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Understanding Observational Learning: An Interbehavioral Approach

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Observational learning is an important area in the field of psychology and behavior science more generally. Given this, it is essential that behavior analysts articulate a sound theory of how behavior change occurs through observation. This paper begins with an overview of seminal research in the area of observational learning, followed by a consideration of common behavior analytic conceptualizations of these findings. The interbehavioral perspective is then outlined, shedding light on some difficulties with the existing behavior analytic approaches. The implications of embracing the interbehavioral perspective for understanding the most complex sorts of behavior, including those involved in observational learning are considered.

Key words: observational learning, interbehaviorism, interbehavioral psychology, stimulus substitution, rule-governed behavior

Research in observational learning represents a critical development in the history of psychology. Indeed, the research and scholarly work conducted by Bandura and colleagues set the occasion for the social cognitive perspective of learning (Bandura, 1986), which seemed to challenge the possibility that all behavior could be accounted for by respondent and operant processes alone. Toward this, the social cognitive perspective focused more explicitly on both modeling and cognition, and their role in understanding behavior. Meanwhile, behavior analysts have continued to contend that observational learning can be explained through processes of generalized imitation, conditioned reinforcement, and rule-governed behavior (e.g., Catania, 2007; Pear, 2001; Pierce & Cheney, 2008). However, these contentions become increasingly difficult when we take a closer look at the psychological event of interest in observational learning. Further, while behavior analysts have continued to conduct research in the area of observational learning, relatively little progress has been made toward developing a theoretical understanding of this work. The primary aim of the current paper is to consider the general findings of the observational learning research within a thoroughly naturalistic, behavioral perspective. Of course, verbal processes play an important role in understanding observational learning, and thus, they are given both general and specific treatment throughout. In pursuing this work, J. R. Kantor's philosophy of interbehaviorism and scientific system of interbehavioral psychology are reviewed. The potential benefits of embracing the interbehavioral perspective with respect to understanding observational learning and complex behavior more generally are considered.

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OBSERVATIONAL LEARNING

In the 1960s and 70s Albert Bandura and his colleagues became well known for their social psychology research in the area of observational learning. Indeed, several of the early experiments in this area are very well known, and considered hallmarks in the field of psychology and behavior science (e.g., Bandura & McDonald, 1963; Bandura, Ross, & Ross, 1963). These studies were pursued for a variety of reasons; partially to undermine the value of common psychoanalytic (Bandura & Huston, 1961; Bandura, Ross, et al., 1963) and developmental theories (Bandura & McDonald, 1963), and also to evaluate the role of observation as a primary

determinant of behavior change. Early studies examined the role of modeling[1] on the acquisition of aggression (Bandura, Ross, & Ross, 1963) and moral judgment (Bandura & McDonald, 1963), for example, and provided a foundation upon which the social cognitive theory was built. Importantly, this theory is often considered to extend beyond behavioral theories, questioning the possibility that behaviorism alone could provide a comprehensive understanding of learning. Given the importance of this research, we will now provide a brief overview of some of the general findings of studies on observational learning. It is important to note that our review is admittedly less than comprehensive, and that our primary aim is to describe some common themes within this literature.

The Role of Modeling

An early and longstanding aim of the observational learning literature is to understand the role of modeling in behavior change (e.g., Bandura & Huston, 1961; Bandura & McDonald, 1963; Bandura, Ross, & Ross, 1961). For example, an early study examined how the incidental behaviors of an experimenter might be acquired in the context of learning another task (Bandura & Huston). The important conclusion of these studies is that behavior change can and does occur through observation, even when such observation is incidental, occurring in the context of other activities. While this finding seems rather simple, it has significant implications for how we conceptualize learning. As we will discuss in the coming paragraphs, this general finding may present specific conceptual challenges for behavioral theories of learning.

