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HOW AUTISTIC CHILDREN MAY USE NARRATIVE DISCOURSE TO SCAFFOLD COHERENT INTERPRETATIONS OF EVENTS: A CASE STUDY

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ABSTRACT

High-functioning autistic children often behave as if they fail to integrate information or seek out coherence. In this article we present a social-pragmatic account of this impairment, in which we propose that social and linguistic deficits tend to isolate autistic children from the experiences that promote the integration of information by other children. This hypothesis is based on the view that, in typical human development, language plays a central role in creating coherence, including the ability to infer the intentions of others. The proposal is supported by a case study of an autistic adolescent who, when provided with adult scaffolding as he repeatedly retells a story, shows the same kinds of changes shown by unimpaired, although younger, children. An implication is that the difficulty that autistic children have in pulling information together arises, in part, from problems with the narrative mode of discourse. We infer that, provided with the right kinds of language-use experiences, high-functioning autistic children may develop the ability to find coherence in the events they experience.

INTRODUCTION

The behavior of autistic children is often described as showing a weak drive toward coherence (for example, [1]). This means that the children act, in both visual (e.g., hidden pictures) and linguistic tasks (e.g., narrations), as if they fail to "integrate sources of information to establish meaning" [2]. Their behaviors have been attributed to a fundamental cognitive impairment, with a single, "central" cause. As Frith put it, autistic children lack the typical "built-in propensity to form coherence over as wide a range of stimuli as possible" [1, pp. 159-160].

Autistic children do behave as if they generally fail to integrate information or seek out its collective meaning, as our review below makes clear. However, we question an account that invokes damage to a central drive toward coherence. Summerfield has warned against a "first order isomorphism fallacy"—a fallacy, when it is one, of explaining observable behaviors or characteristics by invoking a copy of them inside the head that causes them to appear in public [3]. An alternative idea is that the autistic behaviors result from a complex constellation of causes [4-7]. We adopt that view here.

Our purpose in this article is to present an alternative explanation of why autistic children do not seek out coherence. We propose that their language impairments and social deficits tend to isolate them from social and linguistic experiences that would promote integration of information to discover the larger meanings in events. We will focus on their experiences using language. Our hypothesis is based on the view that, in typical human development, language plays a central role in creating coherence, including the attribution of intentions to others [8, 9].

We first review evidence showing that autistic children do not seek integration or coherence. This evidence, among others, underlies the account of autism that invokes damage to a central drive toward coherence. Next we offer an alternative interpretation of the evidence. Our interpretation focuses on the social and linguistic deficits of autistic children as a source for the autistic child's failure to create or detect coherence. We hypothesize that these children lack the kinds of narrativizing experiences that Bruner [10], Nelson [11], and others consider central to making integrative sense of experience. We adopt a view of the importance of these experiences in the development of unimpaired children. We suggest that children acquire coherence through social influences both direct and indirect: through scaffolding by adults, and through children's reflections on their own discourse. Because even high-functioning autistic children have limited narrativizing experiences, they may fail to acquire coherence. We ask: were these children provided the relevant experience, would they acquire these various types of coherence?

We describe a case study of a high-functioning autistic child who is provided with prompts and other forms of scaffolding as he attempts several repetitions of a film narration. The child shows the same kinds of changes in his narration that unimpaired, although younger, children show. We infer that, provided with the right kinds of language-use experiences, high-functioning autistic children may develop the ability to find the coherence in events that they experience.

STUDIES THAT SHOW AN ABSENCE OF COHERENCE AND "CENTRAL" EXPLANATIONS

There is considerable evidence that autistic children fail to discover or fail to use global properties of utterances, objects, or events that underlie the coherence and, therefore, the meaningfulness of things. They perform poorly when achieving

coherence is necessary or helpful, and they perform well on tasks where seeing the big picture is detrimental.

Failure to discover coherence in the linguistic domain is illustrated by a variety of findings. Hermelin and O'Connor presented both unimpaired and autistic children with spoken lists of randomly selected words for the children to recall [12]. When the list length exceeded the children's span, both unimpaired and autistic children reported the last few words of the list. However, when the word list consisted of words that formed a meaningful sentence followed by a few randomly chosen words, the two groups of children responded differently. The unimpaired children reported the sentence followed by the random words. That is, they were able to increase their span by exploiting the fact that the words of the sentence were organized into a meaningful whole. In contrast, the autistic children reported just the last few words of the list; their span did not increase.

More recently, Joliffe and Baron-Cohen showed that autistic children were less likely than unimpaired children to use various kinds of context in performing linguistic tasks [2]. For example, given a homographic word (that is, a word such as *lead* that can be pronounced in two ways) in a disambiguating context, unimpaired children used the context to choose the appropriate pronunciation of the homograph. In contrast, autistic children tended to use the more frequent pronunciation whether or not it fit the context. Similarly, they were less likely to make bridging inferences between sentences. As shown below, given a pair of sentences such as (1), autistic children were less able than unimpaired children to choose an appropriate (2i) over less appropriate inferences (2ii and 2iii).

(1) Albert said he would not return to the restaurant.
He left without leaving a tip.

(2) Albert didn't leave a tip because
  i. he was dissatisfied with the service
  ii. he only had enough money to pay for the meal
  iii. the restaurant was closed when he arrived

By themselves, these and other findings need not be interpreted as showing that autistic children are specifically deficient in tasks in which performance benefits from being able to achieve global coherence. Their difficulty might arise from their weak linguistic skills. However, evidence shows that failure to integrate is considerably more general. For example, Mottron and Belleville describe the drawing strategy of an autistic artist whose drawings are remarkably skilled [13]. Most commonly, individuals begin a drawing by sketching the global form. The autistic artist did not, however. He began with details and chose what to draw next based on its proximity in the picture to the details he had already provided. Global form emerged from the details. More recently, Mottron, Belleville, and Menard found a similar tendency in nonsavant autistic adolescents [14]. These

participants were also less negatively affected than controls in copying pictures of impossible versus possible objects.

Other findings show that autistic individuals may show superior performance on tasks in which seeing the big picture is detrimental. For example, they are reported to be less impaired on face recognition than are nonautistic individuals when depicted faces are inverted [15]. The difficulty that people have with face inversion is generally ascribed to a tendency to perceive faces holistically or configurally. Perhaps autistic observers do so to a lesser degree.

Compatibly, Frith and Happe report that autistic children are relatively good at finding embedded figures and on the Wechsler block design subtest [16]. Embedded figures are difficult to find because they are embedded within larger patterns in which, for most observers, they nearly disappear. Block design is difficult, because the global pattern of geometric forms generated when four blocks are arranged in a 2 × 2 array make it difficult to see what each individual block must look like to make the pattern.

Autistic individuals may be less subject than matched controls to certain visual illusions in which context affects how a figure appears. Happe presented participants with the Titchener circles illusion in which two same-sized central circles are surrounded by circles of different sizes—large ones for one central circle and small ones for the other [17]. Viewers typically judge the central circles to be different in size; however, Happe found that her autistic participants were less subject to the illusion than were matched controls. Finally, Frith remarks that autistic children may be good at jigsaw puzzles—and may be relatively unimpaired if the puzzle is put together picture side down. They are not misled as ordinary people are by the global properties of the picture as they seek a missing piece. Rather, they seek pieces based largely on their contours.

