

The role of language and communication impairments within autism

Morton Ann Gernsbacher, Heather M. Geye and Susan Ellis Weismer

Delays in language development and impairments in communication ability constitute a defining feature of autism. However, these language and communication impairments can be quite varied, even in classic Autistic Disorder. By current diagnostic definition (ICD-10, World Health Organization 1993; DSM-IV, American Psychiatric Association 1994), these impairments can range from a delay in the development of expressive language to a total lack of expressive language, from problems with initiating or sustaining a conversation to use of stereotyped, repetitive, and idiosyncratic language. In this chapter we first describe the historical interpretation of the basis for the language and communication impairments in autism, beginning with Kanner's (1943) description of his 11 seminal patients and continuing through the 1990s. We then identify an emerging view of the role of language and communication impairments within autism, namely that they overlap, perhaps considerably, with the language and communication impairments observed outside of autism. We then review numerous empirical studies that have demonstrated this overlap. We conclude by offering recommendations for further, necessary empirical investigations and the theoretical implications of those investigations.

1. History of language/communication impairments in autism: Kanner's 11 patients

Communication impairments have been among the defining features of autism since Kanner (1943) first described his eleven seminal patients. The first child, Donald T., arrived at the Harriet Lane Home when he was 5 years, 1 month of age. Before the age of 2, Donald could recite "short poems and even learned the Twenty-third Psalm and twenty-five questions and answers of the Presbyterian Catechism" (Kanner 1943/ reprinted 1985: 11). However, his parents were concerned because "he was not learning to ask questions or to answer questions" (p. 11). During his two-week evaluation, Donald frequently engaged in "verbal rituals" (p. 13) using delayed echolalia by repeating phrases and questions his mother had asked him previously. As an example, when he wanted to get up after his nap, he would ask his mother to say "Don, do you want to get down?" and his mother would repeat the question to him verbatim. Donald would then tell his mother to say "All right" at which point Donald would be able to get up from his nap (p. 13). If his mother did not play her role in these verbal rituals, Donald would throw a temper tantrum. Donald believed in literal, inflexible meanings to words and "he seemed unable to generalize, to transfer an expression to another similar object or situation" (p. 14). By the age of 6;6, 1 his mother reported that "he talks very much more and asks a good many questions. Not often does he voluntarily tell me of happenings at school, but if I ask leading questions, he answers them correctly" (p. 16).

The mother of the second child, Frederick W., reported that "he had said at least two words ('daddy' and 'Dora') before he was 2 years old. From then on, between 2 and 3 years, he would say words that seemed to come as a surprise to himself. He'd say them once and then never repeat them" (p. 18). When Frederick was 4 years old, his mother tried to make him use words to ask for something he wanted or she would not give him the desired object, but he refused to comply. His mother also reported that he had great difficulty with the correct use of personal

pronouns. Frederick was seen at the Harriet Lane Home when he was 6 years old. At that time, "when he responded to questions or commands at all, he did so by repeating them echolalia fashion" (p. 19).

Richard M. was brought to Johns Hopkins Hospital at 3;3 because his parents suspected that he was deaf as he did not talk or respond to questions. The intern who admitted Richard observed that "it is difficult to tell definitely whether he hears, but it seems that he does" as he obeyed commands "even when he does not see the speaker and he does not pay attention to conversation going on around him" (p. 20). During his evaluation, he "uttered short staccato forceful sounds- 'Ee! Ee! Ee!' He complied with a spoken and gestural command of his mother to take off his slippers" (p. 21). However, when she asked him a different command without gesture accompanying her speech, he again took off his slippers. At two subsequent visits to Johns Hopkins before his fifth birthday, he failed to display any expressive language gains. By the time Paul G., the fourth child, was 3 years old, he could recite "not less than thirty-seven songs and various sundry nursery rhymes" (p. 22). During his evaluation, when he was 5 years old, he played with a toy telephone, "singing again and again, 'he wants the telephone'" (p. 23) and while using a pair of scissors to cut a piece of paper into small pieces, he sang over and over, "cutting paper" (p. 23). Paul also engaged in many instances of delayed echolalia, repeating sentences he had heard before, such as "Did you hurt your leg?", "You'll fall off the bicycle and bump your head", and "Don't throw the dog off the balcony" (p. 23). However, while Paul had a large vocabulary and used language frequently, he did not use language as a means to communicate with others. Additionally, like Frederick, he had great difficulty with the correct use of personal pronouns. His mother reported that he had never referred to himself with the first person pronoun. For example, when he wanted candy, he would say, "You want candy."

The prominent psychiatrist father of child five, Barbara K., described his 8-year-old daughter as having had "ordinary vocabulary at 2 years, but always slow at putting words into sentences," having "difficulty with verbal expression, "and repeating phrases (Kanner 1943: 25). The father reported that the child had previously shown difficulty with the correct use of personal pronouns. During her evaluation when she was 8;3, Barbara was able to comment on a pen on the desk ("Pen like yours at home") and ask for a pencil ("May I take this home?"). She frequently interrupted other conversations and interjected her own irrelevant information (such as "I saw motor transports" and "I saw piggy-back when I went to school").

Child six, Virginia S., like Richard, was at one time suspected to be deaf. However, a psychologist at the state training school for the feeble-minded (where Virginia had been a resident since she was 5 years old), observed that just before her 7th birthday, Virginia could respond to sounds, including her name being called. The psychologist reported that "she pays no attention to what is said to her, but quickly comprehends whatever is expected" (p. 27). Some of the other children she roomed with at the state training school reported that when Virginia was 8;9, she was able to produce some single words, including "chocolate," "marshmallow," "mama," and "baby." During an evaluation when Virginia was 11 years old, she occasionally answered "mamma, baby" in response to questions directed at her.

