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Reading and Metaphonological Outcomes in Late Talkers

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Children with a history of slow expressive language development (SELD) were followed to second grade, at which point outcomes in terms of speech, language, cognitive skills, reading achievement, and metaphonological performance were evaluated. Although there were some statistically significant differences between groups, children with a history of SELD generally performed within the normal range on the measures collected. Relations among speech, reading, and metaphonology in the SELD cohort appeared to operate in a manner similar to that seen in groups with typical language development. The implications of these findings for understanding the nature of specific language impairments and for treating early circumscribed language delays are discussed.

KEY WORDS: reading, phonological awareness, language disorder

Children with learning disabilities frequently have histories of slow language growth (Catts & Kamhi, 1986; Maxwell & Wallach, 1984; Roth & Spekman, 1989; Weiner, 1985). Further, it has been shown that preschoolers with delayed language tend to have chronic deficits (Aram, Ekelman, & Nation, 1984; Aram & Nation, 1980; Garvey & Gordon, 1973; Griffiths, 1969; Hall & Tomblin, 1978; King, Jones, & Lasky, 1982; Shriberg & Kwiatkowski, 1988). Until recently, though, there have been few data on which to base prognostic statements for children under age 3 who appear to be normal in every way except for the development of language. The condition of circumscribed language delay in very young children is relatively common. Rescorla (1989) reported that 1015% of middle-class toddlers failed to produce more than 50 words or use two-word combinations at 24 months of age.

Outcome studies (summarized by Paul, 1996) of children who had small vocabularies as toddlers suggest that many of these children retain deficits throughout the preschool period. These deficits, although appearing as an overall delay at age 2, become more focused later in the preschool years to a few areas of language production, including phonology, syntax, and narrative skills. By school age, the majority of these children perform within the normal range of expressive language, and even those who do not function broadly within the normal range of school achievement (Bishop & Adams, 1990; Paul, 1996; Rescorla, 1993; Whitehurst & Fischel, 1994). These findings appear to suggest low risk for chronic learning disability in the SELD population.

Although the language and early school achievement scores of these children fall within the normal range, they are significantly lower than peers with normal language histories from similar socioeconomic backgrounds and with similar nonverbal IQ levels (Paul, 1996; Rescorla, 1993; Thal & Katich, in press.) Further, investigators such as Nippold and Schwarz (1996) have questioned whether the apparent success of children with SELD in early grades may be in jeopardy as they proceed to higher academic levels. Because the demands for language and literacy increase in intermediate and upper grades, primary grades are simply too early to decide whether children with a history of SELD evidence any educational handicaps. Nippold and Schwarz advocate probing higher level language skills in order to identify residual linguistic weaknesses in children with a history of SELD.

An example of such a higher level linguistic skill is phonological awareness. Metaphonological skills have been studied extensively (e.g., Brady & Shankweiler, 1991; Hodson, 1994; van Kleeck, 1995), in part because of their demonstrated connection with reading ability (see Blachman, 1989; Catts, 1993; Swank, 1994 for reviews). Treiman and Zukowski (1991) outlined a sequence of acquisition of phonological awareness. In their model, rhyme is the first level. Children as young as 3 are able to recognize when two words rhyme. Three- and 4-year olds are also able to recognize when initial syllables in words match (hammer/hammock). Preschoolers, though, have difficulty analyzing smaller units within words. Only half the 3- to 4-years olds tested were able to recognize that two onsets matched (broom/brand). It is not until kindergarten that most children can accomplish this task. The ability to recognize that single consonants in words match (blue/brave) is not mastered until grade 1, with initial consonants being easier to match than final ones.

Treiman and Zukowski also showed that the ability to recognize matches between syllables or between consonants within words emerges earlier than the ability to count (segment) these units within a single word. A one-to-one correspondence task (derived from Liberman, Shankweiler, Fischer, & Carter, 1974), in which the child taps or moves a disk for each segment within a word, showed that children who could accomplish the soundmatching task were often unable to do this segmentation. Further, Yopp (1988) showed that the ability to count or isolate segments within a word is acquired earlier than the ability to manipulate sounds in words, such as saying sun backwards or

rearranging the order of phonemes in words. Bruce (1964) showed that it is not until age 8 that children can reliably perform phoneme deletion tasks, such as "What would stand be without the 't'?" Thus the research on phonological awareness has revealed the following sequence of acquisition of phonological awareness skills:

Identifying rhymes

Matching syllables

Matching onsets

Counting segments within words

Manipulating the order of segments within words

Deleting segments within words

There is some debate regarding the causal direction of the well-established relationship between reading and metaphonological skills. In one view (Goswami & Bryant 1990), awareness of intrasyllable structure (onset/rime) is considered prerequisite for reading, but segmentation ability is thought to result from reading ability. Still, it is known that training in phonological segmentation improves reading performance (Blachman, 1994). Moreover, phonological segmentation skills are the best predictors of word identification ability, which is a primary determinant of reading comprehension (Vellutino & Scanlon, 1991). Despite these findings, it is clear that some aspects of phonological awareness emerge after reading has begun, indicating that they are not prerequisite to it (Bruce, 1964). The present study will present data on the relationship between reading and phonological awareness in a population of children with a history of slow expressive language development (SELD).

In addition, the present study extends the followup of a SELD cohort to second grade and examines cognitive, language, school achievement, and metaphonological outcomes. These data will be presented to address the question of whether the apparently good outcomes seen in this population at school entrance (Paul, 1996) persist beyond the first grade. In addition, metaphonological skills will be examined because of their known relationship with reading achievement (Blachman, 1989), as a way of exploring the connection between reading and phonological awareness in the SELD population.

Method

Subjects

The Portland Language Development Project, a longitudinal study of outcomes of early language delay, has been following a cohort of children who were slow to begin talking since they were 20-34 months old. At that time, subjects were recruited into the study through pediatricians' offices, radio announcements, and newspaper advertisements requesting participation of families of 2-year-olds who did not talk. Thirty-two children with little speech, who were recruited at age 2 through these means, remained in the study until they were in second grade. SELD diagnosis was confirmed at intake by having parents fill out Rescorla's (1989) Language Development Survey (LDS), a checklist of 300 of the most common words in children's early vocabularies. The LDS has been shown to have high validity, reliability, sensitivity, and specificity for identifying language delay in 2-year-olds. Children whose families reported fewer than 50 words on this measure were considered SELD.

A contrast group of 27 normal-language (NL) toddlers, whose parents reported more than 50 words on the LDS, was recruited through the same pediatricians' offices and remained in the study until second grade. The contrast group was matched to the SELD group for age, socioeconomic status, sex, birth order, and performance on nonverbal cognitive items on the Bayley Scales of Infant Development (1969).

All subjects had a total standard score above 85 (Bayley). All passed a hearing screening in a sound field at 25 dB and passed observational screening for neurological disorders and for autism. The SELD and NL groups were closely matched in terms of socioeconomic level (both were middle- to upper-middle-class and included no children from impoverished backgrounds). Moreover, Paul (1996) reported that these two groups were closely matched on nonverbal IQ scores on the McCarthy Scales of Children's Abilities (McCarthy, 1972) in kindergarten. Detailed information concerning the subjects' status at intake is provided in Paul (1991). Demographic data for the cohort appear in Table 1.

Procedures

Subjects were seen for yearly follow-up evaluation of language and related skills through their second grade year. For the present report, cognitive, language, school achievement, and metaphonological data collected at the second grade follow-up, as well as data from a phonological awareness task collected at the first grade assessment, will be presented.

Standardized Language and Cognitive Testing

Test of Language Development-Primary. The TOLD-P (Newcomer & Hammill, 1988) was administered to all subjects at the second grade evaluation. The TOLD-P consists of subtests that measure semantics, syntax, and phonology in both expressive and receptive modalities. It provides several composite scores, based on varying combinations of scores from these individual subtests. In this report, mean standard scores (and standard deviations) for each diagnostic group will be reported for two of these composite scores: Speaking Quotient and Listening Quotient. The Speaking Quotient (SQ) is a composite of scores on the expressive language subtests and includes measures of expressive syntax, semantics, and phonology. The Listening Quotient (LQ) is a composite of scores on the language comprehension subtests and includes measures of receptive syntax, semantics, and phonology.

McCarthy Scales of Children's Abilities. This test (McCarthy, 1972) was also administered in second grade as a measure of cognitive function. The McCarthy provides both a verbal and performance subscore. These are reported as T scores with a mean of 50 and a standard deviation of 10.

Spontaneous Speech Analyses

Speech Sample Collection. Spontaneous speech samples were collected using an interview format (Evans & Craig, 1992). The interviewer (a graduate research assistant on the project) asked each child a series of three open-ended questions about family, school, and hobbies, and used nondirective follow-up questions to keep the child talking for the 10-minute period. Speech samples were audio-recorded, using a transcribing tape recorder, and transcribed orthographically for analysis.

