Literacy Development in Successful Men and Women with Dyslexia

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Literacy Development in Successful Men and Women with Dyslexia

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To investigate how, when, and under what conditions individuals with dyslexia manage to develop high literacy levels, an interview and literacy assessment study was conducted with 60 highly successful men and women with dyslexia and 10 peers without dyslexia. The sample with dyslexia included a Nobel laureate, a member of the National Academy of Sciences, and leaders in a variety of fields requiring extensive reading (i.e., medicine, law, business, and the arts and sciences).

For both males and females with dyslexia, interest-driven reading was key to the development of high literacy levels. Results showed distinct groups of successful professionals with dyslexia: a compensated group and two partially compensated groups. In each group, literacy development was augmented by avid reading in a content area of passionate personal interest, along with systematic phonics instruction. Through avid reading on a specific topic, the individuals with dyslexia developed knowledge of the specialized vocabulary, typical text structures, concepts, themes, and issues of a particular field. Extensive reading about a favorite subject enhanced the background knowledge of these individuals and enabled them to gain reading practice, which in turn, fostered the development of reading fluency and increasingly sophisticated skills. Although topics and genres of personal interest varied, fascination with a subject area was a common theme among those interviewed.

In the literacy assessment, the 60 men and women with dyslexia demonstrated most of the salient characteristics of Chall's (1983)

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Stage 5, the highest level of reading development. All participants comprehended sophisticated text, but some, with partially compensated dyslexia, showed continuing lags in basic, lower level "print" skills. Individuals with partially compensated dyslexia fell into two groups: one group showed specific deficits only in spelling, whereas the other group had difficulty in spelling, word recognition, and oral reading. Many, but not all, of the participants with dyslexia showed ongoing lags in reading rate. Gender differences were most apparent in topics of personal interest reading and in mentoring patterns.

The study explores how adults with dyslexia, who may continue to lack strong integration of lower level "print" skills, succeed in constructing higher order "meaning" skills. This analysis underscores the need for a balanced approach to literacy instruction that includes both "print" and "meaning" aspects. It emphasizes the need to integrate solid interest-based approaches as a centerpiece of instruction.

INTRODUCTION

How, when, and under what conditions do individuals with dyslexia develop high level literacy skills? This question prompted me to conduct a study comparing 60 highly successful adults with dyslexia with equally successful adults without dyslexia. Participants with dyslexia included a Nobel laureate, a member of the National Academy of Sciences, a member of the National Academy of Education, and others in a range of fields that require extensive reading (i.e., medicine, law, business, biology, chemistry, education, psychology, anthropology, theater, art, interior design, and literature). My rationale for studying literacy development in highly successful men and women with dyslexia lay in the hypothesis that these individuals may have devised novel strategies potentially useful in the education of others at risk for reading failure. This study included equal numbers of males and females in an effort to move away from the historical tendency of dyslexia research to focus disproportionately on males.

Previously, researchers and practitioners believed that dyslexia predominantly affected males, in a 3 or 4 to 1 male to female ratio. However, in recent years, this gender disparity has been questioned in a growing number of studies (Finucci and Childs 1981; Flynn and Rahbar 1994; Mellard and Byrne 1993; Naiden 1976; Nass 1993; Scarborough 1989; Shaywitz et al. 1990; Vogel 1990; Vogel and Walsh 1990). Converging evidence from recent studies suggests that dyslexia may affect boys and girls

in equal proportions (Anderson 1997; Leinhardt et al. 1982; Wadsworth et al. 1992). The higher ratio of males to females in the reported dyslexic population is attributed (in part) to teacher reporting bias—teachers refer boys for diagnosis more frequently than girls because boys "act out" more (Anderson 1997; Shaywitz et al. 1990). In a comprehensive review of the literature, Vogel found that girls who were referred for diagnosis and remediation generally had more severe cognitive deficits than boys (Vogel 1990). Apparently, for a girl with dyslexia to receive attention, she had to have more serious learning problems than boys. It seems that females with dyslexia have been largely overlooked as a focus of inquiry in much the same way that females in general were omitted from studies of moral development prior to Gilligan's (1982) groundbreaking work. The present research was designed to address this gap in the dyslexia literature.

