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Educating the Whole Child: Implications of Behaviorism as a Science of Meaning

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New conceptions of what constitutes meaning for the organism have recently arisen within the behavioral tradition. These conceptions are a function of reformulations of traditional topics such as reinforcement and verbal behavior. This paper will review these reformulations and discuss their implications for education. It is argued that teachers are in need of a more comprehensive framework for understanding human behavior than the technique-based behaviorism to which they are frequently exposed. The present paper suggests that advances in our understanding of choice behavior and verbal behavior put us within reach of a comprehensive framework for making sense of the interconnectedness of social, self, and academic development.

KEY WORDS: matching law; Relational Frame Theory; choice; verbal behavior; education.

The application of behavioral principles within education has a long history characterized by successes—especially with respect to special education—and failures. The failures include the inability of behavioral researchers to win over the education community to adopt behaviorally-based technologies, despite impressive empirical evidence supporting the efficacy of those technologies (e.g., Watkins, 1988). This failure has fostered disillusionment about the commitment of the educational establishment to provide children with excellent education (Maloney, 2002; Pennypacker, 1994). However, educators—even those affiliated with the behavioral camp—argue that the education community is not to be blamed for eschewing behavioral education technologies, claiming that the empirical support for these methods has been overstated (Deitz, 1994). This criticism is

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based, in part, on the paucity of research exploring the implementation of behavioral technologies on a scale larger than individual classrooms (e.g., across an entire school or school district). Also, little is known about the effects of behavioral education on child development over the long-term, or on the development of non-academic competencies such as prosocial behavior.

This last point may be protested by behavioral researchers who have long argued that a major dilemma in education concerns a focus on socialization to the detriment of academics (Engelmann & Carnine, 1982). Nevertheless, the everyday job of the general education teacher entails more than teaching the academic curriculum. Teachers are also charged with helping students master the hidden curriculum, which involves becoming “good citizens,” capable of negotiating a complex world (Kegan, 1994). Moreover, teachers must engage students from a variety of backgrounds with dissimilarities in terms of their academic and social readiness—a fact not frequently acknowledged in behavioral education outcome research (Deitz, 1994). To the extent that a behavioral approach to education fails to provide a complete framework for conceptualizing the multiple tasks and demands faced by teachers, it will likely be ignored by them.

It is the premise of this paper that teachers have rejected behavioral education because it is not useful to them. A proposed obstacle to the acceptance of behavioral education is that it highlights behavior-based *techniques* without providing a *philosophy* of education that is compatible with the goals and demands that teachers face. A philosophy of education must be consistent with teachers’ experiences and also provide them with a means for understanding how children make decisions and also how they develop academically and socially. That philosophy should present a conceptualization of the child as an active agent making choices in the world. It should also acknowledge and make sense of the role of verbal abilities as the basis for success in the modern world.

The portrayal of individual behavior and development frequently offered by behavioral education is not of a coherent and self-directed individual acting in the service of competing short- and long-term goals, but rather of a disconnected set of behaviors that are responsive solely to changes in their consequences. This portrayal is faulty because it fails to recognize that changes in both the availability of, and reinforcements for, other behaviors affect the value of the behavior in question. A second shortcoming of the technique-focused behavioral model is the notion that the rewards most salient to children are those that may be controlled by some external authority such as a teacher or parent. As noted by DeGrandpre (2000), “[There exists a] widespread misconception . . . that operant learning is restricted to cases in which some device or its human equivalent doles out reinforcements or punishers, contingent on some response or pattern of responding” (p. 729). This portrayal is false and downplays the impact of both automatic reinforcement, and also important establishing operations (Michael, 1993). In sum, behavioral education—as it is frequently presented to teachers—provides a framework for understanding individual behaviors and a set of interventions for altering those

behaviors. However, what is frequently missing is a sense of the child as a whole organism whose behaviors are interconnected and more than the sum of their reinforcement contingencies.

