

PARADIGMATIC BEHAVIORISM AND INTELLIGENCE: TASK ANALYSIS? TECHNICAL PLAN? OR THEORY?

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Let me begin by congratulating the Director (José Muñiz Fernández) and Associate Directors (Jorge L. Arias, Marino Pérez, Guillermo Vallejo, and Serafín Lemos) for launching the publication of *Psicothema* with its goal of publishing research and theoretical contributions dependent upon on rationality and verifiability regardless of theoretical orientation, using Spanish and English as the official languages. Theoretical partisanship is too often the criterion for judgment. Moreover, a journal that will promote communication between Spanish psychology and United States psychology is very much needed.

Let me also say in this introduction that I am very pleased to have paradigmatic behaviorism's theory of intelligence appear in the first volume of *Psicothema*, and to have the theory exposed to the analysis of five psychologists of such imposing stature. Beginning with the first, I have been acquainted with the work of Mariano Yela for some years and I have been impressed by his vast scholarly back-

ground and the manner in which he brings that background to bear on the consideration of psychology and the problems of psychology. I believe that his writings provide some of the most penetrating passages available concerning what our field is—both behavioristic and non-behavioristic psychology (see Yela, 1974, 1987)—and he sets forth a position that demonstrates his broad grasp. I find his comments on my theory of intelligence to display both this grasp and his abilities of analysis.

It is infrequent in United States psychology that evaluations can be separated from the particular theoretical approach of the reviewer and placed in a broader context. Paradigmatic behaviorism is especially difficult because it is attempting to be a new type of theory—a unified framework theory (see Staats, 1963, 1975, 1987, 1988, in press)—and most psychologists are not able to evaluate it in its own context. Rather, they attempt to categorize it in the terms with which they are familiar. It is important to note, thus, that before making his own criticism, Yela characterizes paradigmatic behaviorism and its aims and goals in a penetrating manner, and

places the approach into the context of his broad view of theory in psychology. In this manner Yela performs a productive function for the theory, because his account will be enlightening for many who are not able themselves to see what paradigmatic behaviorism really is, as well as what its goals are. Having done that, Yela then goes on to bring his own conceptual framework into play, making two major criticisms. Let me say that I found his criticisms to be equally penetrating. It is not often that one agrees wholeheartedly with a critic, but this is one of those occasions—for the criticism does not spring from theoretical competitiveness but from the internal needs of paradigmatic behaviorism, and for that reason they are not to be rebutted but rather to be used constructively.

His first criticism is that the paradigmatic theory of intelligence does not recognize, or diminishes, the importance of biological inheritance. (This is also one of the strong points made by López Cerezo.) Behaviorism has traditionally ignored or rejected the topic of biological causation (see Skinner, 1950) and has never indicated well how behavioral principles and biological study can be integrated. It may appear that paradigmatic behaviorism follows that tradition. But this is one of those areas in which paradigmatic behaviorism takes a different, third-generation view. What looks to be a rejection of the biological area is in actuality simply the inability to devote a specialized work to this area at a time when the basic characteristics of the approach are still being formulated. That is one of the many tasks that remain to be accomplished. Let me add, however, that perusal of paradigmatic behaviorism works will reveal that it has indicated very clearly its aim is to include the biological in its structure. Thus, in my first general statement of the ap-

proach I indicated that the principles of conditioning—both classical conditioning and instrumental conditioning—could be considered to have evolved biologically. «It is not surprising that organisms have evolved in this manner [to follow the principles of reinforcement], since a species of organism which did not function according to this principle would not be likely to survive» (Staats, 1963, p. 68). The principles of extinction and intermittent reinforcement are similarly analyzed. (Let me point out that it was not until 1966 that Skinner set forth his analysis that considered reinforcement similarly in terms of evolutionary adaptation.)

Yela specifically mentions in his criticism that Jerison (1982) has indicated how the advancing level of species is related to increasing encephalization. It is important to indicate that paradigmatic behaviorism has dealt with this topic, in its analysis of the manner in which biological and behavioral can be interrelated (Staats, 1975, chapter 15). This analysis refers to biological science literature (Diamond & Hall, 1969) that indicates that brain anatomy evolves in accord with environmental demands—for example, that similar behavioral requirements can lead to similar brain development in different species. The paradigmatic behaviorism account then considers the once-popular hypothesis that there should be a correlation between size of the association area of the cortex and the learning ability of the species. This hypothesis was rejected because «all species regardless of their association cortex, formed simple associations at about the same rate» (Diamond & Hall, 1969, p. 252) and the attempt to establish biological/behavioral relationships was discouraged for a time as a consequence. The paradigmatic behaviorism view, however, is that the brain-behavior (learning ability/size of cortex) relationship

has not been established in this case because of a faulty view of human learning that is based solely on the principles of primary conditioning. The following describes the paradigmatic behaviorism solution to this problem, and indicates how productive implications in this area can be derived from paradigmatic behavioral analysis.

