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Observational Learning from a Radical-Behavioristic Viewpoint

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Bandura (1972, 1977b) has argued that observational learning has some distinctive features that set it apart from the operant paradigm: (1) acquisition simply through observation, (2) delayed performance through cognitive mediation, and (3) vicarious reinforcement. The present paper first redefines those three features at the descriptive level, and then adopts a radical-behavioristic viewpoint to show how those redefined distinctive features can be explained and tested experimentally. Finally, the origin of observational learning is discussed in terms of recent data of neonatal imitation. The present analysis offers a consistent theoretical and practical understanding of observational learning from a radical-behavioristic viewpoint.

According to social-learning theory, a new behavior can be acquired symbolically at a cognitive level simply through the perception of a modeled behavior. The acquired behavior can then be stored as a symbolic representation and performed much later under the guidance of that representation (Bandura, 1971a, 1971b, 1972, 1977b). Thus, acquisition is clearly different from performance. The acquisition of new behavior via an observer's exposure to the modeled behavior is called "observational learning." This perspective emphasizes the perceived reinforcement of the modeled performance (vicarious reinforcement) rather than current or historical direct reinforcement of any of the observer's behavior. Vicarious reinforcement is said to play informative and motivational roles for future performance by creating expectations about the results of later imitation. Thus, imitation can occur even if it is not reinforced directly at that time.

This view of observational learning has some distinctively inefficient or shortsighted features from a radical-behavioristic viewpoint: (1) acquisition simply through observation; (2) delayed performance mediated by cognitive processes whose need, history, and autonomy are not analyzed; and (3) the importance of vicarious rather than direct reinforcement. Among radical behaviorists and social-learning theorists, however, these conflicts seem to lie not in the empirical data, but rather in their interpretation and in where to look for a more complete analysis.

Some behavior analysts have attempted to explain the phenomena of observational learning within their behavioral systems (Gewirtz, 1971a, 1971b; Whitehurst, 1978). Gewirtz (1971a, 1971b; Gewirtz & Stingle, 1968) presented an early behavioral view of observational learning using operant conditioning principles. Whitehurst (1978) has attempted to define and classify types of observational learning and to identify some variables that influence it. These attempts have advanced the behavioral understanding of observational learning, although not always from the standpoint of radical behaviorism (see Day, 1983; Skinner, 1974). Gewirtz, for example, apparently saw no roles of private events or of phylogenic contingencies in his analysis of observational learning. Whitehurst intentionally avoided integrating variables that can control and influence observational learning into a minimal set of behavioral principles. The purpose of this paper is to establish a minimal set of consistent functional explanations from a radical-

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behavioristic viewpoint. The present analysis shows how radical behaviorism and social-learning theory interpret observational learning and attempts to resolve major conflicts between the two paradigms and to put in perspective the origin of observational learning.

DESCRIPTIVE DEFINITION

The first step toward resolving conflicts between radical behaviorists and social-learning theorists is to redefine the three distinctive features of observational learning at the level of description. Radical behaviorists and cognitive psychologists speak different languages, even when they are talking about the same thing (Catania, 1972). Thus the use of only one language may fail to distinguish what they share from how they differ. The descriptive definition of the three distinctive features of observational learning allows us to examine whether what can be said in the language of social-learning theory can also be said in the language of radical behaviorism and perhaps said better. The three features can be summarized descriptively as follows:

(1) One-trial learning: Relatively new behavior can be imitated following a single exposure to the model without any direct physical assistance or external reinforcement.

(2) Delayed performance: That behavior can be performed later and in the absence of the model whether or not it is performed at the time of modeling.

(3) Observed consequences: A modeled response producing contingent reinforcement to the model is more likely to be imitated than a modeled response that does not produce contingent reinforcement to the model.

BEHAVIORAL INTERPRETATION

The second step is to interpret and examine these three features, now redefined at the descriptive level, in the language of radical behaviorism. Conflicts unveiled through this behavioral interpretation can then be analyzed at methodological and philosophical levels to resolve or clarify the conflicts between radical behaviorists and social-learning theorists.

