Social Scripts for Conversational Interactions in Autism and Down Syndrome[1]

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The ability of high-functioning verbal individuals with autism or Down syndrome (DS) to respond appropriately to conversational "social scripts" involving responding to another person's distress was investigated. Subjects were 13 persons with autism and 13 with DS, matched on verbal mental age. During a "tea party" situation, subjects were each told about an examiner's unhappy personal experience (e.g., a stolen wallet). If the subject did not produce an acceptable response after several probes (e.g., "My money's gone; now I can't buy groceries"), the other examiner modeled a sympathetic response and more probes were administered. Subjects with DS gave a significantly greater percentage of relevant suggestions and sympathetic comments, whereas subjects with autism gave a significantly greater percentage of responses relating only to the tea party. Significantly more subjects with autism than DS required modeling. Although a smaller percentage of subjects in the autism group than the DS group exhibited improvement after modeling, some subjects with autism were able to improve, suggesting that they understood some aspects of the social situation (the social script) but needed help formulating an appropriate response.

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Persons with autism evidence significant social and communication deficits when compared to their mental age peers. Even high-functioning verbal persons with autism behave and communicate in inappropriate ways, remaining deficient in social interactional skills later in life (Baltaxe & Simmons, 1983; Loveland & Kelley, 1988; Volkmar et al., 1987). One area of special difficulty for the verbal person with autism may be a poor awareness of social expectations or "scripts" governing communication.

Sets of expectations for human behavioral events can be described in terms of scripts (Fivush & Slackman, 1986; Nelson, 1986). We recognize commonalities among certain kinds of events, and with experience, we expect them to unfold in similar ways, (i.e., the way something usually happens). For example, events such as ordering food in a restaurant have characteristic participants, props, and verbal routines. Even young children appear to have some awareness of scripts for such events as bedtime routines. Although young children have less knowledge about particular kinds of events, there is evidence that their scripts for events are qualitatively similar to those of older children and adults (Fivush & Slackman, 1986). Their implicit knowledge about events becomes more explicit and flexible with increasing age and experience (Furman & Walden, 1990).

However, persons with autism might be expected to have difficulty developing an awareness of social scripts and applying them to everyday situations. To behave appropriately in many social situations, one must be able to detect the nature of the situation and identify the social script that applies (e.g., someone has just passed the salt, therefore it is time to say "thank you"). The task of identifying an appropriate script to guide behavior might be difficult for the person with autism, because it requires sensitivity to a wide range of social information, as well as a fluent knowledge of cultural values and expectations.

In fact, there is abundant evidence that persons with autism have difficulty detecting and interpreting information for others' emotional states (Hobson, 1986a, 1986b, 1989; Weeks & Hobson, 1987) and have special difficulty reasoning about what others know and believe (Baron-Cohen, Leslie, & Frith, 1985; Tager-Flusberg, 1989). These problems seem to affect their communication in important ways (Loveland, Tunali, McEvoy, & Kelley, 1989; Loveland, McEvoy, Kelley, & Tunali, 1990). In addition, people with autism appear to have trouble developing an awareness of the culturally determined meanings of objects and events they encounter (Loveland, 1991). These problems all suggest that the task of interpreting a social situation, identifying an appropriate script, and applying it would be especially hard for the person with autism.

However, autistic persons may not be unable to use social scripts to guide behavior in all situations. It is important to ask to what extent and under what conditions they are able to do so. We also do not know whether their performance can be facilitated by providing additional cues such as modeling of appropriate behavior.

The present study compared high-functioning verbal children and adolescents with autism to age- and language-matched subjects with Down syndrome (DS) in their ability to respond to conversational situations according to an accepted social script. The situation presented involved another person's expression of distress. We hypothesized that subjects with DS would be more likely to express sympathy, offer suggestions, or otherwise indicate their awareness of social expectations for such a situation. In addition, we wished to examine whether the performance of both groups could be facilitated by modeling of appropriate behavior. Modeling (as opposed to direct teaching) requires that the student/observer be able to detect the relevance of the modeled behavior to the social script in question. Thus, the ability to benefit from modeling implies that one has at least some awareness of the relevant social script.

