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EXTENDING CONVERSATIONS AMONG ADOLESCENT PEERS WITH AUTISM

by

NICHOLAS KYPARISSOS

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor in Philosophy, The City University of New York.

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This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirements for the degree of Doctor in Philosophy.

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Abstract

EXTENDING CONVERSATIONS AMONG ADOLESCENT PEERS WITH AUTISM

by

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Adviser: Professor Claire L. Poulson

Adolescents with autism with sufficient verbal skills to permit engagement in conversations do not typically engage in extended verbal exchanges with their autistic peers. The purpose of the present study was to teach conversational skills to adolescents with autism to enable them to participate in extended conversations with their peers. A relatively simple and effective way to engage in and to extend conversations is to ask questions about what the others have just said. All five participants were adolescents between 15 and 20 years of age diagnosed with autism. Three served as target students, two as confederate peers. The experimenter constructed 36 scripts, each providing the target student 10 opportunities to ask wh-questions embedded in the ongoing conversation. The confederate peers initiated and conducted four scripted conversations per session with each target student. A within-subject multiple-baseline design across three types of wh-questions was used to assess whether the systematic introduction and later fading of scripted exchanges would increase the number of verbal exchanges of the target

students. Training occured across three types of wh-questions (what, where, when) and generalization was assessed across three different types of wh-questions (who, why, how). All target students reached a level of 10 scripted exchanges per conversation. With fading, unscripted exchanges gradually increased while scripted exchanges decreased. All target students showed substantial generalization to the untrained scripts. In two social validation measures teachers of youth with autism and graduate students naive to autism unanimously rated all three target students as greatly improved or improved in their conversational skills after the intervention.

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Table of Contents

Page

Approval page.....ii

Abstract.....iii

Acknowledgements.....v

Table of Contents.....vi

List of Tables.....vii

List of Figures.....ix

Introduction.....1

Method.....8

Results.....50

Discussion.....65

References.....74

List of Tables

Page

Table 1. An example of a complete script (where 6).....14

Table 2. An example of a training script (where 6).....24

Table 3. An example of a probe script.....25

Table 4. The 36 conversation scripts used in the study are listed with their corresponding topic/conversational object. Conversational topics that had no associated conversational objects are listed in parenthesis. The probe scripts are underlined.....26

Table 5. An example of a script of the confederate peers (where 6).....29

Table 6. The six labelled containers and the contained corresponding scripts used to create the order of four scripts for each session.....33

Table 7. An example of a baseline script.....38

Table 8. An example of fading Step 1 (where 6).....41

Table 9. An example of fading Step 2 (where 6).....42

Table 10. An example of fading Step 3.....43

Table 11. The interobserver agreement scores of Tom's rescored what- and where-probe scripts.....47

Table 12. The videotaped sequence of target students and of conversation scenes presented during the post-study social validity measures. The types of scripts are shown in parenthesis.....49

Table 13. The three questions given to outside evaluators following every viewing of the same conversation during baseline conditions and during the end of the intervention.....51

Table 14. Tom's and John's independent variable average data.....62

Table 15. The summed responses of each group of evaluators for each target student are shown in percentages of agreement among evaluators. Group I had 8 teachers of other youths with autism; Group II had 6 Graduate Psychology students.....64

List of Figures

Page

Figure 1. The number of scripted (closed circles) and unscripted during training scripts (closed triangles), unscripted during probe scripts (open squares), and other exchanges (asterisks) uttered by Susan during each conversation script over Session numbers.....54

Figure 2. The number of scripted (closed circles) and unscripted during training scripts (closed triangles), unscripted during probe scripts (open squares), and other exchanges (asterisks) uttered by Tom during each conversation script over Session numbers.....58

Figure 3. The number of scripted (closed circles) and unscripted during training scripts (closed triangles), unscripted during probe scripts (open squares), and other exchanges (asterisks) uttered by John during each conversation script over Session numbers.....60

People with autism typically exhibit a wide range of anomalies in language and social interactions, from severe delays in receptive and expressive language, echolalia, mutism, perseverative and noncontextual speech to extreme social withdrawal and unresponsiveness. There is now a substantial body of literature that has demonstrated successful language and social skills teaching procedures with youths with autism (Harris, 1976; Lovaas, 1977; Guess, Sailor, & Baer, 1978). Many people with autism can acquire expressive language with the help of such teaching procedures. Still, one of the core deficits characteristic of the autistic syndrome is the lack of engagement in social interactions (Kanner, 1943; Rapin, 1991; Wing & Gould, 1979; Volkmar, 1987; Fein, Waterhouse, Lucci, & Snyder, 1985). The diagnostic manual of the American Psychiatric Association states that "the essential features of Autistic Disorder are the presence of markedly abnormal or impaired development in social interaction and communication and a markedly restricted repertoire of activity and interests" (DSM-IV,1994). The diagnostic Criterion A2b states that individuals with autism who speak may be markedly impaired in their ability to initiate and sustain a conversation with others. This deficit is apparent in the infrequent spontaneous speech of verbal youth with autism and it is more pronounced in the presence of their peers. Youths with autism will initiate and engage in conversations mostly with significant adults, but

rarely with their peers (Rutter, 1978; Krantz, Ramsland, & McClannahan, 1989).

Conversational skills have been investigated with institutionalized women with retardation (Wheeler & Wislocki, 1977). Some studies demonstrated successful teaching of conversational skills to people with various disabilities that are associated with pathological, infrequent, or absent social interactions. Holmes, Hansen, and Lawrence (1984) trained ten chronic psychiatric patients in group skills (appropriate self-disclosure, conversational questions, speech acknowledgers and reinforcers, and high-interest content statements) and demonstrated long-term socially-validated improvements in conversational skills. Bradlyn, et al. (1983) taught five adolescents with retardation group conversational skills (asking questions, talking about oneself, and acknowledging the speech of others) and showed long-term conversational skills improvement. Twardosz and Baer (1973) taught adolescents with severe retardation to ask questions about novel items by prompting and reinforcing question-asking about some training items. Shultz (unpublished manuscript) taught three adults with developmental delays and dual diagnoses conversational skills by using scripts and later systematically fading them. McGee, Krantz, & McClannahan (1984) taught assertive verbal responses in the context of two game situations to three adolescents with autism by

pre-game modeling, behavioral rehearsals, and token delivery contingent upon assertive responses.

A plethora of studies have demonstrated the efficacy of using nonhandicapped or less-handicapped peers to increase the social repertoires of their more withdrawn peers. Normal peers were used to increase peer social interactions (Odom, Hoyson, Jamieson, & Strain, 1985; Odom, Strain, Karger, & Smith,1986), to increase communicative interactions (Goldstein & Wickstrom, 1986), to increase social initiations (Breen & Haring, 1991), and to improve conversational skills (Haring, Roger, Lee, Breen, & Gaylord-Ross, 1986) of children with disabilities. Normal peers were used to increase generalized conversational interactions of adolescents with retardation (Hughes, Harmer, Killian, & Niarhos, 1995). Normal peers were also used to teach social skills (Kamps, et al., 1992), to increase complex social behavior (Pierce & Schreibman, 1995), and to increase positive social behavior (Strain, Shores, & Timm, 1977; Ragland, Kerr, & Strain, 1978; Strain, Kerr, & Ragland, 1979) of children with autism. Further, peers with mild handicaps were trained to facilitate changes in social interaction skills of children with autism (Shafer, Egel, & Neef, 1984).

A study by Krantz, et al. (1989) demonstrated that a peer with autism could be effective in prompting an increase in conversational language of other verbal youths with autism. Additional studies of youth with autism point

to the efficacy of using advanced peers as agents of change (Strain, 1977) and procedures that teach within the natural context of the target skills (McGee, et al., 1984). The research literature suggests that the most effective interventions to overcome the autistic deficit in social interactions are the ones that use teaching-within-the-context, peer-mediated, procedures. As McGee, et al. noted:

> Naturalistic procedures seem paricularly promising for teaching and assessing the social skills of autistic youth, since they are often unable to generalize new skills in the absence of special programming.

The value of using peers to teach conversational skills is twofold: (a) It involves teaching under the natural stimuli that control the behavior of conversing with peers; and (b) it involves maximizing opportunities to engage in the behavior, because youth with autism spend most of their day with other peers with autism.

Odom and Strain (1986) compared a peer-initiation condition in which the confederate peers initiated interactions with three children with autism to a teacher-antecedent condition in which teachers prompted the children with autism to initiate to the confederates. They found that both conditions increased the social responses of the children with autism, but the teacher-antecedent condition increased initiations and produced longer chains of social interaction. The purpose of the present study was to teach adolescents with autism to have extended

conversations among themselves. Employing peers with autism and having the targeted adolescents initiating to the confederate peers were both parts of the present intervention, because these procedures were expected to facilitate the acquisition of the targeted conversational skills.

Some recent studies have used social scripts to teach contextually relevant language and social skills to youths with autism, disabilities, and autistic characteristics (Loveland & Tunali, 1991; Goldstein, Wickstrom, Hoyson, Jamieson, & Odom, 1988; Goldstein & Cisar, 1992). The results of these studies indicate that scripts are important in prompting more frequent contextual social behavior. Krantz and McClannahan (1993) used social scripts and a script-fading procedure to teach children with autism to initiate to peers. In that study four children with autism were taught to read 10 statements or questions to their peers about recently completed, current, and future activities, while engaged in arts and crafts activities with their peers. After each child could independently read the script, it was systematically faded in five steps from end to beginning. With fading, scripted initiations decreased while unscripted initiations increased. The script-fading procedure enabled these children with autism to initiate with contextual, peer-directed, and generative language without prompting by adults or peers. Similar results were obtained in a

systematic replication of the Krantz and McClannahan (1993) study with adults with developmental delays and dual diagnoses (Shultz, unpublished manuscript). The present study is extension of the Krantz and McClannahan (1993) study, employing slightly older participants (adolescents) and teaching more elaborate conversational skills (asking questions relevant to the statements of others).