Historically, instructional research on dyslexia has focused primarily on the effectiveness of highly structured skills-based teaching approaches (Cox 1983; Gillingham and Stillman 1966; Orton 1937; Griesbach 1993). Such approaches, used at all levels of instruction, include systematic phonics instruction (Chall 1983) and multisensory methods such as simultaneous instruction in the use and association of the three sensory channels (visual, auditory, and kinesthetic). In addition, bypass approaches, such as the use of audio- or videotapes and other devices that circumvent and/or support reading, have served as integral components of dyslexia instruction, especially at middle school, secondary, and postsecondary levels (Knight 1986; Morris 1983; Vogel 1987). In recent years, computer assisted programs have been used at various developmental levels with increasing frequency (Anderson-Inman and Horney 1996/1997; Meyer et al. 1991; Rose and Meyer 1994; Rose and Meyer 1996).

There has been a growing interest in research on adults with learning disabilities (Blalock 1981; Bruck 1990; Blalock 1981; Felton et al. 1990; Fink 1992, 1993, 1995/1996; Finucci et al. 1985; Fowler and Scarborough 1993; Gerber et al. 1992; Gerber and Reiff 1992; Rawson 1968; Scarborough 1984). Studies overall have reported both successful adult outcomes and specific continuing difficulties. Fowler and Scarborough found that, while the reading disability persists in adulthood, "there is considerable variability in the severity of the ultimate deficit and its impact on overall functioning" (Fowler and Scarborough 1993, p. 62). In 1992, Gerber and his colleagues analyzed 71 case histories of successful adults with learning disabilities and devised a

social/ecological framework that emphasizes locus of control and interpersonal relationships as key factors for understanding life success. Blalock (1981) reported that adults with dyslexia were "amazingly adept" at using context clues to enhance their reading ability; similarly, Bruck (1990) found that the use of context clues by adults with dyslexia simultaneously improved both the speed and accuracy of their reading. Lefly and Pennington (1991) found that a group of 25 adults with dyslexia decoded unfamiliar words nearly as accurately as did nondyslexic controls, albeit more slowly, confirming and extending results from research on learning disabled children (Meyer et al. 1997; Wolf 1997; Wolf and Bowers in review). Few studies have investigated the adult reading abilities, habits, attitudes, and experiences of highly successful adults with dyslexia (Feldman et al. 1993; Rawson 1968). The current study focused on these often neglected areas of research.

METHOD

PARTICIPANT RECRUITMENT, SELECTION, AND ASSESSMENT

The goal of recruitment was to find individuals who would inspire and motivate others currently struggling with dyslexia. All but one of the 60 participants with dyslexia agreed to be identified by name, education, and profession (see Appendix I).

Successful professionals. Recruitment methods were designed to identify participants with dyslexia who had achieved high levels of success in various professions that require reading and demand extensive training, skill, and responsibility. Therefore, the sample was not random or representative, but rather was selected on the basis of level of educational and career achievement, field of professional expertise, gender, age, and socioeconomic level. Participants were considered "successful" if they demonstrated professional competence recognized by peers in an area of expertise, and they supported themselves financially (unless currently enrolled in graduate school).

Individuals with dyslexia. The choice of selection criteria was guided by the International Dyslexia Association (IDA) research definition of dyslexia. Despite ongoing controversies (Aaron 1997; Stanovich 1991), this definition maintains the classic notion of an "unexpected" reading problem or discrepancy between the person's potential (often measured by the Full Scale IQ) and his or her actual reading achievement (often measured by standardized diagnostic reading tests). The IDA definition conceptualizes dyslexia as:

> a specific language-based disorder of constitutional origin characterized by difficulties in single word decoding, usually reflecting insufficient phonological processing abilities. These difficulties . . . are often unexpected in relation to age and other cognitive and academic abilities. . . . Dyslexia is manifest by variable difficulty with different forms of language, often including, in addition to problems reading, a conspicuous problem with acquiring proficiency in writing and spelling (Orton Dyslexia Society Research Committee 1994, p. 4).

