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LANGUAGE, RULE-GOVERNED BEHAVIOR, AND COGNITIVISM: On Moerk's Integration of Skinner's and Chomsky's Approaches to Language

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ABSTRACT: This is a friendly critique of Moerk's synthesis of cognitive and behavioral approaches to language. The critique addresses four dangers we all have trouble avoiding: (a) the confusion of rule-governed and contingency-controlled behavior, (b) the acceptance of the mentalistic implications common to cognitive terminology, (c) the nonrigorous use of behavioral concepts, and (d) the acceptance of the structuralist limitations common to linguistics.

Our behaviorist heritage from the animal laboratory imposes an absurd burden: Most methodological behaviorists analyze human behavior as if human beings do not think or, if they do think, their thoughts have no impact on their overt behavior -- the *methodological-behaviorist error*. At this point in the evolution of behavior analysis, most behavior analysts seem to be methodological behaviorists; that is, they deal with only directly observable independent and dependent variables; they shy away from inferences about covert processes. They shy away, though Skinner argued that our science will be incomplete without an understanding of covert or private events, difficult as that understanding may be to obtain (Skinner, 1945). However, even Skinner usually dealt with private events only as dependent variables rather than as intermediate variables in a causal chain.

The cognitivist heritage from the human laboratory imposes an equally absurd burden: Cognitivists argue that, not only do human beings think, so do nonhuman animals -- the *cognitivist error*.

A more reasonable radical-behavioral view is that, though animals do not think, of course human beings do, at least part of the time; and, furthermore, our overt behavior would be much less effective in coping with our environment, if it were otherwise. This is a *radical-behavioral view*, because it argues that such covert behavior follows the same laws of behavior as does overt behavior. It is from this radical-behavioral perspective that I address Ernst Moerk's integration of the work of Skinner and Chomsky (this issue). (For other commentaries on the relation between Skinner's and Chomsky's approaches to language see Anderson [1991] and MacCorquodale [1970].)

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It is important that a linguist such as Moerk looks with favor on Skinner's conceptual analysis of verbal behavior. Moerk's effort to reconcile the behavioral and cognitive approaches deserves encouragement. So I hope it will not seem inhospitable, if I split terminological hairs, in the name of behavioral purity and at the risk of ecumenical dissension. In trying to build an intellectually honest bridge between cognitive and behavior analyses, we must take care not to trivialize the differences between these two approaches.

Bridging the gap between a cognitive and a behavioral approach to language may be so difficult, it will require the combined and sustained efforts of behaviorists, cognitivists, and linguists. Otherwise, the bridge may not be durable and may be flawed with superficial connections. We are at an early point in the evolution of a behavioral/cognitive approach to language; so now there may be no behaviorists, cognitivists, or linguists able to make rigorous use of the concepts from the other fields, without the help of experts from those fields. Therefore, I offer this friendly critique of Moerk's article with the aim of supporting rigorous interdisciplinary bridge building. (The problems are also common among us behavior analysts.) Even if Moerk has not completed this task of intellectual civil engineering, at least he is assembling the crew. I hope increasingly sophisticated analyses will grow out of these initial multidisciplinary efforts. (For an excellent example of a behavioral/cognitive multidisciplinary effort see Butterfield, Slocum, & Nelson [in press].)

The present article addresses four dangers we all have trouble avoiding: (a) the confusion of rule-governed and contingency-controlled behavior, (b) the acceptance of the mentalistic implications common to cognitive terminology, (c) the nonrigorous use of behavioral concepts, and (d) the acceptance of the structuralist limitations common to linguistics.

RULE-GOVERNED BEHAVIOR

First, it may help to define some key concepts: (a) *behavioral contingency* -- the occasion, a response, and the outcome of that response, (b) *rule* -- a verbal description of a behavioral contingency, (c) *rule-governed behavior* -- behavior under the control of a rule, and (d) *contingency-controlled behavior* -- behavior under the direct control of a behavioral contingency without the involvement of rules. (For a more detailed discussion of these and related issues, see Malott [1989]).

Rule-governance vs. behavioral consistency

Moerk says, "When Skinner (1957) asserted that speech and writing were forms of behavior, he certainly was correct" (p. 18). Unfortunately, I think Chomsky (1959) commits the classic cognitivist error, when he labels these forms of behavior as rule- governed. To use Moerk's terminology (as I understand it), Chomsky failed

to distinguish between *descriptive rules* (rules that merely describe behavior) and *prescriptive rules* (rules that themselves govern the behavior). (Bandura [1986] also makes this distinction, using the same terminology.)

