Early Development of Language and Literacy Skills of An Extremely Precocious Reader

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Abstract
Precocious literacy is a form of intellectual giftedness that occurs frequently in young children. This case study documents the emergence of reading ability in an extremely precocious reader between the ages of 2 years 7 months and 3 years 2 months. At the end of this period, the child's word recognition ability was conservatively estimated at the late first-grade level, and he was able to use knowledge of some level of letter-sound correspondences to sound out unfamiliar words and pseudowords. However, his writing skills did not begin to develop to a comparable degree until after he was 4 years old. The results are used to generate hypotheses about the nature and measurement of precocious reading and its relations with oral language and writing skills.

Many young children whose intellectual gifts later will be demonstrated in diverse ways first call attention to themselves as precocious readers (Jackson, 1992). Therefore, understanding precocious reading is important for understanding the development of giftedness in childhood. Information about the emergence of precocious reading may also contribute to efforts to develop theoretical models of relations between reading and intelligence across the full range of individual differences in reading acquisition. These models should help us learn more about both reading and giftedness.

Precocious readers learn to read at unusually early ages, without formal instruction and with varying degrees of adult assistance (Jackson, 1988). Because precocious readers learn to read without the imposed structure of formal schooling, they can be an important source of information about how reading skills are acquired. However, few studies have explored how precocious readers learn to read. No effective and efficient system for identifying potential precocious readers has been designed, so most such children have been studied only after they have acquired rudimentary reading skills, usually at age 4 or later (e.g., Jackson, Donaldson, & Cleland, 1988; Tobin & Pikulski, 1988). Case histories of early literacy development have focused on children whose rate of progress in reading has been average or only moderately advanced (e.g., Baghban, 1984). Answers to questions about the early development of precocious readers' skills have been limited by the information available in retrospective parent anecdotal reports or baby book records.

The present case study of a very young child still in the beginning stages of learning to read provided an opportunity to address several questions about the emergence of precocious reading. "Max," a precocious reader, was observed and tested repeatedly across a period of 8 months beginning when he was 2 years 7 months old. The case study addressed five issues: the adequacy of standardized tests designed for older children for assessing the skills of a very young reader, the relation between oral language and reading development, the bases of word identification, the relation between reading and writing development, and whether the early development of a precocious reader's language skills shows exceptional strengths in areas found to be deficient in predyslexic children.

Max's mother contacted the investigators' department when he was about 2 years 5 months of age. She reported that her son had read the word pizza out of context at his second birthday and, in the following 2 months, had learned to read three new words a day. The investigators observed Max's reading and language development on 13 occasions when he was between the ages of 2 years 7 months and 3 years 2 months. Most data collection sessions were conducted in Max's home with his mother present. Both concurrent and retrospective reports of his oral language and reading were collected from Max's mother, who had graduate training in the teaching of reading.

Three types of data were collected on Max's reading development: the historical data reported by Max's mother of language and reading development before age 1 year 7 months; the observations and standard test data collected during the study period (age 2 years 7 months to 3 years 2 months); and his mother's reports of Max's language and literacy development.

Putting the Research to Use
Few teachers of the gifted have opportunities to observe the emergence of gifted performance in very young children. This case study describes the development of precocious literacy in a child whose skills were observed and assessed repeatedly, beginning when he was 2 years old. The ways in which Max learned to read and write illustrate the complexity of emerging literacy and the value of engaging children in activities that match their interests. Max's mother facilitated his reading development with informal instruction that had much in common with whole language approaches to beginning reading. The history of Max's early years is also full of surprises for those who expect children with one exceptional gift to be equally superior in related skill areas or who think that children's literacy skills must always develop in a set order.
subsequent to the study (age 3 years 2 months to 3 years 11 months). Highlights of Max's reading development and the schedule of our observations and tests are indicated in Figure 1.

**Figure 1**

Time line summarizing highlights of Max's reading development. Events between 2 years 7 months and 3 years 2 months were observed by the first author. Those before and after this age period were reported by Max's mother.