Frith accounts for all of these findings as a tendency in autistic children to "weak central coherence," different from a normally innate propensity to "form coherence over as wide a range of stimuli as possible" [1, p. 159]. Certainly the evidence reveals a broad deficit in achieving integration or coherence. However, it does not show that coherence is achieved when it is because of a built-in drive to achieve it. This may be an instance of a first-order isomorphism fallacy [3]. Conceivably, instead, there are kinds of experiences that foster integration and understanding; autistic children, because of their social and linguistic deficits, may not characteristically have those experiences. This possibility is appealing because it implies that exposure to the right kinds of experiences might foster coherence seeking. We consider that possibility here.

SOCIAL INFLUENCES ON COHERENT ACCOUNTS PRODUCED BY NONAUTISTIC CHILDREN

We set aside for now discussion of the non-linguistic tasks and focus on the linguistic. We first describe the use, by nonautistic children, of discourse practices

that may lead to increasing coherence [8, 9]. Our approach is consistent with the cultural views of Nelson [11], Bruner [10], and others, that children use language, and especially its narrative properties, to construct coherent accounts of their everyday experiences. In Nelson et al.'s *experiential* approach, children use words—sometimes "borrowed" from adult speech—to construct explanations of their own experiences, especially their participation in social activities [18]. From an early age, these take the form of explanatory narratives that describe events within the "landscape of consciousness" [10].

This view is supported by Nelson's observations of the crib talk of two-year-old Emily. In her solitary speech, this child tended to "circle around" issues, "returning again and again to a central proposition and reformulating it," apparently trying to construct a coherent account of her everyday life [19, p. 61]. Bruner remarks of this same child that she used narrative devices to achieve a sense of "what happened" [10]. Over the 16 months of the recordings, he noted a progression toward "more linear and tighter sequencing"—from simple conjunctions, to temporal, and finally causal connectives. Such studies suggest that children's interpretations of their experiences rest on their acquisition of cultural forms of narrative discourse, and the form taken by each child's discourse depends on the style of their own parent's speech [20]. The acquired forms become, as Bruner [10], part of a *tool kit* of symbolic devices that children acquire from the language of their culture. They provide children "with new powers of narration . . . through the traditions of telling and interpreting in which [the children] soon come to participate" [10, p. 80].

Our goal in citing these approaches is to point out that, from a social-pragmatic point of view, coherence does not emerge in isolation of language, but rather it depends on children's use and manipulation of language forms. When children "circle around" issues, formulating and reformulating propositions, they are manipulating language both within individual clauses, and at the level of connected discourse, where entire clauses are added, deleted, and otherwise rearranged; and the discourse that results is frequently more coherent than the original formulation [9]. In the rest of this section, we address the acquisition of narrative discourse by nonautistic children, focusing on its roots in social interaction.

Definition of Coherence

We define coherent narratives as descriptions of event sequences that are reported from the perspective of thematic characters, and are preceded by descriptions of the characters' motivations for participating in them.

Example (3) shows the start of a highly coherent narration produced by an adult describing a silent cartoon.

(3.1) [the movie] was interesting told like through the eyes of a child . . .
.2) this little kid had a dream about the snowman that he built

.3) and then he showed the snowman how his world works and everything
.4) he taught him all different kinds of things
.5) and the snowman brought him to his world
.6) and showed him you know how they lived and where he came from and everything like that
.7) and it looked like you know he had a lot of fun with the snowman
(74 narrative utterances follow)

This anticipatory statement introduces a thematic character, and in a few utterances (.3–.6), uses summaries of long sequences of events—generalizing over a wide range of contexts—to describe the parallel goals of the thematic and a second primary character. Thus, the passage sets up expectations that the rest of the narration will describe how the summarized events unfold in time, and how the events reflect the characters' attempts to achieve their goals.

The speaker in (3) above makes use of sets of discourse skills to produce these effects. First, she creates *information structure* by ordering the discourse into "units of information on the basis of . . . what [she] is treating as information that is recoverable to the hearer (given) and what [she] is treating as non-recoverable (new)" [21, p. 27]. For example, she introduces the main character with the indefinite referring expression, "a child," in the predicate of the clause, and later refers to this character with the presupposing pronoun "he" in the subject. Second, in the event descriptions that follow, she reports a *temporal sequence* that reflects the order of events in the original film, and finally, she draws *causal connections* between characters' goals ("he showed the snowman how his world works") and their actions in the rest of the narration. In what follows, we refer to these, respectively, as *informational, temporal,* and *logical* coherence. This example shows the production of discourse in a highly developed form, yet it points up discourse skills involved in the production of less coherent narrations as well.

Direct and Indirect Social Influences on Coherence in the Narrations of Nonautistic Children

Studies of spontaneous discourse (summarized in [11]) suggest that there is a range of social influences on the development of coherence. This varies from the highly transparent role of adult prompts, to children's immediate and even delayed reproduction of adult speech, to, in the least transparent case, children's reproduction and elaboration of their own speech. Along a second dimension of variation, reproductions range from parrot-like repetition of individual tokens of speech, to highly elaborated reproductions [8]. These distinctions are illustrated in the following examples.

The first shows a child's immediate reproduction, in dialogue, of a discourse pattern used by her father to list a temporal sequence of events. This is an elaborated reproduction of the father's words.

(4) F: when you wake up we are going to Tanta's first of all
I'll tell you what we're going to do tomorrow
let Daddy explain
when you wake up you say good morning Daddy good morning Mommy
E: good morning Tanta

A less direct social influence, the child's delayed reproduction of adult speech is described and illustrated in a number of earlier studies [8, 9, 11, 22, 23]. It includes the reproduction of discourse patterns that are informationally, temporally, and causally coherent. For example, Emily reproduces her father's use of discourse-bounding devices, such as "you know what we're going to do [when you wake up]" [22], and his use of anaphoric pronouns [8], and she also reproduces similar patterns from the more formal sources of story books and nursery rhymes [8]. In addition, she continues in her solitary speech to reproduce her father's pattern of listing event sequences [19, 24], as in (4). Finally, she reproduces and elaborates on patterns of causal connectors, such as *but, because,* and *so* [23]. These examples show that delayed reproduction includes generalizations that children form from multiple tokens of adult speech, most often, as McCabe and Peterson put it, of "habitual parental interaction" [20].

The last example illustrates the least transparent form of social influence, the reproduction—sometimes exact and sometimes elaborated—of the child's own speech. Similar to the more directly social activity of reproducing the speech of others, it involves *cultural learning* [25]. However in self-reproduction the child carries out functions that are otherwise performed by two people, an adult source and a learner. When the child reproduces her own speech, she looks at her own behavior "as if someone else were looking at it" [25, p. 261].

This is illustrated in Table 1, which shows four successive retellings of an experienced series of events. Across retellings, Emily adds, deletes, and rearranges entire clauses, and the resulting discourse is more coherent than the initial formulation. (In this and other examples, retellings are presented side by side, with descriptions of the same event(s) appearing on the same line.)

This child achieves greater informational coherence by adding the phrase "Tanta house" in (3.2), providing a location against which the remaining events are set. This phrase is merged with a second clause (3.1) in the fourth retelling, forming "when I sleeping Tanta house" in (4.1). As a result, the reported events that follow, "Mommy came, wake my up," are presented as new information, set against information concerning space and time that is presupposed, or background information.

