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 Donna Dutcher, Kitty George, Mark Johnston, and Gloria Middleton 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, 1991, and 1993 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 Tom Critchfield (Department of Psychology, Auburn University, Auburn, AL 36849-5214); submit research in progress, abstracts, and news to Dean Williams (Parsons Research Center, P.O. Box 738, Parsons, KS 67357).

Submit brief reports and technical information by February 15 and all other materials by March 15 for the Spring, 1995 issue.

POSITION ANNOUNCEMENT

Postdoctoral Position in Human Behavioral Laboratory in the Department of Psychiatry and Behavioral Sciences at the University of Texas-Houston. Facilities include 10 human operant test chambers located in an outpatient institute and 2 test areas located in a departmental inpatient hospital. Unique opportunity to collaborate with 3 behaviorists and a research psychiatrist currently involved in behavioral, biological and pharmacological studies of human behavior under controlled laboratory conditions. Current studies involve ADHD children, adult and child psychiatric patients, normal adults and parolees, and focus primarily upon aggressive behavior and self-control. While collaboration on existing projects will be expected, the trainee will be encouraged and supported in the development of his/her own research projects. A background in experimental analysis of behavior preferred; experience in human research not required. Interested individuals should contact:

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1994 OUTSTANDING GRADUATE STUDENT PAPER AWARDS

The EAHB-SIG congratulates the recipients of Outstanding Paper Awards in its 11th 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 the titles of their papers are:

Lucianne Hackbert, University of New Mexico; Stimulus equivalence and respondent conditioning: The effect of altering stimulus equivalence class membership. (*Michael J. Dougher, sponsor*)

Scott H. Kollins, Auburn University; Human matching in the laboratory: A second look at concurrent variable-interval schedules. (*Thomas Critchfield, sponsor*)

Jacqueline J. Schenk, Rijks Universiteit Leiden; Children's emergent relations of equivalence between "correct" and "incorrect" stimuli. (*Paul M. Smeets, sponsor*)

Brendan F. Tompkins, University of Florida; Timeout postponement in humans without reduction in overall timeout frequency. (*Timothy Hackenberg, sponsor*)

The winners will be honored at an awards symposium at the 1995 ABA Convention in Washington, DC where they have been invited to present a summary of their work. Watch the Spring edition of the Bulletin for summaries of the winning papers. For information about the 1995-96 competition (submission deadline: September 19, 1995), write: Dr. Barbara J. Kaminski, 96 Sherman Road, Battle Creek, MI 49017, Telephone: 616-962-4681.

We are especially appreciative that Barb has agreed to coordinate next year's competition. Barb will be taking on this responsibility with the cooperation and assistance of her new daughter. Congratulations Barb!

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:

William Buskist
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William Dube
Stephen Flora
Mark Galizio
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Robert Zettle

AUDITORY SPATIAL LOCATION IN AUDITORY-VISUAL MATCHING TO SAMPLE: A PRELIMINARY INVESTIGATION

S. A. SORACI, JR., L. T. STODDARD, R. W. SERNA, W. J. MCILVANE, & M. T. CARLIN
E. K. SHRIVER CENTER FOR RESEARCH IN MENTAL RETARDATION

Much research had been conducted on methods to establish the first instances of conditional discrimination performance in persons with developmental disabilities. With respect to visual-visual conditional discriminations, work in our laboratories and others has developed a variety of alternative programmed routes for successfully establishing initial baseline performances of both identity and arbitrary matching to sample (Dube, Iennaco, Rocco, Kledaras, & McIlvane, 1992; McIlvane, Dube, Kledaras, Iennaco, & Stoddard, 1990; K. Saunders & Spradlin, 1989, 1990, 1993; Zygmont, Lazar, Dube, & McIlvane, 1992). No such route, however, currently exists for teaching the first instances of auditory-visual matching to sample (AVMTS). Methods based on trial and error, delayed prompting, and various procedures to transfer control by visual to auditory stimuli have proven largely ineffective, especially with individuals with more severe intellectual limitations (Carr, 1979; Yoder & Layton, 1988). More effective and efficient methods are clearly needed.

Our current focus with regard to programmed AVMTS methods is on manipulation of different aspects of the auditory rather than visual stimuli, following up interesting work with infra-human subjects (e.g., D'Amato & Columbo, 1985; Wright, Shyan, & Jitsumori, 1990). These studies used sound location to gain initial stimulus control of the subjects' (monkeys) correct responding. The purpose of the present preliminary study was to investigate the efficacy of auditory spatial-location prompt procedures for establishing AVMTS performance. Young children with developmental disabilities were first given a two-comparison AVMTS task in which each dictated sample sounded with equal loudness from speakers adjacent to each comparison. The children did not learn via this trial and error task (Condition A). We then localized each auditory sample on its corresponding visual comparison, as a prompt (Condition B). Our primary question was whether superimposing such prompts was sufficient to establish the relations between the auditory samples and the visual comparisons. In a further effort to transfer control from the auditory location prompts to the auditory-visual conditional discrimination, we slightly decreased, and slightly increased, the volume from the speakers adjacent to the correct and incorrect comparisons, respectively (Condition C). To our knowledge, no such research has been conducted with this population.

METHOD AND RESULTS

Subjects

Two males, D.J. and A.B., who were 3 years and 6 months, and 4 years and 1 month, respectively, and one female, D.S., who was 3 years and 6 months, served as subjects. Based on the Denver Developmental Screening Assessment, parental reports, and professional observation, each exhibited at least a six-month delay in intellectual development.

Apparatus & Stimuli

The apparatus (cf. Deckner, Soraci, Blanton, & Tapp, 1984) consisted of two 6" by 6" translucent plexiglass panels, mounted on an aluminum board. The panels were spaced 18" apart. Slide projectors concealed behind the display projected visual stimuli onto the panels. A small amount of pressure anywhere on the panel surface activated a micro-switch. In addition, each panel had a concealed speaker mounted adjacent to it. Stimulus presentation was controlled by an Apple IIe computer. Subjects were seated approximately 2-1/2 feet in front of the display.

Visual stimuli consisted of two letter-like forms projected onto the panels. Auditory stimuli were tape-recorded spoken nonsense words.

Procedure

Condition A: Baseline AVMTS. The baseline task was simultaneous two-choice AVMTS, in which form comparison B1, was correct in the presence of auditory sample A1, and form B2 was correct in the presence of A2. The task was designed to assess whether the children would readily acquire name-form relations via trial-and-error AVMTS. A trial began with the presentation of one of the two dictated auditory samples and the two visual comparison stimuli. In this condition, the auditory samples were presented through both the left and right speakers at equal volume levels. The sample sounded once, while the

comparisons remained on the panels until either a response was made or 15 sec had elapsed. If the subject touched the panel with the correct comparison, the panels immediately darkened and a reinforcer was presented, followed by an intertrial interval ranging from 15-20 sec. The reinforcer consisted of 5 sec of recorded music, verbal praise from the experimenter, and one of a variety of small edibles. If the subject touched an incorrect visual comparison, the panels immediately darkened and the intertrial interval began. Each session consisted of 20 trials.

As shown in Figure 1, D.S. and A.B. never showed reliable control by the dictated samples when they sounded with equal loudness from both speakers (initial Condition A). Subject D.J. made 18 correct responses in Session 2, but his performance deteriorated in the four subsequent sessions of this condition. Hence, each child's baseline AVMTS performance indicated the need for the prompt superimposition procedure that followed.

Condition B: Prompt superimposition. Children were next exposed to the same task and stimuli as Condition A, except that each dictated sample sounded only from the speaker adjacent to the correct comparison. As shown in the first Condition B of Figure 1, the performance of all children improved. Thus, the children demonstrated stimulus control by the sound-source location.

