REVISTA MEXICANA DE ANÁLISIS DE LA CONDUCTA 1998, **24**, 97-110 NÚMERO 2 (SEPTIEMBRE)
MEXICAN JOURNAL OF BEHAVIOR ANALYSIS NUMBER 2 (SEPTEMBER)

MECHANISM, CONTEXTUALISM, AND THE BEHAVIOR ANALYSIS OF DEVELOPMENT

MECANISMO, CONTEXTUALISMO Y EL ANÁLISIS CONDUCTUAL DEL DESARROLLO

EDWARD K. MORRIS[1]
UNIVERSITY OF KANSAS

ABSTRACT

Among the content domains of behavior analysis (e.g., social, emotional, cognitive), the analysis of development is among the most vigorous and distinctive, in part, because it is aligned with the contextualistic worldview and is opposed to mechanism. This paper briefly reviews the emergence of contextualism in philosophy and psychology, and then in the behavior analysis of development. It describes characteristics of the latter that make it contextualistic, not mechanistic, both with respect to behavior as its subject matter and the behavior of its scientists. The paper concludes by suggesting that, in being contextualistic, the behavior analysis of development is at forefront of the discipline more generally.

Key words: contextualism, mechanism, developmental psychology, behavior analysis, worldviews

RESUMEN

Entre los temas de estudio del análisis de la conducta (e.g., social, emocional, cognoscitivo), el análisis del desarrollo es uno de los más vigorosos, en parte porque se alinea con la perspectiva contextualista que se opone al mecanicismo. En este artículo se revisa brevemente el surgimiento del contextualismo en la filosofía y en la psicología, y subsecuentemente en el análisis conductual del desarrollo. Se describen las características del análisis conductual que lo hacen contextualista y no mecanicista,

[1] I thank Professor Martha Peláez for inviting this contribution to the special issue of the Journal. Correspondence may be sent to me at the Department of Human Development, Dole Human Development Center, University of Kansas, Lawrence, KS 66045-2133.

tanto respecto a la conducta como la materia de estudio como respecto al comportamiento de los propios científicos. El artículo concluye proponiendo que, al ser contextualista, el análisis conductual del desarrollo está a la vanguardia de la disciplina.

Palabras clave: contextualismo, mecanismo, psicología del desarrollo, análisis conductual, perspectivas filosóficas

---

Among the content domains of behavior analysis (e.g., social, emotional, cognitive), the analysis of development is among the most vigorous and distinctive. It is vigorous in that it encompasses many aspects of the other domains (e.g., cooperation, anxiety, problem-solving). It is distinctive in that it is conceptually aligned with contextualism (Morris, 1988; 1992; Novak, 1996; Reese, 1982) and opposed to mechanism (Bijou, 1979; Morris, 1993a). Although contextualism is arguably the worldview of behavior analysis more generally (Hayes, Hayes, & Reese, 1988), the conceptual relations there are more strained (see Morris, 1993b). If, however, this is its worldview, then conceptual work in the analysis of development is at forefront of the discipline overall. These are among the themes to follow.

I begin by reviewing the emergence of contextualism in philosophy, psychology, and the behavior analysis of development. After this, I discuss characteristics of the last that make it contextualistic, not mechanistic, both with respect to behavior as its subject matter (ontology) and the behavior of its scientists (epistemology). I conclude by commenting on the place of contextualism in the evolution of behavior analysis. [2]

Mechanism, Organicism, and Contextualism

In 1942, the philosopher Stephen C. Pepper published *World Hypotheses: A Study in Evidence* in which he presented the relatively adequate worldviews of his day, among them mechanism, organicism, and contextualism. At the time, however, his analysis was of little consequence in the philosophy of science and developmental psychology--or behavior analysis.

---

[2] My thesis is not that the behavior analysis of development *must* adopt a worldview or that, if it did, the view *must* be contextualism (see Morris, 1997). The worldview of behavior analysis will evolve on its own and in the context of its other internal and external perspectives. However, given the extant worldviews, I expect that the behavior-analytic view will resemble some variety of contextualism (see Hayes, Hayes, Reese, & Sarbin, 1992). At the very least, comparing and contrasting behavior analysis with these worldviews may provide insight into what its worldview may become.

