

Applied Behavior Analysis: New Directions from the Laboratory

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Applied behavior analysis began when laboratory based principles were extended to humans in order to change socially significant behavior. Recent laboratory findings may have applied relevance; however, the majority of basic researchers have not clearly communicated the practical implications of their work. The present paper samples some of the new findings and attempts to demonstrate their applied importance. Schedule-induced behavior which occurs as a by-product of contingencies of reinforcement is discussed. Possible difficulties in treatment and management of induced behaviors are considered. Next, the correlation-based law of effect and the implications of relative reinforcement are explored in terms of applied examples. Relative rate of reinforcement is then extended to the literature dealing with concurrent operants. Concurrent operant models may describe human behavior of applied importance, and several techniques for modification of problem behavior are suggested. As a final concern, the paper discusses several new paradigms. While the practical importance of these models is not clear at the moment, it may be that new practical advantages will soon arise. Thus, it is argued that basic research continues to be of theoretical and practical importance to applied behavior analysis.

Applied behavior analysis as a scientific enterprise began with the extension of laboratory-based principles to the understanding and control of socially significant human behavior (Baer, Wolf & Risley, 1968). Such an extension was predicted by Skinner (1953) and evidenced by the subsequent application of basic principles to a variety of human problems (e.g., Risley, 1968; Hart, Reynolds, Baer, Brawley & Harris, 1968; Keller, 1968; Barrish, Saunders & Wolf, 1969; Lovaas & Simmons, 1969). This extension also included theoretically important advances in the analysis of contingencies of reinforcement operating at the human level (e.g., Baer, Peterson & Sherman, 1967; Gerwritz, 1969). Historically, the link between applied behavior analysis and operant principles has been a successful strategy. Thus, it is important to detail some of the recent developments in basic research which may suggest new applica-

tions and tactics for behavior change.

A current issue of concern for behavior analysts is the apparent separation of applied and basic research. Several papers have documented this separation and have suggested the continuing relevance of laboratory research for applied behavior analysis (Dietz, 1978; Hayes, Rincover & Solnick, 1980; Pierce & Epling, 1980; Michael, 1981; Poling, Picker, Grosset, Hall-Johnson & Holbrook, 1982). Other investigators have also recognized this divergence but have argued that it is inevitable and may have positive implications (Baer, 1982). In this debate, a major problem may be that basic researchers have not communicated how continued attention to laboratory data and principles could or would be important for applied behavior analysis.

An acquaintance with basic research could have two major effects. First, applied behavior analysts, who are in the best position to identify socially relevant problems, would be able to work out new applications. Second, basic research may suggest new ways of analyzing socially important behavior. A number of currently available behavior principles have implications for applied behavior analysis. In addition, there are analyses and paradigms in existence which challenge some currently held tenets. The remainder of this paper will be devoted to illustrating

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some of these principles, analyses, and paradigms.

Schedule-Induced Behavior

Researchers have described classes of behavior which occur as a side-effect of schedules of reinforcement (e.g., Staddon & Simmelhag, 1971; Falk, 1966). This behavior is not specified by the contingencies and is therefore called schedule-induced (Staddon, 1977; Falk, 1971). Schedules of reinforcement may induce a variety of behavior patterns, including exaggerated water drinking (Falk, 1966), attack (Flory, 1969), wheel running (Levitky & Collier, 1968), licking at an air stream (Mendelson & Chillag, 1970), and smoking in humans (Wallace & Singer, 1976). These behavior patterns are typically excessive and resistant to change by manipulation of operant contingencies. Thus, when an analysis of response-consequence relationships does not indicate clear controlling variables, behavior could be schedule-induced. Foster (1978) has pointed to the absence of clinical investigations of induced or adjunctive behavior with humans and has suggested that:

Potential candidates for human adjunctive behaviors range from (a) "normal" time-filling or "fidgety" patterns such as playing, idle conversing, finger-tapping, and beard-stroking, through (b) "neurotic" obsessive-compulsive or "nervous-habit" patterns such as nailbiting, snacking, and hand-washing, to (c) "psychotic" patterns such as self-stimulating rituals, manic episodes, and rage outbursts. Potential candidates for human "inducing" schedules include home, office, classroom, and ward routines, whose time, effort, and consequence properties have long been suspected of side effects by lay and professional people (p. 545).