Moerk distinguishes between descriptive and prescriptive rules. This seems exemplified by the distinction between processes controlling the acquisition of a first language in children's normal environments and processes controlling the acquisition of a second language in adults' language courses.

Adults first will learn rules of grammar, definition, and pronunciation. Then they will say those rules to themselves before, or while, speaking and writing the new language. Clearly, their behavior will be rule-governed; for example, if they are unable to say the rules, they will be unable to speak or write properly. This is not true of children learning their first language.

Children cannot say the rules, but they can speak and eventually write properly. Rules do not govern their behavior, though we can describe that behavior by rules of grammar, definition, and pronunciation. Direct-acting contingencies of reinforcement and punishment control their behavior; so the behavior is contingency-controlled. During children's early language learning, other human beings are the major part of the environment that delivers the reinforcing and punishing outcomes. But, as children gain language skills, more complex sources of reinforcement and punishment operate (e.g., children may solve verbal problems and so get reinforcers from the nonhuman environment).

When Moerk talks about the style of the verbal utterance resulting either from a *simple rote formula* or a *linguistic prescription*, he seems to acknowledge the difference between contingency-controlled and rule-governed behavior.

So merely describing behavioral regularities with rules does not mean the behavior is rule-governed. We should not say, "Even in simple cases of conditioning there exists evidence of rule-governed behavior: When a signal is presented (the 'stimulus'), the subject *has learned that* it has to produce a specific behavior (the 'response') *in order to* obtain a result (the 'positive or negative reinforcement')" (p. 18, italics added).

Consider resistance to extinction resulting from intermittent reinforcement: We should not say the subjects "have acquired the *expectation of reinforcement* based upon the abstraction of the above-stated 'rule' that is, the contingency pattern" (p. 18, italics added). We reserve rule-governance for verbal organisms, not just by definition but also by logic and common sense.

Fortunately, Moerk distinguishes between descriptive and prescriptive rules. But, unfortunately, he often seems to treat them as if they were all the same. For example, he persists in saying linguistic generativity is rule-governed.

We should be cautious in our use of expressions such as the preceding italicized phrases *has learned that, in order to,* and *expectation of reinforcement. Learning that* suggests learning a rule that *if I do this, then that will happen. In order to,* suggests a purposiveness that might be appropriate for rule-governed

behavior but not for contingency-controlled behavior where even a verbal organism might be unaware of the rule, the outcome, or the behavior. Along the same line, *expectation of reinforcement* suggests that the behaver can state a rule describing the contingency between the behavior and the forthcoming reinforcer. We should infer none of the above processes, unless we have reason to believe the behaver has stated the relevant rule.

Along the same line, we should avoid saying skills rely on *knowledge*. *Knowledge* normally suggests the ability to describe verbally. But being able to describe an act or the contingency of which the act is a part is not the same as being able to do the act. For contingency-controlled behavior, being able to describe the act is neither necessary nor sufficient for being able to do the act and vice versa.

Cognitive development seems to be the acquisition of language skills and their use in the description of rules. If so, then the preceding analyses suggest that *cognitive development* does not underlie *nonverbal behavior*.

More to the point of language, we should not say rules govern linguistic generativity or productivity. In other words, we cannot infer rule governance from the mere fact that a child says a novel sentence in a grammatically correct manner. Most often, the grammatical child will not be able to state the rules of grammar. This is like the pigeon that cannot state the rules describing the concepts of human being and nonhuman being, though the bird's key peck is under the differential control of those stimulus classes (Herrnstein & Loveland, 1964; Malott & Siddall, 1972).

Rule-governance and the confusion of feedback with reinforcement

As Moerk points out, "in sports-training, videotape replay is broadly employed to demonstrate to the performers the errors in their performance." Although this is true, we would not want to confuse the feedback or knowledge of results in videotape replay with the direct-acting processes of reinforcement and punishment. Typically, such feedback is received a considerable time after the occurrence of the behavior of interest -- an interval too great to accommodate the processes of reinforcement and punishment of the behavior of interest (Krumhus & Malott, 1980). The effectiveness of such delayed feedback surely must require that the delayed feedback help the athlete formulate a rule for proper performance. The athlete can then say that rule the next time the performance is called for. No one would try to use such delayed feedback to improve the performance of a nonverbal organism. Such an organism is not able to formulate and later state rules that could govern its behavior.