Criticizing a behavioral position as failing to take the whole child into account is ironic considering that behaviorism is the study of the whole organism (Rachlin, 1994). This is in contrast to competing philosophies, such as cognitivism, which are recognized as carving the individual into different parts in order to understand behavior. That behaviorism comes across, however, as carving the child up into distinct behaviors—each of which is dependent on its own reinforcement contingencies—is not only incompatible with the everyday experience of teachers, but is also incompatible with 30 years of behavioral research. In the remainder of this paper we will refer to this model of behaviorism as the *absolutist* behavioral position, and shall present an alternative formulation that is more in line with behavioral research findings and with teachers' implicit notions of child development.

Unbeknownst to most educators and psychologists, the absolutist model of reinforcement is rejected by most behaviorists. In its place is a model that does not assume that behavior is simply a function of its consequences. Rather, according to the alternative view—a view that shall be called the *relativistic* behavioral position—behavior is a function of the entire field of response-reinforcement relationships experienced by the organism (Kantor, 1963). In the next sections of this paper we shall outline the benefits to teachers of a relativistic behavioral model. The basis of this model is the *matching law*, which conceptualizes behavior not in terms of the absolute rate of reinforcement, but rather in terms of *choice*. In addition to discussing the matching law, we shall also explore a second fundamental aspect of behavior that is useful to teachers—the notion of *relational responding*. While the matching law allows for an understanding of choice behavior, relational responding provides a framework for understanding the tasks involved in the mastery of academic content areas and the emergence of verbal behavior. These two concepts, the matching law and relational responding, are discussed with respect to a conceptualization of the developing child as having coherence across time and situations that cannot be explained in terms of independently operative reinforcement contingencies. Moreover, the child is seen with respect to responding in his or her environment in terms of both contingency experiences and also verbal experiences. Ultimately, the child is engaged in a process of meaning-making that integrates disparate behaviors into a unified whole that is recognized by teachers, and that must form the basis of a theory of development and instruction (DeGrandpre, 2000).

A RELATIVISTIC FRAMEWORK: THE MATCHING LAW

According to the matching law, behavior is to be conceptualized in terms of choice. For instance, to understand the distribution of behavior across concurrent

schedules, one must know not only the rate of reinforcement for one behavior, but the rate of reinforcement for possible alternative behaviors. According to the matching law, if the distribution of reinforcement across two potential behaviors is 2/3 for behavior A and 1/3 for behavior B, then the distribution of behavior will be 2/3 for behavior A and 1/3 for behavior B. Importantly, the value of one behavior is dependent on the value of other behaviors (Baum, 1973).

What is the implication of this relativistic view for understanding the organism of interest—the child? First, it is consistent with teachers' experience that child behavior is more complex than the absolutist model suggests. That is, the strength of a behavior cannot be estimated in terms of the absolute rate of reinforcement accruing to it. Rather, individuals operate according to what has been described as a cost-benefit principle in which the repercussions of some behaviors are weighed against the repercussions of competing or alternative behaviors (Rachlin, 2000). Second, this model makes sense of a seeming paradoxical aspect of child social behavior—that some children, despite receiving very harsh punishments for aggressive or otherwise antisocial behavior, may display high rates of such behavior (Patterson, 1979). Although held up as an indictment against reinforcement theory, such results are parsimoniously accounted for by the relativistic reinforcement framework. The key to the paradox is to conceptualize reinforcement as a within-child rather than across-child variable (Snyder, 2002; Snyder & Stoolmiller, 2002). That is, rather than comparing reinforcements accruing to the same behaviors for different children, one must compare reinforcements accruing to competing behaviors for the same child. According to the relativistic model, some behavior will dominate the behavioral repertoire of a child to the extent that it garners higher reinforcements than its alternatives. So, for example, despite the fact that aggressive children may receive no better outcomes for their aggressive behaviors than do non-aggressive children, their comparatively low rate of reinforcement for prosocial behavior makes aggression their most gainful response (Snyder & Patterson, 1995). The central premise of a relativistic model is that behavior can be predicted only with respect knowledge about its outcomes *relative to* the outcomes of behavioral alternatives.

