines a mand as "a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation" (Skinner, 1957, p. 35-36). *Milk, please, taxi,* and *stop that* are typical mands; each produces its own characteristic consequence when received by an appropriately conditioned reinforcement mediator. A particular deprivation or aversive stimulus automatically acquires

control over its mand because the reinforcer it specifies is ineffective under other conditions. In these respects the mand is very like most nonverbal behavior. But more importantly, unlike most nonverbal behavior, the *form* of the mand does not covary with stimuli in the speaker's environment.

All of the examples of deprivations and aversive stimuli cited in *Verbal Behavior* are wholly objective. The motivational conditions responsible for mands that specify conditioned reinforcers, *Take me for a ride; Let me fix it*, presumably involve some other reinforcer that originally was paired with the conditioned reinforcer specified in the mand. No riding drive or fixing drive is implied; drive, the suspect term which seems to come and go between books, does not appear in *Verbal Behavior*.

However, one new (to me) dynamic process of motivational control is invoked to explain *magical mands*, "which cannot be accounted for by showing that they have ever had the effect specified or any similar effect upon similar occasions" (Skinner, 1957, p. 48). One supposes, for example, that *Would God I were a tender apple blossom* has never been reinforced by the effect it specifies. "The speaker," Skinner says, "appears to create new mands on the analogy of old ones" (Skinner, 1957, p. 48), which does describe the process but does not really explain it. It is as if reinforcement of a sufficient variety of mands creates a kind of superoperant containing all of the remaining motivational states, pre-coupled with whatever responses specify the reinforcers appropriate to them. Unfortunately, *Verbal Behavior* does not coordinate this analogic process with any familiar principle of behavioral control. Magical mands are merely said to be *extended*, a word Skinner uses in this book to characterize behavior whose strength is due to either response induction or stimulus generalization, both ways of "creating by analogy" to be sure. To the best of my knowledge, however, we do not yet have any experimental evidence to justify including deprivation among the variables that sustain generalization. Even if we did, the heterogeneity of the deprivation states among which generalization would have to extend seems excessive. The existence of magical mands seems so ubiquitous that the informality of Skinner's explanation suggests a real weakness in the formulation.

Mands comprise a rather small fraction of all speech, which is interesting because it follows that the large remainder is essentially free of control by motivation, the variable which even Skinnerian psychologists tend to think lies somewhere behind everything.

Stimulus Variables: S^Ds

The larger part of speech is controlled by discriminative stimuli (S^Ds). It includes the generic *tact* case, such as naming, assertion, and announcement, and also the speech involved in reading, echoing, intraverbal responding, and certain audience effects. Such speech is often entirely objective and disinterested, independent of, and sometimes antithetical to, the speaker's motivations. The scientist is a highly discriminating tacter, reporting what he observes whether it refutes his theory or not. The reader simply talks away, saying anything, any time, good news or bad, whether he believes or even understands a word he speaks. There is, so to say, nothing of the *speaker* in such verbal behavior. This is remarkable and it must be explained.

In conditioning these operants, the reinforcing community solves an obvious problem in behavioral engineering: it must maintain a three-term contingency between the speaker's environment, the form of his verbal response, and the presentation of reinforcement. So much is no problem of course, except that it must be done so as to prevent the spontaneous emergence of an additional contingency between any particular motivational state of the speaker and the probability and form of reinforcement. The verbal community accomplishes this through the use of *conditioned generalized reinforcers*. For verbal behavior, the common conditioned generalized reinforcers are themselves verbal. The reinforcement mediator says something: *um-hm, right, thank you, correct, yes, very interesting*—a short list whose items are interchangeably applicable to any stimulus-response contingency *provided* they stand in some sort of conventional correspondence. If their use is restricted to these circumstances, purely environmental control results, while careless use of them produces inexact stimulus-response correspondences such as exaggeration, ambiguity, and outright lying.

The largest and most important class of stimulus-controlled speech occurs in the *tact*,

whose controlling relations are "nothing less than the whole of the physical environment—the world of things and events which a speaker is said to 'talk about'" (Skinner, 1957, p. 81). Formally, the tact is defined as "a verbal operant in which a response of given form is evoked (or at least strengthened) by a particular object or event or property of an object or event" (Skinner, 1957, p. 82).