Along the same line, we should not conceive of reinforcement and nonreinforcement "as signals for correct and incorrect performance." Such signals would again best be understood in terms of rule-governed behavior and not be appropriate for nonverbal organisms.

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Positive and negative feedback may well play an important role in the rule-governed acquisition of a second language. But such feedback should not be confused with the important roles of reinforcement and extinction or punishment in the acquisition of both first and second languages.

Moerk argues that the "homologies between skill acquisition generally and language acquisition specifically are quite convincing." Behavior analysts might go further and say language behavior *is* skilled behavior. But in doing so, we should avoid the error of confusing rule control with contingency control; we should not require that "what the behaviorists labeled 'reinforcement' [be] reconsidered as 'informational feedback' or 'knowledge of results.'"

LATENT MENTALISM AND RELATED ISSUES

Speaking of skills being *expressible* as behaviors lends itself to the reification of *skills*; this is like speaking of *intelligence* and *personality* being expressible as behaviors leading to the reification of those undesirable concepts. We generally should be cautious of behavior expressing or measuring any underlying causal agent. Instead *skills*, *intelligence*, and *personality* are merely summary terms describing consistent ways of behaving, across a variety of settings.

Most behavior analysts have read the history of psychology as evidence that they might be more productively engaged in activities other than inferring hypothetical *neurological structures* and *memory traces* established through learning.

Similarly, we might not find it profitable to infer *deep structures* from innate responses (reflexes?). To exaggerate for didactic purposes, the notion of *deep structure* is a bit like saying Lincoln inherited the particular vocal sequences that resulted in the Gettysburg Address, and the occasion for his commemorative address happened to release that string of utterances.

Following Skinner's lead, we behavior analysts find it more useful to search for the causal agent in the environment rather than in the individual. And we may be better able to maintain that search if we are careful in our use of the language to describe the phenomena we study. Therefore, it may help to say (a) "the *abstract* stimulus properties of the environment *exerted stimulus control* over the behavior," rather than "the child *abstracted* a three-element structure from environmental input," (b) "the modeled behavior (or the details of the modeled behavior) *exert(s) stimulus control over the behavior of the imitator*," rather than "the observer uses the *perceptual skills needed to analyze the patterns* in the modeled behavior," (c) we could simply say "a limited set of the stimulus properties of the model's behavior are *controlling* the child's behavior," rather than "the child is certainly *selecting* and *reconstructing* the modeled items" (italics added). "Analyze" may imply a "cognitive" level of activity that might be appropriate in some contexts but not necessarily in this one. In other words, we do *analyze* problems, sometimes in a systematic and rule-governed way; but it seems to be cognitive overkill to say that the pigeon

analyzed the stimulus configuration in the matching-to-sample display and selected the correct comparison stimulus.

Moerk's use of *permanent storage of items* learned suggests a cognitive model that might not fit too well with a behavior-analytic one. And when he speaks of the *content* of the linguistic response, he may be missing the behavioral point that the human being's verbal behavior has no more content than does the rat's lever press. Similar concerns might apply to the notion that the child must first *comprehend* the model's speech before imitating it. Would we say a parrot must comprehend speech before imitating it?

It may help to speak of some planned, rule-governed behavior as *goal directed* or *purposive*. But it may not help to speak of operants generally as *purposive*. We probably should not think of the lever-pressing rat as having a purpose. Similarly, the environment might shape behavior in a way that will result in the efficient production of reinforcers; but it may be too teleological or purposive to say the environment shapes *goal* responses. However, it might be appropriate to speak of the rat's lever press as the goal of the rule-governed experimenter.

PRECISE USE OF BEHAVIORAL CONCEPTS

Topography vs. structure

Behavior analysts may show "disinterest in the topography of behavior" on a theoretical level (i.e., reinforcement works much the same, "whether the rat presses the lever with the left paw, the right paw, or its mouth"). However behavior analysts are quite interested in the topography of behavior when shaping skilled repertoires on a practical level (Barlow, Reynolds, Agras, & Miss, 1973; Buzas & Ayllon, 1981; Fittering & Ayllon, 1983).