Similarly, greater temporal coherence is achieved by adding new clauses and rearranging old ones. In the first retelling, Emily describes activities that she engaged in with her mother. The last retelling redescribes these events (4.1–4.4), and also contains a segment (4.5–4.8) that refers to the activities of *Mormor* (the

Table 1. Emily's Successive Retellings of a Series of Events

First retelling	Second retelling	Third retelling	Fourth retelling
1.1) my sleep	2.1) when my slep	3.1) yesterday my slept	4.1) when when I sleeping Tanta house
		3.2) and say um and in Tanta house	
	2.2) and and Mormor came		
1.2) Mommy came	2.3) then Mommy coming		4.2) Mommy came
1.3) and Mommy get get up	2.4) then get up	3.3) and Mommy woke my up	4.3) wake my up
1.4) time go home	2.5) time to go home time to go home	3.4) and go time to go home	4.4) because to go home
			4.5) drink p-water
		3.5) and then Mormor came	4.6) and then Mormor came
		3.6) and Mormor said	4.7) and Mormor said
		3.7) time t'go home	
	2.6) drink p-water [Perrier water]	3.8) and Daddy bring p-water	4.8) time to drink p-water

child's grandmother). This segment is added gradually across the retellings: (4.5), (4.6), and (4.8) are added in (2.6) and (2.2); and (4.7) in (3.6). Old clauses are rearranged, as "Mormor came" is moved from the first segment of retelling (2) to the second segment of (3) and (4), and the clausal complement of "to say" in retelling (3) ("and Mormor said time t'go home") is replaced by a different complement in (4) ("and Mormor said time to drink p-water"). As a result of these rearrangements, Emily achieves what is apparently a more appropriate ordering of events.

Finally, the substitution of the causal connector "because" in (4.4) for the additive connector "and" in (3.4) creates a narration with greater logical coherence. This produces a causal link between a character's actions and a state of affairs ("[Mommy] wake my up *because* [time] to go home"), and so establishes the character's motivations for her actions.

Looking across Emily's self-repetitions, she: 1) at first constructs an initial framework; in the two retellings that follow she 2) adds more information; and, in the third and fourth, she 3) rearranges what she has already said. The result is a description of her experiences that is more complete and coherent—informationally, temporally, and logically—than her earlier formulations. These changes result from the *addition, reordering, merging,* and *substitution* of words, expressions, and/or whole utterances.

We now illustrate the range of social influences on the acquisition of coherence in older children's elicited narrations. Our goal in presenting these data is to provide a basis for comparing the elicited narrations of our autistic speaker.

Elicited Narrations of Nonautistic Children

The following examples are from repeated retellings of stories elicited from five-year-old, nonautistic children. The children watched a one-half-hour commercial video, and retold the story to the same adult listener on three different occasions: immediately after viewing the video and then once on each of the following two days. The examples show that, on the first day of the study, the children had difficulty performing the task on their own, and their adult listeners prompted responses with sequences of questions. Across days, however, the children came to rely on their own earlier speech, and so used both their own speech and the speech of others to construct more coherent narratives.

The first example, in Table 2, shows the influence of an adult's prompts on the child's production of a temporal sequence. On Day 1, the mother's questions range from the *general* ("what else?"), presupposing only the sequentiality of events, to the *specific* ("what about when they were in the bedroom?"), referring to particular characters and events. On Day 2, the child produces a series of three consecutive clauses. Each is a reproduction of her own earlier speech originally elicited on the previous day, by her mother's questions.

The first of the child's utterances on Day 2 (C2.2) was elicited on Day 1 by M's general question (M1.1), "what do you think it was about?" The child's second utterance on Day 2 (C2.3) was elicited by M's specific prompt on Day 1 (M1.5), "what about when they were in the bedroom?" The third utterance on Day 2 (C2.4) was prompted by another specific question (M1.9), "who did they see?" This comparison across retellings shows a progression from the mother's prompts to the child's own narrative report. The result is a sequence of reported events with presuppositions of temporal order.

The next example, in Table 3, shows a second child's manipulation of her own speech that results in greater informational and causal coherence. On the third day, parts of utterances on Day 2 are merged to form a single clause with a single inflected verb, "they flied to Santa's house to see the reindeer" (in C3.4). This is formed from "and then they flied" (C2.7) and "and then they showed him a reindeer" (C2.9). The utterance in (C3.4) is informationally more coherent

Table 2. The Influence of an Adult's Prompts on a Five-Year-Old's Production of a Temporal Sequence

Day 1	Day 2
M1.1) ahhh [child's name] we just watched the snowman what do you think it was about?	*M2.1) yesterday [child's name] watched The Snowman the movie and now we want to go back and see how you tell he story again so go ahead [child's name]*
C1.2) it was about when they were flying and umm motorcycle	C2.2) they were flying going on the motorcycle
M1.3) mmhmm what else?	
C1.4) and uhh shh and the one that umm he was putting his the stuff on him nose	
M1.5) mmhmm okay what about when they were in the bedroom?	
C1.6) they were dressing up	C2.3) they were dressing up
M1.7) what else?	
C1.8) dancing	
M1.9) mmm who did they see? (C: what?) *who did they see?*	
C1.10) Santa Claus	C2.4) then they saw Santa Claus

because what was previously made explicit (the viewer of the reindeer) is now treated as highly presupposed and thus deleted. It is logically more coherent because two reported events are linked with a causal connector, "[in order] to." Two of the utterances on Day 2 (C2.8 and 2.9) are themselves reproductions of speech—both the adult's and the child's—on the day before, the adult's question in (A1.48), "what did [Santa] show [the little boy]?," and the child's response in (C1.49), "a bell and his reindeer." Thus the coherent utterance on Day 3 results from a history of discourse manipulation, involving both the speech of an adult and the child's own speech.

Table 3. Informational and Logical Coherence from a Five-Year-Old's Manipulation of Her Own Speech

Day 1	Day 2	Day 3
	C2.7) and then they flied	
A1.47) *did Santa show him anything?* (C shakes head yes)	C2.8) and Santa showed him a bell	
A1.48) *what did he show him?*	C2.9) and then they showed him a reindeer	C3.4) they flied to Santa's house to see the reindeer
C1.49) a bell and his reindeer		C3.5) and they saw the snowman and bells

These passages suggest that children use discourse devices to scaffold the construction of coherent accounts of events (see other examples from older children in [9]). The children use both their own speech and the speech of adults to create temporal sequences of events, to build information structure, and to include causal explanations. The example in Table 3 suggests that some instances of logical coherence depend on the prior production of temporally and informationally coherent pairs of utterances; that is, the purposive construction is created from two earlier clauses that are sequentially ordered, with references to the same character in subject position. This is an example of the developmental progression from temporal to causal connectors that Bruner observed in Emily's speech [10] (see above). It must be emphasized, however, that while individual tokens of speech may be transformed from temporal to causal relationships, older children appear to be at least as likely as younger children to use general connectives, such as "and," in their narratives [26].

With this as background, we return to our central point: if the discourse skills required by these linguistic activities are rooted in social interaction, then a child's lack of participation in early social experiences—a defining characteristic of autism—will result in impaired discourse skills. That is, in the absence of sufficient social interaction, autistic children lack access to the mechanisms of the cultural transmission of narrative skills, and, lacking these skills, they fail to attain the same type of coherent understanding of events.

