TREATMENT OF SOCIAL BEHAVIOR IN AUTISM THROUGH THE MODIFICATION OF PIVOTAL SOCIAL SKILLS

ROBERT L. KOEGEL AND WILLIAM D. FREA

UNIVERSITY OF CALIFORNIA AT SANTA BARBARA

We examined acquisition of individual social communicative behaviors and generalization across other social behaviors in 2 children with autism. The results of a multiple baseline design showed that the children's treated social behaviors improved rapidly and that there were generalized changes in untreated social behaviors. These improvements were accompanied by increases in subjective ratings of the overall appropriateness of the children's social interactions. The results suggest the possibility of identifying pivotal response classes of social communicative behavior that may facilitate the understanding of social behavior in autism as well as improve peer interactions, social integration, and social development.

   DESCRIPTORS: autistic children, response generalization, self-management, generalization, language, social behavior, pragmatics

Because children with autism require treatment for a considerable number of behaviors, investigators have been searching for pivotal behaviors that, when changed, will result in collateral changes in other behaviors as well (Koegel, Koegel, & Schreibman, 1991). Ideally, the identification of pivotal behaviors would result in changes in clusters of behaviors that are prominent aspects of the syndrome of autism, such as abnormal language or social behavior. Systematic research has already identified several key pivotal behaviors that have resulted in powerful treatment interventions that change multiple areas of functioning (Koegel & Koegel, 1988). In addition, the literature in the areas of response covariation (Houlihan, Sloane, Jenson, & Levine, 1991; Parrish, Cataldo, Kolko, Neef, & Egel, 1986; Sprague & Horner, 1992), response generalization (Horner, Dunlap, & Koe-

gel, 1988), and response classes (Browder & Schoen, 1989; Day & Horner, 1989; Northup et al., 1991; Reichle, Lindamood, & Sigafoos, 1986) suggests important new directions for the continued identification of pivotal behaviors. Of special note is the concept that topographically different behaviors may be functionally equivalent in terms of the effect they have on a child's environment (Carr & Durand, 1985).

   Recent research in the area of pragmatics (social communicative behavior) suggests one potentially profitable new line of research in this direction. The social aspects of language are the behaviors that accompany verbal communication, thus allowing the communicator successful, appropriate, and normally perceived conversation. A variety of topographically different language structures may serve a similar function for a child, and not all of these may be perceived as socially appropriate by other members of society. To date we are still far from completely comprehending the area of social communicative behavior. However, it is clear that the social deficits that are primary in the diagnosis of autism result in a great amount of difficulty in communicating appropriately for persons with this disorder. These problem areas include the failure to respond to verbal initiations from others, inappropriate affect or facial expression during communicative interactions, perseveration on the same

topic even when cues are given by the partner for a topic shift, eye contact directed away from the partner, and nonverbal gestures that are unrelated to the topic (Bernard-Opitz, 1982; McHale, Simeonsson, Marcus, & Olley, 1980; Rimland, 1964; Schreibman & Mills, 1983; Waterhouse & Fein, 1978).

In previous research (Koegel, Koegel, Hurley, & Frea, 1992), we reported that individual social communicative skills can be improved in children with autism. The results of that research showed that when the children learned and demonstrated, on a regular basis, a single social communicative behavior (to respond to verbal initiations from others), their level of disruptive behavior decreased collaterally without the need for additional treatment. These results suggested that individual social skills might be part of a larger functional response class. For example, a variety of seemingly different abnormal social communicative behaviors might have served a similar function for the children, just as a variety of different disruptive behaviors might serve a similar function (such as getting attention from others or escaping from difficult tasks). If correct, this hypothesis would have major implications for advancing the understanding of social behavior in autism. That is, the social behavior of children with autism, which has been considered one of the most severe and puzzling aspects of the disorder (Schopler & Mesibov, 1986), might be easier to treat than once thought. Specifically, the above research leads to the hypothesis that changing one or two individual social communicative behaviors (such as eye contact or nonverbal gestures) should result in the immediate modification of a broader range of abnormal social behavior.