To determine whether auditory spatial-location prompts were sufficient to establish AVMTS, Condition A was repeated for each subject. Figure 1 shows that the children's performance fell to the initial baseline levels when the samples again were sounded with equal loudness from both speakers. Conditions B and A were then repeated with similar effects. Thus, while control by the sound source was established, it failed to transfer to the name-form relation.

Condition C: Modified prompt superimposition. As previously noted, in Condition B the dictated sample sounded only from the speaker directly adjacent to the correct visual comparison. For Condition C, 75% of the volume of the dictated sample sounded from the speaker adjacent to the correct comparison, while 25% sounded from the speaker adjacent to the incorrect comparison (as judged by five normal adults). The question was whether brief exposure to Condition C (75/25) would facilitate subsequent Condition A performance. As shown in Figure 1, Subject A.B.'s accuracy score during Condition C was higher than in any previous equal-loudness session, and his performance was then 85% correct on the very next equal-loudness AVMTS test. With the other two subjects, however, their data showed no effect, including failure of the modified prompt to control reliable responding.

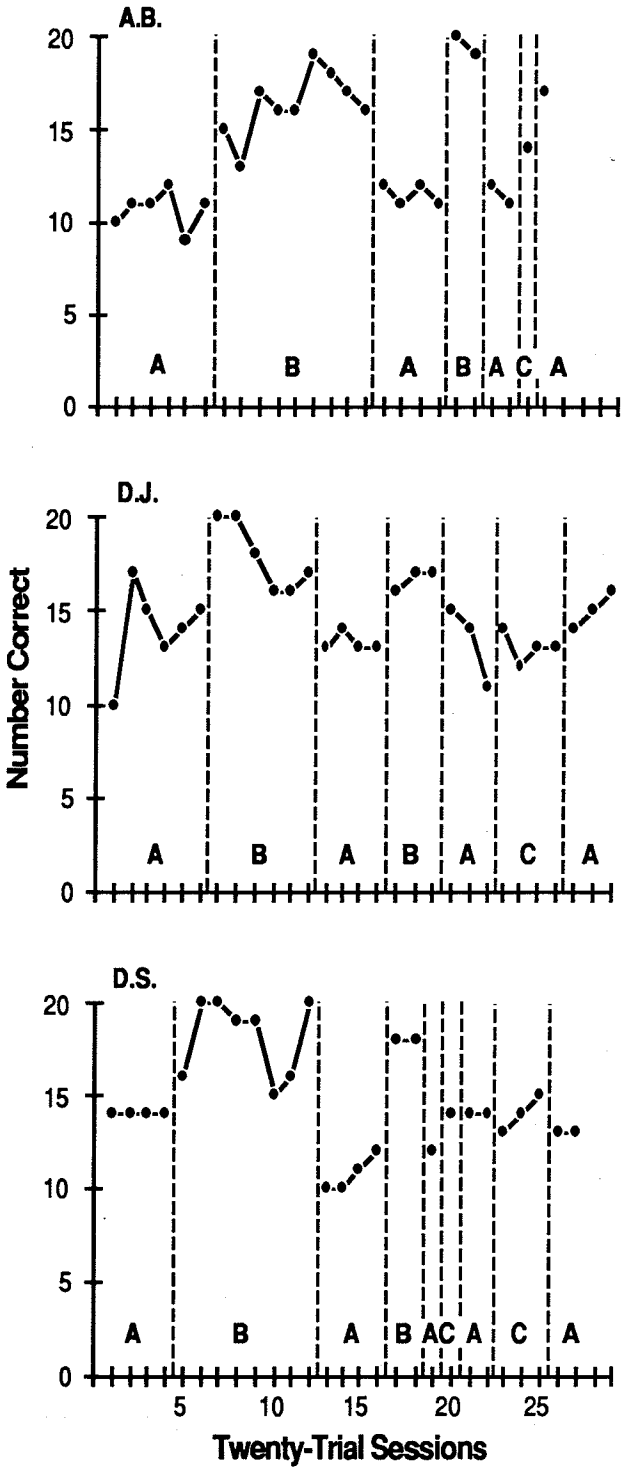

Figure 1

DISCUSSION

The performances of the children replicate findings in the infra-human literature showing that the location of a sound source can exert reliable discriminative control of responding. Superimposing location on the dictated samples was not sufficient to produce a transfer of stimulus control from location to the dictated samples. In previous research, superimposition of an already learned discriminative basis on a to-be-learned basis has sometimes resulted in more rapid acquisition of the new discrimination than mere trial and error (e.g., Terrace, 1963). In the present study, although the sound-localization prompt verified control of listening, that behavior did not lead to discriminating differences of the sounds in relation to the forms.

Condition C data from Subject A.B. suggests the possibility that superimposing a relative-loudness (75/25) prompt might be helpful for some subjects, and points to an obvious more systematic manipulation in future research. That will be to program a series of gradual stimulus changes between zero and full loudness from the nonadjacent sound source. A procedure that involved gradually fading out the auditory spatial-location prompt was used successfully by Wright et al. (1990) to teach a generalized same/different concept to monkeys.

A fundamental issue for future research will be to analyze the precise nature of the stimulus control involved in transfer from a simple discrimination (sound location) to the conditional discrimination that characterizes AVMTS. The former can be performed merely by discriminating the location of the sound source, independent of other auditory differences and of the visual stimuli also present. The latter task requires not only discriminating different sounds but also learning the relation between each specific sound and a particular visual stimulus (cf. Soraci et al., 1991). With prompt fading, transfer may be facilitated by the fact that children will typically look at a comparison stimulus when they touch it (Stella & Etzel, 1986), while at the same time gradual removal of the prompt may be successful in maintaining listening.

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DIFFERENTIAL OBSERVING OF COMPLEX SAMPLE STIMULI AND DELAYED MATCHING PERFORMANCE: A BRIEF REPORT

R. STROMER AND W. V. DUBE
E. K. SHRIVER CENTER

If only a subset of the elements of a complex stimulus exert discriminative control of responding, the stimulus control involved may be called "restricted" (Litrownik, McInnis, Wetzel-Pritchard, & Filipelli, 1978). This report describes some preliminary results with procedures that may help to remediate problems of restricted stimulus control in humans with developmental limitations. Our assessment protocol included delayed matching-to-sample tasks with multi-element sample stimuli (e.g., Maki & Leith, 1973; Maki, Riley, & Leith, 1976; Roberts & Grant, 1978). Our work extends prior studies that used delayed matching procedures to study attention in individuals with mental retardation (e.g., Schneider & Salzberg, 1982; Whiteley, Zaparniuk, & Asmundson, 1987).

Sample stimuli were made up of one stimulus element on some trials and of two elements on other trials, and positive comparisons were one or two elements identical to one or both sample elements. In a previous study, we have found that most subjects' accuracy scores were lower on delayed matching trials with the two-element samples than on trials with the one-element samples (Stromer, McIlvane, Dube, & Mackay, 1993). We interpreted this outcome as restricted stimulus control (Stromer, McIlvane, & Serna, 1993; cf. Bickel, Richmond, Bell, & Brown, 1986; Bickel, Stella, & Etzel, 1984). In Stromer, McIlvane, Dube, et al. (1993), microanalyses of performances with two-element samples showed that the nature of restricted stimulus control varied across individuals. For example, in some subjects, conditional-discrimination accuracy scores were high with some stimuli and low with others. In other subjects, scores were intermediate across all stimuli. For all subjects, performances rarely improved with protracted training (cf. Allen & Fuqua, 1985; Schreibman, Charlop, & Koegel, 1982) or discrimination training with individual sample elements (Dube, Kledaras, Iennaco, Stoddard, & McIlvane, 1990; cf. Barnes, 1978; House, 1979; Huguenin, 1985).

The top of Figure 1 shows the computer-presented stimulus displays used for the three trial types relevant to this report. The S/S trials (Figure 1, left) presented single-element (S) samples and single-element (S) comparisons. Trials began with a sample stimulus on the center key. The sample remained displayed until the subject touched it, and then it disappeared and the comparisons were presented on two corner keys (0-s delay). Touching the comparison identical to the preceding sample was followed by a reinforcing stimulus. High accuracy scores on S/S trials would indicate that the subject had observed the one-element sample.

