Speech and Language Disorders in Children and Adolescents With Schizophrenia

by Christiane A.M. Baltaxe and James Q. Simmons III

Abstract

This study examines communication characteristics and specific language deficits in 47 children and adolescents diagnosed with early-onset schizophrenia using DSM-III-R criteria. All had been referred for speech and language services because of apparent communication problems. Standardized tests and formal measures were used to identify impairment in discrete areas of communication, including pragmatics, receptive and expressive vocabulary and syntax, abstract language, auditory processing, and speech production. Results showed that these discrete areas were variably involved, with pragmatics, prosody, auditory processing, and abstract language having the greatest involvement. The communication deficits identified in the early-onset group closely resembled the phenomenology reported in studies of the communication characteristics of adults with schizophrenia. This comparison thus lends further support to the presence of the same disorder as seen in adults. The roles of gender, mental retardation, and seizure disorders are also discussed as additional risk factors in the development of communication problems and schizophrenia.


Speech and language disorders have been demonstrated to coexist with a wide range of childhood and adolescent psychiatric conditions, including infantile autism (Baltaxe and Simmons 1981; Prizant et al. 1990), affective disorder (Baker and Cantwell 1992), and other behavioral and emotional disorders (Beitchman et al. 1986; Baltaxe and Simmons 1988, 1990).

One such condition is schizophrenia with onset in childhood or adolescence, a relatively rare disorder affecting approximately 3 youngsters in 10,000 (Graham 1986). The diagnosis of schizophrenia in childhood and adolescence has not been uniquely defined and is made using diagnostic criteria for the adult disorder. Thus, the diagnostic criteria for schizophrenia include the presence of a thought disorder, hallucinations, motility disturbances, and disturbances in social relationships. In childhood, thought disorders and hallucinations are among the most differential criteria that distinguish schizophrenia from other psychiatric conditions, particularly autism, pervasive developmental disorder (not otherwise specified), and schizotypal personality disorder. Additional considerations in differentiating schizophrenia from these other conditions involve the age at onset and family history (Cohen et al. 1986; Rutter and Schopler 1987).

Because a thought disorder manifests itself in language, the characteristics of language have always been among the key diagnostic features of schizophrenia (Kraepelin 1919/1971; Bleuler 1911/1950; Andreasen 1979a, 1979b; American Psychiatric Association 1987). A thought disorder can take the form of incoherence, marked...
loosening of associations, illogicality, and poverty of content of speech (formal thought disorder). It can also manifest itself in delusions of various types (content of thought disorder). Closely associated are prodromal and residual linguistic symptoms of schizophrenia, which include language that is characterized as digressive, vague, overelaborate, circumstantial, and impoverished in content as well as output, according to DSM-III-R (American Psychiatric Association 1987).

The linguistic manifestations of thought disorder in adults and children have been studied through instruments with known validity and reliability (Andreasen 1979a, 1979b; Arboleda and Holzman 1985; Caplan et al. 1990; Caplan 1994) and through formal discourse analysis, an aspect of pragmatics (Rochester and Martin 1979). Considered from the perspective of pragmatics (or the use of language in a social context), most manifestations of thought disorder in persons with schizophrenia have been identified as a dysfunction in a speaker-hearer role relationship (Andreasen 1979a, 1979b; Rochester and Martin 1979; Baltaxe and Simmons 1987). The emergence of these impairments in communication are assumed to coincide with the onset of the schizophrenic disorder (DSM-III-R; American Psychiatric Association 1987).

In addition to delays and abnormalities in behavioral, emotional, and motor development, a significant number of children also appear to have delays and abnormalities in language development (Beitchman 1983; Graham 1986). Direct and indirect evidence for the existence of developmental language delays and abnormalities years before the onset of schizophrenia is documented in several sources. One source is retrospective and followup studies of schizophrenia in childhood and adolescence. Although many of these studies make no reference to early language characteristics, delays, and abnormalities, others discuss these briefly as part of the general developmental picture (Bender and Faretra 1972; Eggers 1978; Kydd and Werry 1982; Green et al. 1984; Garralda 1985; Watkins et al. 1987). Another source of data comes from risk factor studies in which early developmental indicators including language are discussed (Mednick and Schulsinger 1965; Harvey et al. 1982; Fish 1987; Sameroff et al. 1987; Weintraub 1987). And finally, a third source is studies relating to children with schizophrenia with early autistic symptomatology (Bender and Faretra 1972; Petty et al. 1984; Watkins et al. 1987). These studies generally distinguish between early language delay and abnormalities and the subsequent verbal manifestation of a thought disorder. All clearly indicate that in a significant number of children and adolescents, early language delays and abnormalities were prominent among the premorbid symptoms of schizophrenia. The delays and abnormalities noted in these studies are summarized and further discussed by Baltaxe and Simmons (submitted for publication). These authors concluded that language dysfunction may be an early and significant neurodevelopmental indicator of schizophrenia.

