JOURNAL OF APPLIED BEHAVIOR ANALYSIS 1988, 21, 31–43 NUMBER 1 (SPRING 1988)

IDENTIFYING REINFORCERS FOR PERSONS WITH PROFOUND HANDICAPS: STAFF OPINION VERSUS SYSTEMATIC ASSESSMENT OF PREFERENCES

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We evaluated a systematic means of determining stimulus preferences among seven profoundly handicapped persons. Preferences were determined by observing student approach responses to individual stimuli. Results indicated that there were differential stimulus preferences across the multiply handicapped participants. However, results of the systematic assessment did not coincide with the results of a more traditional, caregiver-opinion method of assessing student preferences. A second experiment was then conducted with five participants to evaluate whether stimuli that were assessed to consistently represent preferences would function as reinforcers in skill training programs. Results indicated that stimuli that were systematically assessed to represent student preferences typically functioned as reinforcers when applied contingently. However, preferred stimuli as reflected by caregiver opinion did not function as reinforcers unless those stimuli were also preferred on the systematic assessment. Results are discussed in terms of assisting profoundly handicapped persons by (a) improving the effectiveness of training programs by increasing the likelihood of using stimuli that have reinforcing value and (b) increasing the overall quality of life by providing preferred stimuli in the routine living environment.

DESCRIPTORS: mentally retarded, reinforcement, stimulus, assessment, severely handicapped

One of the most challenging tasks facing special educators and personnel in related fields who work with developmentally disabled individuals is teaching students who have profound handicaps. Profoundly handicapped persons are characterized by extremely serious mental disabilities (e.g., profound mental retardation) and physical disabilities (e.g., spastic quadriplegia) that render the fulfillment of teaching responsibilities very difficult (see Green, Canipe, Way, & Reid, 1986). Evidence of the difficulties encountered in attempting to teach new skills to this population exists in the recognition that many profoundly handicapped persons have participated for long periods of time in training programs without making any demonstrable skill gains (Bailey, 1981).

Reasons as to why certain individuals do not respond to training endeavors are numerous. With profoundly handicapped persons, one reason that has surfaced repeatedly is the inability to find reinforcing stimuli to use in training programs (Wacker, Berg, Wiggins, Muldoon, & Cavanaugh, 1985). Because of the difficulty of finding reinforcers for use with profoundly handicapped persons, there have been a number of calls to develop systematic methods of identifying reinforcing stimuli for this population (e.g., Gutierrez-Griep, 1984; Reid & Green, in press; Wacker et al., 1985).

Typical attempts to identify reinforcing stimuli for profoundly handicapped persons rely on the subjective opinions of caregivers (e.g., institutional direct care staff, teachers) regarding what they think given clients prefer. Caregiver opinion is used in this respect because methods used to identify reinforcers with other populations—such as asking clients what they will work for—are usually impossible with the profoundly handicapped because of the severity of their mental and physical impairments (Pace, Ivancic, Edwards, Iwata, & Page, 1985). However, there are some data that suggest

Appreciation is expressed to the education staff of Rosewood School for their competent assistance in conducting the assessment and training procedures. Appreciation is also expressed to Carole McNew and Mary Carswell for their patience and competence in preparing the manuscript.

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that caregiver opinion regarding likes and dislikes of profoundly handicapped persons is not very accurate (Favell & Cannon, 1976).

Recently, Pace et al. (1985) and Dattilo (1986) demonstrated reliable methods for determining stimulus preferences of profoundly mentally retarded and severely retarded persons, respectively. Pace et al. also demonstrated that data on preferences predicted which stimuli would function as reinforcers in behavior change programs. However, the Pace et al. study did not involve persons who had profound mental *and* physical disabilities, or did it include sensory impaired individuals. There can be large differences among the response repertoires of individuals diagnosed as profoundly mentally retarded that may affect the ease with which stimulus preferences can be detected. For example, an ambulatory profoundly mentally retarded person with no other disabilities may exhibit many more discrete behaviors (e.g., vocalizations, reaching for an object) than a deaf-blind, quadriplegic person who is profoundly mentally retarded and exhibits no verbalizations and has minimal arm control. Consequently, it is not clear whether the results of the Pace et al. investigation can be extended to the latter population (Reid & Green, in press). In addition, as noted by Pace et al., it is not apparent whether the systematic, observational approach to identifying preferences (and subsequently reinforcers) is superior to the more traditional reliance on caregiver opinion (Pace et al., 1985).

The purposes of our investigation were several. First, we evaluated whether a systematic assessment strategy involving observed client performance similar to that described by Pace et al. (1985) could be used to identify preferences of very low-skilled, profoundly handicapped persons who had histories of nonresponsiveness to training attempts (Experiment 1). Second, we compared the results of the systematic preference assessment with results of a more traditional, caregiver opinion assessment (Experiment 1). Finally, we evaluated whether preferred stimuli based on the results of the two assessment strategies would function as reinforcers in actual training programs (Experiment 2).

EXPERIMENT 1

Method

Participants and setting. Seven profoundly mentally retarded, nonambulatory individuals who lived in a residential facility and attended a school program on the facility grounds participated in the study. Ages ranged from 12 to 34 years. Four of the participants were legally blind and had mild to severe hearing losses. Two participants also exhibited a high rate of stereotypic behavior. Each student was diagnosed as having at least two of the following: seizure disorder, spastic diplegia, spastic quadriplegia, hypertonicity, and secondary microcephaly. Each individual was completely dependent on caregivers for fulfillment of all basic needs. These seven individuals were chosen to participate in the study because of their profound handicapping conditions and their previous lack of progress in behavior change programs as reflected in their program records and reports from their educators and caregivers. All sessions were conducted in a 1.83-m by 2.44-m training room.

