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THE EXPERIMENTAL ANALYSIS OF HUMAN BEHAVIOR BULLETIN

The EAHB Bulletin is published twice yearly, in the Spring and Fall, by the Experimental Analysis of Human Behavior Special Interest Group (EAHB SIG), a group organized under the auspices of the Association for Behavior Analysis (ABA). See the inside back cover for information about joining the SIG and contributing to the Bulletin.

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A STRATEGY FOR DESIGNING SCHEDULES
WITH DISCRETE OR CONTINUOUS
RESPONSE AND REINFORCER DIMENSIONS

Dean C. Williams
University of Florida

Jim Johnston and I have been developing an approach to reinforcement schedules that is designed to more fully and directly represent human behavior as it occurs in non-laboratory environments. Although our general conceptualization of schedules and our laboratory procedures are fundamentally consistent with existing traditions, there also are some marked differences.

We hope to provide a bridge (or at least some stepping stones) between the traditional literature on laboratory schedules of reinforcement and more complex human behavior. It is a matter of some concern that the behavior of humans in their natural environment (or even under contrived conditions) may not readily resemble the discrete responses and consequences that define the study of traditional reinforcement schedules. As one example, consider the behavior of playing the violin. The complex relations of pressure, duration, angle of the bow, and the quality of the resulting sound do not fit the traditional analysis of contingencies as currently represented in the experimental literature.

In traditional schedules, variation in dimensions of responses and reinforcement are constrained or controlled within narrow limits, such that measurement requires only that discrete instances be counted. As the example of violin playing illustrates, analysis of some behavior requires more than the discussion of discrete events. Similarly, clinically important behavior change often depends on changing not only the frequency of discrete instances of behavior, but also the duration, forcefulness, topography, or a host of other dimensions of the behavior.

Taking a lead from Lindsley's conjugate reinforcement procedure and

Logan's incentive schedules, we began to systematically recast traditional schedule contingencies. We decided that the increased complexity might be addressed by allowing greater variability in responses and reinforcement to directly enter into the relation. This was done by recasting contingencies in terms of continuous response and consequent stimulus dimensions, that is, dimensions that may assume any value along a continuous scale. This perspective in no way denies or abandons the methods or findings of the extant literature; instead, it is intended to be complementary.

Our strategy is to formulate contingencies by considering responding and reinforcement in terms of the continuous dimension of duration as well as the traditional discontinuous dimension of count. This yields contingencies involving: (a) response count and reinforcer count (corresponding to traditional contingencies), (b) response duration and reinforcer count, (c) response count and reinforcer duration, and (d) response duration and reinforcer duration. Observing performance under all four allows comparison of the novel schedules with each other and with the more traditional contingency. In addition, the data on the traditional contingency provides a way to evaluate the overall adequacy of our experimental procedures by allowing us to compare our results with those in the existing literature.

The mathematical relation between the response units and stimulus units is the same across the four types of contingencies. As an example, the first relation we studied was a simple fixed ratio. For each of the four

contingencies, units of the reinforcement were contingent on units of responding on a 1:1 basis (FR 1). These contingencies may be translated as follows: one response produces one reinforcer (Count-Count); one response produces one second of reinforcement (Count-Duration); one second of responding produces one reinforcement (Duration-Count); and one second of responding produces one second of reinforcement (Duration-Duration).

The traditional schedule (Count-Count) is relatively easy to envision because behavior analysts have a long history with counting relations. The duration of the response is usually irrelevant except to meet some minimum value defined by the transducer, and the duration of the reinforcer is usually set to some fixed value.

Defining the contingency in terms of response duration (not a response event of a specified duration) means that the duration must accumulate for reinforcement. In this schedule (Duration-Count), response number is irrelevant (to the schedule, not necessarily to the subject), and one reinforcer may be obtained following ten responses lasting one-tenth of a second each or one response lasting one second.

The Count-Duration contingency is similar to the traditional response requirement, but each response produces one unit of reinforcement duration, allowing reinforcers of variable durations depending on the rate of responding.

The final condition programmes a 1:1 correspondence of reinforcement duration to response duration. Thus, the duration of the reinforcement is equal to the duration of responding. To directly compare performance under the four generic schedule contingencies incorporating response and consequence count and duration, the apparatus must allow a response that can be emitted both continuously and in discrete cycles, and a reinforcing stimulus that can be presented continuously or as a discrete event. The manipulandum that we used is a plain wheel that can be

turned freely. As a reinforcing stimulus, we use a machine that provides controlled presentations of reading material. This reinforcer was selected because it may be presented continuously with little satiation. It was also selected to take advantage of the histories of the subjects housed in our vivarium (the introductory psychology classroom).

The machine projects reading passages one line at a time onto a screen. The rate with which these lines are projected and the duration that text may be viewed is controlled by standard relay equipment. Subjects readily respond to produce the projected lines of text, and their scores on comprehension tests prove that they do read the material.

We have always shaped responding and only occasionally have we had to resort to modeling the response. Instructions are minimal and generic to all conditions, and we have had little apparent interference of instructions with sensitivity to the contingencies. Differentiated performance usually develops gradually over several sessions depending on the particular schedule contingencies.

