Reducing the Self-Stimulatory Behavior of a Profoundly Retarded Female Through Sensory Awareness Training

(mental retardation, occupational therapy, self-mutilation)

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Sensory awareness training procedures were used to reduce the self-stimulatory behavior of a profoundly retarded female. Self-stimulatory behaviors were directly observed and recorded using a 15-second momentary time sample procedure for 10-minute recording periods. An alternating treatment design was used to compare the effects of treatment and nontreatment. Tactile, olfactory, and gustatory materials were used to stimulate the person's senses. Generalization was assessed across noncompliant behaviors. The results indicate that sensory awareness training reduced self-stimulatory behaviors, but that these behaviors were still being emitted at a high rate. Suggestions for further research are made, and the use of "traditional" sensory awareness training procedures is questioned.

Self-stimulatory behavior is frequently a behavior problem with developmentally disabled individuals. O'Brien (1) defines self-stimulatory behavior as "behaviors that are stereotyped and performed repetitiously, and that fail to produce any apparent positive environmental consequences or physical injury." (p 117) Berkson and Davenport (2) estimated that two-thirds of the mentally retarded people that live in large institutions perform self-stimulatory behavior. Although this reference is dated, there is no reason to believe that this situation has changed dramatically. Self-stimulatory behavior is undesirable when it is frequent and interferes with the individual's ability to learn, communicate, and interact adaptively with the environment.

One of the theories as to why self-stimulatory behavior occurs is that there is competition between self-stimulation and adaptive behavior (1). Foxx and Azrin (3) state that self-stimulatory behavior is reinforced by tactile, proprioceptive, and sensory stimulation. Rincover (4) provided an empirical basis to this theory by demonstrating that self-stimulatory behavior could be reduced by removing or blocking the consequent auditory, visual, or proprioceptive stimulation in psychotic children. In reviewing the sensory reinforcement literature, Murphy (5) concludes that there is a close relationship between self-stimulatory behavior and sensory reinforcement. This conclusion is supported by other reviews and research (6, 7).

Another theory suggests that self-stimulatory behavior is used as a regulatory mechanism for individuals who may have difficulty receiving and interpreting sensory input.
information. Resman (8) discusses the theoretical implications of stimulus-seeking behavior in hyperactive individuals who are intrinsically underaroused versus those who are overaroused. Bonadonna (9) states that stereotypic rocking behavior can provide "an increased level of stimulation for individuals unable to . . . process a sufficient amount of the environmental stimuli," or it can provide a "general inhibitory or relaxing effect . . . blocking out an overstimulating environment." (p 776) She suggests that rocking may occur in the same individual for either reason.

A variety of behavior management procedures have been used to suppress self-stimulatory behavior, including time-out (10), overcorrection (11), slaps on the thigh (12), electric shock (13), and sensory extinction (14). Although successful in many cases, these procedures are primarily consequence strategies, that is they involve a reaction following the occurrence of a self-stimulatory behavior. Alternatives to these consequence strategies for reducing behavior are antecedent manipulations that decrease the likelihood that particular behaviors will occur. One antecedent strategy for reducing stereotypical behavior that has received theoretical support, but little empirical support, is sensory awareness training. The premise of sensory awareness training is that by using a systematic training method to stimulate one or more of the five physical senses, persons will increase awareness of themselves, others, their surroundings, and will increase their adaptive behavior skills. Also, these training activities provide opportunities for individuals to receive stimulation from other events (for example, therapists, teachers, and so on). Through this development, other maladaptive behaviors (for example, self-stimulatory behavior) would be predicted to decrease.

Previous research in this area has been limited in number and has relied primarily on the use of group comparisons measured by standardized tests. For example, Edgar et al. (15) used the Gesell Developmental Schedules to measure the differences between groups of moderately and severely retarded children using training methods such as walking boards, rhythm instruments, and balance boards. In this study, the experimental group gained more on the Gesell Developmental Schedules than the control group. Montgomery and Richter (16) used items from the Frostig Movement Skills Test Battery, developmental scales, and a reflex test in comparing groups of retarded children who were involved or not involved in stimulation procedures such as rolling, crawling, and standing balance. These researchers found that the children in the experimental group improved more than those in the control group.