The relativistic model is an important breakthrough conceptually, but it also has many practical advantages. For instance, it suggests interventions that are inconsistent with the absolutist model. According to the absolutist model, interventions involve altering reinforcements accruing directly to some target behavior. Little attention is paid to contingencies for non-target behaviors. The relativistic model, on the other hand, supports interventions that target both the immediate reinforcements accruing to the target behavior and also interventions that target reinforcements accruing to other behaviors. The former have been referred to as *direct reinforcement effects* while the latter have been referred to as *indirect reinforcement effects* (Strand, Wahler, & Herring, 2001). In a demonstration of an indirect reinforcement intervention, McDowell (1982) illustrated that the aggressive behavior of a mentally retarded adult decreased in response to providing higher

rates of reinforcement for non-aggressive behaviors. This reduction occurred despite the fact that rates of reinforcement for aggressive behavior were unchanged. Similarly, Friman and colleagues (1997) reported decreases in the behavior problems of five of six boys in residential care as a result of increasing their positive to negative staff interaction ratios, despite no changes to the reinforcement accruing to those problem behaviors.

A focus on the relativity of reinforcement has also led to the emergence of other indirect methods for altering behavior. For instance, Ducharme (1996; Ducharme, Atkinson, & Poulton, 2000) has illustrated the benefits of Errorless Compliance Training. In this procedure, teachers and parents refrain from generating negative consequences for undesired child behavior such as noncompliance. Rather, efforts are made to make requests of children that they are likely to comply with. At each phase of training, parents request increasingly difficult behaviors. According to the authors, a momentum for compliance is generated by this type of training that increases the child's capacity and willingness to perform in desired ways under increasingly difficult conditions. Once again, these methods speak to the importance of attending not simply to the direct contingencies of desired and undesired behaviors, but to the implications of the interdependent field-like properties of behavior (Cavell, 2001; Strand, 2000).

FROM A THEORY OF BEHAVIOR TO A THEORY OF THE WHOLE CHILD

In the last section, practical aspects of a relativistic reinforcement model were discussed. Although of significant value, it is our contention that practicality is not foremost on the minds of educators with respect to adopting a theory of professional behavior. Rather, of foremost concern is a sense that the model in question be consistent with one's observations, and inclusive with respect to conceptualizing one's professional responsibilities. It is argued here that teachers are looking for a theory that acknowledges and makes sense of the *predictability* of child behavior across contexts and across time, and also the *clustering* of certain behaviors within children. The absolutist model fails in this regard because it seeks to understand the rate and frequency of behavior in the reinforcement accruing to that behavior, without respect to other response-reinforcer relations. In this model, the value of a behavior is equal to the value of reinforcements accruing to it. The relativistic reinforcement model argues, on the other hand, that the value of a behavior is determined by the value of its reinforcers, relative to the value of reinforcers for other behaviors. From this perspective, the child appears as an active agent making choices based on an evaluation of available opportunities.

A relativistic conceptualization of reinforcement may solve some problems interfering with the adoption of a behavioral position within mainstream education. This is so because it makes behaviorism more in line with the dominant

cultural system of the educational establishment concerning the notion of children as active decision-makers. Nevertheless, any model of reinforcement may be incomplete regarding processes that are of perhaps the greatest concern to teachers—the development of cognitive and linguistic skills. The primary focus of the educational establishment is to educate children with respect to successful engagement in a verbal or information-based society. Therefore, any perspective focused on altering behavior without providing guidance about the uniqueness of verbal abilities will be out of alignment with the existing cultural system of education. Put differently, existing models of behavioral education fail to speculate on the underlying behavioral processes that distinguish verbal behavior from non-verbal behavior.