A tact conditioned to one stimulus will, of course, generalize to other stimuli. Again avoiding the technical term, Skinner says that such generalized behavior is *extended*, and again he runs the risk of appearing to name the effect but not explain it, although the informed reader should see at once that generalization is involved. Skinner shows, in a very illuminating discussion, how such literary examples of extension as metaphor, simile, and metonymy, with all of their traditional mentalistic, high-art, creative-act connotations, are nothing but rather simple instances of generalized stimulus control. Metonymic extension is particularly important because it accounts for many instances in which a tact appears to be strengthened by a missing stimulus, such as when a speaker says *no orange* when confronted by the empty fruit bowl. A missing stimulus cannot control any response. To suppose it could generates endless absurdities: there is no elephant either, but no one is likely to mention the fact. *Orange* in this context is often a simple tact, metonymically controlled by the fruit bowl in whose presence it has been reinforced on occasions when it held an orange. The *no* is autoclitic, not metonymic, and will be discussed below.

Abstraction involves tacting in response to some single isolated property of a stimulus such as its shape, color, or configuration. The process is often conceived as involving a prior nonverbal act of decomposing the environment into its parts—called universals—which are then tacted. Skinner's reconstruction implies, however, that functionally it is not the speaker who acts to abstract a property out of its context, but rather the property which abstracts or strengthens one response out of the speaker's repertoire.

Skinner says that "abstraction is a peculiarly verbal process because a non-verbal environment cannot provide the necessary restricted contingency" (Skinner, 1957, p. 109), *i.e.*, the discrimination learning necessary for abstrac-

tion *must* be mediated by another organism. Feral organisms thus do not abstract, because colors, lengths, and shapes as such do not have innate functional identities, and the feral environment does not maintain any correlation between them and reinforcement for some conventional response. The full pursuit of this empirical view of perception contains much food for thought and can be the subject of endless debate. It is probably true for *conditioned* responses controlled by abstract properties of stimuli, which do appear to require mediated reinforcement. However, some abstract stimuli appear to have innate functional identities for some feral organisms, since they evoke (or is it elicit?) species-specific behavior from them.

Tacting Private Stimuli

It is somewhat curious that Skinner, the most thoroughgoing behaviorist, is the only one who has been willing to discuss private stimuli, which he has done with characteristic consistency since 1945. Since speakers do learn to tact such stimuli, from, as Skinner puts it, "*heartburn to Weltschmerz*" (Skinner, 1957, p. 132), the variables controlling those tacts must be located in the interests of the completeness of the verbal account. The analysis in *Verbal Behavior* is essentially unchanged from his 1945 version, and need not be reconstructed here. In *Verbal Behavior*, however, he gives especially detailed consideration to tacts that describe the speaker's own behavior. These include responses like *beautiful*, *familiar*, and *similar*, which *refer* to external stimuli, but the possibility that external stimuli directly control them is contraindicated by the fact that these responses are evoked by stimuli among whose members no generalization gradients or common objective properties can be presumed. Skinner suggests that the recurrent element in situations called *beautiful*, *familiar*, or *similar* is to be found in the speaker's responses, not the situations themselves.

This, of course, is the mediation paradigm. It has been in operant psychology a long time. It presupposes that a speaker *can* discriminate his own behavior as a covert, essentially private, event.

Other Kinds of Stimulus Control

In addition to the tact, Skinner recognizes four specialized classes of stimulus control.

Echoic speech "generates a sound pattern similar to the stimulus" (Skinner, 1957, p. 55), and is conditioned, not innate. In a *textual* operant, "a vocal response is under the control of a nonauditory verbal stimulus" (Skinner, 1957, p. 66), such as printed, written, or pictorial matter. *Intraverbal* operants are composed of stimulus-response relationships which do not show the fine-grained, point-to-point control of echoics and textu-als. The *audience* gains control as an S^D whose effects upon speech are always supplementary, according to a process to be discussed below.