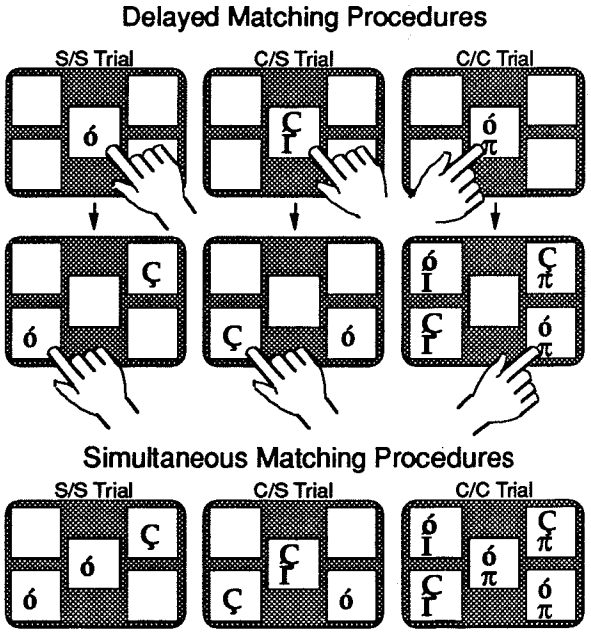

Figure 1

The C/S trials (Figure 1, center) presented complex (C) two-element samples and single-element (S) comparisons. One of the comparisons was identical to one of the sample elements, but the subject could not predict which sample element would appear as

This research received support from the National Institute of Child Health and Human Development (Grants HD04147 and HD25995) and the Massachusetts Department of Mental Retardation (Contract No. 100220023SC). Correspondence can be addressed to Robert Stromer, Behavioral Sciences Division, Eunice Kennedy Shriver Center, 200 Trapelo Road, Waltham, MA 02254 (E-mail: RStromer@Shriver.org).

the positive comparison on a given trial. Thus, high accuracy scores would indicate that the subject had observed both sample elements. Accuracy scores in the 75% range would suggest that stimulus control was restricted to one sample element.

The C/C trials (Figure 1, right) presented two-element samples (C) and two-element comparisons (C). The correct comparison was identical to the sample. There were three negative comparisons; two of them had one element in common with the sample, and one had no element in common. As with C/S trials, high accuracy required stimulus control by both sample elements. In our initial assessments, lower delayed matching accuracy scores on C/S trials (compared to S/S) have always been accompanied by lower scores on C/C trials.

The panels at the bottom of Figure 1 show how these trials appeared in simultaneous matching. Note that correct selections on simultaneous C/S trials required discrimination of only one of the sample elements. The C/C trial is different in that a correct selection required discrimination of both sample elements on every trial. Below, we describe some ways we took advantage of this feature of simultaneous C/C trials in attempts to establish discriminative control by both sample elements in subjects whose scores on delayed C/S trials indicated control by only one element (cf. Allen & Fuqua, 1985; Schreibman et al., 1982).

We focus first on Subject CP, an adult with mental retardation a mental age equivalent score of 6 years, 7 months (Leiter International Performance Scale). Stimuli were the four forms shown in Figure 1; over trials, each form appeared equally often on each trial type and in each stimulus position. The bars in Figure 2 show the mean and range of accuracy scores for the trial types listed on the abscissa, over three to six sessions. The first two bars on the left show high accuracy scores for delayed S/S trials and simultaneous C/S trials. The third bar shows much lower accuracy scores on delayed C/S trials, an indication that stimulus control was restricted to one sample element.

Subject CP's results are not unusual. We have assessed 17 subjects with mental retardation with such procedures; their mental age equivalent scores ranged from 1 year, 11 months to 7 years, 7 months. All of them have shown a decline in delayed matching accuracy when the contingencies required control by two sample elements. Thus, this kind of evidence for restricted stimulus control cuts across a considerable range of levels of functioning. Moreover, in only one case have accuracy scores improved significantly merely with protracted exposure to the C/S trials. For example, CP had received 42 sessions with such trials prior to those shown in the left portion of Figure 2.

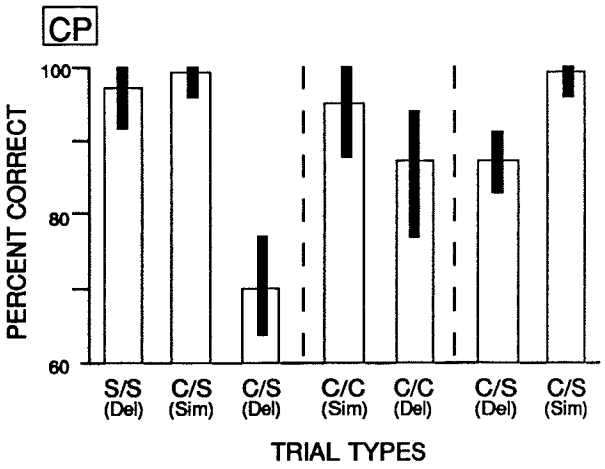

Figure 2

The two bars in the center of Figure 2 show average scores for 13 sessions with simultaneous C/C trials and 17 sessions with delayed C/C trials. CP's accuracy scores were nearly perfect on the simultaneous trials. Surprisingly, scores were much higher on delayed C/C trials (87%) than they had been on delayed C/S trials in previous sessions (70%), both of which required stimulus control by two sample elements. Of even greater interest are the results shown in the two bars on the right in Figure 2: When we reassessed delayed C/S performance, accuracy had improved to 87% across seven sessions; simultaneous C/S matching remained highly accurate across five sessions. A comparison of these last two bars shows that CP's improvement on trials with two-element samples still indicated some degree of restricted stimulus control.

These results suggested that exposure to C/C trials may, under some circumstances, help to broaden restricted stimulus control. Further, the results also showed improved performance on a different task that also required two-element control, in this case the delayed C/S trials. The relative contributions of the simultaneous and delayed C/C trials to the improved accuracy is not clear. This was CP's first exposure to C/C trials and therefore the first exposure to simultaneous matching that required observing two sample elements. Exposure to the delayed trials may have contributed by providing contingencies of reinforcement for any supplemental behavior that improved stimulus control by the sample stimuli. Generalization to delayed C/S trials could have been encouraged because the same sample stimuli appeared on both trial types.

To date, CP is the only one of seven subjects who has shown this kind of improvement with interpolated C/C training. Why CP responded differently from other subjects is not clear. One possibility is suggested by CP's mental age equivalence score, which was among the highest of any subject in these studies thus far: Perhaps (a) CP's improvement reflected within-session transfer of training from simultaneous to delayed C/C trials, and across-session transfer from delayed C/C to delayed C/S trials, and (b) such transfer is less likely in lower-functioning individuals without explicit programming. We investigated this possibility with two of our lower-functioning subjects by incorporating the C/C observing requirements within each delayed C/S trial.

The left portion of Figure 3 shows the standard C/S procedure; the two-element sample disappeared when it was touched and the comparisons appeared (0-s delay). The sample touch was a nondifferential observing response because it required the subject only to discriminate that the sample key was not blank; discrimination of specific elements was not required.