Speech Sample Analysis. Percent Consonants Correct (PCC) was employed as a quantitative measure of speech intelligibility (Shriberg & Kwiatkowski, 1982). The middle 100 words in each speech sample were used, and phonemic transcriptions for each consonant produced by the children were derived from the audiotaped speech samples. Target words were identified by comparing the phonemic transcriptions to the orthographic transcriptions. PCC was derived by counting the number of correct consonants (relative to the target consonants in words in the orthographic transcriptions) and dividing by the number of correct plus number of incorrect consonants (relative to the target consonants in words in the orthographic transcriptions) in the 100word sample. Reliability was established by having a second rater listen independently to an audiotape of 10% of the speech samples and compute PCC as just described. Interrater reliability was 97%.

Speech samples were also analyzed according to Lee's (1974) procedures for computing a Developmental Sentence Score. The DSS was chosen as the primary index of expressive language ability, first, because it had proved in earlier studies of this population (Paul, 1993) to be the most sensitive measure of differences between children with SELD and those with normal language histories. Second, the DSS was considered an ecologically more valid measure of language production, as it involves spontaneous conversation, than was a score on a standardized test. Fifty consecutive noun-verb utterances are analyzed for eight developmentally ordered levels of eight grammatical categories (Lee, 1974).

Metaphonological Tasks

An informal measure of phonological analysis skill (Ball & Blachman, 1988; Elkonin, 1973) was administered to all subjects during their first grade year. This task, called "say it and move it," is a one-to-one correspondence phoneme-segmentation activity. This task is difficult for most 5-year olds, but mastered by typical first graders (Liberman et al., 1974). It involves showing children how to move a disk for each phoneme in words of one-, two-, and three-phoneme length. After extensive practice trials, subjects are given 36 items, 5 with one phoneme (/o/), 13 with two (/if/), and 18 with three phonemes (/vat/). Order of words is randomized. Responses are considered correct if the subject moved the accurate number of disks, corresponding to the number of phonemes in the stimulus (one, two, or three). Scores on this measure were the number of fully correct responses out of the 36 trials.

In second grade, subjects were administered the Lindamood Auditory Conceptualization Test (LAC; Lindamood & Lindamood, 1979). This measure requires children to manipulate the order of the segmented phonemes they identify. This task is more difficult than phoneme-segmentation tasks, such as "say-it-and-move-it" task (Yopp, 1988). The LAC was chosen as an assessment procedure for second grade both because it would be sensitive to group differences of interest and because it provides norm-referenced data suitable for comparison to other measures used in the study. A phoneme-deletion task was not employed because this skill is not mastered until age 8 (Bruce, 1964). Use of the LAC thus avoided both ceiling and floor effects.

The LAC involves practice trials associating different colored blocks randomly with phonemes (this [blue] is/i/; this [red] is/f/; this [green] is/s/). Subjects are then told, "If this (red-blue-green) is/fis/, what is/sif/?" The child's task is to rearrange the blocks to correspond to the phonemes in the new item (e.g., /sif/; green-bluered). Although the LAC involves a motor component, there is no time limit on the child's response. Moreover, the quality of the motor response is not considered in scoring. The blocks have only to be placed so that the intended sequential order is obvious. Thus any motor deficits the children with SELD might have experienced (none were evident to the experimenters) had no effect on the LAC scoring.

The LAC provides norm-referenced scores for kindergarten through sixth grade. Responses are scored as "correct" only if the child rearranges the blocks accurately to represent each of the phonemes in the stimulus. (For example, if the child produced green-red-blue for the item above, this response would be scored as incorrect.)

School Achievement

When subjects were in second grade the Peabody Individual Achievement Test (PIAT; Dunn & Markwardt, 1970) was administered in order to assess school achievement. This test provides standardized scores in the areas of Reading Recognition (word identification), Reading Comprehension, Spelling, Mathematics, and General Information.

Diagnostic Subgroups at Second Grade

Using DSS scores, the subjects with a history of SELD were subdivided into two groups at second grade. Children who were originally placed in the SELD group at intake and had DSS scores at or above 8.11 (the 10th percentile for age 6:6--year:months) were referred to as the History of Expressive Language Delay (HELD) group. Twenty-seven (84%) of the 32 original subjects with SELD made up this subgroup. The remaining 5 (16%) subjects from the original SELD group scored below 8.11 on the DSS and were considered the chronic Expressive Language Delay group (ELD). All subjects originally classified as having normal language (NL) had DSS scores above 8.11 in second grade. Demographic data on the subjects at the second-grade evaluation, broken down by subgroup, appear in Table 2.