Because of the retrospective nature of most of the studies, none used formal tests to assess early communication behaviors in their schizophrenia subjects. Therefore, it is not clear to what extent discrete areas of speech and language were seriously disturbed early in development. It is also not clear to what extent disturbances in discrete areas of communication are identifiable after the schizophrenia has been diagnosed. The present study is designed to examine the specific communication characteristics and deficits in children and adolescents diagnosed with schizophrenia and referred for speech and language services because of obvious communication involvement.

Standardized and formal measures will be used to identify dysfunctions in discrete areas of communication and to examine their relevance to schizophrenia. These areas are usually considered in children suspected of communication handicaps. Most of these areas have also been those investigated separately in studies of adult schizophrenia. Because of the paucity of specific information currently available on communication deficits in early-onset schizophrenia, the findings from this study will be examined from the perspective of what is known about these areas in adult schizophrenia. Deficits similar to those seen in adults may provide additional evidence for the presence of the same disorder in childhood.

Methods

Subjects. The subjects were 47 patients admitted to the child and adolescent inpatient services of the University of California, Los Angeles, Neuropsychiatric Institute, an acute care psychiatric facility. The youngsters ranged in age from 6.9 through 17.2 years; their mean age was 13 years, 4 months (standard
deviation [SD] = 3 years, 10 months). Eight of the subjects were under the age of 10 years, and 39 were 10 years and older. Seventy percent (n = 33) were male, and 30 percent (n = 14) were female. Sixty-seven percent (n = 25) were white, 24 percent (n = 8) black, and 8 percent (n = 3) Hispanic. Seven subjects had an additional diagnosis of mental retardation (5 mild, 1 moderate, and 1 severe). Five were also diagnosed with a seizure disorder. All were fluent in English and all had been referred for speech and language services because of obvious or suspected communication involvement.

Psychiatric Assessment. The psychiatric diagnoses were based on data obtained by structured and semistructured psychiatric interviews with the children and their parents. Psychiatric diagnoses were made according to the diagnostic criteria specified in DSM-III-R. Diagnoses were made independently by a psychiatrist and an interdisciplinary treatment team; issues concerning the diagnoses were resolved by consensus between the psychiatrist and the interdisciplinary treatment team.

Communication Assessment. All subjects received a complete speech and language evaluation by a speech pathologist. Assessment tools included standardized speech/language tests and formal procedures for analyzing spontaneous speech samples. Areas of speech (including articulation, fluency, voice, and prosody) and language (including abstract language, syntax, vocabulary [expression, reception], auditory processing, and pragmatics) were assessed. Definitions of each of these areas of language are presented in the appendix. All subjects were cooperative during testing, and none were on medications when they were tested.

In general, impairment in an area of language functioning was operationally defined as standardized test scores 1 or more SDs below the norm for the child's age level. For the seven youngsters who had mental retardation (i.e., a significant discrepancy between chronological age and mental age levels), language impairments were diagnosed in relation to non-language mental age (i.e., performance intelligence) levels. Specific explanations of how each area of language was assessed in the present study and operational definitions of what constituted a deficit in each area in the present study are provided in the appendix.

Results
Table 1 indicates the numbers and percentages of youngsters with schizophrenia who were impaired in the various areas of speech and language assessed. As this table shows, pragmatics (or the interactional use of language) was the area of language impaired in the greatest number of youngsters—83 percent. The other two areas of language most frequently impaired were prosody (or the melody of speech), which was impaired in 81 percent of the youngsters, and auditory processing, which was impaired in 72 percent.