In the present study, participants were included and considered to have dyslexia if they reported having had difficulties learning to decode single words and/or acquiring adequate reading and spelling skills. This difficulty had to be evident by first grade and continue at least until third grade. Participants between the ages of 26 and 50 had been diagnosed with dyslexia by learning disabilities professionals using established assessment instruments. For those over 50 years of age (educated when documentation was less common), a case history of early and continuing difficulties in reading unfamiliar words, spelling, and writing constituted the "diagnostic signature" of dyslexia (Shaywitz et al. 1994, p. 7).

Participants were initially located by means of professional referrals, word of mouth, and notices distributed at professional conferences. In preliminary telephone interviews, I screened prospective participants for exclusionary criteria such as a history of inadequate schooling or poor vision. I recorded and analyzed profiles of participants' language-based difficulties based on retrospective face-to-face interviews that I conducted individually with each participant. A case history was conducted, and included a family history of reading disabilities, a personal history of diagnosis/remedial assistance for reading difficulties, and early and/or persistent difficulties with letter identification, word recognition, spelling, writing, slow speed of reading and writing, memory (e.g., difficulty memorizing multiplication tables), laterality (i.e., difficulty making left-right distinctions in speech or action), fine motor control, or second language learning. Males and females were matched for types of problems and severity of dyslexia (see table I).

Academic degrees. Of the 60 men and women with dyslexia, 30 had either repeated a grade in elementary school as

TABLE I. MALES (n = 30) AND FEMALES (n = 30) WITH DYSLEXIA INCLUDING SPECIFIC PROBLEM AREAS IN SELF-REPORT.

Problem areas**	# Males	# Females	Total
Single word decoding	29	30	59
Spelling	30	29	59
Discrepancy	26	27	53
Diagnosis/Remediation	25	25	50
Letter identification	23	23	46
Writing	25	24	49
Slow reading and/or writing	28	26	54
Memory	26	26	52
Laterality (left-right distinction)	16	22	38
Second language acquisition	27	28	55
Fine motor skills (i.e., illegible handwriting)	19	17	36
Familial dyslexia	22	26	48
Mean Number of Problems per Participant:			
Mean # of Problems (*SD*)	9.9 (1.3)	10.0 (1.3)	
Range	6-12	8-12	

**There were no significant differences between males and females (t = 0.30, p =.767).

a result of academic failure (not illness), or stated that their parents and teachers had seriously considered grade retention. Despite personal histories of serious reading problems, 59 of the 60 individuals with dyslexia had graduated from four-year colleges or universities. Furthermore, the majority had earned masters and/or doctorate degrees. Academic degrees earned by the 60 men and women with dyslexia included six MDs, seventeen PhDs, four JDs, nineteen Masters Degrees, and twelve Bachelors Degrees. One individual with dyslexia had attended but did not complete college.

The comparison group was matched on all criteria except dyslexia, and included individuals without dyslexia whose high professional and educational achievements were comparable to the study participants with dyslexia. The comparison group, which included one MD, five PhDs, one JD, and three individuals with masters degrees, was limited to 10 participants due to the study's limited resources. Like those with dyslexia, all participants without dyslexia were active professionals in

fields that demand extensive reading. On average, both subjects with dyslexia and the control group in this study exceeded Gerber and Reiff's definition of "high success" (Paul Gerber personal communication; Gerber and Reiff 1991, p. 34). Many members of both groups were outstanding professionals in the top echelons of their fields (see Appendix I).

Attempt to represent diversity of region, SES, and race. The majority of participants were white, middle-class United States citizens who came from all regions of the country, including 18 states and the District of Columbia. Most had been raised in middle- to upper-middle-class families, although a few came from working class origins. (In one case, the participant's father had been a carpenter and the mother washed laundry for a living). A small number of African-Americans and Hispanics participated, but their numbers were not proportionately representative of minorities in the American population. Although more members of minorities were sought, finding them proved difficult, presumably because minorities are still not proportionately successful in our society because of ongoing discrimination (Gadsden 1991; Ladson-Billings 1994). At the time of the study, participants earned salaries that placed them in middle to high socioeconomic categories.