One-Trial Learning

The first component of the descriptive definition is the one-trial demonstration of relatively novel behavior following an exposure to the modeled behavior without any direct manual guidance, prompting, or external reinforcement. Even if social-learning theory insists that the acquisition of such behavior occurs at the cognitive level, the behavior must be performed at least once to assure us (its researchers) of its acquisition. The term "one-trial" is more descriptive than the term "acquisition," except at the cognitive level, which is not observable, and our purpose now is description.

For some social-learning theorists, observational learning is a primary category of behavior process: New behavior is acquired through stimulus contiguity and cognitive mediation simply by observation (Bandura, 1977b; Bower & Hilgard, 1981). Indeed, in a typical social-learning paradigm, *normal* children show the acquisition of relatively new behavior through a single exposure or repeated exposures to a modeled response even when external reinforcement is impossible (e.g., Bandura, 1965; Bandura, Ross, & Ross, 1963). Interestingly, most radical behaviorists would not be surprised by this observation of one-trial learning. They have seen relatively new models of behavior imitated on the initial trial (or trials) without external reinforcement or physical assistance, as long as other imitations are reinforced (Brigham & Sherman, 1968) or after enough imitation training, in the cases of initially nonimitative persons (Baer, Peterson, & Sherman, 1967; Metz, 1965). Most behaviorists still suppose, however, that the origin of that ability lies in the subject's conditioning history, although they sometimes differ subtly in postulating the ways that reinforcement histories influence that ability (see Baer & Deguchi, in press, for a conditioned-reinforcement thesis, and Gewirtz, 1971a, for a conditional-discrimination thesis).

Thus, one conflict lies in the historical role of reinforcement for the emergence and control of one-trial learning. This

conflict appears to be due partly to the length or levels of observation that social-learning and behavioral approaches have adopted in their analyses of the phenomenon. To observe the role of reinforcement in already generalized imitations, behavior should be observed over extensive time because behavior can be controlled by very sparse intermittent reinforcement schedules (Ferster & Skinner, 1957; Gewirtz, 1971b). In behavioral research, continuous assessment of behavior typically is used to collect data over time and with individual-analysis designs. Through this continuous analysis, imitation has been observed to increase or decrease *over time* by manipulating its consequences, even its very intermittent consequences (cf. Baer & Deguchi, in press). In most social-learning research, however, behavior is observed for relatively short times and with between-group designs. Data for each subject are usually collected only over one or two sessions of pre- and post-testing: Their reliability is analyzed statistically. Especially in normal children, observational learning or imitation has been likely to be reinforced at least intermittently outside the laboratory. Then how could the effects of intermittent reinforcement in the natural environment be validated with such short term synchronic observation in the laboratory? Different conclusions may well be reached depending on how long or when the behavior is sampled; that is, absent continuous assessment of observational learning, researchers may well miss the long-term role of reinforcement.

One-trial observational learning is *negatively defined,* if its definition relies on observing an absence of reinforcement for only a short time (also see Baer, 1982b, and Beach, 1955, on negative definitions). The definition may stand only until we observe some longer-term reinforcement control of observational learning. Ample evidence exists that an imitative response class can easily be controlled by its intermittent contingent consequences (Baer & Deguchi, in press; Baer & Sherman, 1964; Baer et al., 1967; Brigham & Sherman, 1968; Furnell & Thomas, 1981). Thus, social-learning theorists should be open to the possibility of direct but eventual reinforcement control. Although the origin of observational learning is unknown and may be expected to be difficult to prove (this issue is discussed later in depth), reinforcement control of observational learning is already empirical fact. Given that, we can then inquire further into the operant characteristics of observational learning. Perhaps this direction of research will contribute to the further development of "modeling therapies" based on social-learning theory (see Kirkland & Thelen, 1977; Rosenthal & Bandura, 1978).