Therefore, the purposes of this experiment were (a) to continue our line of research testing the feasibility of modifying social behaviors in individuals with autism; (b) to assess whether such an intervention, focused on only one or two target behaviors, would simultaneously improve other social communicative behaviors without the need for additional treatment; and (c) to determine whether such changes, if they did occur, would be broad enough to have an impact on nondisabled individuals' subjective judgments of the overall social appropriateness of the children's conversational interactions.

METHOD

Participants

Two children participated. Each had an early diagnosis of autism by two independent agencies, according to the criteria of the Autism Society of America (Ritvo & Freeman, 1978) and the criteria specified by the DSM III-R (APA, 1987). In addition, the following criteria were applied in the selection of children who were "high functioning" and who had opportunities to interact in socially integrated settings: (a) an IQ score above 70, (b) no atypical physical characteristics or handicaps that might limit their social interactions, (c) currently part of a normal education classroom for at least part of the day, and (d) functioning successfully in all academic areas in school.

Andre was 13 years old. He was placed in a special education sixth-grade classroom and was mainstreamed into regular classrooms throughout the day. He entered the study with a full-scale IQ of 102 on the Wechsler Intelligence Scale for Children–Revised. His performance IQ was 112 and his verbal IQ was 94. Previously, he had obtained a standard score equivalent of 88 on the Peabody Picture Vocabulary Test–Revised, which was 1 year below his chronological age level. His standard scores on the Vineland Adaptive Behavior Scales were 64 (communication domain), 65 (socialization domain), 46 (daily living domain), and 54 (adaptive behavior composite). Subjectively, he appeared to raise his voice to highly inappropriate volumes whenever any topic became exciting to him. He had favorite topics such as Nintendo® games and restaurant design.

Chris was 16 years old. His home-room placement was in an eighth-grade classroom for language-disordered students. Scores on the Stanford-Binet Intelligence Scale ranged from 60 to 91. His composite score was 71. His standard scores on the Vineland Adaptive Behavior Scales were 43 (communication domain), 48 (socialization domain), 47

(daily living domain), and 42 (adaptive behavior composite). Subjectively, he appeared to have a great deal of difficulty socializing, but enjoyed discussing Nintendo® games and Yugoslavia. He also had an astounding memory and was able to list everyone he met on any given day a year ago.

Dependent Measures and Data Recording Procedures

Language samples were recorded for each participant individually while he interacted with a non-disabled adult who was introduced as a friend who wanted to talk to him for a short while. Data were recorded continuously in 5-min sessions, with each session defined as 5 min of consecutive conversational interactions (data were not recorded during reinforcement periods when the children played video games in a separate area). All sessions were conducted in the children's natural community settings (e.g., restaurant, park). Typically, four to seven conversational sessions took place per day, 1 day per week, throughout the 14 weeks of the investigation. For each participant, three target behaviors were chosen for detailed recording, based upon parent and teacher reports of their most serious social and communicative difficulties. A modified continuous 10-s interval recording procedure was used (see definitions below). This form of recording was sufficiently sensitive to changes in the children's behavior, because the behaviors tended to occur either for relatively long periods of time or not at all. Each behavior was scored within every 10-s interval as occurring either appropriately or inappropriately (see definitions below). In addition, pre- and posttreatment videotapes were scored by two independent observers (who were naive to the purposes of the experiment) for subjective judgments of appropriateness of the interaction.

Social communicative variables. Based on the literature in the area of autism, observations of the children, and parent and teacher reports, three of the following five behaviors (facial expression and affect, eye gaze, nonverbal mannerisms, voice volume, and perseveration of topic) were targeted for systematic observation and data recording for each participant. For each participant, the three most

problematic behaviors were selected for detailed recording. These were perseveration of topic, intensity of voice volume, and facial expression and affect for Andre, and eye gaze, nonverbal mannerisms, and perseveration of topic for Chris. We targeted two of the three behaviors for treatment for Chris. For Andre, we tested the extreme case of targeting only one behavior for treatment, in order to assess generalized changes in other social behaviors. Operational definitions of the behaviors were as follows.

Within any given 10-s interval, appropriate *facial expression and affect* was scored if the child exhibited facial expression and affect that were relevant to the conversation throughout the interval. The behavior was recorded as inappropriate if the child exhibited a facial expression (typically contorted) unrelated to the conversation for more than 3 s (usually if it lasted more than 3 s, it lasted throughout the interval and was accompanied by affect that was unrelated to the conversation, such as inappropriate singing of the verbal content, use of a cartoon voice, monster impressions unrelated to the topic, etc.).