Herbert B., child seven, was also at one time suspected to be deaf because he appeared to pay little attention when others spoke to him and he appeared to make little attempt to speak. According to his physician mother at the time of his referral at 3;2, he had always been quiet. He returned to the clinic two more times (at ages 4;7 and 5;2). Herbert still did not speak, nor did he respond to any speech addressed to him during either of those visits. However, he occasionally produced "inarticulate sounds in a monotonous singsong manner" (p. 30).

Alfred L., the eighth child, was seen at the clinic for the first time at 3;6. At that time, his clinical psychologist mother reported that "language developed slowly; he seemed to have no interest in it. He seldom tells experience. He still confuses pronouns. He never asks questions in the form of questions (with appropriate inflection). Since he talked, there has been a tendency to repeat over and over one word or statement. He almost never says a sentence without repeating it" (p. 30). By the age of 9 years, 1 month, his language was grammatically correct, but included many obsessive questions regarding his current topic of interest (darkness and light). When asked to define words such as balloon and tiger, he was "painstakingly specific in his definitions" (p. 32), yet he was "often confused about the meaning of words" (p. 33).

The mother of child nine, Charles N., described his language at 4;6 as nothing more than a repetition of what had been said to him. Additionally, he did not use personal pronouns correctly, always using the third person rather than the first person when talking about himself. His mother said that he had a good vocabulary, but that he "never initiates conversation, and conversation is limited, extensive only as far as objects go" (p. 34), and Kanner noted that "he never used language as a means of communicating with people" (p. 35).

At the time that, John F., the tenth child, was seen at the clinic for the first time at 2;4, his vocabulary was rather limited. Three months later, his vocabulary "showed remarkable improvement, though his articulation was defective" (p. 36). By the end of his fourth year, "he was capable of forming elaborate and grammatically correct sentences," (p. 36) but his language was full of many examples of both immediate and delayed echolalia. Additionally at this age, he did not use personal pronouns correctly. Unlike Charles (who used the third person personal pronoun), John used the second person personal pronoun when referring to himself. He began using pronouns correctly at 4;6, and by 5;6, "he had a good mastery of the use of pronouns" (p. 37).

The final child, Elaine C., was 7;2 when she was first seen at the clinic. Her parents reported that "she could say four words at the end of her first year, but made no progress in linguistic development for the following four years" (p.38). Like several of the other children, deafness was suspected and subsequently ruled out. When she finally began to speak at 5 years of age, she started out with "complete though simple sentences" (p. 38). A Boston psychologist who examined Elaine when she was 7 years old stated that she could name a wide variety of objects, but that she "rarely answered a direct question" (p. 39). The psychologist also noted her tendency to repeat contextually irrelevant phrases over and over again, which quite possibly was a display of delayed echolalia. Elaine was observed for three weeks at the Child Study Home of Maryland when she was 7;2. During her evaluation, the doctors noted that her speech was rarely communicative, that her grammar was inflexible, and that she repeated sentences just as she heard them (e.g., she repeated "Want me to draw a spider" rather than saying "I want you to draw a spider," p. 40).

Thus, all of Kanner's (1943) eleven patients exhibited communication impairments, although the impairments varied widely. Over half the children exhibited delayed early language development, and three of the children never developed fluent spoken language. Parents of four of the children reported that at one time they suspected that their child was deaf. Of the eight children who could speak, nearly all displayed examples of immediate or delayed echolalia and impairments in their use of personal pronouns, and several were reported to not use language as a means of communication. Additionally, several of the children displayed literalness in the meanings of their words, and a couple used verbal rituals in their daily conversations.

2. History of the role of language/communication impairments in autism: 1970-1990

Kanner did not attribute the language and communication impairments he observed in his patients to psycholinguistic origins; rather, Kanner viewed these impairments solely as manifestations of the children's social or emotional impairments. Twenty-five years later, the tide turned. In the 1970s, the language and communication impairments found within autism were not only presumed to be psycholinguistic in origin, they were believed to be identical to the language and communication impairments found outside of autism, differing only in their severity. For example, Churchill (1972, as quoted in Bishop 1989: 113) proposed that "there was no qualitative distinction between 'developmental aphasia' and autism, and that they differed only in degree." Wing (1976, as quoted in Bishop 1989: 114) predicted that "if children... could be arranged in an orderly series, starting from the most autistic child at one end and extending to the child who most clearly had nothing but a developmental receptive speech disorder at the other, to say where the dividing line should be drawn would need the judgment of Solomon."

Rutter's early work similarly claimed that some of the communication impairments found in autistic disorder were "almost synonymous with childhood dysphasia." In one study, Bartak, Rutter and Cox (1975) examined 42 children with severe developmental receptive language disorder, 19 of whom were diagnosed with autism (mean age = 7;0), and 23 were diagnosed with developmental language disorder (impaired comprehension and production) without autistic features and referred to as dysphasic (mean age = 8;2). All the children had nonverbal IQs of at least 70. The children's expressive language was measured by the Reynell Developmental Language Scales (Reynell 1969) and through a sample of spontaneous speech from a free play session with the examiner. No significant differences were found in the mean length of utterance between the two groups or in the grammatical complexity of their speech. While both groups showed developmental delay in the production of single words (58% for the autistic group and 65% for the dysphasic group) and phrase speech (89% for the autistic group and 83% for the dysphasic group), the groups did not differ significantly from each other. The groups also did not differ significantly in the production of abnormal or diminished babble as toddlers (42% for the autistic group and 65% for the dysphasic group). Finally, there was no difference between the groups on family history of speech disorder (26% for the autistic group and 26% for the dysphasic group).