Gajar, Schloss, Schloss, & Thompson (1984) demonstrated gains in appropriate responding of youths with head-trauma when either feedback (i.e., a light signal corresponding to positive or negative social interactions) or self-monitoring (i.e., the clients flipping a switch corresponding with their positive or negative interactions) was implemented. In the present study the delivery of token reinforcers to the target students was designed to function as feedback on the target students' conversational behavior.

Minkin, et al. (1976) measured three objective components of conversation: questioning, providing positive feedback, and proportion of time spent talking. They then established the social validity of these conversational responses and found high correlations between ratings and the objective measures, suggesting that the measured components of conversation were socially important aspects of conversational ability. The results of Minkin, et al. validate the benefits of teaching the behavioral components of question asking and feedback in conversation when these

skills are lacking. In other studies, question asking was taught to adolescents with severe retardation (Twardosz & Baer, 1973), to children with language delays (Wilcox & Leonard, 1978; Zimmerman & Pike, 1972), and to children with autism (Hung, 1977; Taylor & Harris, 1995), but the taught skill was not trained in the context of ongoing conversations. The present study had 36 scripts that were initiated and conducted by two confederate peers. Embedded in each of these scripts were 10 questions by the target student relating to the statements of the confederates.

Is the use of a treatment package employing confederate peers with autism, conversational scripts, a script-fading procedure, and a supporting motivational system effective in teaching youths with autism to engage in extended conversations with each other on topics of common interest? Can the above procedures be used to teach youths with autism conversational skills that are more complex that initiating to their peers? Can listening to what the confederate peers have just said and asking a question about it be successfully taught by these procedures? Will these procedures increase the number of exchanges by the target students across different wh-questions? The present study addressed these questions. Listening to peers and asking questions about what they said were chosen as the target skills because of their relative simplicity and their efficacy in engaging the subject in an ongoing conversation. These conversational

skills were expected to substantially extend the conversations among youths with autism.

Method

Participants

Five adolescent clients, enrolled in the Princeton Child Development Institute's Education Program, were the participants of the present study. All participants were diagnosed with autism by independent agencies. They all knew each other well having been classmates for three or more years.

All participants had adequate language to permit engagement in conversations with others and sufficient reading skills to allow script following. Only 3 of the 5 participants (Susan, Tom, and John) were targeted for the present intervention, because they were identified by their teachers as never initiating and participating in extended verbal exchanges with others. Only the target students' exchanges were the dependent measures in this study. The 2 other participants (Kate and Bill) did occasionally engage in conversations with peers, but their teachers suggested they would benefit from participating in structured conversations. These 2 were trained by the experimenter in the role of confederate peers, initiating and conducting conversations on different topics by following scripts and pausing for 3 seconds when prompted by their scripts, to allow the targeted participants to respond.

Prior to this study all the participants had received 10 to 18 years of educational intervention at the Princeton Child Development Institute. During the first baseline session, Susan was 15 years 10 months, Tom was 16 years 3 months, John was 20 years 7 months, Kate was 20 years 7 months, and Bill was 18 years 3 months old. During the last generalization probe, Susan was 16 years 3 months, Tom was 16 years 8 months, John was 21 years, Kate was 21 years, and Bill was 18 years 8 months old.

Susan was admitted to the Institute at age of 3. At that time she had few vocalizations ("ma ma, da da, me me me, no no no"). She now speaks in full sentences with clear articulation. Susan resides at one of the Institute's group homes for people with autism, and she visits her family every other weekend. Susan was tested on the Woodcock Reading Mastery Test before the beginning of the study and she scored on the second grade reading level.

Tom came to the Institute at the age of 8. At that time he had some delayed speech (some words, phrases if prompted). He also has a diagnosis of Tourette's Syndrome which is in remission. He now speaks in full sentences, but he makes some grammatical errors (pronoun reversals, wrong verb tenses, singular-plural errors, etc.) and his articulation is sometimes poor. Tom resides at the same group home as Susan, visiting his family every other weekend. When tested on the Woodcock Reading Mastery Test

before the onset of the study he, too, scored at the second grade reading level.

John was admitted to the Institute at the age of 3. At that time he only babbled and he had no functional speech. He currently speaks clearly and in full sentences. John resided with his family at the time this study was conducted. He also was tested before the study began on the Woodcock Reading Mastery Test and he scored at the fourth grade reading level.

All participants, in general, followed the experimenter's instructions and they rarely engaged in stereotypic and disruptive behavior. They all were responsive to their individualized monetary motivational systems. For John, one of the target students, a contract was put in place on the 5th baseline session and onwards to control vocal noise and disruptive verbalizations. The contract stated: "I was responsible in Room 3" (the room in which the experimental sessions were conducted). If during the session John did not display any vocal noise and disruptive verbalizations, the experimenter marked the "YES" on his contract and John would earn break-time with his friends after the session. If "NO" was marked on his contract, John would have to return to academic work after the end of the session. An informed consent statement for their children's participation in this study was obtained from the parents of all participants.

Setting and Apparatus

All sessions of the present study were conducted at the Princeton Child Development Institute's Education Program at Princeton, New Jersey, where the participants attended classes. The experimental sessions were conducted in a classroom containing only a table, measured 64cm by 49cm, and three chairs arranged around it. A video camera (General Electric VHS movie video system, model 9-9609) mounted on a tripod was placed to view the table and chairs across the classroom. The seat in front of the table and facing the camera was reserved for the target student. The confederate peers assumed either of the two remaining seats that were oriented towards the target student and in side view of the camera.

Three stackable storage bins on wheels were used to make a portable store containing preferred snacks, books, magazines, music tapes and CDs. The stacked bins had a sign that said "STORE" and the items in every bin were labelled and priced in large print (e.g.,"Chocolate $1.60", "Candy $0.30"). The store was always positioned in the corner next to the classroom door, at the other end of the room from the table and chairs.

A clipboard with the target student's scripts for each session and a pencil were placed on the table. In the right upper corner of the target student's table there was a glass cup where dimes were contingently dropped by the experimenter upon correct responding of the target student.

Most of the conversation scripts involved an object, such as a watch, a toothbrush, a magazine, a small plant, etc., or 1 or 2 photographs that related to the conversation topic. When a script was presented that involved a related object, that object was placed in the middle of the table, on the side closest to the camera, so it would be easily accessible to the three conversing peers. The scripts of each confederate peer for each session were held in individually labelled clipboards with a pencil and placed on their chairs. Behind the table and chairs there was a built-in bench with materials used by the experimenter in every session, such as a cashbox with money in dollar bills and change, individual wallets for the participants to save their earnings if they so desired, a 'Money Earned' tally-sheet filled out in every session (part of the confederate peers' individualized motivational system), the conversational items to be used in that session, as well as, some other printed materials (experimenter's checklist, session's scripts), and pencils.

Stimulus Materials

The experimenter constructed 36 scripts. These scripts were texts of conversations among 3 participants on different age-appropriate topics. The experimenter applied seven rules to constuct the scripts: (a) The target student asked only wh-questions; (b) the target student's questions were not repeated; (c) what, where, when, who, why, or how was always the first word of the target student's

exchanges; (d) the target student's exchanges were a maximum of 7 words long; (e) active as opposed to passive, positive as opposed to negative, and simple as opposed to complex forms of speech were used; (f) each script provided 10 exchanges for the target student; and (g) the confederate peers never used other than the script's target wh-question. Table 1 shows an example of a complete script.

Response Definitions

A verbal exchange was defined as one turn-taking episode in which the target student asked a question or made a statement relevant to the statements of the confederate peers. An exchange was scored if a response fulfilled all four conditions below:

1. It was independent, that is, it was not prompted in any way by the experimenter.
2. It was audible.
3. It was grammatical and longer than one word, that is, it was at least a noun in addition to the wh-question or a grammatical phrase or sentence of at least two words.
4. It was contextual, that is, it fitted the semantic context of the scripted conversation in progress involving the same set of references, such as, people, places, things, etc..

Exchanges that fulfilled all four above conditions were scored as: (a) Scripted, if they were uttered exactly as they appeared in the script; (b) Unscripted, if they

Table 1

An example of a complete script (where 6).

__	Kate: Let's talk about where we are going at Summer Break.
__	Target student: Where are you going at Summer Break?
__	Bill: I'll ask my parents. Maybe we'll go somewhere nice for the vacations.
__	Target student: Where will you go for vacations, Kate?
__	Kate: Maybe we'll go where we usually go for vacations.
__	Target student: Where do you usually go for vacations?
__	Kate: At my relatives in Florida.
__	Bill: It would be nice to spend the holidays there.
__	Target student: Where do you usually spend holidays, Bill?
__	Bill: We usually go to my uncle's at the Jersey shore. I like going to that place.
__	Target student: Where would you like to go, Kate?
__	Kate: I dream of going to a tropical island.
__	Target student: Where do you dream of going, Bill?
__	Bill: I dream of going to Yellowstone National Park. It's beautiful there.
__	Kate: They say it's one of the best places to visit.
__	Target student: Where was the best place you visited?
__	Bill: The Catskills during the Fall. It was my best vacation!
__	Target student: Where was your best vacation, Kate?
__	Kate: Our family trip to Canada.
__	Bill: Kate, do you remember your first vacation?

Table 1 (continued)

__	Target student:	Where was the first vacation you remember?
__	Kate:	At Disneyworld in Florida. It's one of the coolest places I've been.
__	Target student:	Where else have you been, Kate?
__	Kate:	I've also been in California once.

varied from the script but contained the same wh-question as the scripted exchanges, or if they were scripted exchanges uttered out of order but were contextual; or (c) Other, if they contained a wh-question other than the scripted question, or if they were grammatical statements rather than questions.

Exchanges that did not fulfill one or more of the above four conditions were scored as:

1. Errors, if they were non-contextual, ungrammatical, or reading errors. Echolalic utterances were also scored as errors. Exact repetitions of previous target student's scripted exchanges were scored as errors, except when the target student: (a) repeated the exchange to the other confederate peer, or (b) repeated the exchange once after 3 seconds with no response from either of the confederate peers, or, (c) was prompted by either or both of the confederate peers to repeat the question (e.g., "What did you say?").