Self-report better in successful middle-aged participants. Recent literature indicates that self-report of childhood reading difficulties by learning disabled adults is valid and reliable (Decker, Vogler, and DeFries 1989; Finucci, Whitehouse, Isaacs, and Childs 1984; Gilger 1992; Lefly 1997; Lefly and Pennington in review). Apparently, accuracy and reliability of self-reported reading difficulties are especially high for middle-aged, normally achieving, or high-achieving individuals (Gilger 1992). For the present study, therefore, I selected highly successful dyslexic adults with a mean age of 45 years (age range: 26 to 75).

PROCEDURES AND INSTRUMENTS

Clinical interviews. Using Gilligan's clinical interview methodology (Attanucci 1988), I conducted detailed face-to-face retrospective interviews (three to nine hours long) with each participant. Whenever possible, interviews were conducted in the familiar setting of the person's home or workplace. Twenty interview questions were used to guide the interviews in a semistructured, open-ended format (see Fink 1995/1996 for interview protocol). Care was taken to avoid asking questions in a manner likely to influence participants' responses. Participants recollected their literacy and learning history in a developmental

5. How do the experiences of males and females with dyslexia differ?
6. What are the implications of the results of this study for theory, research, educational, and clinical practice?

RESULTS

INTERVIEW RESULTS

When did basic fluency develop? The 60 successful men and women with dyslexia developed basic fluency, or relative smoothness in reading connected text, substantially later than normally developing readers. Most of them developed basic fluency between ages 10 and 11 (three to three-and-one-half years later than nondyslexic controls). There were no significant gender differences regarding this variable. Intercoder reliability for the age variable was 100 percent.

Development of basic fluency represented a memorable turning point for many, following years of intense personal frustration and public humiliation. Consequently, development of basic fluency, of beginning to learn to read and "getting it," was an "Ahaa!" experience for many, recalled with vivid emotions and clear memories of a key person at a poignant time.

Baruj Benacceraf (immunologist):
My problems were earlier. . . . And from about 11 or 12, I surmounted it; I surmounted my reading problem.

Lori Boskin (alumni developer):
Well, I didn't finally start to learn to read until fourth grade. With Mrs. Orenberg. I remember so clearly sitting there with Mrs. Orenberg; she was the first person that took the time to teach me.

How did literacy develop? Of the 60 successful men and women with dyslexia, many had read avidly as children. Some began avid reading before they were fluent at a basic level. Despite ongoing struggles with basic, lower level skills (i.e., letter identification, word recognition, and decoding strategies), neither males nor females had circumvented reading overall; rather, they sought out books in order to learn.

Ann Brown (educational researcher):
I became a very avid reader; I read my way through the local library. (Age 13 and up.)

Florence Hazeltine (gynecologist):
When I was almost 11, I started to read. . . . And from then on I read all the time. (Age 11 and up.)

Robert Knapp (gynecologist):
I went to the library and read a lot on my own. (Age 7 and up.)

Ronald Davis (biochemist):
You'd start reading a lot. Because you like it. (Age 8 and up.)

Reading was extremely difficult and laborious for these men and women. So why did they read avidly? And, how did they do it? With few exceptions, literacy development was spurred by a strong desire to know more about a content area of passionate personal interest. Consequently, they read every book and magazine they could find in order to satisfy their curiosity about a particular topic.

H. Girard Ebert (interior designer):
I've always been attracted to books and anything that has to do with history, decorative arts, architecture. . . . So I took reading, which was a problem, and turned it around, because it was the only way that I could explore what I was interested in.

Ronald Davis (biochemist):
You read science for . . . how things are put together. . . . My interest in chemistry just came from . . . it started with my interest in airplanes in grade school . . . that quickly converted to propellant systems in seventh and eighth grades.

Passionate interest in a topic spurred avid reading that provided the scaffolds necessary to develop literacy skills. A pattern common to most of these 60 individuals' reading histories was that they engaged in a great deal of personal interest reading. Although topics and genres of personal interest varied, fascination with a topic was a common theme.