The role of consequences. Specific emphasis was also placed on the role of consequences in the observational learning literature (e.g., Bandura, 1965; Bandura, Grusec, & Menlove, 1966; Bandura & McDonald, 1963, Bandura, Ross, & Ross, 1963). Experiments that added to our understanding of the role of consequences generally compared behavior change between children who either observed a model who was rewarded, a model who was punished, or a control condition (e.g., observing non-aggressive play or observing no consequences). Generally, less behavior change is observed when a child observes a model being punished (e.g., Bandura, Ross, & Ross, 1963).[2]

Interestingly, there is often no difference between conditions involving rewards and conditions involving no consequences at all. For example, Bandura and McDonald (1963) compared the effects of three different variables on the acquisition of moral judgment responses. In this study, the three variables involved three different groups of adult/child dyads: group one involved both the model and child's target judgments be reinforced, group two involved the model's behavior being reinforced but not the child's, and group three involved no model and only child reinforcement. Importantly, in the model/child groups trials alternated between the model and the child. Groups one and two demonstrated more behavior change than group three at a 1–3 week post-treatment assessment. Thus, the researchers concluded that modeling was the significant factor involved in the acquisition of the moral judgment repertoire.[3] Other experiments also found no difference between the reward and no consequence groups, while the model punished group continued to yield different results (e.g., Bandura, 1965).

Along similar lines, other studies seemed to raise questions about the potentially detrimental effects of incentives on the acquisition of behavior. For example, at the beginning of one experiment (Bandura, Grusec, & Menlove, 1966) half of the participants were placed into an incentive condition where they were told that they

[1] The term *modeling* is used synonymously with observation and demonstration in this context. In other words, when something has been modeled the individual has observed a demonstration of the response and factors surrounding it.

[2] See Greer et al., 2004 for a description of related studies on peer tutoring, where it was the observation of corrections, and not simply of reinforcement, that resulted in observational learning.

[3] Of note, the researchers acknowledged the possibility that their positive statements may not have been the most optimal reinforcers, and thus, it is possible that the modeling plus reinforcement condition would have been superior had more powerful reinforcers been used (Bandura & McDonald, 1963, p. 281).

would be given candy treats for correctly demonstrating what they learned after watching a movie. More specifically, after watching a film, children in both conditions were asked to demonstrate what they observed on the movie. Generally, the researchers found that children in the incentive condition did slightly worse than those in the no incentive condition, raising questions about the benefits of incentives on learning (see Bandura, et al., p. 505).[4]

At this point we must note that the terms *reward*, *reinforcement*, and *operant conditioning* are used rather loosely within this literature. From a behavior analytic perspective, a stimulus change can only be classified as a reinforcer if it increases the future frequency of the class of behavior it was made contingent upon (e.g., Cooper, Heron, & Heward, 2007). Given this, the majority of stimulus changes called ''rewards'' or ''reinforcers'' in the observational learning literature do not technically meet the criteria to be classified as reinforcers, or as being involved in the process of reinforcement or operant conditioning in general. Nevertheless, we can say that consequences seem to play some role in observational learning. Again, there are studies suggesting that there are no differences between observation with reinforcement and observation with no consequence at all, leaving us more confident that if consequences have a role, aversive consequences seem to play a large part. Given these important concerns, however, these findings need to be interpreted with caution.

The Role of Verbal Behavior

As this line of researched progressed, increasing attention was paid to the role of cognitive factors, often described with the terms *coding and rehearsal*. Generally, coding can be thought of as describing what is observed in some way, whereas rehearsal can be thought of as practicing what was observed. For example, Bandura, Grusec, & Menlove. (1966) examined the effects of describing the activity of the model (''coding'') on the acquisition of observed behavior. Of specific interest, this study was fueled by motivation to discredit behavior analysts who failed to account for ''delayed reproduction of modeling behavior'' (p. 499), which was assumed to necessarily involve some sort of cognitive activity. In this study three groups of children all viewed a video; one group was asked to ''verbalize every action of the model as it is being performed'' (p. 501), the second group to ''count 1 and a 2, and a 3, and a 4, and a 5'' (p. 501) repeatedly while watching the video, and a third group observed without any instruction. The researchers found that those individuals who verbally described every action of the model were the most successful when tested for behavior change at a later time. Importantly, this study highlights the early recognition of ''cognitive'' factors in observational learning.

In an effort to elaborate upon this sort of research, Bandura and Jeffrey (1973) examined the role of ''coding and rehearsal'' on the acquisition of observed behavior. The researchers found that participants who ''symbolically coded'' (i.e., developed number or letter coding systems) the model's actions, and also immediately rehearsed (i.e., practiced) those codes had the best outcomes. Neither coding without symbolic rehearsal or symbolic rehearsal without coding was found to be sufficient. Put differently, developing a coded description of the models actions and practicing that description were both found to be important factors in the acquisition of observed behavior. Interestingly, physically practicing (''motor rehearsal'') the observed behavior was found to be less important. This seemed to support a growing distinction between different aspects of an individual's repertoire and the various processes that contribute to their existence (see below).