Moreover, those children whom Rutter identified in the late 1970s as only language impaired exhibited 20 years later strong autistic behaviors in adulthood (Howlin, Mawhood, & Rutter 2000). In a follow-up study, conducted when the participants were in their early to mid-twenties, the autism group continued to show impairments in stereotyped behavior patterns, social functioning, social relationships, jobs, and independence (Howlin et al. 2000). However, the language impaired group (known previously as the dysphasic group) also displayed impairments in all of these areas. Over half (55%) of the language impaired group were rated as having "intermediate" levels of problem behavior on the Vineland Maladaptive Behavior Domain, and less than half obtained "adequate" scores in any of the three sub-domains on the Vineland Socialization Domain. Additionally, well over half of the language impaired group experienced challenges in establishing spontaneous reciprocal social relationships, over a third had no friends, and two thirds had never had a close sexual relationship. While general ratings of friendship had remained unchanged over time in the autism group, they had deteriorated in over two thirds of the language impaired group. Many of the participants in the language impaired group still lived with their parents, and few had permanent jobs.

The 1980s witnessed the widespread assumption that the sole, or at least primary deficits of communication in autism were pragmatic in nature (Paul & Cohen 1984, 1985; Lord, Ruller, Goode, Heemsbergen, Jordan, Mawhood, & Schopler 1989). For example, Paul and Cohen (1984) compared eight individuals with autism (mean age = 22.3 years) with eight IQ-matched adults with mental retardation (mean age = 29.5 years). The autism group was significantly inferior to the mental retardation group in the understanding of figurative and comparative

language (as measured by the Clinical Evaluation of Language Functions; CELF). When assessed for their request-for-clarification abilities (e.g., Speaker 1 states "I watched *Dynasty* last night" followed by speaker 2 asking "You watched what?"), the participants with autism responded to the contingent queries an average of 93% of the time; however, they were less likely than the mental retardation group to supply the specific constituent requested. Rather, they tended to repeat or revise their utterance "as if they were unable to identify from the query which piece of information needed clarification" (Paul & Cohen 1984; 356). The authors concluded that the deficits in contingent queries displayed by the autism group were due to impairments in "the ability to make the social judgments that dictates the choice of linguistic form in discourse (p. 356).

Using almost the same participant sample, Paul and Cohen (1985) compared the comprehension of 20 indirect requests, each with varying syntactic complexity, by the group of eight adults with autism (mean age = 22.3 years) and the eight IQ-matched adults with mental retardation (mean age = 27.9). In a structured condition the experimenter directly prefaced requests ("I'm going to ask you to color some circles; color them either red or blue according to what I say"), whereas in the pragmatic condition the experimenter made indirect requests during the middle of a conversation. While the performance of the group with mental retardation remained constant across conditions, the performance of the group with autism was significantly better in the structured condition than the pragmatic condition. Paul and Cohen concluded that explicit cues were necessary in order for the autism group to comprehend the speaker's intention.

Lord et al. (1989) examined the reliability of the Autism Diagnostic Observation Schedule (ADOS), a semi-structured, standardized protocol for the observation of social and communicative behavior associated with autism. They compared four groups of 20 children: autistic/mildly retarded (mean age = 13;0), autistic/non-retarded (mean age = 13;0), mentally handicapped (mean age = 13;0), and typically developing (mean age = 12;11). Of the 30 items (including 11 items of social interactions, 10 items of communication/language, 3 items of restricted/stereotyped behavior, and 6 mood/nonspecific abnormal behaviors), only two communication/language items - idiosyncratic language and inappropriate questions and statements - significantly differentiated the two autism groups from the two non-autism groups. Both of these communication/ language items are highly pragmatic in nature, providing support for the argument that communication impairments in autism were pragmatic in nature. Indeed, the assumption that deficits of communication in autism were primarily pragmatic in nature was held so strongly during the 1980s that in one study children with autism's omission of the regular past tense and present progressive (compared with their relatively intact usage of the regular third-person and possessive) was interpreted as a sign of pragmatic impairment (Bartolucci, Pierce, & Streiner 1980).

The 1990s continued to embrace the assumption that the primary deficits of communication in autism were pragmatic and went further to attribute the pragmatic deficits to challenges in social-cognition. An example of one of the social-cognitive explanations was the theory of mind hypothesis (Tager-Flusberg 1999). Theory of mind refers to "the ability to attribute mental states, such as desire, knowledge, and belief, to oneself and other people as a means of explaining behavior" (Tager-Flusberg 1999: 326). By 4 years of age, typically developing children are assumed to understand that others may hold beliefs that conflict with reality, known as false beliefs. The conventional test for theory of mind is the false belief test, in which the child is told a story about Sally and Anne. Sally places a marble in a basket and then leaves the room, leaving the marble in the basket. Anne, who is still in the room, then takes the marble from the basket and places it in a box. The child is then asked to predict where Sally will look for the marble when she returns to the room. To answer correctly, the child must disregard his/her knowledge of the actual location of the marble because Sally does not have this information. In several early

studies, autistic children were more likely to fail a false belief test than were mental age matched controls. This poorer performance on the false belief test was taken as strong evidence that autistic children were specifically impaired in their ability to interpret human behavior within a "mentalistic framework" (Tager-Flusberg 1999: 326).

However, it has now been demonstrated that linguistic sophistication underlies success on theory of mind tasks. Steele, Joseph and Tager-Flusberg (2003) utilized a longitudinal approach to examine the developmental trajectory of theory of mind abilities in 57 children with autism (mean age = 92 months). Receptive vocabulary, assessed with the Peabody Picture Vocabulary Test (PPVT), and expressive vocabulary, assessed using the Expressive Vocabulary Test (EVT; Williams 1997) were assessed at an initial visit and at follow-up one *year* later. Additionally, ten theory of mind tasks, ranging from early (e.g., desire) to advanced (e.g., moral judgment), were administered to all participants. Scores on the PPVT, EVT, and the theory of mind tasks improved significantly between the initial testing and the one-year follow-up. Vocabulary at the initial assessment was significantly correlated with theory of mind scores at the initial assessment ($r = 0.85, p < .01$) and with theory of mind scores at follow-up ($r = 0.87, p < .01$). The authors, therefore suggested that "language plays a causal role in the development of theory of mind abilities in both normally developing children and children with autism" (p. 465).