Within any given 10-s interval, appropriate *nonverbal mannerisms* were scored if the child exhibited only gestures or mannerisms that were related to the conversational topic. Inappropriate nonverbal mannerisms typically consisted of persistent rubbing of objects or body parts or persistent limb movements for more than half of the interval (typically they occurred throughout the interval), or peculiar gesturing that appeared to be too exaggerated or unrelated to the topic of discussion.

Perseveration of topic was scored as appropriate if the child followed the topic of discussion of the conversational partner throughout the interval. Inappropriate perseveration of topic was recorded if the child's verbalizations were related to the preceding topic after the partner had introduced a new topic, if the child reintroduced a topic that had previously been covered in detail, or if the child did not comply with cues to shift the topic (e.g., "Let's talk about something else now").

Intensity of voice volume was scored as appropriate if the child's voice volume remained at a

level that was compatible with the setting and with the partner's voice volume. Intensity of voice volume was recorded as inappropriate if the child's volume changed from a normal volume to either a very loud volume (yell) or to a whisper for no apparent reason.

Eye gaze was scored as appropriate if the child's gaze was in the direction of either the partner or the relevant referent to the conversation. Inappropriate eye gaze was recorded if the child exhibited a fixed gaze turned away from the partner or referent for more than 3 s (typically, if it lasted for more than 3 s, it lasted throughout the interval).

Subjective judgments of overall appropriateness. To provide a subjective measure of the overall appropriateness of the children's conversational interactions, pre- and posttreatment videotapes were scored using a 9-point Likert-type scale. Two pretreatment and two different posttreatment observers independently rated each child's overall interaction on a scale from 1 to 9, with 1 representing "very inappropriate," 5 representing "slightly inappropriate," and 9 representing "very normal."

To eliminate the influence of the treatment provider during the conversational interactions, a behavioral self-management intervention was used (described below). This allowed the interactions to involve only the children and their partners.

Design

Treatment was implemented within a multiple baseline design across behaviors and subjects. Of the six behaviors selected for each child, those that were judged most stigmatizing by the parents and teachers received treatment, and the others were left untreated to assess response generalization. Chris received treatment on two narrowly defined behaviors (eye gaze and nonverbal mannerisms). Andre received treatment on one broadly defined behavior (appropriate perseveration of topic).

Procedure

Baseline. Baseline measures were obtained for each of the targeted behaviors in normal conversations with undergraduate students who were blind to the purpose of the study. The students were

simply instructed to engage in normal conversation with the child while allowing the child to behave freely.

Treatment. Treatment sessions were conducted by a doctoral-level clinician. Self-management procedures were used to permit the child to interact with his partner without the presence of the treatment provider in either the baseline or treatment data-collection sessions. Treatment procedures were based upon the general strategy outlined in Koegel and Koegel (1990) and Koegel et al. (1992).

Specifically, following baseline measures (and before the subsequent treatment measurement sessions), each child was taught to differentiate appropriate from inappropriate instances of the target behavior. This was accomplished by the clinician modeling the behaviors and having the child first imitate the appropriate and inappropriate behaviors and then identify each as being appropriate or inappropriate. After the child was able to discriminate the appropriate from the inappropriate behavior (this required approximately 10 min for each child), a digital watch with a preset count-down alarm was given to the child. The child was instructed to place a mark on a sheet with numbered boxes each time the alarm sounded if he had exhibited only the targeted appropriate behavior during the interval (described below).

Because both children enjoyed video games, community settings were chosen that had video games available nearby for reinforcers after the child had earned enough points by exhibiting appropriate social communicative behavior. At the beginning of treatment, after 1 min of exhibiting the appropriate behavior, the child marked a check in the first box and was allowed to take a quarter from the table and play the video game of his choice. For both children, appropriate behavior occurred at high levels under these conditions, and self-recording errors were infrequent; therefore, no specific contingencies were provided for inappropriate or incorrect responses.