SOCIAL INFLUENCES ON AN AUTISTIC ADOLESCENT'S PRODUCTION OF COHERENT NARRATIVES

If the lack of linguistic experiences is responsible for the poor narrative performance of autistic children, then it is possible that direct participation in

conversation will promote linguistic performance, and affect the ability of autistic individuals to integrate information. We addressed this question by asking David,[1] an adolescent diagnosed with autistic disorder,[2] to retell stories on successive days, and we arranged for his retellings to be scaffolded by adult participation. We report in detail his retelling of a one-half-hour silent film at age 13;3, then briefly describe his retelling of a second silent cartoon at age 14;10.

Age 13

Our intention, parallel to that of the earlier study of nonautistic children, was to ask David to tell the story three different times. However, he was resistant at first to describing the story in words: he tried to redirect attention to other activities; he fidgeted; and he tried to act out the story. He was prompted at different times by a variety of adults—his parents, a home health aide, and two undergraduate students—and as a result he retold parts of the story many times. In the end, David had narrated this story on four different occasions. One group of retellings took place on the afternoon of Day 1 (Day 1A), another group on the evening of the same day (Day 1E), a third group on Day 2, and a final narration on Day 3. During this time, he made a remarkable shift from a strong reliance on adult prompts to a reliance on self-reproduction, and in the process achieved greater temporal and informational coherence.

David's initial resistance to retelling the story is illustrated in Table 4, with a sample from the start of his first retelling. (The full transcription continues for 985 utterances.) This passage shows that at the start of the study, David was relatively adept at constructing simple clauses, although they varied in grammatical appropriateness (compare "the kids were happy" in line 11 to "the boy fly" in 38). It also shows his reluctance—or perhaps inability—to string together more than two clauses referring to events in the film. However, at a different, social-pragmatic level, he shows a grasp of what it means to tell a story (as in "I don't want to tell the whole story over and over and over"), including the title ("called The Red Balloon" in 9) and the use of conventional discourse-bounding devices ("lived happily ever after" in 12 and "once upon a time" later on Day 1). David also shows an understanding that stories have a beginning, middle, and end (as in his accurate responses in 40 and 42 to the questions, respectively, "Was that the beginning, or the end, or the middle?" and "What happened at the end?").

Table 5 contains the entire transcript from Day 3. It shows that David's retelling on this day was dramatically different from the first. At this time he told the story with little resistance and relative ease. He required little intervention from adults, and provided an account that was relatively coherent with respect to

[1] To preserve confidentiality, this child's name has been changed.
[2] Personal communication with David's psychiatrist.

Table 4. A Segment of David's Retelling, at Age 13, on Day 1A
(M is Mother; F is Father; E is an Undergraduate Student)

E1	*What do you remember?*
D2	I don' know.
E3	*You don't know?*
M4	*David you've got to do better than that.*
F5	*You got to concentrate concentrate.*
E6	*Think about it.*
D7	Nooooo.
E8	*What's the movie about?*
D9	Called The Red Balloon.
E10	*And what happened in The Red Balloon?*
D11-12	The boy (*E:uh huh*) the kids (*E: um*) the kids were happy [unintell] and lived happily ever after.
M13	*Oh you've gotta tell us more than that David.*
E14	*But can you tell me from the beginning? What do you remember from the beginning of the movie?*
. . .	. . .
D22-24	I don't remember. Why don't you tell it? And then I say after you.
E25-27	*I can't. How about the middle of the movie? Remember what happened?*
M28-32	*Dave Dave you have to do better than that because we're we're trying to figure out what kind of words children use. And so you need to help us by telling us something that you remember about the movie.*
F33	*Answer the question Dave.*
M34	*Did you like the movie, Dave?*
E35-37	*Can you narrate it? Can you show me what happened? Can you tell me what happened?*
D38	<David gets off couch, holds both hands together high over head, and jumps each time he says "eye" as though he is holding onto the pack of balloons and flying.> The boy fly-eye-eye-eye
M39	*Was that the beginning or the end or the middle?*
D40	The end.
M41	*And what happened at the end?*
D42	The boy flew.
E43	*The boy flew?*
M44-45	*And how did he fly? How did he fly?*
F46	*How did he get in the air?*
D47	<clasps hands together, stretching arms over head> tight
M48	*By what?*
D49	By balloons.
M50-53	*Oh by holding on tight by balloons oh OK that's what the words were*
...	. . .
M104-106	*Dave I know it's hard to put things in words but you can do this.*

Table 5. A Segment of David's Retelling, at Age 13, on Day 3 (C is an Undergraduate Student)

D1	Can I tell you The Red Balloon . . .
D3	The story goes like this . . .
D8-11	Once upon a time there was a boy climbing up the pole. And the little boy cut the balloon. And then the little boy came down the balloon. And just—Mom I need some help.
M12-15	*What did the boy do when he climbed— He he got the balloon and he climbed down the pole with the balloon? And then where did he go?*
D16-21	He went— he went uh down the pole, and then went to the school bus. And then the school bus took him to school. And the and the balloon followed him. And and then the balloon followed him and back and forth back and forth all the way to school. And then the balloon got, he— and then he got in a closet.
M23-27	*so why why did he get into a closet? What happened? He was in school and he had the balloon. And what happened? . . .*
D32, 35, 38-39	He was in school [with his balloon] . . . Hey Mom, you sit next to my daddy . . . he was in school and then he went in the closet
M41-43	*Why? He didn't go in the closet by himself? What happened?*
D44-61	Uh and then and then he get out of the closet. And then he get out. And then he went to the mirror store. And then he went to the train store. Then he went to the bakery. And then the mirror store. He cannot find the balloon. And then he, and then the balloon got lost in the mirror. And then and then the bakery he ate a donut. And guess what he did? . . . He cannot find that balloon . . . He cannot find it. He lost it. And then then the balloon— then what did the kids do? They stepped on it.
M62	*What where how did the kids get involved with— how did the kids get the balloon?*
D64	By take.
M65-66	*Where did they take it? How did they take it?*
D67-71	They take it up on top of that hill. They st- popped it. And then all the balloons gathered around. And they flew away. That's the end of my story.
M73	*That's a very good telling.*

temporal sequencing and informational structure. In fact, he began by introducing the name of the film, as well as the social act he was about to engage in (in 1 and 3, "I'll tell you The Red Balloon. The story goes like this.") The clauses were still simple, but now were linked with a clausal connector "and then."

What accounts for David's shift to greater coherence within the short time frame of two days? Comparisons across retellings suggest that this relied on the direct and indirect influence of his interactions with adults.[3] On the first and second days, adults made use of frequent, repeated prompts, in the form of questions, commands, and sentence fragments. These called attention to the structure of the story, and to the sequencing of events (such as "We have the beginning now. We need the middle. What else do you remember?" and "Come on Dave, tell us what happened"). In fact, the phrase "(and then) what happened" was used by adults 62 times on Day 1A alone. Frequently David responded to these prompts. (See also [4] and [27] on autistic children's responses to adult prompts.) In addition, like the nonautistic children in our studies, David engaged in the immediate and delayed reproduction of adult discourse, and in the reproduction of his own speech.

To analyze the range of social influences on David's retellings, the transcriptions were segmented into monologic units that could be compared over successive retellings, despite the sometimes persistent interruptions of adults and of David himself (see Tables 6 to 9).[4] An overview of the monologic units shows changes both in the manner with which they were produced, and in their narrative content. These are described in the next two sections.