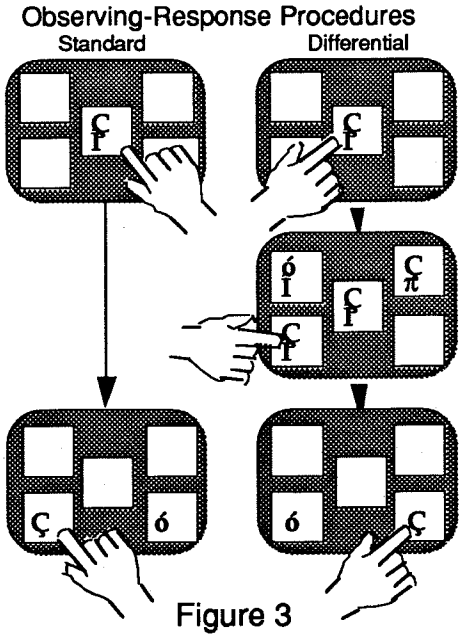

Figure 3

In contrast, the trial procedure shown on the right required a *differential observing response*. Here, a touch to the two-element sample produced a simultaneous C/C trial, where discrimination of both sample elements was required. Following a response to the identical C/C comparison, the trial continued as in the standard delayed C/S procedure. We asked whether this additional requirement would improve subjects' accuracy on delayed C/S comparison selection. If it did, would the improvement continue when the differential observing response was no longer required?

Figure 4 shows results for two subjects; their mental age equivalence scores on the Peabody Picture Vocabulary Test-Revised (PPVT-R) were 2 years, 3 months (DJB) and 1 year, 11 months (MLF). Within sessions, different stimuli were displayed on every trial. The two bars on the left show mean accuracy scores for six sessions of C/S trials with the standard observing response. These scores are consistent with our profile of restricted stimulus control. The middle bars show improved C/S performance for eight sessions when the differential observing response was required within each trial. Finally, the last two bars show that the improvement continued for six sessions following a return to the standard observing-response procedure.

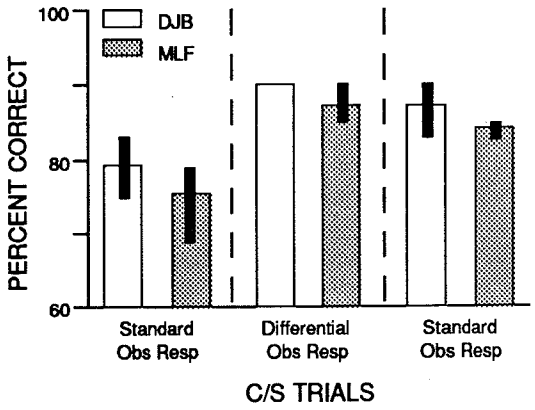

Figure 4

We are encouraged but cautious about these preliminary results, and we are planning to evaluate the procedure in a controlled study. We anticipate one difficulty in replicating these results because several subjects in previous studies have not been able to perform simultaneous C/C trials accurately. We may need to develop an additional intervention to teach simultaneous C/C matching. A second concern involves the transfer of training necessary for lasting improvements when differential observing responses are no longer required. This transfer may have to be programmed, perhaps by gradual elimination of the differential observing response requirements. Finally, we note that none of our subjects' delayed matching scores with two-element samples improved to the same levels of accuracy as on S/S trials. This finding is consistent with our earlier microanalyses showing that restricted stimulus

Due to a Printer Error, the symbols in Figures 1 and 3 are incorrect. Instead of ó, Ç, I, π, ∅, ∞, Δ, π, respectively. the stimului were

control may involve multiple stimulus control topographies (Stromer, McIlvane, Dube, et al., 1993). The C/C training contingencies may address only one part of a larger constellation of behaviors. Nevertheless, the general approach and initial findings described here may help set the stage for further studies relevant to the problem of restricted stimulus control.

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Note from Dr. SIG to other Faculty SIG members: In addition to Editorial Board members, we have begun to ask advanced graduate students to review submissions, under the assumption that (a) the experience provided is in keeping with the EAHB-SIG's general practice of nurturing graduate students; and (b) these reviewers represent a sizeable portion of the *Bulletin's* readership. We now need the names of some additional graduate student reviewers. If you know of students who are ready to serve in this capacity and can represent the *Bulletin* well, please send Tom their names and information on how to contact them.

STIMULUS ORGANIZATION AND LEARNING BY EXCLUSION: A PRELIMINARY EXPERIMENTAL ANALYSIS

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This paper reports preliminary findings from a recently initiated crossdisciplinary study of behavioral processes in relational learning. Our research seeks to integrate methods and implications from what have so far been parallel, independent research programs conducted over the past 15 years in psycholinguistics and behavior analysis (see Huntley & Ghezzi, 1993 for a summary). Both fields have been interested in processes by which subjects relate stimuli without explicit discrimination training. Behavior analysts have studied so-called "exclusion" performances in which the subject immediately displays arbitrary matching relations without explicit differential reinforcement (Dixon, 1977; McIlvane, Kledaras, Lowry, & Stoddard, 1992). Psycholinguists have been concerned with the phenomenon of "fast mapping," a process considered critical to allow children to learn up to nine new word-referent relations a day in the absence of ostensive input, typically beginning in the second year of life (e.g., Carey & Bartlett, 1978; Mervis & Bertrand, 1993). Despite their well-known differences in philosophy and terminology, both programs developed similar procedures and report similar behavioral outcomes (see Huntley & Ghezzi, 1993, or Wilkinson, Dube, & McIlvane, 1994, for extended descriptions). These convergences suggest that "learning by exclusion" and "fast mapping" may involve the same learning process(es), which may be characterized under the general term emergent symbolic mapping (ESM) (Wilkinson & McIlvane, 1994).

Methodological Background

A typical paradigm for studying ESM is as follows. The subject views a comparison array that contains several items. All but one comparison has been previously defined (i.e., the subject has selected that item when a corresponding sample was present). The remaining item has not yet been defined. When a novel sample is presented, the subject selects the undefined item, although he/she has never been taught explicitly to do so. This outcome has been widely reported by ESM researchers in both fields (e.g., Markman, 1989; McIlvane et al., 1992). Both also report that such selections need not establish ***one-to-one*** mapping relations between one specific sample and one specific comparison (Carey & Bartlett, 1978; Dixon, 1977). For instance, the subject might select any other undefined comparison in response to that same sample (cf. McIlvane, Bass, O'Brien, Gerovac, & Stoddard, 1984). Both behavior analysts (McIlvane & Stoddard, 1985) and, more recently, psycholinguists (Golinkoff, Hirsh-Pasek, Bailey, & Wenger, 1992) recognize the need to assess one-to-one mapping by evaluating more than one new relation at a time (see Stoddard, [1982] for a discussion of techniques for assessing "learning by exclusion").

One such procedure, the ***staggered introduction procedure,*** has its roots in both psycholinguistics and behavior analysis. For example, Golinkoff and her colleagues (Golinkoff et al., 1992) presented their subjects with what we shall term a ***traditional exposure trial:*** the comparison array included several defined items and one novel, undefined item; the sample was also novel and undefined (e.g., "dax"). After completion of traditional exposure trials, a ***staggered exposure*** trial (our term) displayed the just-defined form (i.e., the DAX) with two defined comparisons and a new undefined comparison; the sample was novel and undefined (e.g., "jick"). If the subject selected the new novel comparison, it was taken as evidence that a one-to-one mapping relation had been established between the recently defined DAX comparison and its corresponding sample. The rationale was that the established relation allowed the subject to reject the DAX comparison as a possible match for the sample "jick." Golinkoff and colleagues (1992) reported such behavior for all of their adult subjects and the majority of children.

The stimulus control literature suggests two additional tests to support further the inference of mapping. The first makes use of ***novelty control***

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trials (McIlvane & Stoddard, 1981; also Golinkoff et al., 1992): One or more defined comparisons are displayed with a novel comparison, and the sample corresponds to one of the defined comparisons. Selections of that defined comparison demonstrate that the subject does not merely select a novel comparison whenever it appears. The second, more stringent test uses ***mapping outcome trials*** (or discrimination probes, see Dixon, 1977), which are possible when two new sample-comparison relations have been defined. The two new comparisons are displayed together, and stimulus control by each new sample is assessed on different trials. Evidence for established mapping relations is obtained when the previously defined sample-comparison relations are maintained in this context.