Results

Between-Group Differences

Table 3 presents the data from the outcome measures collected for language, cognition, school achievement, and metaphonology. The Kruskal-Wallis nonparametric Analysis of Variance was used to detect differences because of the difference in sample sizes among the three groups. Post hoc pair-wise testing to identify the sources of difference was accomplished using Mann-Whitney U tests.

Table 3 shows, first, that there were no significant differences among the groups on the "say it and move it" phoneme-segmentation task given in first grade $N = 59$) = .82, $p < .17$].

On the second-grade measures, there were significant differences among groups on the verbal scale of the McCarthy [$\chi^2(2) = 10.00$, $p < .006$]. Both the NL ($U = 13.00$, $p < .005$) and HELD ($U = 26.50$, $p < .03$) groups scored significantly higher than the ELD and were not significantly different from each other ($U = 257.50$, $p > .05$). These results are similar to those reported in Paul (1996) for kindergarten McCarthy scores in this population, and they reflect the continuing verbal deficits of the ELD group.

On the McCarthy Performance scale there was also a significant difference among groups [$\chi^2(2, N = 59) = 5.83$, $p < .05$]. Here, only the difference between the NL and ELD groups reached significance ($U = 23.50$, $p < .02$), with no other significant pair-wise differences (NL/HELD: $U = 283.50$, $p > .05$; HELD/ELD: $U = 39.5$, $p > .05$).

There were significant differences in scores on the TOLD Speaking (expressive language) Quotient in second grade [$\chi^2(2, N = 59) = 11.9, p < .003$], with the NL group performing significantly better than both the HELD ($U = 205.50, p < .006$) and the ELD groups ($U = 13.00, p < .005$). The difference between the ELD and HELD groups did not reach significance ($U = 47.00, p > .05$). There were no significant differences among groups on the TOLD Listening (receptive language) Quotient [$\chi^2(2, N = 59) = 2.44, p > .05$] or on the Percent Consonants Correct in spontaneous speech [$\chi^2(2, N = 59) = 4.70, p > .05$]. PCC scores for all groups were above 90%, indicating good intelligibility for all subjects.

No differences appeared on the Reading Recognition (word identification), Reading Comprehension, or Spelling achievement tests given in second grade [$\chi^2(2, N = 59) = 1.26, p > .05$; $\chi^2(2, N = 59) = 3.80, p > .05$; $\chi^2(2, N = 59) = 0.66, p > .05$, respectively]. There were significant differences among the groups on the Mathematics [$\chi^2(2, N = 59) = 8.51, p < .01$] and General Information [$\chi^2(2, N = 59) = 6.96, p < .03$] subtests of the PIAT. Both the NL ($U = 10.50, p < .003$) and the HELD ($U = 18.00, p < .01$) groups scored significantly higher than children with chronic ELD on the Mathematics subtest. There was no significant difference between the NL and HELD groups on this measure ($U = 347.50, p > .05$). On General Information, the NL group scored significantly higher than the group with ELD ($U = 17.00, p < .009$). However, the group with HELD was not significantly different from either the NL ($U = 298.00, p > .05$) or ELD groups ($U = 31.00, p > .05$). It should be noted, however, that mean scores for all three groups on all subtests of the PIAT and TOLD fell well within the normal range in second grade.

Results of the analysis of variance of the LAC scores revealed a significant difference among the three groups [$\chi^2(2, N = 59) = 5.77, p < .05$]. Post hoc analyses showed that the ELD group scored significantly lower than peers with NL ($U = 25.50, p < .03$) and than those with HELD ($U = 28.00, p < .04$). There was no difference between the NL and HELD groups ($U = 308.5, p > .05$). It should be noted that the average score for the ELD group fell at the 47th percentile according to LAC norms, again well within the normal range. The means for the HELD and NL groups fell within the 72nd-79th percentile range, suggesting once more that these relatively high SES groups perform generally above average.