<table>
<thead>
<tr>
<th>Age</th>
<th>Milestones and Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year 6 months</td>
<td>Began watching &quot;Sesame Street&quot;</td>
</tr>
<tr>
<td>1 year 7 months</td>
<td>Accurately identified capital letters on five blocks</td>
</tr>
<tr>
<td>1 year 8 months</td>
<td>Read pizza</td>
</tr>
<tr>
<td>1 year 9 months</td>
<td>Mother began composition book</td>
</tr>
<tr>
<td>1 year 10 months</td>
<td>Second MLU sample</td>
</tr>
<tr>
<td>1 year 11 months</td>
<td>Consistent attempts to sound out words</td>
</tr>
<tr>
<td>2 years 1 month</td>
<td>Test of Early Reading and Concepts about Print</td>
</tr>
<tr>
<td>2 years 2 months</td>
<td>Test for Auditory Comprehension of Language-Revised</td>
</tr>
<tr>
<td>2 years 3 months</td>
<td>Read &quot;cholesterol; created &quot;silly words&quot;</td>
</tr>
<tr>
<td>2 years 4 months</td>
<td>• Sounded out new words; PIAT-R and MacArthur CDI; MLU</td>
</tr>
<tr>
<td>2 years 5 months</td>
<td>Mother contacted investigators</td>
</tr>
<tr>
<td>2 years 6 months</td>
<td>• WPSSI-R Information; PIAT-R retest</td>
</tr>
</tbody>
</table>
| 2 years 7 months   | • 
| 2 years 8 months   | • 
| 2 years 9 months   | • 
| 2 years 10 months  | • 
| 2 years 11 months  | • 
| 3 years 1 month    | • 
| 3 years 2 months   | • Read silently and aloud, including newspapers, difficulty copying letters, drawings representational, creative oral language play                           |
| 3 years 3 months   | • 
| 3 years 4 months   | • 
| 3 years 5 months   | • 
| 3 years 6 months   | • 
| 3 years 7 months   | • 
| 3 years 8 months   | • 
| 3 years 9 months   | • 
| 3 years 10 months  | • 

During observation and testing sessions and interaction with the first author, Max was friendly, talkative, emotionally expressive, inquisitive, and energetic. He seemed to enjoy performing for an audience but sometimes was uncooperative when asked to sit still and follow instructions for completing standard tests. Aspects of Max's personality are evident in some of the examples of his language that follow.

**Reading History**

Max's mother had kept a record of Max's early oral language and reading development, including phonetic spellings of his first wordlike utterances and what they represented; the first letters he learned, and the first words he learned to read. At age 1 year 8 months Max brought five blocks to his mother and accurately named the letters on each block. Because his parents had not taught him the names of the letters, they speculated that Max had learned the letters from watching the television show, "Wheel of Fortune." Prior to this incident, Max's language development had not seemed remarkable to his parents. His oral language may even have been somewhat behind that of his age mates. During the month after Max named his first letters (age 1 year 8 months to 1 year 9 months) he learned half of the alphabet, and his oral language skills also started to expand rapidly. Max learned to recognize written words from signs, television, and his mother reading to him. He also started noticing shapes in the environment that resembled letters, such as a u shape on a balcony near his home. After Max read the word pizza out of context, his mother started using magnetic letters on the refrigerator to teach Max three words each day that were related to the day's activities. Some of the first words he learned by this method were hospital, horses, scared, rained, and tissue.

When Max reached age 2 years 1 month, his mother began a composition book. For several days she composed stories using words that Max knew how to read. However, it was difficult to write about the day's activities with a limited number of words. After 4 days, she started writing stories in her own language, including words that were unfamiliar to Max. For example, the entry for the day Max was age 2 years 3 months was

"WHEN WE PASS THE FIRE STATION ON THE WAY TO PLAYGROUP MAX ALWAYS SAYS, WITH VIGOR, "TWO FIRE ENGINES, I CAN'T STAND IT." HE'S A FUNNY FELLA. HE CHECKED MY EARS FOR CHEERIOS YESTERDAY.