Ann Brown (educational researcher):
I remember reading many historical novels; I read those avidly, particularly about the Tudor and Stuart Periods. Because mainly they were lovely love stories.

Jane Buchbinder (fiction writer):
I loved novels. *Harriet the Spy* is the book I remember as a milestone. I also read Judy Blume books, which were really captivating.

Susan Cobin (headmaster):
I've always liked biographies. The first book I remember reading was a biography of Franklin Roosevelt. That's the one I remember as a key to reading, a step into reading for me.
Ronald Davis (biochemist):
I became fascinated with nitrogen chemistry. So the way to understand that was to start reading chemistry books. So I got organic chemistry books.
Robert Knapp (gynecologist):
I always read history books. Beginning in grade school! And even today, I'm a Civil War buff. I love to read about the Civil War.

Through avid reading in a content area of high interest, these individuals with dyslexia developed knowledge of the specialized vocabulary, concepts, themes, questions, typical text structures, and critical issues of a particular field. Extensive reading about a favorite subject enhanced their background knowledge and enabled them to gain practice, which fostered fluency and development of increasingly sophisticated skills. With practice, these men and women developed deep schema knowledge, which supported their literacy development (Anderson 1983). They relied extensively on contextual facilitation to derive meaning from a new text, foraging for context clues in their hunt for new information. These context clues proved relatively reliable in a restricted content area. Through unsolicited remarks explaining how they coped, the men and women with dyslexia reported their use of context as an aid to reading.

Alexander Goldowsky (museum coordinator):
I tended to be fairly, you know, context-driven. So I made assumptions very quickly based on context and usually substituted a reasonable word.
Barbara Bidofsky (special educator):
I used context a lot to guess at new words.
Baruj Benacerraf (immunologist):
Even today, when I can't figure out a word, I guess from context.

Because their ability to decode was often unreliable, participants with dyslexia used decoding strategies along with context clues, but not necessarily effectively. Many felt that in spite of explicit phonics instruction, their ability to decode through the use of phonological strategies remained poor.

Charlann Simon (speech pathologist):
To this day, I can't sound out a word.
Charles Bean (neurologist):
Phonics doesn't always work. Even though I'll read phonetically, my phonetic sounds don't always fit with everybody else's.
Florence Hazeltine (gynecologist):
I can't sound out anything.
Annette Jenner (biologist):
I had phonics training in the resource room, but it never got into my head.

Even in cases where they had mastered many of the sound-symbol relationships of English, they often had difficulty using this knowledge because of ongoing problems with the blending and sequencing of sounds.

Marlene Hirschberg (arts administrator):
I could look at the letter and tell you what the sound was, but I couldn't put it together into a word.

Contextual guessing strategies were more reliable than phonological decoding strategies for many of these men and women with dyslexia.

Susan Marlett (artist):
I cannot figure out how to pronounce a word based on its letters; I always guess it wrong. But I can figure out what words mean from the words around them.

Participants reported that it was easier to guess and correctly predict a word when the schema of a particular topic was familiar. Schema knowledge provided the conceptual scaffolds that supported optimal reading skills about a topic of interest. By focusing on a single domain of knowledge, many of the individuals with dyslexia became virtual "little experts" about their favorite topic, sometimes beginning at an early age. For some, early reading interests later developed into high-powered careers; for others, early reading interests developed into lifelong hobbies.

How did experiences of males and females differ? A salient finding that emerged from this study was that personal interests played a pivotal role in the literacy development of these men and women with dyslexia. There were clear gender differences in

personal reading interests. As children, the individuals interviewed chose both fiction and nonfiction that embraced their specific interests. Of the 30 women with dyslexia, 23 preferred fiction whereas 7 preferred nonfiction. Of the 30 men with dyslexia, 14 preferred fiction and 16 preferred nonfiction. Gender differences in topics of personal interest reading were statistically significant ($\chi^2 = 5.71$, $p = .017$). Table III summarizes findings related to gender and topics of high interest reading.