Thus, from this view a simple learning task would not seem to be one, with which to test differences in learning prowess between species. It is the ability to learn hierarchies of skills—more advanced skills built upon the prior acquisition of basic skills—that distinguishes man's learning ability. It is the number and complexity of repertoires that can be learned that is probably related to the size of association areas. Thus, as an example, language—man's most unique repertoire—is based upon simple conditioning principles. And lower animals can learn by those same principles; they can even be trained to various aspects of language repertoires (Hayes, 1951; Premack and Schartz, 1966) and number concepts (Ferster & Hammer, 1966). But, it is suggested they cannot learn as readily and in as great number the fantastically complex repertoires of which a full language is composed, with new skills learned on the basis of previously learned repertoires. The hierarchical form of skill development, involving multitudes of individual stimulus-response learning, occurs in all of man's skill accomplishments. *It is suggested that animals could be distinguished in terms of their brain development by the level of increasing complexity that they were able to attain in learning. Possibly*

such hierarchically complex types of learning procedures could be developed for differentiating along a scale of increasingly complex brain structures. Such a demonstration would help reestablish the relationship between neurology and behavioral study. It is thus suggested that the social behavioristic learning theory could lead to research at the biological level (Staats, 1975, pp. 548-549).

Thus, not only does paradigmatic behaviorism expect that its elementary behavior concepts—of the stimulus, response, and association (or learning)—link readily with biological concepts—receptor, effector, connector—but also that its more advanced concepts—such as the basic behavioral repertoires and cumulative-hierarchical learning—will also link readily with biological study. Paradigmatic behaviorism, however, takes the position that this integration of behavioral and biological principles must be done in detail, with derivation from one level of study to the other (see Staats, chapter 15, 16). Loose biological-behavioral relationships must be accepted for what they are, as suggestive but not definitive. Thus, for example, correlational studies of heredity-intelligence relationships provide only suggestive evidence—which is made even less substantial by the weaknesses involved in such studies (see Staats, 1971, and Kamin, 1974). Direct evidence that anatomical, physiological, biochemical, and genetic variables have specific effects on behavior and learning are necessary to establish the biological-behavioral relationships—just as direct evidence of the effects of learning on behavior are necessary to confirm behavior principles. This position is one of the many that differentiates paradigmatic behaviorism from radical behaviorism.

Let me add only one thing to this point. The paradigmatic behaviorism model of personality (and intelligence as a part of personality) has been schematized as shown in Figure 1. S_1 represents the individual's life environment up until the present. S_2 represents the individual's present environment. BBR represents the individual's basic behavioral repertoires—which perform the functions usually attributed to personality. The individual's

behavior is determined by S_2 , the situations encountered in life, and BBR, the individual's personality. This model applies to intelligence, an aspect of personality. The theory says that intelligence is learned and is thus a dependent variable. However, it also acts as an independent variable, determining the individual's behavior in concert with the individual's present environment.

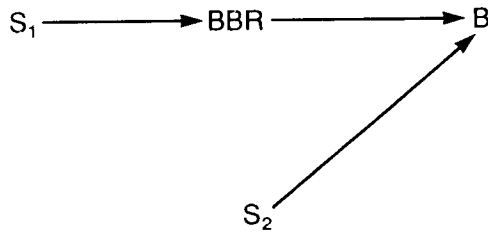


Figure 1.— S_1 represents the past life environment that has produced the learning of the basic behavioral repertoires, BBR, that have the effects on the individual's behavior, B, usually attributed to personality. The individual's behavior is also a function of the present environment, S_2 . The individual's behavior, thus, is determined by an interaction between personality and environment. While not shown in the Figure, the individual's behavior will also affect further learning of personality and later environmental conditions. Thus, there are complex interactions of the several variables.

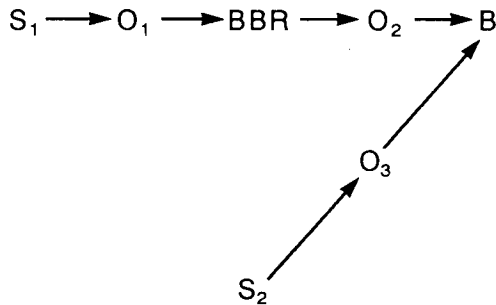


Figure 2.— The paradigmatic behaviorism model shows that organic conditions enter into the determination of behavior at three points. The first point occurs at the time of the original learning of personality, as shown by O_1 . Organic problems can diminish the child's ability to learn the personality repertoires (including intelligence). Organic conditions can also affect the determination of behavior after the personality repertoires have been learned. O_2 stands for organic damage that results in the loss of already learned basic behavioral repertoires, thus interfering with normal behavior. O_3 stands for organic conditions that prevent environmental stimuli from being perceived normally by the individual, thus interfering with normal behavior, even though the individual has normal basic behavioral repertoires.

This model shows the behavioral variables that are involved in the formation of personality and in the manner in which personality affects behavior. The manner in which paradigmatic behavior conceives of biological variables is not shown in this model, and it is not discussed in my article on intelligence, for space reasons and the focus on developing the theory. Let me say briefly here, however, that paradigmatic behaviorism does include biological variables in its conception, and in a more detailed manner than has been considered in other approaches that involve behavioral principles. That is, the paradigmatic behaviorism model says that biological variables may affect each of the causal relationships depicted in the model. As shown in Figure 2, biological (organic) variables, O_1 , may affect the development of intelligence. O_1 , thus, includes the biological variables that are usually considered to limit intelligence—such as mongolism, PKU problems, microencephaly, early brain damage of any kind, and so on. The conception is that such biological deviations interfere with the normal environment having a normal affect on the learning of the necessary intelligence basic behavioral repertoires. Paradigmatic behaviorism also, however, includes here other organic problems that interfere with learning—for example, cases of spasticity, or deafness, and so on. The model in addition, however, indicates that biological conditions may affect the display of intelligent behavior in other ways. Even though the biologically normal individual has had a normal environment and has learned normal basic behavioral repertoires of intelligence, biological conditions may be altered at a later time. The individual, for example, may suffer brain damage through accident, disease, drugs, and so on, that in effect remove the basic behavioral repertoires the individual has