In the next section, a behavior analytic theory of verbal behavior that focuses on the emergence of human cognition and language will be reviewed. The theory highlights the capacity for deriving relationships among stimuli—in the absence of stimulus-specific training—as underlying verbal and academic skills such as speaking, thinking, reading, spelling, mathematics, and others. The theory is advantageous in that it provides teachers with (1) a framework that is consistent with their experiences regarding the central role of verbal behavior in academic achievement and (2) practical information regarding the teaching of verbal and academic skills. The theory is consistent with the belief that verbal behavior is based on a unique process that affects all aspects of human behavior. After discussing the theory and its implications, the paper will conclude with a discussion of how the models of verbal behavior and relativistic reinforcement provide teachers with a comprehensive theory of instruction that may serve as a context that increases the acceptability of existing behavioral technologies.

EDUCATION AND VERBAL BEHAVIOR

The behavioral model of education stresses a componential approach to learning complex material. That is, the best method for learning any complex skill is to become proficient at the subtasks that form the basis of that skill. Based on this notion, behavioral education has been focused on providing teachers with techniques for increasing child fluency and competence with respect to specific academic skills. This approach has proved itself in terms of increasing child academic competence (Watkins, 1988). Nevertheless, it is a methodology that has been roundly rejected by educators. One possible reason for this rejection is that the behavioral model fails to identify verbal behavior—in particular the behavior of the listener—as a unique capacity. Instead, Skinner (1957) argued that the behavior of the listener could be understood in terms of previously identified learning principles. More recent behavioral researchers have challenged this idea, arguing that both the behavior of the listener and the behavior of the speaker constitute processes that require a new behavioral principle (Hayes & Hayes, 1992).

Relational Frame Theory

Relational Frame Theory (RFT) is a theory of cognitive and linguistic behavior based on evidence that verbal humans “infer” or derive relationships among stimuli that have not been explicitly trained. For example, humans who have been trained that A is related to B and that A is related to C derive, for example, that B is related to A and that C is related to A. Furthermore, they also make the connection that B is related to C and C is related to B. Therefore, although trained explicitly in only two relations, verbal humans demonstrate the acquisition of six relations in total, four of which are untrained. These untrained relations are referred to as *derived stimulus relations*, and there is a rich body of literature documenting such performances (Horne & Lowe, 1996; Hayes, Barnes-Holmes, & Roche, 2001; Sidman, 1994).

Hayes and Hayes (1992) have argued that derived stimulus relations involve a new basic principle for behavior analysis—one that underlies the qualitative differences between humans and other species. They also argue that cognitive and verbal behavior involves “framing” events in terms of derived and previously learned verbal relations. This is in contrast to non-verbal organisms who, according to the literature, rarely if ever show any forms of derived relational responding. What makes verbal humans unique is their capacity to learn and to arbitrarily apply a relational repertoire to a wide range of stimuli. In this way, the world of meaningful relationships for verbal humans is nearly limitless.

How relational frames translate into an expanded repertoire of meaning and behavior is illustrated in the following example:

“Suppose we teach a rat to press a lever upon seeing the words “red light” by reinforcing lever presses with food. “Red light” is a [discriminative stimulus], and the lever press is a discriminated operant. By contrast, imagine that a person presses a lever upon seeing “red light,” but that the history was the following: training lever pressing in the presence of a red light and then relating (in a frame of coordination) “red light” to “luz roja” and “luz roja” to actual red lights.” (Hayes & Wilson, 1993, p. 288).

In this example, there may be little difference in the formal properties of the lever pressing behavior of the rat and the human. Unlike the rat, however, the lever pressing behavior of the human is a function of a relational frame that was previously established between an actual red light, the words “red light,” and the words “luz roja.” Studies show that rats and other nonverbal humans cannot readily engage in this type of verbal behavior (i.e., behavior based on a relational frame). Verbally competent humans, on the other hand, easily learn such relational frames and apply them arbitrarily to novel situations (Hayes et al., 2001).

RFT and Education

Barnes-Holmes and colleagues (2001) stress that it is the capacity for framing events relationally (i.e., verbally) that represents the cornerstone of academic

competence. That is, the process of becoming a verbally competent human involves “the ability to elaborate entire networks of stimulus relations quickly, to bring them under increasingly subtle forms of contextual control, to transform stimulus functions through entire networks, and to abstract features of the natural environment that will support and sustain relational responding.” (p. 161). Education, from this perspective, involves training with respect to verbal frames, and applying such frames across a wide range of stimuli.