The use of group comparison in these studies limits the external validity of the findings because of averaging of results over the group, generality of findings, and intersubject variability (17). A more thorough analysis of the treatment procedures would be possible if single case experimental designs (for example, multiple-baseline, alternating treatment, and so on) were used. Further analysis of the treatment procedures would be possible if direct observational methods such as frequency recording, duration recording, or interval time sampling were used as measurement techniques (18). In this study, the effectiveness of a more "traditional" sensory awareness training program (using only tactile, gustatory, and olfactory stimulation) on reducing self-stimulatory behavior was evaluated. Observational assessment data were recorded for self-stimulatory and noncompliance behaviors.

Method
Research Design. An alternating treatment design (19) was chosen to compare the effects of treatment and nontreatment regarding the self-stimulatory behavior. The advantages of this design are that it does not include a withdrawal of treatment and that the comparison may be made more quickly than in a withdrawal design. The basic feature of the design, as described by Barlow and Hayes (19), is "the fast alternation of two different treatments or conditions, each associated with a distinct and discriminating stimulus." (p 200) The two conditions were baseline and sensory awareness training.

Subject Description. Becky, a 12-year-old female diagnosed as profoundly mentally retarded-microcephaly, primary; osteogenesis imperfecta, has lived in large state institutions for the mentally retarded for the past three years. Previous to this, she lived at home but did not attend school. On the Vineland Social Maturity Scale (administered June 1, 1981), Becky achieved a social age of 2.05 and a social quotient of 19. As a result of her bone condition, that is, osteogenesis imperfecta, Becky has spent much of her life in body casts and casts of other sizes. Becky is nonverbal and does not use any manual signs expressively. She was not on any medications. She was...
referred to the first author for consultation because her high rate of self-stimulatory behavior and her noncompliant behavior were interfering with her educational programming.

Becky's educational programming consisted of prevocational training, money identification, self-care, social skills training, and manual sign language training. Most of her classroom instruction was one-to-one with either her teacher or an aide.

Setting, Trainer, and Target Behaviors. All training and data collection took place within Becky's special education classroom. The class was divided into two rooms, each 4.8 m (15 feet, 8 inches) x 3.7 m (12 feet), with a total of eight students, three aides, and one teacher. Usually there were one to three other students in the room with Becky and one to two staff members. The first author was also present to collect data.

All of the training sessions (approximately 25 total) were conducted by the same classroom aide. The aide had a high school diploma and had worked in the classroom for approximately two months at the start of the study.

A total of 29 different self-stimulatory behaviors were defined and divided into three categories (see Table 1).

**Materials and Training Procedures.** A variety of materials were used to stimulate Becky's senses. The materials were divided into different sensory modalities for recording purposes, although it was possible to stimulate more than one sense at a time by the procedure. The trainer used her own discretion in selecting the training materials, although Becky sometimes reached for materials if they were accessible. The training sessions lasted approximately 15 minutes each, and data were collected during the first 10 minutes of the session. Training initially occurred one time per day and then was increased to three times per school day.

The different sensory awareness training materials included hand lotion, playdough, shaving cream, sand, tinsel, powder, cotton, water, sandpaper, colored scarfs, and rice (tactile); incense sticks and cinnamon sticks (olfactory); and syrup, lemon, salt, and honey (gustatory). During training, Becky was encouraged to manipulate the various materials. For example, one tactile activity involved Becky transferring sand from one hand to another, either independently or with teacher assistance. An olfactory stimulation activity required trainer assistance to encourage Becky to smell incense sticks. In gustatory stimulation, the trainer put honey on Becky's tongue. During all training activities, the trainer would talk with Becky about what she was doing and give Becky social reinforcement for appropriate interactions and manipulations.