Our initial research examined performance under FR 1 and extinction. Lately the conception and procedure have been expanded to larger fixed-ratio schedules and to fixed-interval schedules.

Fixed-ratio schedules may be defined as a mathematical ratio of response units to reinforcement units along any dimension. This class of schedules convert from cumulative number to cumulative duration when response duration is related to reinforcement. The mathematical relation of the ratio of units of the response dimension to units of the stimulus dimensions can remain constant. Thus, on a FR 10 schedule, reinforcement could be presented following 10 responses or 10 seconds of responding. A similar ratio contingency between response count and reinforcement duration would allow one second of reinforcement for every 10

responses. And an FR 10 contingency between response duration and reinforcement duration would provide one second of reinforcement for every 10 seconds of accumulated response duration.

Under fixed-interval schedules, a single response following a fixed period produces a reinforcer. If the schedule is modified to relate response duration to reinforcement, then a second of response duration must accumulate following a fixed period to produce either a single reinforcement or a second of reinforcement.

Generally, markedly different patterns of responding have been obtained under the four classes of experimental relations (Count-Count, Duration-Count, Count-Duration, Duration-Duration). The patterns are largely determined by the nature of the response dimension. For example, schedules of response count produced short duration, discrete responses at higher rates; response duration contingencies produced responses of long duration with highly variable rates.

The type of reinforcement schedule (FR, FI) determined the patterning or distribution of responding, and these patterns are generally similar to traditional patterns under ratio and interval schedules when measured along the correct dimension. The FR 1 schedule produced moderate rates on count schedules and steady long duration responding on duration schedules: higher ratio schedules produced very high run rates or a single uninterrupted long duration response depending on the response dimension. Fixed-interval schedules produced temporal patterning in either the number of responses or response duration.

The nature of the reinforcer dimension also influences responding. The effects are subtle and complex, however, and we still are in the process of analyzing them.

A more detailed description of our findings will be available in a poster that Jim Johnston and I will be presenting in the SIG's Group Poster Session at the ABA convention in May.

WINNERS OF THE GRADUATE STUDENT REVIEW PAPER CONTEST

Barbara Wanchisen (Baldwin-Wallace College) has announced the results of the SIG's third annual contest for graduate student review papers. Six entries were received, three of which were selected for awards. The winners are:

Daniel Cerutti (Temple University), "Discrimination Theory of Rule-Governed Behavior"

Thomas Critchfield (West Virginia University), "Experimental Analysis of Private Events: An Evaluation"

Henry Riegler (University of Kansas), "A

Developmental Analysis of Rule-Governed Behavior"

Each paper was examined by at least two members of the judging panel, and detailed written reviews were sent to the authors. Besides Barbara, the judging panel consisted of Alan Baron, Phil Chase, Sam Deitz, Mark Galizio, Sigrid Glenn, Lexa Logue, Ed Morris, Tom Tatham, and Robert Zettle.

The winners will present their papers at the ABA Convention in Nashville on Tuesday, May 26, from 11:00 a.m. to 12:50 p.m. in the Cheekwood Room. Barbara will present the authors with plaques at that time.

RESEARCH PROFILE

Vicki L. Lee
Monash University

My current position is Lecturer in the Faculty of Education at Monash University. My responsibilities include designing and teaching courses, supervising research students, and conducting research. I have held this position since May 1986, and I am still in the process of designing the courses and attracting an initial group of research students.

I am currently teaching three courses. One, taken by students working towards the Diploma of Educational Psychology, is a substitute for the research project taken in the fourth year of an Honors degree in Psychology. Students in this course design and conduct a research project under my supervision. This year's students are developing a behavioral analysis of the problem traditionally formulated as "learning from text." The second course is an introduction to behavior analysis, offered as part of the degree of Bachelor of Educational Studies. The third course, offered as part of the degree of Master of Educational Studies, concentrates on a functional analysis of verbal behavior.

The latter two courses emphasize the conceptual aspects of behavior analysis, reflecting my own interest in these matters. Further, both courses present behavior analysis as an alternative approach to the problems of psychology rather than as a cookbook approach to classroom management. As far as I can tell, presenting behavior analysis as an alternative psychology (rather than as behavior modification) is innovative in the context of Australian Faculties of Education.

I am currently supervising three research students. Broadly stated, the topics of interest to these students are social skills, spelling, and school refusal. The student interested in social skills is still formulating her

research problem. The student working on spelling intends to follow up some suggestions that Sanderson and I made in a paper that will appear shortly in The Analysis of Verbal Behavior. This paper explores some possible directions for an experimental analysis of the development of spelling repertoires. The student working on school refusal is preparing a literature review on the topic. She plans to analyze the literature in terms of the costs and benefits of school refusal, following a model suggested to us by Goldiamond's nonlinear contingency analysis.