Delayed Performance

The second component of the descriptive definition is that the observer can perform an imitative response much later and in the absence of the model.

Cognitive mediation. To explain delayed performance, some social-learning theorists (e.g., Bandura, 1971a, 1971b, 1977b) emphasize the role of representational processes said to mediate subsequent behavior. Once a representation of behavior has been acquired, it is presumed to be stored and to guide later performance of the observed behavior. From a behavioral viewpoint, however, hypothesizing about supposed cognitive mediators may not be necessary to explain delayed performance. Delayed performance can be explained as a phenomenon on the same continuum with immediate imitation—a delay always occurs between the modeled behavior and the so-called immediate imitative responses (Gewirtz & Stingle, 1968). Why is a different level of explanation needed for phenomena continuously distributed on a simple continuum of time?

Still, Bandura (1971a) has argued that this kind of explanation can be possible only when the delay is short but that considerably delayed imitation in the absence of the model is too difficult to explain without a concept of cognitive mediation. However, if the emergence of delayed performance can be traced to the reinforcement history of the individual

and can be controlled by environmental manipulation, then delayed performance could be attributed to and thus explained by describing those historical conditions without hypothesizing a mediating cognitive process that is not independently manipulable. For example, Garcia (1974) trained three initially somewhat imitative retarded children and one nonimitative retarded child to imitate both immediately and after delays. The nonreinforced delayed imitations increased only when reinforcement was contingent on other delayed imitations. Also, when reinforcement was contingent on some immediate imitations, nonreinforced immediate imitations increased, and nonreinforced delayed imitations decreased.

Thus, delayed imitation can be created, controlled, and eliminated by reinforcement contingent on the timing of imitations. Describing conditions under which delayed performance is shaped and generalized to new instances when those conditions are basic procedures in an explanatory system in itself forms a convincing behavioral explanation within that system. Making more complex systems is not parsimonious.

Environmental antecedents. Other cases, however, exist where cognitive functioning has been supposed to play an important role. For example, certain types of instructions are seen as manipulations of functional cognitive events by some social-learning theorists (Bandura & Jeffery, 1973; Bandura, Jeffery, & Bachicha, 1974; Gerst, 1971). In the Gerst study (1971), college students were exposed to filmed modeling stimuli. One group of students was instructed to memorize them by vivid imagery, a second group by verbal coding, and a third group by labeling them concisely. A fourth group was the control group; they were required to count the beats of a metronome to prevent their engaging in cognitive processes. All three coding groups were statistically superior to the control group in an immediate-reproduction test. In a delayed-reproduction test (15 min period), the summary-labeling group was better than the other two coding groups and the control group. These results were interpreted as empirical support for the significant role of cognitive operations in observational learning and delayed performance, and for the usefulness of the acquisition-performance distinction. Descriptively, however, these data show only a close correlation between certain verbal instructions and subsequent overt behavior. This correlation may not justify any causal relationship between cognitive operations and behavior. In addition, what was manipulated, at the level of description, were not cognitive events but types of instructions.

This need not mean that private events are irrelevant to the analysis of observational learning. Most radical behaviorists do not deny the existence of private events and do recommend analyzing them thoroughly as physical, behavioral events (Day, 1969; Johnston & Pennypacker, 1980; Moore, 1980, 1984; Skinner, 1945, 1953, 1957, 1972, 1974). The scientific analysis of private events is one of the distinguishing characteristics of radical behaviorism (Skinner, 1974). In this paradigm, private events are assumed to be capable of playing a role in behavior as mediators (Skinner, 1972, p. 325), or as parts of causal chains of behavior (Baer, 1982a; Moore, 1984).