Logical Positivism and Mechanism

As for the philosophy of science, Pepper (1942) was arguing, in part, against a strictly empiricist and logical epistemology, devoid of a priori metaphysical commitments. This position, however, contradicted the received view--logical positivism. On this view, science entails purely logical deductions from theories about operationally defined constructs, said deductions formulated as hypotheses about facts, the prediction of which confirm the theories (see Carnap, 1935).

In Pepper's analysis, logical positivism exemplified the mechanistic worldview. In describing mechanism, he framed it, as he did the other worldviews, in terms of its common-sense root metaphor and theory of truth. In mechanism, the root metaphor is the machine and its parts. Its theory of truth is a causal-adjustment version of correspondence, that is, the correspondence of theories with the facts they predict. More formally, Pepper (1942) aligned mechanism with what was called "naturalism or materialism and, by some, realism," as associated with Democritus, Galileo, Descartes, Hobbes, and Hume.

Developmental psychology. Until the 1970s, Pepper's (1942) analysis was also of little consequence in developmental psychology, for it, too, adhered to logical positivism (see Stevens, 1939). In the 1940s, experimental child psychology was aligned with dynamic social learning theory which sought explanations of psychoanalytic principles in stimulus-response (S-R) terms (e.g., Miller & Dollard, 1941). In the 1960s, this approach evolved into cognitive social learning theory, which replaced the S-R mechanisms with cognitive mechanisms (e.g., representations) having the same ontological status (e.g., Bandura, 1977; see White, 1970). Today, experimental child psychology is increasingly aligned with an information-processing model of mind (see Siegler, 1998, pp. 66-100) whose mechanisms have still the same status (Leahey, 1992).

Mechanism and Organicism

As long as the philosophy of science and developmental psychology were mechanistic, Pepper's (1942) analysis was of little import. Pepper was simply wrong on logical positivist grounds; and, mechanism needed no scrutiny where it had no competition. In the 1960s, this changed. Logical positivism faltered in the face of more psychological and naturalistic epistemologies (e.g., Laudan, 1977), while experimental child psychology was challenged by Piaget's (1960) cognitive-developmental theory with its organismic worldview. In Pepper's analysis, the root metaphor of organicism is biological growth, that is,

development through integration. Its theory of truth is coherence: The coherence of our understanding one thing about nature with our understanding of other things about it, with an emphasis on their logical relations. According to Pepper (1942), organicism was called "absolute (or objective) idealism," as associated with Schelling, Hegel, and Royce.

Although the cognitive revolution in psychology entailed a change from learning theory-based behaviorisms to an information-processing model, both were mechanistic in worldview. As a consequence, there was, in a sense, no actual revolution (Leahey, 1992). Developmental psychology, in contrast, was revolutionized, at least for a while, as Piaget and organicism displaced learning theory and mechanism. In order to clarify this change, Reese and Overton (1970; Overton & Reese, 1973) adopted Pepper's (1942) analysis of organicism and mechanism, and as a basis for understanding the changing nature of research questions, explanations of empirical findings, and developmental theory in general.

The behavior analysis of development. In Reese and Overton's (1970; Overton & Reese, 1973) account, the exemplars of organicism and mechanism were, respectively, Piaget's (1960) theory of development and Bijou and Baer's (1961, 1963, 1965; Baer, 1970) analysis of development. When their account became authoritative (Horowitz, 1987), Reese and Overton's description of mechanism became defining and the assessment of behavior analysis as mechanistic became the received view (e.g., Cohen & Siegel, 1991).[3] Ironically, in now setting Piaget and organicism aside and adopting a computational model of mind, developmental psychology is embracing a worldview it earlier rejected. Of even greater irony, Bijou and Baer's behavior analysis of development is not mechanistic, as assessed by Reese and Overton (Morris, 1988; cf. Chiesa, 1992; Moxley, 1992). It is closer to what Pepper (1942) described as contextualism (Morris, 1988, 1991; Morris, Hursh, Winston, Gelfand, Hartmann, Reese, & Baer, 1982; Reese, 1982, 1986).[4]

---

[3] "Mechanism" is, of course, often an honorific. As Skinner (1938) wrote: "it is assumed that behavior is predictable from a knowledge of relevant variables and is free from the intervention of any capricious agent" (p. 433). Not all the meanings of mechanism, though, are consistent with behavior analysis. "Mechanistic," for instance, is also described as "The view or doctrine that all human activities can be fully explained in terms of the principles of physical mechanics..." (Pronko, 1969, p. 488; see Morris, 1993a).