METHOD

Participants

Thirteen individuals with autism and 13 with DS were compared in this study. The age of participants ranged between 5 and 27 years (autism $M = 13.5$ years, $SD = 7.1$; DS $M = 13.3$ years, $SD = 2.9$). Subjects were recruited through private referrals, through the Parents of Children with Down's Syndrome, and through local chapters of the Association for Retarded Citizens. All were seen at the University of Texas Mental Sciences Institute, Developmental Neuropsychology Clinic. The autistic group had a primary diagnosis of Infantile Autism according to DSM III-R (American Psychiatric Association, 1987) criteria, diagnosed by a developmental pediatrician who specializes in autism and pervasive developmental disorder.

Each subject was first seen for a developmental evaluation to determine verbal and nonverbal age equivalents. The Leiter International Performance Scale (Leiter, 1974), a measure widely used to assess developmentally disabled populations whose language is impaired, was used to assess nonverbal functioning. An approximate verbal age

equivalent was determined using the McCarthy Scales of Children's Abilities–Verbal Scale (McCarthy, 1972) and the Peabody Picture Vocabulary Test (Dunn & Dunn, 1981). This assessment took about $1\frac{1}{2}$ hours.

Matching

The autism and DS groups were individually matched on composite verbal age equivalent to ensure that any observed group differences were not due to differing language ability. Nonverbal intelligence and chronological age were kept as similar as possible between the two groups (see Table I).

Procedures

After the developmental evaluation, the subject and two examiners had a "tea party" with water and snacks during which each of the examiners told the subject about an unhappy personal experience (sick pet, stolen wallet). The anecdotes were designed to portray experiences that would be readily understood by the subject, and to which a sympathetic or helpful response would ordinarily be expected. During each anecdote, if the subject did not produce an acceptable response after several probes (e.g., Now that my money's gone I can't buy groceries), the other examiner modeled a sympathetic response and more probes were administered. The tea party interaction was videotaped from behind a two-way mirror.

Coding

The entire session, including the examiner's probes and the subject's responses, was transcribed from the videotape by a team of two coders. The subject's responses to the examiner's modeling were also recorded during transcribing.

Responses were coded as 0 (unintelligible, other, no response, bizarre or irrelevant responses), 1 (responses relevant to the tea party only), 2 (relevant, marginal responses), 3 (relevant, concrete responses), and 4 (responses that were both relevant and sympathetic) (see the Appendix for examples of responses in each category). Recoding for reliability was done by two independent pairs of coders on 25% of the data (8 subjects randomly selected). Reliability was calculated using Cohen's kappa (Fleiss, 1973) with individual values for the eight subjects ranging from 0.77 to 1.0; overall kappa was 0.90 ($p \leq .01$).

Table I. Chronological Age, Nonverbal Age Equivalent, and Verbal Age Equivalent in Months for Subjects with Autism and Down Syndrome[a]

Autism (n = 13)			Down syndrome (n = 13)		
CA	Nonverbal AE	Verbal AE	CA	Nonverbal AE	Verbal AE
194	114	109	215	78	93
324	93	98	151	78	92
171	102	92	217	87	91
252	90	90	194	77	90
160	102	81	154	75	84
114	60	67	170	72	74
192	162	65	223	72	73
167	103	59	163	72	68
357	66	57	211	72	68
104	96	57	194	66	68
208	84	79	147	57	57
152	75	63	156	41	72
130	66	52	192	73	76

	Autism		Down syndrome	
	M	SD	M	SD
CA[b]	194	76	184	28
Nonverbal AE	93	27	71	11
Verbal composite AE[b]	75	18	77	12

[a]Nonverbal age equivalent is taken from the Leiter International Performance Scale. Verbal composite AE is the mean of McCarthy and PPVT age equivalents.
[b]T tests (df = 24) indicated no significant differences for CA and Verbal composite.