Similarly, "a primitive cry" and "an elegant *bon mot*" may be members of the same response class with regard to some contingencies of reinforcement (e.g., when the skillet is on fire). But they may be members of different response classes with regard to contingencies of social and intellectual reinforcement and punishment in other settings (e.g., behavior analysts invest much effort training retarded clients to use socially acceptable language rather than grunts and gestures). At least on a practical level, behavior analysts are "...interested in fine-grained structure."

However, we should distinguish between the topography of behavior and the structure of behavior. *Structure* seems appropriately applied to the hierarchical component relations among units of language, "phonemes, morphemes, sentence constituents, paragraphs, etc.." With vocal language, we might best restrict *topography* to duration, accent, or pronunciation of a word (at the risk of being linguistically naive).

We should not confuse the physical properties of a response such as topography, duration, and intensity with the grammatical structure such as words,

sentences, paragraphs, and scholarly articles. For example, training can transfer among structurally equivalent instances of verbal behavior, though there is no topographical similarity. The verbal behavior of typing an article, hand writing it, and dictating it are essentially the same functional response class. They are also the same response class defined in terms of transfer of the effects of reinforcement (i.e., a reinforcer contingent on one topography such as typing the article also will increase the rate of writing it by hand, when the typewriter is broken).

Similarly, one can learn a spelling list using visual discriminative stimuli and a typing response topography. That new set of skills will then transfer perfectly to a test with auditory discriminative stimuli and a hand-writing response topography. The learning and testing situations involved the same stimulus and response classes in terms of conceptual structure; but they are not the same, in terms of physical stimulus similarity or response topography (Malott, 1991).

Not only are behavior analysts innocent of the charge of neglecting topography, they are also somewhat innocent of the charge of neglecting hierarchical response structures. In developing programmed instruction, Englemann and Carnine (1981) and Tiemann and Markle (1978) make great use of the hierarchical nature of the concepts with which they are establishing stimulus control. No doubt we could do more work in the area of hierarchical response structures in skill acquisition, just as we could do more work in hierarchical stimulus classes in the acquisition of conceptual stimulus control. Perhaps verbal skills are "acquired and built-up in a gradual and iterative manner by combining smaller components into larger sequences." But that does not mean that all skills are a combination of such components (e.g., singing middle C or pressing the lever with 20 grams of force).

Skill acquisition

Moerk correctly emphasizes the importance of practice in skill acquisition; however we should not ignore the crucial though subtle role of reinforcement in making that practice productive. The immediate consequences of each practiced act determine the development of a skill. The differentially reinforcing consequences may be no more than the learner's recognizing a slight improvement in performance, but learning needs more than merely the "tens to hundreds of thousands of linguistic rehearsals during one day."

In considering the role of modeling and imitation in skill acquisition, Moerk argues that they "are principles foreign both to the classical and instrumental conditioning paradigm and they have not yet been convincingly integrated into a behavioral approach" (p. 17). He seems to be ignoring the large amount of experimental and theoretical work expressly designed to integrate imitation into our behavioral approach (Acker, Acker, & Pearson, 1973; Aronfreed, 1969; Baer & Sherman, 1964; Gerwitz & Stingle, 1968; Steinman, 1970).

STRUCTURALISM

Moerk advocates "a combination of the tool sets provided by the two competing paradigms," suggesting that "the linguist can contribute refined descriptive tools." He is probably right, but we must take care that "those refined descriptive tools" do not become a Trojan horse. We must avoid the traditional linguist's error of becoming so engrossed in refined descriptions of vocal behavior (form) that we forget function, that we act as if verbal behavior and vocal behavior were synonymous, that we ignore the functional equivalents of other forms of verbal or linguistic behavior such as writing and typing.

CONCLUSIONS

It is cheap sport to take potshots at an outsider with the temerity to invade our conceptual labyrinths. I hope I have not been partaking of such sport, for at least two reasons: (a) Many fellow behavior analysts will not agree with all or perhaps even much of what I have said; our field is not that solidified. (b) Even if I am generally correct in my concerns and criticisms, it is our responsibility to make our field more readily accessible to serious scholars such as Ernst Moerk; then they will be able to use our concepts without risking such potshots.