DADDY BOUGHT A BASKETBALL AND TEA SET FOR MAX. GRANDMA SENT AN INFLATABLE CRUISE SHIP FROM HER VACATION.

MAX SAT WITH ERICA IN THE HIGH CHAIRS AT PLAYGROUP AND MADE BABY NOISES."

His mother and Max read all the composition book entries each day until the number grew too cumbersome. Max memorized many of the earlier entries, and his mother felt that he learned many new words through this activity.

Max's mother supposed that he began reading books by memorizing sentences using one or two recognized words to cue himself. If he did not recognize a word out of context he
would respond, "I don't know." At age 2 years 7 months, he began sounding out unfamiliar words, and by age 2 years 9 months, Max made attempts to sound out most unfamiliar words. The names of the four Hebrew letters used in the game dreidel were presented to Max once at age 2 years 9 months, and he then was able to identify them correctly.

Max began watching "Sesame Street" at age 1 year 6 months, but his interest in the program was sporadic. Videos, especially those used by Raffi, were often Max's viewing preference. In addition to singing and dancing with the video, he also memorized songs from the Raffi video, which he enjoyed performing. Max was interested in telling jokes, which often involved repeatedly relating parts of videos that his dad had thought were funny.

Max's mother reported that she routinely read him a story before nap and before bedtime each day. Observations supported her report that she used an interactive style while reading a story, asking Max questions about the story and having him anticipate what would happen next.

Max's mother encouraged Max's reading development, primarily by keeping a journal of their daily activities and reading it with him. She felt that Max's interest and motivation to learn to identify words were primarily self-generated. She provided reading materials such as magnetic letters on the refrigerator and answered his questions about words, but reported that she was careful not to push him to learn to read. In fact, as is characteristic of many precocious readers (Jackson, 1988), at times Max seemed obsessed with learning to decode or with whatever reading task he currently found fascinating.

**Standard Tests and Observations of Reading and Oral Language Development**

The study measures included several standard tests of language development and academic achievement: the MacArthur Communicative Development Inventory: Toddlers (CDI: Toddlers; Fenson et al., 1991) at age 2 years 7 months; the Peabody Individual Achievement Test-Revised (PIAT; Markwardt, 1989) at ages 2 years 7 months and 3 years 2 months; Concepts About Print (Clay, 1979) and the Test of Early Reading Ability (TERA; Reid, Hresko, and Hammill, 1981) at age 2 years 10 months; the Test for Auditory Comprehension of Language-Revised (TACL-R; Carrow-Woolfolk, 1985) at age 3; and the WPPSI-R Information subtest at age 3 years 2 months (Wechsler, 1989). We also recorded and analyzed Max's productive language, computing mean length of utterance (MLU) at ages 2 years 7 months and 2 years 8 months and audio-tape recorded his reading of both familiar and unfamiliar texts on a number of occasions.

**Standard Tests of Reading**

We administered the PIAT-R to Max because the original version of the PIAT had been found to be a reliable and potentially valid measure of individual differences in reading precocity among intellectually gifted 3 and 4 year olds (Shonn & Robinson, 1980). However, two attempts to administer the reading sections of the PIAT-R to Max suggested that extensive revision of prereading items in the reading recognition subtest may have made the 1989 test less appropriate for very young readers. Max was able to complete some prereading items involving letter and word matching, but he failed items requiring finding embedded words and matching words on initial sounds. Directions for some items had to be rephrased before he could comprehend them. For example, he did not understand the direction "Find one like this—down here. Point to it." in the matching section. When the question was rephrased to "Find the [letter name] and now find the other [letter name] he was able to do the letter matching task.

Because she knew that Max could read words, the examiner administered word-reading items even though this violated standard administration procedures for the test. Max read 7 words correctly at age 2 years 7 months and 15 words at age 3 years 2 months, yielding the estimated age- and grade-equivalent scores reported in Table 1.