My research interests fall under two broad headings: the philosophy of psychology, and the functional analysis of verbal behavior. Work under the first heading has been published in Behaviorism and The Psychological Record (Lee, 1983b, 1986). I have continued this work by exploring some of the ramifications of taking contingencies as the basic units of description in psychology. The results of this work are discussed in a book I have in preparation. I am thinking about how the results of this philosophic work might help to clarify criticisms (by non-operant psychologists) of the assumptions underlying social skills training. Rick Fleming, who is visiting Monash from the University of Massachusetts at Amherst, is working with me on this project. I am also preparing a review for the Journal of the Experimental Analysis of Behavior on a book entitled "A New Language for Psychoanalysis" (Schafer, 1976). Schafer proposes an action language for psychoanalysis, and his proposals have much in common with our insistence upon such a language for psychology.

My research on verbal behavior has appeared in Behaviorism, the Journal of the Experimental Analysis of Behavior, The Psychological Record, and Verbal

Behavior News (Lee, 1981a, 1981b, 1983a, 1984, 1985; and Lee & Pegler, 1982). My current interests include the project on "learning from text" mentioned earlier, developing a behavioral program for establishing various conversational patterns (giving free information, picking up free information, etc.) through textual instruction, supervised practice, and self-experimentation. As far as I can see, such a program would offer many opportunities for some interesting research on verbal behavior and would serve an applied function appropriate to my current position in a Faculty of Education.

I would welcome inquiries from colleagues and students interested in visiting Monash. The Faculty of Education usually provides visitors with an office, secretarial assistance, and access to computers. There is space for conducting research with human subjects, and children are available on campus in the Child Study Center attached to the Faculty. The Faculty has about 50 full-time academic staff from a variety of disciplines, including psychology, history, sociology, and administrative studies. Included among the psychologists are Drs. Chris Sharpley and Geof Molloy, both with applied behavioral interests.

Monash University has 14,000 students and is located 20 km south-east from the city center of Melbourne. Melbourne has a rich cultural life and an abundance of good restaurants. It has three universities (Monash, Melbourne, and LaTrobe) and a number of colleges.

Anyone with applied behavioral interests who would like to visit Melbourne should contact Dr. Chris Sharpley. Chris is a member of the Australian Behavior Modification Association and a member of the Board of Editors of the Australian journal Behavior Change. I would especially welcome inquiries from people who take an operant approach to human behavior or

who have a philosophic interest in radical behaviorism.

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Note

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ON THE DISTINCTION BETWEEN SETTING EVENTS AND STIMULI

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The three-term contingency model has been criticized at recent meetings of the Association for Behavior Analysis for failing to give adequate attention to the nature and operations of setting events. I agree that the model lacks precision with respect to the distinction between setting events and stimuli. But I disagree that setting events have been ignored by contingency theorists. Instead, stimulus events have been left out. This is a consequence of two other shortcomings of the contingency model. The first shortcoming is a failure to deal with subtle forms of action; the second is a failure to identify the psychological functions of all features of the experimental situation.

I would argue further that the lack of precision in the contingency model is not altogether unwitting. It is engendered by fully acknowledged and perfectly legitimate motivations of prediction and control, and occurs as a product of viewing events from the standpoint of an observer.

The lack of precision is not altogether witting, either. Analytical precision does not necessarily compromise prediction and control, and it is possible to develop an adequate account of stimuli, the subtle forms of responding coordinated with them, and the events making up the setting in which they are occurring without such compromise. Precision with respect to setting events and stimuli requires a different sort of intellectual approach than is usually taken in our field, however. It may be achieved by approaching events not from the standpoint of the observer, but from the standpoint of the events themselves, and it is characteristic of the interbehavioral model to do so.

My aim, then, is to clarify the distinction between setting events and

stimuli, as articulated from an interbehavioral perspective. I do so on the grounds that more precision is better than less, and that it would be foolhardy to settle for less if more is available. It is not my purpose to suggest that the type of analysis characteristic of the interbehavioral model is "better" than that of the contingency model. The two analytic strategies are not incompatible. Quite the contrary, I believe they represent complementary forms of analysis and that together a more complete understanding of our subject matter may be achieved than if either bears the burden alone. With that introduction we may move on to the distinction between setting events and stimuli.

Setting Events and Stimuli

The nature of setting events. The focus of analysis from an interbehavioral perspective is a function obtaining between the responding of an organism and the stimulating of an object, called a behavior segment. Setting events are those events making up the field in which a particular behavior segment is occurring. They may have an organismic or an environmental character, and in some instances they may have aspects of both. Organismic setting events include such things as deprivation, satiation, fatigue, injury, and biochemical imbalance or other condition of ill-health. Environmental setting events include all ongoing events, as well as their pattern or organization, and all co-present objects with the exception of those occupying the role of stimulus object at a particular moment of observation. Setting events that include both organismic and environmental features consist of other behavior segments, for the most part.

Stimuli and the operations of setting events. The operation of setting events, that is, the role they play in a psychological event, is the actualization of potential behavior segments. To understand this role, we must examine more closely the concept of the behavior segment.

A behavior segment is a simultaneous interchange between stimulation arising from a source object and responding arising from a source organism. Both object and organism may harbor numerous functions, that is, a given object may be capable of stimulating a variety of responses with respect to it, including responses normally stimulated by other objects; and, accordingly, a given organism may be capable of responding in a variety of ways with respect to a particular stimulus object. Responding and stimulating, bear in mind, are reciprocal phases of the same event.