learned. The individual's intelligent behavior will decrease. Such biological variables, which occur at a different time, are represented by O_2 in Figure 2. Finally, although everything may be normal, including the basic behavioral repertoires of intelligence, there may be biological conditions that interfere with the individual's sensory contact with the life situation, S_2 . The individual may develop cataracts, have a migraine headache that distorts vision, lose hearing, and so on, in such a manner that he/she is not able to respond to the environment. As another example, many of the changes that take place in old age are to be found in O_2 and O_3 conditions. Let me suggest that with this model, and the theory underlying the model, paradigmatic behaviorism is better prepared to deal with biological conditions, in a manner that integrates them into the study of behavior, than any other existent theory. This is not to say that paradigmatic behaviorism has already dealt deeply with this subject matter—that will await a specialized treatment. Rather it proposes a model and framework theory that project new directions of study that will provide a basis for deep and specialized development, and in doing so illustrates the heuristic nature of paradigmatic behaviorism.

Yela also indicates another important area for development in paradigmatic behaviorism in questioning how the basic behavioral repertoires act. «¿Son una mera suma de componentes comportamentales aprendidos, cada uno regido por las leyes del emparejamiento y el refuerzo, o su eficacia depende de cómo se combinan y controlan mediante estrategias diversas?» («Are the basic behavioral repertoires a mere sum of behavioral components learned through contiguity and reinforcement, or does their efficacy depend on how they are combined and con-

trolled through diverse strategies?» (Yela, 1989, p. 29). This is a question that calls for much conceptual analysis and research. The framework of paradigmatic behaviorism calls for that type of development, for the question arises in various problem areas. Take the question of creativity, for example. Non-behavioral psychology has disagreed with behaviorism for a long time for attributing behavior solely to learning when everyone can see that human behavior is frequently new, never having occurred before, and hence not explainable by learning. Explanation of originality is necessary, and paradigmatic behaviorism has begun making such analyses of creativity (see Staats, 1968, pp. 168-178). Another problem area involves the fact that behavior shows purpose, some organizing process that directs behavior in a consistent manner over a period of time. Purpose has been described to involve the function of repertoires of verbal behavior that mediate overt behavior (see Staats, 1963). (Skinner's concept of rule-governed behavior, as presented in 1966, appears to involve closely related behavioral mechanisms.) The important point is that when complex repertoires of behavior are described specifically, these descriptions constitute an elementary set of concepts and principles that can be employed in the analysis of special human characteristics, such as purpose, creativity, strategies, schemas, and so on. My answer to Yela, thus, is that there are indeed behavioral repertoires that serve to organize and direct behavior in the essentially human ways that we see in naturalistic circumstances. Traditional psychology has attempted to characterize these by reference to mental traits. In paradigmatic behaviorism it is necessary to analyze such cases in specific form, indicating the basic behavioral repertoires that are involved, so that research may be conducted. This

type of analysis has only been begun—but there are already prototypical examples that can be used as guides.

To continue, I consider the comments made by Rocío Fernández-Ballesteros with especial attention for a number of reasons. First, and most general, she is a leading psychologist nationally and internationally—with a long list of accomplishments and a research program that has been productive for many years. Moreover, her interests lie in areas that are among the most important in the development of paradigmatic behaviorism—psychological assessment and psychodiagnostics, evaluation of learning potential, evaluation of programs for the development of intelligence, and methodology. Moreover, she has developed a behavioral approach in her work, and approach that has taken her past the limitations of radical behaviorism. It is her program of research and theory and her behavioral approach that has brought her to further develop her approach within the paradigmatic behaviorism framework—making her a leading paradigmatic behaviorist in addition to her other accomplishments. Fernández-Ballesteros and I have had the opportunity to work together for an extended period during her visits to the University of Hawaii. We have drafted a theory of psychological assessment within the paradigmatic behaviorism framework but have not yet had time to complete the small book on this topic that is involved. This theory uses more fully than any other paradigmatic behaviorism's theoretical combination of biological and behavioral variables, employing the model schematized in Figure 2 above. The Staats/Fernández-Ballesteros theory of psychological evaluation aims to be heuristic in a number of different directions, for example, in the specification of the basic behavioral repertoires important for psychological

testing.

Fernández-Ballesteros, thus, is able to deal with the works of paradigmatic behaviorism that are related to the definition, measurement, and change of intelligence in a manner that introduces new developments and that extends and elaborates and deepens the theory involved. She is able not only to evaluate and analyze the theory, she can provide heuristic paths to be followed. With her deep scholarship she is able to analyze the weaknesses in other behavioral approaches to behavioral assessment and to see where they have fallen short. She makes an important point in describing the neobehavioristic error of considering intelligence as an intervening variable in the manner proposed by Nelson (1980). That point springs from a recognition that calling the concept of intelligence an intervening variable adds no new knowledge to that which already exists. The concept does not project any new research to be conducted, new tests to be designed, or new treatments to be developed by which to change intelligence. As Fernández-Ballesteros emphasizes in her work and in her analysis in this area of concern, development of paradigmatic behaviorism calls for specific definition of what intelligence is, how it develops, how it can be measured, and how it can be changed. Fernández-Ballesteros makes another conceptual contribution in this area based upon the theory in her treatment of the approach of Determan and Sternberg (1985). It is important to realize that an approach such as this that utilizes vaguely defined concepts will propose methods that also include vagueness. For example, there were early environmentalists who felt that intelligence was in good part learned. But they did not specify what intelligence was or, indeed, what the environmental conditions were that were responsible for the development of

intelligence. So their studies involved presenting children with «enriched» school environments that did indeed result in increases in intelligence. But what had taken place? No one was sure, because of the lack of specification of the learning conditions involved, what was learned, and how intelligence was affected. Perhaps the children had only been trained in answering intelligence test questions, rather having their intelligence advanced. Fernández-Ballesteros makes that criticism and shows that contemporary cognitive approaches suffer from the same vagueness.