Norm-Referenced Performance

Table 4 shows the number and percentage of children in each group whose scores fell below the 10th percentile (or below its equivalent, a standard score of 80) on the second-grade tests. In addition, Table 4 contains a breakdown of the subtests that constitute the TOLD Speaking (expressive language) Quotient. The number and percentage of each group who scored below the 10th percentile on each of these subtests is also given. On most tests, none of the subjects from any of the three groups had scores below the cut-off. Three subjects (11%) from the HELD group scored below 80 on the TOLD Speaking Quotient. Inspecting subtest scores for the TOLD reveals that 37% of the subjects with HELD fell below the 10th percentile in articulation performance. However, on the other subtests the percentage of HELD subjects who scored below the 10th percentile was similar to the NL group. Thus the difference between the NL and HELD groups on the TOLD SQ reflects persistent articulation errors in the children with HELD. Although over a third of this group scored below criterion in articulation, none scored below criterion on the LAC. This finding suggests that even if articulation problems persist in this population, they do not have an adverse effect on phonological awareness. Moreover, the average PCC for the HELD group was over 93%, suggesting that the articulation errors on the TOLD are residual (Shriberg, 1994) and do not affect speech intelligibility.

For the ELD group, the areas in which some subjects failed to reach criterion were Sentence Imitation and Grammatical Completion. Thus the problems that distinguish this group are not semantic (i.e., no children with ELD failed to reach criterion on Oral Vocabulary) but morphological (Grammatical Completion) and syntactic (Sentence Imitation), consistent with their lower DSS scores.

In achievement scores on the PLAT, Table 4 shows that one subject (4%) in the NL group and one (20%) from the ELD group scored below 80 on Reading Recognition (word identification). One subject (4%) from the HELD group scored below 80 on Reading Comprehension. Even though the ELD group scored significantly lower on the TOLD Speaking Quotient and on the PIAT Mathematics and General Information subtests (see Table 3), none of the children with ELD performed below a standard score of 80. However, 2 of the 5 children in the ELD group did score below the 10th percentile on the LAC.

Predicting Reading Achievement

Two step-wise regression analyses were used to explore the relation of LAC, reading, and language performance in this sample. The first used Reading Recognition (word identification) scores on the PIAT as the dependent variable

and entered DSS, TOLD Speaking (expressive language) Quotient, TOLD Listening (receptive language) Quotient, and LAC scores as predictors. The only significant predictor ($r = .63$, $p < .0001$) of word identification performance was the LAC, with 39% of the variance in word identification score accounted for by LAC score alone. With the Reading Comprehension score on the PIAT as the dependent variable and using DSS, TOLD Speaking, TOLD Listening, and LAC as predictors, only LAC scores provided any significant prediction of reading comprehension ($r = .52$, $p < .003$), with 26% of the variance in reading comprehension accounted for by LAC performance.

Discussion

Summary of Outcome Findings

These data indicate that 16% of children with a history of SELD have syntactic production deficits in spontaneous speech at second grade. Another 9% (3 children in the HELD subgroup/32 children originally showing SELD) score below the normal range on a standardized expressive language test, even though they perform adequately in conversational speech. Lowered scores for these three subjects, however, are primarily attributable to residual articulation errors. The overriding finding of this study is that children with a history of SELD perform within the normal range on standardized measures of language and school achievement at second grade.

This is the case even though the second graders with ELD scored significantly lower than peers with NL on a nonverbal cognitive measure. Paul (1996) reported that in kindergarten, when 26% of the children with a history of SELD were classified as ELD, there were significant differences on verbal McCarthy scores but not on the nonverbal scale. The children who still remain in the ELD group as late as second grade, however, constitute only 16% of the original SELD group, and these children would appear to be the ones with lower general cognitive abilities. Still, it should be noted that the nonverbal T scores of the children with ELD are within (though at the low end of) the normal range (40-60). And even these children with persistent ELD and lower general performance "intelligence" still operate within the normal range of school achievement at the primary level.

There are few statistically significant differences among the groups in school achievement. There were no differences in the areas most closely related to literacy: Reading Recognition, Reading Comprehension, or Spelling Achievement. The groups differed on the LAC metaphonological task, with the NL and HELD groups performing significantly better than the ELD. Nonetheless, the LAC scores for the ELD group are well within the normal range. On the other measures for which there were significant differences between NL and ELD groups (TOLD Speaking Quotient, Mathematics, General Information, LAC), again none of the children with ELD scored below the normal range.

Prognosis for Children With SELD

These results suggest SELD is not a significant risk factor for learning disabilities, because virtually all the children with this history perform within the normal range of school achievement, as well as of metaphonological skill, in the primary grades. Moreover, the children in the ELD group would not qualify as learning disabled by most definitions because they show no significant discrepancy among verbal, nonverbal, and achievement performance. Their performance is consistent with their relatively lower general cognitive level.