Research Questions

The present study was a follow-up to some seemingly anomalous findings that occurred in the course of our mapping research. The subject had previously demonstrated reliable mapping of new dictated names and pictures within a baseline of defined name-picture relations. He showed less reliable mapping of new names and printed letters within a baseline of defined name-letter relations. For the first time, we had obtained direct evidence that the nature of the visual comparison stimuli might affect learning of arbitrary relations in our ESM procedures. Our study asked two questions: (1) How reliable were the effects of the stimulus variable? (2) Were these effects due to the nature of the stimuli to be mapped, the baseline within which mapping occurred, or both?

METHOD

Subject

JGS was a 21-year-old young man with moderate mental retardation with an estimated mental age of 6:10 (*Peabody Picture Vocabulary Test- Revised*, Dunn & Dunn, 1981). Although JGS could speak, he preferred to communicate expressively via writing or signs.

Setting and Apparatus

JGS worked approximately three times a week in a quiet office with a Macintosh computer-based apparatus that has been described in this journal (Dube, 1991). Comparison stimuli were displayed in one of four touch-sensitive locations. Auditory samples were presented through a speaker attached to the computer. Token reinforcers were delivered into a bowl in front of JGS after each correct trial.

Novel Stimuli

All novel sample stimuli were nonsense words, for example, "pafe" and "shede". Novel comparison stimuli were either "picturelike" or "letterlike". Picturelike stimuli were arbitrary forms altered from line drawings of familiar objects. Letterlike forms were selected from a corpus of Greek letters. The stimuli were so defined primarily on the basis of experimenter judgment, although more precise quantification seems possible. The letterlike stimuli, for example, were made up of continuous lines that varied little in thickness. The picturelike stimuli had more varied features, due to being adapted from line drawings.

Baselines

Two separate baselines were established. The "picture" baseline consisted of the auditory samples "dog", "tree", and "house" and corresponding line drawings (preassessment performance = 36/36 correct). The "letter" baseline consisted of the auditory samples "a", "k", and "w" and corresponding lowercase letters (preassessment performance = 24/24 correct).

Emergent Mapping: Training Sets and Trial Types

In the course of the study, JGS was taught 14 pairs of auditory:visual relations. A "training set" for each pair consisted of four successive sessions, each separated by at least 24 hours. Within each training set all baseline comparison stimuli (including the S- comparisons in exposure trials) were all of the same type, that is, either all letter or all picture stimuli. The two relations in each training set were introduced using the staggered introduction procedure, illustrated in Table 1.

Session 1 presented two blocks of 18 trials each. In each block, the first novel relation (S1:C1) was presented on 3 traditional exposure trials, interspersed among 12 baseline trials and 3 novelty control trials with the C1 comparison. The second relation (S2:C2) was introduced in Session 2. As in Session 1, two blocks were presented. The first block was identical in format to those in Session 1; it thus reviewed the previously defined relation. The second block intermixed three staggered exposure trials for S2:C2 and the three associated novelty control trials (total trials in Session 2 = 42).

Session 3 included two blocks identical in format to the blocks in Session 2. This was followed by a third block that presented six baseline trials intermixed with six mapping outcome trials. Three outcome trials were presented for each sample (total trials in

Session 3 = 54). Session 4 probed whether JGS retained new mappings across time. A single block identical in format to the third block in Session 3 was presented (total = 12 trials).

Table 1
Number of baseline, exposure, control, and outcome trials per session.

		S1: C1		S2: C2		OUTCOME	
	BL	EXP	CTR	EXP*	CTR	S1*	S2*
Session 1							
Block 1	12	3	3				
Block 2	12	3	3				
Session 2							
Block 1	12	3	3				
Block 2	12	3	3	3	3		
Session 3							
Block 1	12	3	3				
Block 2	12	3	3	3	3		
Block 3	6					3	3
Session 4							
Block 1	6					3	3

Note: BL = baseline trials; S1:C1 = first sample:comparison relation; S2:C2 = second sample:comparison relation; EXP = exposure trial (traditional or staggered); CTR = control trial; OUTCOME = outcome trials; * = on these trials, both new comparisons appear together.

RESULTS

JGS completed 14 training sets, six targeting picturelike stimuli and eight targeting letterlike stimuli. Overall, JGS showed high accuracy on the 18 trials per training set where both new comparisons appeared together (staggered exposure trials plus mapping outcome trials, total of 108 for picturelike stimuli and 144 for letterlike stimuli). Accuracy on picturelike stimuli, however, was generally higher than on letterlike ones (96.3% vs. 86.8%, respectively). Performance on baseline and control trials was highly accurate under both conditions (96.6% for picture baseline and 99% for letter baseline).

Figure 1 presents the number of errors made on each training set. The first seven training sets introduced either picturelike stimuli within picture baselines (sets #1, 2, 4, 7, mean accuracy: 95.8%, mean errors: .75) or letterlike stimuli within letter baselines (Sets #3, 5, 6, mean accuracy: 81.5%, mean errors: 3.3). Thus, mapping accuracy with the picturelike stimuli was clearly superior to that with the letterlike stimuli. To this point, however, our training procedures did not allow us to know whether the superiority was due to the nature of the stimuli or to the baseline in which the training was conducted.

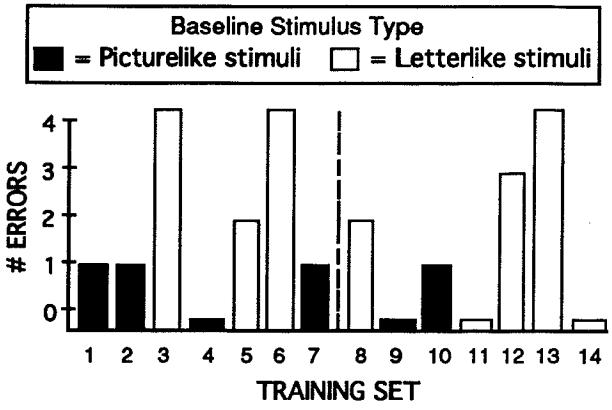

Figure 1

To evaluate the influence of baseline stimuli, subsequent sets introduced picturelike stimuli within a letter baseline or letterlike stimuli within a picture baseline. Performance with picturelike stimuli in the letter baseline remained accurate (set #10). Performance with letterlike stimuli varied as a function of the baseline. Overall, mean accuracy was 96.3% when letterlike stimuli were presented in the picture baseline (sets #8, 11, 14). Recall that mean accuracy was 81.5% in the first three sets in which letterlike stimuli were presented in the letter baseline (sets #3, 5, 6). Scores were no higher on later sets of this type (#12, 13; mean accuracy: 80.6%).

DISCUSSION

Our preliminary analysis showed clear, replicable influence of stimulus type on learning by exclusion. Picturelike stimuli were typically mapped more accurately than letterlike stimuli. The results of sets #11 and 14 suggested, however, that accurate mapping outcomes with letterlike stimuli might be achieved if the baseline was composed of picture stimuli. Such enhanced performance could not be attributed to JGS's greater experience with the procedures, as testified by the re-emergence of errors in sets #12 and 13 when letterlike forms were again presented in a letter baseline.

Why might picturelike stimuli be mapped more accurately than letterlike stimuli? A psycholinguist might say that stimulus type matters because of the subject's preference to relate spoken words with stimuli that resemble three-dimensional objects (see the discussions of the "principle of object scope", Golinkoff, Mervis, & Hirsh-Pasek, 1994). For the behavior analyst, stimulus type may matter because stimuli vary in discriminability, thus implicating perceptual factors. Such factors may play a role in

mapping, as they seem to do in other discrimination procedures (see Soraci & Carlin's [1992] work on the influence of stimulus organization in matching and oddity procedures).