[4] In fairness to Reese, I note that he later stated that the behaviorism he described as mechanistic was "Watsonian behaviorism," not "Skinnerian" (Reese, 1986), where the latter better reflected what Pepper (1942) called contextualism (see also Reese, 1982).

Contextualism

For Pepper (1942), contextualism was another word for "pragmatism," as associated with the philosophies of Peirce, James, Dewey, and Mead (see Reese, 1991). Its root metaphor is the "historic event," captured in the Heraclitan aphorism, "No one ever steps into the same river twice." The historic event is neither a place nor an arrow of time, but rather, an ever-evolving dynamic relation between, for instance, organisms and ecologies (biology), individuals and environments (psychology), and classes of responses and stimuli (behavior analysis). In each case, the relation of one to the other continuously evolves, as the present becomes the past for more present. The stream of behavior and its lines of fracture are fluid and ever-changing.

In contextualism so construed, organisms and ecologies, individuals and environments, are historic entities. Changes in them are thus the province of natural history, not natural science (cf. Rosnow & Georgoudi, 1986, where social psychology is not science, but "history"). Contextualism, however, does not preclude a natural science of behavior. The province of the latter are the generic laws or principles that describe the historic event (e.g., reinforcement) and explain natural history (e.g., behavioral development). In the end, though, even these processes are historic events, for they are the product of evolution through natural selection.

As for contextualism's theory of truth, this is pragmatism's "successful working." Coherence and correspondence are not irrelevant on this account, but they are not the final arbiter. In behavior analysis, successful working is "effective action," defined in terms of "prediction and control." Prediction and control, however, are not ends in themselves, but means for understanding behavior and discerning whether it is true, that is, whether it is useful or not (Morris, Todd, & Midgley, 1993).

Having described mechanism and organicism in developmental psychology, the assumption that mechanism is the worldview of the behavior analysis of development, and the contextualistic alternative, I turn to issues concerning (a) root metaphors and behavior as a subject matter and (b) theories of truth and the behavior of scientists.

Mechanism, Contextualism, and Behavior as a Subject Matter

In this section, I address the five structural and two functional "corollary model issues" presented by Reese and Overton (1970; Overton & Reese, 1973; see Morris, 1988). In each case, I discuss the mechanistic perspective and then contextualism as it is found in the behavior analysis of development.

Covering each issue in detail is, of course, beyond the scope of this paper, so I focus more on some issues than others (see Morris, 1988, 1991).

Elementarism

According to Reese and Overton (1970; Overton & Reese, 1973), mechanism holds to elementarism and thereby to atomism, associationism, and essentialism. On this view, behavior and environment (e.g., a child's running to its father) is but a concatenation of its essentialist stimulus and response elements (e.g., "muscle twitches" in Hullian behaviorism or "on-off switches" in the computational model). More complex action such as problem-solving is but an associative compounding of them. In addition, formally identical responses and stimuli (e.g., smiles) are presumed to have the same function, no matter what their context (e.g., the function of smiles is to establish "positive social contact," Reese & Overton, 1970, p. 136).

The behavior analysis of development. The behavior analysis of development assumes none of these *isms*. First, as interrelated classes of responses and stimuli, behavior is the unit of analysis, not spatiotemporally defined response instances. Response instances are formal entities; their analysis would tell us little about behavioral functioning. Moreover, the unit of behavior includes not only responses and their functions, but also their correlated stimuli and stimulus functions, all in current and historical context (Bijou, 1989).