Similarly, Happé (1995) reported age-independent correlations between theory of mind scores and scores on the British Peabody Vocabulary Test (BPVS, Dunn, Dunn, Whetton, & Pintilie 1982), and Eisenmajer and Prior (1991) found that both verbal mental age and pragmatic ability were superior among children with autism who passed theory of mind tasks. Tager-Flusberg and Sullivan (1994) also found that PPVT scores correlated with theory of mind performance in children with autism; however, in their study, a stronger correlation with theory of mind tests was found for a sentence comprehension measure of syntactic knowledge (the Sentence Structure subtest on the Clinical Evaluation of Language Fundamentals, CELF, Semel, Wiig, & Secord 1987). More recently, Tager-Flusberg has suggested that acquisition of sentential complements is a core predictor of which children with autism will pass theory of mind tests (Tager-Flusberg 1997, 2000). Tager-Flusberg and Joseph (in press) examined 51 children with autism who were between the ages of 5;4 and 14;2 at the start of a two-year longitudinal study. IPSyn scores, a measure of general syntactic and morphological development (Index of Productive Syntax; Scarborough 1990), explained a significant amount of the variance in Year 2 theory of mind score, especially in the analyses of the concurrent predictors of theory of mind. Specific knowledge of sentential complements accounted for significant additional variance in predicting both concurrent and longitudinal performance on theory of mind tasks.

While some researchers in the 1990s were attributing the pragmatic deficits observed in autism to a lack of a theory of mind, others were attributing them to other social-cognitive constructs. For example, Mundy, Sigman and Kasari (1990), attributed the pragmatic deficits to a deficit or delay in joint attention. In one study, fifteen autistic children (mean age = 45 months) were matched with 15 children on mental age (mean age = 29 months), and 15 children on language age (mean age = 25 months). Nonverbal communication skills were assessed twice (initially and at follow-up 13 months later) with an abridged form of the Early Social-Communication Scales (ESCS; Seibert, Hogan, & Mundy 1982), which examines the social behavior, joint attention, and requesting behavior of children. The autistic children displayed fewer joint attention behaviors than both of the comparison groups. Language development was assessed initially and then at follow-up 13 months later using the Reynell Developmental Language Scales. ESCS scores from the first testing session were correlated with the Reynell language age estimates from the follow-up testing. Joint attention was a significant predictor of language development in the autistic group ($r = 0.61, p < .05$).

However, other studies have found that joint attention is unrelated to language development within children with autism. For example, Morgan, Maybery and Durkin (2003) examined 21 children with autism (mean age = 54 months) and 21 typically developing children (mean age = 55 months) on three measures of joint attention. Although the children with autism demonstrated significantly lower rates of joint attention as measured by each of the three tasks, vocabulary development (as measured by the PPVT) was neither correlated with joint attention within the autism group nor a mediator of the difference between the two participant groups on the measures of joint attention. In other words, joint attention and language development were independent (see also Loveland & Landry 1986; Stone & Yoder 2001). Gernsbacher, Sauer, Geye, O'Reilly and Goldsmith (submitted) reported a case study of child with autism (birth to 8;0) who has never shown traditional indicators of joint attention (pointing, showing, and tripartite gaze), but who nonetheless has age-advanced receptive and non-speech expressive language.

3. Emerging view of the role of language/communication impairments within autism

An emerging view of the role of language and communication impairments within autism is that they overlap, perhaps considerably, with the language and communication impairments observed outside of autism. For example, there is empirical evidence for behavioral overlap between the language and communication challenges observed in autism and those observed in (i) Specific Language Impairment (SLI, which is impaired language in the face of otherwise typical development; Baltaxe & D'Anglia 1996; Bishop & Norbury 2002; Joseph, Tager-Flusberg, & Lord 2002; Kjelgaard & Tager-Flusberg 2001; Paul, Fischer, & Cohen 1988), (ii) Pragmatic Language Impairment (which is impaired use of pragmatic language in children whose non-language behaviors fall outside the autism spectrum; Bishop & Norbury 2002; Botting & Conti-Ramsden 2003); (iii) Landau-Kleffner Syndrome (Nass, Gross, & Devinsky 1998; Rossi, Parmeggiani, Posar, Scaduto, Chiodo, & Vatti 1999; Shinnar, Rapin, Arnold, Tuchman, Shulman, Ballanan-Gill, Maw, Deuel, & Volkmar 2001); and (iv) early language delay (as manifested by vocabulary development, gestural use, and comprehension; Charman, Drew, Baird, & Baird 2003a). Each of these arenas of overlap will be reviewed briefly below.

4. The overlap between autism and Specific Language Impairment (SLI)

Baltaxe and D'Angiola (1996) compared the use of referencing strategies (pronominal, demonstrative, and comparative) produced in a one-hour free play session with an experimenter in three groups of children matched for sex, social class, and language age (including MLU in morphemes, receptive vocabulary age on PPVT-R, and language comprehension on the Test of Auditory Comprehension of Language; TACL). The three groups comprised 10 children with autism (mean age = 93 months), eight with SLI (mean age = 92 months), and eight with typical language development (mean age = 42 months). All three groups used personal pronouns most frequently, followed by demonstrative reference, and then comparative reference. However, both the autism and the SLI groups produced significantly fewer correct examples of all types of referencing categories, and the autism and SLI groups did not differ significantly from each other. The typically developing group used first person pronouns significantly more than either the autism or SLI groups, and the amount of first person pronoun usage did not differ significantly between the autism and SLI groups.