### Table 1

Max's PIAT-R Reading Recognition and Reading Comprehension Performance at Two Ages, with Reading Recognition Scored Two Ways

<table>
<thead>
<tr>
<th>Measure</th>
<th>Age at Test</th>
<th>Age at Test</th>
</tr>
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<tbody>
<tr>
<td>Reading Recognition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Standard Scoring)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade Equivalent</td>
<td>less than 5 years</td>
<td>less than 5 years</td>
</tr>
<tr>
<td>Age Equivalent</td>
<td>K.0</td>
<td>K.0</td>
</tr>
<tr>
<td>Reading Recognition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scored Assuming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Pre-reading Items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age Equivalent</td>
<td>5 years 11 months</td>
<td>7 years</td>
</tr>
<tr>
<td>Grade Equivalent</td>
<td>K.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Standard Scoring)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age Equivalent</td>
<td>n/a</td>
<td>7 years</td>
</tr>
<tr>
<td>Grade Equivalent</td>
<td>n/a</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Max's PIAT-R scores were consistent with his performance on the other two reading tests administered at age 2 years 10 months (TERA age-equivalent score 5 years 2 months and Concepts About Print score in age range 6 years—6 years 3 months). As on the PIAT-R, Max consistently failed the advanced print concept items on the Concepts About Print.

At a minimum, Max seems to have been reading about as well as the average child twice his age. However, Max was easily distracted and often uncooperative in test sessions. If the testing task did not interest him or if he was inspired by the test to start playing with words, it was impossible to get an accurate picture of his ability level. Therefore, all these estimates seem conservative relative to the word identification skills Max dem-
Thoreson & Dale, 1992) for precocity in reading. The question of whether certain aspects of oral language development are related (Jackson, 1988), but linguistic precocity is neither necessary (Healy, 1982) nor sufficient (Craint-Thoreson & Dale, 1992) for precocity in reading. The question of whether certain aspects of oral language development are more closely associated with others with reading precocity remains open, and the results of our assessments of Max's oral language production and comprehension suggest the complexity of this issue. Max's reading was exceptionally advanced, but his oral language ranged from about average to advanced depending on the measure used.

Max was just beyond the 30-month upper age limit for the MacArthur CDI: Toddlers when his mother completed this report of his productive language during the period when he was 30-31 months old. The inventory asks parents to identify which of a long list of words are part of their child's vocabulary, indicate whether the child uses irregular noun and verb forms, indicate the grammatical complexity of the child's sentences, and give examples of the child's sentences.

Overall, Max's CDI performance was good but not extraordinary. His scores for total vocabulary and sentence grammatical complexity were both above the 90th percentile. In use of irregular noun and verb forms Max scored between the 75th and 90th percentiles. His "three longest sentences," which had a mean length of utterance (MLU) of 12 morphemes, earned Max another score between the 75th and 90th percentiles. The longest of these sentences was "I want to leave the garage there because haveta don get paint on it."

Analysis of two oral language samples was consistent with a judgment that at least some aspects of Max's oral language were advanced. His MLU was computed by two independent raters using standard guidelines from speech samples collected by the first author (Dale, 1976). Max's MLUs computed from the more conservative rater's scoring at ages 2 years 7 months and 2 years 8 months were 7.25 and 8.86 morphemes per utterance, respectively. These MLU values are lower than the estimate from the MacArthur CDI: Toddlers because they reflect typical speech rather than "best" examples. In these samples of conversation, Max's sentences were complex, with unusually advanced mastery of auxiliary verbs and conjunctions. However, the vocabulary used in these speech samples was characterized by one of the authors of the MacArthur CDI: Toddlers as "good, but not remarkable" (Philip Dale, personal communication, July, 1990).

Although Max's generally strong performance on parent report and direct observation measures indicated that some aspects of his productive language were advanced, his performance on tests of verbal knowledge and language comprehension was only modestly above average for his age. His WPPSI-R information score was one SD above the mean, and his TACL-R overall age-equivalent score was in the 39-41 month range when he was tested at 36.5 months. However, when asked, as part of the WPPSI-R, what a common food was made of, Max retrieved the item from his kitchen and read the ingredients on the package label.