Second, the unit of behavior is defined empirically, not a priori (Palmer & Donahoe, 1992). A child's running to its father constitutes a unit to the degree that it is functionally related to its current antecedents (e.g., father's presence) and past consequences (e.g., play with father). Where its "lines of fracture" (Skinner, 1935) entail something more or less than the act-in-context, behavior is less amenable to prediction and control (Lee, 1988).

Finally, in the behavior analysis of development, behavior is not defined formally, but functionally. On the one hand, formally similar responses and stimuli are not necessarily functionally equivalent within or across individuals. Indeed, they will never have precisely the same function given that individual histories are unique and ever-changing. For example, formally classified self-injurious responses may have different functions. They may function to escape an arduous task or produce adult attention (see, e.g., Carr & Durand, 1985a). Likewise, adult attention may differ in its reinforcing and aversive functions within and across individuals (see Carr & Durand, 1985b). On the other hand, formally dissimilar responses or stimuli may have similar functions (i.e., be members of the same class). Self-injurious behavior and communication skills, for instance, may function similarly in the avoidance of arduous tasks (see Carr

& Durand, 1985b). The responses are formally different, one developmentally inappropriate, the other developmentally appropriate, but their function is the same.

Antecedent-Consequent, Unidirectional, and Linear Causality

In the second structural model issue, mechanism assumes that behavior occurs in antecedent-consequent causal chains, while the two functional model issues assume unidirectional and linear causality. According to these assumptions, the mechanist's explanatory model is an asymmetric, one-way relation between independently defined causes and effects. In regards to behavior, this model yields an S-R psychology in which a stimulus is the cause of its one and only response, and in which a response is caused by its one and only stimulus.

The behavior analysis of development. Behavioral development, however, is not conceptualized this way. First, the most fundamental behavioral process--reinforcement--involves the selection of behavior by its consequences, not stimulation by antecedents (Skinner, 1981). Second, responses and stimuli are not characterized as invariable causal forces or in terms of linear relations among instances thereof (Moxley, 1997). Rather, responses and stimuli are described functionally as class concepts (Skinner, 1935). And third, as described below, their relations develop historically and interdependently with respect to one another, with a mutuality in their functions.

Additional Structural Model Issues

As for the three remaining structural model issues, mechanism assumes (a) that *behavior change* is change in the number, strength, and association of stimuli and responses, (b) that behavioral development entails only *continuous*, quantitative change, and (c) that the organism is *passive*. Again, the behavior analysis of development does not hold to these assumptions.

First, behavior change is change in functional relations among response and stimulus classes. More generally, behavioral development does not simply entail changes in the physical and formal parameters of their instances (e.g., number, strength), but changes in the organization of classes of responses and stimuli for the individual as a whole. From this perspective, the assumption of efficient cause-and-effect relationships between dependent and independent variables, or between causes and effects, gives way to an integrated-field perspective of functional interdependencies. In the latter, "cause" loses any essentialist meaning when causation becomes the entire field of currently

interdependent factors necessary for behavior (Midgley & Morris, 1988).

Second, changes in the organization of functionally-defined classes of stimuli and responses may involve discontinuous, qualitative change (Krapfl, 1977). When one functional relation changes--for instance, when stimulus equivalence is established (Sidman, 1986)--the organization of the response repertoire and its controlling variables will be altered as a whole.

Third, the behavior analysis of development rejects both organicism's organism-as-autonomous-agent and mechanism's environment-as-autonomous-agent. Instead, organisms and environments, responses and stimuli, are not separable sources of variance, but rather, are interdependent. In accounting for behavior, an organism does not independently cause a response to occur; responses function in relation to their correlated stimulus functions. Likewise, the environment does not independently cause a response to occur; stimuli function in relation to their response functions. In other words, organisms do not possess inherent power to control behavior any more than environments. The active-passive dichotomy is a false dichotomy, just as are those between nature and nurture (Midgley & Morris, 1992) and personality and situation (Morris, 1988, pp. 307-308).

Having now addressed some ontological issues concerning mechanism, contextualism, and behavior as subject matter, I turn to some epistemological issues concerning the behavior of scientists. Specifically, I address issues concerning positivism, operationism, theory construction, and truth.