During later childhood some children originally diagnosed with SLI show autistic symptoms in non-language domains (Bishop & Norbury 2002). A third of SLI children (including those with SLI-T and PLI) exhibited abnormal imagination/creativity and over-activity/agitation on the ADOS-G and approximately 20% exhibited abnormal excessive interest in objects and unusual sensory interest on the ADOS-G (Bishop & Norbury 2002).

Joseph, Tager-Flusberg and Lord (2002) examined the verbal and nonverbal abilities in 120 children with autism using the Differential Ability Scales (DAS) and the Autism Diagnostic Observation Schedule. The Preschool Das was administered to 73 children between the ages of 3;8 and 6; 11 (mean age = 5;5), and the School-Age DAS was administered to 47 children between 7;0 and 13; 11 (mean age = 8; 11). Almost half the children administered the Preschool DAS (48%) and a third of the children administered the School-Age DAS (34%) exhibited substantially lower verbal IQ than nonverbal IQ scores, meeting diagnostic criteria for SLI.

Kjelgaard and Tager-Flusberg (2001) examined the phonological, lexical, and higher order language abilities in 89 children with autism (mean age = 88 months) using a battery of tests (including the Goldman-Fristoe Test of Articulation, which measured productive phonology for consonants in English; the PPVT-III; the EVT, which measures expressive vocabulary; the CELF, which measures morphology, syntax, semantics, and working memory; and repetition of nonsense words, which assesses the ability to reproduce words). Using methodology commonly used in SLI research, the researchers divided the 82 children who completed the PPVT into three groups: the normal group (standard PPVT scores of \geq to 85; $n = 22$), the borderline group (standard PPVT scores between 70 and 84; $n = 10$) and the impaired group (standard PPVT scores below 70; $n = 50$). Fourteen children (28%) in the impaired language group had nonverbal IQ scores above 70, and nine children in the normal language group (41%) had nonverbal IQs in the borderline to mentally retarded range. Thus, the researchers concluded that language skills "can be independent of IQ in autism" (p. 301). Furthermore, the children's overall vocabulary scores, PPVT ($M = 85.57$) and EVT ($M = 84.9$), were greater than their knowledge of syntax and semantics, CELF Total $M = 72.3$, CELF-Receptive $M = 70.9$, CELF-Expressive $M = 74.9$), which, the researchers argued, is similar to the profile of abilities found in children with SLI. Thus, Kjelgaard and Tager-Flusberg (2001) concluded that their "profile analysis may be taken as evidence for theoretically significant overlap between SLI and autism" (p. 304).

Paul et al. (1988) examined the sentence comprehension strategies in six children with autism (mean age = 6.5 years), seven language impaired (LI) children (mean age = 4.8 years), eight typically developing children matched on receptive language age (mean age = 34.8 months), and eight typically developing children matched on nonverbal mental age (mean age = 43.4 months). A speech-language pathologist tested the children individually on 24 test sentences that the children were instructed to act out. Half the sentences were in active voice, and half were in passive voice. Within each voice set, there were three subsets: probable (e.g., the girl carries the baby), neutral (e.g., the truck pushes the car), and improbable (e.g., the baby carries the girl) sentences. While the autism and the LI children produced fewer correct responses for both the improbable active (autism $M = 1.5$ out of 4, LI $M = 1.6$ out of 4) and passive (autism $M = 0.7$ out of 4, LI $M = 0.4$ out of 4) voice sentences than the typically developing 3-year-olds (active $M = 3.3$; passive $M = 2.1$), the performance between the autism and LI groups did not differ significantly. The authors concluded that the autism and LI children "who are at similar stages of language and cognitive development appear to perform more similarly than might be expected on this comprehension task" (p. 678).

Speculation has even arisen from quantitative genetics of a locus of susceptibility common to autism and SLI (O'Brien, Zhang, Nishimura, Tomblin, & Murray 2003; Warburton, Baird, Chen, Morris, Jacobs, Hodgson, & Docherty 2000, but see Newbury & Monaco 2002); such speculation is supported by behavioral genetic data demonstrating an increased risk of autism to siblings of children with SLI (Tomblin, Hafeman, & O'Brien 2003) and an increased risk of SLI to siblings of children with autism (Fombonne, Bolton, Prior, Jordan, & Rutter 1997; Folstein, Santangelo, Gilman, Piven, Landa, Lainhart, Hein, & Wzorek 1999). Tomblin et al. (2003) assessed the autistic behaviors of 522 biological (full or half) siblings of 158 children with SLI

and 132 children with normal language abilities on the Autism Behavior Checklist, the Autism Diagnostic Interview-Revised, and the Autism Diagnostic Observation Schedule. Ten siblings were identified as being at risk for autism based on scores from the Autism Behavior Checklist (> 557), and six of those 10 were siblings of SLI children. Additionally, the parents of three siblings of SLI children reported their children had received an autism diagnosis. Although not significant, the risk for autism was greater in the siblings of children with SLI than siblings of children with normal language abilities. In addition, when the language proficiency of the probands (z-scores of at or below - 1.25 SD in 2 of 5 areas of language function while in kindergarten) was taken into account, risk for autism was found only in siblings with probands with poor spoken language.

Fombonne et al. (1997) inquired about the history of any developmental disorders of language, articulation, speech, reading or spelling, and abnormalities of conversational abilities in the first-degree relatives of 99 autism probands (198 parents with mean age = 50;0 and 153 siblings with mean age = 20;4) and 36 Down syndrome controls (72 parents with mean age = 52;1 and 65 siblings with mean age = 25;2). Nearly a quarter of the parents and siblings of the autistic probands had delayed language onset or reading compared to less than 10% of the parents and siblings of the controls. Folstein et al. (1999) also inquired about the history of any developmental disorders of language, articulation, speech, reading or spelling in the parents (n = 166, mean age = 45;6) and siblings (n = 87, mean age = 18;9) of 90 autistic probands and in the parents (n = 75, mean age = 44;8) and siblings (n = 64, mean age = 18;5) of 40 Down Syndrome controls. Twenty-six percent of the autistic parents reported a history of probable or definite language delay, articulation defects, trouble learning to read, or trouble spelling compared to only 11% of the parents of the controls ($\chi^2 = 6.73, p < .01$); fathers more likely than mothers to report these impairments. Interestingly, the autism-parents without any early language-related impairments achieved higher Verbal IQ scores than those achieved by the entire group of autism-parents. A similar relationship was found in the siblings of children with autism, with the siblings without any early language-related impairments achieving higher scores on the Full Scale IQ, Verbal IQ, the Kaufman Reading Comprehension test, and the Schonell spelling test than the siblings with early language-related impairments.