Despite this apparently positive prognosis for children with SELD, it is probably too soon to rule out longterm risk entirely. It is important to remember that success in reading in the primary grades requires relatively low levels of either verbal or literacy skill. In first and second grade, the curriculum involves "learning to read," with basic word recognition and decoding skills introduced slowly and comprehension demands kept at relatively low levels (Chall, 1983). Demands for reading comprehension in second grade have not yet escalated to the point where, in Chall's scheme, children are required to "read to learn"--to acquire new information from print and draw inferences and conclusions from it. Longer term follow-up into the intermediate and secondary grades is necessary to confirm the hopeful findings reported here. Children with ELD who show somewhat more limited cognitive performance may begin to evidence academic difficulties as the demands of the curriculum increase.

There is anecdotal evidence to suggest that this may be true. An informal telephone survey, conducted when the children were in fourth grade (Abild-Lane, 1996), of the parents of the 5 children in the ELD group revealed that 4 of the 5 had received some special services in school, and 3 of the 5 were currently eligible for special education or speech-language services. More systematic and controlled research is needed to confirm and extend these findings.

Relations Among Speech, Reading, and Metaphonology

The regression findings of this study are consistent with other reports of a strong predictive relationship between metaphonological awareness and reading (e.g., Blachman, 1989; Treiman & Zukowski, 1991; Yopp, 1988). The regression results suggest that this relationship extends to children with SELD.

The articulation errors seen in children with SELD did not appear to adversely affect metaphonological skills or reading achievement. This contrasts with the findings of Webster and Plante (1992). However, Webster and Plante's subjects were reading disabled. Thus, children with SELD are not necessarily from the same population as children with Reading or Learning Disabilities.

Despite some residual articulation errors in the children with HELD, the PCC data show that there are no significant differences in the average intelligibility of speech among the three groups. In fact, none of the subjects in any of the groups had PCC scores that would reflect levels of involvement greater than "mild" (Shriberg & Kwiatkowski, 1982). Thus, none of the subjects, even those who scored below criterion on an articulation test, would be considered to have impaired intelligibility, and this may help to explain why metaphonological skills were not affected.

Clinical and Theoretical Implications

These findings raise two issues. The first has to do with our understanding of the definition and roots of language disorders, their relation to the spectrum of normal development, and the theories we build to explain the appearance of seemingly specific impairments of language development. The second concerns the clinical implications of the results and the ways in which they should influence clinicians attempting to make intervention decisions for young children who present with SELD.

Implications for Theory and Research on Language Disorders

It is reasonable to ask if the children described here are from the same population as those described in the literature on Specific Language Impairment (SLI) (e.g., Johnston, 1994; Leonard, 1994; Rice, 1994; and Watkins, 1994). Should studies of children with SELD be considered to provide evidence about SLI? There are characteristics of the children studied as "late talkers," or SELD, that differentiate them from those discussed under the rubric of Specific Language Impairment (SLI).

First, Paul (1991) reported on nonverbal cognitive characteristics in SELD. Average score on the Bayley Scale of Infant Mental Development (Bayley, 1969) for the NL group in this cohort was 116, whereas for the SELD group it was 97. Paul (1991) also observed that 19 of the 40 items at the 18- to 30-month level on the Bayley scale tapped verbal skills. When these verbal items were removed, there was no significant difference between the two groups on number of items passed. This implies that children with SELD, on average, are functioning at a nonverbal IQ level of 116, in the above average range. Paul (1996) reported that this pattern of performance on IQ testing continued to hold when the cohort was retested in kindergarten. The children in the SELD cohort, as a group, appeared to be functioning at an above-average level in terms of nonverbal cognition. It was not until second grade, when all but 16% of the children originally classified as SELD had moved into the normal range of language performance, that differences in performance IQ became evident. It would appear, then, that at least one factor that determines which children remain language impaired as long as second grade is nonverbal cognition. The difference between the small group of children with low-average nonverbal cognition and the rest of the SELD group did not become evident until almost all the rest of the children with SELD had moved out of the ELD classification into the normal range of language performance.

A second characteristic to consider is the socioeconomic status (SES) of the children with SELD who participated in this study. These subjects were selected from small (all families in this cohort had three or fewer children) middle- to upper-middle-class homes. As Hart and Risley (1995) pointed out, higher SES is associated with better language outcomes in typically developing children-presumably as a function of parent input and interactional style. Subjects with SELD in this cohort would be expected to have experienced this facilitative style, and data on maternal linguistic input during early childhood (Paul & Elwood, 1991) found few differences in mothers' speech styles with toddlers with NL as opposed to those with SELD.