Mechanism, Contextualism, and the Behavior of Scientists

As mentioned previously, logical positivism entails the operationalizing of theoretical constructs and the hypothetical-deductive model of theory construction. Theories are constructed on the basis of, and evaluated in terms of, the predicted correspondence between (a) hypotheses about constructs (e.g., cognition) deduced from theories and (b) behavior indicative of those constructs, which thereby supports the theory. The behavior analysis of development, however, does not engage this methodology (Smith, 1986).

Positivism, Operationism, and Theory Construction

First, behavior analysis embraces a descriptive, not a logical, positivism (Skinner, 1945). Intelligence, for example, is not a hypothetical construct that attains credibility and meaning through a network of logically and empirically verifiable statements about observable behavior indicative of it. Rather, intelligence is a word spoken on certain occasions with respect to certain behaviors in context--said occasions, behavior, and context constituting its

meaning. This is an open, descriptive positivism, not a narrow, logically symbolic one.

Relatedly, in behavior analysis, operationism is concerned with the workability of terms and concepts, not with truth-by-agreement about them (Skinner, 1963). The meaning of terms such as traits and personality lies not in whether we agree on logical and empirical operations (e.g., personality inventories) that permit agreement in their use. Rather, their meaning lies in their utility for describing, predicting, and experimentally (not statistically or arbitrarily) controlling behavior.

Finally, behavior-analytic theory building is empirical and inductive, not hypothetical and deductive (Skinner, 1956). In emulating physics, psychology's hypothetical-deductive theories--for instance, about mind--ran too quickly ahead of its empirically-derived concepts and laws, such as those known to physics when it took up that style of inquiry. As a consequence, theories about cognition have been unconstrained by knowledge of basic concepts and laws, for instance, by what has been empirically and inductively derived from the analysis of behavior as a subject matter in its own right (Lee, 1988).

Theories and Criteria of Truth

As noted before, contextualism's theory of truth is successful working, which in behavior analysis is effective action. Successful working, though, does not make coherence and correspondence irrelevant, just as effective action does not make description and prediction unimportant. As for coherence and correspondence, Pepper (1942) himself suggested that they were varieties of successful working, included in contextualism as "qualitative confirmation" and "verified hypotheses." These are variations in successful working along which contextualism and the behavior of scientists varies (cf. Hayes et al., 1992).

Coherence as qualitative confirmation. A pragmatic theory and criterion of coherence is "qualitative confirmation"--understanding through conceptual analysis. Increases in qualitative confirmation (e.g., in its scope and precision) confirm coherence and make understanding "truer." The behavior analysis of development pursues truth of this sort through behavioral interpretation, offering explanations of everyday behavior in terms of known principles and concepts (e.g., Schlinger, 1995). Truth as coherence-through-behavioral-interpretation, however, is only provisional; it is acceptable only when behavior cannot be at least predicted. When it can be predicted, behavior analysis seeks the truth of coherence-through-behavioral-interpretation in the causal-adjustment version of correspondence.

Correspondence as causal-adjustment. A pragmatic theory and criterion of the causal-adjustment version of correspondence is "verified hypotheses"--understanding through prediction. Increases in verified hypotheses (e.g., in their scope and precision) verify correspondence, making understanding even "truer." The behavior analysis of development pursues truth of this sort through the prediction of behavior, sometimes pursued through statistical correlations and time-series analysis, but more often through baseline logic and the visual analyses of data (see Sidman, 1960). As with coherence, truth as correspondence-through-prediction is also only provisional; it is acceptable only when behavior cannot be analyzed through experimental control. When it can be controlled, behavior analysis seeks the truth of correspondence-through-prediction in successful working.

Operational. A pragmatic theory and criterion of successful working is an "operational" account--understanding through control. Increases in successful-working-through-control (e.g., in its scope and precision) make successful working operational and understanding "truer" yet. The behavior analysis of development pursues truth of this sort through the experimental analysis of behavior, where control is a means for discovering and verifying functional relations (Morris et al., 1993).