5. The overlap between autism and pragmatic language impairment

Bishop and Norbury (2002; study I) assessed 13 children with pragmatic language impairment (PLI; NVIQ of 80 or above and pragmatic composite score on the Children's Communication Checklist below 133; mean age = 8;3) and eight children with typical SLI (SLI-T; NVIQ of 80 or above, pragmatic composite score on the Children's Communication Checklist above 132 and score on a standardized language test at least 1 SD below the normative mean; mean age = 9;2) on three commonly used autism assessments (the Autism Diagnostic Interview-Revised and the Social Communication Questionnaire, which were administered to the parents, and the Autism Diagnostic Observation Schedule - Generic, which was administered to the children). On the Autism Diagnostic Interview, six children with PLI (46%) and two children with SLI-T (25%) had scores that were above threshold for autistic disorder. Two additional PLI children (15%) and four additional SLI-T children (50%) scored above threshold on two of the three domains, meeting criteria for Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS). On the Social Communication Questionnaire, five PLI children (39%) and two SLI-T children (25%) met criteria for autistic disorder, while an additional two PLI children (15%) and three SLI-T children (38%) met criteria for PDD-NOS. On the Autism Diagnostic Observation Schedule, six children with PLI (46%) and one child with SLI-T (13%) met criteria for autistic disorder, while two additional PLI children (15%) and one additional SLI-T child (13%) met criteria for PDD-NOS. Thus, around 40% of the children with PLI met criteria for autistic disorder, and another 15% met criteria for Bishop and Norbury (2002) argued that these data

demonstrated that "many language-impaired children have some pragmatic abnormalities, and some have other features of autism" (p. 922).

Bishop and Norbury (2002; study 2) assessed 18 children with PLI (mean age = 9.2 years), 11 children with SLI-T (mean age = 9.45 years), six children with autism (mean age = 9.44 years), and 18 typically developing children (mean age = 8.56 years) on the Social Communication Questionnaire and the Autism Diagnostic Observation Schedule. On the Social Communication Questionnaire five children with PLI (28%), four children with autism (67%), and one child with SLI-T (9%) met criteria for Autistic Disorder; an additional four children with PLI (22%), two children with SLI-T (18%), and one child with autism (17%) met criteria for PDD-NOS. On the Autism Diagnostic Observation Schedule, three children with PLI (17%) and three children with autism (50%) met criteria for Autistic Disorder, and an additional three children with PLI (17%), one child with autism (17%), and one child with SLI-T (9%) met criteria for PDD-NOS. Botting and Conti-Ramsden (2003) compared 13 children with autism (mean age = 10;10), 25 PLI children (mean age = 11;3), and 29 SLI-T children (mean age = 10;10) on a series of psycholinguistic tests, including the Children's Non-Word Repetition (CNRep), the Past Tense Task (PTT), and the CELF Recalling Sentences subtest, which have previously been effective descriptors of SLI. The children with autism did not differ significantly from the children with PLI on their performance on any of the three psycholinguistic measures.

6. The overlap between autism and Asperger's disorder

Although by diagnostic definition, Asperger's Disorder is not characterized by an early history of language delay or by a set of symptoms describing communication impairments, several studies have shown that children and adults diagnosed with Asperger's Disorder nonetheless demonstrate language and communication impairments, often quite similar to those found in Autistic Disorder. For example, Howlin (2003) examined the current linguistic functioning of 34 adults with autism with a history of childhood speech delay (assigned to the Autistic Disorder group; mean age = 27.6 years) and 42 adults with autism without a history of childhood speech delay (assigned to the Asperger's Disorder group; mean age = 26.1 years). The two groups were matched for age and nonverbal IQ. Group assignment was based on developmental speech delay as defined by two items from the ADI-R (i.e., no single word speech by 24 months of age and/or no phrase speech by 3 years of age). Current day receptive vocabulary was assessed using the British Picture Vocabulary Scale (BPVS; Dunn, Dunn, Whetton, & Burley 1997; Dunn et al. 1982), and current day productive vocabulary was assessed with the Expressive One Word Picture Vocabulary Test (EOWPVT; Gardner 1982). Even though the mean chronological age of the Asperger's group was 26.1 years, their age equivalent scores were considerably lower on both the BPVS ($M = 16.09$ years, $SD = 4.17$) and the EOWPVT ($M = 16.60$ years, $SD = 2.63$). Indeed, 57% of the Asperger's group scored below ceiling (18 years) on the BPVS, and 62% scored below ceiling (19 years) on the EOWPVT.

Mayes and Calhoun (2001) compared the current expressive language of 23 children with autism with a history of speech delay (Autistic Disorder) and 24 children with autism without a history of speech delay (Asperger's Disorder). All the children had normal nonverbal intelligence (NVIQs ranged from 80 to 143), and the mean age across groups was 6.1 years. The children's spontaneous conversation were analyzed, and their speech was examined for the presence of 11 atypical speech patterns (including abnormal voice quality/modulation, screeching or making other odd noises, repetitive vocalizations, idiosyncratic jargon, echolalia, idiosyncratic speech, perseverative speech, sporadic and infrequent speech, rote phrases uttered out of context, nonsensical speech, and improper use of pronouns). All the children in the Asperger's Disorder group met DSM-IV Autistic Disorder diagnostic criteria for impairments in communication, either displaying difficulty in initiating or sustaining a conversation or stereotyped and repetitive

or idiosyncratic language, and in some cases displaying both symptoms. All except one child in the Asperger's Disorder group displayed one or more of the atypical speech patterns.