Side-effects of schedules of reinforcement may have implications for other problem behaviors. There is suggestive evidence from animal studies that some problems of drug addiction, including alcohol (Freed & Lester, 1970; Samson & Falk, 1975; Gilbert, 1974), narcotics (Leander, McMillan & Harris, 1975), barbiturates (Kodluboy & Thompson, 1971; Meisch, 1969), and nicotine (Lang, Latiff, McQueen & Singer, 1977) may be induced by the operating contingencies of reinforcement. The applied analyst who deals

with drug dependency might gain new insight by a consideration of this literature. Of equal importance, basic researchers in these areas should attempt to communicate the applied relevance of their findings.

In addition to drug dependencies and psychiatric disturbances, there may be other socially important human activities which arise as a by-product of schedules of reinforcement. In particular, there is growing evidence that some classes of aggressive behavior are induced. At the animal level, several studies have demonstrated that birds reponding on food reinforcement schedules will attack another bird or a visual representation of another pigeon (Azrin, Hutchinson & Hake, 1966; Cohen & Looney, 1973; Flory & Ellis, 1973; Flory & Everist, 1977). A similar effect is produced with rats maintained by schedules of food or water reinforcement (Gentry & Schaeffer, 1969; Thompson & Bloom, 1966). Also, primates have shown induced biting of a rubber hose with positive or negative reinforcement schedules in effect (Hutchinson, Azrin & Hunt, 1968; DeWeese, 1977). Importantly, these findings have been extended to humans. Fredericksen and Peterson (1974) report that 16 five year old nursery school children increased their hitting of a Bobo doll when extinction for monetary reinforcers was scheduled. In a later review of induced aggression in humans and animals, Fredericksen and Peterson (1977) examined the variables controlling schedule-induced attack across species; in most instances animal and human data were remarkably similar.

Some problems of classroom management may have to do with the generation of induced aggression by contingencies operating in the school. Temporal properties of work assignments, classroom routines, the allocation of recess periods, and schedules of teacher attention are likely facilitators of such side effects. For example, increased physical and verbal aggression would be expected when reinforcement is temporally delayed. This might occur in line-ups when coming into the school, assembly, washroom, or other

activities. Educators who recognize how these behaviors are produced may be able to design school programs which reduce the likelihood of aggressive behavior.

Another behavior of clinical interest that may be induced by reinforcement schedule is excessive locomotor activity. Epling, Pierce and Stefan (1981; in press) have argued for an activity model of anorexia nervosa. These researchers have suggested that the hyperactivity observed in some anorectic patients (Kron, Katz, Gorzynski, & Weiner, 1978; Crisp, Hsu, Harding & Hartshorn, 1980) is central to an understanding of what they call "activity-based anorexia". They have further argued that this hyperactivity is induced by food schedules. In support of this model, Epling et al. have demonstrated that rats and mice will excessively increase wheel running behavior (up to 20,000 revolutions per day), decrease food ingestion, and die of starvation when they are placed on a restricted meal schedule and allowed access to an activity wheel on a non-contingent basis. Control animals placed on the same food schedule but not provided with the opportunity to run increase food intake and survive. In this model of activity anorexia, the authors suggest that excessive wheel running is induced by properties of the meal schedule (see also, Wallace, Samson & Singer, 1978). Further, this high rate activity functions to suppress and eventually reduce food intake. This is a paradoxical effect, since it would be expected that organisms who are expending large amounts of energy and declining in body weight would increase (rather than decrease) food ingestion.

The determinants of induced behavior were described by Falk (1977). Two critical factors are the length of the inter-reinforcement interval and the deprivation status of the organism with respect to the scheduled reinforcer. Schedule-induced behavior is an increasing monotonic function of deprivation. However, the relationship of schedule-induced activity to the inter-reinforcement interval (IRI) is more complex. Research (Falk, 1966; Flory, 1971) indicates that as the length of the IRI increases from small

values (approximately 2 seconds) to medium values (between 120 and 180 seconds), there is a direct increase in schedule-induced responses. As the length of the interval is increased beyond these medium values, induced behavior declines and reaches a low level at approximately 300 seconds.

Of course, the IRI values explored in this literature are of such short duration that the effects reported are not directly applicable to most human situations. One way the interval values may be extended is to consider that a small amount of food is delivered to an animal after a brief temporal interval. Schedule-induced behavior in humans might be generated over longer time intervals with relatively large reinforcers. In order to draw more convincing parallels from animal studies, it is necessary to generate research focused directly on human subjects in both laboratory and natural settings. An understanding of the parameters that control schedule-induced behavior in humans might lead to new types of treatment and improved long term follow-up results.