Although experimental control is the final arbiter of truth in contextualism, even it is provisional, for further analysis may yield still further "truths." In other words, knowing the truth is a behavioral relation and thereby a function of past and present contingencies. It is relative, not absolute. In this sense, laws of behavior are not independently discoverable things and relations, but rather the verbal products of interactions among scientists with their subject matter. As Skinner (1974) wrote: Scientific knowledge is "a corpus of rules for effective action and there is a special sense in which it could be 'true' if it yields the most effective action possible" (p. 259). He commented as well that "So far as I am concerned, science does not establish truth or falsity; it seeks the most effective ways of dealing with subject matters" (Skinner, 1938, p. 241). Behavior analysis is thus philosophically pragmatic, that is, contextualistic in its epistemology (cf. Zuriff, 1980).

CONCLUSION

The theme of this paper is that the behavior analysis of development is distinctive within behavior analysis for being conceptually aligned with contextualism and opposed to mechanism. Given that an operational criterion for the truth of this claim was not possible, I sought its truth in qualified confirmations and verified hypotheses concerning some points of coherence

and correspondence--and the lack thereof. I conclude by suggesting that further coherence and correspondence can be gleaned from an analysis of the evolution of science more generally.

Behavior analysis draws heavily on analogies among natural selection in evolutionary biology, the reinforcement of operant behavior, the selection of cultural practices (Skinner, 1981; see Glenn & Madden, 1995). Given that science is a cultural practice, then it too is presumably subject to a selectionist account. Such an account is already found in the philosophy of science where epistemology is concerned (e.g., Popper, 1972), albeit not for ontology. The history of science, however, describes some changes in the evolution of ontology that seemingly confirm and correspond to an evolution in the worldviews described by Pepper (1942).

The first modern description of evolutionary ontology was Einstein and Infeld's (1938/1961) account of how physics had evolved from substance theory, to the mechanical view, to field theory. Another was offered by Kantor (1946), who described corresponding changes from the substance-property stage, to the statistical-correlational stage, to integrated field theory. A third example is Dewey and Bentley's (1949) three "levels of action"--from self-action, to interaction, to transaction. Integrating across these accounts, we have, in the first phase, physical events produced by their own self-contained, self-actional substances whose inherent properties account for them (e.g., phlogiston in physics; vitalism in biology; mind in psychology). In the second phase, we find the mechanical view of causal determinism, where causes lie in factors acting on objects in absolute time and space (e.g., stimulus-response psychologies, computational models of the mind). In the third phase, events and actions are particular points in the ever-changing interrelation of their interdependent conditions in a field or system of factors.

These three phases of evolutionary ontology correspond to what Pepper (1942) described as organicism, mechanism, and contextualism. Moreover, they suggest that the mechanism-contextualism debate found today in behavior analysis may be the result of the evolution of the discipline from one to the other worldview (see Morris, 1997). If so, then the congruence of contextualism and behavior analysis of development place the latter at the forefront of the discipline overall.

REFERENCES

Baer, D. M. (1970). An age-irrelevant concept of development. *Merrill-Palmer Quarterly, 16*, 238-245.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bijou, S. W. (1979). Some clarifications of the meaning of a behavior analysis of child development. *The Psychological Record, 29*, 3-13.

Bijou, S. W. (1989). Behavior analysis of human development. In H. W. Reese (Ed.), *Advances in child behavior and development* (Vol. 21, pp. 221-241). Orlando, FL: Academic Press.

Bijou, S. W., & Baer, D. M. (1961). *Child development, Vol. 1: A systematic and empirical theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bijou, S. W., & Baer, D. M. (1963). Some methodological contributions from a functional analysis of child development. In L. P. Lipsitt & C. C. Spiker (Eds.), *Advances in child development and behavior* (Vol. 1, pp. 197-231). New York: Academic Press.

Bijou, S. W., & Baer, D. M. (1965). *Child development II: Universal stage of infancy*. Englewood Cliffs, NJ: Prentice-Hall.

Carnap, R. (1935). *Philosophy and logical syntax*. London: Kegan Paul.