   For John only, the questions: "When was this picture taken?", "What month was this picture taken?", and "What year was this picture taken?", were judged as perseverative and they were scored as errors. John perseverated on such questions every time a picture was presented without actually seeking the answers to these questions, so the experimenter made the decision not to accept the above particular questions as conversing with peers, thus avoiding their reinforcement.

2. Prompted, if the target student was in any way manually, gesturally, or verbally prompted by the experimenter to attend to the script.
3. No opportunity to score, if responses were incomprehensible to the observer scoring after three viewings of that exchange from the recorded video tape.
4. Not observed, if they were rendered unobservable due to malfunction of the video tape, or, if they were not recorded on the video tape.
5. No utterance, if the target student was silent.

A trial was any pause of 1 second or longer between two exchanges of the confederate peers. Exchanges of the target students' uttered immediately after each script-prompted pause of the confederate peers were also accepted as uttered within the trial period. Exchanges that occurred during non-trial times were scored separately from those that occurred during trial times and they were not part of the primary dependent measures.

Exchanges that were questions were further scored as belonging to one of the following six dimensions of inquiring, collectively labelled wh-questions: reference (what), location (where), time (when), person (who), reason (why), and method (how). A question was scored as belonging to a dimension of inquiring when its content and context agreed with the dimension trained or probed in the scripted conversation in progress.

A session had four scripted conversations on different topics and it lasted up to 20 minutes for each target student. Looking was defined as any glance towards one or both of the confederate peers within 1 second of the target student's exchange (i.e., for the period of 1 second before, during, and 1 second after the exchange). Manual guidance was defined as any manual prompt the experimenter delivered to the target student that was not a direction towards the script and script following (e.g., correction of posture or of body orientation, prompting looking when talking to the confederate peers, etc.).

As noted before, Tom consistently made some specific grammatical errors when speaking independently. Because grammatical speech was not the purpose of this intervention, for Tom the following grammatical errors were accepted and counted as unscripted exchanges: (a) Missing or wrong pronouns, conjunctives, prepositions, or auxiliary verbs; (b) wrong tenses of verbs; (c) wrong use of singulars or plurals; and (c) missing or superfluous articles. All other grammatical errors of Tom's were scored as errors, such as, ommission of the subject, non-contextual use of a verb (e.g., What kind of juice are you eating?), non-contextual use of wh-questions (e.g., What did you find it?), errors of syntax, etc..

Procedure

Pre-Study Social Validity Measures

The experimenter collected normative samples of conversations on specific topics among 4 normally developing adolescents between 14 and 16 years of age. They participated in 12 conversations. All participants were acquainted with each other before they were brought together for these conversations. These normative measures were conducted 8 months prior to the initiation of the data-collection part of the present study and involved the same procedures in the same location as the present study. The purpose was to examine the strategies a third, typically developing, peer might use to participate in a conversation of two other peers.

The 4 participants were arranged in twelve possible combinations of 3 conversing peers, the 2 confederate peers pre-briefed on the topic of conversation and the target peer brought in to join the conversation. There were two different conversations per each of the six different topics: (a) show and tell, (b) remote events, (c) recreational activities, (d) favorite things, (e) school activities, and (f) talking about people. The only topic that had an associated item with each conversation (an audio tape and a music magazine) was (a). Each pair of confederate peers was presented with the two conversations of each topic. The same video camera that was used in the present study was placed in a corner of an emptied

classroom to record the conversations among each group of 3 typically developing peers. A pair of confederate peers was brought into the classroom containing only a table at the center with three chairs arranged around it. The pair of confederates was then provided with a note on a strip of paper describing the first conversation on a topic. For example, on topic (f) the first note said: "Talk to your friends about someone you know very well (like: a friend, a teacher, a schoolmate, etc.)." For the conversations on topic (a) the related object was placed on the table. After both confederates had the opportunity to read the note, the experimenter removed it and brought the target peer from an adjacent waiting room (another classroom). The experimenter then said to the target peer: "Please, take a seat and join in the conversation with your friends" and set a timer for 5 minutes, the duration of each conversation. When the timer rang, the experimenter thanked the participants, brought the target peer to the waiting room, and returned with the other target peer who was waiting there. The above procedure was repeated with the other target peer with the second conversation of the topic. For example, on topic (f) the second note said: "Talk with your friends about famous people (like: movie stars, TV personalities, singers and performers, people in the news, etc.)." These procedures were repeated for every pair of confederates and topic.

The data extracted from the videotaped conversations were of two types: (a) the specific strategy by which the target peer joined in the conversation of the confederates, and (b) the most commonly encountered conversational phrases. The target peers used four different ways to participate in the 12 conversations: (a) In 7 conversations the target peers were prompted to participate by a question from a confederate peer; (b) in 3 conversations the target peers contributed additional information to the previous statements of the confederate peers; (c) in 1 conversation the target peer initiated the conversation by commenting on the object present; and (d) in 1 conversation the target peer asked a question relating to the initial exchanges of the confederate peers. The most common conversational phrases encountered across participants were phrases such as: "Yeah!", "ah-ha!", "Me, too!", "I know!", "So have I!", "That was...", "I do, too!", "That's neat!", "So...", "Well...", "Oh, really?", etc.

The above pre-study social validity measure provided some indication of how typical adolescent peers converse on given topics. Of course, typical adolescents and adolescents with autism are not entirely comparable in their language and social skills, but elements of the above measure were adapted to the present study.

General Procedures

The experimenter taught the 2 confederate peers (described under Pretraining below) to follow the scripts.

The confederate peers introduced each topic, conversed about it, and provided at least 10 opportunities for the target student to participate in the conversation. Throughout the study the confederate peers had complete, typed, scripts that provided their part of the conversation as well as instructions for when to pause (e.g., "PAUSE 3 SECONDS"). The pauses of the confederate peers were embedded in their scripts to provide the opportunity for the target student to participate in the conversation. The target students' scripts had 10 questions of one type of wh-question, that is, either what, where, when, who, why, or how questions on what the confederate peers had just said. For all participants, every scripted conversational exchange was preceded by a blank line for the participants to check after completing that exchange.

Each of the six wh-question types had six scripts (6x6=36). One half of the scripts (18 scripts) were the treatment scripts (6 what-, 6 where-, and 6 when-scripts). The other 18 were the generalization scripts (6 who-, 6 why-, and 6 how-scripts) that received no intervention (i.e., they remained in baseline) throughout the duration of the study to assess any generalization across those types of wh-questions.

For the treatment scripts (what-, where-, and when-scripts), the six scripts in each of these wh-question types were further divided into 4 training scripts and 2 probe scripts. During training scripts the target student

was provided with the complete script for every exchange, while during probe scripts the target student was provided only with the wh-question prompts, empty lines of various lengths following the prompts, and question marks at the end of the lines (e.g., "What _____?). Table 2 shows an example of a training script. Table 3 shows an example of a probe script. The probe scripts provided a measure of acquisition of the targeted conversational skills. The only criterion used in determining which 2 of the 6 what-, where-, and when-scripts were going to be the probe scripts was that probe scripts should always have a related object present. The assumption was that a present photograph or object was more facilitating to the conversation than an abstract or absent object.

Most of the scripts (29/36: 80.5%) had objects present that related to the conversation. On the average, 1 of the 6 scripts in each wh-question type had an abstract conversation topic. Table 4 lists all conversation topics and related conversational objects. Table 4 also indicates the probe scripts and the scripts that had no related object present.

All participants were able to follow scripts before their engagement with the present study. They were all familiar with the format of the scripts, which had short lines followed by names, colons, and exchanges. They all read reliably every exchange that followed their names and

Table 2

An example of a training script (where 6).

__	Where are you going at Summer Break?
__	Where will you go for vacations, Kate?
__	Where do you usually go for vacations?
__	Where do you usually spend holidays, Bill?
__	Where would you like to go, Kate?
__	Where do you dream of going, Bill?
__	Where was the best place you visited?
__	Where was your best vacation, Kate?
__	Where was the first vacation you remember?
__	Where else have you been, Kate?

Table 3

An example of a probe script.

__ **Where _____?**
__ **Where _____?**
__ **Where _____?**
__ **Where _____?**
__ **Where _____?**
__ **Where _____?**
__ **Where _____?**
__ **Where _____?**
__ **Where _____?**
__ **Where _____?**

Table 4

The 36 conversation scripts used in the study are listed with their corresponding topic/conversational object. Conversational topics that had no associated conversational objects are listed in parenthesis. The probe scripts are underlined.

Scripts	Topics/Conversational Objects
TREATMENT SCRIPTS	
What 1	(movie recently seen)
What 2	compact music disc
What 3	music magazine
What 4	(T.V. shows)
What 5	photographs of the gym
What 6	a wrapped package
Where 1	photographs of past vacations
Where 2	photographs of home
Where 3	photographs of school
Where 4	a soda but no cups
Where 5	photographs of a classroom
Where 6	(future vacations)
When 1	photograph of Kate as an infant
When 2	photograph of participants eating
When 3	a calendar of 1995
When 4	photograph of Kate cooking

Table 4 (continued)

When 5	a watch
When 6	(visitor coming after the session)
GENERALIZATION SCRIPTS	
Who 1	(friends)
Who 2	photograph of a schoolmate
Who 3	pictures of professionals
Who 4	a letter received by Kate
Who 5	photograph of Bill's family
Who 6	(mail)
Why 1	a potted plant
Why 2	a toothbrush
Why 3	a written schedule
Why 4	picture of a crying child
Why 5	a wallet with money and cards
Why 6	picture of a bedridden, ill, child
How 1	a cookie recipe
How 2	a business letter
How 3	photographs of a pool table
How 4	a used bank check
How 5	photograph of a bicycle rider
How 6	(general information about the participants: age, siblings, etc.)

made a checkmark with their pencils on the short line that preceded every exchange.