Why might the nature of the baseline (i.e., pictures vs. letters) influence accuracy on mapping outcome trials? From a psycholinguist's perspective, baseline stimuli might matter because they establish context for learning relations involving spoken words and visual stimuli. Our baseline pictures were members of stimulus classes (likely extraexperimentally-defined equivalence classes) with objects that had functional significance; they may have provided a rich context for word learning. By contrast, our baseline letters may have had differences in their class membership; in writing, meaning is rarely established by individual letters.

In behavior analysis, extant studies of the effects of context do not appear to predict the results that we obtained. Consider conditional discrimination procedures, in which conditional stimuli are said to provide context under which the discriminative stimuli exert their control (cf. Cumming & Berryman, 1965). Such analyses apply to contextual effects within discrimination trials, but tell us less about across-trial effects. There have been a few studies of across-trial effects, for example, Neef, Iwata, and Page's (1977) demonstration that certain baseline conditions could help to reduce competition from undesirable stimulus control topographies. There are also studies of more general contextual effects, for example, the arbitrary-assignment phenomenon (Stromer, 1986) or the analyses of relational frames (Steele & Hayes, 1991). Although these studies are helpful in a general way, a richer, more detailed analysis seems necessary to help us understand why our superficially similar, comparably accurate letter vs. picture baselines did not comparably encourage accurate mapping. Perhaps the psycholinguist's analysis might inspire stimulus class research to illuminate the behavioral processes by which such learning is encouraged.

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

CONFERENCE PRESENTATION ABSTRACTS

An Undergraduate Microcomputer Laboratory in Human Operant Conditioning

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A software program, *The Box*, available in Windows™, allows the student or instructor to conduct a series of N=1 operant studies. The student-researcher may conduct each experimental project using a classmate or volunteer, or the study can be conducted with the experimenter serving as his or her own subject. Both steady-state and transitional-state studies can be conducted. The student can (a) conduct 1 of 20 experiments covering basic and advanced concepts and methodology, and (b) view a cumulative graph of the results of the experiment. Using the program Qwick Editor™, the student can design his or her own studies. These additions help the student explore the graph in detail for report writing. The program is menu-driven and user-friendly. Written in VBASIC for Windows, the program is designed for most color monitors. Demonstrations can be conducted on home PCs or in a university microcomputer lab as part of an experimental psychology or behavior analysis course. Finally, each study, as it is being conducted with a single student, can be projected before an entire class using an LCD display or a large computer monitor.

Southeastern Psychological Association, New Orleans, LA, March, 1994.

Analyzing Discrimination Repertoires for Augmentative and Alternative Communication

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Augmentative and alternative communication (AAC) systems are used widely with individuals who do not use vocal speech to communicate or whose vocal speech is not functional. Often the selection of stimuli for AAC systems is based on informal, trial-and-error assessment, sometimes guided by a presumed hierarchy of discriminability derived from a small number of empirical studies. We evaluated the discrimination skills of three students (inferred from identity match-to-sample performances) with eight sets of typical AAC stimuli: Objects, miniature objects, color photographs, black-and-white photographs, cutout color photographs, line drawings, line drawings paired with printed words, and printed words alone. Results of the analyses provided an empirical basis for selecting stimuli for AAC systems for each student. They also provided pilot data for a larger study designed to expand the relatively small data base on discrimination and matching of AAC symbols by students with severe communication and learning deficits.

Association for Behavior Analysis, Atlanta, GA, May, 1994.

A Swallow Induction Avoidance Procedure to Establish Oral Food Consumption

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Respondent swallow induction has been used to shape or prompt food swallowing in dysphagic infants and children. This project coupled swallow induction with an avoidance procedure to increase swallow frequency, decrease swallow latency, and establish eating in a 45-month-old girl diagnosed with severe mental retardation, attention deficit/hyperactivity disorder, seizure disorder, and status post-liver transplant, who had received all nutrition by nasogastric tube feedings. Food acceptance was established through positive reinforcement and escape extinction. However, other operant procedures failed to decrease subsequent expulsion, and swallow latencies were great, with a range of 30 s to 17 min. Respondent swallow induction was probed, and appeared effective, but was viewed as distasteful by the child's mother. Respecting the mother's wishes, a swallow induction avoidance component was added to the positive reinforcement and extinction procedures, such that swallowing within an initial

target latency of 5 min produced reinforcement, while failing to do so produced swallow induction. As swallow frequency increased and latencies decreased, target latency was decreased in 30 s increments to a terminal latency of 60 s. By discharge, the child swallowed greater than 75% of bites within 30 s and the remainder within 60 s, received all nutrition orally, and tube feedings were discontinued. At 6 months follow-up, the child was observed to self-feed and consume table food appropriately.

Association for Behavioral Analysis, Atlanta, GA, May, 1994.

Self-Control and Impulsiveness in Adult Human Females: Effects of Visual Food Cues and Dieting Status

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Self-control can be defined as the choice of a more delayed, larger amount reinforcer over a less delayed, smaller amount reinforcer, and impulsiveness as the opposite. Adult humans exhibit varying degrees of self-control and impulsiveness in laboratory experiments using food as the reinforcer. Previous research indicates that the presence of visual food cues alters self-control in young children. It has also been demonstrated that dieting status in adults is related to this type of choice behavior. The present experiment used 16 adult human females to explore the effects of presence of visual food cues and dieting status on choice behavior in a self-control paradigm. Over all subjects, no significant difference in self-control was demonstrated as a function of the presence or absence of visual food cues. However, the results demonstrate that subjects' dieting status, in conjunction with the order in which the conditions of visual presence of food cues was presented to the subjects, influences subjects' self-control. The results suggest that presence of visual food cues may influence adult human females' self-control for food reinforcers.

Association for Behavioral Analysis, Atlanta, GA, May, 1994.

Self-Control and Impulsiveness in Preschool-Age Children: Effects of Food Preferences

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Self-control has been defined as the choice of a more delayed, larger amount of reinforcement over a less delayed, smaller amount of reinforcement, and impulsiveness as the opposite. Several researchers have found that preschool-age boys tend to demonstrate impulsiveness. However, much of this research has used the same type of reinforcer for both response alternatives, despite the fact that reinforcer preference has been shown in a variety of experiments to significantly influence choice behavior. The present experiment used six 3-year-old males to explore the effects of food preference on preschoolers' choice behavior in a self-control paradigm. Boys showed a higher proportion of responses for more delayed, larger amount reinforcers when those choices resulted in receipt of the most preferred food as compared to when those choices resulted in the least preferred food. Further, boys chose the less delayed, smaller amount reinforcers significantly more often when only those choices, as opposed to both choices resulted in preferred food. Conversely, they choose the more delayed, larger amount reinforcers significantly more often when only those choices, as opposed to both choices, resulted in preferred food. The results demonstrate that subjects' food preferences can influence self-control for food reinforcers.

"Children's Food Choice," Association for Behavior Analysis, Atlanta, GA, May, 1994.

A Comparison of Two Zone Discrimination Reinforcer Assessment Procedures

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Zone discrimination occurs when previously spatially indiscriminate reinforcement is made available only for responses emitted within a restricted area, resulting in behavioral reallocation to that area. Two zone discrimination based reinforcer assessments

were examined. Subjects A and B were 50- and 30-month-old boys of average intellectual functioning. Subject C was a 10-year-old boy with moderate mental retardation and noncompliance. Sessions were conducted in an 8' by 11' room with two 36" square boxes (target zones) marked on the floor, 18" apart diagonally. Baseline measures were taken of behavioral allocation toward either target zone, or neither space. Next, a reversal design alternated preferred stimulus availability between the two target zones, while neutral stimuli were freely available. In the Extended Assessment, steady state patterns of allocation were obtained before reversing preferred stimulus access between zones. In the Brief Assessment, preferred stimulus access alternated between zones every 30 or 60 s. Data for both assessments showed behavior almost completely allocated toward neither zone during baseline, with behavior reallocated toward the target zone in which presence earned access to the preferred stimulus during treatment. Allocation reversed reliably with reversals in contingent access to preferred stimuli between target zones, as would be predicted by matching research. Both assessments effectively assessed positive reinforcer function, but the Brief Assessment was 42.5% more efficient.