<table>
<thead>
<tr>
<th>Head and Body Movements</th>
<th>Mouth Movements</th>
<th>Hand Movements</th>
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<tbody>
<tr>
<td>1. rocking head sideways</td>
<td>1. mouth noises</td>
<td>1. hands placed on mouth</td>
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<tr>
<td>2. sitting and rocking body above waist in a forward and backward motion</td>
<td>2. clicking teeth</td>
<td>2. with arm in upward position, hand flipped away from body</td>
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<tr>
<td>3. rotating head position in a jerky motion</td>
<td>3. grimacing</td>
<td>3. hand hit to head</td>
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<tr>
<td>4. rocking body in a sideways motion while sitting</td>
<td>4. tongue extended from mouth</td>
<td>4. flicking fingers on hand</td>
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<td>5. arching head backwards</td>
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<td>5. hand shaking</td>
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<td>6. while standing, shifting weight from side to side while lifting feet from floor</td>
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<td>6. fanning self with paper</td>
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<td></td>
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<td>7. finger in ear</td>
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<td>8. finger in nose</td>
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<td></td>
<td></td>
<td>9. fingers on nose</td>
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<td></td>
<td></td>
<td>10. tapping fingers against lips</td>
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<td></td>
<td></td>
<td>11. arms upstretched over head</td>
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<tr>
<td></td>
<td></td>
<td>12. flicking finger across chest in downward direction</td>
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<tr>
<td></td>
<td></td>
<td>13. flicking eyelashes with finger</td>
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<td></td>
<td></td>
<td>14. fingers in mouth</td>
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<tr>
<td></td>
<td></td>
<td>15. clapping hands together</td>
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<tr>
<td></td>
<td></td>
<td>16. tapping hands together</td>
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<tr>
<td></td>
<td></td>
<td>17. rubbing hands across chest in downward motion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18. hands grabbing crotch</td>
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<tr>
<td></td>
<td></td>
<td>19. tapping fingers on table</td>
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</table>
**Data Collection.** Data were recorded three to five times per week during 10-minute time samples using a 15-second momentary time sample. At the end of the 15-second interval, the observer recorded whether Becky was engaging in any of the three categories (head and body, mouth, and/or hand) of self-stimulatory behavior. The observer then waited until the end of the next 15-second interval and once again recorded the behaviors. This was continued until 40 intervals had been recorded during the 10-minute time sample. If Becky engaged in more than one of the categories at the same time (that is, clicking her teeth while rocking her head sideways), each of the appropriate categories was recorded on the data sheet.

**Reliability.** Interoobserver agreement in scoring self-stimulatory behavior was determined by having either a graduate student in special education or Becky's teacher record a data sheet identical to that of the principal investigator. An agreement was defined as both observers agreeing that a self-stimulatory behavior either occurred or did not occur during the momentary time sample. Reliability was calculated by dividing the number of agreements by the number of agreements plus disagreements, and multiplying by 100. The overall mean reliability coefficient was 78 percent with a range of 67 to 90 percent. The low mean score may be due in part to the high rate of Becky's self-stimulatory behaviors and the difficulty of distinguishing at the end of the 15-second period exactly which behaviors were occurring for data collection purposes.

**Generalization.** Stokes and Baer (20) define generalization as "...the occurrence of relevant behavior under different, non-training conditions (that is, across subjects, settings, people, behaviors, and/or time) without the scheduling of the same events in those conditions as had been scheduled in the training conditions." (p 350) For Becky, the generalization component was the number of noncompliant behaviors (on floor, out of seat, and throwing objects) during class time. Before the sensory awareness training was started, a timeout of 2 minutes was initiated in an attempt to eliminate her noncompliant behaviors.

**Results**

Figure 1 shows the percentage of intervals during the 10-minute time samples that Becky was engaging in self-stimulatory behavior. During baseline, she had a mean of 86.9 percent with a range of 61 to 98 percent. During sensory awareness training, she had a mean of 61.4 percent with a range of 38 to 75 percent. During the posttraining phase of the alternating treatment design (regular classroom time), she had a mean of 87.5 percent with a range of 75 to 95 percent. The percentage of self-stimulatory behavior in each sensory awareness training session was lower than the percentage of self-stimulatory behavior emitted during the same day in the regular classroom time.