Pretraining

Before the onset of the study the experimenter constucted a list of all words that appeared in the 36 scripts of the target students. He then gave the regular classroom teachers of the target students 2 copies of the word-list for each target student and asked the teachers to have the target students read through it. The words that each target student misread or could not read were used to construct individual lists for each target student to practice and learn to read. The purpose of the target students' pretraining was to assure they could read through their scripts, thus keeping the flow of conversations smooth and uninterrupted.

The two confederate peers were pretrained in correctly reading and timing their parts of the scripts. Each confederate peer had to read the next exchange in the script preceded by his or her name, check it in the line left of his or her name, look up to the other confederate or target student, and say it. When the confederate peers reached the instruction in their scripts: "(PAUSE 3 SECONDS)", they were trained to time a 3-second pause in following their script by tapping one foot quietly 6 times on the floor (which takes about 3 seconds). Table 5 shows an example of a script of the confederate peers. The confederate peers were also pretrained to respond to the

Table 5

An example of a script of the confederate peers (where 6).

__	Kate:	Let's talk about where we are going at Summer Break.
		(PAUSE 3 SECONDS)
__	Bill:	I'll ask my parents. Maybe we'll go somewhere nice for the vacations.
		(PAUSE 3 SECONDS)
__	Kate:	Maybe we'll go where we usually go for vacations.
		(PAUSE 3 SECONDS)
__	Kate:	At my relatives in Florida.
__	Bill:	It would be nice to spend the holidays there.
		(PAUSE 3 SECONDS)
__	Bill:	We usually go to my uncle's at the Jersey shore. I like going to that place.
		(PAUSE 3 SECONDS)
__	Kate:	I dream of going to a tropical island.
		(PAUSE 3 SECONDS)
__	Bill:	I dream of going to Yellowstone National Park. It's beautiful there.
__	Kate:	They say it's one of the best places to visit.
		(PAUSE 3 SECONDS)
__	Bill:	The Catskills during the Fall. It was my best vacation!
		(PAUSE 3 SECONDS)
__	Kate:	Our family trip to Canada.
__	Bill:	Kate, do you remember your first vacation?
		(PAUSE 3 SECONDS)

Table 5 (continued)

__	Kate:	At Disneyworld in Florida. It's one of the coolest places I've been.
		(PAUSE 3 SECONDS)
__	Kate:	I've also been in California once.

best of their ability to any unscripted or other exchange of the target student, that is, to any intelligible and contextual exchange that did not appear in the script. Finally, when the key-word-emphasis procedure (see: Experimental Conditions below) was implemented for Tom and John, the confederate peers were trained to utter with correct emphasis the highlighted key words.

Motivational Systems

During the conversations in all sessions (i.e., during baseline, treatment, and generalization probes conditions) the target students earned a dime for each scripted or unscripted exchange uttered during trial time, while the confederates peers were silent. When the session for each target student was completed, he or she counted the dimes collected.

During all sessions the confederate peers each earned up to 50 cents per each completed conversation script depending on their performance. Their earned amount for every script was added on their 'Money Earned' tally-sheet. When all sessions of the day with the 3 target students were completed, the confederate peers totaled their earnings on their tally-sheet.

At the end of the sessions the experimenter asked the target student for the amount collected in dimes and the confederate peers for the amounts they individually collected. The experimenter brought his cashbox to the

participants' table, exchanged the target student's dimes for dollar bills and change, and gave the confederate peers the amounts they earned in dollar bills and change. All participants had the choice to either save all or a portion of their money in individually labelled wallets that were secured in the cashbox, or spend it on items from the reinforcer store located close to the exit of the room.

Experimental Sessions

Each session for each target student had four scripted conversations: 3 from the training and probe what-, where-, and when-scripts, and 1 from the generalization who-, why-, and how-scripts. More specifically, every session had 2 training scripts, 1 probe script, and 1 generalization script. To assist the target students in acquiring the taught conversational skills the two training scripts were always presented first. Each session's scripts were selected through a fixed random order procedure described below.

To select the session's treatment scripts the experimenter used six small, labelled, containers with adhering envelopes that contained strips of paper typed with the treatment scripts labels. Table 6 lists the containers and their corresponding scripts. The experimenter followed these selection rules:

1. He picked one probe script from either the What-, Where-, or When-probe containers.
2. He picked one training script from each of the other

Table 6

The six labelled containers and the contained corresponding scripts used to create the order of four scripts for each session.

Label	Contained Scripts
1. What - training	(what 1, what 3, what 4, what 6)
2. What - probe	(what 2, what 5)
3. Where - training	(where 2, where 3, where 5, where 6)
4. Where - probe	(where 1, where 4)
5. When - training	(when 1, when 4, when 5, when 6)
6. When - probe	(when 2, when 3)

two training-scripts containers. That is, if he had picked a 'when' probe script, he then had to pick one training script from What-training container and another training script from the Where-training container.

3. He did not pick from the same training or probe container until he had picked with equal frequency from the other two training or probe containers.
4. To determine whether the 1 probe or the 1 generalization script for that session would follow the selected training scripts a coin was flipped. If the coin landed with head facing up, the probe script followed the training scripts. If the coin landed with tail facing up, the generalization script followed the training scripts.

To select the session's generalization script the experimenter used only three containers: one for the who-scripts, one for the why-scripts, and one for the how-scripts. The selection rule followed for the generalization script was simply that the experimenter randomly picked one script from one container and he did not pick again from the same container until he had picked one script from each of the other two containers.

By following the above script-selection procedures the experimenter produced each session's order of 3 treatment scripts and 1 generalization script. The thus selected four scripts comprised each session's conversation scripts.

The pair of confederate peers repeated in the same order the four scripts of each session separately with each target student.

After the session's scripts were selected, their corresponding printed paper strips were placed in the envelopes adhering to the containers from which they were picked. The same procedures were repeated for the selection of every sessions' scripts, until all scripts in the six treatment and three generalization containers were exhausted. The content of each envelope was then returned to its corresponding container for a new cycle of script-selection to begin. By following the three above script-selection rules, each of the two probe scripts from each type of wh-question was always presented intersperced with two consecutive sessions of training scripts from that type of wh-question.

With the termination of treatment the whole script-selection process was reversed, with the training and probe scripts being selected as the generalization script was selected during the treatment phase of the study, and vice versa. This allowed for 1 treatment and 3 generalization scripts to be selected per session. Thus, during the generalization probes, the training and probe scripts were kept in maintenance (appearing only once per session), while one of each of who-, why-, and how- scripts were presented in every session of generalization probes.

The experimenter alone conducted all experimental sessions including the final generalization probes. For all sessions the typed scripts of the two confederate peers and of the target student were secured in their order for that session on their individually labelled clipboards before the beginning of the daily sessions.

Session Procedure

Every session began with the experimenter bringing the two confederate peers into the classroom and directing them to their seats. The experimenter then brought the target student to the room and directed him/her to the seat that faced the camera. The experimenter reviewed the individualized motivational systems with the participants and then turned on the video camera. The experimeter looked at the participants and said: "Talk with (to) your friends." He then positioned himself behind the target student.

The experimenter dropped a dime into the target student's cup for every scripted or unscripted exchange uttered during trial times by the target student throughout baseline, treatment, and generalization conditions. The experimenter also manually prompted, when needed, correct script following and checking of each completed exchange by the target student. If manually prompting the target student's index finger across the text did not induce uttering of the scripted exchange, the experimenter verbally modelled the question and then repeated the manual

prompt. When needed, the experimenter also manually prompted looking-when-talking to the confederate peers, correct posture, and proper orientation towards the confederate peers.

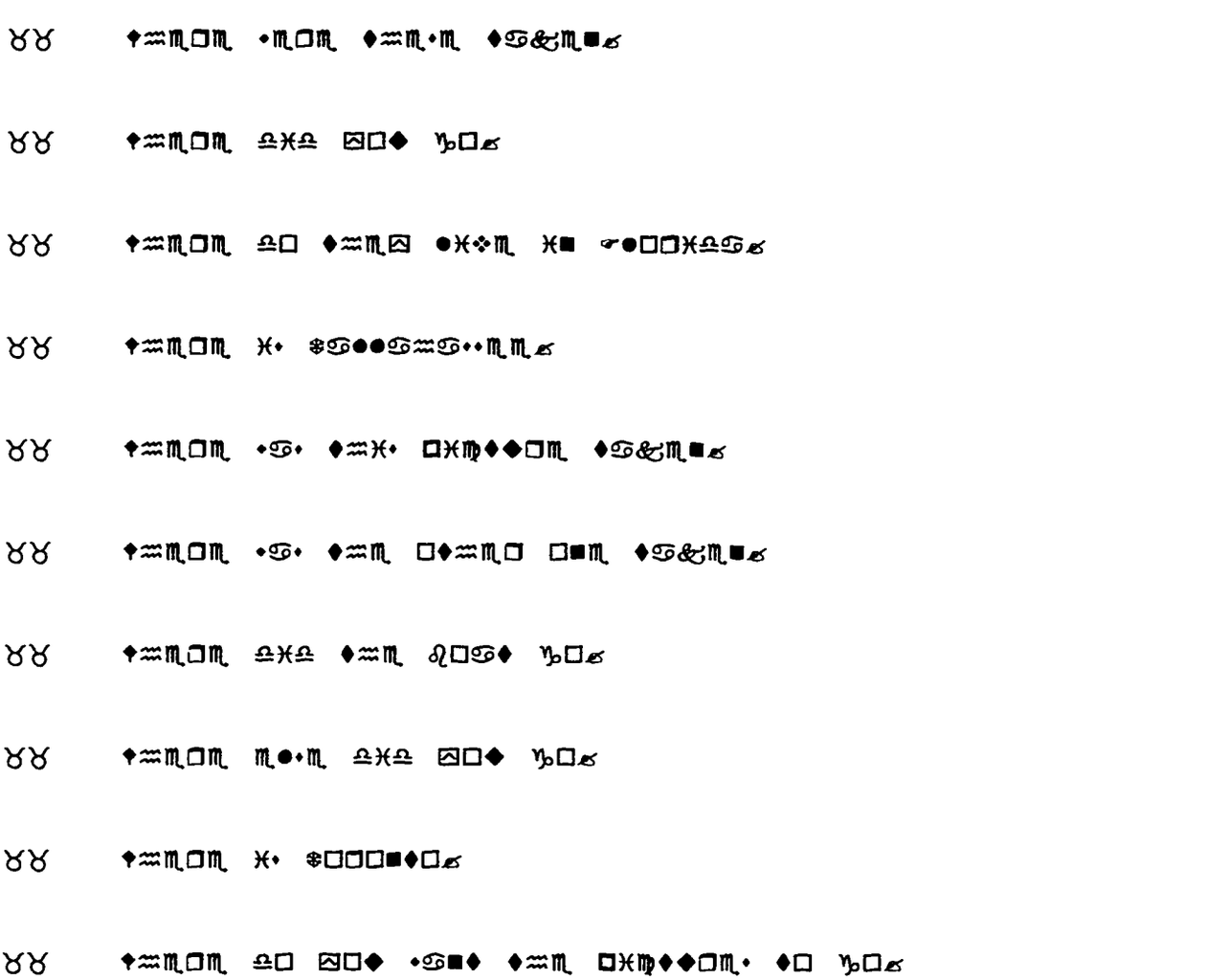
Upon completion of each script the experimenter said: "You did a great job talking with (to) your friends!" to the three participants and turned off the video camera. The experimenter then collected the completed script from each participant. The above procedures for each script were repeated with the three remaining scripts for that session and with each target student.