Relational Frame Theory suggests that relational framing abilities underlie success with respect to acquiring skills across a wide range of academic subjects. In fact, RFT suggests that derived relational responding may account for the moderate to strong correlations commonly observed with an individual across academic domains, such as general intelligence, problem-solving, and analogy. In other words, the core underlying behavioral process involved in these and other domains, from the RFT perspective, is relational framing. This RFT position also accounts for the fact that vocabulary emerges as the primary factor of verbal intelligence, rather than other forms of verbal behavior such as spelling, because relational frames usually emerge in the context of acquiring verbal content (i.e., vocabulary). Therefore, as noted by Barnes-Holmes and colleagues (2001), “persons with a highly elaborated vocabulary will tend also to have highly elaborated relational repertoires” (p. 160).

From a pragmatic standpoint, RFT identifies the types of educational experiences most important for preparing humans for successful functioning in a wide range of academic subjects. This training involves teaching “the cognitive skills involved in relational framing itself” (Barnes-Holmes & Barnes-Holmes, 2001; p. 185). It includes teaching children relational frames of equivalence, coordination, comparison, opposition, conditionality, self-discrimination, perspective-taking, and many others. The goal of education, from this perspective, is for children to be able to apply repertoires of relational framing quickly and across a wide range of stimuli. For example, the capacity to apply a “more-than/less-than” relational frame appears to be at the heart of many basic or early language and mathematical skills. Any child who is not well versed in this relational frame will struggle with many content areas.

Several studies have examined the usefulness of RFT with respect to the emergence of academic abilities. For instance, Barnes-Holmes and colleagues (Barnes-Holmes, Barnes-Holmes, Roche, & Smeets, 2001a, 2001b) have reported methods for facilitating derived relational responding with young children. These studies demonstrated the utility of exemplar training, as opposed to explicit name training, in facilitating transformations of function in accordance with symmetry in children ages four and five years old. Participants were trained in an action-object conditional discrimination (e.g., when the experimenter waved, choosing a toy car was reinforced, and when the experimenter clapped, choosing a doll was reinforced). They were subsequently exposed to a test for derived object-action symmetry relations (e.g., experimenter presents toy car → child waves

and experimenter presents doll → child claps). Using a multiple-baseline design, exemplar training was introduced in the form of explicit symmetry training for those children who failed the symmetry test. In other words, if a participant failed a test for symmetry the failed symmetrical response was then explicitly reinforced before a novel set of stimuli was introduced for training and testing. Across both studies explicit symmetry training across exemplars successfully facilitated the target transformations of function in accordance with symmetry for all participants (21 out of the 24 experimental participants) who failed to show derived object-action or action-object symmetry.

In a set of related studies, Barnes-Holmes and colleagues (Barnes-Holmes & Barnes-Holmes, 2001) were concerned with establishing specific patterns of relational responding when they were found to be absent in children ages four to six years old. In two lengthy studies, problem-solving tasks were developed to test and train patterns of relational responding in accordance with the relational frames of comparison and opposite. To test and train responding in accordance with the former relational frame, the problem-solving task involved presenting a child with two or three identically-sized paper coins. On each trial, the experimenter described how the coins compared to one another in terms of their value (i.e. one coin being worth more or less than another), and the child was then asked to pick the coin that would buy as many sweets as possible. A similar approach was adopted for testing and training responding in accordance with the relational frame of opposite. In this problem-solving task participants were presented with various numbers of coins and instructed, for example: “This coin buys many (or few) sweets, and is opposite to this coin. Which would you take to buy as many sweets as possible?” All six participants in both the more-than/less-than and opposite studies failed to pass baseline tests for specific patterns of relational responding in accordance with these two frames. Interventions suggested by RFT, including explicitly reinforcing failed relational responses on one stimulus set before introducing a subsequent set, were then successfully used with all participants to establish these relational responses. Generalization tests also demonstrated that the relational responding successfully generalized to greater numbers of coins than those used in training and to novel experimenters. In addition, the use of a non-contingent reinforcement condition for one participant in each of the experiments, during which no improvement was made, together with contingency reversals for all participants, indicated that the trained and tested relational responding may be considered a form of generalized operant behavior.