Women, more often than men, noted the "pull" of reading materials related to developmental self-identity and relational issues provided in novels.

Priscilla Sanville (arts educator):
I read as many Nancy Drew mysteries as I could find in the library. And I was amazed that I could be so locked in a book; it was like the discovery of how a book could take me somewhere different and take me into a world and characters that I could identify with.

The men, more often than women, were drawn into factual information-loaded materials provided by nonfiction texts. Six males with dyslexia, but only one female, read avidly during childhood about social studies. The same pattern emerged with regard to scientific reading. As children, five males with dyslexia, compared to only two females, were avid science readers. These numbers, while small, mirror the reading interests of nondyslexic children (Whitehead and Maddren 1974, pp. 24–25).

Most important for both males and females with dyslexia in this study was the specificity of their interest-driven reading.

TABLE III. EARLY READING INTERESTS REPORTED BY MEN AND WOMEN WITH DYSLEXIA.*

Women $n = 30$		Men $n = 30$	
Novels	23	Novels	14
Biographies	2	Biographies	2
Science	2	Science	5
Social Studies	1	Social Studies	6
Cooking	1	Auto mechanics	1
No Data	1	Sailing	1
		Poetry	1

*Gender differences in topics of high-interest reading were statistically significant (chi square = 5.71, $p = .017$).

Through highly focused avid childhood reading in specialized disciplines and genres, they developed deep background knowledge, becoming conversant with domain-specific vocabulary, concepts, themes, questions, and typical text structures. Repetition and practice within a content domain facilitated optimal skill development.

CURRENT LITERACY ASSESSMENT RESULTS

What literacy levels did successful men and women with dyslexia develop? As adults, nearly all of the men and women with dyslexia demonstrated most of the salient characteristics of Chall's Stage 5, the highest level of literacy development (Chall 1983). This was demonstrated in their high performance on the DARTT, shown in table II. In 95 percent of cases, their knowledge of word meanings and silent reading comprehension levels reached ceiling, or as high as the DARTT measures. Only 5 percent of the individuals with dyslexia did not reach ceiling in these skills. Their scores were similar to those of the nondyslexic control participants. Moreover, according to their strong performance on the Nelson Denny, most of the individuals with dyslexia demonstrated the ability to read silently and comprehend text at high collegiate and postgraduate levels that were only slightly lower than those of the nondyslexic control group.

The solid performance of the individuals with dyslexia on both the vocabulary and silent reading comprehension subtests of the DARTT and ND demonstrates their ability as adults to read, understand, make inferences, and create meaning from text. These are all Stage 5 skills. Furthermore, their current utilization and application of reading skills demonstrates Stage 5 performance. Stage 5 entails reading materials that are "highly difficult, specialized, technical, and abstract" (Chall 1983, p. 100). Sylvia Law explained how she reads huge amounts of highly technical legal materials today.

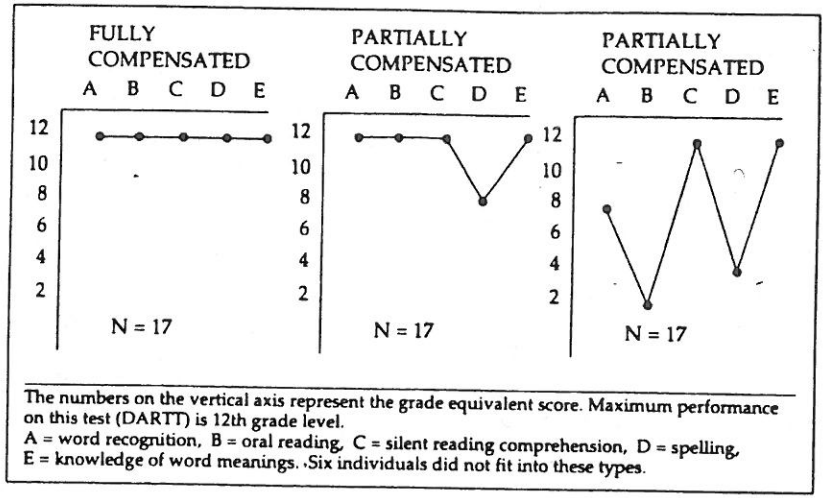
Sylvia Law (attorney):
When you're immersed in a field, you kind of know what the forest looks like, and you're looking to see if there's a particular tree in here. So it's easy to just skim and zero in on the important stuff in the law. You know, the most important sentence in a 100 page document, where it says, 'The court says. . . .' So there are a lot of techniques and filtering devices that I use to get through lengthy legal documents.