Carr, E. G., & Durand, V. M. (1985a). The social-communicative basis of severe behavior disorders in children. In S. Reiss & R. Bootzin (Eds.), *Theoretical issues in behavior therapy* (pp. 219-254). New York: Academic Press.

Carr, E. G., & Durand, V. M. (1985b). Reducing behavior problems through functional communication training. *Journal of Applied Behavior Analysis, 18*, 111-126.

Chiesa, M. (1992). Radical behaviorism and scientific frameworks: From mechanistic to relational accounts. *American Psychologist, 47*, 1287-1299.

Cohen, R., & Siegel, A. W. (Eds.). (1991). *Context and development*. Hillsdale, NJ: Erlbaum.

Dewey, J., & Bentley, A. F. (1949). *Knowing and the known*. Boston: Beacon Press.

Einstein, A., & Infeld, L. (1961). *The evolution of physics: The growth of ideas from early concepts to relativity and quanta*. New York: Simon and Schuster. (Original work published 1938)

Glenn, S. S., & Madden, G. L. (1995). Units of interaction, evolution, and replication: Organic and behavioral parallels. *The Behavior Analyst, 18*, 237-251.

Hayes, S. C., Hayes, L. J., & Reese, H. W. (1988). Finding the philosophical core: A review of Stephen C. Pepper's World Hypotheses: A study in evidence. *Journal of the Experimental Analysis of Behavior, 50*, 97-111.

Hayes, S. C., Hayes, L. J., Reese, H. W., & Sarbin, T. R. (Eds.). (1992). *Varieties of scientific contextualism*. Reno, NV: Context Press.

Horowitz, F. D. (1987). *Exploring developmental theories: Toward a structural/behavioral model of development*. Hillsdale, NJ: Erlbaum.

Kantor, J. R. (1946). The aim and progress of psychology. *American Scientist, 34*, 251-263.

Krapfl, J. E. (1977). Dialectics and operant conditioning. In N. Datan & H. W. Reese (Eds.), *Life-span developmental psychology: Dialectical perspectives on experimental research* (pp. 295-310). New York: Academic Press.

Laudan, L. (1977). *Progress and its problems*. Berkeley, CA: University of California Press.

Leahey, T. H. (1992). Mythical revolutions in the history of American psychology.

American Psychologist, 47, 308-318.

Lee, V. L. (1988). *Beyond behaviorism*. Hillsdale, NJ: Erlbaum.

Midgley, B. D., & Morris, E. K. (1988). The integrated field: An alternative to the behavior-analytic conceptualization of behavioral units. *The Psychological Record, 38*, 483-500.

Midgley, B. D., & Morris, E. K. (1992). Nature = f(nurture): A review of Oyama's The ontogeny of information. *Journal of the Experimental Analysis of Behavior, 58*, 229-240.

Miller, N. E., & Dollard, J. (1941). *Social learning and imitation*. New Haven: Yale University Press.

Morris, E. K. (1988). Contextualism: The world view of behavior analysis. *Journal of Experimental Child Psychology, 46*, 289-323.

Morris, E. K. (1991). The contextualism that is behavior analysis: An alternative to cognitive psychology. In A. Still & A. Costall (Eds.), *Against cognitivism: Alternative foundations for cognitive psychology* (pp. 123-149). Hempstead, England: Harvester-Wheatsheaf.

Morris, E. K. (1992). The aim, progress, and evolution of behavior analysis. *The Behavior Analyst, 15*, 3-29.

Morris, E. K. (1993a). Behavior analysis and mechanism: One is not the other. *The Behavior Analyst, 16*, 25-43.

Morris, E. K. (1993b). Mechanism and contextualism in behavior analysis: Just some observations. *The Behavior Analyst, 16*, 255-268.

Morris, E. K. (1997). Some reflections on contextualism, mechanism, and behavior analysis. *The Psychological Record, 47*, 529-542.

Morris, E. K., Hursh, D. E., Winston, A. W., Gelfand, D. M., Hartmann, D. P., Reese, H. W., & Baer, D. M. (1982). Behavior analysis and developmental psychology. *Human Development, 25*, 340-364.