Learning and performance. Related to the role of verbal behavior, Bandura and colleagues began to notice a difference between the observers imitative performance at a later time compared to their ability to describe what was observed when asked. The ability to describe what was observed was viewed as a measure of learning, while engaging in the observed behavior at a later time was viewed as performance. For example, Bandura, Ross, & Ross (1963) found that children in both the

[4] The idea that rewards distract individuals from learning seems to be related to the concerns raised by Alfie Kohn (1999).

aggressive-reward (participants observed a model be rewarded for engaging in a sequence of responses) and aggressive-punished (participants observed a model be punished for engaging in a sequence of responses) groups were able to *describe* the observed sequences of behavior, despite differences in imitative behavior change. Similarly, Bandura (1965) found that differences between group measures on imitation of observed behavior were removed on an ''acquisition index,'' where children were told they would get a reward for telling the experimenter what the model did. These findings further highlighted the role of verbal behavior in the process of learning from observation, including the various ways in which such learning from observation might be measured. That is, one way of measuring learning from observation is through imitation of the observed response at a later time, while another is through descriptions of the observed behavior. As these repertoires seemed to be influenced by different factors, Bandura and colleagues began to distinguish between them more and more.

Theoretical Developments

Throughout the above studies Bandura and colleagues began to articulate a theoretical model of observational learning. Fueled by findings that individuals might be able to describe observed behavior at a later time, even if they did not actually engage in the behavior themselves during a testing condition (e.g., Bandura, 1965; Bandura, Ross, & Ross, 1963), Bandura and colleagues began to distinguish between learning and performance (also see Greer, Singer-Dudek, & Gautreaux, 2006). Specifically, Bandura and colleagues noted that verbal processes were more likely to influence learning,[5] whereas consequences were more likely to influence the extent to which the individual's behavior changed through observation (i.e., that they actually engaged in the observed behavior). Indeed, theoretical accounts of observational learning highlight this distinction (e.g., Bandura & Jeffrey, 1973; Greer, Singer-Dudek, & Gautreaux, 2006).

Bandura and colleagues assumed that learning from observation occurred via an input-output, cognitive model. Specifically, Bandura and Jeffrey (1973) described four processes that account for learning from observation: attentional, retention, motor reproduction, and motivational. Bandura and Jeffery (1973) say, ''Within this framework acquisition of modeled patterns is primarily controlled by attention and retention processes. Whereas performance of observationally learned responses is regulated by motor reproduction and incentive processes'' (p. 122).

Attentional processes were described as cognitive abilities that ''regulate sensory registration of modeled actions'' and retention processes were those that took ''transitory influences and converted to enduring internal guides for memory representation'' (Bandura & Jeffery, 1973, p. 122). Motor reproduction processes are those that move component actions stored in memory into overt action resembling that of the modeled behaviors. Finally, motivational processes determine whether or not those behaviors emerge as overt action.

According to the authors, this model not only explains how a modeled response can be imitated immediately after it is observed, but can also explain how this behavior can be reproduced later under many different circumstances. Bandura and Jeffrey (1973) conclude, ''After modeled activities have been transformed into images and readily utilizable verbal symbols, these memory codes can function as guides for subsequent reproduction'' (p. 123). The authors also concluded that participants who engage in transforming modeled actions into either descriptive words or visual images achieve higher levels of observational learning than those who did not.

As a result of these and other experiments, Bandura theorized that observational learning was an integral part of human development, which accounted for the development of the personality (Bandura & Walters, 1963), as well as social and antisocial behaviors in children (Bandura, 1973). Importantly, this research shows that humans can learn without directly experiencing the

[5] In this literature the term *learning* is used to describe the individual's ability to describe observed behavior at a later time.

consequences of their own actions. Thus, if behavior analysts aim to develop a comprehensive account of learning it must include an adequate description of these instances. In particular, behavior analysts must account for the acquisition of novel behavior in the absence of contingent reinforcement for the individual engaging in those responses, and also articulate the role of verbal behavior in observational learning.