As treatment progressed, the amount of time between alarms and the number of checks required for reinforcement were increased. Interval length was increased steadily from 1 to 9 min for Andre and from 1 to 7 min for Chris. Most of this fading

was accomplished within 1 day for each child. After the children exceeded the criterion of 5-min intervals, the number of checks required to earn a quarter for the video games continued to be increased but was adjusted so that it was always possible to earn at least one reinforcer during any given day. Thus, the maximum amount of time Andre was required to converse for a single reinforcer was four 9-min intervals, and the maximum amount of time Chris was required to converse for a single reinforcer was five 7-min intervals.

Interobserver Agreement

Two observers independently scored a minimum of 30% of the sessions selected randomly from both the baseline and treatment conditions. The observers' scores were compared interval by interval for each of the separate measures. Interrater agreement was calculated by dividing the number of intervals of agreement by the number of agreements plus disagreements and multiplying by 100%. An agreement was defined as both observers independently recording the interval as appropriate or as inappropriate. Agreement for ratings of appropriateness of the interactions was defined as both observers recording a score within one number of each other. For the target and generalization behaviors, the average percentage agreement for recording non-occurrences was 94.1% (range, 63% to 100% across sessions); the average percentage agreement for occurrences was 98.4% (range, 93% to 100% across sessions). Percentage agreement for ratings of appropriateness was 100%; 50% of the ratings were identical scores recorded by both observers.

RESULTS

Figure 1 shows the results for the social communicative behaviors that received treatment. During baseline sessions, the children displayed low (eye gaze for Chris), highly variable (nonverbal mannerisms for Chris), or decreasing (nonverbal mannerisms for Chris and perseveration of topic for Andre) levels of appropriate behaviors during conversational interactions. Andre's initially high level of appropriate perseveration of topic reflects the fact that his conversation was not regarded as in-appropriately perseverative until after he had persisted on the same topic for several sessions.

Following the training in self-management procedures, the children rapidly increased and maintained their levels of appropriate behaviors. Their appropriate behaviors increased to 100% or near 100% during treatment for all treated behaviors.

The generalization results are shown in Figure 2. The data suggest that generalization to the untreated behaviors occurred for both children. These results support the hypothesis that these other inappropriate behaviors were part of the same response class as the target behaviors.

The results for the subjective judgments of the overall appropriateness of the conversational interactions are as follows: In all cases, the children interacted without assistance from the treatment provider and without the visibility of any self-management materials. The pre- and posttreatment judgments obtained from videotapes showed that the subjective judgments of appropriateness were dramatically higher after treatment for both children. Specifically, both children progressed from subjective ratings of "very inappropriate" (1 and 2, respectively) at pretreatment to scores of 7 and 8 at posttreatment, which approached the ceiling of "very normal."

DISCUSSION

The results showed that (a) high-functioning children with autism were able to modify their social communicative behaviors during conversational interactions following training, (b) the behaviors appeared to be part of a response class in that changes also occurred in untreated behaviors, and (c) these changes were broad enough to be markedly noticeable and favorably judged by non-disabled individuals who were naive to the purposes of this study.