However, merely hypothesizing cognitive processes—and only cognitive processes—is limited in utility. How can we manipulate one's cognitive events independently of manipulating types and histories of instructions and experience? The ultimate cause of behavior, from an experimenter's viewpoint, should be found outside the organism, partly in the sense that only environmental events[1] are directly accessible and effectively manipulable (Skinner, 1974, p. 10; Blanshard & Skinner, 1967, p. 331). For analysis, it

[1] Environmental and private events, however, are not in any way dichotomous. Dr. Lawrence E. Fraley, a reviewer of this paper, points out that one's private events sometimes are directly accessible and manipulable when analyzers deal with their own private events, which are unconcerned about a proof of another audience. Thus, for them, those private events are environmental.

is crucial to know of what the private events are a function and how to manipulate those events for the control and prediction of observational learning. Attention should then be directed not only to types of instructions manipulated in the immediate case but also to how those instructions come to influence the emergence of observational learning, not at the cognitive but at the environmental, historical level. Otherwise, individual differences in the effects of types of instructions are difficult to explain (other than tautologically) and to modify. A thorough experimental analysis of private events cannot be made unless we identify their immediate and historical environmental antecedents. When private events are a cause, they might best be assumed to be questioned as potential formal causes (Moore, 1984), that is, as momentary, local causes operating as parts of a behavioral chain. If so, their explanation cannot be complete until their immediate and historical antecedents are specified.

Some cognitive psychologists point out that the entire history of an individual is unknowable, and, known or unknown, affects current behavior only by constructing cognitive processes that operate in the current situation (see Bandura, 1971a; Wessells, 1981). As a result of this, the social-learning approach has not paid much attention to histories (e.g., Bandura, 1977a, 1977b). Their experimental inquiries have been about immediate environmental antecedents that interact with supposedly already existing cognitive processes and that thereby influence observational learning, such as types of instructions, characteristics of the model and the observer, and consequences to the model (see Akamatsu & Thelen, 1974; Rosenthal & Zimmerman, 1978; Thelen & Rennie, 1972). For behavior analysts, these immediate antecedents are at best considered as predictors of observational learning or as social or physical conditional discriminative stimuli that set the occasion for observational learning to be reinforced, extinguished, or punished. But they are neither explanatory of all the variability of observational learning nor its final causes that should be pursued. What should be questioned is why those immediate antecedents come to predict or influence observational learning, probably at the level of environmental history. At that level, those immediate antecedents can acquire discriminative functions (controlling power) for the observer or the person who attempts to predict, probably because it is in association with the predecessors of those relevant antecedents that observational learning has been reinforced, extinguished, or punished.

Private events as history. The difficulty of knowing someone's entire history does not mean that we cannot analyze the relatively small parts of it operating in a given case or that intrinsically tautological cognitive processes are the necessary alternative, and thus sufficient. As Baer (1982a) has argued, a series of studies by Meichenbaum and his colleagues (e.g., Meichenbaum & Goodman, 1969, 1971; Asarnow & Meichenbaum, 1979) shows that teaching certain self-instruction procedures can offer a useful experimental model for this issue. (It should be noted that Meichenbaum's interpretation of the procedure and its results are not always similar to the present analysis.) In their procedure (especially, Meichenbaum & Goodman, 1971), children are taught through modeling and instructions to say a series of corrective statements to themselves intended to regulate their own problem-solving behaviors, initially at an overt level but fading gradually to a covert level. Children with such training in self-instruction show certain changes in their performance relative to children without that training. A behavioral analysis of this procedure acknowledges that self-instructive behavior can be made part of a behavioral chain controlling other behavior and that this can be made to happen through direct teaching of self-instructive behavior, that is, as a function of certain prior environmental histories. In this view, private events are not inferred substitutes for the reinforcement history because they are demonstrably products of it and demonstrably functional. Those events are parts of the chain

that follows the immediate environmental antecedents whose functions have been created by their historical interactions with reinforcement contingencies.

The experimental analysis of historical reinforcement contingencies can be a logical substitute for merely constructing hypothetical cognitive processes. What may be going on at a cognitive level can be analyzed and taught at the overt level before allowing the behavior to become covert as parts of the chain. Such analyses of private events into workable behavioral skills to be taught might be very important to applied behavior analysis (Baer, 1982a, 1983). Can we not analyze private operations (events) that possibly follow different types of instructions used in observational learning research into effective teaching procedures? For example, can we not teach how to describe the modeled response verbally to children who do not respond well to the instruction to memorize the model by covert verbal coding and observe its effects in the children's later reproduction of the model?