Approximately two-thirds of all subjects (64%) were impaired in understanding and formulating abstract language. Receptive and expressive vocabulary was deficient in close to two-thirds of the subjects (62%). Receptive and expressive syntax (i.e., the understanding and use of different sentence types) were impaired in approximately one-half of the subjects (51%), as was speech fluency (53%). Fewer impairments were seen in speech articulation and

Table 1. Discrete areas of communication impairment in 47 youngsters with schizophrenia

<table>
<thead>
<tr>
<th>Areas of communication</th>
<th>No. impaired</th>
<th>% Impaired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pragmatics</td>
<td>39</td>
<td>83</td>
</tr>
<tr>
<td>Language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive vocabulary</td>
<td>29</td>
<td>62</td>
</tr>
<tr>
<td>Receptive syntax</td>
<td>24</td>
<td>51</td>
</tr>
<tr>
<td>Expressive vocabulary</td>
<td>29</td>
<td>62</td>
</tr>
<tr>
<td>Expressive syntax</td>
<td>24</td>
<td>51</td>
</tr>
<tr>
<td>Abstract language</td>
<td>30</td>
<td>64</td>
</tr>
<tr>
<td>Auditory processing</td>
<td>34</td>
<td>72</td>
</tr>
<tr>
<td>Speech</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Articulation</td>
<td>18</td>
<td>38</td>
</tr>
<tr>
<td>Fluency</td>
<td>25</td>
<td>53</td>
</tr>
<tr>
<td>Voice</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td>Prosody</td>
<td>38</td>
<td>81</td>
</tr>
</tbody>
</table>
Table 2. Patterns of communication impairment in 47 children and adolescents with schizophrenia

<table>
<thead>
<tr>
<th>Areas of impairment</th>
<th>No. impaired</th>
<th>% Impaired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech problems only</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Auditory problems ± speech/pragmatic deficits</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Language problems</td>
<td>43</td>
<td>91</td>
</tr>
<tr>
<td>Receptive problem (with speech deficit)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Expressive problem (with speech/pragmatic deficits)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Combined receptive and expressive problems</td>
<td>40</td>
<td>85</td>
</tr>
<tr>
<td>with speech deficits ± speech/pragmatic deficits</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>with additional pragmatic deficits</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>with speech, auditory processing, and pragmatic deficits</td>
<td>30</td>
<td>64</td>
</tr>
</tbody>
</table>
and lack of reference and inappropriate ellipsis of reference); (2) topic selection, maintenance, and switch (difficulties establishing topic of discourse, inappropriate topic switch, inappropriate topic expansion, topic switch to self); (3) sequencing of discourse (difficulties describing events in time and logically sequencing utterances within a discourse); and (4) turn-taking problems. The pragmatic deficits seen in the present study mirrored the deficits discussed above relating to reference and difficulties with changing register, topic, sequencing, and turn taking. Pragmatic deficits seen in children with schizophrenia thus appear to mirror those reported for adults with schizophrenia.

Receptive and Expressive Vocabulary and Syntax. The findings in this study showed that more than half the subjects were impaired in receptive and expressive vocabulary and syntax. Little information is currently available on the receptive language skills of children with schizophrenia. However, the results appear to agree with what little information is available, primarily in adults. Also, Waterhouse and Fein (1984) demonstrated lower receptive and expressive vocabulary scores for the group of children with schizophrenia they studied compared with normal controls. Similarly, Fish (1987), in her study of children at risk for schizophrenia, noted a drop in vocabulary scores in seven of her subjects and in comprehension scores on the Wechsler Intelligence Scale for Children–Revised (Wechsler 1974) comprehension subtest in five of her subjects between 10 and 15 years of age. However, these findings are in contrast with those of Schneider and Asarnow (1987), who found no such difference between the children with schizophrenia and the normal controls they studied.

With respect to receptive syntax, Morice and McNicol (1985) investigated the comprehension of complex grammatical structures in adults with schizophrenia, using a modified version of the Token Test (DiSimoni 1978). Their results demonstrated an impairment of comprehension that was proportional to a reduction in the syntactic complexity of their spoken language. These investigators found a significant correlation between the schizophrenia patients' receptive and expressive skills.

The existence of deficits in the expressive syntax of adults with schizophrenia has been shown in a series of studies using computer-assisted linguistic analysis of free speech samples (Fraser et al. 1986; Thomas et al. 1987; Fraser et al. 1989; King et al. 1990; Thomas et al. 1990). These studies showed that the syntactic structures of speech in adult schizophrenia subjects were less complex than those of normal controls. Patients with schizophrenia used less clausal embedding, fewer reduced relative clauses, more syntactically and semantically deviant sentences, and more syntactic errors.