In a recent analysis defining paradigmatic behaviorism as a «framework theory» I said the following.

Paradigmatic behaviorism is a framework theory in the sense that while it extends to a wide range of psychology's knowledge, with its characteristics established in extensive, systematic work, it is the first psychology theory to recognize that every grand theory must be incomplete, constructed in detail only in selected areas. Full construction for all grand theories cannot be a one-person job; additional major theorists and researchers are needed (Staats, 1988, p. 232).

This described paradigmatic behaviorism's program, essential in the concept of the framework theory. Paradigmatic behaviorism is meant to be developed in specialized works throughout psychology—that has traditionally been the goal of behaviorism from Watson on. Yet the grand behaviorists of the past have never indicated a program for achieving that goal. Radical behaviorism's theory development, for example, has relied upon Skinner for its theory. In contrast, paradigmatic behavior aims to have major

theorists in particular areas, who will provide the specialized theory development that is necessary to encompass that field. Each special area theory must be formulated to interweave with the other special area theories and with the general framework theory. Only through having such theorists can paradigmatic behaviorism's framework theory in an area do justice to all of the knowledge elements the area contains. When all those special area theories have been formulated, paradigmatic behaviorism will no longer be a framework theory — it will be a full theory, of very large scope. I have described this because Rocío Fernández Ballesteros, and Aimee Leduc as well, exemplify this aspect of paradigmatic behaviorism. They are major theorists. Each has made and is making important contributions to psychology and to paradigmatic behaviorism. Fernández Ballesteros, to illustrate, can be expected to become the specialized theorist in the field of psychological evaluation, taking the lead in the development of the paradigmatic behaviorism theory in this area.

I was very pleased to have José Antonio López Cerezo write a comment article in response to my analysis on intelligence. In is clear from his article that he is seriously concerned with theory construction and the philosophy of science as well as with the field of theories of intelligence. I have already referred to the fact that López Cerezo, along with Yela, realizes that the paradigmatic behaviorism theory of intelligence needs specialized development in constructing its bridge to biological study. This is an important criticism, as I have indicated, that must be addressed. López Cerezo, however, draws a conclusion that Yela does not. López Cerezo says that the paradigmatic behaviorism theory of intelligence is not a theory, because of its incompleteness with respect to

the inclusion of neurology and cognitive science. This conclusion that paradigmatic behaviorism's theory of intelligence is not a theory must be considered, because it is crucial in understanding theory construction in general and paradigmatic behaviorism in particular.

Let me begin by saying that it is important to understand what theory is, because that understanding will constitute a guide for the work of scientists, including psychologists. Logical positivism defined theory very specially, using the advanced natural sciences as its model. In this view theory involved a set of axioms from which principles were derived in successive levels until they yielded hypotheses that could be tested experimentally. Formal logic was to be used in those derivations, and the relations and measurement of variables were to be expressed mathematically, «The stature of a science is commonly measured by the degree to which it makes use of mathematics» (Stevens, 1951, p. 1). Hull (1943, 1951) spent most of his career in attempting to follow this model in constructing a theory —which still represents the definition of theory in psychology for many. The fact is, however, axiomatic theory is the wrong model for our science. Hull was misled by that model, and his theory construction labor was as a consequence largely wasted. Thus, it is important to have a good understanding of what theory is to be in psychology, to avoid wasting our time.

López Cerezo has defined «a causal theory in the sense of an aggregate of nomothetic generalizations that (together with experimental procedure exemplars) encompass the causal field in a manner which is sufficient to account for intelligent behavior («una teoría causal de la inteligencia en el sentido de un conjunto de generalizaciones nómicas que [junto con un conjunto de procedimientos experi-

mentales ejemplares] circunscriban el campo causal en el que cabe dar cuenta de la conducta inteligente») (1989, p. 41). From this definition we can see why he does not consider paradigmatic behaviorism's theory to be a theory, because the definition requires a theory to be complete, to encompass (include comprehensively) the causative variables that determine the events in the general field of interest. Paradigmatic behaviorism's theory of intelligence is incomplete—it does not deal in detail with neurological and cognitive events and it does not deal with all of the many instances of intelligent behavior—and following this definition cannot be considered a theory.