Experimental Conditions

During the baseline phase the target students had their scripts printed in unreadable font (Zaph Dingbats) to permit an assessment of their pre-intervention conversational skill level. Without a readable script it was assumed that the target students would have to rely only on their pre-intervention coversational skills to participate in the ongoing coversations of their peers. Table 7 shows an example of a baseline script. The Zaph Dingbats font was available through the Miscrosoft Word programs for Macintosh personal computer, which the experimenter used to print the participants' scripts. With the introduction of treatment the target students had complete and readable scripts of their parts in the conversations for only the training scripts.

Table 7

An example of a baseline script.



For 2 of the target students, Tom and John, an additional intervention was introduced during treatment to assist their acquisition of the targeted conversational skills. Key words in the confederate peers' exchanges were emphasized. The experimenter highlighted the key words in the confederate peers' scripts with a yellow marker before each session. The experimenter had pretrained the confederate peers in emphasizing the highlighted words. The stressed key words were the ones that the target student should use to build a wh-question on the confederate peers' utterances. For example, one confederate peer said: "Let's talk about where we are going at summer break." The highlighted words: where, going, and summer break, could be used by the target student to construct a related wh-question such as, "Where are you going at summer break?". Both training and probe scripts appeared with key words emphasized.

For Tom, the key-word-emphasis procedure was introduced in a systematic stepwise fashion across the treatment wh-scripts. When emphasis on key words showed a marked improvement in the target student's performance on the what-probe scripts, the procedure was introduced for the where-scripts, and, eventually, for the when scripts. Tom was introduced to the key-word-emphasis procedure for the what-scripts on session 56, for the where-scripts on session 69, and for the when-scripts on session 79.

For John, the key-word-emphasis procedure was not introduced systematically, but it was employed almost simultaneously across the treatment wh-scripts. This procedure was introduced for the what-scripts on session 56, and for the where- and when-scripts on session 61. Key words emphasis for the treatment scripts continued until the last session of the generalization probes for both Tom and John. The key-word-emphasis procedure was not applied to the generalization scripts for either Tom or John.

For Susan and John only, all training scripts were systematically faded in three steps, from end to beginning. For example, the scripted exchange "What movie did you see?", was faded in Step 1: "What movie did *^+ #{{?", in Step 2: "What movie ['[*^+ #{{?", and in Step 3: "What -^|\{ ['[*^+ #{{?". Tables 8, 9, and 10 show examples of a training script during fading Steps 1, 2, and 3, respectively. The printed scripts presented to Susan and John during fading conditions had the faded characters in Zaph Dingbats font. Each fading step eliminated 1 or 2 words from the target students' scripted exchanges. Script-fading was systematically introduced for Susan and John across the training scripts, once the probe scripts in each treated wh-question were mastered.

Experimental Design

A within-subject multiple-baseline design across three types of wh-questions (what, where, and when), with generalization measured across three other types of wh-

Table 8

An example of fading Step 1 (where 6).

___	Where are you going at ♦◆○○♏□ ♐□♏♋&?
___	Where will you go for ❖♋♍♋♦♐□■•♋ ☺♋♦♏?
___	Where do you usually go ♐□□ ❖♋♍♋♦♐□■•?
___	Where do you usually spend ♒□●♐♎♋♎•♋ ♐♐●●?
___	Where would you like to ♑□♋ ☺♋♦♏?
___	Where do you dream of ♑□♐■♑♋ ♐♐●●?
___	Where was the best place ♎□◆ ❖♐•♐♦♏♎?
___	Where was your best ❖♋♍♋♦♐□■♋ ☺♋♦♏?
___	Where was the first vacation ♎□◆ □♏○♏○♌♏□?
___	Where else have you ♌♏♏■♋ ☺♋♦♏?

Table 9

An example of fading Step 2 (where 6).

__ Where are you [illegible]?

__ Where will you [illegible]?

__ Where do you [illegible]?

__ Where do you [illegible]?

__ Where would you [illegible]?

__ Where do you [illegible]?

__ Where was the [illegible]?

__ Where was your [illegible]?

__ Where was the [illegible]?

__ Where else [illegible]?

Table 10

An example of fading Step3 (where 6).

___ Where [illegible] ?

___ Where [illegible] ?

___ Where [illegible] ?

___ Where [illegible] ?

___ Where [illegible] ?

___ Where [illegible] Bill?

___ Where [illegible] ?

___ Where [illegible] ?

___ Where [illegible] ?

___ Where [illegible] ?

questions (who, why, and how), was used to indicate whether the introduction of treatment conditions substantially increased the number of contextual verbal exchanges between the target students and their peers.

Measures/Data analysis

The dependent measures were: (a) the number of scripted, (b) the number of unscripted, and (c) the number of other verbal exchanges uttered by the target students during trial times, across different wh-question-scripts (what-, where-, when-, who-, why-, and how-scripts). Only scripted, unscripted, and other exchanges that occurred during trial times were represented in the primary dependent measures.

The data collected on the independent variable were the following: Whether (a) the confederate peers waited 3 seconds as instructed by the script, (b) the target student looked at the confederate peers during his/her exchange, (c) the experimenter manually guided the target student, (d) a dime was delivered following every exchange of target student, and, finally, (e) the experimenter gave the beginning instruction "Talk to your friends" and the concluding praise "You did a great job talking to your friends" during each scripted conversation. The dime-delivery data were analyzed in contingent or non-contingent dime-delivery. Contingent was any dime-delivery that followed within 3 seconds a scripted or an unscripted exchange by the target student. Non-contingent was any

other dime-delivery. The dime-delivery data of each conversation were further analyzed for the number of: (a) scripted and unscripted exchanges for which a dime was delivered out of the total number of scripted and unscripted exchanges, (b) prompted exchanges for which a dime was delivered out of the total number of prompted exchanges, (c) other exchanges for which a dime was delivered out of the total number of other exchanges, and (d) errors for which a dime was delivered out of the total number of errors.

Interobserver Agreement

The experimenter and another observer scored 100% of the sessions. The other observer was trained before the onset of the study on the data scoring procedures employed in this investigation. Scored conversations with interobserver agreements below 80% in the primary dependent measures were rescored up to three times, independently by both observers. The calculations of interobserver agreement were based on point-by-point comparisons of occurrences of the target responses (Kazdin, 1982). The percentages of interobserver agreement were calculated by dividing the number of agreements by the number of agreements plus disagreements multiplied by 100.

The mean interobserver agreement scores on the number and types of exchanges uttered across all 3 target students were: (a) 100% for both training and probe scripts during baseline, (b) 83% (range: 78-90%) for the training scripts

and 88% (range: 84-92%) for the probe scripts during treatment, (c) 98% (range: 89-100) for the generalization scripts during baseline, and (d) 84% (range: 65-95%) for the generalization scripts during generalization probes. The range of interobserver agreement scores shown in parentheses represents the range in the interobserver agreement scores of the 3 target students.

For Tom, the experimenter rescored the 30 initial what- and where-probe conversations of Sessions 9 to 61, accepting and adding to the number of unscripted exchanges the specified (see: Response Definitions above) ungrammatical utterances. Interobserver agreement was obtained for 30% of these rescored what- and where-probe scripts. Table 11 shows the interobserver agreement on Tom's rescored probes. The overall interobserver argeement on Tom's exchanges in the rescored what- and where-probes was 88% (range: 75-100%).

The mean interobserver agreement scores on secondary measures across all 3 target students were: (a) 84% (range: 84-86%) on exchanges during non-trial times, (b) 96% (range: 93-97%) on contingent delivery of dimes, (c) 75% (range: 69-81%) on non-contingent delivery of dimes, (d) 94% (range: 92-98%) on target student's looking at the confederate peers, (e) 95% (range: 94-97%) on whether the confederate peers waited 3 seconds, and (f) 62% (range: 52-76%) on whether manual guidance was used. Again, the range of interobserver agreement scores appearing in parentheses

Table 11

The interobserver agreement scores of Tom's rescored what- and where-probe scripts.

Session Number	Script	Interobserver Agreement
14	What 2	100%
17	What 5	86%
29	Where 1	75%
32	Where 4	90%
55	What 2	83%
56	Where 4	90%
58	What 5	80%
59	Where 1	100%
61	What 2	90%

represents the range in the interobserver agreement scores of the target students.

Social Validity Measure

Upon completion of the data collection part of the study the experimenter made a baseline/end-of-treatment comparison tape from the sessions recorded on video tapes. To make the comparison tape the experimenter picked for each target student one conversation topic from each treatment wh-question (i.e., 1 what-, 1 where-, and 1 when-script) during baseline sessions and the same topics during the last sessions, in total, 9 conversations compared. Table 12 shows the sequence of conversation comparisons as they appeared on that tape.