In summary, the studies conducted by Bandura and colleagues seemed to question the role of rewards on the behavior of the observer. Importantly, Bandura believed that reinforcement history alone was not sufficient, and that the observation of a model was the most critical factor. Moreover, learning from observation was viewed to be a result of other processes, of which ''verbal coding'' was one. These general findings seemed to devalue the comprehensiveness of the behavioral position, and set the stage for the social cognitive perspective. However, it is crucial that we reiterate the fact that Bandura and colleagues often misused the terms *reinforcer* and *reinforcement*, and thus, it is difficult to draw valid conclusions about the role of consequences from this line of research. What can be said is that observational learning is an important area for behavior science to consider.

Bandura found limitations with the operant interpretation of behavior, albeit a less than thoroughly informed understanding of it. Observational learning seems to defy traditional discriminative stimulus—response—reinforcer analyses, even when more contemporary concepts (e.g., the motivating operation) are considered. Specifically, novel responses occur in observational learning models, responses that have obviously never been reinforced. Added to this, delayed responding is common, and such responding presents conceptual challenges to traditional behavioral concepts (e.g., Bandura, Grusec, & Menlove, 1966, p. 499). As mentioned earlier, it is perhaps not surprising that Bandura's work may be considered by some to be an extension or move beyond the behavioral position. The limitations of Bandura's work not withstanding, Bandura and colleagues raised several important issues regarding the role of observation and verbal behavior in behavior change processes.

Still, Bandura's model relies upon the existence of hypothetical entities that do not exist in the spatiotemporal event matrix comprising the natural world. In other words, Bandura's theoretical constructs are not derived from events, and as such cannot be found and thereby can never actually be studied (see Kantor, 1957; Smith, 2007). Rather, they are inferences derived from a thoroughly mentalistic, dualistic worldview. Behavior analysts have long held that embracing such constructs can only distract workers from a scientific analysis (e.g., Skinner, 1953). It isn't surprising, then, that behavior analysts have proposed an alternative conceptualization of observational learning. In the following section we provide an overview of the behavior analytic position on observational learning.

THE BEHAVIOR ANALYTIC POSITION

The behavior analytic account of observational learning rests squarely upon the process of generalized imitation (Baer, Peterson, & Sherman, 1967; Baer & Sherman, 1964; Pierce & Cheney, 2008). This is a familiar process, where the organism is asked to imitate several responses of the model (e.g., ''do this'' while the model is touching their nose), and after multiple exemplars have been successfully trained, the organism is asked to engage in a response which has never been modeled before. Generalized imitation is said to occur when the organism engages in a response that has never been modeled or reinforced in the past; that is, when imitation has ''generalized'' to new behaviors. Furthermore, it is assumed that the social community shapes up delays in imitative responses, and thus, it is said that ''all instances of modeling and imitation involve the absence of the Sd'' (Pierce & Cheney, 2008, p. 252). For example, a child might watch their favorite TV show, and at a much later time repeat a phrase from the show, perhaps while sitting in the car, and their parent might say ''yes, that's what you heard on TV!''. In other words, the organism is said to learn to imitate observed behavior in the absence of any particular stimulus, and perhaps at a much later point in time. In this sense, the organism may be said to ''emit''

behaviors, which typically fall under the purview of generalized imitation.

Importantly, conditioned reinforcement hypotheses are also central to the behavior analytic conceptualization of observational learning and imitation in general. In this sense, behaviors that closely resemble the observed behavior of models are presumed to have a history of reinforcement, and thus, behaving in a manner which is similar to the model may become conditioned reinforcer itself. This sort of conceptualization seems to be particularly helpful toward the behavior analytic understanding of delayed imitation (see Gladstone & Cooley, 1975; Rosales-Ruiz & Baer, 1997).

Behavior analysts have also provided an account of the verbal coding that is said to participate in observational learning. For example, behavior analysts propose that individuals derive self-rules when they observe their environment (e.g., Hayes, Barnes-Holmes, & Roche, 2001; Hayes, Zettle, & Rosenfarb, 1989; Poppen, 1989). It is assumed that society teaches the organism to tact (Skinner, 1957) relationships in their environment, and that these descriptions exert tremendous control over behavior. Indeed, it is suggested that a large amount of rule-following behavior is reinforced throughout the organisms lifetime, and when combined with a history of tact repertoires being reinforced, individuals both derive self-rules (i.e., tact if-then relations in their environment) and subsequently engage in a great deal of rule-following with respect to those rules.