Let me respond by saying that if his definition of theory were accepted there would be no theories of intelligence, for none of them are comprehensive. As an example, Sternberg's theory (1977; Sternberg & Detterman, 1988) definitely is not. We might ask in this respect why is it important whether or not we «label» something as a «theory». López Cerezo says that because of its incompleteness paradigmatic behaviorism's approach to intelligence is a «technique for the analysis and modification of behavior», instead of a theory. The label is important because it tells us what to expect—and «techniques» yield different things from «theories». We do not expect «techniques» to provide new directions of research. Rather, we use techniques to help us solve problems we have already isolated. In contrast, we look to theories to tell us what important problems are, to tell us what to study, and so on. This is an important reason why paradigmatic behaviorism should be considered to be a theory. Its theory of intelligence, for example, aims to be heuristic in opening new research directions as well as in providing specific research hypotheses in the various areas of its purview. That

goal would be defeated if the theory were to be labeled as a technique. Psychologists should not be turned away from using the theory in that manner, for paradigmatic behaviorism's theory of intelligence is a real, explanatory, causal theory in traditional senses not attained by other theories of intelligence. (1) The theory is based upon a complex aggregate of nomothetic generalizations that include the elementary principles of conditioning, principles of complex human learning, principles of child development and personality, and so on—a complex that involves many studies and theoretical formulations, which my article only summarizes. Paradigmatic behaviorism has extended that aggregate of principles to many types of behavior in various areas other than intelligence, and has generated experimental hypotheses and data based on those principles. That body of basic and secondary principles and findings constitutes the foundation for the derivation of the theory of intelligence. (2) In addition, those principles have been progressively extended in a series of empirical and theoretical works to describe more specifically and in a detailed manner aspects of intelligence. The general theoretical body—a very extensive theoretical body—has been focused on the conceptual analysis of intelligence (Staats, 1971), introducing a concept of the basic behavioral repertoires which in its componential character is similar to a later theory of intelligence developed within a cognitive language (Sternberg, 1977). (3) This body of paradigmatic behaviorism theory has shown its heuristic value in generating research that involves manipulating (increasing) intelligence by manipulating independent variables that are specified in the complex theory and generating predicted changes in intelligence behavior and in psychometric measures of intelligence. Various re-

lated and subsidiary studies have been performed (see Staats, Brewer, and Gross, 1970, as one example). The theory suggests new directions for research yet to be conducted (see Staats & Burns, 1981), and psychology should not be turned away from utilizing these guides.

As I have indicated, López Cerezo does not call this conceptual-empirical-methodological body of knowledge a theory because it is incomplete, that is, he feels it does not develop sufficiently its relationships to neurology and cognition. Let me say that a part answer lies in the other works of paradigmatic behaviorism—for these indicate what paradigmatic behaviorism's aim is with respect to the questions he raises (see Staats, 1963, 1975, 1988). For example, consideration of the correlational studies aiming to show that heredity determines intelligence suggested reasons for the correlations that do not involve heredity (Staats, 1971), and analysis that was later elaborated in systematic detail (Kamin, 1974). Another part of the answer lies in the concept of the framework theory (Staats, 1988, in press), which I should explain a bit. To begin, a comprehensive (paradigmatic) theory must in its development be a framework theory—it may not in the beginning cover in detail all of the areas to which it is addressed because the scope of work involved is too great. The traditional methodology is to hide incompleteness by active rejection—for example, behaviorism simplified its task by labeling most of psychology «mentalist», and thus not worthy of consideration. The methodology of the framework theory proposed in paradigmatic behaviorism says that all of psychology must be systematically considered for inclusion. The way it aims to simplify the task is by including many areas only in outline form, attempting to provide by its analysis a foundation for laun-

ching a more specialized and detailed treatment.

Paradigmatic behaviorism's theory of intelligence is based on that concept of the framework theory. Paradigmatic behaviorism's position is that it is necessary to *consider* systematically the various types of explanation that have been proposed—but in due course, as the framework of the theory is completed. Cognitive science and biologically relevant study will have to be considered for the possibility they have productive elements to contribute. Perusal of paradigmatic behaviorism will reveal that it has in various areas begun that analysis. Let me add that no current theory of intelligence meets López Cerezo's demand for completeness. When we examine existing theories, thus, we must be concerned with their promise for providing completeness, as shown by their methodologies and their substantive analyses that are of a unifying nature. Along this line, the fact that paradigmatic behaviorism indicates its goal of unifying theory should be considered, along with its achievement of unification already. For example, López Cerezo recognizes that paradigmatic behaviorism's theory of intelligence unifies behavior principles with the psychometric treatment of intelligence—but he does not see the significance of that. Let me point out that the psychology of psychological testing is a cognitive psychology. In establishing unity between behavior principles and the field of psychological measurement, paradigmatic behaviorism includes in its theory an important part of cognitive psychology. Moreover, such unifications constitute one of the most important characteristics of advanced theories. Let me only add that paradigmatic behaviorism has been pioneering an understanding of unified theory in psychology (see Staats, 1983, 1987, 1989) and philosophy of science

works are being affected (see Darden, in press). My more general point is that the first generation behaviorisms do not provide a good understanding of what theory is or should be in psychology, nor have traditional approaches. Paradigmatic behaviorism has been developing new understanding in this area that should be considered in evaluating its theory.