[3] An "utterance" contains an inflected verb with all its necessary arguments, that are either explicit, or can be inferred. This includes many uses of "yes," "no," and "okay." An utterance is considered: a) a reproduction of adult speech if the last similar utterance was made by an adult speaker, even if David had produced a similar utterance before that; and b) self-reproduction if the last similar utterance was made by the same speaker.

[4] Monologic units contain a minimum of three utterances. A comparison of Tables 5 to 9 illustrates how the units were extracted from the transcripts of the interactions. Utterances were included in a unit if they were produced by David without specific adult prompting, that is, if the prompt did not contain a reference to specific characters or events within the story--unless the prompt was a simple repetition of David's last remark. For example, in M12-15 of Table 5 David's mother asks a question about specific characters, and so David's response in D16-21 was considered to start a new discourse unit. If, however, an adult were to ask "and then what happened," this was considered a general prompt, intended simply to keep the narration going, and David's next utterance would be included within the previous discourse unit. Utterances that followed adult remarks which were requests for clarification, or which did not refer to the film (such as "you have to sit") were also included in the current discourse unit. David's responses to a "why" question were excluded. In evaluating these passages, it is important to consider that many of David's descriptions of events are omitted because they did not fit these criteria. For example, the first mention of an event presented in Tables 6 to 9 may not be the first reference to that event either by David or an adult; instead it may have occurred outside of a discourse unit, as defined here.

Table 6. David's Monologic Units, at Age 13, on Day 1A of Retellings

First retelling	Second retelling	Third retelling	Fourth retelling	Fifth retelling
	1A.397) once upon a time there was a balloon			
	1A.400) and there was a boy named Freddy*		1A.580) there was a little boy	
			1A.582) I don't want to say it [*urging from adults to continue story*]	
			1A.585) once upon a time there was a little boy	
			1A.590) there was a balloon	
			1A.591) that belonged to some man	
			1A.592) then they shared the balloon	
1A.135) I remember was				
1A.136) the boy picked up a bag				
1A.137) and then the boy the boy see the pole	1A.401) Freddy got up the pole			
	1A.402) and Freddy climbed up			
	1A.405) and they say to balloon [unintell]			
	1A.406) you come here balloon			
	1A.411) and then he stayed			

	1A.412) and stayed			
	1A.413) and followed him everywhere yeah			
			1A.593) then I forgot one part	
			1A.594) oh no there were two blue balloon	
			1A.595) two blue balloons who were flying	
				1A.675) he walked up [like this]
	1A.416) and then all the balloons gathered around	1A.471) and then the balloon all the balloons gathered around		
		1A.472) and floated in the air		1A.675) and then after that then [unintell] and then the balloons floated
		1A.473) then he picked them up		
		1A.474) then he floated away		
1A.138) and and that's the end	1A.417) and then once a and then that's the end	1A.475) the end		1A.677) and then he came to an end
				1A.678) and then happily ever after

*"Freddy" does not refer to a character in the film.

Table 7. David's Monologic Units, at Age 13, on Day 1E of Retellings

First retelling	Second retelling	Third retelling	Fourth retelling	Fifth retelling (F as well)
1E.33) the movie was	1E.56) it was about red balloon a red–			
	1E.57) and guess			
	1E.58) what the little boy did			
	1E.59) I'm gonna act it out	1E.179) I just want to pretend		1E.352) I show you
	1E.62) the little boy climbed up	1E.180) I'm the little boy		
	1E.63) got the balloon			
			1E.243) the little boy went a long long time ago [unintell] various places on the roof of the house	1E.353) [the kid was] walking around
			1E.245) he went on the roof to the balloon	
				1E.354) and then walking around
				1E.355) and then the balloon- ok pretend this is a balloon
	1E.64) carried it around everywhere	1E.183) holding the balloon		
	1E.65) and then he he he the balloon followed <u>me</u> everywhere [right here?]	1E.184) and then the balloon followed me everywhere		1E.358) and the balloon followed me everywhere

1E.68) and then guess what?

1E.69) when I get tired

1E.70) I went to the movies

1E.71) I went to the movie store

1E.72) I looked around

1E.75) and then and then guess

1E.76) what I did

1E.77) I lost the balloon

1E.78) (calling balloon) balloon balloon balloon

1E.246) came sudden

1E.247) popped

1E.34) all the balloons gathered around

1E.186) and then he floated

1E.35) then and the boy hanged from the balloons

1E.187) he hanged on tight

1E.188) and then say wheee

1E.36) and [unintell] the air

Table 8. David's Monologic Units, at Age 13, on Day 2 of Retellings (E is Undergraduate Student; Mi is Home Health Aide)

First retelling	Second retelling	Third retelling	Fourth retelling	Fifth retelling	Sixth retelling	Seventh retelling
2.9) the red balloon how it started						
2.10) was all the kids running around running around						
2.11) and then one kid got all upset				2.212) (*video started in mid-utterance*) and the little boy climbed the pole		
		2.86) uh once upon a time there was a boy		2.216) once upon a time there was a boy	2.226) (*video started in mid-utterance*) little boy	
		2.87) and he walked up his steps				
	2.50) I remember					
	2.51) one day the little boy climbed up [unintell]	2.88) then he climbed over				
	2.56) one day a little boy climbed up on a pole	2.89) then he climb up to the pole	2.146) the little boy went up to the pole	2.217) and then he went to (*E: think about it*) to the pole	2.227) once upon a time the little boy climbed up to the pole	

		2.147) and then the- and then the little boy cut the balloon	2.220) and then he got the balloon	2.228) he [got/cut] the balloon
	2.90) then he went to the bus			2.229) he walked with it
				2.230) and then he went to school
	2.92) and he went to the bus	2.148) and then and then the little boy went to get on the bus	2.221) and then he walked to the bus	
2.57) and he followed the bus	2.93) and then he followed the balloon to school		2.222) then the balloon followed the bus	2.231) and then he followed the bus
		2.149) and and then the balloon followed him to school		2.232) and then he– the balloon followed the bus
2.58) he went to school				
2.59) and then the balloon went in and out in and out in and out		2.150) and then he went back and– then he went back and forth and back and forth and this and that		
2.62) and and then he and then he went to school				

Table 8. (Cont'd.)

First retelling	Second retelling	Third retelling	Fourth retelling	Fifth retelling	Sixth retelling	Seventh retelling
		2.94) and today he was gone <3 clause invented story>				
	2.63) and he went to jail for that (*E: for what for what?*)	2.98) and then he went to jail	2.151) and then he he went to the [get in?] jail	2.223) and then the little boy got in the closet	2.233) and then he got in a closet (*Mi: what happened to the balloon while the little boy was in the closet?*)	
	2.65) for the balloon					
	2.66) and then the balloon stayed outside					
	2.67) and then the balloon is his friend right					
	2.70) and then he was [unintell] (*E: he was gone that what you said?*)	2.99) and then that's it	2.152) then he was gone	2.224) and he was gone		2.236) and then he got up
	2.74) yes he was gone					
						2.237)and then he went to the mirror store

2.238) and then he went to the– then he looked around [a little?]