One might reasonably expect the language development of precocious readers to be the inverse of the development of children who will eventually be identified as dyslexic, with precocious readers showing their greatest strengths in those areas in which predyslexics are weakest. Comparing Max's early language development with the results of Scarborough's (1990) longitudinal study of the language deficits of predyslexic children lends support to this hypothesis. At age 2 years 6 months the mean MLU computed for a group of 20 predyslexic children was 2.35 words per utterance, and the mean MLU for the 20 normal readers included in the study was 2.89 words per utterance. At age 2 years 7 months Max's MLU was 7.25 words per utterance and at age 2 years 8 months, 8.86. Predyslexic children produced shorter sentences with simpler syntax and more pronunciation errors than other children at age 2 years; Max presented the opposite picture. He constructed unusually long and syntactically complex sentences for his age and used accurate word pronunciation. The predyslexic child's poor rhyme recitation skills contrast with Max's ability—reported by his mother and observed by the first author—to recite rhymes, songs, and long passages. We cannot be sure whether Max had strengths in phonemic awareness contrasting with the deficits shown by predyslexics. Although he did not respond correctly to the phonemic awareness items on the PIAT-R, Max did start sounding out unfamiliar words at age 2 years 7 months, so his ability to identify patterns within words was well-developed although it may not have involved analysis at the level of individual letters.

**Bases of Word Identification**

Observations of Max's reading of unfamiliar words and pseudowords confirmed his mastery of word analysis during the period of this study. According to his mother, his word reading initially was characterized by whole word recognition, but he started sounding out unfamiliar words at age 2 years 7 months. Despite his advanced word identification ability, Max was relatively insensitive to letter and word order. He read "odg" as "dog" and often skipped around when reading words on a book page. The contrast between his skilled sounding out of unfamiliar words and his frequent inattention to letter order suggests that Max was able to use order information but that he sometimes did not attend to it or could disregard it in order to make sense of a string. He may have been using a similar strategy in assembling sentence meaning from words read out of order.

**Reading and Writing**

Contemporary accounts of the acquisition of literacy often emphasize writing development as more observable than read
ing and as essential for development of the child's understanding of the meaning of both acts (Baghban, 1984; Bruner & Cole, 1990). However, precocious readers of preschool age are not always precocious writers (Jackson, 1988). Max had access to writing and drawing materials and magnetic letters, but by the age of 3 years 2 months he had shown little interest in writing, although he once copied his name. His paintings were scribbles with no distinct forms or recognizable representations. When asked what he had drawn or painted, he would say it was a picture of a sculpture.

Max did enjoy assembling nonsense letter strings with magnetic letters and then sounding out his "words." At age 3 years 1 month Max created the following "silly words": iszop (pronounced "sop"), fak (pronounced "fake"), taud (pronounced "taud"), and iszopu (pronounced "zup"). Once again the order of the letters was not important. Max seemed to have been pattern finding. He constructed iszop then later added a u at the end (iszopu) with his pronunciation changing from "sop" to "zup." Either he was pronouncing the isz as an "s" or "z" sound or he was ignoring some of these letters. This activity seemed more like playing with letters and reading than intentional spelling.

**Continued Development**

At the end of the study, Max's family moved from the town in which the investigators' university was located. Eight months later, when Max was age 3 years 10 months, Max's mother reported Max's reading, writing, and oral language progress in a letter to the first author.

Max was reading books both silently and aloud with "remarkable" dramatic expression, according to his mother. His reading was very smooth. He was able to read newspapers but often became impatient with the small print. Max enjoyed reading informational brochures, adventure picture books that were also comic, books on outer space, and a range of fiction and nonfiction books, including books of photography with informative captions and books about animals. He enjoyed reading aloud to his younger brother.

Max's interest in maps continued. His mother reported that he could quickly put together a map puzzle of the United States, correctly placing each state. He also enjoyed finding places on the world globe and learning things about the people who live there.