That has been written in answer to López Cerezo's main criticism. He also posed certain secondary questions, which I will answer briefly. Point two is not a criticism. Point three states that being able to manipulate variables to produce a particular effect does not constitute a theory—as he says, men sailed ships before they had a theory. True. But as soon as they constructed statements concerning the principles involved in sailing—for example, statements concerning the various angles the sails should be set to the wind—that constitutes a beginning theory, with important functions. These statements, for example, could be conveyed to others and affect their actions, over and above direct experience. The fact that these principles could be elaborated and deepened—for example, by additional principles describing sails as airfoils, which are heuristic in terms of sail design—does not alter this point. When humans construct principles for the actions of observable events, they construct a theory—the sophistication of the statement of the principles is not fundamental. The more detailed, the more consistent, the more inclusive the principles—and the more the principles at more basic and more advanced levels as well—the more sophisticated the theory. Moreover, when the principles can be used to guide one to new observations and new actions of various kinds, then the principles serve additional functions of classic scientific theory. Paradig-

matic behaviorism's theory of intelligence has all of these characteristics of sophisticated theory. López Cerezo's fourth point criticizes paradigmatic behaviorism's concern with causation in the concept of intelligence. This is the type of criticism of theory that contemporary radical behaviorists frequently make. It involves a good point generally, but one that is over extended in rejecting the value of various types of knowledge that could usefully be considered. In my 1963 book I was one of the first who described the importance of the analysis for behaviorists, calling it circular reasoning. For example, first individual differences in intelligent behavior were observed in traditional psychology and then it was inferred that there was a process or quality of «intelligence» within humans that explained the behavioral differences. As I indicated, no matter how refined the psychological measures of intelligence become, they still provide no explanation of intelligence. Defined in this way, the term intelligence is simply a label for intelligent behavior. However, that criticism of traditional the concept of intelligence (and many other traditional concepts) has nothing to do with the program of study involved in paradigmatic behaviorism's theory of intelligence. That program of study involves independent variables, not just dependent variables. That program meets all of the requirements of causal definition that a behavioristic (or scientific) analysis requires. That program of study should be examined in detail to be understood. When paradigmatic behaviorism says that its definition of intelligence has causal properties, this is not subject to the same criticism that is applied to traditional definitions.

The fifth point of López Cerezo, like all the rest, is interesting—appearing to be a reflection of the «second-generation»

radical behaviorism position. Watson indeed said that personality (and we could add intelligence, as a part of personality) is the sum of the individuals responses. Skinner has followed Watson's position. As an example of the position, frequently when confronted with the question of why people behave differently in the same situation (that is, display individual differences) radical behaviorists will say that the differences are due to different learning histories. There are problems with this position that personality is the sum of all behavior, behavior is learned, and individual differences result from different learning histories. Very centrally, the position, while true, does not tell anything. It does not tell us what are those behaviors that constitute personality or provide knowledge concerning those learning histories. Neither Watson or Skinner advanced us at all in isolating that knowledge of the constituents or environmental determinants of «personality behavior». Nor have they told us how to obtain that knowledge. Moreover, their statement also tells us to reject the efforts others have made to describe personality. So what has that Watson-Skinner position given us; it has given us some 60-70 years of nothing with respect to the study of intelligence. Radical behaviorists should consider what a theory does, rather than accept it uncritically. Such consideration would reveal that radical behaviorisms has not contributed much except criticism to psychology's knowledge of intelligence (and personality generally). Paradigmatic behaviorism, in contrast, has provided a research program and a theory in this area, both completely justifiable by objective behaviorist standards. The theory provides a definition of intelligence (and personality) that can account for the traditional conception of causation. The theory provides a basis for unifying traditional psy-

chological (personality) measurement within its behavioral principles. This yields knowledge of personality and behavior far past that provided by Watson or Skinner, or other radical behaviorists. To recognize that paradigmatic behaviorism does indeed contribute that knowledge, only to conclude that nevertheless the Watson position of 60-70 years ago is a better theory —when it has contributed nothing to this area of study —does not follow the dictates of good science. In the face of such a difference in productivity science says very clearly, accept the productive theory, reject the nonproductive.

And this brings me to a consideration of John Cone's article. Again, I must remark on how important I think it is to have a psychologist of his stature criticize the paradigmatic behaviorism theory of intelligence. John Cone has for many years been a leader in the behavioral field, of the radical behaviorism or behavioral analysis variety. He has made many empirical and theoretical contributions to the field that show him to be one of the best known psychologists in this tradition. Cone was one of the individuals who constructed the West Virginia University behavioral program, especially its clinical program, which continues to be one of the several strongest programs in behavioral analysis. Many of the prominent behavior analysts gained their degree in this program, including a number who had Cone as their major professor. Perhaps his greatest influence upon behavioral psychology has been as one of the leaders in the development of the field of behavioral assessment and one of the founders of the journal *Behavior Assessment*, of which he is presently editor. Cone continues to do work that helps define this and related fields.

Before dealing with his criticisms, I would like to mention one other point.

There are a number of characteristics of radical behaviorism —some of them implicit in the sense that they either have never been made explicit or have not been recognized— that limit the development of behavioral psychology. (I use the name behavioral psychology for the field and behaviorism for the particular approach.) Many of these characteristics were laid down by Skinner, but some have been developed by other radical behaviorists, at least in part. For example, Skinner's experimental analysis of behavior program at the beginning, even with humans, was intended to restrict empirical efforts to the operant conditioning chamber, cumulative recording, schedules of reinforcement, single organism designs, automated instruction, and so on. Some of us had to expend effort to enlarge that framework to include additional methodologies. As another example, Skinner (1950) has also criticized theory and radical behaviorism has come to have a prejudice against any work that could be labeled as theoretical. As another, Watson and Skinner rejected mentalistic concepts, and this came to be thought to include any concept that referred to events internal to the individual. This rejection came to be extended even to behavioral concepts that were not Skinnerian. For example, the concept of mediation via implicit responses —gained from research by non-radical-behaviorists— has been soundly rejected by radical behaviorism. Labeling an approach as «mediational» today in radical behaviorism is as bad as labeling it «mentalistic», even though valuable studies are ignored as a consequence. There are many such restrictions in radical behaviorism that impede scientific progress. Many of them only serve a purpose in separating radical behaviorism and radical behaviorists from the rest of psychology, and viceversa. That has functional for Skinner in forming

a group of behaviorists completely loyal to his approach, but it has been disadvantageous for the development of behavioral psychology generally.