The above investigators also demonstrated that syntactic and semantic errors were state-dependent features associated with positive schizophrenia symptoms, whereas a reduction in syntactic complexity was associated with the presence of negative symptoms. Expressive syntax also appeared to deteriorate as a function of the schizophrenic process. Differences in the free speech samples of acute and chronic subjects with schizophrenia were seen on measures of syntactic complexity, integrity (errors), and fluency, with acute patients performing less well than the normal controls but better than the chronic patients. The authors concluded that linguistic deterioration in their adult subjects was related to the illness process.

Although comparable studies in early-onset schizophrenia are still lacking, the results of the present study appear to parallel those in the above adult studies with respect to receptive and expressive vocabulary, syntax, and fluency. The subjects showed lower age scores and demonstrated more errors in receptive and expressive vocabulary, less syntactic complexity than expected for their ages, and a considerable amount of dysfluency. It cannot be determined in the context of the present study whether these receptive and expressive deficits were developmentally in origin or whether they are a function of the schizophrenic process.

Receptive/Expressive Abstract Language. The current study identified deficits in the understanding and use of abstract language in close to two-thirds of the subjects. Difficulties with abstract language have been shown to exist in adults with schizophrenia and have been considered a characteristic of the disorder. Thus, Goldstein (1944) noted that "expressions of abnormal concreteness" are characteristic of schizophrenia; Arieti (1974) described the language impairment in schizophrenia as "an impairment in the ability to abstract"; Kasanin (1944) referred to a reduced ability "to think abstractly"; and Moran (1953) re-
ferred to a "lesser capacity to deal with abstract analogies."

Difficulties with abstract language have been found in a number of empirical studies of adults with schizophrenia. Cutting et al. (1987) used four tests of categorical thinking and found that those with schizophrenia showed elevated rates of conceptual loosening and overcategorization. Cutting and Murphy (1990) studied denotative and connotative meanings and found elevated rates of difficulty with metaphorical meaning.

Deficits in abstract language are also characteristic of children with communication handicaps (de Ajuriaguerra et al. 1976; Nippold and Fey 1983). Abstract language thus appears to be an area where language characteristics expected in children and adolescents with schizophrenia and language characteristics of those with language disorders intersect. Within the current context, it is not possible to determine if deficits in abstract language are more closely associated with communication impairment or schizophrenia. However, deficits in abstract language again appeared to mirror the adult phenomenology of schizophrenia.

Auditory Processing. Almost three-fourths of the current subjects showed significant deficits in the auditory processing of language. Deficient auditory processing in its various designations has been associated with schizophrenia, communication handicaps, and learning disorders. In its broadest sense, attentional deficits, including the auditory channel, have been regarded as characteristic of the schizophrenic disorder since its earliest description (Kraepelin 1919/1971). Although there is no direct evidence that attentional deficits predispose to schizophrenia (Rutter and Garmezy 1983), these deficits also were the most consistent findings in high-risk studies (Erlenmeyer-Kimling et al. 1984). The attentional and information processing deficits described by Weintraub (1987) for children of mothers with schizophrenia included an inability to maintain attention and to ignore irrelevant information. Everett et al. (1989) noted that subjects with schizophrenia have difficulty maintaining selective attention over time. Manischewitz and Schreck (1986) suggested an attentional deficit hypothesis for schizophrenic language functioning based on the results of a study of semantic priming in those with schizophrenia who have thought disorders. More recently, Barch and Berenbaum (1994) proposed that reduced processing capacity may underlie the decreased syntactic complexity, decreased verbal output, and increased pause length reported in those with schizophrenia.

With respect to auditory memory, Weiss et al. (1988) concluded that auditory information overload severely disrupted the performance on digit recall of those with schizophrenia. Wood and Flowers (1990) determined an auditory memory deficit for narrative prose that they associated with a unique language-related focal deficit in schizophrenia. Huang et al. (1990) described possible conflicting results. In a study of recall and language characteristics via story schemata they showed that adults with schizophrenia did not have an impaired ability to recall story schemata. Auditory memory deficits were also found by Goldberg et al. (1989), who compared adults with schizophrenia with other neuropsychiatric and normal controls by using a selective reminding test and by Goldberg et al. (1990) in a study of monozygotic twins discordant for schizophrenia. These investigators also found deficits in vigilance and concept formation. Auditory memory deficits in schizophrenia were found by Silverstein et al. (1988).