REFERENCES

Acker, L. E., Acker, M. A., & Pearson, D. (1973). Generalized imitative affection: Relationships to prior kinds of imitation training. *Journal of Experimental Child Psychology, 16*, 117-125. http://dx.doi.org/10.1016/0022-0965(73)90067-2

Anderson, J. (1991). Skinner and Chomsky 30 years later or: The return of the repressed. *The Behavior Analyst, 14*, 49-60.

Aronfreed, J. (1969). The problem of imitation. In L. P. Lipsitt & H. W. Reese (Eds.), *Advances in child development* (Vol. 4, pp. 210-314). New York: Academic Press.

Baer, D. M., & Sherman, J. M. (1964). Reinforcement control of generalized imitation in young children. *Journal of Experimental Child Psychology, 1*, 37-49. http://dx.doi.org/10.1016/0022-0965(64)90005-0

Bandura, A. (1986). *Social foundations of actions and thought: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Barlow, D. H., Reynolds, E. J., Agras, W. S., & Miss, J. (1973). Gender identity changes in a transsexual. *Archives of General Psychiatry, 28*, 569-576. http://dx.doi.org/10.1001/archpsyc.1973.01750340089014

Butterfield, E. C., Slocum, T. A., & Nelson, G. D. (In press). Cognitive and behavioral analyses of teaching and transfer: Are they different? In R. J. Sternberg & D. K. Detterman (Eds.), *Transfer on trial*. Norwood, NJ: Ablex.

Buzas, H. P., & Ayllon, T. (1981). Differential reinforcement in coaching tennis skills. *Behavior Modification, 5*, 372-385. http://dx.doi.org/10.1177/014544558153006

Chomsky, N. (1959). Verbal behavior. By B. F. Skinner. *Language, 35*, 26-57. http://dx.doi.org/10.2307/411334

Englemann, S., & Carnine, D. W. (1981). *Theory of instruction: Principles and applications*. New York: Irvington.

Fittering, J. M., & Ayllon, T. (1983). Behavioral coaching in classical ballet. *Behavior Modification, 7*, 345-368. http://dx.doi.org/10.1177/0145445530073004

Gerwitz, J. L., & Stingle, K. G. (1968). The learning of generalized imitation as the basis for identification. *Psychological Review, 75*, 374-397. http://dx.doi.org/10.1037/h0026378

Herrnstein, R. J., & Loveland, D. H. (1964). Complex visual concepts in the pigeon. *Science, 146*, 549-551. http://dx.doi.org/10.1126/science.146.3643.549

Krumhus, K. M., & Malott, R. W. (1980). The effects of modeling and immediate and delayed feedback in staff training. *Journal of Organizational Behavior Management, 2*, 279-294. http://dx.doi.org/10.1300/J075v02n04_05

MacCorquodale, K. (1970). On Chomsky's review of Skinner's *Verbal behavior*. *Journal of the Experimental Analysis of Behavior, 13*, 83-99. http://dx.doi.org/10.1901/jeab.1970.13-83

Malott, R. W. (1989). The achievement of evasive goals: Control by rules describing contingencies that are not direct-acting. In S. C. Hayes (Ed.), *Rule-governed behavior: Cognition, contingencies, and instructional control* (pp. 269-322). New York: Plenum.

Malott, R. W. (1991, May). Using *Think Fast* to atenuat a colige perffeser's speling dificinses. In J. A. Parsons (Chair), *Using* Think Fast *in teaching and research*. Symposium conducted at the meeting of the Association for Behavior Analysis: International, Atlanta, GA.

Malott, R. W., & Siddall, J. W. (1972). Acquisition of the people concept in pigeons. *Psychological Reports, 31*, 3-13. http://dx.doi.org/10.2466/pr0.1972.31.1.3

Skinner, B. F. (1945). The operational analysis of psychological terms. *Psychological Review, 52*, 270-277. http://dx.doi.org/10.1037/h0062535

Skinner, B. F. (1957). *Verbal behavior*. New York: Appleton-Century-Crofts.

Steinman, W. M. (1970). The social control of generalized imitation. *Journal of Applied Behavior Analysis, 3*, 159-167. http://dx.doi.org/10.1901/jaba.1970.3-159

Tiemann, P. W., & Markle, S. M. (1978). *Analyzing instructional content: A guide to instruction and evaluation*. Champaign, IL: Stipes.