The important question to ask about this array of stimuli is whether they are consistent with the traditional physical definition of the S^D. So far as I can determine they all are. However, either of two rather easily made mistakes might lead to the erroneous criticism that one has, in fact, found a hypothetical stimulus in *Verbal Behavior*. The first is to restrict *stimulus* to simple points or dimensions. When a speaker tacts a painting as *Dutch*, he is responding to complex and subtle relations among many simple stimulus dimensions, not to any element of Dutchness. The relations he is tacting are as physical as the elements that comprise them, however, and no hypothetical stimulus dimension is involved. The other mistake is to identify the *referent* of a tact as its S^D. Tacting is not reference. Reference is a relation between the environment and some of the words in a language; its existence is independent of any speaker. Although the notion of reference has its uses elsewhere, Skinner shows that in a functional analysis it is merely mischievous. The principal difficulty is that a word that *refers*, while it is indeed controlled by its referent in some tact relationships, also occurs at other times, controlled by other stimuli to which it does not refer. So, one may say *Eisenhower* because he has just read the name or heard it; his response refers to the man but is controlled by the text or the echoic stimulus. Attempting to preserve the reference-tact identity in these circumstances conduces to the hasty conclusion that the Eisenhower that controls the response is now a hypothetical, mental one. In a functional analysis, of course, it is the controlling stimulus, not the referent, which is of interest. The speaker who says *I am going to Europe this summer* refers to an event but does not tact it because it does not

exist yet. The envoy who reports home what the ambassador said is not speaking echoically, although he is referring to the ambassador's speech. In such instances, other S^Ds, real and concurrent, must be presumed to control.

Combining the Variables:

Recomposing the Environment

These five kinds of stimulus control, plus motivation, constitute all of the variables Skinner provides to account for the emission of speech, and the functions that relate them to speech are all simple enough to be observed in lower organisms. Everything considered, the basic explanatory apparatus seems very meager, while verbal behavior is very complex.

But the power of a simple functional law must not be underestimated. A process observed in a simple organism such as a pigeon or rat may recur in the behavior of a human child or adult with vastly different parameter values. Grammatical behavior may be very rapidly conditioned in children and at a very early age. Neither the complexity nor the rapidity nor the age of the child proves that the underlying conditioning processes are different from those involved in conditioning the key peck. The fact that rats and pigeons never learn to talk does not prove that their conditioning processes are insufficient. No one has ever tried to teach one to behave verbally using the processes specified in *Verbal Behavior* (although Wenrich appears to have trained a rat to tact, Premack is undertaking to condition abstract tacting in a chimpanzee, and the Gardners are teaching theirs to mand).

More importantly, the power of a single variable is seen to multiply when we take into account its multiplicity of effects. Two forms of what Skinner calls *multiple causation* are identified in *Verbal Behavior*. First, a single variable controls many responses, giving a speaker a great deal to say even in a static environment. No train of ideas is needed to keep him talking. Although multiple concurrent effects of a single deprivation condition are familiar, multiple S^D effects are not. In the laboratory experiment, an initially neutral stimulus is ordinarily selected to become the controlling variable for a single response, thus conducing to an informal "one-stimulus one-response" rule which is, however, artificial and not a necessary consequence of the discrimination process.

If one stimulus controls many responses the problem of accounting for the sheer bulk of speech is solved, but the solution generates another problem because, if several responses are concurrently strong, additional variables are needed to control the order of their emission and whatever response selection, and rejection, occurs. Ordering is a problem of great magnitude and interest. It is discussed below.

As for response selection, two traditional but repugnant solutions suggest themselves. One is to give in at last and let the speaker "choose his words" from among those currently made available to him by the variables. Skinner rejects this because such choice behavior must, in turn, be accounted for. The other is less solution than stratagem: predict that the response which has the most favorable reinforcement history will occur first, and then account for mispredictions, when the occasional low-strength response intrudes, as due to oscillation (that is, chance).

Skinner's alternative is to account for response selection in terms of variables already at hand. Some responses no doubt select themselves on the basis of their superior reinforcement history. The unexpected response, the neologism, slip, or intrusion is accounted for by another form of multiple causation in which a given response is concurrently strengthened by more than one variable, or "said once for two reasons". Their separate strengths are said to combine, additively and algebraically in fact. Skinner calls this process *supplementary strengthening*. The most subtle and interesting examples occur within *thematic groups*. A thematic group might be defined as the array of responses strengthened by a single S^D in the tact or intraverbal relationship. If a normally weak response in such a hierarchy receives sufficient additional strength from a supplementary variable, it will occur instead of other, normally stronger, responses. One of Skinner's examples (Skinner, 1957, p. 237) quotes a legend underneath a picture of the kitchen at 10 Downing Street: *A bad meal cooked here can derange British history*. The oddity of *derange* in this sentence compels attention. An existing tendency to say *derange* as part of a thematic group including *disrupt*, *disturb*, *deflect*, and so forth, may have received the necessary supplementary strength from the rather prominent *range* in the picture.