To make the treatment scripted conversations during the final sessions of generalization probes (for Susan Sessions 92-97, for Tom Sessions 94-97, and for John Sessions 97-102) comparable to the same scripted conversations during baseline condition, the experimenter just stood behind the target student and did not deliver any dimes during the treatment scripts of these final sessions. Before the onset of each of these final treatment scripts the experimenter told the target students that they would receive all due money (10 dimes: 1 dollar) at the end of each conversation, if they talked nicely with their friends.

To provide some measures of social validation of the conversational skills taught with this study the

Table 12

The videotaped sequence of target students and of conversation scenes presented during the post-study social validity measures. The types of scripts are shown in parenthesis.

Topics	Student	Session Numbers	
		Scene 1	Scene 2
	I. SUSAN		
A. What 6 (training)		93	6
B. Where 1 (probe)		10	94
C. When 3 (probe)		6	95
	II. TOM		
A. What 5 (probe)		95	2
B. Where 5 (training)		96	3
C. When 1 (training)		4	97
	III. JOHN		
A. What 1 (training)		7	101
B. Where 6 (training)		8	102
C. When 1 (training)		97	17

experimenter gathered two groups of independent evaluators: a group of 8 teachers of other youths with autism and a group of 6 graduate students in Psychology who were specializing in the subfield of Learning Processes and who were naive to autism. The evaluators in each group were given a sheet with three questions to answer for each conversation during baseline and during final generalization probes they viewed. Table 13 lists the questions presented to the evaluators.

Results

The results for each target student are plotted separately, showing number of scripted, unscripted, and other exchanges, in Figures 1 through 3. In all Figures the abscissa represents Session numbers and the ordinate represents number of scripted, number of unscripted, and number of other exchanges. The closed circles show scripted exchanges and the closed triangles show unscripted exchanges during training scripts. The open squares show unscripted exchanges during probe scripts. The asterisks show other exchanges during all scripts.

The vertical broken lines show the points at which full scripts were introduced across each of the treatment wh-scripts (what-, where-, and when-scripts), and the points at which only the wh-prompts were introduced across each of the generalization wh-scripts (who-, why-, and how-scripts). For Tom and John only, the second set of vertical broken lines labelled "KWE" show the points at

Table 13

The three questions given to outside evaluators following every viewing of the same conversation during baseline conditions and during the end of the intervention.

(a) During which scene did Susan (or Tom, or John) (the student facing the camera) seem more engaged in conversation with her (or his) peers?

Scene 1 Scene 2 Equally engaged

(b) If you chose Scene 1 or Scene 2 above, was Susan's (or Tom's, or John's) engagement with the conversation extended during that scene?

Yes No

(c) If you judged above that Susan's (or Tom's, or John's) conversational skills improved, evaluate the amount of improvement.

Somewhat improved Improved Greatly improved

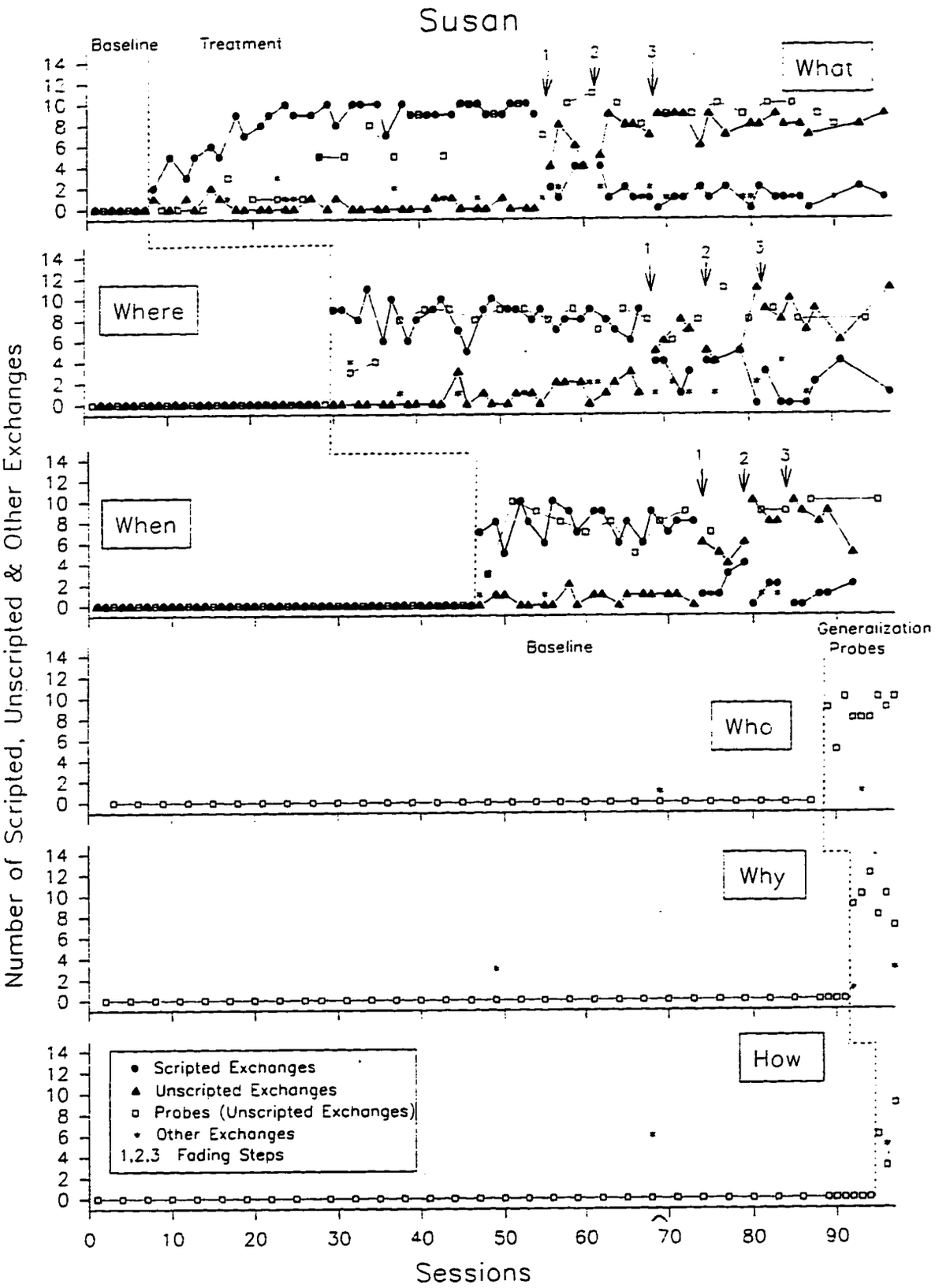
which the key-word-emphasis procedure was introduced across the treatment scripts. For Susan and John only, the arrows labelled "1", "2", and "3" indicate the points of introduction of the 3-step script-fading procedure.

Figure 1 shows Susan's results. Her baseline performance was very stable at 0 unscripted and 0 other exchanges. On only four occasions during baseline conditions of the generalization scripts (who-, why-, and how-scripts) did Susan utter 10, in total, other exchanges.

With the introduction of the treatment package for the what-training scripts Susan's scripted exchanges gradually increased to a level of 10 (range: 2-10), while her unscripted exchanges remained around zero (range: 0-2). With the introduction of treatment for the where- and when-training scripts scripted exchanges jumped immediately to an average level of 8, showed some initial variability (range: 5-10), and then stabilized around a level of 10 scripted exchanges per conversation, while unscripted exchanges remained around 1 unscripted exchange per conversation (range: 0-3).

With the introduction of treatment, the probe scripts showed slower acquisition than the training scripts. The probe scripts eventually stabilized at a level of 10 unscripted exchanges. There was faster acquisition in probes to an average level of 10 unscripted exchanges with the sequential introduction of treatment across the what-, where-, and when-scripts. The number of unscripted

Figure 1. The number of scripted (closed circles) and unscripted during training scripts (closed triangles), unscripted during probe scripts (open squares), and other exchanges (asterisks) uttered by Susan during each conversation script over Session numbers.



exchanges rose faster to a level of 10 in the where-probe scripts than in what-probe scripts, and faster in the when-probe scripts than in the where-probe scripts. With the introduction of treatment other exchanges appeared sparsely in different conversations, never exceeding the level of 4 other exchanges per conversation, and occurring mostly during probe scripts.

When the number of scripted exchanges during training scripts and the number of unscripted exchanges during probe scripts were stable, the 3-step script-fading procedure was implemented across the what-, where-, and when-training scripts, first during the what-scripts, then during the where-scripts, and finally during the when-scripts. With the introduction of fading across the training scripts the number of unscripted exchanges increased to a level of 10 (range: 4-10), while the number of scripted exchanges decreased to a level of 2 (range: 0-4), uniformally for the what-, where-, and when-training scripts. Overall, with every sequential fading step there were more unscripted exchanges and fewer scripted exchanges uttered.

With the sequential introduction of the who-, why-, and how-generalization probes, unscripted exchanges reached a level of 8 unscripted exchanges for the who-probes (range: 5-10), 9 for the why-probes (range: 7-12), and 6 for the how-probes (range: 3-9). Other exchanges were uttered during four occasions across all generalization

probes at a level of 2 other exchanges per occasion (range: 1-5).

Those findings were replicated with the other 2 target students, Tom and John, with the addition of the key-word-emphasis procedure. Figure 2 shows Tom's results and Figure 3 shows John's results. The number of Tom's unscripted exchanges during probe scripts gradually increased to an average level of 6 unscripted exchanges. Then key-words emphasis was introduced in a systematic stepwise manner across the what-, where-, and when-scripts. With the introduction of key-words emphasis Tom's unscripted exchanges during probe scripts gradually reached a level of 10 per conversation. Tom's training scripts were never faded. For John, the unscripted exchanges during probe scripts increased gradually but showed variability. The key-word-emphasis procedure was introduced for John almost simultaneously for all treatment scripts. With the introduction of key-words emphasis the variability in the number of unscripted exchanges during the probe scripts was eliminated and unscripted exchanges stabilized at an average level of 10 per conversation. The introduction of the script-fading procedure for John produced similar results to Susan's: unscripted exchanges increased (range: 2-10) while scripted exchanges decreased (range: 0-7). During the generalization probes, the average number of unscripted exchanges during each

Figure 2. The number of scripted (closed circles) and unscripted during training scripts (closed triangles), unscripted during probe scripts (open squares), and other exchanges (asterisks) uttered by Tom during each conversation script over Session numbers.