Association for Behavioral Analysis, Atlanta, GA, May, 1994.

A Method for Teachers to Analyze Discrimination Errors

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New England Center for Autism

Three distinct forms of stimulus control may determine a subject's performance on conditional discrimination tasks: control by the sample, control by position, or control by specific comparison or choice stimuli. Conditional discrimination performance is often represented by accuracy or percentage correct. This measure, however, only represents "accuracy" as it corresponds with the experimenter specified contingencies--control by the sample. This study analyzes the performance of a student with autism on an identity matching conditional discrimination task. Error analysis templates were completed for each session; they indicated that the subject's performance was under control by position and features of certain experimental stimuli. The importance of analyzing errors to determine the precise source of stimulus control is illustrated in the present study. Given the formulas of the error analysis template, it can be used by teachers unfamiliar with applied behavior analysis or stimulus control.

Association for Behavior Analysis, Atlanta, GA, May, 1994.

Systematic Assessment and Instruction in Prerequisites for Conditional Identity Matching

C. Johnson, D. White, S. Langer, R. Graff, and E. Conlin
New England Center for Autism

This experiment asked whether students who do not demonstrate conditional identity matching performances lack certain behavioral prerequisites for performing the task: Sitting, waiting, looking at the sample, scanning the comparison stimuli, and pointing to a stimulus (referred to collectively as "session skills"). Three students with severe to profound mental retardation served as subjects. An initial assessment indicated that all three students lacked conditional identity matching skills, as well as one or more of the session skills described above. Prompts, prompt fading, and differential reinforcement procedures were used to train session skills in the context of a simple discrimination task. Effectiveness of teaching was evaluated with a multiple baseline across students research design. Improved performances on identity matching posttests demonstrated the importance of evaluating and teaching responses that may underlie or enable performances of fundamental skills like conditional identity matching.

Association for Behavior Analysis, Atlanta, GA, May, 1994.

Self-Control in Adult Humans: Effects of Counting and Timing on Choice

J. M. Kirk and A. W. Logue
State University of New York at Stony Brook

The effects on choice behavior of interfering with adult females' counting and timing behaviors were examined using a self-control paradigm. The experiment used concurrent variable-interval schedules in which reinforcers consisted of 10-s access to points exchangeable for money after a 10-s delay (the self-control alternative) and 2-s access to points

exchangeable for money after a 2-s delay (the impulsive alternative). There were four groups of 10 subjects each. Three groups listened to numbers played on a cassette tape. One of these groups was asked to perform a timing task with the numbers, another was asked to perform a division task with the numbers, and the third group was not asked to do anything with the numbers. The fourth group heard no tape. Subjects in the groups performing timing and division tasks showed more self-control than groups asked not to perform these tasks. These results suggest that subjects operating at diminished cognitive capacity tend to choose the alternative delivering the greatest amount of reinforcement in the short run regardless of whether that choice distribution provides an increase in total received reinforcement.

Association for Behavior Analysis, Atlanta, GA, May, 1994.

A Comparison of In-Context and Out-of-Context Instruction in Sequential Identity Matching for Machine Activation

S. Langer, C. Johnson, and G. Green
The New England Center for Autism

A recent trend in designing curricula for students with severe disabilities has been to teach most skills in the context of complete, multi-component tasks or activities. While this approach may be effective for teaching some students, others might benefit from training designed to establish tight stimulus control of component performances outside the context of the whole activity. This study compared the efficacy of in-context and out-of-context training to establish sequential identity matching skills for activating machines. Three students received computer-based training on generalized two-digit sequential identity matching performances (out-of-context training). Three other students were trained to match two-digit numbers using a television remote control device to select channels (in-context training). All students completed pre- and posttests with the computer and the remote control device, as well as a microwave oven (the generalization task). Trials to acquisition during training in both conditions and accuracy of performances with the microwave were the main dependent measures. Preliminary observation suggest that for some students with severe learning difficulties, out-of-context training on component skills or a combination of out-of-context and in-context training might accelerate learning relative to in-context training alone.

Association for Behavior Analysis, Atlanta, GA, May, 1994.

Quantitative Measurement of Self-Control: Use of the Matching Law with an Adjusting Procedure

A. W. Logue
State University of New York at Stony Brook

Self-control can be defined as choice of a larger, more delayed reinforcer over a smaller, less delayed reinforcer. The generalized matching law has been used very successfully to quantify self-control in a large variety of experiments. The ratio of two free parameters in the generalized matching law, S_A/S_D, measures a subject's relative sensitivity to variation in reinforcer amount and delay. Values of this ratio greater than 1.0 tend to be associated with self-control, and values of this ratio less than 1.0 tend to be associated with impulsiveness. In situations in which a subject's preference is equal between two alternatives varying in reinforcer amount and delay, assuming that there is no response bias, it can be shown that $S_A/S_D = [\log(D_1/D_2]/[\log(A_1/A_2)]$, in which A_i and D_i represent the amounts and delays of the two choice alternatives, respectively. Several experiments have now measured S_A/S_D in rats, monkeys, and humans using such an analysis along with an adjusting procedure that results in equal preference between the two alternatives. This method can obtain a quantitative measure of self-control with fewer experimental conditions than are required with some other methods.

Society for the Quantitative Analysis of Behavior, Atlanta, GA, May, 1994.

Editors' Note: Watch this space for a new column on information exchange via the Internet. Bill Dube, Richard Serna, and Brendan Tompkins will coordinate information on sites of interest to SIG members. If you want to advertise a site contact Bill at: wdube@shriver.org. Some are: UW-Milwaukee's FTP/ Gopher site (Contact Marshall Dermer at dermer@csd.uwm.edu); a MOSAIC home page at USF: URL= HTTP://www.coedu.usf.edu/behavior/behavior.html (Contact Brendan Tompkins at tompkins@tempest.coedu.usf.edu); and the U of Rochester's JEAB and JABA home page (URL= http://www.envmed.rochester.edu/wwwrap/behavior/jeabjaba.htm). More next issue - Tom & Dean.

Stimulus Classes with Features of Different Dimensions

L. A. Perez-Gonzalez
University of Oviedo, Spain

Stimulus class studies are usually carried out with stimuli differing along a single dimension (e.g., form). The purpose of the present analysis was to explore class formation among different features of stimuli corresponding to three different dimensions. For each conditional discrimination, two stimuli differing in values corresponding to the same dimension are presented. Over successive discriminations, the stimuli differed in value across dimensions. With such a procedure, the principle of stimulus substitutability is broken, since identity is impossible to test, symmetry is not particularly different from the trained discriminations and transitivity evidence that features of two different dimensions become members of a class through their relations with a feature of a third dimension. The empirical finding of such a type of transitivity has important implications to human perception.

The Association for Behavior Analysis, Atlanta, May, 1994.

Transfer of Selections Between two Comparisons in the Presence of Novel Combinations of Compound Samples

L. A. Perez-Gonzalez
University of Oviedo, Spain

In a previous experiment, adults and 10-to-11-year-old children were trained with AB relations using a matching-to-sample procedure. Then, a stimulus A and a stimulus B were presented as a compound sample and novel stimuli X1 and X2 were the comparisons. Selections of X1 in the presence of stimuli related in the previous training (i.e., A1 and B1) and selections of X2 in the presence of non-related stimuli were reinforced. After new relations PQ were trained, a transfer test demonstrated consistent selections of X1 or X2 in the presence of P and Q compound samples depending on the relation established between the P and Q stimuli in the previous training. The present research explored, in 5-year old children, whether new relation-stimulus relations of this type will emerge when the relations between the stimuli in the compound samples have not been directly trained or have not been tested but the prerequisites to make them members of the same class have been trained.