The capability of each source to enter into behavior segments of enormous number and variety is a product of their history of reciprocal interaction. The functional properties of objects and organisms develop throughout their history of interaction, and it is this development to which we refer when speaking of setting events actualizing potential behavior segments. Which particular coordination of already established stimulus and response functions occurs at a given moment is said to be "determined" by the configuration of setting events operating in that field at that moment. From a contingency standpoint, setting events "set the occasion" for behavior segments.

Comparison of Contingency and Interbehavioral Models

This last statement -- that setting events set the occasion for behavior segments -- introduces a difference between the contingency and interbehavioral models with respect to the distinction between stimuli and settings. To set the occasion for

response events of a particular type is not the role of setting events from a contingency perspective. It is, rather, the role of stimulus events, discriminative stimuli in particular.

To clarify this difference we may use a simple tone discrimination as an example. A food-deprived rat, with a history of reinforcement for lever pressing, is placed in an experimental space containing a houselight, speaker, food dispenser, and a lever. A tone alternates with silence every 39 seconds. Pressing the lever during the tone is reinforced with food, while pressing the lever in the absence of the tone is not reinforced. Pressing eventually occurs more often in the presence of the tone than in its absence.

In analyzing this situation from a contingency perspective, we would say that the pressing response has come under the control of the tone as a stimulus, and that this relation is occurring in a setting consisting of the various features of the experimental space. More specific detail as to the constitution of the setting is not typically provided. It would appear to be limited to aspects of the physical environment, however, including the chamber walls, floor, and ceiling, the houselight perhaps, and the speaker. It may also include the food dispenser and the lever, although neither of these objects tends to be described in paradigmatic terms. They tend, instead, to be described as pieces of hardware, without reference to their psychological function. Moreover, the organismic condition of food deprivation would not appear to be included among the setting conditions. Organismic conditions tend to be described from an operations standpoint, and are categorized separately.

An interbehaviorist would make a different analysis of these events. From this perspective, pressing is regarded as a response occurring with respect to the lever as a stimulus, and this relation is held to be taking place in a setting consisting of the

organismic condition of food deprivation and the various aspects of the experimental space, including the tone-silence alternation.

Before dealing with the implications of this difference between the two models, let us make a further comparison. We may use the same example, taking another response as a point of departure this time. If pressing does come to occur more often in the presence of the tone than in its absence, then we must assume that the rat hears the tone. So let us examine which events are conceptualized as stimuli and which as settings according to the two models as it pertains to the response of hearing.

Within the interbehavioral model, hearing a tone would be analyzed as follows: the response of hearing occurs with respect to the tone as a stimulus, and this relation is occurring in a setting consisting of the various aspects of the experimental space, including the lever and the deprived condition of the organism.

A contingency analysis would hold that the response of hearing occurs under the control of the tone stimulus, and this relation is occurring in a setting consisting of the various aspects of the experimental space.

The differences between these analyses of the same event raise at least three issues. The first concerns the inclusion or exclusion of organismic conditions among the events conceptualized as setting factors. This is an issue of categorizing practices and the reasons for them. The second concerns the fact that pressing and hearing are conceptualized as occurring with respect to the same stimulus from a contingency perspective while, from an interbehavioral perspective, a different stimulus is correlated with each response. This is an issue of specificity, and it has implications for the analysis of more complex events. And, finally, there is the concept of control. It seems more appropriate to invoke this concept in the context of pressing responses than in the context

of hearing responses. Added to this is the fact that a concept of control is not invoked in the interbehavioral description of either event. The issue here is one of descriptive standpoint -- observer versus event. We will consider each of these in turn.

Status of organismic conditions. Whether organismic conditions ought to be included among the factors constituting the setting of a psychological event is not an arbitrary decision. Categorization is achieved on the basis of common function and in accordance with established categories. In the present case, the relevant, established category is the unit of analysis. Interbehaviorists and contingency theorists have isolated different units of analysis, and it is for this reason that interbehaviorists include organismic conditions among the factors making up the setting while contingency theorists exclude them.

In the contingency model, response events are not conceptualized as phases of unitary functions involving stimulus events. Rather, responding is conceptualized as one event, stimulation as another. It is this conceptualization that is reflected in such pairs of terms as "dependence" and "independence" or "cause" and "effect," neither of which are used in the interbehavioral model. Without comment as to the advisability of these concepts, we may draw from them the logic of omitting organismic conditions from the account of setting factors: As long as response events can be isolated from stimulus events, it makes sense to categorize factors influencing the source of responding differently from those influencing the source of stimulation. Hence, deprivation conditions are not conceptualized as setting factors along with other features of the experimental space.

The units of analysis isolated by interbehaviorists, on the other hand, are interdependent stimulus-response relations. As such, any factor having an impact on either source influences the interdependent event. And, as long

as categorization is achieved by way of common function, there is no reason to distinguish between organismic and environmental conditions as setting events. Hence both are included in the same category.

Specificity of the stimulus-response relation. The second difference between the two models concerns the fact that lever pressing and hearing are conceptualized as occurring with respect to the same stimulus from a contingency standpoint, while each response is correlated with a different stimulus when approached from an interbehavioral perspective. Related to this issue is the fact that such activities as hearing are not typically addressed by contingency theorists in a context of this sort.