Eisenmajer, Prior, Leekam, Wing, Ong, Gould and Welham (1998) compared 46 children with autism (mean age= 11.69 years) whose early language development was delayed and 62 children with autism (mean age= 11.6 years) whose early language development was not delayed. ICD-10 and DSM-IV behavioral criteria were used to assess both group's current day autistic symptomatology. Children with autism with a history of early language delay (no single words before 24 months and no use of phrases by 36 months) did not differ in current day autistic symptomatology from children with autism without a history of early language delay; however, the two groups did differ in their current day language skill. Thus, it was the language skill and not the autistic symptomatology that distinguished the two groups.

Finally, Miller and Ozonoff (1997) examined the four children presented in Asperger's seminal 1944 paper. They used DSM-IV criteria for Autistic Disorder to determine whether Asperger's children would receive a current day diagnosis of Autistic Disorder. Three of the four children, Fritz, Harro, and Ernst, each displayed three of the communication impairments listed under the diagnostic criteria for Autistic Disorder, including impaired ability to initiate/sustain conversations, stereotyped, repetitive, or idiosyncratic language, and social play below developmental level. The fourth child, Hellmuth, displayed stereotyped, repetitive, or idiosyncratic language, and social play below developmental level. Miller and Ozonoff also identified the children's impairments in social interactions and restricted behaviors and interests. When all three domains were taken into account, seven professionals (4 child psychiatrists, 11 educational psychologist, and 2 doctoral-level special educators) rated all four of the children described by Asperger as meeting DSM-IV criteria for Autistic Disorder rather than Asperger's Disorder.

7. The overlap between autism and Landau-Kleffner syndrome

Landau-Kleffner Syndrome (LKS, a.k.a. acquired epileptiform aphasia, AEA) is characterized by the profound deterioration of previously acquired receptive and expressive language abilities, usually between 3 and 7 years of age, in association with either clinical seizures or epileptiform electroencephalographic abnormalities. Nass et al. (1998) retrospectively reviewed the charts of children admitted to the Comprehensive Epilepsy Unit at New York University Medical Center between September 1993 and January 1996. Forty-two pediatric patients with a history of language, cognitive, social, and/or behavioral deterioration were selected for further examination. The mean age of evaluation was 5;6. Five were identified with epileptiform discharges in the occipital region and were eliminated from further study. None of the remaining children met strict criteria for LKS. Based on Tuchman's (1997) criteria, the remaining 37 were classified as four with autistic regression, 19 with autistic epileptiform regression, 13 with autism, and one with disintegrative epileptiform regression.

Rossi et al. (1999) observed 11 patients with LKS from a mean age at first observation of 5;7 through a mean age at last observation of 13;6. Autistic-like behavior was present at the first observation in four of the 11 children (36%). At the last observation, autistic-like behavior was still present in two of the children (18%). Shinnar et al. (2001) prospectively identified 177 children (145 males, 32 females) with language regression. Of the 177 children with language regression, 155 had received an autism diagnosis. Children whose language regressed before 36 months had a higher probability of an eventual autism diagnosis (144 of 158 children; 91%) than children whose language regressed at 36 months or later (11 of 19; 58%). Additionally, an eventual autism diagnosis was more common in males (90%) with regressed language than in females (75%). Thirty-two children had a history of seizures. Twenty-two of the children with

seizures (69%) also received an autism diagnosis. Seizures were more common in children whose language regressed after 36 months (10 of 19; 53%) than children whose language regressed before 36 months (22 of 158; 14%).

8. The overlap between autism and specific language delay

With the exception of language regression, the recommended early markers - "red flags" - for autism and for specific language delay without autism are synonymous: "no single words by 18 months" and "no two word spontaneous (non-echoed) phrases by 24 months" (Baird, Cass, & Slonims 2003; Filipek, Accardo, Baranek, Cook, Dawson, Gordon, Gravel, Johnson, Kallen, Levy, Minshew, Prizant, Rapin, Rogers, Stone, Teplin, Tuchman, & Volkmar 1999). However, very few studies have examined the early language development of children with autism, and none has compared the early language development of children with autism with that of children with specific language delay. Charman et al. (2003a) compared the early language development of children with autism to the MacArthur Communicative Development Inventory (CDI-Infant form) norms. While nearly all 1-year-old typically developing children respond to their name, to 'no,' and to 'there's mommy/daddy' (Fenson, Resznick, Thal, Bates, Hartung, Pethick, Pethick, & Reilly 1993), only 50% of the children with autism under 2 years of age responded to their name, only 70% responded to 'no' and only 30% responded to 'there's mommy/daddy.' By 1;4, approximately 90% of typically developing children imitate words (Fenson et al. 1993), but only 30% of the children with autism under 2 years of age imitated words. Additionally, nearly 75% of typically developing children at 1;4 name or label objects (Fenson et al. 1993), but only 15% of the children with autism under 2 years of age named or labeled objects. Finally, while the average number of words produced by typically developing children at 1;4 is 31 words, the mean number of words produced by the children with autism under the age of 2 years was only 7 words.