Then how can we analyze private events?[2] Sometimes we can deduce their nature: We can ask what private process could control the public behavior in question (see Baer, 1982a, for an example of the logical analysis of an experimentally teachable, initially public square-root algorithm that eventually becomes private). Verbal reports about private events may sometimes be a source of hypotheses for the subsequent experimental analyses of those events (Skinner, 1953, p. 282). Note, however, that verbal reports are not dependable as a measure of "efficacy expectation" (e.g., Bandura, 1977a) nor should they be conceptualized as a metacognition (e.g., Meichenbaum & Asarnow, 1981; also see Lowe & Higson, 1981, for a discussion of metacognition from a radical-behavioristic viewpoint).

[2] General tactics to private events have been discussed elsewhere (see Johston & Pennypacker, 1980; Skinner, 1945).

Private events, like other operations that may interact with subsequent observational learning, can be analyzed into behaviors at an overt level. Their validity is tested by teaching them to naive organisms and then observing the effects of that teaching. The generality of that teaching and of the behaviors taught should be examined in terms of the extent to which they work powerfully and in many situations, especially in nonteaching situations. For some behaviorists, at least, it is not the postulation but rather the experimental analysis of private events—by transforming them effectively at a procedural level as instructions or teaching—that is of great importance.

One theoretical problem is still unsolved: How can we be sure of the ongoing function of those newly taught events after they become covert and unobservable? Probably, we cannot. The only recourse is to be pragmatic. Once possible private events are analyzed into an effective instructional or teaching procedures, theorizing about their subsequent function may no longer be useful. It is better to analyze private events by learning how to teach them and see what difference that makes; then we should be satisfied with knowing those effects and their procedural antecedents, and should recognize as speculation any further knowledge of their later, ongoing function within the behavioral system (D. M. Baer, personal communication, April 12, 1984). This strategy may be seen as radical behaviorism in that the analysis of private events as environmentally controlled potential mediators can play an important role in the study of observational learning. Yet some analysts may consider only privately the role that private events might play in their subjects' behavior. If they make that analysis real by constructing observable teaching curricula and do not publicize their deductions about the private events that the public curriculum is to teach, they will appear to be methodological behaviorists. In other words, it may require some radical-behavioristic research to analyze

a radical-behavioristic function in some methodological behaviorism!

Observed Consequences

The final component of the descriptive definition is the observation that a vicariously reinforced modeled response is more likely to be imitated than a nonreinforced one (cf. Arem & Zimmerman, 1976; Bandura, 1965; Kazdin, 1973; Ollendick, Shapiro, & Barrett, 1982; Thelen & Rennie, 1972). Bandura (1971b) also notes that the effects of vicarious reinforcement may be short-lived. One of his examples is, "One would not recommend to employers, for example, that they maintain the productivity of their employees by having them witness a small group of workers receiving paychecks at the end of each month" (p. 235). This example implies that vicarious reinforcement would not work unless the observers experienced some direct reinforcement (paychecks), too. As analyzed previously, the construction of cognitive processes need not be a substitute for history, theoretically or pragmatically. Bandura, however, did not describe the role of direct reinforcement in the definition of vicarious reinforcement.

Vicarious reinforcement is negatively defined in terms of an absence of direct reinforcement to the observing subject, who is observed for only a short period of time. From a behavioral viewpoint, the modeled consequences of the modeled behavior probably function as discriminative cues for extrinsic reinforcement for an observer's later imitation; that function may be hypothesized to have been established in the observer's earlier reinforcement history (Gewirtz, 1971a, 1971b). The effects of vicarious reinforcement may then be examined as control by direct reinforcement in a historical context. If vicarious reinforcement is a discriminative stimulus for the observer, its effects should decrease over time in the absence of reinforcement of the observer's behavior, the amount of time necessary being a function of prior history. If so, the therapeutic and educational use of vicarious reinforcement alone is not a good strategy for the reliable maintenance and generalization of its outcomes.