The outcome of failing to consider certain types of response events, coupled with what may be called a lack of specificity in the contingency conception of stimulus events, is a lack of precision in our analyses of psychological events. I will elaborate after considering another difference between the two models.

Concept of control. The third difference also is an issue of categorization. Because of its implications, however, it is a more important issue than whether organismic conditions ought to be categorized as setting events. Of concern is whether a concept of control is always necessary. It seems appropriate in the description of the relation between the tone and the pressing response, but not as appropriate in the case of the tone and the hearing response. To describe the relation between sound and hearing as one of control seems somewhat superfluous. And given the absence of a concept of control in the interbehavioral description of both of these events, the issue might better be phrased: Is a concept of control ever necessary, and, if so, under what specific conditions is it necessary?

The superfluousness of a concept of control in the description of the relation of sound to hearing arises from

the fact that the presence of control implies the possibility of its absence, as well as a distinction between that which controls and that which is controlled. Neither of these possibilities exists in the context of a response such as hearing. Unless there is an act of hearing on the part of a given organism, no tone occurred for that organism. A concept of control in events of this sort is superfluous -- hearing and the thing heard are reciprocal phases of a single event (as are pressing and the thing pressed).

The concept of control is not superfluous in the case of the pressing response, however. The failure of an organism to make a pressing response, given a tone, does not necessarily mean that the tone did not occur for that organism. It means, instead, that the stimulus function of the lever was not actualized by the tone in that particular instance, and this might have been a product of any number of ongoing events.

Why should the operation of a stimulus be so different in these two cases? Are we to assume that the function of a stimulus, paradigmatically speaking, depends on the nature of the response event involved? If this is assumed in the contingency model, how many types of functions are there, and on what more specific grounds are we to distinguish one from the other? More to the point, does it make sense to include functionally different events in the same technical category?

I think most contingency theorists would agree that the answer to this last question is surely "No." It does not make sense to include functionally different events in the same technical category, because to do so would violate the only rule upon which categorization is achieved in this field. In fact, it is probably contingency theorists' reluctance to include functionally different events in the same category that accounts for their failure to identify the psychological functions of all aspects of the experimental situation, among which may be included

the operanda involved. Were the psychological functions of objects of this sort identified, it would become apparent that the tone is not the stimulus with which the response of pressing is coordinated. That stimulus is the lever.

Summary of differences between the two models. In short, contingency theorists have not neglected setting events, but they have neglected the lever and its technical function. And when the technical function of the lever, as a stimulus coordinated with pressing responses, is considered, the nature and operation of setting events may be adequately differentiated from those stimulus events. The actualization of a stimulus function, that is, the occurrence of a behavior segment, is not the role of a stimulus. The stimulus is an integral part of that event. The actualization of a stimulus function is the role of a setting event, or, more precisely, the role of a configuration of setting events. The tone, in having this role, is a feature of the setting.

Observational Standpoints

Why the neglect of stimulus events in the contingency model? Sometimes our scientific objectives are decidedly and immediately practical in nature. When this is the case, events are described from the standpoint of the observer and in terms of their operations with respect to other events. This is the type of analysis characteristic of the contingency model. The lack of precision with respect to concepts of stimuli and setting events, apparent in the contingency model, is dictated by the practical objectives of its adherents. Unlike stimulus events, setting factors can be isolated from response events, and this is why the concept of control does not seem superfluous in considering the relation between the tone and the pressing response. Setting events, not stimuli, "exert control" -- and contingency theorists are interested in control.

Control, of course, is not an aspect of the events themselves. It is a construction articulated out of practical considerations, and it comes in two varieties: We may speak of control as a force of some sort -- as something at time X that causes something to happen at time Y. Or we may speak of it in less forceful terms, meaning little more than the temporal relation itself. It is in this latter sense that most contingency theorists use the term. The specific interpretation of control is not at issue here. What is at issue is that a temporal construction of some sort is always involved in conceptualizations of control.

We must keep before us that time is not an operation; it is not even an event. It is a metric, not unlike length or weight. As such, if we are to invoke a concept of time in our explanations of events, we must be prepared to say just what it is that time measures. We will not be able to do so if we are restricted to analyses of events from this standpoint; it is not itself subject to analysis. What time actually measures can be understood only from the standpoint of the events themselves.

Events from the standpoint of the events themselves. Events tend to be described from the standpoint of the events themselves when the objectives of scientists are not immediately practical; when the interest of the scientist is "knowing about," not "knowing how." In such descriptions, there is an emphasis on the specific character of the events under consideration and the simultaneity of their interactions with other events. From an event standpoint, the only legitimate temporal construction is the continuously evolving present. As such, the concept of time is replaced by reference to spatial arrangements of particular events. And because the concept of control is meaningless in the absence of a meaningful temporal construction, the concept of control is abandoned. Interbehavioral analyses

have this character.