2.239) and then he saw– then he looked for the balloon

2.240) then he went to the train store

2.241) then he looked over there

2.242) and then he went to the bakery

2.243) and then he looked over there

2.245) and then someone took it

2.246) and then all [unintell] stepped on it

2.247) and then all the balloons they they get flay– [making gesture]

2.248) and then [unintell] flied away

2.251) all the balloons gathered around

2.253) and then they [unintell] flied away

Table 9. David's Monologic Units, at Age 13, on Day 3 of Retellings (M is Mother)

First retelling	Second retelling	Third retelling	Fourth retelling
3.1) can I tell you the red balloon			
3.3) the story goes like this			
3.4) I telled my mommy [unintell]			
3.8) once upon a time there was a boy climbing up the pole			
3.9) and the little boy cut the balloon			
3.10) and then the little boy came down the balloon	3.16) he went he went uh down the pole		
	3.17) and then went to the school bus		
	3.18) and then the school bus took him to school		
	3.19) and the and the balloon followed him		
	3.20) and and then the balloon followed him and back and forth back and forth all the way to school		
		3.38) he was in school	

3.21) and then the balloon got– he– and then he got in a closet

3.39) and then he went in the closet

3.44) uh and then and then he get out of the closet

3.45) and then he get out

3.46) and then he went to the mirror store

3.47) and then he went to the train store

3.48) then he went to the bakery

3.49) and then the mirror store

3.50) he cannot find the balloon

3.51) and then he– and then the balloon got lost in the mirror

3.52) and then and then the bakery he ate a donut

3.53) and guess what he did?

3.55) he cannot find that balloon

3.57) he cannot find it

Table 9. (Cont'd.)

First retelling	Second retelling	Third retelling	Fourth retelling
		3.59) he lost it	
		3.60) and then then the balloon– then what did the kids do? (animated)	
		3.61) they stepped on it	
			3.64) (*M: . . . how did the kids get the balloon?*) by take
			3.67) they take it up on top of that hill
			3.68) they st– popped it
			3.69) and then all the balloons gathered around
			3.70) and they flew away
			3.71) that's the end of my story

Overview of Changes in David's Manner of Retelling across Monologic Units

As noted above with respect to the entirety of David's narrations, David's manner of speaking changes dramatically with respect to the monologic units as well. Because of his resistance to retelling the story on Day 1, the promptings by adults constitute their urging to keep the story going. He often tries to act out the events before describing them (see for example 1E.59 in Table 7), and at times uses the first person to refer to the actions of the little boy (as in "the balloon followed me everywhere" in 1E.65, 1E.184, and 1E.358 in Table 7).

On Day 2, the first retelling (Table 8) is somewhat of a turning point. For the first time, David does not act out the story, but sits quietly and appears to be trying to concentrate. He begins by telling the undergraduate, "I thinked about in my head," responding to her request to him on the evening before to "think about it" until tomorrow. Now the adult interruptions do not constitute requests to continue, but rather help, sometimes elicited by David, in maintaining the continuity of the narration. However, he still begins the story from the start after an interruption. The last two retellings on Day 2 represent a second turning point. When David's retelling is interrupted by an adult's question (in 2.233), he continues his narration as if telling a single, connected story (in 2.236). Day 3 (Table 9) follows a similar pattern to the last two retellings on Day 2. After each interruption by an adult or by David himself, he picks up the story and completes his narration.

These changes—from David's reliance on adult prompts to a reliance on his own earlier speech—are reflected in the increased percentage of utterances that occur in the groups of three or more uninterrupted utterances that constitute the monologic units. Table 10 shows that monologic utterances increase from 3% on Day 1A to 49% on Day 3.

Overview of Changes in Content across Monologic Units

A look at the content of the monologic units shows that most changes concern the construction of a temporally coherent sequence of events. This is achieved by

Table 10. Number of Utterances that Occur in Monologic Units on Each Day of David's Narrations, Age 13

	Day 1A	Day 1E	Day 2	Day 3
No. of D's utterances in monologic units	33	37	66	35
Total no. of utterances in interaction	985	424	253	73

building an initial structure, and then adding to and deleting from it. The changes are summarized below.

On Day 1, both the afternoon and evening monologues are concerned for the most part with the first and last scenes in the film. On Day 1A (see Table 6), David creates an *introductory scene* ("I remember was the boy picked up a bag and then the boy the boy see the pole" in 1A.135-7), and then reproduces it, with additions and deletions, in subsequent retellings. For example, in the next retelling he: deletes an utterance ("the boy picked up the bag" in 1A.136), never mentioned again; adds an utterance ("Freddy climbed up" in 1A.402) that is frequently repeated, with modifications, in later retellings; and adds a *closing* scene ("all the balloons gathered around" in 1A.416). In the third retelling he repeats this last utterance and adds to it ("and floated in the air, then he picked them up, then he floated away" in 1A.472-4).

In the next group of monologues (Day 1E; see Table 7), David adds a new scene to his framework. This is an invented scene (*movie store*) that describes events similar to those of the actual film (going to a store, losing and looking for a balloon in 1E.68-78), and that on the next day is transformed to a more accurate reproduction of events in the film (now the *stores* scene; utterances 2.237-43 in Table 8). In the second retelling of Day 2 (Table 8) he adds another, *school* scene (2.57-74) to a reproduction of the *introductory* scene, and then repeats this structure four times (third to sixth retellings). Finally, in the last two retellings on this day he produces the first continuous narration, describing the same scenes (*introductory* and *school*) described in the second to fifth retellings, and after the adult interruption in (2.233) (see above), the reworked *stores* and *closing* scene. The narration on Day 3 is a close reproduction of this last pair of retellings on Day 2, consisting again of the *introductory, school, store,* and *closing* scenes. David has now achieved a temporally coherent account of events in the film, by building a linguistic framework, and reproducing it with additions, deletions, and other modifications.

In the next two sections we show the effect of a range of social influences on David's construction of temporal coherence, and how these contribute to the greater informational coherence that David achieves in the last monologic units on Day 3.

Social Origins of Temporal Coherence in Monologic Units

We illustrate the social origins of David's sequencing by tracking the discourse history of a single pair of utterances in the final retelling:

(5) D (3.17–.18): and then he went to the school *bus* and then the school bus took him to *school*

Table 11 shows the number of times on each day that David used the noun pair *bus* and *school* following different types of linguistic context. The table shows that

Table 11. Frequency Across Days of David's Use of Noun Pair *School / Bus* Following Different Types of Linguistic Context, Age 13

	Day 1A	Day 1E	Day 2	Day 3
D's use of noun pair elicited by adult prompt(s)	1	1		
Last occurrence of predicate pair produced by adult and D			2	
Last occurrence of predicate pair produced by D			2	1

at first David's usage relies on immediate direct prompts, and later appears to occur independently of them.

The adult prompts used on Day 1A to elicit this noun pair appear in (6):

(6) M (1A.307-8): . . . he was on his way to where? he was on his way to
D (1A.314): school
M (1A.321): okay he was on his way to school and how did he get to school?
D (1A.324): by bus

On this same day, a second adult used the noun pair in a purposive construction, thus carrying presuppositions of a causal and temporal relationship between events.

(7) E (1A.329-30): and what happened after he was on the bus to go to school?