For example, a child might observe a teacher praising another child for accurately matching a Spanish flashcard to the corresponding English flashcard (''Good job matching perro with dog!''). Two days later, the child who observed the incident may be asked to ''match same'' when given that same Spanish flashcard, and correctly place it on the corresponding English flashcard. From the behavior analytic perspective it may be assumed that the child already has a generalized imitative repertoire, so they are imitating the child they observed at a later point in time (see conditioned reinforcement hypotheses above). Furthermore, the child may or may not have tacted the observed relationship when it occurred (rule-stating), and engaged in rule-following behavior when she interacted with the card at a later time. Both of these possibilities are consistent with the behavior analytic position. Importantly, the behavior analytic position does not *require* the individual to engage in rule-stating and following for observational learning to occur. Related to the latter, a recent series of studies conducted by Greer and colleagues seems to support the notion that observational learning may occur without rule-following. For example, individuals have acquired the ability to learn new words through experiences that do not involve observing consequences of another, and stimuli have been conditioned as reinforcers through the observation of others interacting with them, both of which do not require analyses of rule-governed behavior (see Greer & Ross, 2008, Greer & Speckman, 2009).

It must be noted that many of these issues are at the center of current controversy, debate, and development in the field of behavior analysis. For example, the perspectives of joint control (e.g., Lowenkron, 1998) naming (Horne & Lowe, 1996), relational frame theory (Hayes, Barnes-Holmes, & Roche, 2001), and verbal behavior development (e.g., Greer & Ross, 2008; Greer & Speckman, 2009) all seem to account for the type of phenomena we have commented on herein. Given the importance of these issues, this is a good sign. We primarily mention this to acknowledge the current fact that there is not *a* behavior analytic position on many of these issues. Nevertheless, missteps may occur while we are on our journey to account for such phenomena, missteps that could have more or less dangerous implications for behavior analysis as an enterprise. It is our perspective that the interbehavioral position may be a rather useful foundation for workers as we continue on this journey (see Morris, Higgins, & Bickel, 1982).

Generally speaking, the behavior analytic conceptualization of observational learning relies on generalized imitation, conditioned reinforcement, and a range of verbal processes, depending on ones theoretical preference. These processes seem to account for the fact that imitative responses which have never been reinforced occur at a later time, and also for the role of verbal behavior in

observational learning. The fact that there are a number of different perspectives on many of these issues may be considered a sign of progress and growth within behavior analysis, but at the same time highlights the need for further system building in this area. In the following sections we take a closer look at the behavior analytic position through the lens of interbehavioral psychology. Before doing so, we briefly introduce the reader to the interbehavioral position, as it is relatively less familiar to most behavior analysts.

THE INTERBEHAVIORIAL POSITION

From the perspective of interbehavioral psychology the event of interest is always a thoroughly naturalistic, *psychological* event. Specifically, this event is always the stimulus function (*sf*) ←→response function (*rf*) interaction (Kantor, 1958). Moreover, this interaction always participates in a multifactored, *inter*related field. This field is conceptualized by the following formula: $PE = C\ (k, sf, rf, hi, st, md)$; where *PE* is the psychological event, *C* is the interrelationship of all of the participating factors, *k* is the unique organization of all factors, *sf* is the stimulus function, *rf* is the response function, *hi* is the interbehavioral history, *st* is setting factors, and *md* is the medium of contact. Importantly, this is *one* event, *one* interbehavioral field. When one factor is changed the entire field is altered. This is to say none of the above factors are viewed as independent, dependent, or having causal status. Rather, all of the factors are equal participants in the one, integrated whole (see Smith, 2006).

Of particular relevance to our discussion of observational learning and complex behavior in general is the explicit distinction between stimulus objects and stimulus functions made within Kantor's system (e.g., Kantor, 1924, pp. 47–48; Parrott, 1983a, 1983b, 1986). In other words, the stimulating action of stimulus objects is differentiated from the formal properties of those objects in Kantor's system. Kantor has suggested that the borrowing of the terms stimulus and response from biology, where stimulus and response functions are at least relatively more determined by their structural properties, has perhaps contributed to the failure to distinguish between object and functional properties in the domain of psychology (Kantor, 1958, p. 68). For example, in Kantor's system a picture as a stimulus object would be explicitly distinguished from its psychological functions, such that accounting for seeing something in the absence of the thing seen (as when looking at a picture ''reminds you'' of the time or place it was taken) is not difficult (see Parrott, 1983a, 1983b, 1986; Skinner, 1974). The process by which this happens is central to understanding complex behavior, including those that typically fall within the purview of observational learning, and we will now describe this process in more detail.