Reinforcement control of vicarious learning then becomes an important experimental issue, one for which the typical procedures used in past observational-learning research are probably insensitive (for example, Bandura, 1965; Rice, 1976). As pointed out earlier, data for each subject in the observational-learning paradigm are usually collected in only one or two sessions of pre- and post-testing. Therefore, the time course of behavior change cannot be recorded. The possibility of reinforcement control of vicarious reinforcement could be assessed adequately only with longer term, continuous observation of the phenomena. For example, Ollendick, Dailey, and Shapiro (1983) assessed the long-term durability of the effectiveness of vicarious reinforcement for normal children's behavior. Pairs of children performed a task in which one child received direct social reinforcement; the other child could only observe those consequences. Other pairs of children engaged in the same task without reinforcement or with intermittent reinforcement. As trials proceeded, the directly reinforced children improved. The vicariously reinforced children improved initially, but then their performance decreased. However, vicariously reinforced children who also received intermittent direct reinforcement came to perform as well as the directly reinforced children over time. These results support a discriminative-stimulus interpretation of vicarious reinforcement: Its discriminative function is to set the occasion for imitation that can be maintained directly by (intermittent) reinforcement of the observing child's behavior. To analyze further reinforcement control in vicarious learning, the effects of observed consequences should be studied over time in more detail. Direct reinforcement of the observer's behavior can be manipulated in various ways to examine its control of vicarious learning

over time within individual-analysis designs.

THE ORIGIN OF OBSERVATIONAL LEARNING

So far, discussion has emphasized the operant characteristics of observational or vicarious learning that may be developed and controlled by its consequences under relevant social and physical stimulus conditions over time. Still another controversy remains between social-learning and radical-behavioristic paradigms: Is observational learning a primary given category of behavior or a totally learned behavioral process? Is its development shaped from a zero baseline or only modified in detail from a given non-zero baseline? If imitative ability is innate, is it not sufficient for us to find the conditions that modify and control it? For this issue, the neontatal imitation reported recently by Field, Woodson, Greenberg, and Cohen (1982) and Meltzoff and Moore (1977, 1983a) becomes an important case. This controversial issue is considered in terms of methodology, conception, and pragmatics.

Methodological Considerations

Meltzoff and Moore (1977) reported that 12- to 21-day-old infants can imitate tongue-protrusion, lip-protrusion, mouth-opening, and hand-movements. Later, Meltzoff and Moore (1983a) used an improved procedure to demonstrate imitation of mouth-opening and tongue-protrusion by newborn infants ranging from 0.7 to 71 hours of age. Field et al. (1982) also reported imitation of mouth-opening, mouth-widening, and lip-protrusion in infants averaging 36 hours of age. These results, however, should be considered tentative; they contain methodological difficulties peculiar to neonatal imitation. Some of these problems were indicated by the Hayes and Watson study (1981) of these behaviors in neonates. The first Hayes and Watson experiment failed to replicate the Meltzoff and Moore experiment (1977), despite a careful attempt to reproduce their procedures. Hayes and Watson then asked whether neonatal imitation could be a procedural artifact. Their second experiment demonstrated that the type of mouth movement evoked at one moment by a pacifier (also used in the Meltzoff and Moore study) was a reliable predictor of subsequent infant responses of the kind used to define imitation. If these types of movements with the pacifier influenced the experimenter's timing in presenting the model to be imitated, a purely coincidental "imitation" would result. Also, Jacobson (1979) has shown that imitation in young infants can be elicited nonspecifically by events other than facial modeling stimuli—stimuli Jacobson called "incentive events." For example, infant tongue-protrusion occurred in response to a pen moved towards the infant's face just as often as to a tongue-protrusion model. Similarly, a ring dangled before the infant's hand was as effective as a hand-movement model in producing infant hand-movements. These results suggest the possibility of artifactually imitative responses elicited by particular stimulus aspects that the modeled responses may contain. The Meltzoff and Moore (1977, 1983a) and Field et al. (1982) studies did not experimentally rule out the possibility of these artifactually imitative responses.