Stimuli. Twelve stimuli were selected to be assessed for student preferences. The stimuli were chosen based on their availability and ease of presentation and because they represented a variety of types of sensory input. In addition, stimuli were included based on their frequent (attempted) use as reinforcers with a profoundly handicapped population as reported in previous literature (e.g., Bailey & Meyerson, 1969; Johnson, Firth, & Davey, 1978). The stimuli and presentation format for each stimulus are presented in Table 1.

The 12 stimuli were organized into four groups of three stimuli each for presentation purposes. Similar types of stimuli were not grouped together (e.g., pudding and juice).

Behavior definitions. Two types of behaviors were targeted based in large part on the definitions of approach and avoidance of Pace et al. (1985). *Approach* was defined as the student making an apparent voluntary body movement toward the stimulus, maintaining contact with the stimulus for at least 3 s, exhibiting a positive facial expression, or making a positive vocalization within 5 s of the presentation of the stimulus. *Avoidance* was de-

Table 1
Presentation Format for Assessment of Stimulus Preferences

Stimulus	Presentation format
Hug	Assessor places both hands around upper arms or shoulders of student
Verbal interaction	Assessor talks to student for 5 s alternating to left, right, and front side of student
Vibrator	Assessor strokes arm of student with vibrator for 5 s
Juice	For sighted student assessor places cup of juice in visual field of student; for visually impaired, assessor places lip of cup to side of student's cheek
Pudding	For sighted student, assessor places spoon in visual field of student; for visually impaired student, assessor places tip of spoon to lip of student
Rock music or soft music	Tape player with music on (increased volume for hearing impaired) presented to left, right, and front side of student
Tactile mitt	Assessor rubs student's arm with mitt
Light board	Assessor places light board in visual field of student; student's hand placed on switch which activates light board
Mechanial toy	Assessor activates toy for 5 s within visual field of student, student's hand or arm placed on toy
Hand-held toy	For sighted student, assessor presents toy by laying it on student's table top; for visually impaired student, assessor touches toy to student's preferred hand
Hand clap	Assessor claps hands three times to the front, right, and left side of student

fined as the student exhibiting a negative vocalization, pushing the stimulus away, or making a movement away from (e.g., head turning away) the stimulus within 5 s of the presentation of the stimulus. Because of the focus of this investigation on identifying reinforcing stimuli, attention given to avoidance behaviors was minimized.

Assessment procedures. An observer (facility staff member) who was in the training room with the student recorded the occurrence or nonoccurrence of approach and avoidance behaviors for 5 s following each stimulus presentation. As a control against observer drift and bias, midway through the study an additional staff person, unfamiliar with the experimental purpose, was trained to conduct observation procedures using the same definitions and training procedures as used with the original observers (i.e., experimenter instructions, practice observing with students not involved in the study, and experimenter feedback). This person then conducted reliability checks intermittently throughout the study.

Reliability checks occurred on more than 78% of all assessment trials. Reliability was calculated on a trial-by-trial basis for overall, occurrence, and nonoccurrence agreement percentages (Bailey & Bostow, 1979) for approach and avoidance behaviors using the formula of number of agreements divided by number of agreements plus disagreements multiplied by 100. Across all subjects, stimuli, and assessment trials, overall reliability for approach behaviors averaged (mean) at least 96%, occurrence averaged at least 90%, and nonoccurrence at least 94%. For each of the 12 separate stimuli, overall reliability averaged at least 94%, occurrence at least 78%, and nonoccurrence at least 88%. Results of reliability checks involving the naive observer were comparable to the results involving the other observers.

Across all subjects, stimuli, and trials, overall reliability for avoidance behaviors averaged at least 96%, occurrence at least 74%, and nonoccurrence at least 95%. For each of the 12 stimuli, overall reliability averaged at least 93% and nonoccurrence at least 86%. Occurrence reliabilities for avoidance were lower across the 12 stimuli, ranging from 25% to 100%. The lower figures were caused by a very low frequency of occurrences and a small number of disagreements that deflated the average. For example, for the stimulus (verbal interaction) with occurrence reliability of 25% there were only three disagreements on occurrence across all assessment trials.

Experimental sessions. Each student was presented with each stimulus a total of 36 times (30 assessment trials and 6 primer presentations, see below), during a 5-week period. One exception was Student 3, who could not receive pudding because of a dietary restriction. Three stimuli were presented each session in a counterbalanced fashion across sessions. Each session began with a 5-s presentation of the stimulus in which the subject was prompted to touch, taste, or look at the stimulus. Next, five trials were conducted. A trial began when the assessor presented a stimulus to the student as described in Table 1. If the student exhibited an avoidance or nonoccurrence behavior, the stimulus was removed and a new trial was begun. For example, each mechanically operated stimulus was activated for 5 s and then discontinued if an avoidance or nonoccurrence was noted. If the subject displayed an approach behavior, the device was activated for an additional 5 s.

Staff opinion survey. Staff opinion of student preferences for the 12 stimuli was assessed with a survey form using a Likert-type scale. A scale value from 5 (most preferred) to 1 (least preferred) was assigned to each stimulus. The 12 stimuli were listed in arbitrary order on the form. No other information was provided on the form. Direct-care staff and professional personnel who worked with each student rated the student's perceived preference for each item by checking the appropriate scaled number. In total, 35 staff members completed the surveys, with at least five staff members completing a survey for each student.