In brief, these studies and others like them (McHugh, Barnes-Holmes, O’Hora, & Barnes-Holmes, 2002) illustrate that children trained to respond to certain items in terms of frames of “more-than/less-than” and “opposition” subsequently generalize this laboratory-induced relational repertoire behavior to untrained, novel stimuli. These data suggest the arbitrary application of relational frames, which is the cornerstone of verbal and cognitive behavior from an RFT perspective.

Similar training procedures have been used to increase the academic performance of young children, and the logic and abstract mathematical abilities of college students (Barnes-Holmes & Barnes-Holmes, 2001). In a recent application of RFT principles within an education setting, Lalli and colleagues (1999) attempted to increase the spelling skills of disruptive students using methods consistent with teaching relational frames. These researchers explored outcomes with respect to both academic (i.e., spelling) and social (i.e., disruptiveness) behavior. The instructional manipulation involved teaching the students to construct appropriate words when shown photographs (Sidman, 1971/1994; Sidman, Cresson, & Wilson-Morris, 1974/1994). Subsequently, the students were able to correctly name printed words and match printed words to corresponding photographs and dictated names. They were also able to spell dictated words. Moreover, results showed that rates of problem behavior were inversely related to these academic improvements.

These results illustrate the promise of RFT as a guide for improving educational outcomes with respect to academic skills. In addition, the fact that improvements with respect to spelling behavior led to decreases in aggression is supportive of the relativistic model presented earlier.

RFT AND A RELATIVISTIC REINFORCEMENT FRAMEWORK

RFT and a relativistic reinforcement framework inform us about different aspects of the organism's relationship to the environment. The relativistic reinforcement framework highlights the *motivational* qualities of stimuli and stimulus contexts. The primary message of the relativistic framework is that the meaning of a stimulus resides not within the object but rather within a larger ecological context. From this perspective, consequences are not understood with respect to directly strengthening or weakening responses. Rather, consequences alter the probability of behavior by way of shaping the meaning of the stimulus context (DeGrandpre, 2000).

RFT, on the other hand, is not directly concerned with the shaping of meaning with respect to environment-organism interactions; rather, it is concerned with the relational frames that form the basis for organizing and animating phenomenal experience. In turn, phenomenal experience affects human behavior because it is an element of the context that gives meaning to behavior. Effective functioning within a verbal community derives from the capacity to organize one's experiences with respect to a network of relational frames that are shared by other members of that community. A major goal of education, therefore, must be to teach children relational frames that underlie higher order cognition and problem solving. Such relational frames play a central role in academic achievement and success in a technological society.

Interestingly, many of the techniques proposed by behavioral education are valuable with respect to increasing children's relational framing behavior.

However, these techniques are rarely presented as foundational with respect to social and self development, in addition to academic development. RFT explains the interconnectivity of social, self, and academic development that teachers observe on a daily basis.

CONCLUSION

It may be that general education teachers have rejected behavioral education because the caricatured version oftentimes presented to them is too narrow in terms of conceptualizing the duties and responsibilities they face. This rejection has occurred despite convincing data that behavioral techniques would improve student academic outcomes. If it is a goal of behavioral researchers to increase the popularity of their models within education, it may be necessary to provide teachers something other than a set of operant control techniques. Rather, the goal must be to provide them with a framework for understanding the whole organism, with an emphasis on the unique role played by verbal behavior. Consistent with this idea, the promise of behaviorism does not lie so much in its capacity to generate techniques for solving individual problems; rather, its promise concerns its capacity for explaining how meaning derives from an organism's interaction with the environment. From this perspective, interventions are secondary to the understanding that gives rise to them. Because the framework presented here attempts to make sense of both the child's changing motivations and the child's changing phenomenology it may be appealing to teachers.

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