Asarnow et al. (1987) concluded that children with schizophrenia had problems in the recruitment and allocation of this momentary processing capacity. Limitations in recruitment and allocation of processing capacity have also been considered core impairments in adult schizophrenia (Nuechterlein and Dawson 1984). Soares and Collet (1988) concluded that those with schizophrenia showed an alteration in the cognitive processes underlying the processing and reconstitution of simple messages. Rund (1988) noted that attention focusing and information processing seemed to be the most conspicuous disturbances in schizophrenia. Similarly, a dysfunctional auditory information processing system was posited by Wale and Carr (1988) in a study of dichotic listening asymmetries in schizophrenia. Finally, in a study of the N400 component of event-related potentials in patients with schizophrenia, Grillon et al. (1991) suggested that N400 amplitude abnormalities identified in adults with schizophrenia suggested a delay in information processing.

A number of studies have also associated auditory processing deficits with communication handicaps (Heins et al. 1976; Keith et al. 1989). However, recent studies have also shown that higher level
language deficits are not attributable to difficulties in the more preliminary analysis of acoustic stimuli (Akshoomoff et al. 1989). Thus, although auditory processing deficits show a high co-occurrence with language deficits, they do not appear to be essential for the development of communication disorders.

The above studies seem to provide evidence that auditory processing deficits in those with schizophrenia and the communication handicapped are not unidimensional. Rather, these deficits may range over a number of individual components associated with the auditory processing of information as this term is defined in the appendix. It is of interest that only three subjects in the current study had auditory processing deficits without central language deficit while in all other instances, the auditory processing deficits co-occurred with central language problems. The deficits seen in the present study were based on the immediate recall of digits, unrelated words, and sentences. In the current context, it cannot be determined whether these deficits were more closely associated with the schizophrenic process or the language disorder. Rutter (1987) noted that deficits in the ability to process incoming information may lead to subsequent biases and distortions in cognitive processing and be associated with social and emotional malfunction.

**Speech Disorders.** Only four subjects had problems in speech (i.e., articulation, voice, fluency, and prosody) without also having concurrent central language deficits.

**Voice.** The deficient vocal characteristics found included hypo- and hypernasality, breathiness, whispering, and subvocalization. These difficulties have not been discussed specifically in the literature on schizophrenia. However, Cantor et al. (1981) described hypotonic children and adolescents with schizophrenia, and we know hyponasality is often a vocal correlate of hypotonia. Similarly, Bick and Kinsbourne (1987) described subvocalizations in adults with schizophrenia (and subvocalization may reflect a voice disorder).

Voice disorders may also occur as an aspect of a communication disorder picture. It is not clear whether the voice disorders identified here uniformly relate more closely to the schizophrenic process or to the communication disorder pattern.

**Fluency.** This study found that somewhat more than half the subjects had speech fluency problems. Fluency problems have been described in adult schizophrenia in several ways. Andreasen (1979a, 1979b) described three distinct formal thought disorders, which include a fluency factor and affect the flow of speech: thought blocking, distractible speech, and pressure of speech. In thought blocking the speaker’s train of thought is interrupted and the flow of speech is interrupted, sometimes by pauses lasting from seconds to minutes in which the patient cannot recall what he is saying or what he meant to say. In distractible speech the patient stops talking in the middle of a sentence or idea and changes the subject in response to the intrusion of another stimulus. Dysfluency occurs in the form of pausing, false starts, and disruptions by changes in topic or lack of sentence completion. Disruptions may occur at the sound and syllable level, but are more likely to occur at the word, phrase, or sentence level. In pressure of speech, sentences may be left incomplete because of the patient’s eagerness to get an idea across. The speaker may also use false starts and perseverations and alter the speed of speech flow.

A fluency factor was also recognized by Holzman et al. (1986), who included a “fragmentation” parameter in their revised Thought Disorder Index (Soloyav et al. 1986). Also, fluency tests are included in many neuropsychological studies of schizophrenia (Goldberg et al. 1988; Gruzelier et al. 1988; Williamson et al. 1989; Sagawa et al. 1990; Cleghorn et al. 1991).