RESULTS

Group Characteristics

The autistic and DS groups were compared using t tests on mean scores for verbal age equivalents (AE), nonverbal AE (Leiter), and chronological age (CA). The groups did not differ on verbal AE or CA (Table I). However, the autism group had a higher mean score than the DS group on the Leiter, $t(25) = 2.81, p < .01$, indicating greater nonverbal AE. This reflects the characteristic profile of abilities found in individuals with autism, whose language-based abilities are often more impaired than their nonverbal abilities.

The autism group was composed entirely of males whereas the DS group had 7 males and 6 females. Differences in gender between the two groups reflect characteristic sex ratios found in these populations. T tests

Table II. Percentage of Responses by Category

	Autism (n = 13)		Down syndrome (n = 13)		
	M	SD	M	SD	t
Unintelligible	.02	.04	.04	.06	
Other	.16	.20	.20	.20	
No response	.32	.24	.19	.22	
0 (irrelevant, bizarre)	.07	.11	.02	.06	
1 (relevant to tea party only)	.15	.17	.02	.05	2.56[a]
2 (relevant to story; marginal)	.15	.15	.10	.10	
3 (relevant to story; concrete)	.11	.15	.31	.26	-2.39[a]
4 (relevant to story; sympathetic)	.01	.03	.17	.17	-2.46[a]

[a]$p < .05$.

were performed to compare males and females in the DS group on verbal AE, nonverbal AE, and CA to examine whether male/female differences were present. The results yielded no significance.

Percentage of Responses by Category

T tests were performed to examine the group differences in mean percentage of responses in each category (Table II). The groups did not differ significantly in the percentage of no responses, irrelevant/bizarre responses, or marginally relevant responses. Autistic subjects gave a significantly greater percentage of responses relating only to the tea party, $t(14.21) = 2.56, p = .02$, whereas subjects with DS gave a significantly greater percentage of concrete suggestions, $t(19.08) = -2.39, p = .03$, and sympathetic comments, $t(12.86) = -2.46, p = .03$.

Modeling

Significantly more subjects with autism required modeling (12/13 or 92%) than did subjects with DS (7/13 or 54%), $\chi^2(2) = 8.16, p = .02$. Among those subjects who required modeling ($n = 12$ autism, $n = 7$ DS), 6 of the 7 DS (86%) and 5 of the 12 autism subjects (42%) exhibited improvement after modeling (i.e., produced concrete and/or sympathetic responses relevant to the story). However, this difference was not significant, ($\chi^2(2) = 8.16$), possibly because of reduced sample size in this analysis.

DISCUSSION

The results show that subjects with autism and language-matched subjects with DS differed in their ability to respond appropriately to a simple conversational situation in which a helpful or sympathetic verbal response is ordinarily expected. In this particular situation, interactions occurred on two levels: the conversational exchange concerning eating and drinking (tea party), and the conversational exchange dealing with the unhappy personal experience. Subjects with autism tended to focus on the former to the exclusion of the latter. Why should this be so? This finding might be interpreted in several ways, depending upon the way in which such an apparently simple social situation is characterized.

The social situation presented might be characterized as involving two distinct, but co-occurring, social scripts: one more instrumental in emphasis (e.g., requesting food) and the other more interpersonal in emphasis (e.g., responding to another person's distress). To participate effectively, a speaker/listener must be able to identify and distinguish these two, and must also be able to move from one to the other as needed. The speaker/listener must not only be aware of the need to make a response in a given situation but also know the kind of response to make. Problems in the execution of any of these components might result in the types of behaviors exhibited by subjects with autism in this study.

For example, autistic subjects might have had difficulty distinguishing the two social/conversational contexts present. It was clear that the verbal autistic persons in this study were at least aware of the meaning of the tea party situation. However, some subjects may have failed to respond appropriately because they did not recognize that comments about the sad personal experience pertained to a topic other than the tea party. This possibility cannot be ruled out in all cases, although 6 of the 13 subjects eventually responded appropriately to the sad personal experience, suggesting that they, at least, distinguished the two contexts.