The schedule-induced literature demonstrates that high-strength behavior can occur as a by-product of programmed contingencies. Thus, contingency control of behavior may not always be a productive way of viewing environmental control in applied settings. Another branch of research suggests that close temporal proximity between behavior and consequence is not a necessary requirement for the control of behavior. This literature on the correlation-based law of effect may explain some problems of treatment and suggest new intervention strategies.

The Correlation-Based Law of Effect

Many applied researchers pursue modification programs based on principles that stipulate a relationship between behavior and its immediate consequences (e.g., Skinner, 1953). There are good reasons for an analysis of response-consequence relationships; contingencies of reinforcement have proven to be an effective behavior change strategy. However, there is increasing evidence that behavior is not always maintained in a

direct linear manner. In environments where many sources of reinforcement are available, operants may be acquired and maintained on the basis of correlations between rate of response and rate of reinforcement (Herrnstein, 1961; Baum, 1973). Such correlations may occasionally be critical to an analysis and modification of behavior, especially when behavior is maintained in human environments which contain multiple sources of reinforcement.

The analysis of behavior can be problematic when only contingency-contiguity principles are assumed to operate. These analytical difficulties were addressed by Rachlin (1974) when he recounted the research by Herrnstein and Hineline (1966) on aversive control of bar pressing in the rat. In this research, there was no direct connection between responses and their consequences but only a correlation between bar pressing and rate of shock. Results indicated that rats acquired bar pressing when followed by a reduced frequency of shocks over time, *although no particular bar press terminated the shocks*. An observer faced with this behavior would have difficulty accounting for it on the basis of contingency-contiguity principles. At any point in time, the analyst could infer a) that there was no relationship between bar presses and shocks, b) that shocks were causing bar presses, and c) that bar presses were causing shocks. In fact, Rachlin states (1974) "the cause of bar presses is the relationship between pressing and shocks as it is experienced by the rat."

This implies that observers trained to primarily identify response-consequence relationships may occasionally arrive at incorrect conclusions about behavior and its controlling variables. Additionally, introducing manipulations of consequences may have correlational effects that are unexpected. To illustrate, "pestering behavior" emitted by a child in a classroom could be maintained by a correlation between that behavior and teacher attention. This might occur if rate of attention increased with the child's rate of pestering. The increase in attention could occur as a result of reinforcing a

different target behavior. An overall increase in reinforcement accidentally *correlated* with pestering would be expected to increase the frequency of the behavior. Thus, it is possible that behavior in applied settings can be controlled without direct response-consequence relationships.

The value of the correlation-based law of effect in applied settings is the emphasis it places on environment-behavior relations over extended periods of time. Professionals have suspected and occasionally made use of this relationship. The clinical interview where a history is taken may be seen as an attempt to take the correlation between behavior and consequence into account. Thus, the therapist may obtain a family history which correlates with problematic behavior. This is seen in cases of child abuse where a parents behavior is related to punitive socialization practices (Conger, Burgess & Barrett, 1979). However, the therapist is often faced with the problem of identifying immediately present events that can be altered to change the behavior of the client. There are many instances in which particular environmental events that directly follow behavior cannot be isolated. In such instances, applied analysts with a contingency-contiguity viewpoint are often forced to seek explanation for behavior through hypothetical cognitive constructs.

When a client is behaving "neurotically" but there are no conspicuous controlling variables, behavior is sometimes explained in terms of hopes, expectations, or feelings (Bandura, 1977). At this point, applied behavior analysts may abandon their concern with specification of environment-behavior relations. However, the correlation-based law of effect suggests that the environment interacts with behavior over long periods of time. Rachlin (1970) has made the point that we can not understand why a man continues to shovel coal into a fire since the immediate effect is to dampen the flames. But with a long range view we see that the reason the man shovels is the positive correlation between amount of heat and rate of shoveling. The behavior can now be

understood, and it is clear that we must modify the correlation between amount of heat and rate of shoveling in order to modify the man's activity. The variables for behavior change remain in the environment from the correlation point of view.

As a specific instance of the applied importance of the correlation-based law of effect, Rachlin (1970) pointed to the learned helplessness phenomenon (Seligman, Maier & Solomon, 1969). The research on helplessness concerns first exposing a person or an animal to an environment where there is a zero correlation between rate of response and rate of punishment. There are no behaviors which allow escape from the aversive stimuli. The environment is subsequently rearranged so that a positive correlation exists between behavior and reduction of aversive stimuli. But the previous exposure to a zero correlation interferes with the acquisition of escape responses. The animals of the Seligman, et al. research give up and accept their fate. Such effects in humans might be ascribed to "endogenous depression," but an environmental analysis suggests that the observable zero correlation between responding and reduction of aversive stimuli is the cause of giving up. With attention focused on the environment, it is clear that one treatment strategy would involve training escape behavior in an environment which arranges for a positive correlation between escape responding and rate of (negative) reinforcement. This is, in fact, what animal analogues of learned helplessness have done.