The study extends the literature on defining and improving social interactions for persons with autism through the treatment of pivotal behaviors. The results suggest that the social-skills problems characteristic of autism can respond well to treatment. Of major interest is the generalization to untreated behaviors, which suggests that the social
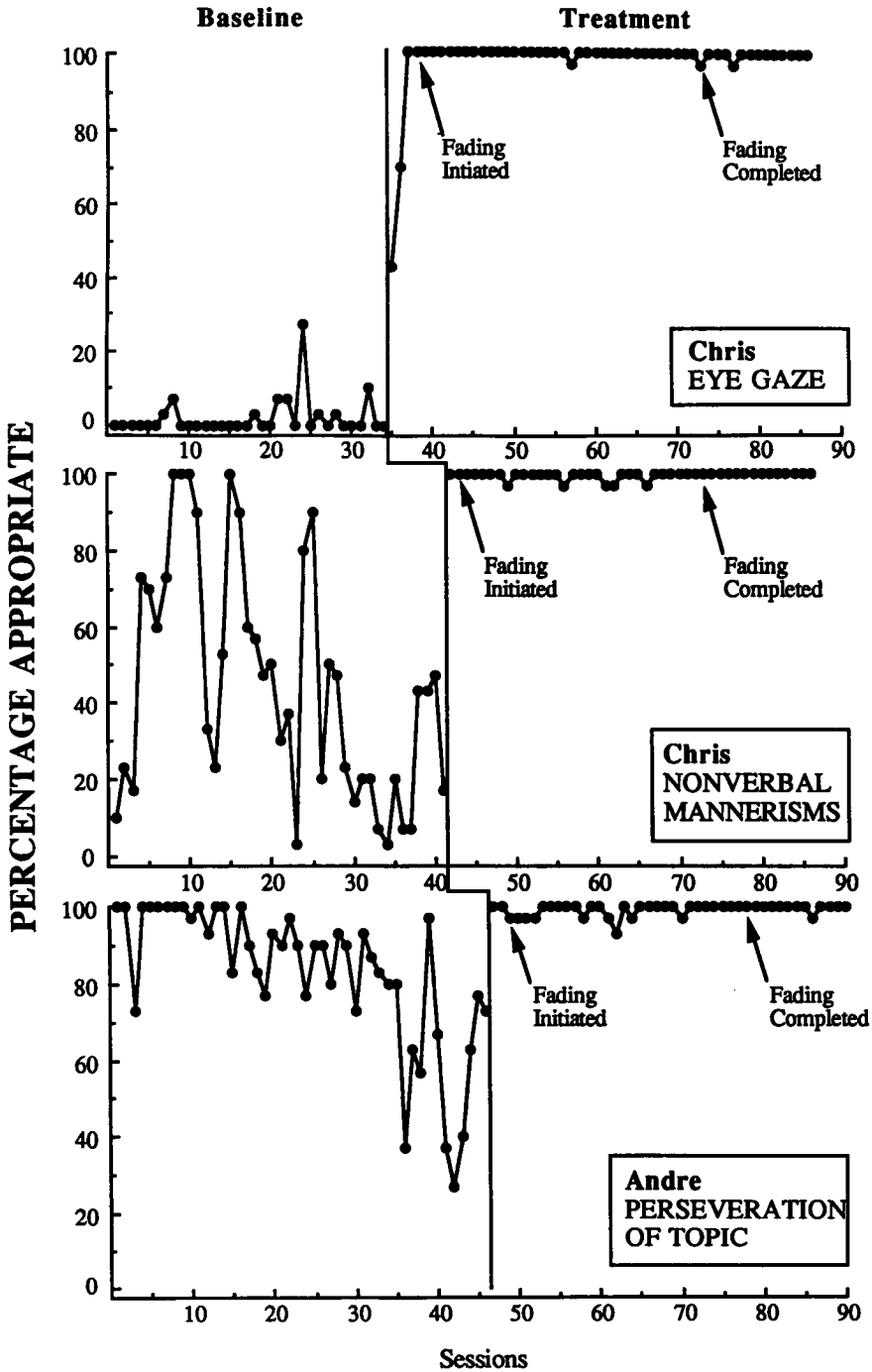
Figure 1.   Treatment data for social communicative behaviors. Chris received treatment for eye gaze and nonverbal mannerisms; Andre received treatment for perseveration of topic. The arrows indicate the points at which fading (i.e., lengthening of the self-management intervals) was initiated and completed.
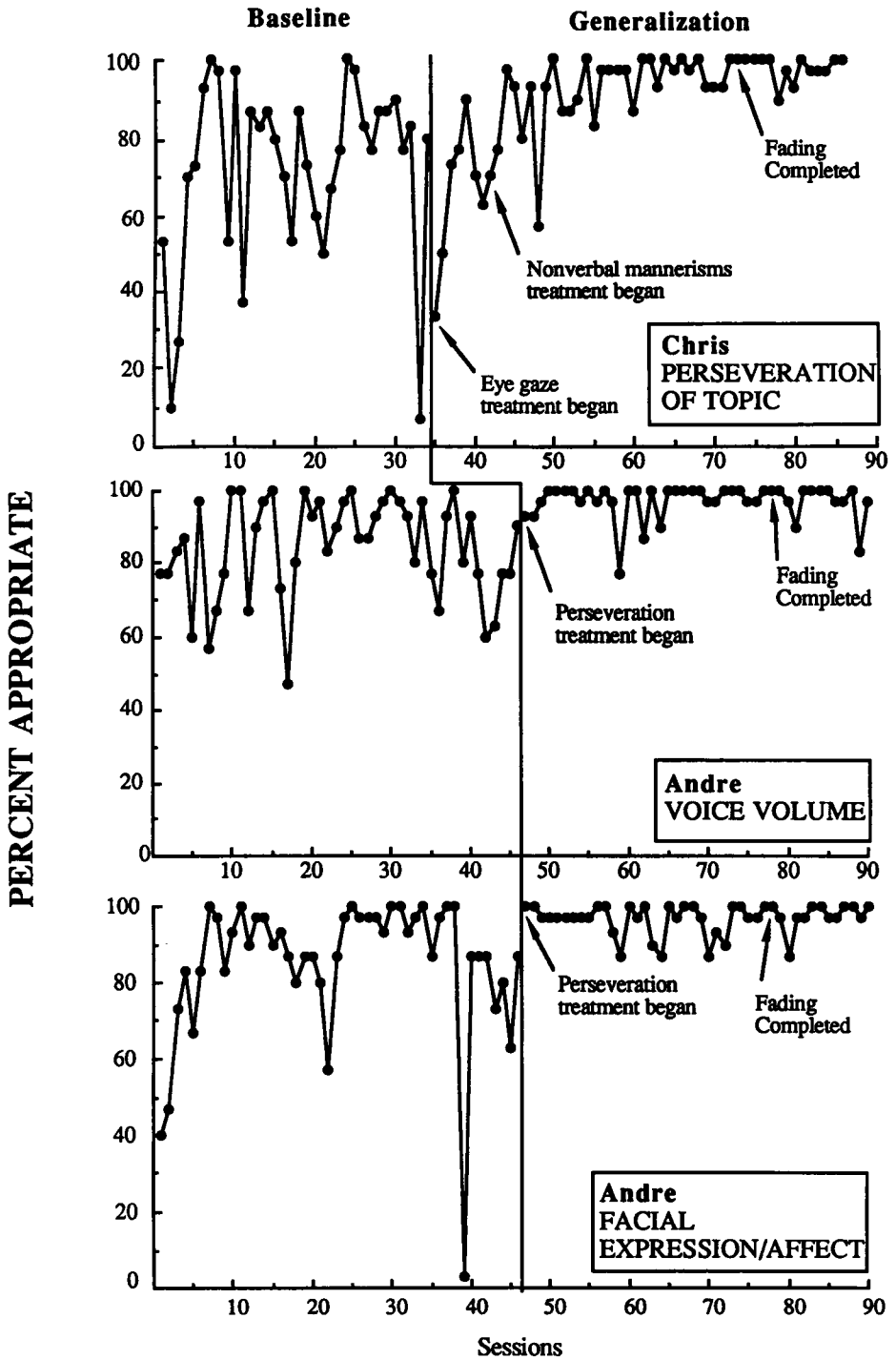
Figure 2. Generalization data for the untreated target behaviors (corresponding to the treatment data in Figure 1). The arrows show the points at which treatment began for each of the treated behaviors and the points at which fading (i.e., lengthening of the self-management intervals) was completed.

skills involved with conversation may be part of a larger response class; thus, each individual response may not require individual treatment. This is consistent with the results of recent research using functional analyses showing that inappropriate behaviors in children with autism may be maintained by avoidance (Carr & Durand, 1985) or attention (e.g., Hunt, Alwell, & Goetz, 1988). In considering the current findings and those obtained via functional analyses, a promising future area of study may be to combine functional analysis research and response-class formation research.

The question arises as to whether all social communicative behaviors are maintained by a common reinforcer. It seems likely that children with autism exhibit seemingly "bizarre" social behavior to avoid difficult social interactions (cf. Koegel et al., 1992). In this case, interventions that simplify conversational exchanges, such as the one used in the present investigation, should have a broad impact on social behavior. In functional analysis terms, the demand is lowered, possibly reducing the stimuli previously associated with escape. On the other hand, it is possible that clusters of these behaviors may occur for different types of reinforcers. In this event, functional analyses may enable the identification of response classes, with treatment designed for each class. In either case, the results of the present investigation suggest that response classes pertaining to social communicative behavior may be large, and that considerable amounts of these behaviors may be altered by a single intervention directed at what we now suspect to be an important pivotal behavior in autism.

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