Results

The initial intent of Experiment 1 was to determine whether one or more preferred stimuli could be identified for each student based on the occurrence of consistent approach behaviors. Table 2 presents the percentage of approach (and avoidance) behaviors to each stimulus averaged across all assessment sessions for each student. Using an 80% criterion of approach behaviors as representing a consistent preference (Pace et al., 1985), five students indicated a preference for one or more stimuli. Students 5 and 6 did not consistently approach any stimulus.

The second purpose of Experiment 1 was to compare the results of the systematic assessment with the results of the staff opinion assessment of student preferences. To make such a comparison, the numerical value reported by staff on the Likert scale for each stimulus for each subject was averaged across staff recordings. The 12 stimuli were then ranked for each student based on the average score. Similarly, the 12 stimuli were ranked for each student according to the average percentage of approach behaviors across assessment sessions. Figure 1 presents the comparisons of the two rankings for the seven students. As indicated in Figure 1, there was considerable discrepancy between the rankings of preferred stimuli from the systematic assessment and the rankings based on staff opinion. Using Spearman's rank correlation coefficient (Hollander & Wolfe, 1973, chap. 8) there was no statistically significant correlation between any student's preferences based on the systematically assessed ranking and the preferences based on the staff opinion ranking. Individual r values between rankings across individual students ranged from $-.33$ to $.11$. However, for each of the five students who approached a stimulus on at least 80% of the trials, there was at least one stimulus that was highly ranked (i.e., in the top 4 or 5 rankings of 12) on both the systematic and staff assessments.

Discussion

Results of Experiment 1 indicated that data from the systematic assessment strategy and the staff opinion strategy did not consistently agree. Experiment 2 evaluated which of the assessment strategies successfully identified stimuli that functioned as reinforcers in training programs.

EXPERIMENT 2

Method

Subjects and setting. The five participants in Experiment 1 who demonstrated a preference for at least one stimulus during the systematic assessment participated in Experiment 2.

Selection of stimuli to assess reinforcer value. Based on the results of Experiment 1, stimuli were grouped into the following four categories for each student to evaluate the types of stimuli that were

Table 2
Mean Percentage of Approach (AP) and Avoidance (AV) Behaviors Averaged Across Stimulus Presentation Sessions in Experiment 1

	Student													
	1		2		3		4		5		6		7	
Stimulus	% AP	% AV	% AP	% AV	% AP	% AV	% AP	% AV	% AP	% AV	% AP	% AV	% AP	% AV
Hug	0	0	33	37	13	47	13	27	10	27	3	0	7	0
Vibrator	27	17	90	10	100	0	67	0	60	7	7	3	13	0
Verbal interaction	3	0	13	27	77	0	27	0	13	0	57	0	0	0
Mechanical toy	13	7	100	0	100	0	70	0	33	40	30	0	17	0
Juice	90	0	83	13	63	27	30	47	30	67	13	76	24	20
Soft music	0	0	37	0	50	0	20	3	10	0	50	3	8	0
Rock music	7	0	33	0	50	3	50	0	3	0	67	0	8	0
Hand-held toy	23	3	83	13	100	0	93	0	63	3	7	3	20	24
Light board	27	0	77	13	27	70	63	7	57	0	23	7	8	12
Pudding	93	0	100	0	N/A		83	13	7	93	30	70	84	0
Clap	0	0	37	10	60	0	23	0	3	0	53	0	13	0
Tactile mitt	10	3	67	13	100	0	30	10	17	47	3	3	7	0

most likely to function as reinforcers: (a) *high systematic/high opinion*—a stimulus ranked at least among the four most preferred stimuli on both the systematic assessment of approach behaviors *and* the staff opinion assessment; (b) *high systematic/low opinion*—a stimulus ranked among the four most preferred stimuli on the systematic assessment *and* among the four least preferred on the staff opinion assessment; (c) *low systematic/high opinion*—a stimulus ranked among the four least preferred stimuli on the systematic assessment *and* among the four most preferred on the staff opinion assessment; and (d) *low systematic/low opinion*—a stimulus ranked among the four least preferred stimuli on both assessments. One exception to the grouping criteria was a stimulus (juice) for Student 1 in the high systematic/high opinion group that was ranked fifth on the opinion ranking. In addition to ranking among the top four stimuli based on the systematic assessment, for a stimulus to be considered in the *high systematic* category for a given student it had to have been approached on at least 80% of presentation trials averaged across assessment sessions.

Behavior definitions and measurement. The dependent variable of interest was the degree of independence exhibited by each student in performing a targeted skill at the trainer's request. For Students 1 through 4, the level of prompt required (see Experimental Procedures below) to evoke student compliance with the trainer's request was recorded for each trial. Prompt levels were recorded on a 4- or 5-point scale depending on a given student's designated training program, with 1 representing least independence (full physical guidance from the trainer) and 4 or 5 representing most independence (completed in response to trainer request without any trainer physical guidance).

The prompt level required by the student was recorded by the trainer and/or observer (experimenters and facility staff). Reliability checks were conducted on 82% of the training sessions, including each experimental condition for each student. Across all sessions with reliability checks (over 1,500 trials), there were only 14 disagreements between observers regarding the prompt level required by the student to perform the task.

For Student 7, the index of relative independence consisted of a correct versus an incorrect response. Interobserver reliability checks were conducted during all sessions for Student 7. Across a total of 165 trials, there were only six disagreements regarding the occurrence and nonoccurrence of a correct response.