The correlation-based law of effect proposes that only regular covariation, planned or adventitious, *over time* is necessary to produce behavior change. The researchers dealing with concurrent operants have recognized this principle and have shown how it governs behavioral choice.

Behavioral Choice and the Matching Law

Human environments typically contain many possible sources of reinforcement. These reinforcers compete for behavior and provide for a number of response

alternatives. Goldiamond (1975) has discussed the linear model based on a response followed by a consequence and an alternative view in which an individual behaves in accord with several reinforcement contingencies. The applied importance of alternatives and choice is stressed in Goldiamond's account of an interview with a "mental" patient.

A patient I interviewed at a state mental hospital clearly indicated the existence of such alternatives. To attain sustenance and shelter when he had outworn his stays at all homes of his friends and relatives, he could either engage in criminal behavior and be sent to prison, or engage in crazy behavior and be sent to the mental hospital, or engage in neither behavior and die of exposure. Viewed unilinearly, engaging in behaviors whose consequence is confinement in a ward in a state hospital does not make "sense", hence is "crazy". . . . (However), his "crazy" behavior did not represent "psychosis", nor would criminal behavior have represented "criminality". Both were (alternative behaviors) maintained by the same consequences, namely, sustenance and shelter (pp. 60-61).

Operant researchers have often accounted for choice in terms of the matching law (Baum, 1974). This principle states that relative behavior (or time) matches relative rate of reinforcement delivered on two or more concurrent alternatives. The person distributes behavior in accord with the relative, rather than absolute, payoffs received over a period of time. A formal statement of this relationship (Herrnstein, 1961) is presented in equation 1.

$$B_1 / (B_1 + B_2) = R_1 / (R_1 + R_2) \quad 1.$$

The values B_i represent the amount of behavior (or time) given to the respective alternatives and the R_i values represent the amount of reinforcement obtained from these alternatives. This proportional equation makes it clear that a given target behavior must always be analyzed with respect to all simultaneously available sources of reinforcement.

At the present time there are a number of studies which have investigated the matching law with humans in laboratory settings (see Pierce & Epling, 1983). Humans are found to match visual responding to concurrently scheduled targets (Baum, 1975; Schroeder & Holland, 1969). Also, Bradshaw and his

associates (e.g., Bradshaw, Szabadi & Bevan, 1976; 1979) report that relative rate of key-pressing in humans matches relative rate of monetary reinforcement. Finally, Conger and Killeen (1974) found that human conversation was distributed in accord with the relative rate of agreement provided by concurrently available listeners.

At the applied level, the proportion equation suggests that in order to modify the rate of occurrence of behavior, the analyst may alter the rate of reinforcement on a target alternative, or alter the rate of reinforcement from other sources. Thus, in order to change the rate of child compliance (see Patterson, 1976) toward the mother, the applied analyst must consider the father or others as additional sources of reinforcement. Rate of compliance may be low toward one parent because this behavior is concurrently reinforced by the other. To illustrate, if maternal reinforcement is at a relatively lower rate than father's reinforcement schedule, modification of the rate of maternal attention for compliance will increase the rate of the behavior *only* if father's rate of reinforcement remains at former levels. Often, however, modifications in maternal attention to the child produce a shift in reinforcement rate for the father. An increase in father's rate of attention would further lower the rate of child compliance to mother, while a decrease would enhance the modification procedure. With consideration and measurement of such changes in alternative sources of reinforcement, predictions of treatment outcomes may be enhanced.

While a proportion equation has predictive and control power when alternatives differ *only* in rate of reinforcement, other variables such as effort, quality of reinforcement, punishment and stimulus control, may affect the distribution of behavior in applied settings. These conditions can, however, be represented in a more general form of the matching equation when only two alternatives are considered (Baum, 1974). Equation 2 presents the matching law in terms of the

ratio of behavior relative to the ratio of reinforcement.

$$B_1 / B_2 = K(R_1 / R_2)^a \quad 2.$$

As in Equation 1, B_i values represent the amount of behavior distributed to respective alternatives and R_i values represent the amount of reinforcement from these alternatives. When the coefficient k and the exponent a are equal to one, Equation 2 is an alternative form of Equation 1. However, when a is not equal to one this is called under (or over) matching and a unit increase in relative reinforcement systematically produces less than (or greater than) a unit increase in relative behavior. For example, if a discrimination is poorly established between concurrently available schedules of reinforcement, this will typically be reflected by the exponent assuming a value less than one (i.e., undermatching).