My point in indicating this is to say that there are neo-radical behaviorists who are beginning to discard the restrictions that, ortodox radical behaviorism contains. Cone is one of those advanced radical behaviorists. As a consequence he has a much broader view of behaviorism and psychology than most radical behaviorists. This is a quality that I appreciate in having him serve as a critic for paradigmatic behaviorism's theory of intelligence. Let me add, however, that there remain distinct points of disagreement between us because Cone comes from the radical behaviorism tradition that is still reflected in various aspects of his approach. Cone, like López Cerezo, takes a position within the area of intelligence that has many things to recommend it. Both of these individuals recognize the error of traditional psychology in its circular reasoning that involves the inference of cognitive (mental) processes, when the only thing that has been done is to observe behavior. They clearly recognize that if one only observes behavior any inference of some causal entity is misleading: «Contemporary cognitive psychologists want to go beyond definitions of intelligence as what intelligence tests measure and seek causes...» (Cone, 1989, p. 48).

Thus, Cone, like López Cerezo, after taking an appropriate critical stand with respect to traditional psychology, presents the standard radical behavioristic position, «The point is that intelligence need be viewed as nothing more than effective performance in specific environments» (Cone, 1989, p. 48). That position is simplistic; moreover, it has resulted in the isolation of behaviorism from the rest of psychology —which means the isola-

tion of the small percentage of psychologists who are radical behaviorists from the large percentage of other psychologists. In part because of this radical behaviorism position there is no communication between these two parts. It is becoming clear that radical behaviorism as it is presently constituted cannot influence the majority part of psychology (Fraley & Vargas, 1986). We need a different behavioral orientation. Paradigmatic behaviorism, in contrast, says let us look at this schism of views again —let us look at the way the differences in position between radical behaviorism and traditional psychology have been stated. If there are productive findings on both sides perhaps the way the conflict has been stated is keeping the two from being unified, at least in part. Paradigmatic behaviorism, thus, has constructed its theory with two goals in mind. One goal has been those of the internal demands of the theory —that is, to follow a generic behaviorist tradition in terms of the use of conditioning principles, the definition by behavioral observations, and so on. The other goal has been that of constructing a theory by which to bridge the separation between behaviorism and traditional psychology, allowing the valuable parts of each to be combined. With respect to the concept of cause, while both Cone and López Cerezo find the concept of cause objectionable in paradigmatic behaviorism's theory of intelligence (and personality), the concept is important for establishing a bridge to traditional psychology. Because their objections spring from a radical behaviorist position, it is necessary to indicate that paradigmatic behaviorism's concept of cause has a strict behavioral definition. Let me give an example. A child who has developed a rich language repertoire can respond in the classroom in ways that a child without that repertoire cannot. As a consequence

of being able to respond, the first child will be able to learn when the other child will not. What is responsible for the difference between those children in their *performance*, that is, in their learning «ability» in the classroom? The difference lies in the difference in their *repertoires*. The child with the repertoire can respond in a certain way, and as a consequence can learn. However, let me ask if the child's language repertoire is the same as the child's performance, the new learning that takes place in the classroom? No, it clearly is not? It may not even be possible to observe the repertoire, many language repertoires take place covertly in the naturalistic situation. The fact is the language repertoire was learned through past learning situations and consists of specific behavioral processes. The learning that takes place in the classroom involves new and different skills the child has not had before. This shows the inadequacy of the radical behavioristic definition of intelligence, because the child's performance and the child's basic behavioral repertoires are different. The child's *repertoire* is the cause of the *learning* in the sense that without the repertoire the child does not learn. The child's repertoire is the cause in the sense that it can be measured, even before the child is present in the classroom. The child's repertoire is the cause in the sense that we can see how the repertoire is necessary for the learning, for example, the child who responds to a command to attend to something and does so then has the experience of seeing something that he would otherwise not see and learning from what he has seen. *The child's repertoire is the cause also in the sense that it fulfills the need for a causal concept for the observations of individual differences as dealt with in traditional psychology.* This is not insignificant in establishing unification between behavioristic

and traditional psychology.

There are many such repertoires that play that type of role. Paradigmatic behaviorism sets the task of studying those «causative» repertoires. Its conceptualization establishes a bridge to the traditional measurements of intelligence, rather than continuing the radical behavioristic isolation. Paradigmatic behaviorism explain what the items on intelligence tests are; they are problems whose solutions demand that the child have certain repertoires in the language repertoire —repertoires that have not been isolated, studied, and defined before. This constitutes a bridging theory for it makes the intelligence test important to the behavioral researcher, and it makes the analysis of intelligence test items into their behavioral repertoires important to the psychological tester. In doing so paradigmatic behaviorism presents new avenues of research that call for extensive development. And in doing so paradigmatic behaviorism begins to establish a theory language that can unify the parts of behavioral psychology and traditional psychology that can complement each other.