Max's mother reported that his writing progress continued to be slow and that he was critical of his writing performance. His nursery school teacher said that Max was a perfectionist who needed adult encouragement to complete art and writing projects. When copying alphabet letters, Max had difficulty copying the letters G, K, S, Z, and Y. The following letters were written upside down or backwards: L, N, P, R, U, W. He wrote the letter F both backwards and forwards. All of the letters Max wrote looked shaky. By age 3 years 10 months, his art had progressed to simple representation of objects. For example, a drawing he described as "Two tepees with a pipe going up" consisted of a vertical line and two inverted u shapes.

Max's mother reported that his oral language comprehension at age 3 years 10 months was very good, a judgment she made based on the types of questions he asked after listening to adult conversation. Max's oral language development also reflected linguistic creativity and love of playing with words. For example, Max often answered his mother's questions with quizzes. For example, if his mother asked him where he left his shoes, he would answer, "What room starts with the letter b?" He was delighted when his mother replied, "bathroom." Max enjoyed playing word games such as "think of as many words as you can that start with the letter R." He enjoyed rhyming simple words and telling jokes, but his mother reported that he often missed reciting the punch line.

When Max played with a friend whose language development was delayed, Max copied the friend's oral language, including his stutter. Max sometimes adopted this style even when his friend was not present. At other times, he seemed to be copying his teacher's "lecturing" style of speech.

Max's nursery school teacher did not treat Max differently because of his advanced reading abilities. His mother said she felt that it was important that a fuss not be made over Max and that he remain as innocent as possible about his precocity.

In the fall of 1991, when Max was 4 years 6 months, his mother reported that his writing developed quite suddenly, in a way reminiscent of his earlier rapid movement into reading. In short order, he learned to print all the alphabet letters clearly (sometimes confusing the orientation of s), and after a brief period of wanting his mother to help him with the exact spelling of words, he began to spell and write words and sentences freely and to incorporate words into his drawings.

A few months after he turned 5, Max sent an illustrated letter to the first author that contained the following text:

```
DeAR SALLY,
I DReW A PICTURe
FOR YoU, I hOPE
You LIKe IT! ALSO,
TODAY IN
PENSLVAINA IT WAS
SO RAiny.
LOVe,
YoUr
PAL,
MAX
```
lacks of awareness of sounds and patterns within words. It test failures like Max's are widespread among precocious readers, further studies of this population may contribute to better ways to measure reading precocity and pre-reading skills.

The syntactic complexity of Max's productive language, his mother's reports, and his ability to integrate both correct and scrambled letter strings are all consistent with the conclusion that the precocious development of phonologically based word identification skill is associated with superior working memory (Jackson & Myers, 1982; Jackson et al., 1988; Naslund & Schneider, 1990). However, this association has not appeared in all studies and may be limited to early ages or lower ability levels within the precocious population (Jackson, Donaldson, & Mills, 1990).

Max's WPPSI-R information performance and a professional evaluation of the words used in two language samples were also consistent with group data, suggesting only a modest relationship between reading precocity and semantic development (Jackson, 1992a, 1992b). On the other hand, Max's productive vocabulary score was the highest he earned on the CDI — higher than the percentile rank earned for the length and syntactic complexity of his utterances. The validity and reliability of the CDI are still being established, and it is possible that parent reports do not differentiate well among types and degrees of linguistic precocity in children at the upper age limit of the scale. The hypothesis that precocious readers' oral language is distinguished primarily by length and complexity of production merits testing, particularly since syntactic production has been found to be delayed in precocious children (Scarborough, 1990).

When literacy develops very early, expected relations among skills, such as connections between reading and writing, between reading and oral language, and between phonemic awareness and reading, are not always present or detectable. The study findings suggest the importance of looking for target skills, not just supposed prerequisites, in assessing precocious readers. Like other young gifted children, precocious readers should be evaluated with a focus on their areas of strength (Roesdell, Jackson, & Robinson, 1980).

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The results of this study were presented at the biennial meeting of the Society for Research in Child Development, Seattle, April 1991. Nancy Ewald Jackson was first author for that presentation.