As noted above, dysfluency has also been found to be a significant factor in linguistic studies of adults with schizophrenia (Thomas et al. 1990). Dysfluency also occurs in isolation and as part of a more general communication disorder picture. However, the incidence of the dysfluencies in communication-disordered populations does not appear to be as high as that seen in the present results. The results appear to show a phenomenology similar to that of adults with schizophrenia who show considerable fluency problems.

**Prosody.** More than four-fifths of the subjects also had disturbances in expressive prosody. Prosodic disturbances are frequently mentioned as part of the abnormalities seen in schizophrenic speech (Alpert 1981) and often appear in the guise of affective flattening or blunting (Andreasen 1982; American Psychiatric Association 1987). Bleuler (1911/1950) described distortions in the pitch, loudness, and duration of speech.
Prosody in schizophrenia has generally been associated with production characteristics. For example, Frickhione et al. (1986) studied aprosodia in eight subjects with schizophrenia and found that seven had aprosodia with associated motor components. On the other hand, Murphy and Cutting (1990) studied both prosodic comprehension and expression in schizophrenia and showed that those with schizophrenia were significantly inferior to normal controls on emotional prosody comprehension and had a significant inferiority in emotional prosody expression.

From the perspective of communication handicaps, prosodic abnormalities are most often seen in neurological disturbances where they are associated with right hemisphere lesions (Borod et al. 1989). Prosodic disturbances do not appear to occur with great frequency in children and adolescents with pure communication handicaps. When they are seen, these disturbances generally are secondary to motor speech disturbances such as dysarthria or apraxia. The exception is obvious abnormalities in verbal children with autism. The high incidence of prosodic disturbances in the current sample, again, appears to parallel the phenomenon of adult schizophrenia.

In summary, the results of the present study reveal a close parallel to the speech, language, and communication characteristics reported in adult schizophrenia. On the other hand, several of the characteristics also appear to support the notion of a spectrum of disorders affecting social communication (Tanguay 1990). Close parallels to the communication deficits seen in high-functioning autistic individuals are discussed by Baltaxe and Simmons (1992a).

Concerning the issue of gender and the presence of mental retardation and seizure disorders, this study used a referred clinical sample, so these factors were not controlled. However, they are important because they have been identified as possible risk factors for both communication disorders and schizophrenia.

Retrospective, followup, and high-risk studies had indicated that a significant number of children and adolescents with early-onset schizophrenia had communication delays and abnormalities, often preceding the disorder. It is not currently clear to what degree earlier deficits continue to exist at the time of full-blown schizophrenia and to what degree they reflect aspects of the schizophrenia itself. This may be a difficult question to answer because the risk factors associated with the onset of schizophrenia, such as pregnancy, birth complications, and illnesses affecting the central nervous system, are also the risk factors related to the development of communication handicaps (Rutter and Garmezy 1983; Shaffer 1985).

Gender. Although schizophrenia in the adult population is distributed approximately evenly among the sexes (American Psychiatric Association 1987), in younger age groups the disorder is more commonly seen in males (Graham 1986). The current results, with a male-to-female ratio of approximately 2.3:1, are in agreement with these findings. However, Beitchman (1983), in a review of the literature, noted that the gender ratio of schizophrenia in children varied widely, depending on the particular study. Because developmental communication handicaps occur more frequently in males than females, the greater male prevalence in the present sample may be due to the presence of communication handicaps in all subjects (Baltaxe and Simmons 1992b). We suggest that presence or absence of a communication handicap may also account for the inconsistencies in gender ratios reported by Beitchman (1983). The potential compounding effect of language disabilities on the gender variable in early-onset schizophrenia therefore deserves further scrutiny.

Mental Retardation. Seven of the subjects had a diagnosis of mental retardation. Rutter et al. (1970) had noted that psychiatric disturbances in childhood are often associated with a low IQ. Corbett (1985) observed that, etiologically, it is more likely for low IQ to antedate the psychiatric disorder. However, a general deterioration in cognitive function can be expected with the development of schizophrenia (American Psychiatric Association 1987).

Mental retardation results in delays in language development. However, because mental retardation may be associated with a variety of underlying causes, additional language problems can also be expected beyond the delay associated with a lower mental age (Miller 1981). It is not possible here to determine whether the additional communication handicaps...
in the seven mentally retarded subjects were associated with underlying causes, which may also have played a role in the development of the schizophrenia or the schizophrenia process itself.