Kantor suggested that association conditions are fundamental psychological processes (1921, 1924). The term *association* is used here to refer to spatiotemporal relationships; that is, to relationships among various factors that occur in the environment together in space and time. To be clear, these factors are associated *in the environment*, and not within the organism. Further, it is not the organism who is associating; rather, the environment is where all associating takes place. Association conditions may involve stimuli and responses, stimuli and stimuli, settings and stimuli, settings and reactions, settings and settings, and reactions and reactions (including implicit and nonimplicit variations thereof; Kantor, 1924, pp. 321–322).

Stimulus Substitution

Stimulus substitution is the outcome of a history of an organism interacting with various association conditions (Kantor, 1924, 1958; Parrott, 1983a, 1983b, 1986). That is, given an organisms history of interacting with spatiotemporal relationships (*A*-coffee shop←→ *B*-Peter), stimulus objects may have the stimulational properties of other objects, even when those other objects are no longer physically present. This is how you might see Peter when you enter a coffee shop you frequented with him, even when he isn't physically there. In this example, stimulus A (coffee shop) and B (Peter) occurred together in space and time, and an organism interacted with that relationship, such that B becomes *A* (*B*[*A*]) and *A* becomes *B*(*A*[*B*]), psychologically speaking (see

Hayes, 1992a). This process is of particular importance to understanding complex behavior of various sorts. Furthermore, this is how interbehaviorists are able to conceptualize the past and present as one, avoiding both mentalistic and reductionistic practices which place the past within the organism in one way or another (see Hayes, 1992b).

Added to this, through processes of generalization, stimuli that share physical features of those that participated in spatiotemporal association conditions may also develop substitute stimulus functions. For example, a coffee shop that is physically similar to the coffee shop you went to with your friend Peter might also substitute for Peter. Specifically, you might see Peter in the presence of a coffee shop that is physically similar to the shop you frequented with him. That is to say, substitute stimulus functions also generalize to stimuli which have never actually participated in spatiotemporal association conditions, but which are physically similar to stimuli which have, and thereby involve similar stimulus functions. This type of process may become particularly subtle, and is likely to be involved in a range of complex behaviors, including imagining and dreaming.

At this point it is important to address one potential misunderstanding with the interbehavioral perspective, specifically with respect to association conditions and the development of substitute stimulus functions.[6] We are suggesting that all stimuli which occur together in space and time, and which the organism interacts with, may develop substitute stimulus functions of one another. That is, it is possible for all stimuli to develop substitute stimulus functions of any other stimulus, given the appropriate interbehavioral history. Indeed, as an individual's interbehavioral history becomes more and more elaborate, one might imagine how all stimuli could develop substitute stimulus functions of all other stimuli, such that everything might become one, psychologically speaking. However, recall that the stimulus function←→response function interaction is always a participant in an exceptionally unique, complex, multifactored field. Indeed, Kantor stated ''Each interaction is always absolutely specific. What the reacting organism and the stimulus object do in each interaction constitutes a distinctly unique relational happening'' (1977, p. 38). Thus, while a specific stimulus object may indeed substitute for a wide range of things given an appropriate interbehavioral history, specific substitute stimulus functions are always actualized (or not) in a unique interbehavioral field. For example, a glass of sangria might substitute for a particular friend in a specific multifactored field (you might see your friend and remember drinking sangria together), whereas that same glass of sangria might substitute for the music of a live band in a different multifactored field (you might hear the music that was playing at a restaurant where you drank sangria in the past). As this example demonstrates, while there may be a wide range of *potential* substitute stimulus functions for every stimulus object, in each and every specific psychological event, *particular* substitute stimulus functions are actualized.

Thus far we have briefly introduced some important features of interbehavioral psychology, which we find to be particularly relevant to our understanding of observational learning. From the interbehavioral perspective, individuals observe (i.e., interact with) spatiotemporal association conditions in the environment (e.g., a child putting scrap paper in the recycling bin and this being followed by praise), such that at a later time the stimulus objects involved might substitute for the prior observation (e.g., the scrap paper might have the stimulus functions of praise in the previous observation). In other words, the scrap paper develops the stimulational properties of the observed relations; it substitutes for them. Psychologically speaking, the scrap paper *is* those relations (see Hayes, 1992a, 1992b).