This theory of intelligence presents new things; new to behavioral psychology, and new to traditional psychology. It is part of a new vision, a new paradigm (comprehensive theory), and there are many of these new things, some capable of being stated already, and others that will only become apparent as further work in the new paradigm is accomplished. Let me suggest that it is important that psychologists become interested in these new avenues for development. Each of the five psychologists who have responded to my article has recognized that there are important new steps made in the paradigmatic behaviorism theory, even those whose work is in a different tradition. The fact is that paradigmatic behaviorism has not

been explored yet as a theory. There has not been a large number of individuals working within this framework, as there has been in radical behaviorism. Most of the resources of behaviorism have been devoted to the development of Skinner's approach (and its potential for inspiring new directions has been expended to a large extent). Yet Skinner's theory does not deal with many areas that are important to develop. Would it not make sense that a good portion of the resources of behavioral psychology be devoted to a behaviorism that has been constructed to deal with those areas? Differences in theory language —for example, in the terms «causal» versus «descriptive», or between «task analysis, technique, or plan» versus «theory», and so on —would seem to be of lesser importance than the heuristic potential that paradigmatic behaviorism so clearly demonstrates.

Aimee Leduc is the leading paradigmatic behaviorist in the French-speaking community, is known internationally (with invited presentations in the United States and Europe), and her work has received important honors in Canada. Her accomplishments are many, for she had a very productive program of work in the behavioral tradition even before she began, almost a decade and a half ago, making her central contributions to the development of paradigmatic behaviorism. Her research program at the University of Laval has covered a range of topics (see Leduc, 1984), including children's problems of learning, disadvantaged interpersonal attitudes and the change of such attitudes through language conditioning, and the design of a psychiatric ward. The latter project involved organization of the ward, its personnel, and its activities based upon a paradigmatic behaviorism conceptualization of abnormal behavior and the social situation of treatment in the

hospital ward. Her book on the feral child, *L'histoire d'apprentissage d'une enfant «sauvage»* (Behaviora, 1988), is having an important impact on the field and a television program is being prepared based upon Leduc and her work with this child. Feral children have been studied before, but not with an analytic theory that states what the child's intellectual abilities consist of, and how the repertoires that compose these abilities are acquired, and how they can be produced through training. Leduc designed a program of treatment for the child based on her analysis of the child's language-cognitive deficits. The program specified the training and made explicit measures of behavioral outcomes in conjunction with psychometric measures. The integration of methods and analysis provided data far beyond the quality found in the nonanalytic, sometimes anecdotal, accounts traditionally employed in treating such children. Her methods were stipulated and objective, even though the study dealt with complex and variegated training and learning. Leduc's paper describes her work with this child, a work that should become classic in this field of study. What she is presenting is a general theory by which to explain and deal with such children.

In addition to her own fertile research, Leduc has had a marked impact upon psychology and education in Canada. She has produced a large number of Ph. D. students who are paradigmatic behaviorists and has disseminated her approach to colleagues as well. There are presently centers of research in paradigmatic behaviorism in seven universities in Canada and about five years ago the growing group founded the L'Association Quebecoise pour L'Avancement du Behaviorisme Paradigmatique. This association, in conjunction with several other

behavioral organizations in Canada, Belgium, France and Switzerland now publish a journal called *Comportement Humain*.

One of the central features of Leduc's work with Dominique is of a general methodological sort, in the present opinion, involving the experimental-longitudinal methods introduced into paradigmatic behaviorism. Leduc has shown that it is possible to conduct long-term studies with children who have profound problems with the goal of treating the problems, while at the same time collecting meaningful data. Most studies of children in behavior therapy and behavior modification involve relatively simple responses and are of a short term variety. Certainly when one works with a group of children as the subjects of an experiment it is not possible to devote concentrated study that extends over a very long period. But that is what is necessary for profound study. Leduc has shown us that important data can be gained from studying one problem child over an extended period. We need many additional studies of this type, whose objective is to take a child with profound problems and work with the child for an extended period with the goal of providing the child with normal basic behavioral repertoires. This work must be done systematically, following a specified plan, with a system of data collection that permits the testing of various principles and concepts during the course of the study. Experimental-longitudinal research has much potential that has not yet been exploited.

Leduc's comment article, and her own study of children acquiring language-cognitive basic behavioral repertoires, performs an important function in extending and elaborating principles within the paradigmatic behaviorism theory of intelligence. For example, Leduc treats the

principle of cumulative-hierarchical learning and focuses on the importance of the principle with respect to the individual difference effects on children's performance. A child who has not acquired a necessary basic behavioral repertoire will not perform as well as children who have. The child will not learn well. This deficit in learning is traditionally interpreted as a deficit within the child. The child is thus considered to be mentally retarded, or to have a learning disability, or to be brain damaged in some unspecified way. While those explanations are circular and inadequate, it is still important to understand the reasons for making such explanations, and the need for improving the explanations of the phenomena involved. There are real observations involved in the definition of such traditional concepts; they are the observations of individual differences

in learning. It is unsatisfactory to simply dismiss traditional explanations as mentalistic, or to say vaguely that the children have had different learning histories. The individual differences in learning «ability» must be treated seriously and studied. The principles of the basic behavioral repertoires and cumulative-hierarchical learning, and their extension to the concerns and problems of traditional psychology constitute a central area for the development of both behavioral psychology and traditional psychology. The full importance of these concepts for understanding the development of children has not yet been exploited in the many areas and problems of concern; paradigmatic behaviorism calls for this type of work, and Leduc's, work exemplifies what can be done in advancing this framework.

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