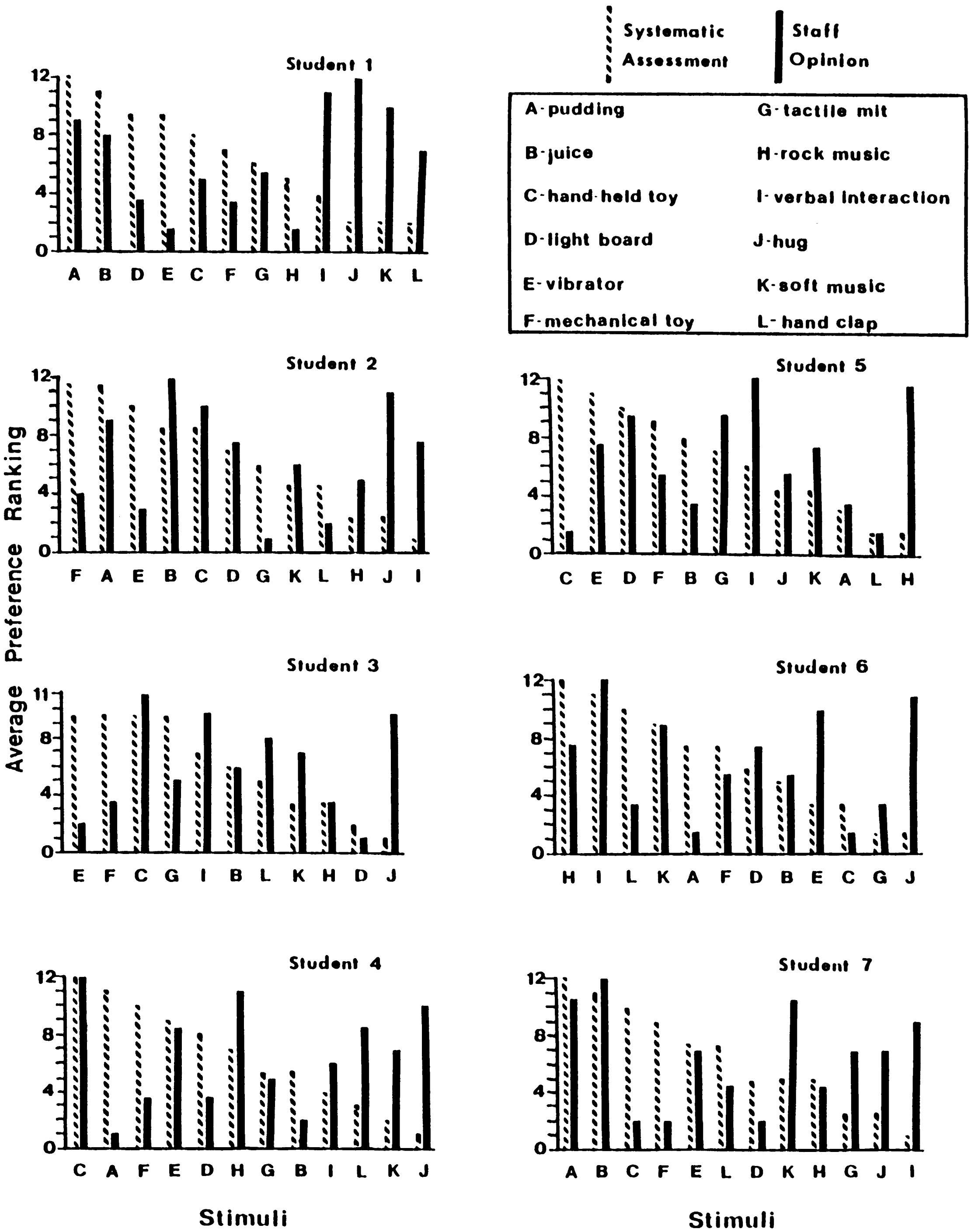

Figure 1. Average preference ranking based on the systematic assessment (striped bars) and staff opinion (closed bars) for the 12 stimuli for Students 1 through 7 (11 stimuli for Student 3).

Experimental procedures—baseline. During baseline, a graduated prompt sequence based on the locus of physical contact of the trainer's prompt (O'Brien, Bugle, & Azrin, 1972) was used to train targeted skills. For example, for Student 3's target behavior of placing a cylindrical cone on a dowel, the trainer began each trial by saying, "(name), cone on." If the student did not comply within 5 s, the trainer repeated the instruction and partially guided the student by placing her hand on the student's shoulder. If the student again failed to comply, the trainer paired the instruction with increased physical assistance by partially guiding the student by touching her elbow. Failure to comply at this level was followed by the trainer again repeating the instruction and providing more intense physical assistance by partially guiding the student at the wrist. The final level of prompt, if needed, was a verbal instruction with hand-over-hand, full physical guidance by the trainer.

The target behavior for Student 1 was to reach and touch a toy. Student 2's target behavior was to put a utensil in a container. Student 4's target behavior initially was the same as that for Student 2 and was later changed to a switch-pressing behavior (see Results). Student 7's target behavior was to lift her head to an upright position on trainer command. As indicated earlier, in contrast to using a graduated prompting sequence as used with the other students, a dichotomous scoring process was used with Student 7 (i.e., she either lifted her head or she did not).

Training sessions were conducted individually with each student. Sessions for Students 1 through 4 consisted of 10 trials, whereas sessions for Student 7 involved five trials. Throughout the baseline condition, the trainer provided no consequences for correct performance.

Experimental procedures—contingency conditions. During the contingency conditions, a stimulus selected from one of the four stimulus groups was presented to the student for 3 to 5 s contingent on a designated behavior. More specifically, for each of Students 1 through 4, when the student performed the task at the least intrusive prompt level that was required to evoke his or her performance during baseline, the selected stimulus was provided. When the student later performed the task at a less intrusive prompt level, then that prompt level was subsequently used for the reinforcement criterion. To ensure that the student was aware of the presence of the stimulus, each of the 10-trial training sessions started with a primer trial in which the trainer verbally cued and physically guided the correct behavior and then immediately presented the stimulus. Procedures for Student 7 were the same as for Students 1 through 4 with the exception that the stimulus was provided contingent on the occurrence of a correct response (i.e., head lift to an upright position) in contrast to being provided contingent on the less restrictive prompt level. Except for the use of the contingent stimulus presentation, all procedures remained the same as in baseline.