Morris, E. K., Todd, J. T., & Midgley, B. D. (1993). Prediction and control: Watson, Skinner, and beyond. *Mexican Journal of Behavior Analysis, 19*, 103-131.

Moxley, R. A. (1992). From mechanistic to functional behaviorism. *American Psychologist, 47*, 1300-1311.

Moxley, R. A. (1997). Skinner: From determinism to random variation. *Behavior and Philosophy, 25*, 3-28.

Novak, G. (1996). *Developmental psychology: Dynamical systems and behavior analysis*. Reno, NV: Context Press.

Overton, W. F., & Reese, H. W. (1973). Models of development: Methodological implications. In J. R. Nessleroade & H. W. Reese (Eds.), *Life-span developmental psychology: Methodological issues* (pp. 65-86). New York: Academic Press.

Palmer, D. C., & Donahoe, J. W. (1992). Essentialism and selectionism in cognitive science and behavior analysis. *American Psychologist, 47*, 1344-1358.

Pepper, S. C. (1942). *World hypotheses: A study in evidence*. Berkeley, CA: University of California Press.

Piaget, J. (1960). *Psychology of intelligence*. New York: Littlefield & Adams.

Popper, K. R. (1972). *Objective knowledge: An evolutionary approach*. Oxford, England: Clarendon.

Pronko, N. H. (1969). *Panorama of psychology*. Belmont, CA: Brooks/Cole.

Reese, H. W. (1982). Behavior analysis and life-span developmental psychology. *Developmental Psychology, 2*, 150-161.

Reese, H. W. (1986). Behavioral and dialectical psychologies. In L. P. Lipsitt & J. H. Cantor (Eds.), *Experimental child psychologist: Essays and experiments in honor of Charles C. Spiker* (pp. 157-195). Hillsdale, NJ: Erlbaum.

Reese, H. W. (1991). Contextualism and developmental psychology. In H. W. Reese (Ed.), *Advances in child development and behavior* (Vol. 23, pp. 187-230). New York: Academic Press.

Reese, H. W., & Overton, W. F. (1970). Models of development and theories of development. In L. R. Goulet & R. B. Baltes (Eds.), *Life-span developmental psychology: Research and theory* (pp. 116-145). New York: Academic Press.

Rosnow, R. L., & Georgoudi, M. (Eds.). (1986). *Contextualism and understanding in behavioral science*. New York: Praeger.

Schlinger, H. D. (1995). *A behavior analytic view of child development*. New York: Plenum.

Sidman, M. (1960). *Tactics of scientific research*. New York: Basic Books.

Sidman, M. (1986). Functional analysis or emergent verbal classes. In T. Thompson & M. D. Zeiler (Eds.), *Analysis and integration of behavioral units* (pp. 213-245). Hillsdale NJ: Erlbaum.

Siegler, R. S. (1998). *Children's thinking* (3rd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Skinner, B. F. (1935). The generic nature of the concepts of stimulus and response. *Journal of General Psychology, 12*, 40-65.

Skinner, B. F. (1938). *The behavior of organisms*. Englewood Cliffs, NJ: Prentice-Hall.

Skinner, B. F. (1945). The operational analysis of psychological terms. *Psychological Review, 52*, 270-277, 291-294.

Skinner, B. F. (1956). A case history in scientific method. *American Psychologist, 11*, 221-233.

Skinner, B. F. (1963). Behaviorism at fifty. *Science, 140*, 951-958.

Skinner, B. F. (1974). *About behaviorism*. New York: Knopf.

Skinner, B. F. (1981). Selection by consequences. *Science, 213*, 501-504.

Smith, L. D. (1986). *Behaviorism and logical positivism: A reassessment of the alliance*. Stanford, CA: Stanford University Press.

Stevens, S. S. (1939). Psychology and the science of science. *Psychological Bulletin, 36*, 221-263.

White, S. H. (1970). The learning theory tradition and child psychology. In P. H. Mussen (Ed.), *Carmichael's manual of child psychology* (pp. 657-701). New York: Wiley.

Zuriff, G. E. (1980). Radical behaviorist epistemology. *Psychological Bulletin, 87*, 337-350.