Experimental Analysis of Behavior Group Meeting, London, April 1994.

Effects of Triazolam on Continuous-Recognition Memory Performance in Sedative Abusers

C. R. Rush and R. R. Griffiths
Department of Psychiatry and Human Behavior
The University of Mississippi Medical Center

The acute effects of trizolam (0, 0.25, 0.50, and 0.75 mg/70kg) were assessed on a Continuous-Recognition-Memory procedure in human volunteers (N = 8) with a history of recreational sedative abuse. In the Continuous-Recognition-Memory procedure, a subject views a series of stimuli (e.g., alphanumeric strings like "C6Z5" or words like "Captain"). As each stimulus is presented, the subject responds differentially ("New" to a new stimulus or "Old" to a previously presented stimulus), depending on whether the stimulus has or has not been presented previously. Test stimuli were separated by 0, 1, 2, 4, 8, 16, 32, and 64 intervening stimuli. Stimulus type (e.g., alphanumeric strings versus words) was also manipulated. Signal detection analyses indicated that all doses of triazolam significantly impaired Continuous-Recognition-Memory performance in the alphanumeric string condition. High doses of triazolam impaired performance in the word condition at the longer separation intervals. The sensitivity of the Continuous-Recognition-Memory procedure suggests it may be useful for detecting subtle drug effects, or between-drug differences. The Continuous-Recognition-Memory procedure may also be useful for elucidating the behavioral mechanisms by which commonly prescribed medications impair remembering.

Association for Behavior Analysis, Atlanta, GA, May, 1994.

Human Behavioral Pharmacology of Commonly Prescribed Hypnotics

C. R. Rush and S. T. Higgins
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The University of Mississippi Medical Center*

Sleep disorders affect approximately 15-45% of the adult population. Benzodiazepines, including triazolam and temazepam, are effective pharmacotherapies, but produce side effects including impairment of learning, recall, and performance. Recently, scientific and social controversy has surrounded the benzodiazepine hypnotics, in particular triazolam (HALCION®). The present series of studies compared the behavioral and self-reported effects of triazolam and temazepam, benzodiazepine hypnotics, and zolpidem, a newly marketed imidiazopyridine hypnotic, in normal, healthy volunteers. Across the experiments, the acute behavioral effects of oral administrations triazolam (0.125, 0.25, and 0.50 mg/70 kg), temazepam (15, 30, and 60 mg/70 kg), and zolpidem (5, 10, and 20 mg/70 kg), and placebo were assessed during 4- to 6-hour sessions. During peak effect, triazolam, temazepam and zolpidem produced comparable dose-related impairment of learning, recall and performance, and increased subject ratings of drug strength and sedation. These results do not support the position that the behavioral pharmacology of triazolam is inherently different from that of other benzodiazepines hypnotics. Furthermore, despite the somewhat unique benzodiazepine receptor-binding profile of zolpidem, its behavioral and self-reported effects are similar to those of triazolam and temazepam.

Behavioral Pharmacology Society, Cambridge, MA, May, 1994.

Development of Ordinal and Equivalence Relations in Number/Quantity Classes by Students with Severe Disabilities

D. White, G. Green, and K. Clark
The New England Center for Autism and Northeastern University

Stimuli with common ordinal functions in independent sequences may also be related to one another in match-to-sample contexts without explicit training, documenting equivalence classes. Sequence training that capitalizes on exclusion can establish both untrained sequencing and untrained match-to-sample performances. To date, such generative performances have not been demonstrated by subjects with severe disabilities. Two adolescents with severe mental retardation who participated in this experiment had previously demonstrated equivalence classes of dictated number names, numerals, and quantities of dots. We used computer-based instruction with intensity fading and forward chaining to teach them to sequence the numerals 1, 2, and 3. That sequence then served as the baseline for teaching a novel sequence by exclusion. For Subject 1 the novel sequence consisted of printed number names; for Subject 2 it was quantities of lines. Production of the novel, untrained sequences on probe trials indicated that the exclusion training established ordinal relations among the novel stimuli for both subjects. It also sufficed to add the novel stimuli to the preexisting equivalence classes for Subject 1, but not for Subject 2. Error analyses suggested that a stimulus artifact interfered with equivalence class expansion for Subject 2.

Association for Behavioral Analysis, Atlanta, GA, May, 1994.

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 Dean Williams by March 15, 1995.

GRANTS AWARDED TO EAHB SIG MEMBERS

Grant Title: Self-Control in Adult Humans: Effects of Food Preferences
Principal Investigator: L. B. Forzano
Affiliation: State University of New York College at Brockport
Agency: SUNY College at Brockport Summer Faculty/Student Research Program
Dates: 06/01/94 - 06/30/95
Amount: $3,800

The objective of this research is to examine the effects of reinforcer preference, in particular, food preference on adult human females' choice behavior in a self-control paradigm. The results of a previous experiment suggest that humans' food preferences can influence their self-control for food reinforcers. The results of that research are limited due to the inability of the apparatus to deliver two different reinforcers to the subject during the experiment. Therefore the reinforcers were points exchangeable for the differently preferred juices delivered at the end of the experiment. However, it has been demonstrated that the time in which the reinforcers are delivered affects the degree of self-control demonstrated. In the present research subjects will choose between two differently preferred juices which they can receive during the experiment. It will then be possible to directly examine the effects of *only* humans' food preferences on self-control for food reinforcers.

Grant Title: Basic Memory Processes in Autism
Principal Investigator: Gina Green
Affiliation: New England Center for Autism, E. K. Shriver Center for Mental Retardation, and Northeastern University
Agency: National Institute of Mental Health
Dates: 09/30/94 - 09/30/95
Amount: $123,822

Microscopic abnormalities have been found in the limbic system and adjacent cortex of individuals with autism. Certain nonverbal learning and memory tasks have been shown to be sensitive to abnormalities in those brain structures. This study will use such tasks to evaluate basic memory processes in children with autism, as follows:

(1) Delayed nonmatching-to-sample (DNMS) with trial-unique stimuli. A novel stimulus (sample) is presented first on each trial, followed after a brief delay by the presentation of that same stimulus with another novel stimulus (comparisons); a response to the comparison that does not match the sample is reinforced. Recognition memory is tested by manipulating the delay between sample offset and comparison onset.

(2) Delayed spatial alternation (DSA). Subjects learn to alternate responding between two identical stimuli in different spatial positions with a brief delay between trials. Memory is challenged by increasing the delay.

(3) Two-choice simple visual discrimination. Two nonidentical stimuli are presented simultaneously on repeated trials. Responses to one stimulus (S+) are reinforced, while responses to the other stimulus are not reinforced, until the subject responds exclusively to the S+.

The pattern of performances by children with autism will be compared to that demonstrated by nonhumans and humans with cortico-limbic damage in previous research: Deteriorating DNMS and DSA performances with increasing delays, and relative facility with the simple discrimination task. Comparisons with the performances of nonautistic children with mental retardation will reveal whether the profile obtained differentiates autism from mental retardation.

Grant Title: The Effect of Time on Performance and Cerebral Blood Flow in Adults with Hyperactivity
Principal Investigator: Julie Schweitzer
Affiliation: Emory University Research Committee
Dates: 09/01/94 - 08/31/95
Amount: $14,980

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most prevalent and persistent of childhood disorders, with up to one-half of these children experiencing ADHD symptoms through adulthood. ADHD adults tend to have lower educational and occupational success and a higher incidence of drug abuse and criminal activity. The etiology of the disorder is unknown, but there is increasing agreement that a combination of biological and psychosocial factors are responsible for its development. Neuroimaging techniques provide a powerful tool to systematically evaluate brain-environment interactions in ADHD. The proposed experiment will assess the relation between performance on an attention task on regional cerebral blood flow, using positron emission tomography, in adults with and without ADHD. Ultimately, this research should help us identify brain regions affected by ADHD and the development of more effective treatment procedures for the disorder.

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