On Days 2 and 3, David uses the noun pair in adjacent utterances five times in the absence of adult prompts. Similar to the speech of nonautistic children (see five-year-olds in Tables 2 and 3), the form of David's language is influenced by adult speech in the non-immediate past. Some examples are (near) exact replicas of the mother's speech on the day before (1A). For example, in Table 12 "and he went to the bus" (2.92) is an exact imitation of the mother's speech "when . . . he went to the bus, what did the bus driver tell him?" (1A.265); ". . . and then the little boy went to get on the bus" (2.148) reproduces his mother's "he went to get on the bus" (1A.850); and "the school bus took him to school" (3.18) is a close reproduction of the mother's question, "did the bus take him to school?" (1A.863).

Table 12. David's Spontaneous Uses of the Noun Pair *Bus* and *School*, Age 13

Day 2 (.57-8)	Day 2 (.92-3)	Day 2 (.148-9)	Day 2 (.230-2)	Day 3 (.17-8)
and he followed the bus	and he went to the bus	. . . and then the little boy went to get on the bus	and then he went to school	and then went to the school bus
he went to school	and then he followed the balloon to school	. . . and then the balloon . . . followed him to school	and then he followed the bus	and then the school bus took him to school
			and then he the balloon followed the bus	

Social Origins of Informational Coherence in Monologic Units

The development of informational coherence also relies on a range of social influences. We illustrate this point by tracking the discourse history of a second utterance on Day 3, occurring two clauses after the example in (5).

(8) D (3.20): and and then the balloon followed him and back and forth back and forth all the way to school

Table 13 shows that this results from a merging of two of David's own earlier utterances—"and then the balloon . . . followed him to school" (2.149), and "and then he went back and forth and back and forth and . . . this and that" (2.150). The first is split into two parts, "and then the balloon followed him" and "to school," and a part of the second, "and back and forth back and forth," is inserted between the two. These linguistic manipulations create greater informational coherence because information that was earlier made explicit ("then he went" in 2.150) is now presupposed, and surface references to it are entirely omitted. (Compare with the example from a nonautistic child in Table 3, as well as examples from older children in Levy [9]). Notice that (2.149) is itself a (more accurate) transformation of utterance (2.93). This in turn is composed of parts of earlier, simpler utterances, (2.57) and (2.58). In fact, every utterance in this table is a transformation of earlier speech, going back in part to the introduction of the nouns *school* and *bus* in response to the mother's prompts in (6). Thus the merging of clauses on Day 3 can be traced to adult influences on the temporal sequencing of events, and this, along with David's self-reproductions, may account for the emergence of informational coherence.

Table 13. Discourse History of David's Utterance, Age 13, on Day 3, "the balloon followed him and back and forth back and forth all the way to school"

Day 2 (.57-9)	Day 2 (.93)	Day 2 (.149-50)	Day 3 (.20)
and he followed the bus	and then he followed the balloon to school	and and then the balloon balloon followed him to school	and and then the balloon followed him and back and forth back and forth all the way to school
he went to school			
and then the balloon went in and out in and out in and out		and then he went back and then he went back and forth and back and forth and and this and that	

Summary and Discussion

The comparisons across David's monologic units indicate that he, like nonautistic children, creates temporal and informational coherence by building an initial structure, adding to it on the basis of direct and indirect adult influences, and rearranging his own speech. He thus uses linguistic forms "to achieve more linear and tighter sequencing in [his] account of 'what happened'" [10, p. 20]. It appears that a range of social devices—adult prompts, the reproduction of adult speech, and self-reproduction—guide this progression.

However, David does not provide explanations for events in his monologues, except for several uses of the mental state verb *want* in reference to himself, as in "I just want to pretend I'm the little boy" in (1E.179-80). Unlike Emily in her crib talk and the nonautistic children in the study reported above, David uses neutral and temporal but not causal connectors to link his monologic speech. This finding is similar to one reported by Bruner and Feldman [4]. In a study of the narrations of autistic adolescents, they found that autistic children had difficulty with causal connectors such as *next, while, because,* and *so.* For example, nonautistic children produced constructions that combined propositions into a single clausal construction, as in "He's watering the seeds to make his garden grow," yet autistic children produced simpler sequences of single-clause utterances, such as "A boy planting seeds. He made the flowers."

In David's case, it is surprising that he does not use causal connectors in his monologues, because he does use them to produce answers to adults' questions, as illustrated in (9) and (10).

(9) M (1A.347-8): why did the man lock him up? do you know?
D (1A.349): because he was not supposed to to take the balloon to school.

(10) H (1E.302): the little kid went to jail? for what?
D (1E.303): for to get his way

He also appears to understand adults' uses of the purposive construction.

(11) M (1A.517): what did a kid do to get it out of air, one of the kids?
D (1A.518): he shot a gun

(12) H (1E.248-9): I thought the little boy stepped on the balloon to make it pop
D (1E.250-2): no he did it self he didn't pop it and he the other little kid popped the balloon

The absence of causal explanations in David's monologues is highlighted in his last retelling. When pressed by his mother to give an explanation of the same event that he had explained on an earlier day (in 9 and 10 above), he ignores her request.

(13) D (3.38-9): he was in school and then he went in the closet
M (3.40-2): no, why? he didn't go in the closet by himself? what happened?
D (3.44): uh and then and then he got out of the closet.

Taken together, these instances suggest that David grasps the appropriate use of causal connectors, but does not use them in his monologic speech.

This finding is similar to a second finding reported by Bruner and Feldman [4]. In a separate study of the narrations of autistic adolescents, they found that narrators who did not describe the motivations of characters in their stories did in fact do so when questioned about them. In dialogue, the narrators even showed an understanding of trickery and deceit. The authors conjecture that the discrepant results are due to the fact that, in dialogue, speakers were prompted by adults who themselves supplied a narrative framework. In their responses to the adult prompts, the autistic speakers made use of the text and questions that were provided by the adults. In other words, the events were already "narrationally encoded" [4, p. 283] by the adult participants.

The implications for David are that, in dialogue, he makes use of adult scaffolding to link events recalled from the film (in 6), and to draw inferences based on his own experiences and on knowledge of the film and of social norms and conventions (in 11 and 12 above). He, like the narrators in Bruner and Feldman's study [4], however, does not provide his own scaffolding for these activities.

One-and-one-half years later, in contrast, David creates his own explanations for characters' actions. We report this in the next section.

Follow-Up at Age 14

At this time, David retold a different story on three successive days. In general he now retold the story with greater ease than he had in the previous study. Not surprisingly, he continued to produce causal answers in response to causal questions. Different from the earlier study, however, he now created logical coherence in his monologic speech. First, he repeatedly tied an action to a mental state with the verb *want,* in this way explaining the actions of the main character. This was based at times on transformations of his own earlier speech, as in the change from "he flew" in an earlier retelling to "he wanted to go . . . flying" in a later one, and from "he went in the kitchen" to "wanted to go in the kitchen."

Second, without immediate prompting he produced an explanation, "he was too bright of his eyes," for a character's actions, "then he went to the kitchen." Although this was originally prompted by adult questions, and arrived at through an inference based on an answer to another adult question, the example is of interest because, unlike the previous study, a causal explanation derived from dialogue now transferred to David's monologue. Finally, David produced a motivation for a character's actions by merging two earlier clauses (in 14a) with a purposive construction (in 14b).

(14a) they went to the kitchen and put all different kinds of fruits on their noses
b) the snowman went to the kitchen to try on different noses

As with the nonautistic child in Table 3, the later clause was preceded by a temporally and informationally coherent pair of utterances, ordered in time and with the most presupposing referring expression, a zero, in the subject of the second clause. This example illustrates David's construction of an explanation in the absence of adult scaffolding.