Seizure Disorders. The present sample included five youngsters who, in addition to the diagnosis of schizophrenia, also had a seizure disorder. Shaffer (1985) noted that individuals with such disorders are at particular risk for developing psychiatric disorders. Graham (1986) observed that children with long-standing temporal lobe epilepsy seemed to be at greater risk for the development of schizophrenia. Several authors have also suggested that the development of a psychosis, including schizophrenia, is particularly evident when epilepsy begins during puberty (Slater et al. 1963). The increase of other developmental abnormalities early in life often reported for individuals with early-onset schizophrenia may be an additional risk factor for the development of the schizophrenic disorder (Reichman 1983; Graham 1986). Such developmental abnormalities are frequently further linked with an increased incidence of encephalitis, neoplasms, irradiation, prenatal trauma, and seizure disorders. An excess of obstetric complications appears to characterize the histories of patients with schizophrenia in general (O’Callaghan et al. 1990). Wilcox and Nasrallah (1987) also reported an increased incidence of head trauma before the age of 10 for individuals with early-onset schizophrenia. Associated chronic brain syndromes may place some children and adolescents at greater risk for schizophrenia (Steinberg 1985). Such underlying causes are frequently also associated with communication handicaps (McGee et al. 1984). Communication-handicapped children commonly show a history of perinatal and perinatal difficulties and encephalitic and other disease processes affecting the brain. Seizure disorders, in particular temporal lobe epilepsy, are often linked to communication handicaps. Again, the exact interrelationship between the three types of disorders—schizophrenia, seizure disorder, and communication handicap—cannot be determined within the scope of the present study.

In summary, the above study demonstrates that children and adolescents with early-onset schizophrenia show a broad variety of communication deficits. Most of these parallel deficits also seen in adult schizophrenia seem to present further evidence in support of the continuity of the schizophrenia disorder from childhood to adolescence. However, this investigation also points up linguistic similarities to such developmental disorders as autism and pervasive developmental disorder (not otherwise specified) particularly in pragmatic deficits, prosodic disturbances, dysfluencies, and deficits with abstract language, but also in receptive and expressive syntax. The present findings thus appear to support the notion of a spectrum of disorders, all affecting social communication. It is not clear to what extent the deficits seen in the current study also have their roots in an earlier developmental delay and, perhaps, contribute to the early onset of the schizophrenia disorder. Future studies are needed to focus on these and other issues to further explore the areas of communication deficits identified above and to compare the differences between early-onset schizophrenia subjects with clearly identified communication deficits and those with less obvious signs of communication impairment.

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**Appendix:**

**Definitions and Operational Definitions of Speech/Language Terms**

**A. Language Terms**

**Language.** Language is a conventional system of arbitrary symbols used as a code for representing and communicating messages. It involves two major functions: reception (i.e., understanding, comprehension, or receptive language) and expression (i.e., communicating, expressing, or expressive language). Specific areas of language include vocabulary, syntax, and abstract language. In the present study, language disorder was operationally defined as (1) scores in the deficit range in both vocabulary and syntax and/or (2) scores in the deficit range for abstract language, expressive language, or receptive language.

**Abstract language.** Abstract language is a receptive/expressive linguistic function involving the abilities to discern implied information or information requiring inferences and logical conclusions; to observe unspoken cause and effect relationships; to use and understand proverbs, metaphors, idioms, and complex analogies; to resolve linguistic ambiguities; to form associations between words; and to discriminate between fact and fiction and fact and opinion (Wiig and Semel 1984). A deficit in abstract language was defined operationally in the present study as scores in the deficit range on the following three subtests of the Test of Language Competence (Wiig and Secord 1988): the making inferences subtest, the sentence ambiguities subtest, and the figurative language subtest.

**Auditory processing.** Auditory processing refers to the capacity for processing language that is heard (i.e., through the auditory channel). The psycholinguistic processes involved in auditory
processing are not understood, and there is some controversy about whether they are purely linguistic processes or larger cognitive processes (Barch and Berenbaum 1994). Various component skills have been hypothesized, including selective attention, auditory attention, discrimination of speech versus background noise, discrimination of individual speech sounds, memory for auditory information, sequencing of auditory information, and cognitive information processing (Wiig and Semel 1984). In the present work, an auditory processing deficit was operationally defined by scores in the deficit range on the following tests and subtests: (1) the word sequences subtest and the sentence imitation subtest of the Detroit Tests of Learning Aptitude–Revised (DTLA-R; Hammill 1985) and (2) the word memory subtest, the auditory number memory subtest, and the sentence memory subtest of the subtests of the Test of Auditory Perceptual Skill–Revised (TAPS-R; Gardner 1985).