When the coefficient k departs from one this is called bias (Baum, 1974) and a systematic preference for one alternative is indicated. Bradshaw, Ruddle and Szabadi, (1981) have shown with humans that if alternatives differ with respect to effort there is a preference, over and above the relative reinforcement, for the lower effort alternative. Thus, changing the rate of reinforcement on a target alternative without considering these conditions may produce behavior change that is unexpected in direction or frequency. At the present time, the variables which control these values (i.e., a and k) are being researched at the basic level.¹ This research may suggest strategies of behavior management that will be of practical importance to the applied analyst.

Animal research on concurrent schedules often employs a two-key procedure (Ferster & Skinner, 1957). The animal changes back and forth between two separate keys with different reinforcement schedules on each key. This ex-

¹ For an analysis of the variables affecting the exponent a and the coefficient k with some attention to human behavior see Sunahara and Pierce (1981), Baum (1974), de Villiers (1977) and Pierce, Epling and Greer (1981).

perimental paradigm has external validity and practical importance to the extent that human behavior in everyday settings is described as responding or time spent on simultaneously arranged reinforcement schedules. Recently, for instance, Sunahara and Pierce (1982) have argued for the external validity of this model in representing human social interaction. Thus, an individual is viewed as distributing time and behavior among social others who reinforce responding on concurrently available schedules. This experimental model can be represented as a social interaction involving a central individual, A, who has two (or more) alternatives, X and Y, as partners. In this setting, it is assumed that A exchanges reinforcers with X and Y over time. This kind of situation is researched more effectively if the number of alternatives is limited to two, but evidence suggests that the analysis can be extended to situations which provide multiple alternatives (Herrnstein, 1974; Miller & Loveland, 1974; Pliskoff & Brown, 1976). Also, while X and Y do not interact in this model, this restriction can be relaxed in applied research. The effects of X and Y's interaction would be to alter the rate of reinforcement to A, therefore altering the distribution of A's behavior to these social alternatives.

Another way of programming concurrent schedules has been described by Findley (1958). According to this procedure, reinforcement is delivered for responding on a single key with alternative schedules signalled by different discriminative stimuli. A changeover key is also provided, and a response on this key changes the schedule of reinforcement and associated discriminative stimulus on the response key. Basic researchers have not made a distinction between the two procedures. However, Sunahara (1980) has suggested that a single-key model might represent another socially important phenomenon. He notes that the individual can be viewed as "playing different roles" depending on the stimulus conditions. The person is an employee, and work behavior is reinforced by the employer on a given schedule; the same

individual is also a spouse, with marital behavior reinforced by the partner on a different schedule. The person changes between these respective schedules, sometimes behaving as an employee and sometimes as a spouse. The distribution of behavior (or time) between work and the marital relation can become quite disproportional on the basis of the respective reinforcement schedules. Concurrent schedules can therefore give rise to the common complaints that "he or she is never home" or "he or she never pays attention to me." The behavior which these reports describe is often a prime target for change by the applied analyst.

The matching law suggests multiple sources of environmental control are operating in most human settings. Even when the applied analyst focuses on a single target behavior, the control exerted by alternative sources of reinforcement can be important. Herrnstein's (1970) statement of the quantitative law of effect demonstrated that principles governing the single operant could be derived from the matching law. In recent papers, McDowell (1981; 1982) has shown that clinically relevant behavior conforms to Herrnstein's equation for single operants. He reports that the self-injurious scratching of an 11-year-old boy was described by considering rate of scratches to be a function of rate of verbal reprimands (McDowell, 1981). When McDowell fit the boy's data to Herrnstein's hyperbolic equation, he explained 99.67% of the variance in this self-mutilating behavior. Another applied example is provided by the research of Szabadi, Bradshaw and Ruddle (1981). In this study, parameters of the single operant equation varied systematically and in expected direction for two manic-depressive patients depending on mood state. The implications were that monetary reinforcers, which maintained button-pressing on several variable interval schedules, were less valued in depressive periods and of greater value during manic episodes. Thus, the degree of control by (at least some) reinforcers may vary with affective disturbance. Also, this research suggests that parameters of Herrnstein's equation

may be useful in diagnosis of some behavioral disorders. These applied implications were addressed by McDowell (1982) and he concluded that:

Herrnstein's equation is considerably more descriptive of natural human environments than Skinner's earlier view of reinforcement. It is not always easy to isolate Skinnerian response-reinforcement units in the natural environment. Herrnstein's equation makes efforts to do so unnecessary and, moreover, obsolete. The equation can help clinicians conceptualize cases more effectively and design treatment regimens more efficiently. It also suggests new intervention strategies that may be especially useful in difficult cases (p. 778).