Thus the children in this cohort, and those like them followed by other research groups on late talkers, would appear to start out, for the most part, with strong nonverbal skills and to experience advantageous parental input and interaction. The screening procedures used in most current studies of children with SELD select for children with optimal chances for good outcomes on two counts. First, children must show relatively high nonverbal cognitive performance, as evidenced by their ability to score within the normal range on IQ tests heavily weighted with verbal

items. This requirement necessitates scoring above average on nonverbal items to compensate for the below average performance on the verbal ones. Second, children in these cohorts will experience optimal parental interaction because subjects from socioeconomically deprived backgrounds were excluded.

What, if anything, then, can the data on the development of children with SELD tell us about the source and course of specific language impairments? Two explanations for SLI that are currently being debated in the research literature--that of Leonard (1991) and that espoused by Bishop and her colleagues (e.g., Bishop & Edmundson, 1987; Powell & Bishop, 1992) and elaborated by Locke (1994)--are relevant to this discussion. Leonard has argued that SLI is not a disorder, but rather a "limitation" in the "language intelligence." Leonard invoked Gardner's (1983) discussion of multiple intelligences, relatively independent spheres of cognitive functioning. In this view, limited language skills, relative to abilities in other areas of mental development, represent just one of many possible constellations of mental ability. The only reason language limitations are often singled out as disorders is that verbal skills are the keystone of success in environments like schools that require high degrees of literacy. Children with limitations in other arenas of mental functioning, such as music for example, are not considered "disordered," but simply not talented in that area, and few adverse consequences are suffered as a result.

Bishop's group, on the other hand, has argued for seeing SLI as not truly specific, but rather a reflection of a general neurodevelopmental lag that affects a variety of areas of development. Again, though, because of the primacy of language as the key to success in school, the linguistic aspects of this lag are often more prominent than the subtle motor delays that accompany it (Powell & Bishop, 1992; Tallal, 1988).

Both these views present SLI not as a pathology but as a variation of normal development. Both views imply that the normal range of development is quite broad, and what makes some part of that range appear disordered is related to the requirements for language skills made by the culture. In our own society, particularly in middle-class environments, these demands are quite stringent.

In answer to the question, then, whether children with SELD are part of the SLI population: They would appear to be the "cream of the crop" of those with limited language skills or neurodevelopmental delays. By virtue of their relatively mild degree of language or neuromaturational limitation, their relatively high nonverbal intelligence, and their advantageous socioeconomic situations, such children have the potential to optimize their linguistic performance. By school age they function close to, although not quite as well as, their neurolinguistically more well-endowed peers.

The screening procedures used to include children in this cohort and those of similar studies of late talkers, which screen out most children with normal to low normal nonverbal cognition and those with any degree of economic deprivation, would appear to select for this "cream of the crop." Other young children with similar language skills but less nonverbal cognitive ability and less advantageous environments may be the ones who go on to be identified as SLI in the late preschool period, or as learning disabled (LD) at school age.

If this is the case, how does it inform our understanding of language learning and its disorders? It seems to suggest that there is a relatively broad range of normal development and that children can look quite delayed for a relatively long time at early ages and yet function broadly within that range later, given certain advantages of endowment and nurture. Even if SELD is seen as a variation of normal development, this view would not rule out other syndromes of SLI that are truly pathological, as Aram (1991) and Rapin (1988) have argued. Aram, Morris, and Hall (1993) have suggested the elimination of the term SLI as too general and misleading. They propose a change in focus to the characterization of subtypes of specific language disorders. SELD as discussed here in which language skills follow the pattern Paul (1996) identified: broad deficits in earliest childhood in the context of strong nonverbal performance and facilitative family environment; narrower deficits during the preschool years affecting syntax and phonology; and language function that is more or less normal, though not quite on par with peers in the early school years--may constitute one such subtype: the mildly "limited" or delayed language syndrome. Understanding the natural history of at least this type of disorder may help to differentiate it, in future research, from other, more pathologically based varieties of SLI.

Clinical Implications

To return to the second issue raised by these data, their clinical import, we need to consider not only the abilities of children with SELD but the demands of the environments in which they must function. It seems clear from the foregoing discussion that the consequences of limited language development will be different in different environments. In high-context, traditional cultures (Hall, 1983; Westby, 1995) interactions are deeply embedded within a familiar, unchanging network of interpersonal relationships and are informed by great amounts of shared

knowledge and extralinguistic support. In environments such as these, language limited to the extent seen in the current SELD cohort would have very little effect on the ability to function successfully. However, in our low-context, information driven society and in the school settings that prepare children for it, great demands are made for the understanding and production of specific, abstract language that conveys information about unfamiliar topics across time and distance in both spoken and written forms (Westby, 1995). In settings like these, small differences in linguistic competence can make big differences in performance.