Experimental design. The experimental design consisted of a sequential treatment design with an experimental reversal embedded within treatments (see Kazdin, 1982, chap. 5). Specifically, following baseline, the reinforcing efficacy of a stimulus selected from one of the four groups was assessed. If behavior change occurred relative to baseline, then a reversal to the baseline condition was conducted to demonstrate functional control of the stimulus as a reinforcer. If behavior change was not apparent, another stimulus was selected and provided contingently. This process was continued until a behavior change occurred relative to the preceding condition, at which point a reversal to the preceding condition (or baseline) was conducted to demonstrate functional control of the given stimulus as a reinforcer.

It was hypothesized that the stimuli most likely to function as reinforcers were those that had high rankings on both the systematic and staff opinion assessments. Consequently, because a primary purpose was to develop a method of determining likely reinforcers, stimuli from that group were applied and evaluated more frequently than stimuli from the other three groups.

Results and Discussion

Individual student performance. Results for Students 1 and 2 are presented in separate panels

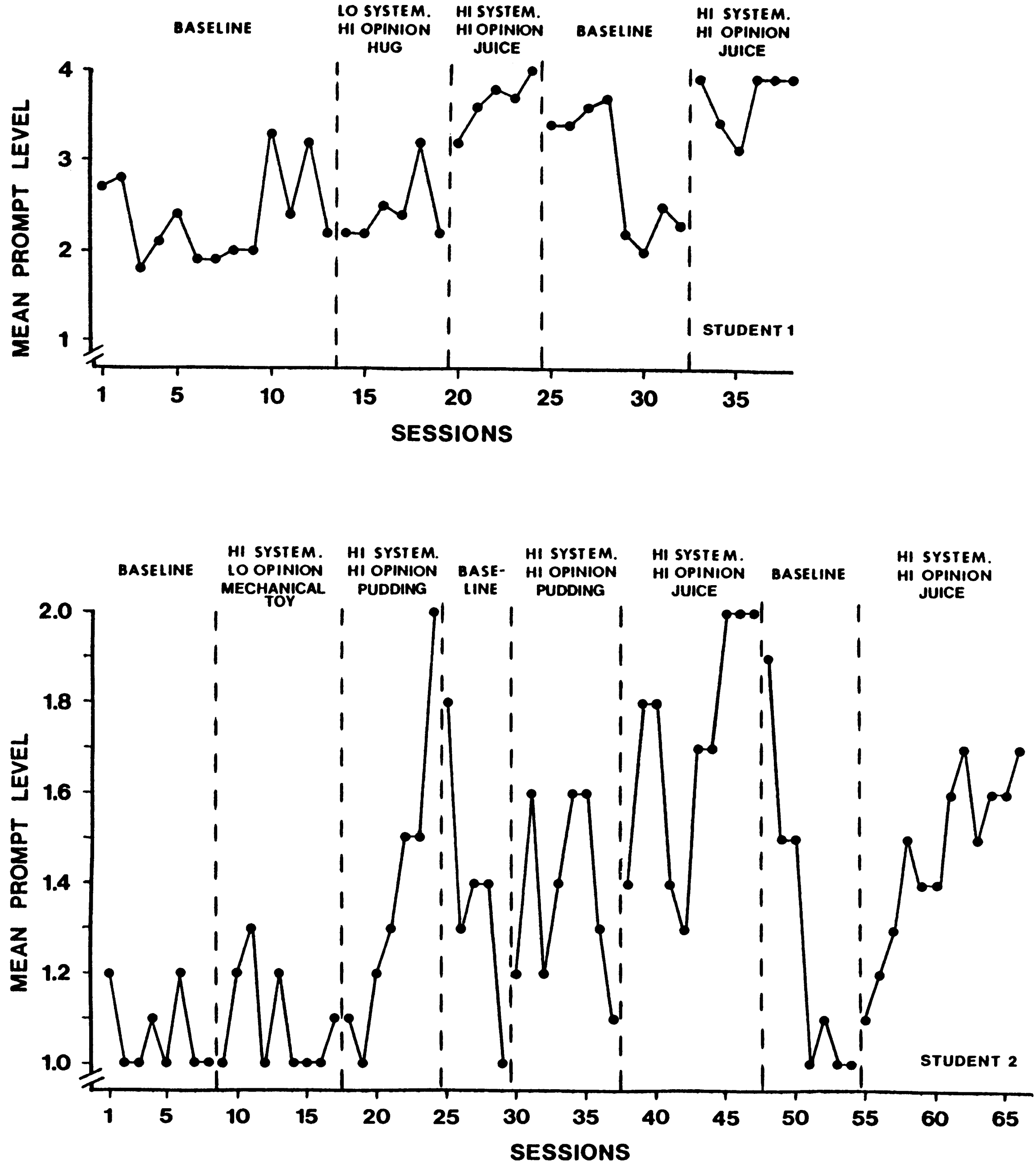

Figure 2. Mean prompt level (with 1.0 representing the most intrusive prompt level—full physical guidance by the trainer) required to evoke Student 1's (top panel) and Student 2's (bottom panel) completion of the target task for each session during each experimental condition.

of Figure 2. Results for Student 1 indicate that no behavior change occurred when a stimulus (hug from the trainer) selected from the low systematic/ high staff opinion group was provided contingently. Specifically, during baseline the mean prompt level required to evoke Student 1's performance of reaching out and touching a toy was 2.4, whereas during the contingent presentation of the low systematic/ high opinion stimulus, it was 2.5. In contrast, when a stimulus (juice) selected from the high system-