The literature dealing with behavioral choice and the quantitative law of effect has been extensive enough to be considered a major paradigm within the experimental analysis of behavior. There are other paradigms suggested by basic research that require a reconsideration of the assumptions held by behavior analysts. These models are generally not as well developed as those presented previously. However, they may ultimately provide new information important to the understanding and control of behavior in applied settings.

Recent Paradigms

A recent paradigm that relates behavior to environmental determinants has been suggested by Collier, Hirsch, and Kanarek (1977). When an organism receives an entire meal contingent on responses, behavior differs from that maintained by typical operant strategies. The paradigm employs long food intervals and analyzes behavior *between* entire meals while the more usual operant analysis employs short food intervals and analyzes behavior *within* a single meal. Collier, et al., have provided data which demonstrate that even a *non-deprived* rat will emit up to 5000 bar presses with the consequence being a single meal. Additionally, these researchers have shown that behavior can change in unexpected ways when it is maintained in accord with this paradigm. For example, increasing the size of a reinforcer for a food deprived animal typically results in an increase in rate of response. Thus, the clinician may increase the size of reinforcement in order

to increase the rate of pro-social behavior. However, the between-meal paradigm shows that behavior slows in rate when size of meal is increased. It follows then, that depending on the maintenance conditions behavior may or may not change in predicted directions as a function of increasing the size of the reinforcer.

While this paradigm has only been explored with non-human subjects and has focused on feeding behavior, it may have further implications for applied behavior analysts. For example, the initiation and maintenance of behavior chains that take a person to a concert, a visit at a friend's house, or to a university class, etc. might be best understood by a consideration of the between-meal paradigm. Once an individual has arrived at the concert, visit, or class, behavior would likely operate according to the more traditional operant paradigm. Of course the Collier, et al. model may not explain human behavior, particularly when it is maintained by conditioned reinforcers. What is needed is an analysis of human behavior in accord with this approach. The analysis might also increase the predictive utility and precision of some behavioral treatment programs.

There are other major conceptual shifts in the literature. Morse and Kelleher (1977) have questioned the continued use of the terms *reinforcer* and *punisher*:

The modification of behavior by a reinforcer or by a punisher depends not only upon the occurrence of a certain kind of consequent environmental event but also upon the qualitative and quantitative properties of the ongoing behavior preceding the event and upon the schedule under which the event is presented (p. 176).

Thus, the transsituational properties of reinforcers and punishers are questioned. In addition, Morse and Kelleher present data which demonstrate consequent events change in function as a result of scheduling. Applied behavior analysts have recognized for some time that a change in environment (discriminative stimulus properties) may change the function of a reinforcer or punisher. For example, the child whose behavior is reinforced by teacher attention in the classroom may show the effects of

punishment with the same attention on the playground. However, Morse and Kelleher's data suggest that the reinforcing effects of teacher attention could change to punishing in the same environment as a result of an increase or decrease in frequency of delivery. This has been recognized by lay persons and in a non-systematic way by professionals. The person who occasionally tells another, "well done", probably reinforces that other person. The effect on behavior is, however, very different when "well done", "great", "good job", etc. are delivered on a continuous reinforcement schedule.

Summary

This paper has presented examples of basic research that may have implications for applied behavior analysis. The research presented is not exhaustive, nor are the implications. The intention of this manuscript was to suggest some of the behavior principles which are currently available to applied behavior analysts.

Much of the basic work points to multiple sources of behavior control. A possible reaction to this complexity would be to give up any attempt to analyze or modify human behavior. This reaction is not necessary. Applied behavior analysis has produced a powerful technology of behavior that, as it stands, seems superior to any other approach. However, case failures, problems of follow-up, and excessive variance in data may be functions of principles presented here or other processes which are undiscovered or unknown. In short, current laboratory evidence continues to suggest new directions for applied behavior analysis.

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