9. Future directions and recommendations

As previously mentioned, very few studies have looked at language development in very young children with autism; the few studies that have were focused on social cognition constructs (e.g., Charman, Baron-Cohen, Swettenham, Baird, Drew, & Cox 2003b) rather than assessing a broad selection of language behaviors. We suggest that it is imperative to investigate communication and language development as early as possible. Consider an analogy from Williams syndrome: Toddlers with Williams syndrome perform relatively poorly on a language task but relatively well on a numerosity task; adults with Williams syndrome show just the opposite pattern (Paterson, Brown, Gsádl, Johnson, & Karmiloff-Smith 1999). Thus, it could be injudicious to assume that outcomes observed in older children or adults characterize the starting states in early development. Thus, what are needed are relatively large-scale longitudinal studies, but unfortunately all existing longitudinal language-autism studies have very small samples (Tager-Flusberg, Calkins, Nolin, Baumberger, Anderson, & Chadwick-Dias 1990), were case studies (Cunningham 1966), or the study's duration was quite brief (e.g., one year in Mundy et al. 1990). We echo Nordin and Gillberg's (1998) plea for more prospective, longitudinal studies with ASD children. Even more rare than longitudinal studies are studies of young children with autism using psycho linguistic methodologies, even though such techniques have become commonplace in the study of non-autistic children with language impairment (Edwards & Lahey 1996; Gathercole & Baddeley 1990; Stark & Montgomery 1995).

Most strikingly, to date there have been no comparisons between the early language development of young children with autism and the early language development of young children who are delayed in their language development but do not exhibit autistic behaviors. We recommend comparisons examining early lexical and grammatical development, the mechanisms and

patterns of early word learning and vocabulary development, the relationship between lexical and grammatical development, and the relation between language level and verbal repetition behavior. We recommend investigating early lexical development because the mechanisms that support word learning have provided a rich basis of inquiry in typically developing populations (Bauer, Goldfield, & Reznick 2002; Dromi 1999; Hoff & Naigles 2002; Markson & Bloom 2001). Of particular interest is the process of 'fast mapping,' which putatively enables young children to quickly construct lexical representations for unfamiliar words given minimal exposure and has been hypothesized to account for rapid gains in vocabulary. Fast mapping has been examined in young children with typical language development (Behrend, Scofield, & Kleinknecht 2001; Heibeck & Markman 1987; Jaswal & Markman 2001; Wilkinson & Mazzitelli 2003), as well as children with Down syndrome (Chapman, Kay-Raining Bird, & Schwartz 1990), Williams syndrome (Stevens & Karmiloff-Smith 1997) and specific language impairment (Dollaghan 1987; Ellis Weismer & Hesketh 1996, 1998; Eyer, Leonard, Bedore, McGregor, Anderson, & Viescas 2002; Rice, Buhr, & Nemeth 1990). However, fast mapping has not been examined in young children with autism and very little is known about the early word learning processes that support lexical development in this population.

Early grammatical development is of importance because it is posited to depend on lexical development, such that advances in grammar occur only after vocabulary has reached a critical mass (Bates & Goodman 2001; Marchman & Bates 1994). The link between lexical and grammatical skills in typical and atypical development is well documented (Dionne, Dale, Boivin, & Plomin 2003; Maitel, Dromi, Sagi, & Bornstein 2000; Throdardottir, Ellis Weismer, & Evans 2002); however, little is known about this link in autism.

Finally, we recommend investigating verbal repetitions in the language use of young children with and without autism. Verbal repetition can sometimes be a prominent feature of some autistic children's discourse during some stages of their language development; however, the frequently made claim that 75% of all verbal individuals with autism engage often in verbal repetition is most likely a misrepresentation. That 75% figure can be traced to only one empirical study, which was conducted almost four decades ago with children diagnosed with infantile psychosis (Rutter, Greenfield, & Lockyer 1967). While it is true that 75% of the 34 children examined in that study exhibited verbal repetition at some point in their development, there was great variability in the pattern and frequency of the verbal repetition, and for the majority of the children, verbal repetition was not a continuing characteristic in later development (see also Wing 1971). Verbal repetition has been suggested to serve certain communicative functions (Prizant 1983; Prizant & Rydell 1993; Rydell & Mirenda 1994), and verbal repetition has been speculated to reflect lower receptive language skills than would be expected from the child's expressive language skills (Roberts 1989). Thus, an investigation of the verbal repetition exhibited by young children with and without autism is crucial for understanding verbal repetition phenomena.

Examining the early language development of children with autism is of theoretical and practical significance. Of specific theoretical significance are the empirical tests of fundamental language development hypotheses, such as the critical mass hypothesis and the nature of the link between lexical and grammatical development in young children with autism. Of more general theoretical significance is whether the language delays and deficits observed in autism should be considered a unique phenomenon, or whether they overlap with other language and communication disorders. We can refer to these two possibilities as the distinct category account and the dimensional account. The dimensional versus categorical nature of psychopathological conditions such as social anhedonia, depression, and dissociation has been addressed in prior research (Blanchard, Gangestad, Brown, & Horan 2000; Ruscio & Ruscio 2000; Waller, Putnam, & Carlson 1996). In the domain of language disorders, results from an investigation by

Whitehurst and Fischel (2000) have been interpreted as indicating the presence of a natural category ('taxon') for dyslexia within a large sample of school-age children. In contrast, recent studies have not provided empirical evidence for a natural category of specific language impairment in large samples of preschool or school age children (SLI; Dollaghan in press; Zhang & Tomblin in preparation). The research focused on dyslexia and SLI has examined distributions of phenomena associated with conditions involving specific deficits relative to normal range reading and spoken language performance. We recommend exploring the overlap in the phenomena associated with language delays in young children with autism and late talkers without autism.

Although the phrasing of the DSM-IV diagnostic criteria (i.e., the use of the term "qualitative impairments") suggests that the language and communication impairments observed in Autistic Disorder and PDD-NOS compose a distinct category, little empirical evidence has directly assessed this assumption. Further research aimed at testing the language distinct account versus the language dimensional account should provide important implications about phenotypic markers (as suggested by Dawson, Webb, Schellenberg, Dager, Friedman, Aylward, & Richards 2002) and by extension, recommended treatment.

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