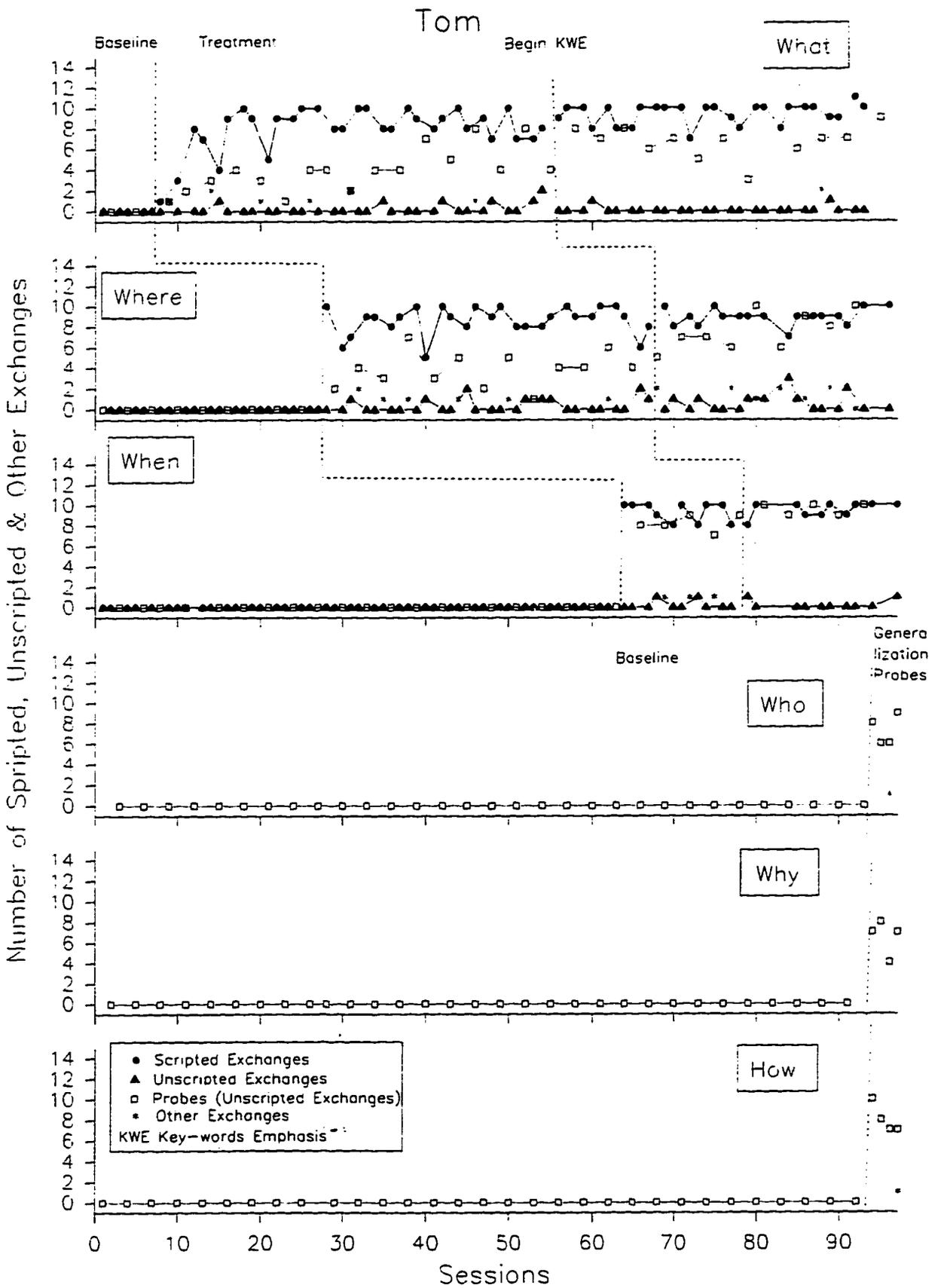
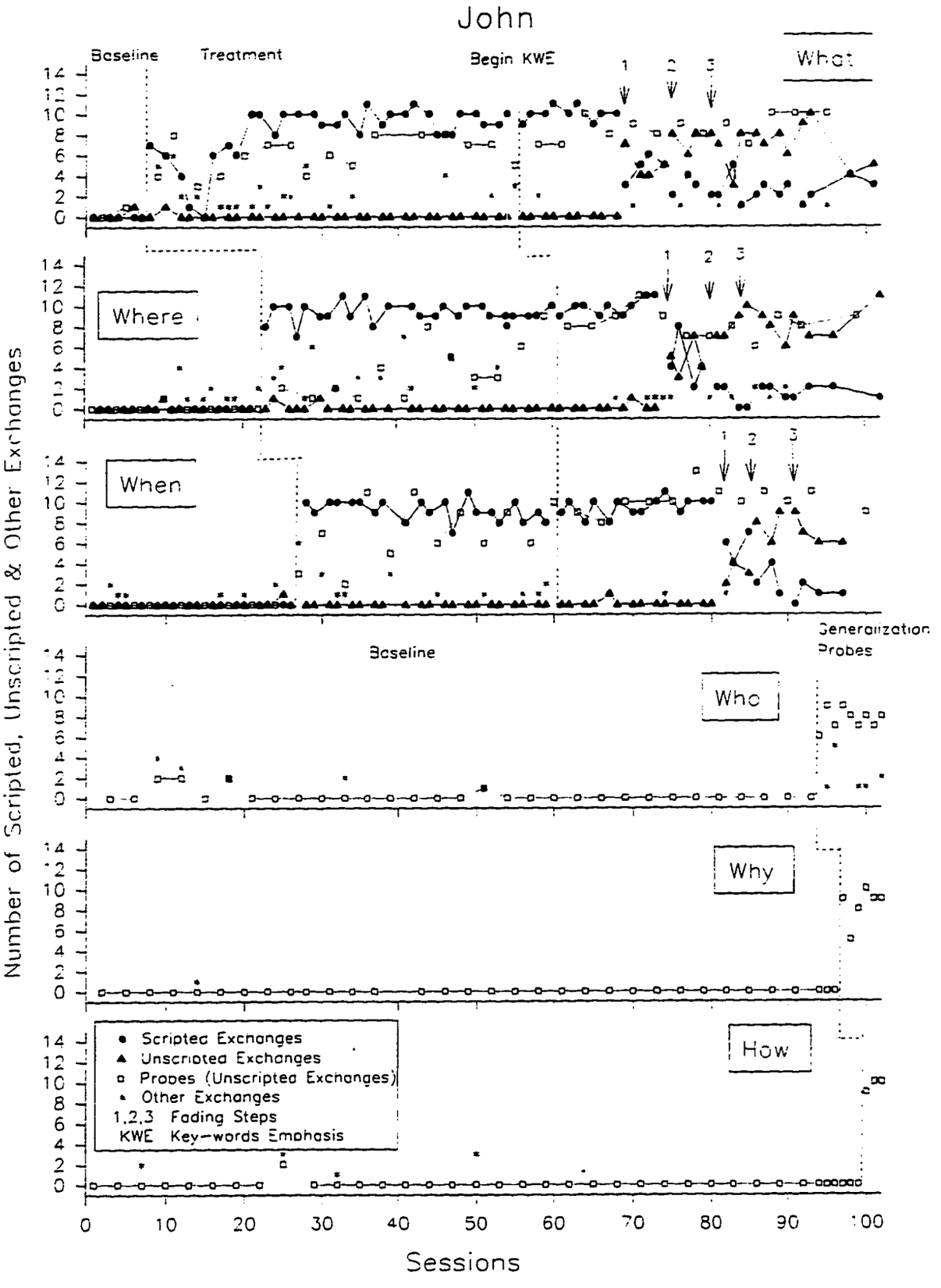


Figure 3. The number of scripted (closed circles) and unscripted during training scripts (closed triangles), unscripted during probe scripts (open squares), and other exchanges (asterisks) uttered by John during each conversation script over Session numbers.



conversation were for Susan: 8.4, for Tom: 7.2, and for John: 8.2.

Analysis of Susan's independent variable measures revealed the following:

1. No dimes were delivered during baseline conditions, while during treatment conditions 91% of dimes were delivered contingently and 9% of dimes were delivered non-contingently.
2. Manual guidance was not applied during baseline conditions, while during treatment conditions there were on an average 0.3 instances where manual guidance was applied per scripted conversation.
3. The confederate peers waited 3 seconds when they were prompted by their script, on an average, 7.4 out of 10 times per scripted conversation during baseline conditions and 8.4 out of 10 times per scripted conversation during treatment conditions.
4. Susan's average data on looking while talking at the confederate peers were 0 times per script during baseline conditions and 3.4 times per script during treatment and generalization conditions.

Tom's and John's independent variable data are shown on Table 14.

Table 15 shows the results of the two post-study social validity measures conducted. In summary, for all target students, both groups of evaluators had on the

Table 14

Tom's and John's independent variable average data.

	TOM	
	Baseline	Treatment
Dimes delivered contingently	0	85%
Dimes delivered non-contingently	0	15%
Confederate peers waited 3 seconds	7.0/10 times /script	8.7/10 times /script
Manual Guidance	0	0.18 times/script
Looking at confederate peers	0	4.5 times/script

Table 14 (continued)

	JOHN	
	Baseline	Treatment
Dimes delivered contingently	50% (1 dime)	92%
Dimes delivered non-contingently	50% (1 dime)	8%
Confederate peers waited 3 seconds	6.5/10 times /script	8.3/10 times /script
Manual Guidance	0	0.39 times/script
Looking at confederate peers	0.7 times /script	5.9 times/script

Table 15

The summed responses of each group of evaluators for each target student are shown in percentages of agreement among evaluators. Group I had 8 teachers of other youths with autism; Group II had 6 Graduate Psychology students.