As Chall points out, the sophisticated Stage 5 reader uses reading for his or her own professional and personal purposes; "reading serves to integrate one's own knowledge with that of others, to synthesize it and to create new knowledge" (Chall 1983, p. 87). The men and women with dyslexia in this study demonstrate all the salient characteristics of Stage 5 except speed and efficiency, which many of them still lack. All of them read materials that are technical, specialized, and abstract. Nearly all do a substantial amount of daily writing in their professions. Moreover, they integrate and synthesize knowledge from other experts with their own knowledge, and create and contribute significantly to the canon of new knowledge in their fields of expertise. Their books and scholarly articles number in the hundreds. The impressive scholarly publications and other creative writings of these men and women with dyslexia provide evidence of their contributions to new knowledge, a hallmark of Stage 5. [1]

Did jagged profiles of literacy continue? The 60 adults with dyslexia showed strengths in components of literacy that Chall (1994) has called higher level "meaning aspects." Higher level meaning aspects include vocabulary knowledge and silent reading comprehension. All but six participants with dyslexia scored at ceiling (12th grade level) on the DARTT in these skills, as shown in figure 1. However, despite the congruence of positive results on vocabulary and reading comprehension subtests of both the DARTT and ND, a distinct subset of individuals with dyslexia showed a pattern of ongoing weaknesses in what Chall (1994) has called lower level, "print aspects" of literacy. Their ongoing weaknesses in "print" components were documented in results from the word recognition, oral reading accuracy, and spelling subtests of the DARTT (see table II).

Distinct groups of highly successful adults with dyslexia emerged from this study. One, a compensated group, revealed few, if any, ongoing weaknesses with subcomponents of reading in adulthood. The compensated group's performance was high

[1] Among the men and women with dyslexia are Dr. Baruj Benaccerraf, 1980 Nobel laureate in Immunology and Pathology; Lora Brody, TV/radio personality and author of *Cooking with Memories*; Dr. Donald Francis, AIDS researcher/activist and protagonist of the movie "And the Band Played On;" Dr. Florence Haseltine, author of *Woman Doctor* and *Women's Health* Research; Dr. Robert Knapp, Harvard oncologist and author of *Gynecological Oncology*; Professor Ronald W. Davis, genomics researcher and biochemistry textbook author; George Deem, New York City artist, Susan Brown, New York City filmmaker; and Professor Sylvia Law, N.Y.U. legal scholar and author of books on poverty, health care, welfare, and the law.



The numbers on the vertical axis represent the grade equivalent score. Maximum performance on this test (DARTT) is 12th grade level.
A = word recognition, B = oral reading, C = silent reading comprehension, D = spelling, E = knowledge of word meanings. Six individuals did not fit into these types.

Figure 1. Profiles of compensated and partially compensated individuals with dyslexia.

across all literacy measures. Seventeen individuals met this criterion, as shown in figure 1. In addition to their ability to comprehend sophisticated text, they demonstrated strong compensation in word recognition, oral reading accuracy, and spelling.

Another group, those with partially compensated dyslexia, showed jagged profiles of literacy strengths and weaknesses. This group consisted of 43 people. With the exception of six individuals, the partially compensated group also met the criteria on the DARTT of scoring at ceiling in knowledge of word meanings and silent reading comprehension. However, the partially compensated group showed lags in other subskills. They lagged behind individuals with compensated dyslexia and nondyslexic controls in word recognition, oral reading accuracy, and spelling. As table II documents, for each of these subskills, the compensated and partially compensated groups differed significantly based on the results of chi square tests, (word recognition, $p = .01$; oral reading accuracy, $p = .001$; spelling, $p < .001$). Therefore, differences in the profiles shown in figure 1 were corroborated by statistical tests.