In approaching events from their own standpoint, we find among them events too subtle to have become aspects of analyses from the more familiar standpoint of the observer. No one denies the existence of such events, it is simply that their inclusion in descriptions of events from an observer perspective is not necessary to achieve the purpose of analysis characteristic of this perspective. But if our purposes are otherwise, we must be prepared to include them in our descriptions. Perceptual activities, as well as subtle forms of intellectual activity, remembering and feeling, must all be considered in our analyses. Likewise, we must consider the psychological functions of all factors participating in the event fields under observation, including those of the operanda involved. If the purpose of analysis is to describe the factors participating in an event field, it is necessary to describe all of the participants, since an "incomplete description" is, in essence, a description of an entirely different event field.

Summary and Conclusion

The products of analysis achieved from an event standpoint are different

from those achieved from the standpoint of an observer, as are the purposes of analysis. Products are suited to purposes, and no one purpose is any more legitimate than another. There is, nonetheless, no reason to assume that different purposes and different products of analysis preclude the possibility of fruitful interchange.

All of our psychological laws and other constructions, including time, have their origins in our confrontations with complex sets of continuously evolving events embedded in continuously changing configurations of other factors. Time, as it is invoked in our descriptions of events from an observer standpoint, is nothing more than an abstract way of referring to such events. And control is nothing more than a useful way of referring to their relations. Neither exist among the events themselves. They exist in our descriptions of those events. Consequently, when an understanding of experimental findings articulated in time-based operational terms is lacking, our only recourse is to look again and more closely at the events making up those findings. There is every reason to believe that we may find among the events something of value -- something useful -- whatever our more specific scientific purpose.

PHIL'S FUN FACTS

1. What comedy team appeared on the Dick Cavett Show with Roger Ulrich and B. F. Skinner?
2. Name as many behaviorists as possible whose last name is the name of an animal.

(Answers on Page 16)

HUMAN OPERANT LABORATORY PRACTICES: SUBJECT RECRUITMENT AND RETENTION

James H. Joyce and Philip N. Chase
West Virginia University

This is the first in a series of articles on the laboratory procedures of the human operant research community. These articles are designed to provide information about human operant research that is not always emphasized in research articles and to help develop standard practices for conducting human research. For this article, EAHB SIG members were surveyed regarding their current methods of subject recruitment and retention. A total of 30 surveys were returned, however, multiple responses were received on some questions. Therefore, the total number of responses for each question vary in the following data summaries.

QUESTION 1: Where do you recruit most of your human subjects?

The most prevalent answer to this question, predictably, was undergraduate college courses with 20 of a total of 45 responses. Public and private schools were also a common source with 5 preschools, 3 secondary schools, and 2 elementary schools reported. A large number of different sources for contacting subjects were listed including: local and student newspapers, Mental Retardation institutions, Social Service agencies, day care centers, hospital clinics, and the general community.

QUESTION 2: What kinds of incentives, if any, do you offer to subjects for participating in experiments?

Money was the most often repeated incentive with 17 of the 46 responses followed by bonus credit in courses with 12. Other categories that were reported more than once were: edibles (3), points leading to lottery prizes (3), none (3), stickers (2), and fun

activities (2). One other innovative idea was reported. Subjects were paid \$65.00 at the beginning of a study on smoking cessation. The money was then refunded contingent on attendance at sessions and at follow-up appointments. This respondent also reported that being able to quit smoking was also an incentive.

QUESTION 3: If subjects are paid for their participation, please answer the following:

- a. How much do you pay per hour (average)?
- b. How much can subjects earn in the whole experiment?
- c. When do you pay the subjects?

A wide range of hourly wages were reported. Values ranged from \$1.50 to \$10.00 per hour with one report of 500 yen per hour (at press time the exchange rate was 142 yen per dollar). The total possible earnings across an entire experiment were also quite varied. Most respondents reported a range that depended on regularity of attendance and in-session performance. These values ranged from a low of \$20.00 to a high of \$500.00 (and 3,000 to 10,000 yen).

There was more consensus on when subjects were paid. Fourteen of 26 reported that subjects were paid at the end of the experiment, 5 paid subjects after each session, and 3 paid weekly. Three responded that subjects were paid for in-session performance after each session, and then paid attendance earnings at the end of the semester. One innovative contingency reported was paying subjects their previous day's earnings at the beginning of the session. This method seemed to assure that subjects will attend the next session.

QUESTION 4: If you use potential

reinforcers besides money, please describe them.

In addition to points toward chances at lottery prizes, and extra credit, other non-money reinforcers reported were: cartoon presentations, chances to play video games, edibles, toys, community-based reinforcers (i.e., favored activities), tokens, and generalized conditioned reinforcers (e.g., praise). Also reported was the use of music and television with the audio and video portions earned independently.

QUESTION 5: Do you establish contingencies for reliable attendance?

Of the 31 responses to this question nine said the attendance contingencies were established, and 11 said they were not. Five reported that attendance had not presented any problem requiring this kind of intervention. Most of the contingencies involved loss of money for no-shows, or incentive pay for each session attended. One researcher reported that subjects received a bonus if they attended 90% of the scheduled sessions.

QUESTION 6: Do you establish contingencies for performance during the experiment? If so, please describe the contingency and how it is presented to subjects.

In-session performance pay was most frequently reported (14/26). Six respondents said no performance pay was given. Also reported was the use of contingent praise, loss of reinforcement opportunities, tokens and 'cookies' on a video screen.