The role of verbal behavior must also be considered in the context of our analysis thus far. Generally speaking, one outcome of interacting with an observed relationship is being able to describe it. In other words, describing an observed relationship requires the organism to interact with it, and thus, descriptions are a particularly strong indication that the relations assumed to be observed have indeed actually been contacted. However, from our perspective verbal behavior, including rules more generally, does not

[6] For example, some have criticized interbehaviorism for its ''loose form of associationism'' (e.g., Hayes, Barnes-Holmes, & Roche, 2001, p. 8).

explain observational learning. This is to say, whether or not the organism describes the observed relationship does not explain behavior change at a later time; however, not surprisingly, it is likely to be correlated with it, as it assures the organism has interacted with the observed relation. Moreover, to the extent that rule-statements substitute for a history of reinforcement, they may further enhance any learning by observation. Importantly, in this sense verbal behavior does not ''mediate'' responding. Its participation in the process of observational learning, however, seems to be worth considering. In doing so, it is important that verbal behavior not be given any causal or special sort of status. Observational learning certainly can, and does occur in the absence of verbal behavior, as is the case in animal research within this area (e.g., Biederman, Robertson, & Vanayan, 1986; Meyers, 1970; Reiss, 1972).

Our contention that verbal behavior not be given any causal status within the conceptualization of observational learning may seem to be at odds with a number of popular perspectives in behavior analysis. For example, a growing body of research on naming (e.g., Miguel, Petursdottir, Carr, & Michael, 2008), joint control (e.g., Lowenkron, 1998), and generalized imitation (e.g., Horne & Erjavec, 2007) seems to support the idea that verbal behavior is mediational. Again, as stated above, we do not deny that verbal behavior is likely to be helpful in a number of circumstances, but caution against giving it any sort of special status. That is, verbal behavior may, but importantly also may not, *participate* in learning from observation. In this sense, verbal behavior need not be considered ''meditational.'' Our perspective on this matter seems to be both parsimonious and comprehensive. That is, it does not employ any unnecessary assumptions or constructs, and accounts for observational learning that occurs with and without verbal behavior.[7]

[7] A number of socially significant behaviors involve language, and we are not questioning the interest in it for the purposes of understanding how to promote such behaviors (e.g., categorization). However, we are arguing that language not be given special status in the conceptualization of observational learning.

We hope we have made it clear that observational learning isn't puzzling from an interbehavioral perspective. Stimulus substitution offers a straight forward, naturalistic, and parsimonious way to conceptualize complex processes, including those involved in observational learning. Importantly, the interbehavioral perspective also avoids some shortcomings found with the behavior analytic interpretation of observational learning. In the following section we outline and address these issues specifically.

Review of the Behavior Analytic Perspective

As described earlier, the behavior analytic conceptualization of observational learning rests on the processes of generalized imitation, conditioned reinforcement, rule-governed behavior, and verbal processes more generally. From our perspective these analyses fail to fully articulate the nature of stimulation in the psychological event. Again, from the interbehavioral perspective the psychological event is *always* the stimulus function←→response function interaction. The generalized imitation analysis leaves us questioning the nature of the stimulus interacted with. In other words, it is not clear what the stimulus is. This problem is further underscored by the suggestion that generalized imitation involves responding in the absence of a discriminative stimulus (Pierce & Cheney, 2008, p. 252). Given our assumption that psychological events always involve *sf*←→*rf* interactions, as participants in multifactored fields, this account is problematic. The process of deriving and following self-rules leaves us in a similar situation. Again, we are left questioning the nature of the stimulus interacted with. That is, it unclear what the organism is interacting with when he/she derives a self-rule, and similarly, when he/she follows such a rule. Again, given our assumptions about the psychological event, both of these analyses require further consideration of the stimulus involved.