As Leonard (1991) has argued, even if SELD is seen as a variation of normal development, children who experience it may benefit from environmental interventions that will help them function closer to the level of their peers. Public policy may not mandate early intervention for these children, because research to date suggests they are more than likely to function within the normal range by school age (Paul, 1996). Individual families, however, may opt to provide facilitative and preventive intervention during the preschool years to optimize communicative growth and lay a stronger foundation for later, higher level language and literacy skills. In working with families of young children with SELD, clinicians can discuss likely outcomes, as well as the role that language plays in laying a foundation for school success and the possible facilitative effects early intensive stimulation could have. Families would then be able to make informed decisions about allocating their resources to provide such intervention on the basis of their own concerns and priorities.

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Table 1. Subject demographic data at intake.

Legend for Chart:

- A - Group
- B - n
- C - Age (mo.) M
- D - Age (mo.) (SD)
- E - SES[a] M
- F - SES[a] (SD)
- G - # Words[b] M
- H - # Words[b] (SD)

A	B	C	D	E	F	G	H
NL	27	26.1	(3.8)	3.4	(1.0)	203.8	(68.9)
SELD	32	25.4	(3.4)	3.6	(0.8)	29.0	(24.0)

a Socioeconomic Status, using Myers & Bean's (1968) adaptation of Hollingshead's four-factor scale of social position, on a scale from 1 to 5, with 1 as the lowest rating

b Number of words reported by parents on Rescorla's (1989) Language Development Survey (LDS)

Table 2. Subject demographic data in second grade.

Legend for Chart:

- A - Group

B - n
 C - Age (mo.) M
 D - Age (mo.) (SD)
 E - SES[a] M
 F - SES[a] (SD)
 G - DSS M
 H - DSS (SD)

A	B	C	D	E	F	G	H
NL	27	96.6	(2.1)	3.4	(1.0)	10.5	(1.8)
HELD	27	96.2	(2.8)	3.6	(0.8)	10.1	(1.3)
ELD	5	95.8	(1.2)	3.0	(0.0)	7.1	(0.3)

a Socioeconomic Status, using Myers & Bean's (1968) adaptation of Hollingshead's four-factor scale of social position, on a scale from 1 to 5, with 1 as the lowest rating

Table 3. Means (and standard deviations) of scores on language, cognition, school achievement, and metaphonology outcome tests by group.

Legend for Chart:

A - Task
 B - Group NL
 C - Group HELD
 D - Group ELD

A	B	C	D
Grade 1			
Phonological Segmentation Task[a] raw score	27.0 (5.1)	24.1 (5.5)	23.6 (8.5)
Grade 2			
McCarthy Verbal T-score[*]	55.5 (11.4) [1]	50.2 (11.5) [1]	39.4 (6.3) [2]
McCarthy Performance T-score[*]	54.9 (10.7) [1]	51.3 (11.9) [1]	43.2 (8.1) [2]
TOLD[b] Speaking Quotient standard score[*]	109.1 (9.2) [1]	98.2 (14.9) [2]	91.8 (9.8) [2]
TOLD[b] Listening Quotient standard score	108.1 (9.6)	106.5 (11.0)	101.2 (7.4)

TOLD Speaking Quotient	0 (0%)	3 (11%) 0 (0%)
Oral Vocabulary[1]	0 (0%)	1 (3.7%) 0 (0%)
Sentence Imitation[1]	0 (0%)	2 (7.4%) 2 (40%)
Grammatical Completion[1]	1 (3.7%)	0 (0%) 1 (20%)
Word Articulation[1]	3 (11%)	10 (37%) 0 (0%)
TOLD Listening Quotient	0 (0%)	0 (0%) 0 (0%)
PIAT Reading Recognition	1 (3.7%)	0 (0%) 1 (20%)
PIAT Reading Comprehension	0 (0%)	1 (3.7%) 0 (0%)
PIAT Spelling	0 (0%)	0 (0%) 0 (0%)
PIAT Mathematics	0 (0%)	0 (0%) 0 (0%)
PIAT General Information	0 (0%)	0 (0%) 0 (0%)
LAC [*]	0 (0%)	0 (0%) 2 (40%)

* Lindamood Auditory Conceptualization (Lindamood & Lindamood, 1979) scores below the 10th percentile.

1 Subtests making up the TOLD Speaking Quotient; scores below the 10th percentile are reported.

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