Thus, the possibility of already existing imitation in newborn infants remains ambiguous and still to be proven. A well-designed procedure will be needed to avoid the problems inherent in neonatal imitation (also see Meltzoff & Moore, 1983b, for a discussion). One basic problem is that the infant behaviors to be tested are not discrete and well formed each time that they occur (Meltzoff & Moore, 1977), thereby creating problems in response definition and hence in reliable measurement. A second, related problem is that the experimentally useful infant behaviors are very restricted in number and form (e.g., Meltzoff & Moore, 1983a). The few useful facial expressions, for example, are difficult to differentiate from arousal or nonmodel-elicited responses. A third problem is the difficulty of keeping the infant's attention on the model, leading to varied numbers and

times of model presentation, some of which might be matched only inadvertently by the infant's responses (see Field et al., 1982; Hayes & Watson, 1981; Jacobson, 1979).

Even if neonatal imitation is shown to be reliable, the origin of imitation or observational learning is not necessarily clarified. Skinner (1984, p. 220) argues that only a first instance of behavior can be considered as essentially innate, and that first instances are difficult to specify. An experimentally sound demonstration of neonatal imitation would at best be an implausible case of learning and a more plausible case of innate (or unknown) origin.

Conceptual Considerations

The possibility of imitation as a product of phylogenic contingencies of survival need not be denied. Skinner (1966, 1974, 1984) has argued that imitation may well have survival value for a species as well as be a product of ontogenic contingencies of reinforcement:

> Since phylogenic and ontogenic contingencies act at different times and shape and maintain behavior in different ways, it is dangerous to try to arrange their products on a single continuum or to describe them with a single set of terms. (1966, p. 1211)

Consider an analogous example. Aggressive behavior in animals or humans can be either elicited by antecedent stimulus events (Azrin, Hutchinson, & Hake, 1966; Kelly & Hake, 1970; Ulrich & Azrin, 1962) or developed and controlled by consequential stimulus events (Azrin & Hutchinson, 1967; Azrin, Hutchinson, & Hake, 1967). Elicited aggression is typically accompanied by autonomic, emotional, vocal, and facial responses; operant aggression usually is not (Hutchinson, 1973). Perhaps these two classes of aggressive behavior are fundamentally different in terms of their controlling variables. If so, they may not belong on the same continuum.

Similarly, not all imitative behavior may come from a single phylogenic or ontogenic origin. Topographical similarities between neonatal imitation and imitation later in life do not justify identifying both as products of the same origin. Even if neonates have an innate ability to imitate a few specific models, that does not mean that all other imitations in later life need not be externally reinforced. Indeed, many studies have demonstrated that imitation can be developed, elaborated, modified, attached to specific cues and setting events, and maintained by its consequences, and that it decreases without those contingencies (see Baer & Deguchi, in press).

In summary, a behavioral analysis can interpret neonatal imitation as a product of phylogenic contingencies but also offers a possible and useful distinction between neonatal imitation and imitation later in life.

Pragmatic Considerations

If either all imitations or later-life imitations are ontogenically established and modified, then discovering the environmental conditions under which imitation develops, differentiates, and is discriminated and generalized will be of primary concern for understanding imitation as a socializing process. Even if the imitations of neonates are phylogenically formed and later-life imitations are on the same continuum with neonatal imitation, simply pointing to its possibly innate character does not actually further its analysis. Environmental conditions are known to influence its development very powerfully in that many behavioral studies have demonstrated that imitation can be developed, modified, and thoroughly controlled by its consequences. An analogous instance is seen in other reflexive behaviors that can be modified by their consequences. For example, Ulrich, Wolfe, and Dulaney (1967) and Azrin (1970) have demonstrated that the class of shock-elicited aggression can be decreased by contingent punishment (shock) in squirrel monkeys.