Anticipating the criticism that the explanation is far-fetched, Skinner says "it is often difficult to prove the multiple sources, but examples are so common that anyone who has bothered to notice them can scarcely question the reality of the process" (Skinner, 1957, p. 237). This is true, and the doubter is urged to bother. Everyday speech is full of them.

A similar process occurs when the supplementary variable is echoic or textual, and is then called *formal strengthening*. A thematically weak response may on occasion be collaterally strengthened by an echoic or textual stimulus that controls a response of similar form. Rhyme, alliteration, assonance, and meter result. During a performance of *Richard III*, John Barrymore is reputed to have been able to speak appositely, immediately, and in unrhymed iambic pentameter when a spectator laughed at the line *A horse, a horse, my kingdom for a horse*. Without hesitating Barrymore thundered on *Make haste, and saddle yonder braying ass*. The theme was apparently determined by the laugh, but its form was influenced by the poetic context in which it occurred.

Other effects of multiple causation include blends and distortions, as when the hungry lady, apparently as *ravenous* as she was *famished*, confided to her dinner companion that she was *ravished*. *Ad hoc* causes for these pathological effects need not be assumed. The fact that we tend to hear and remember better the "Freudian" slips that suggest pathological motivation and dulled speaker vigilance is probably due to a selective process related to hearer behavior, and does not reflect a general characteristic of all misspeaking, much of which probably passes unnoticed.

Autoclitic Behavior

Mands and tacts, along with audience, echoic, textual, and intraverbal responses, constitute the raw material of speech. Additional verbal phenomena of great interest and complexity remain to be accounted for. These are generally called *grammar*, and include *ordering* as well as certain response forms such as *and*, *but*, *is*, *some*, *except*, *no*, and so forth. These behaviors are said to be *autoclitic*, a neologism intended to suggest that they are controlled by other behavior. Thus, grammar is conceived to be causally dependent upon, and temporally secondary to, first having

something to say, in the form of mands, tacts, echoics, and so forth. Grammar is accounted for within the existing analysis and does not invoke a separate causal variable. It is a phenomenon on the dependent variable side, not a cause in itself. So once again the speaker is excluded as a causal instigator.

A few examples will show how the autoclitic process works. *Descriptive autoclitics* simply comment upon the responses they accompany and which control them. *I see it is going to rain* contains the autoclitic *I see*, which identifies the controlling variable for *it is going to rain*, while *He said it is going to rain* identifies a different one. Since *it is going to rain* may be said for any of a number of reasons, the hearer needs to know which one is involved in a current instance. Other autoclitics specify the strength of the behavior they accompany, such as *I am certain that . . .* as opposed to *One might almost say that . . .* Autoclitic identification of the effect of his verbal behavior upon the speaker himself occurs in *Happily his fall broke no bones*. Adverb or not, *happily* modifies the speaker, not *broke*. The *no* in *no orange*, discussed earlier, is autoclitically controlled by the metonymic response *orange*. In the vernacular, *orange* is about the fruit basket, but *no* is about the response *orange*, however odd it may be to trace their strengths to separate variables.

Ordering is the second large class of autoclitic phenomena, although not all ordering is autoclitic. For example, *The boy's hat* could be acquired as a single functional unit, and speech which is controlled echoically, textually, or intraverbally requires no autoclitic behavior.

Much actual autoclitic ordering depends upon "partially conditioned autoclitic 'frames'" (Skinner, 1957, p. 336). Having separately acquired *The boy's gun*, *the boy's shoe*, and *the boy's hat*, the boy's first appearance with a bicycle can be tacted as *the boy's bicycle*, with the boy and his bicycle controlling their respective tacts, and the relation between them controlling the order of their emission. Similar frames include the orders of tacting actor-action and adjective-noun relations.