Even if they were able to distinguish the two social/conversational contexts, subjects with autism might have had trouble shifting attention between the two, in effect perseverating on one of them. It might also be that the tea party situation, which involved a snack, was intrinsically more interesting to them than was the other discussion. Either of these possibilities might have contributed to an individual's tendency not to respond appropriately to the examiner's distress and might have led to a tendency not to respond at all to comments about the sad personal experience. However, there was no significant difference between the two groups in the number of no-responses to examiner probes, suggesting that they were not different in their awareness of the need to respond in some way.

Alternatively, autistic subjects may have had difficulty understanding *how* to respond. The ability of a subset of autistic subjects to improve after modeling suggests that these individuals may not have known how to respond, although they may have understood the nature of the situation and the need to respond in some way. Those who did not improve may have lacked other task components as well.

Despite their difficulties responding in this study, our results suggest that autistic persons are not necessarily unable to use social scripts to guide behavior. The findings on the effect of modeling suggest that when modeling is provided, some autistic individuals can respond appropriately within the relevant social script. Interestingly, autistic subjects' improved responses facilitated by modeling were not mere echoes or direct imitation of the modeled behavior. After modeling (e.g., That's terrible; all your money's gone!), most autistic subjects produced their own unique responses which were still appropriate (e.g., You lost your money; go tell your mom.) These responses imply that the subjects understood the nature of the situation to which they were responding.

Another possible explanation for the group differences observed is that responding to the sad personal experience requires an awareness of another person's affective state and its implications for the listener's behavior, whereas responding to the tea party does not. There is much evidence that people with autism have special difficulty interpreting and expressing affect in a variety of situations (Hobson, 1986a, 1986b) and that it is difficult for them to understand what others think and know (Baron-Cohen, Leslie, & Frith, 1985, 1986; Perner, Frith, Leslie, & Leekham, 1989). Difficulty interpreting these aspects of social situations might lead to difficulty learning about social scripts that involve other people's thoughts and feelings and a resulting failure to know how to respond. Interestingly, these results might be taken to support either the representationalist view ("theory of mind") of the central deficits present in autism espoused by Baron-Cohen et al. or the theory of affective impairment advanced by Hobson.

However, these results also demonstrate that the culturally determined meanings of human activities and their implications for action are difficult for the autistic person to grasp. Given that layers of meaning are present in any human activity, autistic people seem likely to interpret these meanings in idiosyncratic rather than culturally accepted ways (Loveland, 1991; Frith, 1989). (Thus, the autistic subjects in this study tended to focus on the food-related aspects of the tea party situation, or else on other less obvious aspects.) A wide-ranging difficulty interpreting the meaning of

one's environment—not limited to interpersonal behaviors, but including all aspects of life—would result in idiosyncratic behavior that seems bizarre, disturbing, indifferent to others, and even "un-human" (Loveland, 1991). This is, of course, the kind of behavior characteristically observed in people with autism.

Conclusions from this study are limited by the fact that the social script examined included affective content and was embedded in a conversational context with different content; thus, it is hard to be certain which aspects of the situation were most difficult for the autistic subjects to manage. It is important in future research to examine how autistic people deal with other kinds of scripted behavioral events, such as those that do not include affective content and those that are not specifically interpersonal in nature.

APPENDIX

Response Adequacy Codes

Score	Example
(4) Relevant, sympathetic response	"Oh, that's sad, I'm sorry"
(3) Relevant, concrete response	"Just take him to the vet"
(2) Relevant but marginal response	"Man going to take money away"
(1) Response relevant to the tea party only	"More peanuts please"
(0) Untelligible, other, no response, bizarre or irrelevant responses	(Irrelevant: "What's your last name?" Bizarre: "Someone has the voice of me")

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