QUESTION 7: What restrictions does your institution place on the incentives

you may offer subjects for participating in experiments?

Of the 29 who answered this question, 16 reported that they knew of no rules restricting providing incentives to subjects. Three reported that university policies had been established to ensure that sources giving extra credit for participation in experiments also provide alternate methods for earning extra credit points. Two institutions working with special populations reported some restrictions on edible reinforcers, dependent on the subject's physical condition.

QUESTION 8: What is your approximate attrition rate for subjects recruited? (Please indicate if experimental circumstances must be considered).

Of the 28 responses to this question, 13 reported a less than 5% attrition rate. Nine reported attrition rates of between 10% and 20%, and 5 more between 25% and 30%. One researcher noted that for nonaversive procedures the rates were between 10% and 20%, but were between 30% and 40% for aversive procedures.

We hope you find this information useful. In the future you should receive surveys on: procedures for terminating subjects' participation, procedures for obtaining and using subjects' verbal reports, the extent of research activities at your institution, and the types and amounts of equipment used in your research program. These will provide you the opportunity to inform the EAHB community of innovative practices you have developed. Also let us know if there are any questions you would like us to include in our next survey.

RECENT AND FORTHCOMING PUBLICATIONS IN THE
EXPERIMENTAL ANALYSIS OF HUMAN BEHAVIOR

The following is a list of new articles and chapters by SIG members, compiled from responses to our questionnaire of February, 1987.

- Barrett, B. H., Johnston, J. M., & Pennypacker, H. S. (1986). Behavior: Its units, dimensions, and measurement. In R. O. Nelson & S. C. Hayes (Eds.), Conceptual foundations of behavioral assessment. New York: Guilford Press, p. 156-200.
- Bijou, S. W., Umbreit, J., Ghezzi, P. M., & Chao, C. C. (1986a). Psychological linguistics: A natural science approach to the study of language interactions. The Analysis of Verbal Behavior, 4, 23-29.
- Bijou, S. W., Umbreit, J., Ghezzi, P. M., & Chao, C. C. (1986b). Manual of interactions for identifying and analyzing referential interactions. The Psychological Record, 36, 491-518.
- Bennett, R. H., & Samson, H. H. (in press). Human performance under progressive ratio contingencies. The Psychological Record.
- Buskist, W., & Morgan, D. (in press). Competitive fixed-interval performance in humans. Journal of the Experimental Analysis of Behavior.
- Case, D. A., & Fantino, E. Instructions and reinforcement in the observing behavior of adults and children. Learning and Motivation. Accepted pending revision.
- Chase, P. N., & Parrott, L. J. (1986). Psychological aspects of language: The West Virginia Lectures. Springfield, IL: C. C. Thomas Publishers, Inc.
- Devaney, J. M., Hayes, S. C., & Nelson, R. O. (1986). Equivalence class formation in language-able and language-disabled children. Journal of the Experimental Analysis of Behavior, 46, 243-257.
- Deitz, S. M., Fredrick, L. D., Quinn, P. C., & Brasher, L. D. (1986). Comparing two correction procedures on human acquisition of ordering behavior. Journal of the Experimental Analysis of Behavior, 46, 1-14.
- Donahoe, J. W. (in press). Selectionist approaches to verbal behavior: Contributions to neuropsychology and connectionism. In L. J. Parrott & P. N. Chase (Eds.), Proceedings of the Summer Institute on Verbal Relations (tentative title).
- Donahoe, J. W. (in press). Ontogenic theory recapitulates phylogenetic theory. Journal of General Evolution.
- Donahoe, J. W., Palmer, D. R., & Carlson, N. C. (in preparation). Complex human behavior: A biobehavioral approach to cognition. Boston: MA: Allyn and Bacon.
- Doyle, P., Goldstein, H., & Bourgeois, M. (in press). Experimental analysis of syntax training in Broca's aphasia: A generalization and social validation study. Journal of Speech and Hearing Disorders.
- Dunlap, G., Koegel, R. L., & O'Neill, R. E. (in press). Maintaining performance of autistic clients in community settings with delayed contingencies. Journal of Applied Behavior Analysis.
- Ghezzi, P. M., Bijou, S. W., Umbreit, J., & Chao, C. C. (1987). Influence of age of listener on preadolescents linguistic behavior. The Psychological Record, 37, 109-127.
- Goldstein, H. (1985). Enhancing language generalization using matrix and stimulus equivalence training. In S. Warren & A. Rogers-Warren (Eds.), Teaching functional language (pp. 225-249). Baltimore, MD: University Park Press.

- Goldstein, H., Angelo, D., & Moussetis, L. (in press). Acquisition and extension of syntactic repertoires by severely mentally retarded youth. Research in Developmental Disabilities.
- Goldstein, H., Angelo, D., & Wetherby, B. (1987). Effects of training item selection on adults' acquisition of miniature linguistic systems. The Psychological Record, 37, 89-107.
- Goldstein, H., & Ferrell, D. R. (in press). Augmenting communicative interaction between handicapped and nonhandicapped preschool children. Journal of Speech and Hearing Disorders.
- Goldstein, H., & Wickstrom, S. (1986). Peer intervention effects on communicative interaction among handicapped and nonhandicapped preschoolers. Journal of Applied Behavior Analysis, 19, 209-214.
- Goldstein, H., Wickstrom, S., Hoyson, M., Jamieson, B., & Odom, S. (in press). Effects of sociodramatic play training on social and communicative interaction. Education and Treatment of Children.
- Hayes, S. C. (1986). The case of the silent dog. Journal of the Experimental Analysis of Behavior, 45, 351-363.
- Hayes, S. C., Brownstein, A. J., Haas, J. R., & Greenway, D. E. (1986). Instructions, multiple schedules, and extinction: Distinguishing rule-governed behavior from schedule controlled behavior. Journal of the Experimental Analysis of Behavior, 46, 137-147.
- Hayes, S. C., Brownstein, A. J., Zettle, R. D., Rosenthal, I., & Korn, Z. (1986). Rule-governed behavior and sensitivity to changing consequences of responding. Journal of the Experimental Analysis of Behavior, 45, 237-256.
- Hyten, C., & Burns, R. (1986). Social relations and social behavior. In H. W. Reese and L. S. Parrott (Eds.), Behavior science: Philosophical, methodological, and empirical advances. Hillsdale, NJ: Erlbaum.
- LeFrancois, J. R., Chase, P. N., & Joyce, J. H. (in press). The effects of a variety of instructions on human fixed-interval performance. Journal of the Experimental Analysis of Behavior.
- Perone, M., Galizio, M., & Baron, A. (in press). The relevance of animal-based principles in the laboratory study of human operant conditioning. In G. C. L. Davey & C. Cullen (Eds.), Human operant conditioning and behavior modification. Chichester, England: Wiley.
- Saunders, K. J., Pilgrim, C. A., & Pennypacker, H. S. (1986). Increased proficiency of search in breast self-examination. Cancer, 58, 2531-2537.
- Winterling, V., Dunlap, G., & O'Neill, R. E. (in press). The influence of task variation on the aberrant behaviors of autistic students. Education and Treatment of Children.

POSITION AVAILABLE IN
HUMAN BEHAVIORAL PHARMACOLOGY

Applicants are sought for a position at the Ph.D. level (pharmacology or psychology) which provides the opportunity for collaboration with individuals conducting human research in a psychiatry and pharmacology department. Current research involves behavioral pharmacology experiments on the effects of nicotine and other drugs of abuse on social behavior in a controlled laboratory setting. Research laboratory facilities are also available on inpatient ward.

Development of one's own research interests is encouraged, but collaboration on existing projects would be expected.

Salary is open and commensurate with experience. Applicants with post-doctoral experience will be proposed for assistant professor rank. Previous post-doctoral experience is not required. Experience with human experimental analysis of behavior and/or human behavioral pharmacology highly desirable.

Interested persons should send curriculum vitae, an outline of previous experience, research interests, and references to: Don R. Cherek, Ph.D., Department of Psychiatry, Louisiana State University School of Medicine, 1501 Kings Highway, Shreveport, Louisiana 71130-3932.

ANSWERS TO PHIL'S FUN FACTS (from Page 11)

1. Bob and Ray
2. Wolf, Fox, Foxx, Snapper, Lyon, Baer, Karp, Parrott, Trout, Lamb, Poche, Byrd, Griffin, ...?

ABOUT THE EAHB SIG

The Experimental Analysis of Human Behavior Special Interest Group (EAHB SIG) consists of over 110 members of the Association for Behavior Analysis (ABA). The group is organized to facilitate the growth of a multi-faceted experimental literature using human subjects to analyze the relations between behavior and the variables influencing it. The EAHB Bulletin serves the SIG by disseminating information that customarily is not published in the archival journals of behavior analysis.

CONTRIBUTORS are encouraged to submit materials such as articles about EAHB as a specialty area; research notes, e.g., information about specific procedures, anomalous findings, etc.; annotated bibliographies; research profiles; convention and conference notices; course materials; and job announcements and other news of interest to SIG members (see recent issues for examples). Submissions should be sent to the EAHB Bulletin at the address given below.

NEW MEMBERS may join the EAHB SIG by completing the membership form and sending it, along with a check for dues (see below), to the Bulletin.

CONTINUING MEMBERS may renew their membership for 1987 by sending their name and a check for dues (see below) to the Bulletin. Please write "Renewal" in the memo section of your check. Send the membership form only if you wish to report a change of address or interests.

DUES for 1987 are \$6 U.S. funds. Despite rising costs, the SIG has been able to hold dues at a low level because (1) mailing and administrative costs have been subsidized by West Virginia University, and (2) more than 35% of our members have generously added a voluntary contribution of \$2 or more to their dues. Unless this support continues, the SIG may have to cut back on its activities. If you can afford an extra \$2, please send it--the SIG will put it to good use in promoting the experimental analysis of human behavior.

ADDRESS all correspondence to: EAHB Bulletin, Department of Psychology, West Virginia University, P. O. Box 6040, Morgantown, WV 26506-6040.

Circle one: New Member New Address New Interests

Amount enclosed (U.S. funds, payable to EAHB SIG): \$6 \$8 \$10 \$12 \$ _____

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