QUESTION/MEASURE	SUSAN		TOM		JOHN	
	Group		Group		Group	
	I	II	I	II	I	II
1/ % Agreement in identifying the treatment scene	92	100	100	100	100	100
2/ % Agreement that there was improvement	96	100	92	100	96	100
3/ % Agreement (GI): on the level of	92	100	92	89	88	61
improvement (I) :	8		8	11	12	39

Note. (GI): "Greatly Improved", (I): "Improved".

average 87% agreement that the target students' conversational skills had "greatly improved" and on the average 13% agreement that they had "improved." More specifically, 87% of the evaluators scored as "greatly improved" and 13% as "improved" the target students' performance during the nine conversations compared during the baseline and the end-of-treatment phases of the study.

Discussion

The present study demonstrated that the treatment package used produced an increase in the number of exchanges emitted by the target students in conversations with their peers. This treatment package had the following elements: (a) teaching in the context of conversing peers with autism, (b) scripts and faded scripts, (c) reinforcement of scripted and unscripted exchanges, (d) individualized motivational systems, and (e) manual guidance to correct behavior incompatible to conversing with peers. All target students learned to have extended conversations with the confederate peers in the presence of full or faded (to the wh-question prompt) scripts. All target students acquired the targeted skills of listening to peers and asking related questions, as demonstrated by their performance during the treatment and generalization probes. The probed scripts were never trained, but when the wh-question prompts became available all target students were eventually able to participate in these conversations. Altogether, each target student received

the intervention of complete scripts on 12 out of the 36 scripted conversations, but all target students learned to extensively participate in the remaining 24 untrained conversations (6 treatment and 18 generalization probe scripts). The transfer of stimulus control from the scripts to what the confederate peers were talking about was the primary goal of this intervention. The reason the dependent measure is labelled "exchanges" is that the target student takes turns in the conversation. It is the goal of treatment that verbal behavior will come under the control of the topic of conversation. Then, the target student would truly be able to exchange information at social contact with his or her peers.

The present study also demonstrated that the script-fading procedure, although it universally produced unscripted exchanges, was not necessary in teaching adolescent peers with autism to converse extensively. Tom's scripts were never faded, but his treatment and generalization probes were at similar levels to Susan's and John's, whose scripts were faded. Individual differences did exist among the target students. Susan's acquisition was the fastest, followed by John's, and then by Tom's, but all target students reached an average level of 10 unscripted exchanges during the treatment probes and an average level of 8 unscripted exchanges during generalization probes.

The participants in the present study were involved in sessions for a period of five months. Susan and Tom had 97 sessions, and John had 102 sessions, but within each session the target students received relatively little exposure to the scripts and treatment conditions. During each session the target student was exposed to four scripted conversations, which usually lasted less than 1 minute and 30 seconds each. Each target student received less than 6 minutes of exposure to the treatment package per session. With this consideration, the use of scripts and reinforcement of contextually relevant language are not only effective, but also efficient in teaching prolonged conversing among peers with autism.

Individual differences in the rates of acquisition of the targeted skills necessitated the adoption of the additional key-word-emphasis teaching procedure for Tom and John. The key-word-emphasis procedure used in the present study had features which have been shown to facilitate learning in youths with autism. Key-words emphasis is a form of within-stimulus prompting which has been shown to facilitate acquisition of discriminations in children with autism (Schreibman, 1975). The key-words emphasized were the relevant auditory discriminative stimuli that should be used to construct a contextual wh-question. In addition, the key-words emphasized were within-stimulus prompts presented with short intertrial intervals, another condition which has also been shown to facilitate learning

in youths with autism (Koegel, Dunlap, & Dyer, 1980). For youths with autism, short intertrial intervals, such as the ones used in the present study (up to 3 seconds allowed), produce higher levels of correct responding than long intertrial intervals. The present study demonstrated that a within-stimulus prompting procedure, such as key-words emphasis, not only assisted the acquisition of targeted skills, but decreased the variability in responding as well. These effects of the key-word-emphasis procedure are evident in both Tom's and John's results. It is hypothesized that within-stimulus prompting is an effective way to prompt because it occurs within the relevant component of the training stimulus and it does not require responding to multiple cues, a typically confusing task for youths with autism (Etzel & LeBlanc, 1979; Etzel, LeBlanc, Schilmoeller, & Stella, 1981).

Tom's numbers of unscripted exchanges never increased from their baseline levels, as did Susan's and John's, probably because Tom's scripted exchanges were never faded. Although some typical, predefined, grammatical errors were accepted and added to the scores of unscripted exchanges during probes for Tom only, these specific grammatical errors were not reinforced throughout the duration of the study. That is, Tom did not receive dimes for uttering these ungrammatical but contextual exchanges. Perhaps this procedure contributed to his failure to produce unscripted

exchanges, but it made good educational sense to reinforce only grammatical utterances.

The treatment outcomes were further examined by conducting two separate social validity measures. The social validity procedures used were designed to assess whether teachers of other youth with autism and graduate psychology students naive to autism could detect a positive change in the target students' participation in conversation with their peers. Baseline conversations were compared to the same conversations at the end of treatment. The evaluators in the two different validity measures were asked to rate differences in performances of each target student. Both groups of evaluators agreed that the target students had greatly improved or improved in their conversational skills and that they had extended their engagements in these conversations.

Individual differences among the target students' performances were also evident during baseline conditions, although, universally, their baseline levels of exchanges were around zero. Tom never made an exchange during baseline conditions during all treatment and generalization scripts. Tom did not make any attempt to converse unless he was provided with some form of readable script, partial (the wh-question prompt appearing during probe scripts) or complete scripts. John, on the contrary, did occasionally address contextual exchanges to his peers during baseline conditions (in total, during 27 baseline conversations),

but because these were mostly other exchanges (and not unscripted exchanges), they were not reinforced, and John's talking during baseline conditions extinguished during the prolonged baselines of the generalization scripts.

Finally, Susan almost never talked to her peers during baseline conditions, with the exception of three occasions in the second half of the study, during the generalization scripts that were kept in baseline. On the first occasion, during Session 49, the when-training scipts had just been introduced, so Susan had sessions with 3 out of the 4 conversations fully scripted. The response class of listening and asking her peers questions might have gained behavioral momentum, that is, it might have resisted the stimulus change to the baseline conditions (no script) that followed the three scripted conversations (Nevin, Mandell, & Atak, 1983; Mace et al., 1988) and Susan uttered 3 other exchanges despite the absence of a script. On the other two occasions, during Sessions 68 and 69, the fading procedure was almost completed for the what-scripts and initiated for the where-scripts. Susan was relying (i.e., looking) less on her scripts and more on the confederate peers to converse, so when the baseline script followed she continued to converse (6 exchanges on Session 68, 1 on Session 69). Susan uttered only 'other' exchanges during these baseline conversations, which did not produced reinforcement, and talking during baseline quickly extinguished.

The results of the present study raise the issue of the powerful prompt-dependencies exhibited by youths with autism (McClannahan & Krantz, unpublished manuscript). The reliance on the prompts by people with autism and strategies to fade these prompts are areas requiring further investigation. The target students in this study clearly demonstrated that they had acquired the taught skills which helped them to engage in extended conversations with their peers, as was evident from their performance during the treatment probes. Although the target students had the skills, they almost never used them during the generalization scripts, until the end of the study when they were presented with the generalization wh-question prompts (who, why, and how).

Susan's behavior during the above mentioned baseline sessions (Sessions 68 and 69) point to an important, potential, strength of script-fading procedures in situations when teaching is done within the natural context of the target behavior, as was done with the arrangement of conversing peers in the present study. If part of the skills taught in such an arrangement consists of listening to what peers say, then systematic fading of the scripts might help transfer the stimulus control of the behavior of conversing with peers from the scripts to the natural stimuli that control conversing (i.e., to what the peers are saying). One possible reason that such transfer of control of conversing with peers from the scripts to the

peers' verbal behavior became mostly evident only after the introduction of the wh-prompts was the reinforcement contingencies used in the present study. Had other exchanges uttered during baseline conditions been reinforced for Susan and John, such trasfer might have occurred well before the introduction of the wh-prompts during the generalization probes. It is possible that extended engagement in the conversations at a level similar to the treatment probe-scripts could have developed during baseline conditions of the generalization scripts, had the reinforcement contingencies of the present study been different. In general, all target students demonstrated generalization of contextual question-asking within but not across wh-question types. In addition, the occasional occurrences of other exchanges throughout baseline, treatment, and generalization conditions suggest that scripts and script-fading procedures have the potential to produce generalization of contextual question asking in conversations with peers both within and across wh-question types, if the contingencies reward every contextual exchange.

Another interesting set of questions that applies to the type of procedure used in this study are the following: (a) If scripts were faded to: "Wh_____?" and probes had only the "Wh__" prompt, while reinforcement contingencies remained the same, would these conditions produce a variety of types of wh-questions; and (b) how

would this variety of types of wh-questions conform to the reinforcement contingencies of rewarding only the treated type of wh-questions (i.e., either the what, the where, the when, the who, the how, or the why questions)? An important question remains: What kind of unscripted exchanges occur under script fading conditions? Analysis of the types of unscripted exchanges produced when the script is eliminated would likely illuminate the ways language varies and generalizes.

The present study provided a set of procedures to teach skills needed for participating in conversations within their natural context. The procedures employed were successful in teaching adolescents with autism to attend to the speaker and to use elements of the speaker's utterances in inquiring further on the topic of discussion. Such conversational strategies successfully extended the engagement of youth with autism in ongoing conversations with their peers. Participation in conversations is an important set of social skills which may substantially improve the quality of life of youths who originally do not exhibit such skills.

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