Added to the concerns described above, behavior analytic conceptualizations also fail to explicitly articulate the location of the stimulus. In other words, it is unclear *where* the stimulus interacted with is located. Failing to fully describe the nature and location of the stimulus leaves the door open

for common mentalistic explanations to thrive. In the case of generalized imitation we find ourselves saying that the response is ''in the repertoire'' of the organism, because the stimulus is private, covert, or biological in nature (also see Hayes & Fryling, 2009). Alternatively, the *organism* may be said to ''derive'' or ''relate'' with respect to participating verbal processes. In other words, we either avoid attempting to specify the stimulus, place it within the organism, or, alternatively, suggest that it is available only to those involved in other scientific disciplines, namely biology.[8] In each of these cases, we fail to provide a thoroughly psychological account of the event we are interested in, leaving our job unfinished. As has been the case throughout history, where our work is left unfinished, both dualistic and reductionistic workers are quick to complete the job. While it may be argued that much of the contemporary work in the area of complex behavior does in fact avoid many of the concerns we have described, a failure to be *explicit* about these important issues can only result in long-term confusion, and a possible resurfacing of mentalistic thinking.

CONCLUSION

The behavior analytic community continues to be interested in the important processes involved in observational learning (e.g., Alvero & Austin, 2004; Bruzek & Thompson, 2007; Greer & Singer-Dudek, 2008; Greer, Singer-Dudek, Longano, & Zrino, 2008; Moore & Fisher, 2007; Ramirez & Rehfeldt, 2009; Rehfeldt, Latimore, & Stromer, 2003). Added to this, there are some interesting reasons to believe that this process has important clinical value when compared to other procedures (see Hayes, Kohlenberg, & Melancohn, 1989). What is needed is a thoroughly naturalistic conceptualization of observational learning, one that avoids all mentalism (i.e., no intermediate steps within the organism). As we have described, the interbehavioral perspective offers us just that, a clear, consistent, and thoroughly naturalistic conceptualization of observational learning. Moreover, it is one that does not require any additional constructs to explain complex processes, remaining comprehensive all the while.

It is our perspective that the position described in this paper may be integrated with contemporary research and scholarship in behavior analysis. This is especially so when we make clear distinctions between investigative constructs and events, as is advocated by interbehaviorists (see Fryling & Hayes, 2009; Kantor, 1957; Smith, 2007). Kantor (1958) has suggested that investigative constructs are acceptable within the context of the investigative subsystem of science, but that these constructs should not be confused with the constructions of the subject matter and philosophy more generally. That is, the constructs we employ to understand various interrelations among factors participating in psychological events should never be confused to be representations of the subject matter as a whole, as being explanatory of one another, or as having more or less causal status. For example, both operant and respondent processes can be conceptualized within the more global processes of association and subsequent outcomes of stimulus substitution. Contemporary research in behavior analysis requires us to emphasize specific aspects to the interbehavioral position, particularly with respect to the role of the context (unique multifactored fields), and the actualization of specific substitute stimulus functions. In this regard, the research on relational responding is particularly stimulating. In this line of research a multitude of historical association conditions are manipulated in unique ways, under various contextual conditions, and the development or ''emergence'' of a wide range of events is then tested. When these interesting outcomes are conceptualized as unique sorts of substitute stimulation, operating in historical, multifactored fields, their explanations remain wholly consistent and

[8] Here, it is important to note that even when biological factors are observed (and indeed, they increasingly are) they are *never* observed to be engaging in the psychological event of interest. That is to say, we can never observe the brain or any biological component of the organism engaging in the behavior we are most interested in (see Kantor, 1947). Confusions between what is measured and what ones says they measuring are common in science (see Kantor, 1957; Smith, 2007), and are especially likely when there is a failure to fully articulate the boundary conditions between individual scientific disciplines.

naturalistic. We think most contemporary research and scholarship in behavior analysis can and should be integrated with the interbehavioral perspective. Importantly, such integration might serve to coordinate the efforts of various workers in the field, and ultimately maximize on our productivity as a scientific enterprise.

The limitations of Bandura's work not withstanding, the process of learning from observation is interesting and relevant to a comprehensive analysis of behavior. Indeed, if one values such comprehensiveness, our most basic concepts and principles must be relevant to, and provide an account of observational learning. Moreover, this comprehensiveness is only valuable when it is achieved within the context of validity (internal consistency) and significance (external consistency within the greater field of the sciences; see Clayton, Hayes, & Swain, 2005; Kantor, 1958). The interbehavioral perspective is particularly valuable in this regard. Kantor's conceptualization of the psychological event, with all of its fullness, provides an avenue by which the most complex sorts of behavior, including those involved in observational learning, might be fully integrated into a natural science approach to the analysis of behavior.

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