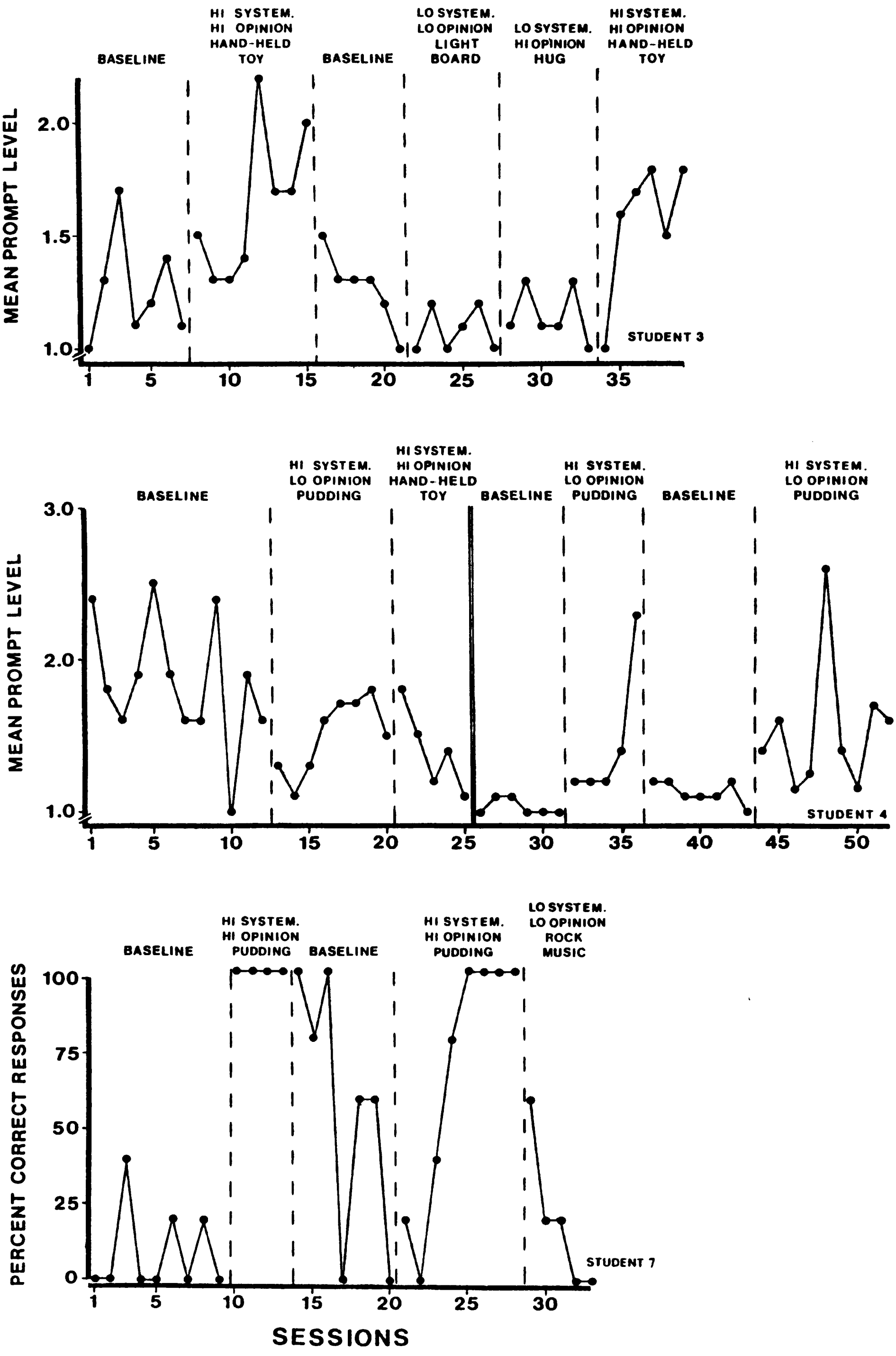

Figure 3. Mean prompt level (with 1.0 representing the most intrusive prompt level—full physical guidance by the trainer) required to evoke Student 3's (top panel) and Student 4's (middle panel) completion of the target task for each session during each experimental condition. The double vertical lines indicate where Student 4's target task was changed. Also, the percentage of correct responses for Student 7 (bottom panel) for each session during each experimental condition is depicted.

atic/high opinion group was provided, the mean prompt level increased steadily, with the last session averaging all independent responses (prompt level 4). When baseline was reinstated, the prompt level decreased such that for the last four sessions, the mean prompt level was back to baseline level. When the high systematic/high opinion stimulus was reintroduced, the mean prompt level again increased, with the last three training sessions resulting in independent responses.

Results for Student 2 (Figure 2, bottom panel) indicate that relative to baseline, the contingent presentation of the stimulus (mechanical toy) selected from the high systematic/low opinion ranking group was not accompanied by behavior change. In contrast, contingent presentation of the stimulus (pudding) from the high systematic/high opinion group was accompanied by a consistently increasing trend in prompt level. When baseline was reinstated, a reversal occurred to a decreasing trend. However, when the high systematic/high opinion stimulus was reintroduced, the increasing trend noted earlier was not replicated. Consequently, another stimulus (juice) was selected from the high systematic/high opinion group and applied contingently, with an accompanying increasing trend in prompt level. A subsequent reversal in the trend occurred when baseline was reinstated. When the stimulus was reapplied, the trend again reversed to an increasing trend in prompt level.