Thus in either the phylogenic or ontogenic case and in either the operant or respondent (reflexive) case, what should be done is virtually identical. The only difference is in our interpretation of the origin of imitation or observational

learning. Of course, we should know whether imitative ability is genetically endowed and whether all imitations through the developmental course are controlled by the same variables. At present, however, these inquiries may be extremely laborious, difficult to prove experimentally, and, indeed, have relatively low logical and pragmatic priority.

Thus, in a pragmatic sense (cf. James, 1907), the origin of imitation or observational learning may not be critical, even in theory. An explanation consisting of the complete exploration of the environmental functions involved may prove to be satisfactory if it allows the developmental and behavioral problems that we face to be solved sufficiently (Baer & Deguchi, in press). The question of origin may become less urgent if the analysis of environmental functions and conditions should prove to confer a powerful control over imitation or observational learning. The achievement of such powerful control of observational learning may give an explanation by ontogenic contingencies not only its own place but a major role in the theories of imitation.

CONCLUSION

When the three major distinctive features of observational learning are redefined at the descriptive level, they prove to be explainable in behavioral terms. One of the most significant disagreements between many behaviorists and social-learning theorists seems to be the issue of reinforcement control of observational and vicarious learning. This disagreement appears to derive largely from the length of observation of the phenomena. Extended observation may be crucial in resolving this controversy. In future research, the control of observational and vicarious learning should be studied by manipulating direct reinforcement of the observer's behavior over extensive time to see whether observational or vicarious learning could be a function of their consequences in a modified observational-learning as well as an operant paradigm. Perhaps this direction of research can lead to developing a more effective and reliable use of observational and vicarious learning for therapeutic and educational practice.

Another disagreement lies in the treatment of private events. The present arguments do not negate the analyses of private events and their immediate environmental antecedents. Studies of private events and their environmental antecedents can have considerable predictive value. Experimental understanding of only the immediate antecedents, which will lead tautologically to cognitive processes, however, contributes to only a gross level of prediction and control of observational learning. The present analysis argues that the effects of those variables, and their variability may originate in historical events such as contingencies of reinforcement. Understanding that history, sometimes through analyzing (teaching) private events, should produce more precise prediction and control of observational learning. The proper goal is to analyze private events by realizing them effectively at a procedural level (see Johnston & Pennypacker, 1980, for a related discussion).

From a methodological point of view, these two disagreements may derive partly from the way that the social-learning approach has dealt with variability in its data. Social-learning theorists always use group designs, unlike behavior analysts who use individual-analysis designs. In group designs, variability in data typically is analyzed statistically. When concepts of observational learning are validated statistically, they are not likely to be pursued further for control of variability within individuals: Observational learning remains a statistical or actuarial outcome. Yet the real needs are for continuous assessment and the analysis of sometimes idiosyncratic historical antecedents, both of which require further control of variability within individuals.

The origin of observational learning and imitation was also discussed from methodological, conceptual, and pragmatic viewpoints. Although the origin of imitation will be difficult to prove, a radical-behavioristic view can systematize the origin of imitation in both its phy-

logenic and ontogenic cases. The present analysis, however, emphasizes explanation through the ontogenic environmental conditions that develop and modify observational learning and imitation, to see if doing so offers a sufficient solution to current developmental and behavioral problems.

An approach to observational learning or imitation should not be criticized or justified only by its level of explanation or its suitability to pre-existing models of human nature. An approach should be judged in terms of its contribution to a science and a technology of human development. In this regard, many behaviorists and social-learning theorists seem to agree with each other (see Bandura, 1977b, p. 4). The present analysis argues, however, that a further theoretical and practical understanding of observational learning will be achieved best by a behavioral account that stubbornly pursues the ontogenic environmental conditions under which imitation and observational learning develop and are modified.

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