Thus Skinner proceeds. The autoclitic hypothesis is the most subtle, complex, and innovative aspect of *Verbal Behavior*. Anyone who wants a real intellectual workout is invited to

take it on. Its plausibility depends upon one's being able to accept the notion that a speaker can respond discriminatively to (1) what he is *about* to say ["responses cannot be grouped or ordered until they have occurred *or are at least about to occur*" (Skinner, 1957, p. 332; italics added)]; (2) why he is about to say it; and (3) how strong the operant is. The discriminations concern complex relations between speech and its causes, and they are very rapid. In this respect it is important not to relapse into conceiving of discrimination as a separate prebehavioral *act*. Ordering is discriminative behavior, not the result of it, so that the complex discriminations in autoclitic behavior need not be allotted prebehavioral time. Skinner apparently considers the discriminability of one's own behavioral predispositions sufficiently well-established not to warrant explicit discussion in his treatment of autoclitic behavior.

Even so, the discrimination of *incipient* speech does raise serious questions, especially concerning its physical form and locus. I can suggest two possible resolutions. First, the incipient speech that controls autoclitic behavior might be conceived to occur covertly first, and then to be autoclitically edited as one would rewrite a sketchy manuscript. However, ongoing speech rarely seems to be marked by the pauses such a process would require. The second and I believe correct and satisfactory resolution of the problem is to understand that any autoclitic which refers to incipient speech is in fact controlled by the variable which makes that speech incipient. Thus, a speaker can autoclitically say *I was about to remark . . .* under the influence of the situation in which he ordinarily says whatever follows, but before he has in any sense done so. The situation that strengthens the tacts *the boy* and *runs* also contains the relation that determines the order of their emission as *the boy runs*. If I am correct in this, autoclitic behavior is not, strictly speaking, controlled by other behavior, but by other operants. There is a difference.

Thinking

Verbal Behavior converges upon an analysis of thinking, with which the book ends. Although this chapter will fascinate those who have watched the evolution of Skinner's preoccupation with this subject, thinking turns

out not to be peculiarly verbal at all. Its final disposition is most clearly defined in these terms, "thought is simply behavior—verbal or nonverbal, covert or overt" (Skinner, 1957, p. 494). More specifically, it is behavior "which automatically affects the behavior and is reinforcing because it does so" (Skinner, 1957, p. 438). As behavior, then, thinking has no unique response properties and no unique sources of control. The speaker therefore loses out again as the autonomous instigator. Thought, his last chance for privacy and self-determination, for creativity and personal style, finds its way into the determinism of the operant paradigm.

Last Words

Thus, the argument in *Verbal Behavior* proceeds, inexorably and relentlessly, to the final overthrow of the speaker as an autonomous agent. Chomsky, recoiling from this conclusion, apparently saw—quite correctly—that the argument in *Verbal Behavior* follows quite impeccably from its premises. He therefore attacked the premises and essentially ignored what followed from them in *Verbal Behavior*. Unfortunately for his purposes, Chomsky did not grasp the differences between Skinnerian and Watsonian-Hullian behaviorism, and his criticisms, although stylistically effective, were mostly irrelevant to *Verbal Behavior*.

He was simply wrong. This is a *great* book. The reader who is well acquainted with the technical experimental analysis of behavior will find real pleasure in watching its elegant argument unfold. It provides a rare opportunity, in psychology, to discover the potential that has existed all along, unsuspected, in the underlying formulation. In the language of the book itself, *Verbal Behavior* serves as a supplementary variable, prompting verbal responses which were at some strength before he read the book. One might, almost, have been able to write it himself. Yet he would

not have. What is most astonishing and exciting about the book is that the speech it prompts is at such wide variance with the residues of one's prescientific, traditional beliefs about this subject matter and, more importantly, about his *self*. The psychologically sophisticated reader may, with Chomsky, recoil from the conclusions in *Verbal Behavior*, but I do not believe he can rationally reject them.

His comfort will have to come from the fact that Skinner cannot prove, any more than any other scientist can, that all of the variance has been accounted for. The remainder may be where the speaker directly controls. Unaccounted-for variability is not the very best basis for theory construction but it is always a safe one, temporarily. History tells us, however, that this variability will be traced to non-theoretical sources, most probably those which are already acknowledged.

Like it or not, the camel's nose is in the tent. Mark my words.

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