Pragmatics. Pragmatics relates to the rules for using language in a social context. Pragmatic behaviors or the interactive use of language were assessed in the present study using a protocol (Baltaxe and Simmons 1987) adapted from Prutting and Kirchner (1987). The following areas of functioning and specific problems were rated: (1) General discourse features, that is, failing to orient the listener by establishing relevant background information, ignoring relevant background information, having difficulties relating coherent narratives, having difficulties sequencing events in time, having difficulties using concepts of time, and perseverating; (2) difficulties relating to topic, that is, having difficulties establishing topics, maintaining topics, inappropriately switching topics, failing to differentiate between old and new information, using pronouns when introducing information, using noun phrases when old information is offered, failing to identify antecedent referents, inappropriately omitting information, inappropriately switching from singular to plural or plural to singular, inappropriately referring to situations, inappropriately switching between situations; (3) difficulties relating to turn taking, that is, not initiating speech, paucity of responses, interrupting, not repairing or revising turn-taking errors, refusal to allow other party to have a turn speaking, manipulating conversation through use of rhetorical expressions; and (4) stylistic variations, that is, the use of tone of voice or word choices inappropriate to the dialect or social group involved in the communication.

Syntax. Syntax refers to the grammatical subsystem of language, including the grammatical categories, and to the grammatical relations and rules required to form sentences and phrases. A deficit in syntax was operationally defined in the present study by (1) scores in the deficit range on the oral directions subtest, the word classes subtest, the semantic relations subtests of the Clinical Evaluation of Language Fundamentals–Revised ( CELF–R; Semel et al. 1987), and on the Test for Auditory Comprehension of Language–Revised (Carrow-Woolfolk 1985) (assessing receptive syntax); and/or (2) scores in the deficit range on the formulated sentences subtest, the sentence assembly subtest, and the recalling sentences subtests of the CELF–R (assessing expressive syntax); and (3) results of an analysis of a spontaneous language sample using published norms for grammatical structures.

Vocabulary. Vocabulary consists of the discrete units of language that represent concepts, ideas, and meaningful relations. In the present study, vocabulary deficits were operationally defined by scores in the deficit range on (1) the Peabody Picture Vocabulary Test–Revised (Dunn and Dunn 1981) (assessing receptive vocabulary) and (2) the Expressive One Word Picture Vocabulary Test (Gardner 1983) (assessing expressive vocabulary).

B. Speech Terms

Speech. Speech refers to the motor act of expressing language and includes articulation, fluency, prosody, and voice. In the present study a disorder in any of these areas was considered a “speech disorder” and aspects of speech were evaluated based on spontaneous language samples and the clinical impressions of a speech pathologist.

Articulation. Articulation is the motor act of producing speech sounds in sequence and in various combinations to form words, sentences, and phrases. In addition to ratings by a speech pathologist, articulation was assessed in the present study by using the Goldman-Fristoe Test of Articulation (Goldman and Fristoe 1986).
Fluency. Fluency includes pausing, hesitations, false starts, and repetitions of sounds, syllables, words, and phrases as well as shifts in the speed of flow of speech.

Prosody. Prosody refers to the melody of speech, including patterns of stress (loudness) and tones (intonation). Prosody is used to communicate affective information such as sadness, happiness, anger, surprise, disapproval, doubt, irony, and other emotional shadings of a communication. Prosody acts as a linguistic indicator of different sentence types.

Voice. Voice refers to the mechanism by which speech sounds are produced. It includes phonation, articulation-resonance, respiration, pitch, and loudness.

An Invitation to Readers

Providing a forum for a lively exchange of ideas ranks high among the Schizophrenia Bulletin's objectives. In the section At Issue, readers are asked to comment on specific controversial subjects that merit wide discussion. But remarks need not be confined to the issues we have identified. At Issue is open to any schizophrenia-related topic that needs airing. It is a place for readers to discuss articles that appear in the Bulletin or elsewhere in the professional literature, to report informally on experiences in the clinic, laboratory, or community, and to share ideas—including those that might seem to be radical notions. We welcome all comments.—The Editors.

Send your remarks to:

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