Partially compensated individuals with dyslexia fell into two categories: one contained those who lagged behind individuals with compensated dyslexia and nondyslexic controls in spelling alone; and another contained those who lagged behind in spelling, word recognition, and oral reading. Figure 1 illustrates the two types of partially compensated, jagged profiles.

One dips only in spelling (15 individuals); the other dips in word recognition and oral reading as well as spelling (22 individuals). The six remaining individuals with partially compensated dyslexia showed similar jagged profiles of strengths and weaknesses; however, their strengths did not reach ceiling and their weaknesses dipped slightly lower than those of the other partially compensated individuals.

When tested as adults and compared with nondyslexic control participants, the individuals with dyslexia performed poorly overall on all measures of phonological and decoding skills, including the Pig Latin Test, the Florida Nonsense Passages Test, and the Graded Nonword Reading and Spelling Tests. An analysis of variance was performed to compare the means for nondyslexic control participants and the total individuals with dyslexia. Differences between the groups were statistically significant on each of these assessments (see table II). For example, on the Florida Nonsense Passages, differences between non-dyslexic controls and the total number of individuals with dyslexia were highly significant, both for speed and accuracy ($p = .0001$). On the Pig Latin Test, differences were also significant. Out of 48 items, the mean number correct for nondyslexic controls was 44.2 ($SD = 5.6$); in contrast, the mean for the total individuals with dyslexia was only 33.0 ($SD = 11.8$), $p = .005$. These results, taken together, attest to ongoing difficulties of the individuals with dyslexia with phonological skills such as blending, sequencing, and manipulating language sounds and symbols.

Table II summarizes the results of all the literacy tests administered and shows three main findings:

1. On every measure of literacy, nondyslexic controls outperformed individuals with dyslexia;
2. The fully compensated group consistently outperformed both of the partially compensated groups; and
3. For individuals with partially compensated dyslexia, ongoing jagged profiles of literacy strengths and weaknesses persisted in adulthood.

Did reading rate distinguish compensated from partially compensated readers? Participants were instructed that I would record how many questions they had completed on the ND at the end of the standard test time, but that if they had not completed the test at the end of the standard time, they could continue under an extended time condition. All nondyslexic control participants completed the ND within the standard time. In contrast, 58 percent of the total individuals with dyslexia used extended time. These differences, snown in table II, were highly significant ($p = .001$).

In addition, on the one-minute reading rate subtest of the ND, 33 percent of partially compensated individuals had scaled scores less than 180, indicating reading rates that were slower than those of both compensated individuals and nondyslexic controls (see table II). A chi square test comparing compensated and partially compensated individuals' reading rates showed that differences in rate were highly significant ($p = .007$). Thus, in many cases, rate further distinguished compensated from partially compensated readers. Comparisons of test scores of those who took the ND with standard versus extended time showed that those who took the test with extended time performed well overall, but not as well as those who took the test within the standard time. Based on comparisons of individuals' scores with standard versus extended time conditions, it was apparent that, without the accommodation of extended time, many individuals with dyslexia would have scored lower on the ND.

QUESTIONNAIRE RESULTS

How did the adult reading habits and attitudes of the groups compare? By adulthood, 25 men and 26 women with dyslexia reported positive reading attitudes, asserting that they valued and enjoyed reading a great deal. All nondyslexic control participants reported having a strong positive attitude. Therefore, overall reading attitudes of individuals with dyslexia and nondyslexic controls were similar.

When questioned about the extent of their current reading, there was a slight trend for individuals with dyslexia of both types—compensated and partially compensated—to report less reading overall than nondyslexic controls. Participants in all categories reported doing a great deal of work-related reading and, specifically, more reading for work than reading for pleasure. All nondyslexic control participants reported doing a great deal of work-related reading. In comparison, 88 percent of fully compensated individuals and 67 percent of partially compensated individuals reported doing a great deal of work-related reading (see table IV).

When questioned about the extent of their current reading for pleasure, there were significant differences among the groups. