EXPERIMENTAL ANALYSIS OF HUMAN BEHAVIOR BULLETIN

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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). Articles in the *Bulletin* represent the views of the authors. They are not intended to represent the approved policies of the SIG or ABA, or the opinions of the membership of the SIG or ABA. The inside back cover has information about joining the SIG. Publication costs are paid by the dues of the SIG members and by the Parsons Research Center of the University of Kansas.

We thank Brendan Tompkins and Julie Jeffery for help with this issue.

Guidelines for Submissions

Please send three copies of brief reports and one copy of other materials. In addition, send one clearly labeled, reproduction quality copy of each figure or table. For general information on preparing materials for publication in the *Bulletin*, we encourage authors to consult the author guidelines in the January issue of the *Journal of the Experimental Analysis of Behavior*. If possible, send text and figures of final versions on disk.

Brief Reports and *Technical Information* should be no longer than 2,000 words. They can be written in APA style (without an abstract) or in summary form. Please prepare figures and tables to fit the column or page width of the *Bulletin*. Incorporate information typically included in figure captions in the text.

Research in Progress may be up to 1,000 words long.

Laboratory Descriptions (as in Spring, 1990 and Spring, 1991 issues) may be up to 2,000 words long (including publication list).

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Please submit brief reports, technical information, and laboratory descriptions to Bill McIlvane (Behavioral Sciences Division, E. K. Shriver Center, 200 Trapelo Road, Waltham, MA 02254); submit research in progress, abstracts, and news to Kate Saunders (Parsons Research Center, P.O. Box 738, Parsons, KS 67357).

Submit brief reports and technical information by May 1 and all other materials by June 7 for the Spring, 1994 issue.

1994 OUTSTANDING STUDENT PAPER AWARDS

The EAHB-SIG congratulates the recipients of Outstanding Paper Awards in its 10th Annual Student Paper Competition. The competition solicited student submissions addressing any topic relevant to the experimental analysis of human behavior. Established members of the SIG and selected guest experts served as peer reviewers on the manuscripts. On the basis of reviewer recommendations, this year's winners, and titles of their papers are:

Erik Augustson, University of New Mexico; The transfer of extinction and respondent eliciting functions through stimulus equivalence classes. (*Michael J. Dougher, sponsor*)

Carmenne Chiasson, University of New Mexico; Contextual control over the transfer of function through stimulus equivalence classes. (*Michael J. Dougher, sponsor*)

Adam S. Goodie, University of California-San Diego; The base-rate error in an experiential task: conditional and unconditional probabilities in human matching-to-sample. (*Edmund Fantino, sponsor*)

Hernan I. Savastano, University of California-San Diego; Choice, matching, and maximizing: A review of the literature. (*Edmund Fantino, sponsor*)

Hernan I. Savastano, University of California-San Diego; Human choice in concurrent ratio-interval schedules of reinforcement. (*Edmund Fantino, sponsor*)

The winners will be honored at an awards symposium at the 1994 ABA Convention in Atlanta where they have been invited to present a summary of their work. The symposium is scheduled for Saturday, May 28 from 9:00 - 10:50 in the Henry Room. Watch the Spring edition of the Bulletin for summaries of the winning papers. For information about the 1994-95 competition (submission deadline: September 19, 1994), write: Dr. Barbara J. Kaminski, Behavioral Biology Research Center, Suite 3000, 5510 Nathan Shock Drive, Baltimore, MD 21224-6823.

Thanks to all members of the SIG who offered to review papers. Special thanks to Barbara Kaminski, the competition coordinator, and the reviewers for this year's competition:

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HUMAN DRUG DISCRIMINATION AND THE NOVEL-RESPONSE PROCEDURE

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UNIVERSITY OF VERMONT

There is a long history of interaction between the experimental analysis of behavior (EAB) and behavioral pharmacology. Most often, principles and procedures from the EAB are put to use in the study of drugs and behavior. Our lab has taken advantage of this approach in the study of drug discrimination (DD) through the development and implementation of an alternative to standard two-response DD procedures in humans. Drug discrimination studies are an integral part in the investigation of drug-taking behavior because the effects of drugs may serve as discriminative stimuli in drug-seeking and thus play a role in the inception of such behavior (Stolerman, 1992). In standard two-response DD procedures, drug effects serve as discriminative stimuli such that in the presence of one drug stimulus (a training drug), responses on a particular lever are reinforced; and in the presence of another drug stimulus (usually placebo), responses on the alternative lever are reinforced. Thus, left and right responses are discriminated operants based on drug vs placebo discriminative stimuli. After training and the demonstration of acquisition of the discrimination, novel drugs are tested and results are interpreted based on the distribution of responding between the two levers. When novel drugs are tested under the standard two-response procedure, however, the results can be difficult to interpret. For instance, if a diazepam (Valium) vs placebo discrimination is trained and then a test of a particular dose of d-amphetamine (CNS stimulant) occasions responding on the placebo-appropriate lever, interpretation is difficult. One possibility, is that the test dose of d-amphetamine is inactive, and in that sense is "placebo-like," but as likely, the placebo-appropriate responding results from the fact that often drugs which are dissimilar to the training drug occasion placebo-appropriate responding with this procedure (Bickel, Oliveto, Kamien, Higgins, & Hughes., 1993). To address this, we developed a novel-response procedure which we anticipated would distinguish drug effects not identical to either training condition.

The research reviewed in this article was supported by United States Health Service Grant DA-06205 (W.K.B.).

GENERAL METHODS

We have completed several studies using the novel-response procedure (Bickel et al., 1993; Oliveto, Bickel, Kamien, Hughes, & Higgins, in press; Kamien et al., in press). The general method for these studies is as follows. Subjects first complete a training (or sampling) phase in which they are told at the time of ingestion which capsules they are receiving (e.g., drug A or drug B). Subjects complete four training sessions in which they have two exposures to each training stimulus. Next, subjects complete a test-of-acquisition phase in which they demonstrate the ability to discriminate the two training drugs by responding >80% capsule-appropriately on a fixed interval (FI) 1-s schedule of point presentation for four consecutive sessions within eight sessions. On the FI, the number of points accumulated is displayed continuously on the video screen. The schedule lasts 3 minutes and the number of points earned on each key are recorded and converted to monetary reinforcement at the end of the session. Then, for subjects demonstrating adequate discrimination, we introduce the novel-response procedure instructions (see Appendix). The first two to four sessions in this phase under the novel-response procedure are acquisition sessions. The purpose of this phase is to make sure that the instructions containing the novel-response alternative do not disrupt the stimulus control of the training drugs. Testing of novel drugs and various doses of the training drug begins after successful completion of this second acquisition phase. On test sessions subjects are told only that it was a test and that the drug letter code will not be revealed until the end of the study. Tests-of-acquisition sessions are also interspersed among the tests to assure that subjects have maintained the discrimination.

Instructions are an important component of our human DD research. The novel-response test phase instructions (see Appendix) used in our studies indicate that (1) on a test session, if the drug a subject received was one of the training stimuli, then responses on either training key will be nondifferentially reinforced and (2) on a test session, if the subject receives a drug that is not like either of the training stimuli, only responses on the novel-response alternative will be reinforced. Importantly, our two-response instructions only indicate the former and not the latter contingency. The two-response test

phase instructions do not indicate a response appropriate to a stimulus that differs from either of the training stimuli. Reinforcement for test sessions under both procedures is withheld until the completion of the study. Through a pilot study at our laboratory, we found that instructions which delay differential reinforcement for novel-appropriate responding were necessary to occasion novel-appropriate responding with d-amphetamine (Bickel et al., 1993).

RESEARCH TO DATE

Initially, we were interested in testing this new procedure using drugs which were dissimilar to our training drug, the benzodiazepine triazolam (Halcion). We chose to begin with d-amphetamine because in animal studies using a benzodiazepine discrimination, d-amphetamine occasions only placebo-appropriate responding under the standard two-response procedure (Kamien, Bickel, Hughes, Higgins, & Smith, 1993). This is also true of humans trained to discriminate diazepam vs placebo (Johanson, 1991). We tested d-amphetamine (5 and 20 mg/70 kg) under both procedures. Figure 1 shows the group mean (n=4) percentages of triazolam- and novel-appropriate responding during the FI 1-s schedule. The left panel shows the two-response procedure. As predicted, d-amphetamine occasioned predominantly placebo-appropriate responding under the two-response procedure with both doses of d-amphetamine occasioning 100% placebo-appropriate responding in three of the four subjects. Importantly, under the novel-response procedure (Figure 1, right), both doses of d-amphetamine occasioned 100% novel-appropriate responding in three of the four subjects. The fourth subject showed 50% novel-appropriate responding at the higher dose. These results suggested that the novel-response procedure advances DD research since the selectivity of placebo-appropriate responding was increased. Thus, under the two-response procedure the effects of d-amphetamine were not differentiated from placebo, while under the novel-response procedure the effects are clearly different from both training conditions.

The next step in our investigation of the novel-response procedure involved testing drugs which occasion partial generalization under the two-response procedure. Partial generalization occurs when responding to the test drug is split between the alternatives in a two-response DD procedure. There are several possible interpretations of such results, including (1) that the test drug shares the discriminative stimulus effects of the training drug, but at a lower intensity, (2) that the discriminative stimulus effects overlap, but are not identical to those of the training drug, (3) that the discriminative stimulus effects are completely different from either training condition, and (4) that partial generalization occurs as a result of a disruption of stimulus control. We anticipated that the novel-response procedure could aid in the interpretation of partial generalization in DD studies.

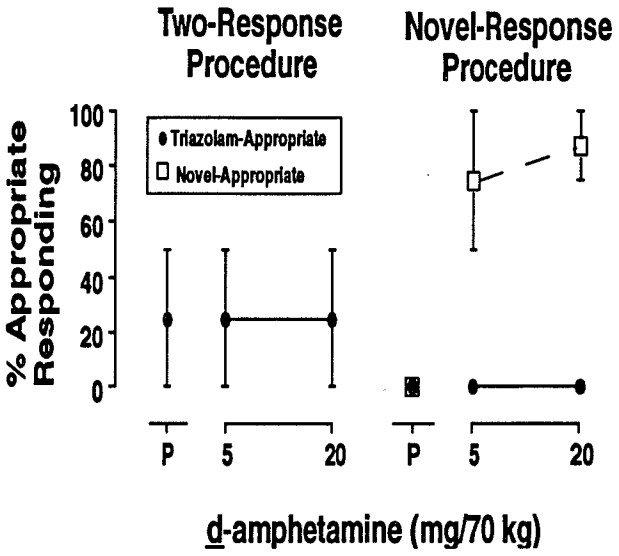

Figure 1

Buspirone, a non-benzodiazepine anxiolytic, has occasioned partial generalization in animals trained in a benzodiazepine discrimination (Ator & Griffiths, 1986). Hydromorphone had not previously been tested in a benzodiazepine discrimination. We predicted that hydromorphone, an opioid receptor μ agonist, would occasion mostly novel responding. In our studies, both buspirone (7.5, 15 and 30 mg/70 kg) and hydromorphone (1.0, 2.0, 4.0 and 6.0 mg/70 kg) were assessed only under the novel-response procedure. Buspirone (n=6, Figure 2, left) occasioned dose related increases in novel responding, reaching a maximum of 58% novel responding at the highest dose. There was a maximum of 25% triazolam-appropriate responding at the intermediate dose of buspirone, while at the lowest and highest doses, less than 20% triazolam-appropriate responding occurred. The group results (n=7) from tests of hydromorphone are shown in Figure 2 (right). Hydromorphone occasioned mostly placebo-appropriate responding

at the lower test doses and 57% novel-appropriate responding at the highest test dose. The intermediate doses of hydromorphone occasioned variable responding across the three response alternatives. For both hydromorphone and buspirone, there was mixed responding, with dose related increases in novel responding. This result suggests that partial generalization of buspirone under two-response benzodiazepine DD procedures results from the discriminitive stimulus effects of these test drugs overlapping with, but not being identical to, the training drug. The results with hydromorphone and buspirone, in addition to those with d-amphetamine in the earlier study, suggest that the novel-response procedure can differentiate not only drugs which are dissimilar to the training drug, but also drugs which share some, but not all, of the discriminative stimulus effects of the training drug.

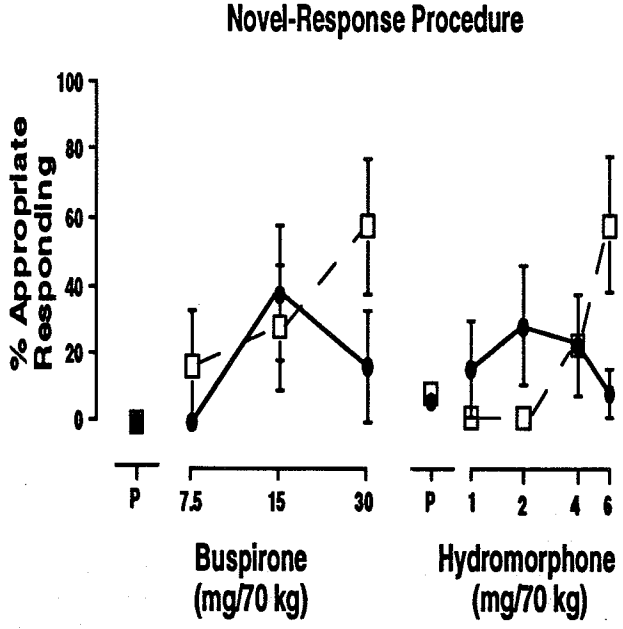

Figure 2

We were also interested throughout the studies in testing other benzodiazepines as well as various doses of the training drug under the novel-response procedure. With this new procedure, tests with drugs which are similar to the training drug were needed to investigate how narrow the substitution profiles generated under the novel-response procedure are. For example, lorazepam is an atypical benzodiazepine, in that the substitution profile in animal studies is inconsistent. In a lorazepam vs placebo discrimination in baboons and rats, pentobarbital does not fully substitute for lorazepam, which is not typical of the substitution profile when other benzodiazapines are used as the training drug (Ator & Griffiths, 1986; Ator & Griffiths, 1989). Diazepam, on the other hand, fully substitutes for other benzodiazepines in two-response DD procedures. We tested both lorazepam and diazepam under the novel-response procedure (Figure 3). With lorazepam (n=6, left), there was a clear dose-dependent increase in triazolam-appropriate responding. The intermediate dose of lorazepam occasioned mixed responding across the three response alternatives. A maximum of 17% novel-appropriate responding occurred following lorazepam at the intermediate doses compared to no novel-appropriate responding occasioned by any test dose of diazepam (n=7, Figure 3, right). Importantly, various doses of triazolam were tested throughout these studies with virtually no novel-appropriate responding (Bickel et al., 1993; Oliveto et al., in press; Kamien et al., in press). These results taken together indicate that an atypical benzodiazepine such as lorazepam occasions discriminable effects which overlap, but are not identical to, those of triazolam. Diazepam, on the other hand, completely substitutes for triazolam, which is consistent with other studies.

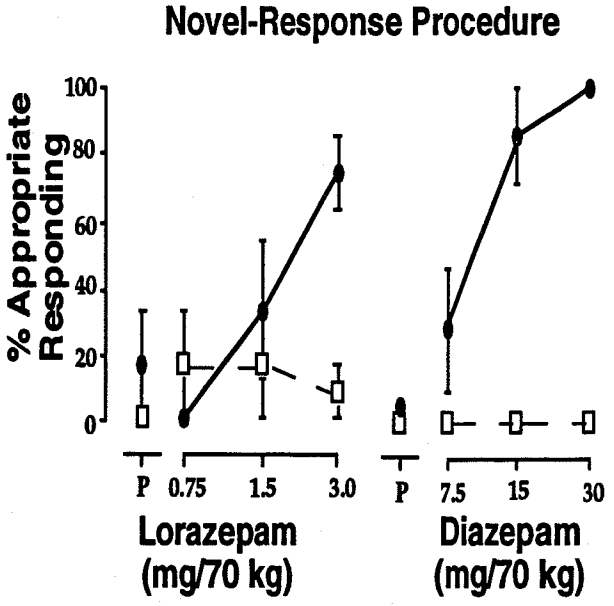

Figure 3

CONCLUSION

The novel-response procedure is based on principles from the experimental analysis of behavior. Via instructions including the differential reinforcement contingency for novel-appropriate responding, we are able to occasion novel responding to drugs with discriminative stimulus effects unlike either training condition. The procedure was initially developed to further our understanding of the over-inclusiveness of placebo-appropriate responding in human DD research. Overall, the novel-response procedure has thus far been a useful alternative to the standard two-response alternative for at least three reasons. First, as seen with the tests of d-amphetamine, the selectivity of placebo-appropriate responding is increased under the novel-response procedure relative to the two-response procedure. Second, as shown with buspirone, hydromorphone and lorazepam, the novel-response procedure can aid in the interpretation of partial generalization. Third, the finding that diazepam and doses of triazolam occasion only triazolam-appropriate responding under the novel-response procedure indicates that there is still generalization of the discriminative stimulus effects of the training drug, triazolam, to other benzodiazepines. In future studies using this procedure, we plan on further investigation of partial generalization using the crossover design. We also anticipate that the novel-response DD procedure will be helpful in interpreting studies of functional antagonism which is also difficult to interpret using the standard two-response procedure.

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APPENDIX

Novel-Response Test Phase Instructions

For this part of the experiment, you may have a __ day, a __ day, or a test day on any given session. On a test day, the drug you receive may be precisely __, precisely __, or may not be precisely like __ or __. You will not be given any information at the beginning of the session to indicate which drug you received, or if it is a test day. You will proceed with the computer tasks and indicate which drug you received. Use the left button to indicate drug __, the middle button to indicate drug __ and the right button when you believe the drug is not precisely like __ or __. At the end of the session, you will be told which drug you received, __ or __, or that it was a test session.

Bonus: If you had a test day and the drug you received was __ or __, you will earn the average amount you received on the last four __ and __ days only if you responded on either the __ or __ buttons. If you had a test day and the drug you received was neither __ nor __, then you will earn the amount you responded on the __ button. On every test day, you will not be told whether you received __, __ or __ until the end of the study. Thus, you will not be told how much you earned on each test day until the study is completed.

EXPERIMENTAL CONTROL OF COVERT ORIENTING

T. D. CALLAHAN, C. K. DEUTSCH, & W. J. MCILVANE
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The construct of attention has had a long and controversial history in the experimental analysis of behavior. For some, "attention" has been held as synonymous with "stimulus control" (e.g., Ray, 1969; Terrace, 1966). An organism was said to attend to a given stimulus if and only if behavioral control by that stimulus could be empirically demonstrated. For Dinsmoor (1985) and others, "attention" was an intervening variable. He argued that a stimulus had to make contact with the relevant sensory apparatus in order for a stimulus to control behavior. "To complete the [account]," he wrote. "... we are obliged to consider analogous processes occurring farther along in the sequence of events ... and commonly known as attention" (p. 365) (see also Macintosh, 1977).

To the limited extent that behavior analysts have studied attention, their goal has typically been to render it directly observable. For example, the subject might be required to emit some overt behavior to reveal the stimuli that will control (or potentially gain control of) subsequent behavior (Singh & Beale, 1978). Researchers in other behavioral sciences, such as neuropsychology, have endeavored to study attention more directly by experimentally manipulating conditions under which subjects sustain or selectively engage attention. The work of Michael Posner and his colleagues exemplifies a "cognitive neuroanatomical" approach, in which selective attention to visual, auditory, and tactile modalities are mapped to separate neuroanatomical systems (Posner, 1978, 1980, 1986, 1988; Posner, Peterson, Fox, & Raichle, 1988). They have studied procedures that reveal a phenomenon termed "covert orienting" of spatial visual attention, which appears to be driven in part by the parietal cortex (Posner, 1992; Posner, Walker, Friedrich, & Rafal, 1984).

How can covert orienting be studied? One widely studied paradigm is outlined in Figure 1. Subjects are instructed to fixate visually on a stimulus centered between two open squares on a computer screen. Periodically, the fixation stimulus is replaced by a "cuing" stimulus at the fixation point; the cue is followed very soon (e.g., 100 msec) afterward by the appearance of a "target" stimulus in one or the other of the outer boxes. The subject's task is to press a button as soon as a target stimulus appears in the boxes; response latency is recorded.

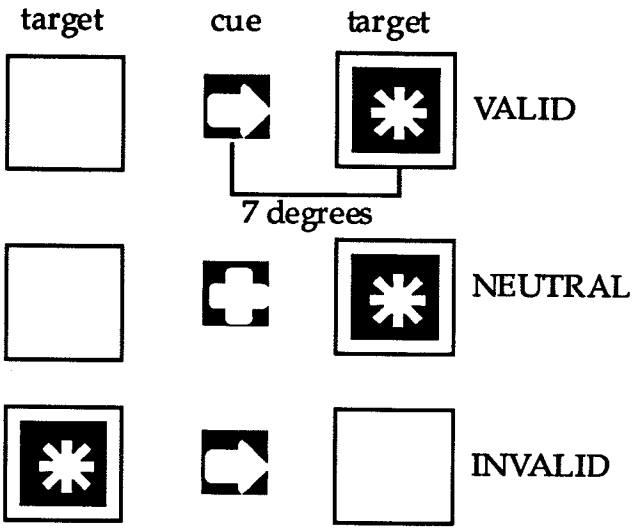

Figure 1

Three types of cuing stimuli are presented: "valid," "invalid," and "neutral." On valid trials, an arrow cue correctly indicates the box in which the target will appear. On invalid trials, the arrow incorrectly indicates that the target will appear in one box, but it actually appears in the other one. On neutral trials, the cue indicates that a target will be presented but does not indicate the box in which it will appear. The target stimulus onset can be easily observed without shifting one's gaze from the fixation point, enabling the subject to detect the target onset readily on every trial.

Comparison of the latencies on the various trial types can reveal an interesting systematic difference, based on the interpretation that the subject covertly orients to the cued box, thus facilitating target detection on valid trials and/or impeding it on invalid trials. Response latencies on the valid trials tend to be relatively short, those on neutral trials intermediate, and those on invalid trials tend to be relatively long.

We find covert orienting interesting as a model private event for experimental analysis. Although it is not directly observable, it is detectable, and it is likely influenced by the same variables that influence behavior in general. Previous studies of covert orienting have relied on statistical control; large numbers of subjects have been run in those studies. The present exploratory study was a step towards establishing direct experimental control of covert

orienting. Although our program is just underway, we have completed a preliminary study that has given us interesting findings. We report them in part to point out this research area to behavior analysts studying attention and private events more generally.

METHOD

Subjects

Six normally capable subjects served. Five were high school students serving 8-week research apprenticeships at the Shriver Center, Waltham, MA. The remaining subject (DEA) was a research technician at the Center.

Apparatus and Stimuli

Stimuli were presented on the screen of a Macintosh IIci computer via a program written in SuperCard (Silicon Beach Software). The program recorded responses (button pushes on the computer's mouse) and calculated response latencies to the nearest 1/60th second. As shown in Figure 1, cuing stimuli were small black squares inscribed with either a plus sign, right arrow, or left arrow; cues appeared at the fixation point, a 0.8 cm black square in the center of the computer screen. Target stimuli were black squares inscribed with white asterisks. Targets appeared in open squares 6.1 cm to either the left or right of the cue stimuli, subtending a visual angle of 7 degrees.

General Procedures

The high school students volunteered for one 20-minute session per day for 5 or 6 days. On each testing day, these subjects were given four 72-trial (see below) test blocks, each lasting approximately 3 m. Intertrial intervals (ITIs) varied unsystematically between 1,000 and 2,000 ms. Interblock intervals were approximately 2-4 m. The research technician was tested similarly, except that the testing was conducted as time and opportunity permitted in the course of her other duties. She completed 20 test blocks in 12 days.

Trial procedures. Trial parameters were adapted from Posner (1980). After a variable ITI, the fixation stimulus was replaced by a cuing stimulus (valid, invalid, or neutral) that had a duration of 150 msec. Target stimuli were presented 100 ms following cue onset on half of the trials and 800 ms later on the other half. (These values were included to facilitate comparison with earlier studies.) Following the subject's response, the target stimuli disappeared, and the ITI commenced. Cuing stimulus type and cue-to-target intervals (CTIs) varied unsystematically across trials, with the restriction that the same cue, target, or cue-to-target interval never occurred on three successive trials. There were two different sequences of trials, each presented in half of the blocks. Each sequence had 48 valid, 12 neutral, and 12 invalid trials. These trials presented intratrial event sequences that were fully counterbalanced for position and cuing stimulus.

Instructions. Prior to all subjects' first session, the experimenter gave the following verbal instructions:

> "Fixate on the center square throughout the entire session. In this square objects appear; these objects usually serve as cues. Cues normally indicate on which side the target appears. The target is a black square with a white asterisk inscribed. Each time you detect the target press the mouse button once."

These instructions were repeated in subsequent sessions if the results of a pre-session interview suggested possible confusion about the task.

RESULTS AND DISCUSSION

We report data only for the 100 ms CTI trials, because they are presumably more sensitive to covert orienting than the 800 ms trials. Our analysis excludes trials that had latencies 4 00 ms, because these latencies probably reflected behavior other than covert orienting (e.g., eye movements, lapses in vigilance [Holland, 1958]). The analysis also excludes latencies 100 ms, because these likely included anticipatory responses made to the cue onset rather than the target stimulus presentation.

Figure 2 represents the data in six individual graphs. The first set of points gives mean latency on valid (filled squares) and invalid (open square) trials for each subject's first two test blocks. The second and third sets of points are the results of subsequent blocks, excluding the last two (see below); each point represents either 7 or 8 blocks.

Data from the first set of points for all six subjects shows that trials with valid cues had mean latencies that were 17 ms to 51 ms shorter than those with invalid cues. This initial mean latency disparity resembles that reported in numerous studies by Posner and his colleagues. In the subsequent blocks, however, the disparity diminished and/or disappeared; by the third set of points it had disappeared for 5 of the 6 subjects. Only DEA did not show this pattern of responding.

Why was the latency disparity not maintained for most subjects? Two possibilities, not mutually exclusive, seem possible. First, consider the nature of

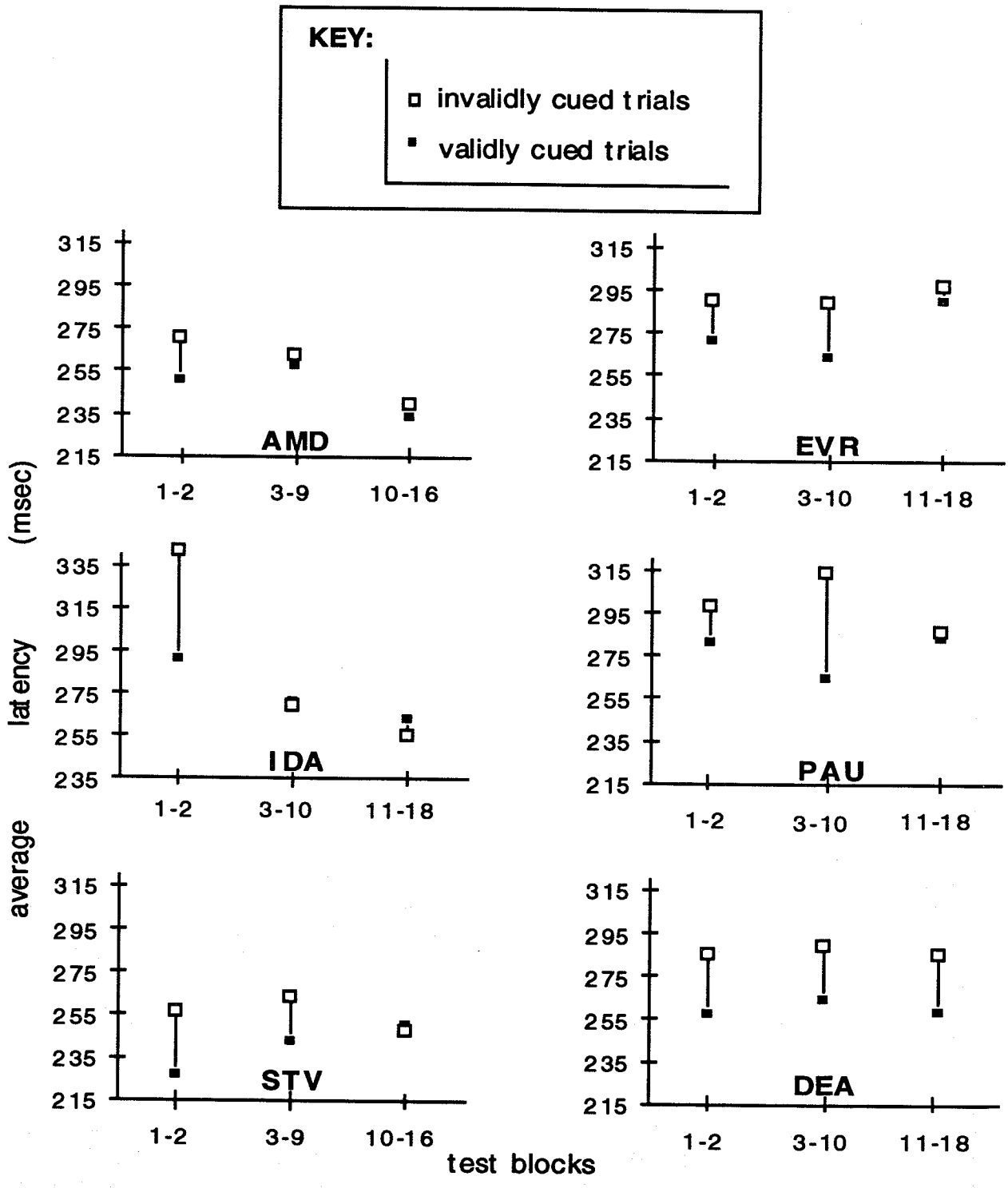
KEY:
invalidly cued trials
validly cued trials
average latency (msec)
AMD
EVR
IDA
PAU
STV
DEA
315
295
275
255
235
215
335
1-2
3-9
10-16
3-10
11-18
test blocks

Figure 2

the instructions. The subjects were told that the arrows would indicate the boxes in which the target stimuli would appear. However, they did not do so reliably; only 2/3 of the trials were valid. Loss of instructional control by the arrow might be predicted from studies showing that such control may depend upon a consistent relationship between the instruction and the contingencies it describes (e.g., Galizio, 1979).

Second, the nature of the task perhaps accelerated the loss of instructional control. Test sessions typically consisted of 12 m of fixating upon repetitively presented, visually uninteresting cue and target stimuli. It seems plausible that, when the task was novel, the subjects fixated consistently, oriented covertly, and responded promptly. However, as testing progressed and subjects wearied of the task, tight stimulus control by the instructions and experimental stimuli broke down.

Two features of the data seem consistent with an interpretation of flagging attention and diminishing motivation as testing progressed. Regarding the first, subject DEA, who exhibited a consistent difference at all three points in Figure 2, was older, permanently employed by the Center, and worked directly with the experimenters; perhaps some aspect of this relationship may have functioned to support compliance with experimenter instructions (cf. Hayes & Hayes, 1989) and a good effort on her part. By contrast, the high-school students' summer internships were ending. Experimenter approval was less likely to have functioned as a potent reinforcer.

A second observation consistent with a motivational explanation was the performance of certain subjects who were informed that the next test session was to be their last. Figure 3 shows the results of the final two test blocks for all subjects. Four subjects (EVR,IDA,STV,PAU) were made explicitly aware of the end of testing, and the fifth was likely aware (AMD called in sick on her last day). Under these circumstances, four subjects once again showed a noticeable difference between invalid and valid latencies. Perhaps these subjects were aware that they had failed to comply with the experimenters' instructions during testing; they may have wanted to finish with a good performance.

Work on this research paradigm is just beginning in our laboratory, yet we are encouraged by these efforts to establish experimental control of covert orienting. The valid/invalid trial latency difference was initially attained in all subjects. Moreover, the overall results suggest that covert orienting is influenced by its consequences. Currently underway are efforts to refine our methods. For example, we are planning to measure fixation directly via imaging of orbital orientation with respect to the CRT display. Doing so, we will be able to arrange contingencies that promote sustained attention to the task; target stimuli can be presented only when the subject's behavior indicates his/her readiness to respond. In addition, some work is clearly needed to determine how to prevent loss of control by the experimenter's instructions. Finally, planned studies will ask whether programmed contingencies can modify valid/invalid trial latency differences. Presumably, there would be a limit on modifiability, reflecting processing limitations of the central nervous system.

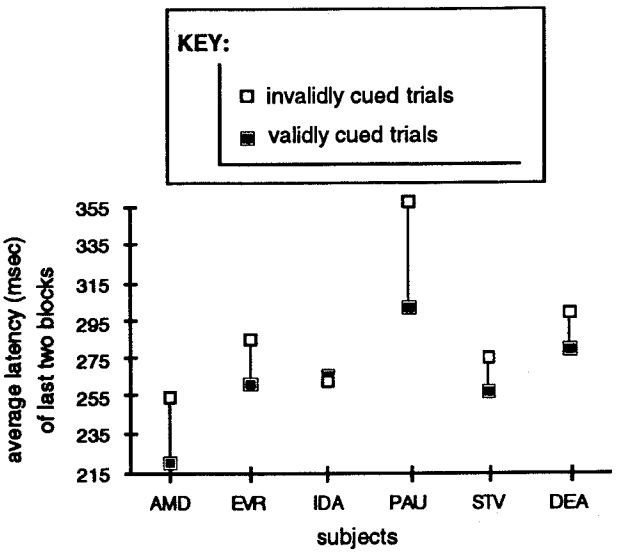

Figure 3

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LABORATORY DESCRIPTION: HUMAN BEHAVIORAL PHARMACOLOGY LABORATORY

DEPARTMENT OF PSYCHIATRY AND BEHAVIORAL SCIENCES

UNIVERSITY OF TEXAS-HOUSTON, HEALTH SCIENCE CENTER

The Human Behavioral Pharmacology Laboratory (HBPL) is located within a free-standing Institute (UTMSI) located in the Texas Medical Center. UTMSI is part of the Department of Psychiatry and Behavioral Sciences in the University of Texas-Houston Medical School. UTMSI serves as a clinical outpatient and research facility. Currently, HBPL consists of four research laboratories which conduct a variety of research activities using a total of 20 human operant test chambers. Research is supported by six NIH grants and an NIH training grant.

Primary investigators include: Don R. Cherek, Ph.D. (Professor), John D. Roache, Ph.D. (Associate Professor), Robert H. Bennett, Ph.D. (Assistant Professor), Ralph Spiga, Ph.D. (Assistant Professor), Donald M. Dougherty Ph.D. (Postdoctoral Fellow), and Terry J. Allen, BS (Graduate Student). These investigators are assisted by 7 research assistants. Most of the research activities of HBPL are associated with the Substance Abuse Research Center at UTMSI.

The following is a partial list of some of the research projects that are being conducted at HBPL.

GENDER COMPARISONS OF AGGRESSIVE RESPONDING (T. J. ALLEN)

Data are currently being collected to compare male and female aggressive responding under laboratory conditions. Subjects are men and women between the ages of 18-22 matched for educational and socioeconomic level, and with no history of illicit drug or tobacco use and no history of medical or psychiatric illness. Using the Point Subtraction Aggression Paradigm ©, subjects are provided with three response options: (1) pressing Button A to earn points, (2) pressing Button B to subtract points from a fictitious person, and (3) pressing Button C to protect their counters (points) from subtractions initiated by the other person. Aggressive and/or escape responding are engendered by subtracting points from subjects and attributing this to the other person. Aggressive responding will be correlated with self-report measures of aggressiveness. Preliminary results indicate that women respond as aggressively as men.

BEHAVIORAL TOLERANCE TO ALCOHOL (R. H. BENNETT)

Current research funded by a grant from the NIAAA is investigating operant learning in the development of behavioral tolerance to alcohol in human subjects. More specifically, these studies are investigating the role of reinforcement and performance feedback in tolerance development in social drinkers. The influence of task difficulty level is also being studied and how this variable may affect transfer of tolerance across similar tasks with varying difficulty levels. Future research interests will determine the influence of family history of alcohol abuse in behavioral tolerance development and how learning factors may interact with this variable.

EFFECTS OF METHYLPHENIDATE ON AGGRESSIVE RESPONDING OF CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) (D. R. CHEREK)

In this project we are using the Point Subtraction Aggression Paradigm © (PSAP) and two additional tasks to assess the acute effects of methylphenidate (0.0, 0.3 and 0.6 mg/kg) on laboratory measures of aggressive responding. In addition, the effects of methylphenidate on attention and performance are being evaluated using the Continuous Performance Task and a delayed matching-to-sample task. Preliminary results indicate that the effects of methylphenidate observed in the laboratory are directly related to effects observed outside the laboratory.

EFFECTS OF VIOLENT HISTORY ON AGGRESSIVE RESPONDING, SELF-CONTROL, AND CNS SEROTONERGIC ACTIVITY IN PAROLEES (D. R. CHEREK)

These studies will compare male and female parolees on measures of operant responding,

psychometric instruments, and potential biological markers. Half of the parolees will have documented histories of violence and half will have nonviolent histories. The two groups will be compared on measures of aggressive and escape responding using the PSAP, operant measures of self-control, questionnaires and on an assessment of CNS serotonergic activity using the neuroendocrine challenge method. Low serotonergic activity has been associated with increased aggressive behavior in nonhumans and humans. We hypothesize that subjects with violent histories will emit higher rates of aggressive responding, exhibit less self-control, and have low CNS serotonergic activity.

EFFECTS OF MARIJUANA SMOKING ON CHOICES BETWEEN RESPONSE CONTINGENT AND NONCONTINGENT REINFORCER DELIVERY (D. R. CHEREK)

Subjects are provided with a choice between response contingent and noncontingent reinforcer presentation. Points exchangeable for money are presented on a progressive-ratio schedule at the beginning of each session. The progressive-ratio schedule begins at FR 50 and increases by 10% following each point presentation. At any time during the session, subjects can complete a FR 10 on the change button which terminates the progressive-ratio schedule and initiates a FT 200-s schedule of response-independent point presentation. Studies are almost completed, and the results indicate that the number of points earned in the progressive-ratio segment are decreased by marijuana smoking, and increased by increases in the monetary value of each point. The acute effects of marijuana to decrease the number of points earned in the progressive-ratio segment was substantially attenuated by increases in the monetary value of each point.

AGGRESSIVE BEHAVIOR: EFFECTS OF ALCOHOL AND MENSTRUAL CYCLE (D. M. DOUGHERTY)

This study will focus on the effects of alcohol on aggressive responding in female subjects. Researchers have typically avoided female subjects in pharmacological studies because of potential interactions between experimental drugs and biological changes accompanying the female's menstrual cycle. Some researchers have suggested that females and males may differ in both their response to provocation and to the effects of alcohol. These studies will examine the effects of menstrual cycle phase, alcohol dose, and their interaction on aggression. In addition, comparisons of aggressive responding among groups of females reporting severe or mild menstrual symptoms will be compared. Preferences for aggressive or escape responding between male and female subjects will also be determined.

CHOICES TO COMPETE OR NOT COMPETE FOR REINFORCERS (D. M. DOUGHERTY)

Subjects' choices to earn reinforcers by competing with a fictitious opponent or by not competing are being studied under placebo and marijuana conditions. Of interest in these studies are the effects of reinforcer probability, reinforcer magnitude, and smoked marijuana on subjects' preference for competing. Several conclusions can be made about our results thus far: (a) strong preferences to compete have been observed at high and moderate reinforcer probabilities, and even at low probabilities, (b) response rates have been higher while competing than while not competing, and (c) response rates and choices to compete have been insensitive to reinforcer magnitude manipulations. We have begun to study the effects of marijuana on competitive responding, and we have found that preferences to compete increase at low marijuana "doses" and decrease at higher "doses."

PERFORMANCE EFFECTS OF DRUGS (J. D. ROACHE)

Several studies apply experimental methods of behavior analysis to examine the adverse effects of sedative/hypnotic drugs on perceptual-motor and memory performance. Operant approaches include the manipulation of reinforcement contingencies and schedules of reinforcement, and the use of conditional discriminations such as matching-to-sample to examine behavioral determinants of drug response and to understand the behavioral dimensions of drug impairment.

PHARMACOLOGICAL AND BEHAVIORAL INTERVENTIONS FOR TREATMENT (J. D. ROACHE)

Several studies apply basic science approaches to integrate behavioral and pharmacological interventions in the treatment of psychiatric disorders.

Studies in chronic anxiety examine the reinforcing effects of anti-anxiety drugs and how cognitive-behavioral treatments for anxiety modify drug reinforcement. Studies in cocaine dependence examine possible use of reinforcing stimulants in a behavioral contingency management of cocaine dependence.

HUMAN DRUG SELF-ADMINISTRATION (R. SPIGA)

Two human drug self-administration studies are in progress. One study examines the effects of prior administration of benzodiazepines (e.g., diazepam) on fixed ratio (FR) responding maintained by 10 ml of solution containing a small dose of methadone (0.54 mg per 10 ml delivery), in methadone maintained patients. In a second study, the interacting effects of ratio size and ethanol concentration are being investigated. In this study, ratio responding is maintained by delivery of 10 ml solutions of 4%, 8%, or 16% ethanol. The ratio requirement is manipulated by requiring completion of a FR 32, 64, or 128 before delivery of 4%, 8%, or 16% ethanol solution.

HUMAN COOPERATIVE RESPONDING (R. SPIGA)

These studies are investigating drug effects on human cooperative responding. Studies in progress are examining the effects of ethanol, caffeine, and nicotine abstinence on cooperative responses. Cooperative responding is examined under conditions of initiation by another person and on cooperative responses initiated by the subject. For further details see abstracts and descriptions of grant by Spiga et al. (1993) *The Experimental Analysis of Human Behavior Bulletin, 11*, p. 29 (abstracts) and p. 11-12 (current grant funding).

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Individuals interested in additional information about HBPL or a particular research area are encouraged to contact the specific investigator at the Department of Psychiatry and Behavioral Sciences, University of Texas-Houston Health Science Center, 1300 Moursund Street, Houston, Texas 77030-3497.

RESEARCH IN PROGRESS

EXCLUSION VS. SELECTION TRAINING OF CONDITIONAL RELATIONS IN INDIVIDUALS WITH SEVERE INTELLECTUAL DISABILITIES

M. J. CAMERON, L. T. STODDARD, & W. J. MCILVANE

THE EVERGREEN CENTER AND E. K. SHRIVER CENTER

Ferrari, de Rose, and McIlvane (1993) reported that normally-developing children learned auditory-visual conditional relations more readily with exclusion training than with selection training (trial-and-error trials interspersed with baseline trials). Using a group design, we asked whether that outcome would hold true when subjects had severe intellectual disabilities.

METHOD

Subjects, Setting, and General Procedures

Subjects were 10 adolescents and young adults with autism and moderate or severe mental retardation. They were ranked according to five measures of adaptive behavior and intellectual potential. Two groups with the same mean rank were constituted. Selection group subjects had average ranks of 1, 4, 6, 7, and 10 and the exclusion group had the remainder.

Subject and experimenter sat side-by-side at a table. Visual comparison stimuli were line drawings of familiar and unfamiliar objects mounted on cards. These cards were mounted on photo album pages. Each page displayed either two or, during pretraining, three pictures. Each drawing appeared in each position an approximately equal number of times. Visual sample stimuli were placed at the top center of the page. Auditory sample stimuli were dictated by the experimenter. Reinforcers were food items.

Baseline Training

Baseline sessions presented visual-visual identity and auditory-visual arbitrary matching to sample (MTS) with drawings of a bus, a ball, and a shoe, and their names. These defined conditional relations had been established extraexperimentally (as in McIlvane, Kledaras, Lowry, & Stoddard, 1992). Delayed-sample MTS procedures were used (McIlvane, Kledaras, Stoddard, & Dube, 1990). Auditory-visual MTS trials began with the presentation of comparison pictures. Five to 10 seconds later, the experimenter dictated a name corresponding to one of them. If the subject selected the corresponding picture, the response was followed by praise, a food reinforcer, and an ITI of about 10 s. If the subject selected a different picture, did not respond within 10 s, or pointed to more than one picture, the ITI commenced. Positive and negative comparisons and their positions varied unsystematically across trials. Visual-visual identity matching trials were procedurally identical, except that the sample was a picture identical to one of the comparison pictures.

Exclusion vs. Selection Training

Undefined drawings appearing on exclusion- or selection-training trials were presumed unfamiliar to the subjects: a drill chuck, a microscope, and a sextant. Corresponding names were "Vek," "Nij," and "Gorf," respectively. All sessions consisted of 84 MTS trials. Each session began with 24 identity MTS trials that presented all combinations of the defined and undefined visual stimuli to assess visual discrimination. Next, 12 auditory-visual MTS trials presented all possible combinations of the three baseline sample and comparison stimuli. Exclusion or selection training and outcome tests occurred in the remaining 48 trials.

Exclusion training consisted of 18 exclusion and 18 control trials in each session. Exclusion trials displayed all possible combinations of one undefined (not involved in a previously established sample-comparison relation) and one defined comparison stimulus; samples were corresponding undefined dictated names. Control trials presented the same comparison displays, and samples were defined names. After the exclusion training trials, 6 discrimination outcome test trials presented all possible combinations of the 3 formerly undefined samples and comparisons. Outcome test trials were irregularly alternated with 6 baseline trials.

Selection training consisted of 18 trials that presented all possible combinations of the undefined stimuli 3 times each. These were irregularly alternated with 18 baseline trials. Outcome test procedures were identical to those used after exclusion training.

This research was supported by NICHD Grants HD 25995 and HD 27703 and by a contract from the Commonwealth of Massachusetts (100220023SC).

Each subject received up to four training sessions to meet a criterion of one errorless discrimination outcome test.

RESULTS

Figure 1 gives individual data and rank for each subject, combining the results of all exclusion or selection training and all outcome tests. The bars represent four sessions for nine subjects and a single session for S1. Performance on baseline or control trials was virtually errorless (data not shown).

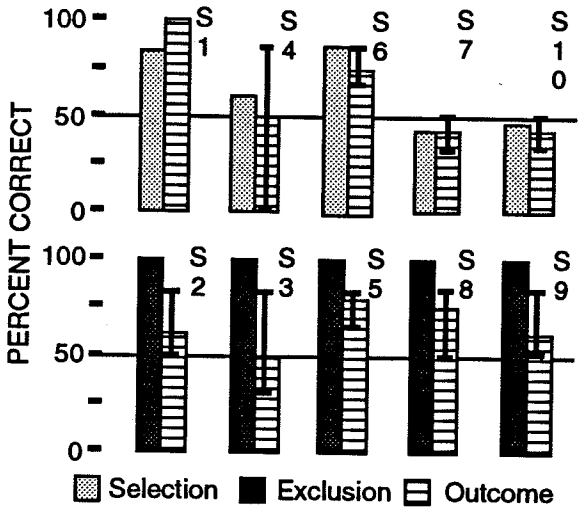

Figure 1

Accuracy scores were always 100% on exclusion training trials for all subjects. By contrast, all selection training subjects made training errors, and three subjects' scores were close to the 50% "chance" accuracy levels. Figure 1 also shows that neither exclusion nor selection training led to high discrimination outcome accuracy test scores. One exception was S1, the highest functioning subject. He learned to relate each formerly undefined visual stimulus to its corresponding undefined name with only three errors. None of the other subjects learned readily. In general, the data in Figure 1 suggest a very modest superiority of exclusion over selection training. The range bars indicate that all 5 exclusion subjects achieved an 83% accuracy score (5 correct trials out of 6) in one or more test sessions. By contrast, only 3 of 5 selection subjects did so.

DISCUSSION

This experiment demonstrates circumstances under which exclusion training may be only marginally and perhaps no more effective than a modified "trial-and-error" regimen, results that would not be predicted from the studies published so far. This finding was likely due to the requirement that subjects learn three new sample-comparison relations simultaneously. Other recently reported studies have demonstrated that simultaneous introduction of multiple sample-comparison relations may be too demanding for individuals with serious intellectual handicaps (e.g., McIlvane et al., 1992). The reason for these difficulties are not yet fully clear. A likely possibility is that simultaneously introduced undefined stimuli share the common property of relative novelty in the experimental context, which may lead to confusion among them. One advantage of the exclusion method is that it permits teaching and conducting learning outcome tests with only one new sample:comparison relation at a time (see Stoddard [1982] for a discussion of relevant techniques). As noted earlier, the selection method requires simultaneous introduction of at least two new relations. This difference suggests another type of comparison between exclusion and selection training, to be pursued in follow-up work. We will compare acquisition of sample:comparison relations taught one at a time via exclusion training to those taught two at a time via selection training. Although this comparison would leave certain variables uncontrolled, the results would be meaningful for those whose interest is in relative teaching efficiency per se.

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BASIC STIMULUS CONTROL FUNCTIONS IN THE FIVE-TERM CONTINGENCY

LUIS ANTONIO PEREZ-GONZALEZ AND RICHARD W. SERNA

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Over the past several years, stimulus control researchers have published a number of studies demonstrating that the composition of stimulus equivalence classes can be controlled conditionally by the presence of other stimuli (e.g., Bush, Sidman, & de Rose, 1989; Gatch & Osborne, 1989; Kennedy & Laitinen, 1988; Lynch & Green, 1991; Markham & Dougher, 1993; Serna, 1987; Wulfert & Hayes, 1988). For example, a subject who demonstrates two, four-member stimulus equivalence classes, A1B1C1D1 and A2B2C2D2, in the presence of the spoken word "Bem" might also demonstrate the classes, A1B2C2D1 and A2B1C1D2, in the presence of the word "Zut" (Lynch & Green, 1991).

Essential to such stimulus control demonstrations has been a conceptual extension of the three-term contingency (Sidman, 1986). This analysis posits that the three-term contingency "unit" (discriminative stimulus-response-consequence) can be controlled by additional stimuli, the *fourth* terms. For example, in an arbitrary matching-to-sample (MTS) task, a response to comparison stimulus B1 and not B2 will be reinforced in the presence of sample A1; in the presence of sample A2, a response to comparison stimulus B2 and not B1 will be reinforced. Sidman (1986) further extends the analysis to include conditional control over the four-term unit. Thus, *five-term* contingencies include antecedent stimuli that control entire four-term units. For example, the presence of the fifth-term stimulus X1 controls the selection of comparisons B1 with sample A1, and B2 with sample A2; the presence of fifth-term stimulus X2 controls the selection of comparison B2 with sample A1, and B1 with sample A2. This analysis, and the accompanying MTS procedures, have provided the basic framework from which analyses of *fifth-term* control of equivalence relations have been conducted.

Beyond merely demonstrating the fifth-term control of equivalence relations, many studies have attempted to show that subjects' performances represent something more than just responses to stimulus configurations in the MTS task. For example, studies have shown that (a) the functions of the stimuli in five-term contingency arrangements are interchangeable with one another (Markham & Dougher, 1993; Serna, 1991), (b) the functions of fifth-term stimuli can be transferred to novel stimuli (Gatch & Osborne, 1989; Lynch & Green, 1991), and (c) once five-term contingencies are established, any stimulus in the contingency can be substituted with other equivalent stimuli (Markham & Dougher, 1993; Stromer, McIlvane, & Serna, 1993). Like previous research from our labs (e.g., Serna, 1991) our *research in progress* summarized here examines further the fundamental processes in five-term stimulus control arrangements. The present studies derive from a joint effort by our respective laboratories to determine whether five-term contingency performances are "generalizable" to somewhat novel five-term contingency arrangements.

STUDY 1

In this study, we asked whether, following five-term contingency training with MTS procedures, conditional control by the fifth-term stimuli would transfer to new conditional discriminations. Figure 1 illustrates the essential features of the training and testing procedures.

In the Oviedo Lab, we first established an arbitrary conditional discrimination, as shown in Phase Ia, with three normally capable 17-year-olds, and three 10- and 11-year-old children, using computer-presented letter-like visual stimuli. All subjects learned the discrimination with very few errors. Then in Phase Ib, we established a simple form of the five-term contingency, such that in the presence of X1, the

Research conducted at the Oviedo Lab was supported in part by the Department of Psychology at the University of Oviedo, Spain, and by a grant for "short stays abroad," 1992 by the University of Oviedo, Spain. Shriver Lab research and manuscript preparation was supported in part by NICHD grants HD 25995, and in part by the Department of Mental Retardation of the Commonwealth of Massachusetts (Contract 3403-8403-306). Portions of these data were presented at the 99th Annual Convention of the American Psychological Association. Address correspondence to Richard W. Serna, E. K. Shriver Center, Behavioral Sciences Division, 200 Trapelo Rd., Waltham, MA 02254.

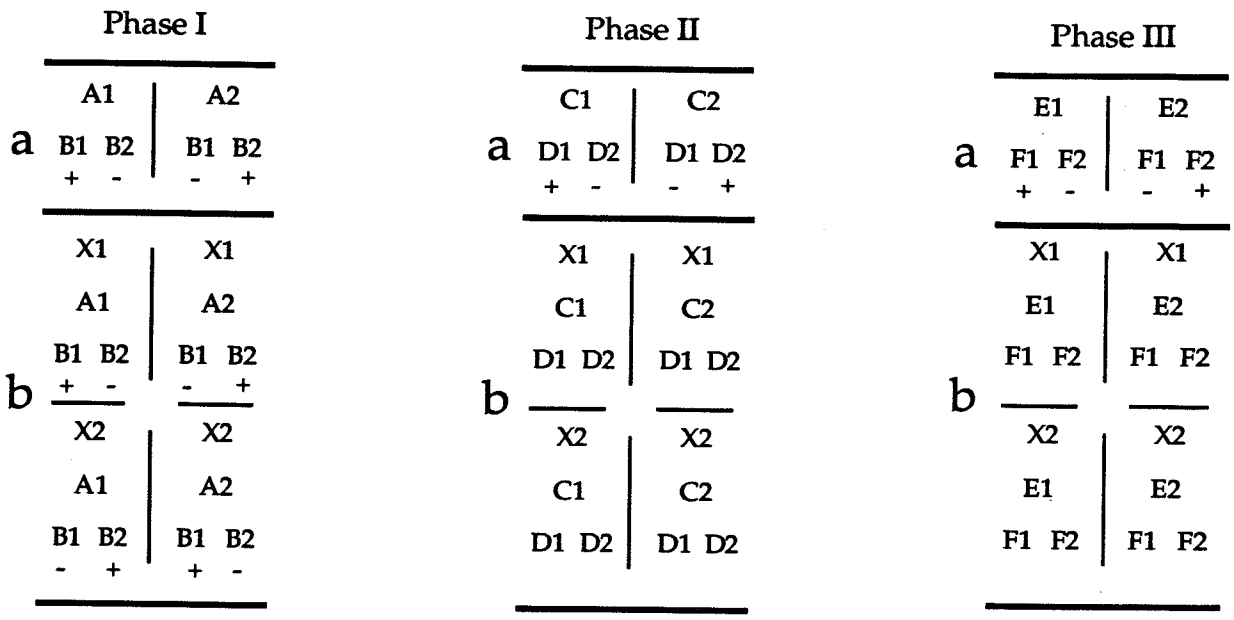

Figure 1

conditional discrimination from Phase Ia (A1-B1, A2-B2) was correct, while in the presence of X2, the opposite relations (A1-B2, A2-B1) were correct. In Phase II, we tested our experimental question: Would the fifth-term control established by the X stimuli in Phase I transfer to new conditional discriminations? To answer the question, we first established a new conditional discrimination, C1-D1, C2-D2, in Phase IIa. Then, in an unreinforced session, the conditional discrimination was presented in the presence of the X stimuli, as shown in Phase IIb. Transfer of fifth-term control would be confirmed if subjects' conditional discrimination performance established in Phase IIa was maintained in the presence of one X stimulus, but was the opposite in the presence of the other X stimulus. All subjects showed the predicted performance with no greater than 1 error in 12- or 24-trial tests. This effect was replicated with a new conditional discrimination, as shown in Phase III, and with two additional teenagers in the Shriver Lab.

STUDY 2

Results from the first study suggest that fifth-term functions established for the X stimuli in training transferred to new conditional discriminations. It is possible, however, that *any* visual stimulus, presented in the same physical and temporal relation to the samples and comparisons as the trained fifth-term stimuli, would exert fifth-term control. We assessed this possibility in the Shriver Lab with four normally capable 15- and 16-year-old subjects by first establishing five-term conditional control in Phase I, Figure 2. Then, in Phase IIa, a new conditional discrimination was established via arbitrary

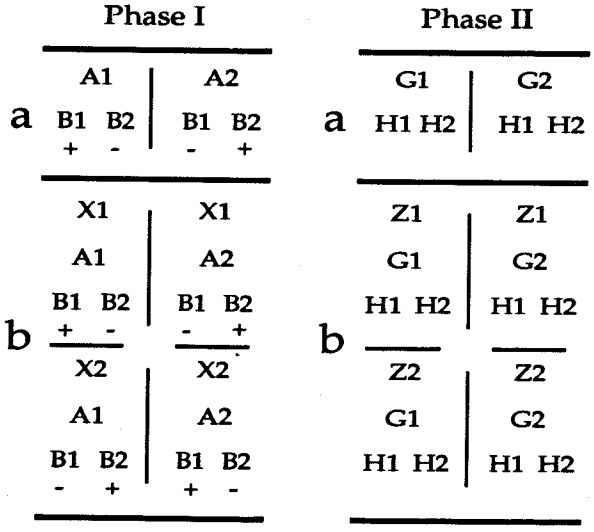

Figure 2

assignment (Saunders, Saunders, Kirby, & Spradlin, 1988), that is, unreinforced MTS trials were presented until subjects showed consistent responding to one comparison in the presence of one sample, and to the other comparison in the presence of the other sample. Finally, we asked in Phase IIb whether subjects' Phase IIa conditional discrimination performance would be maintained in the presence of one entirely novel Z stimulus, but would be the opposite in the presence of the other novel Z stimulus. All subjects' performances confirmed this prediction.

TENTATIVE CONCLUSIONS AND FUTURE DIRECTIONS

The data from Study 1 suggest that the initial five-term training established specific five-term stimulus functions to the X stimuli. However, the data from Study 2 suggest that such training may establish something more: Our current thinking is that we have demonstrated something akin to five-term arbitrary assignment; five-term contingency performance may generalize in much the same way as four-term, conditional discrimination performance (e.g., Saunders et al., 1988). We are currently conducting studies to examine what training conditions may be responsible for the phenomenon.

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SUBMIT ABSTRACTS, ARTICLES, CHAPTERS, AND BOOKS PUBLISHED, AND GRANTS RECEIVED FOR THE NEXT ISSUE

To keep current with member activities we would like to publish abstracts from conference presentations, articles published or in press, and grants received in every issue. Please send abstracts from ABA, Behavioral Pharmacology, and other Spring conferences. Abstracts (including those published as part of "Grants Received") should be no more than 200 words; those longer than 250 words will be returned to you for editing. Send to Kate Saunders by June 7.

CONFERENCE PRESENTATION ABSTRACTS

Results from a Community Intervention to Reduce Adolescent Tobacco and Other Substance Use

Anthony Biglan and Dennis Ary
Oregon Research Institute

This presentation will describe results from a 5-year study of a community intervention to prevent tobacco use that is being conducted in 16 small Oregon communities. The intervention consists of a set of modules directed at specific facets of the tobacco problem, such as sale of tobacco to minors. This presentation will describe the results of a series of experimental evaluations of three of those modules. In two studies we simultaneously evaluated two modules, one that is designed to encourage parents to talk to their children about not using tobacco and another that is designed to directly reach young people with anti-tobacco messages. In two successive years the effectiveness of these modules in reaching their target audiences has been evaluated through multiple baseline designs across communities. In a second set of studies a module designed to decrease sale of tobacco to young people has been evaluated in a multiple baseline design across all of the stores in each of two communities. The results of these experiments will be presented.

Association for Behavior Analysis, Chicago, IL, May, 1993.

A Comparison of Two Training Procedures to Establish Contextual Stimulus Control of Conditional Discriminations

Luis A. Perez-Gonzalez and Richard W. Serna
University of Oviedo, Spain and E. K. Shriver Center

A five-term contingency matching-to-sample task is used to establish contextual control of conditional discriminations. In this task, subjects are reinforced for responding to (a) comparisons B1 with sample A1, and B2 with sample A2 in the presence of contextual stimulus X1 and (b) B2 with A1, and B1 with A2 in the presence of X2 (the entire contingency is abbreviated X-AB). Previous research in our labs suggests that, once contextual control performance is established, the contextual functions of the two X stimuli will transfer to new conditional discriminations (e.g., X-EF). The present paper reports two experiments that examined this transfer as a function of the order of training conditions used to establish contextual control. In Experiment 1, three normally capable adults received training in the following order: AB, EF, X-AB. In subsequent unreinforced transfer tests for X-EF, only one subject performed in a manner consistent with contextual control. In Experiment 2, the training order for four normally capable 10-year-olds and three 17-year-olds was AB, X-AB, EF. All subjects demonstrated contextual control on X-EF tests. Various factors that explain these differences are discussed.

The Fifth Conference of the Spanish Society of Comparative Psychology, Barcelona, Spain.

Diminishing Marginal Utility, the Matching Law, and Jackpot-style Lotteries

Stuart A. Vyse, John V. Harnisher, & Gail L. Sulser
Connecticut College

According to the principle of diminishing marginal utility, the value of money does not increase linearly with increasing amounts. The relationship is assumed to be a power function, increasing in value without bound, but at a decreasing rate. In contrast, the matching law describes the relationship between amount of reinforcement and value as a bounded hyperbolic curve. Lotteries that offer jackpots of varying sizes present a useful test of the diminishing marginal utility function. The relationship of ticket sales to jackpot size in state-operated lotteries is either linear or increasing in slope; however, these aggregate data are affected by a number of uncontrolled variables. In an experimental investigation of diminishing marginal utility, college students were asked how many tickets they would buy if given an opportunity to play a jackpot-style lottery. The experimental scenario gave each student the same budget constraints and described a lottery with a single jackpot prize. On subsequent trials, the jackpot amount was increased, and students were asked again how many tickets they would buy if given an opportunity to play a jackpot-style lottery. The experimental scenario gave each student the same budget constraints and described a lottery with a single jackpot prize. On subsequent trials, the jackpot amount was increased, and students were asked again how many tickets they would buy. Consistent with the traditional economic view of diminishing marginal utility, curves fitted to the mean value function showed a better fit for the power function than for the hyperbola.

Association for Behavior Analysis, Chicago, IL, May, 1993.

GRANTS AWARDED TO EAHB SIG MEMBERS

Grant Title: Acceptance Theory and the Treatment of Polydrug Abuse
Principal Investigator: S. C. Hayes
Agency: National Institute on Drug Abuse
Dates: 1993-1995
Amount: $257,000

This is a treatment development grant that seeks to develop and test procedures that undermine excessive control by the literal meaning of self-rules and the emotional avoidance that is argued to result.

Grant Title: Caffeine as a Reinforcer in Humans
Principal Investigator: J. R. Hughes
Agency: National Institute of Drug Administration

Over 85% of Americans use caffeinated beverages daily, yet the reinforcing effects of caffeine have not been well-studied. In the first grant period, caffeine was shown to be a reliable reinforcer in a subset of coffee and soda users (i.e., some users consistently self-administered caffeinated beverages in preference to noncaffeinated beverages) during repeated double-blind tests. Caffeine withdrawal also reliably occurred in several subjects. We now propose to examine factors that might control the occurrence of caffeine reinforcement. The factors to be studied and the corresponding experimental questions are: (1) Direct effects of caffeine: Will triazolam-induced fatigue and drowsiness increase the probability of caffeine reinforcement?, (2) Pharmacological specificity: Will theophylline and amphetamine substitute for caffeine reinforcement?, (3) Age: Is caffeine a reinforcer in children?, (4) Drug history: Is caffeine reinforcement especially common and robust in cocaine addicts?, and (5) Drug sensitivity: Will those who report adverse effects from caffeine reliably avoid rather than seek caffeinated beverages? In summary, this application will investigate several factors thought to control vulnerability to drug dependence (i.e., pharmacology, age of risk, dependence on other drugs and sensitivity to drug effects).

One important mission of NIDA is to examine the dependence potential of licit drugs initially not thought to be dependence producing (e.g., nicotine and diazepam). We believe the study of caffeine falls within this mission of NIDA. Furthermore, since caffeinated beverages are so widely used and accepted, well-designed scientific studies about caffeine as a reinforcer are especially crucial to help make rational decisions about the dependence potential of caffeine.

Grant Title: Relational Learning and Retardation
Principal Investigator: K. J. Saunders
Agency: National Institute of Child Health and Human Development
Dates: 09/01/93 -08/31/98
Amount: $249,093

This is a FIRST award proposal to investigate relational learning in subjects with mental retardation. Such learning is essential to independent human functioning. A hierarchy of three relational discrimination skills will be studied: arbitrary matching, arbitrary matching learning set, and emergent arbitrary stimulus relations (Sidman equivalence). The first aim is to study arbitrary matching and arbitrary matching learning set in subjects who are initially unable to acquire arbitrary relations without highly structured teaching procedures. An extension of the learning set outcome to relational discrimination would extend the generality of an important set of observations that previously have been made primarily with simple discrimination. Subjects with varying degrees of retardation will be included to extend earlier research that indicated a relation between level of retardation and learning set formation. The second aim is to investigate "emergent" matching performances in subjects with low mental ages (MA). The emergent performances investigated will be those identified by Sidman and Tailby (1982) as indicating that arbitrary matching relations are relations of meaning, or equivalence relations. Many subjects may not initially show these capacities. The studies will test the prediction of relational frames theory that the provision of a history of trained symmetric and transitive performances will be sufficient to produce emergent symmetry and transitivity. Such emergent performances have been considered an integral part of linguistic and symbolic behavior. Little is known about the mechanisms of their development, however, perhaps because they occur so readily in normally developing humans.

*RECENT PUBLICATIONS OF EAHB SIG MEMBERS**

Ary, D. V., James, L., & Biglan, A. (in press). Parent-daughter discussions to discourage tobacco use: Feasibility and content. *Adolescence.*

Biglan, A. (1993, January). Recapturing Skinner's legacy to behavior therapy. *Behavior Therapist*, 3-5.

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Forzano, L. B., & Logue, A. W. (in press). Self-control in adult humans: Comparison of qualitatively different reinforcers. *Learning and Motivation.*

Heltzer, R. A., & Vyse, S. A. (in press). Problem solving and intermittent consequences: The experimental control of superstitious beliefs. *The Psychological Record.*

Higgins, S. T., Bickel, W. K., & Hughes, J. R. (1993). Methods in the human behavioral pharmacology of drug abuse. In F. Van Haaren (Ed.). *Methods in behavioral pharmacology* (pp. 475-497). Amsterdam: Elsevier Science Publishers.

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*Excludes *JEAB*, *JABA*, and *The Behavior Analyst*.

THE AREA GRANT PROGRAM: A POTENTIAL RESEARCH FUNDING OPPORTUNITY FOR EAHB SIG MEMBERS

The National Institutes of Health provides salary, equipment, and other support for health-related research in the behavioral sciences. Several members of the EAHB SIG are or have been recipients of grants from the National Institute of Child Health and Human Development (NICHD), the National Institute of Mental Health (NIMH), the National Institute on Alcohol Abuse and Alcohol (NIAAA), and the National Institute on Drug Abuse (NIDA). Typically, these EAHB SIG grantees became aware of funding opportunities and the steps needed to take advantage of them because they were affiliated with institutions that routinely apply for and obtain grants. How might other SIG members participate in NIH programs that could potentially support their research projects? For many SIG members, the answer might be to participate in the AREA program. This program was created to encourage research projects proposed by faculty members at smaller, primarily baccalaureate-granting schools. These institutions typically have little experience in applying for NIH grants, few facilities to support research projects, and other attributes that make it difficult for faculty to compete with investigators at larger, better established research sites. The AREA program helps level the playing field. Funds are reserved to support projects from AREA institutions, for example, and study sections evaluate AREA projects according to special guidelines.

To encourage EAHB SIG members who might qualify to investigate the program, an abbreviated version of the AREA program announcement is provided below. Those interested can obtain further information by calling the number provided below and/or by contacting program staff at the NIH institute that supports research in the area of interest.

INTRODUCTION

The National Institutes of Health (NIH) is making a special effort to stimulate research in educational institutions that provide baccalaureate training for a significant number of our nation's research scientists but that historically have not been major recipients of NIH support. Since Fiscal Year (FY) 1985, Congressional appropriations for the NIH have included funds for this initiative, which NIH has implemented through the Academic Research Enhancement Award (AREA) Program.

AREA grants are for the support of new or expanded health-related research projects conducted by faculty in institutions that are not research-intensive. The AREA will enable qualified individual scientists to receive support for feasibility studies and other small scale research projects. These grants create a research opportunity for scientists and institutions, otherwise unlikely to participate extensively in NIH programs, to participate in the nation's behavioral and biomedical research effort. It is anticipated that principal investigators supported under the AREA Program will benefit from this unique opportunity to conduct independent, preliminary research studies preparatory to seeking more substantial funding through other traditional NIH grant mechanisms; that the awarded institution will benefit from the strengthened research environment initiated through AREA grants and furthered by participation in the diverse extramural programs of the NIH; and that students will benefit from exposure to, and participation in, research and thus be encouraged to pursue graduate studies in the health sciences. The following information and guidelines have been prepared to assist interested faculty in preparing a research grant application for submission to the AREA Program.

BACKGROUND

The NIH is the principal research arm of the Public Health Service (PHS), Department of Health and Human Services (HHS). At present, 18 awarding components and several support and service divisions constitute the NIH.

NIH fosters the development of new knowledge in the behavioral and biomedical sciences, the ultimate goal of which is to combat disease and improve the health of mankind. To achieve its goals, NIH conducts research in its own laboratories and clinics and funds research by means of grants, cooperative agreements, and contracts in research and academic institutions throughout the world. The majority of awardees are academic institutions, but other research-oriented organizations--both for-profit and not-for-profit--participate significantly as well. The NIH provides funds for research projects, research training, career development of new and established scientists, and research and medical library resources.

Research grant awards represent the largest proportion of all NIH extramural awards. The research plan for each research grant application is generated and developed by an investigator, referred to as the "principal investigator." The institution, on behalf of the investigator, submits the research grant application to the NIH for consideration for support. Principal investigators listed on NIH grant applications are most frequently affiliated with universities or medical schools, and most of them hold doctorate degrees.

The Division of Research Grants (DRG), a service of the NIH, receives all grant applications submitted to the NIH for support; assesses each one for relevance to the health mission of the NIH; and assigns those that are acceptable to the appropriate initial review group (IRG) for scientific merit review, and to the appropriate NIH awarding component for consideration for an award.

Since its inception, the NIH has used a dual peer review system for the evaluation of applications. The NIH system, which has a statutory base, ensures that only the most meritorious and relevant proposals are recommended for funding. The first level of review involves panels composed primarily of non-Federal experts, referred to as IRGs or study sections, which are generally established according to scientific disciplines. These panels of experts render an impartial review and evaluation of each application. They consider not only the scientific merit of a proposal, but also the background and experience of the principal investigator, the research facilities available for the project, and the appropriateness of the budget estimate.

Each application will receive a "priority score" ranging from best (100) to worst (500), unless the IRG determines that an application (1) should be deferred for additional information or (2) should be "not recommended for further consideration" (NRFC). NRFC means that an application does not have "significant and substantial merit." The second level of review is made by the National Advisory Council or Board of the awarding component to which the application is assigned. These groups, composed of scientists, physicians, and leaders in public affairs, are chosen for their expertise, interest, or activity in matters related to the awarding component's mission. The council or board will take into account the scientific merit review of the IRG, plus elements such as the relevance of the goals of the proposed research to the mission of the awarding component, program balance, and the availability of funds. In general, the NIH may award a grant only if the corresponding application has been recommended for funding by both levels of review.

Those in doubt about eligibility should consult their institutional Office of Sponsored Programs. Questions regarding eligibility, policies, procedures, and other administrative aspects of the NIH AREA Program that remain *after consultation with your institutional office* may be addressed to: Research Training and Special Programs Office, NIH, Building 31, Room 5B44, Bethesda, MD 20892, telephone: (301) 496-1968.

CALL FOR STUDENT PAPERS

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11th ANNUAL STUDENT PAPER COMPETITION

The Experimental Analysis of Human Behavior

The Experimental Analysis of Human Behavior Special Interest Group of ABA (EAHB-SIG) seeks submissions for its 1994-95 Student Paper Competition, which is designed to recognize and promote scholarly activity in the experimental analysis of human behavior.

Who is eligible to submit? All current students and individuals who received degrees less than 1 year before the submission deadline. Undergraduate papers will receive special consideration in the review process as long as they were authored during bachelor's training.

What sort of paper is appropriate for the contest? Any paper (e.g., conceptual, review, empirical) that addresses issues relevant to the experimental analysis of human behavior. Papers that consider animal research to draw conclusions or make predictions about human behavior are also appropriate.

How are winners selected? Awards are based on blind review by established members of the EAHB-SIG and selected outside experts. All papers receiving favorable reviews will be recognized.

What are the benefits of participating? The primary benefit of the competition is exposure to the peer review process. All student authors receive journal-caliber reviews, primarily from individuals who serve on editorial boards of the major behavioral journals. Winners receive a commemorative plaque and an invitation (including convention registration fees) to present a summary of their work in a special symposium at the 1995 ABA Convention. Space permitting, a summary of each winning paper will appear in the EAHB Bulletin. Past winners also have received wider recognition within ABA.

CONTEST RULES

- The student must be first and primary author. Advisors may provide conceptual and technical assistance, most co-authored manuscripts will contain too much input from the advisor to qualify as a student paper, however. Contact the competition coordinator well in advance of the submission deadline if you have questions regarding authorship.

- The submission must be accompanied by a letter from the faculty advisor describing the relative contributions of the student and advisor.

- Recent graduates (< 1 year post-degree) may submit only work authored during their training. For consideration as an undergraduate work the paper must have been written during bachelor's training and must not have been substantially revised since that time.

- The paper should be prepared as if for submission to a journal, and must meet APA publication guidelines. The text of the paper should be no longer than 30 pages (contact the coordinator in advance if a planned submission exceeds this length).

- To facilitate blind review, the title page should not contain any author identifying information. Instead, attach a cover letter stating the title of the manuscript and listing the student author's address and telephone number (both home and work/school).

- **Submissions must be received by September 19, 1994.**

- **Papers not meeting specifications may be returned without review**

Send 4 copies of the paper to:

EAHB Competition
c/o Barbara J. Kaminski, Ph.D.
Beh. Biol. Res. Ctr./Suite 3000
5510 Nathan Shock Dr.
Baltimore, MD 21224
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EAHB SIG MEMBERSHIP INFORMATION

You can join the SIG or renew your membership by completing the form below and sending it along with a check. Current members: Check your **MAILING LABEL,** it shows the year through which your dues are paid.

DUES are $6 U.S. funds. Despite rising costs, the SIG is able to hold dues at a low level because (a) administrative costs are subsidized by the Parsons Research Center, University of Kansas, and (b) most of our members have generously added a voluntary contribution of $2 or more to their dues. If you can afford an extra $2, please send it—the SIG will put it to good use.

ADDRESS all correspondence to: Kate Saunders, EAHB Bulletin, Parsons Research Center, 2601 Gabriel, P.O. Box 738, Parsons, KS 67357.

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