A graphic display of the number of noncompliant behaviors emitted per day is presented in Figure 2. Though Becky's noncompliant behavior was reduced when a timeout was implemented, a greater and more consistent reduction was shown concurrent with the initiation of sensory awareness training.

**Discussion**

The results of this study indicate that sensory awareness training was effective in reducing Becky's self-stimulatory behaviors during the times when the sensory awareness training was being implemented. Becky's high rate of self-stimulatory behavior remained at the same rate during nontreatment (that is, regular classroom time) as the baseline rate. Unfortunately, Becky's emergency hospitalization abruptly terminated the research project after four weeks of training. A longer period of sensory awareness training may have helped decrease her self-stimulatory behaviors.

Reasons why Becky's self-stimulatory behaviors decreased during sensory awareness training time are unclear. It is possible that the direct relationship between the stimulus and the sensation (for example, touch the cloth, it feels soft) directed her attention to the activity and away from self-stimulatory behaviors. The stimulus-response relationship in regular classroom activities may have been too "remote" to be meaningful to Becky. In regular classroom activities, in the interval between teacher cues and the person's response, there may be competition between the self-stimulatory behaviors and the cue. If, as Bright et al. (21) suggest, the perceptual abilities are distorted, then the cue may be irrelevant to the individual. Then self-stimulatory behavior, rather than adaptive behavior would be displayed.

Further research is warranted in this area using several dependent variables and single case experimental designs. Individualized analyses should contribute to a greater understanding of the variables that are responsible for the
effectiveness of sensory awareness training procedures. Examples of dependent variables that could be studied include adaptive behaviors such as eye contact, visual tracking, social interactions, response to stimulation (that is, turning head, changes in facial expression, manipulations, vocalizations), manual signing, gross and fine motor responses, imitation skills, and maladaptive behaviors.

Though this study used "traditional" sensory awareness training methods, further investigation could examine ways to integrate these activities into more functional activities. For example, bread making is a functional activity that involves tactile, olfactory, visual, and gustatory stimulation through kneading and rolling the dough, baking the bread, and finally eating the bread. While traditional sensory awareness training methods may be useful with children, their use with adolescents or adults must be questioned. These methods are not age appropriate, may be stigmatizing to the people involved, or may not be in the spirit of normalization in which activities are representative of the kinds of complex leisure pursuits and social interactions that exist in the community (22).

Sensory awareness training has implications for use in occupa-
Figure 2
Compliance to teacher requests under different classroom conditions.
tional therapy. Meaningful adaptive behaviors that focus on sensory awareness can direct attention to the activity, possibly decreasing interfering behaviors and increasing adaptive behaviors. The premise of intervention on a sensory level is that by adjusting the input that an individual receives, he or she will be able to process it in such a way to allow him or her to respond adaptively to the environment to which sensory input is related. Clark et al. (23) found that with profoundly retarded adults, a modified sensory-integrative approach resulted in gains in eye contact, frequency of vocalizations, and postural adaptations, comparable to gains achieved with an operant conditioning approach. Enhanced sensory awareness may also enhance awareness of the activity. More opportunity exists for positive reinforcement from and positive social interactions with others. Activities of daily living (ADL) can be redesigned to include sensory awareness training. An individual can learn to dress in a soft sweater, silky socks, corduroy (bumpy) pants. Sensations can be used to teach separate steps to activities, that is, warm water for soaping and scrubbing your hands, cool water for rinsing.

Conclusion
This study tentatively demonstrates that sensory awareness training may be an effective procedure in reducing self-stimulatory behavior in a developmentally disabled individual and may offer a wider range of training options for teachers, behavior analysts, occupational therapists, physical therapists, therapeutic recreationists, and other individuals in working with developmentally disabled people. Further research is needed with an emphasis on functional sensory awareness training, multiple measurement of dependent variables, and individualized data analysis.

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REFERENCES