Results for Student 3 (Figure 3, top panel) were similar to those for the first two students in that a stimulus selected from the high systematic/high opinion ranking group was accompanied by behavior change, whereas stimuli selected from the other groups were not. The mean prompt level required for Student 3 to put a cone on a dowel increased from 1.3 during baseline to 1.7 (with an increasing trend) when the stimulus from the high systematic/high opinion group (hand-held toy) was applied contingently. During the second baseline, a reversal occurred to a decreasing trend, with all trials during the last session requiring a full physical prompt (overall mean level of 1.3). When stimuli from the low systematic/low opinion (light board) and low systematic/high opinion (hug) groups were applied contingently, there were no changes in prompt level relative to baseline (1.1 and 1.1, respectively). However, when the toy stimulus was reapplied from the high systematic/high opinion group, the mean prompt level again increased (1.5).

For Student 4, the prompt level required to evoke her completion of the task of placing a utensil in a container did not increase (Figure 3, middle panel) from baseline (mean of 1.8) when a stimulus from the high systematic/low opinion group was applied contingently (1.5), nor when a stimulus from the high systematic/high opinion group was applied (1.4). At that point, it appeared that the task was too difficult for the student. When the task was changed and simplified to a switch-pressing task, there was an increase in prompt level relative to baseline with the new task when a stimulus (pudding) was applied from the high systematic/low opinion group. Specifically, the required prompt level increased from 1.0 during baseline (with almost all trials requiring a full physical prompt) to 1.5 when the high systematic/low opinion stimulus was applied, then decreased to 1.1 when baseline was reinstated and subsequently increased to 1.6 when the stimulus was reapplied.

Results of the contingency applications with Student 7 (Figure 3, bottom panel) supported the results with Students 1 through 4 in that (a) a stimulus from the high systematic/high opinion group appeared to have reinforcing effects when applied contingently, and (b) a stimulus from the low systematic/low opinion group did not appear to have reinforcing effects. Specifically, Student 7 successfully lifted her head in fewer than 20% of the trials during baseline, whereas she lifted her head in 100% of the trials when the stimulus from the high systematic/high opinion group was applied. When the latter stimulus was withdrawn, her percentage of successful trials decreased steadily to 0% and then increased steadily to 100% when the stimulus was reapplied. When the stimulus from the low systematic/low opinion group was then applied contingently, her percentage of successful trials decreased steadily to 0%. At that point, the formal experiment was discontinued for Student 7. However, because of the success with the high systematic/high opinion stimulus, the program (and stimulus) was implemented during Student 7's regular classroom regime (hence, even though the last experimental condition involved a poor response pattern, her more desirable response pattern was evoked through her educational programming).

Group performance. At least one of the stimuli that ranked high on the systematic assessment was accompanied by behavior change for all five students when applied contingently on target behaviors (four students responded to stimuli from the high systematic/high opinion group and one student responded to a stimulus from the high systematic/low opinion group). Among the applications of stimuli that were ranked low on the systematic assessment (regardless of whether the stimuli were ranked high or low on the opinion ranking) no behavior change was noted (two applications from the low systematic/high opinion group and two from the low systematic/low opinion group).

GENERAL DISCUSSION

Results of this investigation indicate that the systematic assessment procedure developed by Pace et al. (1985) can be used to identify preferred stimuli with very low-skilled, profoundly handicapped persons. All of the participants exhibited differential approach behaviors across stimuli and five of the seven students consistently approached certain stimuli. The results also indicate that preference rankings based on caregiver opinion do not consistently coincide with the results of a systematic, observational approach to preference assessment. No correlation existed between systematically assessed preferences and opinion-based preferences for any of the seven students.

The results also indicate that stimuli that were systematically assessed to be student preferences represented a likely, albeit not certain, source of reinforcing stimuli for use in skill training programs. Reinforcing effects of a stimulus that was systematically assessed as preferred were found for all five students in Experiment 2. However, not every stimulus that was systematically assessed as preferred functioned as a reinforcer. Reinforcing effects for two systematically preferred stimuli (mechanical toy and pudding) were not convincingly demonstrated with Student 2. Although the initial application and withdrawal of the stimulus pudding suggested its reinforcing value, the second application was not accompanied by a readily apparent behavior change. Also, a systematically preferred stimulus (hand-held toy) did not function as a reinforcer for Student 4. In the latter case, it may have been that the lack of behavior change was caused by task difficulty and not by the lack of a reinforcer. When the task was simplified and a systematically preferred stimulus (pudding) was applied, there did appear to be a reinforcing effect with the new task. The other stimulus (hand-held toy) that was initially unsuccessful was not reapplied with the new task because at that point, a reinforcer (pudding) had been identified. Of course, such an explanation of the lack of reinforcing effects with certain stimuli represents our speculation at this point, and continued research is warranted for clarification.

The clinical implications of the results are that reinforcers for use in training programs with profoundly handicapped persons can be identified with a reasonable degree of reliability through a systematic assessment of stimulus preference. However, additional research is needed to increase the predictive validity of the systematic assessment method as a means of identifying reinforcing stimuli. For one thing, the durability over time of the stimulus preferences was not assessed, disallowing conclusions regarding the potential maintenance of the observed behavior changes. Furthermore, the observed preferences may have been related to the novelty of certain stimuli. Continued research is warranted to address these issues. Nevertheless, the significance of the results should be highlighted when considering the extreme difficulty often encountered when attempting to find reinforcing stimuli for very low-skilled, profoundly handicapped persons (Wacker et al., 1985). Also, because of the lack of correlation of the outcome of the common opinion-assessment approach with that of the systematic observational approach, as well as the finding that no stimulus that was not systematically assessed as a preference functioned as a reinforcer, the systematic approach seems to be a more valid means of identifying reinforcers than does reliance on staff opinion, as usually occurs in applied settings. However, because stimuli that were systematically assessed to be nonpreferred were only applied four times across three students, conclusions regarding the benefits of the systematic versus opinion assessment process should certainly be cautious until additional research can be conducted.