Summary and Discussion

At age 14, David created logical coherence in his monologues. When he provided explanations for characters' actions, he described simple motivations. Some explanations were co-constructed with an adult interlocutor, and some were produced spontaneously on his own, as he modified his earlier speech. In the last example (14), he produced a non-elicited purposive construction, preceded in his earlier retellings by a pair of temporally and informationally coherent utterances.

It might be argued that, in his early retellings, David lacked only the means to express causal relationships. However, his participation in dialogue suggests that he did in fact grasp the use of causal connectives at this time, and thus that something else accounted for the absence of these terms in monologue. Consistent with Bruner and Feldman's view [4], we suggest that David lacked at first a linguistic framework that "allow[ed] of propositional inference" [28], and he also lacked practice using discourse devices, such as causal connectors, as a tool to

shape the inferences. In his later retellings, he created his own linguistic framework, and used it along with discourse devices to produce logical coherence. In Bruner and Feldman's terms [4], David now produced his own "narrational encoding." This consisted of sequences of utterances that were temporally and informationally coherent, and that were available to be used as a springboard for the drawing of inferences.

This finding has implications for the often-noted difficulty of autistic children in attributing intentions to others. We turn to these in the next section.

NARRATIVE COHERENCE AND THEORY OF MIND

Nelson et al. [18] and others [7, 27, 29, 30] have argued that the attribution of intentions by nonautistic children—their "theory of mind"—is influenced by language practice, especially by the narrative discourse of adults and the children themselves. The examples we have given support this view. The children in our studies use discourse devices to scaffold the construction of coherent accounts of events, including the attribution of intentions. The examples suggest that the ability to infer intentions relies, in part, on the creation of logical coherence, and this in turn rests on the production of a temporally and informationally coherent account. The present examples concerned simple motivations, yet they raise the possibility that the articulation of complex motivations depends, to an even greater extent, on prior descriptions of sequences of events.

An implication for autistic children is that difficulties in pulling information together arises, in part, from problems with the narrative mode of discourse. That is, if the discourse skills required to "make sense" of events come from early social interaction, and autistic children lack full access to these experiences, then they lack the means to create coherent discourse, and thus to infer motivations for sequences of actions.

Bruner and Feldman present a similar argument [4]. They claim that the apparent theory of mind deficit in autistic children stems, at least in part, from the failure of autistic children "to represent . . . human action and interaction by the vehicle of narrative encoding" [4, p. 267]; that they are "unable or unwilling to tell stories to themselves or to others" [4, p. 274]. We propose that the autistic adolescent described in the present study was both unable and unwilling to tell stories at first, and we conjecture that this was because he lacked many of the prior experiences with discourse that most nonautistic children engage in, due in turn to weak social and linguistic skills. As he gained experience with discourse, he encoded events in narrative form, and used his earlier speech to infer the motivations of characters.

An example from a second autistic adolescent supports the findings of the present study. Loveland and Tunali present a narrative from a high-functioning autistic adolescent (A) who has viewed a videotaped skit and retells the story to his mother (M), who has not seen the skit [27]. The story concerns a thief

who tries to steal money from an office, but is driven off by a secretary with an umbrella. The example shows that A has difficulty understanding the secretary's motivations for her actions (why she hits the thief with an umbrella), yet he is concerned with uncovering her motivations, and is persistent in questioning his mother about them. At the beginning of his retelling, he describes two events in a temporal sequence, and asks his mother to explain the causal relationship between them.

(15) I saw that there was a kid stealing someone else's wallet, and they she [the secretary] had an umbrella
Why do you have to hit an umbrella you take the money?

A's mother does not understand the question, and prompts him for more information. As a result, he redescribes the events several times, first as "the robber was taking the money," and second as "she had to hit into a kid a thief." After his mother's final prompt (in 16), A articulates an explanation.

(16) A: why did they [the secretary] have to hit him [the thief]?
M: why do you think?
A: so someone won't take the money away

As in the examples from David, this passage shows that the articulation of cause-and-effect is preceded by a listing of events in temporal sequence. The history of A's utterances suggests that his articulation of motivations is scaffolded by an adult's prompts and by A's own earlier speech. Parallel to the argument made by Nelson et al. [18] and others for nonautistic children (see above), it appears that A uses his own narrative encoding to infer motivations.

In summary, just as Emily appeared to get the meaning of what happened from "circling around"—describing and redescribing—events, so too may A and David have achieved an interpretation of events from their own linguistic manipulations, scaffolded to varying degrees by adult sources. Like Jakobson's observations that language play serves as language practice for nonautistic children [31], David and A repeat and transform their own speech, and they appear to use it to construct a greater understanding of the events they observe. One can predict that, were they to continue to describe and redescribe stories about social actions, they would begin to construct explanations that involve more complex motivations.

We conjecture that other autistic children might use the same mechanisms, were they, like nonautistic children to engage in practice with language. (See complementary findings from Gray's [32] work with "social stories," to help children and adults with autism infer characters' motivations and beliefs.) The same may hold for other children with linguistic impairments, such as nonverbal learning disability, sensory integration disorders, and even ADHD.[5]

[5] We are grateful to a reviewer for bringing this to our attention.

CONCLUSIONS

If children require linguistic experience to achieve narrative coherence, and language is developmentally impaired, then coherence will not develop normally. Nor, in the present view, will a theory of mind develop beyond the description of motivations based on direct experience [7, 27].

The same holds true for the difficulties in discourse comprehension illustrated by the Joliffe and Baron-Cohen studies in the first examples above [2]. That is, the ability of nonautistic children to draw bridging inferences arises from their earlier participation in related social experiences. In examples (1) and (2), a child comes to understand the relationship between the size of a tip left in a restaurant and the quality of the service by living through a similar experience—and, most likely, by overhearing or engaging in conversation about it. In the absence of these experiences (or the inability to attend to them), the pragmatic, experiential basis for drawing inferences is missing, as is the basis for the linguistic construction of discourse coherence.

This is a theory of cascading effects, similar in some respects to those of Bruner and Feldman [4], Waterhouse, Fein, and Modahl [5], de Villiers [6], and Loveland [7]. Our explanation for the autistic child's fragmented understanding of social events stands in contrast to the explanation that autistic children lack a high-level cohesive force that drives the construction of the coherent patterns exhibited by typical children [1] (see also [2]). A central difference between the two accounts is that the present one emphasizes the grounding in a social world of those who achieve coherence, and proposes that it is the social world, via linguistic experience, that influences their perception of it. On this account, sensory and linguistic functions create cascading effects, whose outcome is an ability to construct stories about human motivations. As Nelson et al. puts it, "we need a theory of how people construct their explanatory narratives. . . . Our science of people's interpretations will then provide general descriptions based on principles of constructing a coherent explanatory narrative" [18].

Within the mainstream literature in cognitive psychology, autistic children have been described as lacking the cognitive prerequisites for achieving coherence and for inferring the intentions of others. Before reaching this conclusion, however, it is worth looking at what autistic children can do—the extent to which they behave like more typical children—and examining how the similarities in their behavior can be used to their advantage. This is a research strategy in which the first, most important question is how autistic behavior is like typical behavior, then the similarities in behavior are used to try to understand the differences.

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