One issue that arises from the current results is what procedures should be conducted for those profoundly handicapped individuals who did not exhibit a stimulus preference based on the systematic assessment (e.g., Students 5 and 6). One possibility would be to assess potential preferences for other stimuli that were not initially assessed. Another possibility is that the 80% criterion (see Pace et al., 1985) of approach behaviors for indicating a preference may be too stringent. Future research should evaluate whether stimuli that are approached, for example, on the average of more than 50% of the time function as reinforcers. It also seems possible that due to the severity of physical and mental impairment of some profoundly handicapped persons, no reinforcing stimuli may be identified (see Bailey, 1981). In such cases, the systematic assessment process may be used to enhance the quality of life of profoundly handicapped individuals from a nontraining perspective (Ivancic & Bailey, 1986). That is, the systematic assessment process could identify stimuli that a client prefers more than other stimuli, although the client still may prefer (i.e., approach) the former stimuli much less than 80% of the time. Such stimuli may not have reinforcing value in a training program but could be provided to the client noncontingently during the day to help make the client's routine environment more pleasant.

Three students avoided one or more stimuli over the majority of presentation trials, although the frequency of avoidance behaviors was considerably lower than the frequency of approach behaviors across students. As Pace et al. (1985) suggested, perhaps these stimuli could be incorporated into training programs using a negative reinforcement paradigm. Additionally, stimuli that result in client avoidance behaviors could be identified through the systematic assessment process such that those stimuli could be removed from the client's environment to potentially make his or her environment less aversive or unpleasant. Variability among students with the stimuli that evoked avoidance behaviors highlights the importance of systematically identifying individual client preferences. To illustrate, based on the systematic assessment, stimuli (e.g., juice) that were frequently approached by some students (e.g., Students 1 and 2) were frequently avoided by other students (Students 5 and 6).

In summary, results of the two experiments are encouraging in terms of identifying and subsequently applying reinforcing stimuli to help teach more independent skills to a population that is often very difficult to teach. The five students who participated in Experiment 2 all showed behavior change in response to the contingent application of a stimulus that was systematically assessed to be preferred, despite the fact that the students were selected for the study based on their very low functioning skill level and their previous lack of progress in training programs. Continued research in the area of reinforcer identification as well as in the other areas just noted could help to further enhance the successful participation of profoundly handicapped persons in training programs, as well as to enhance the routine quality of life of this population.

REFERENCES

Bailey, J. S. (1981). Wanted: A rational search for the limiting conditions of habilitation in the retarded. *Analysis and Intervention in Developmental Disabilities,* **1,** 45–52.

Bailey, J. S., & Bostow, D. E. (1979). *Research methods in applied behavior analysis.* Tallahassee, FL: Copy Grafix.

Bailey, J. S., & Meyerson, L. (1969). Vibration as a reinforcer with a profoundly retarded child. *Journal of Applied Behavior Analysis,* **2,** 135–137.

Dattilo, J. (1986). Computerized assessment of preference for severely handicapped individuals. *Journal of Applied Behavior Analysis,* **19,** 445–448.

Favell, J. E., & Cannon, P. R. (1976). Evaluation of entertainment materials for severely retarded persons. *American Journal of Mental Deficiency*, **81**, 357–361.

Green, C. W., Canipe, V. S., Way, P. J., & Reid, D. H. (1986). Improving the functional utility and effectiveness of classroom services for students with profound multiple handicaps. *Journal of the Association for Persons with Severe Handicaps*, **11**, 162–170.

Gutierrez-Griep, R. (1984). Student preference of sensory reinforcers. *Education and Training of the Mentally Retarded*, **19**, 108–113.

Hollander, M., & Wolfe, D. A. (1973). *Nonparametric statistical methods* (pp. 191–192). New York: John Wiley & Sons.

Ivancic, M. T., & Bailey, J. S. (1986, September). *Assessing operant training potential*. Paper presented at the Florida Association for Behavior Analysis 6th annual meeting, Orlando, FL.

Johnson, D., Firth, D., & Davey, G. C. L. (1978). Vibration and praise as reinforcers for mentally handicapped people. *Mental Retardation*, **16**, 339–342.

Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings*. New York: Oxford University Press.

O'Brien, F., Bugle, C., & Azrin, N. H. (1972). Training and maintaining a retarded child's proper eating. *Journal of Applied Behavior Analysis*, **5**, 67–72.

Pace, G. M., Ivancic, M. T., Edwards, G. L., Iwata, B. A., & Page, T. J. (1985). Assessment of stimulus preference and reinforcer value with profoundly retarded individuals. *Journal of Applied Behavior Analysis*, **18**, 249–255.

Reid, D. H., & Green, C. W. (in press). Some technological advances in educating severely handicapped persons. In R. P. Barrett & J. L. Matson (Eds.), *Advances in developmental disorders, Volume 3*, Greenwich, CT: JAI Press.

Wacker, D. P., Berg, W. K., Wiggins, B., Muldoon, M., & Cavanaugh, J. (1985). Evaluation of reinforcer preferences for profoundly handicapped students. *Journal of Applied Behavior Analysis*, **18**, 173–178.

Received January 16, 1987
Initial editorial decision March 25, 1987
Revision received June 16, 1987
Final acceptance July 13, 1987
Action Editor, R. Wayne Fuqua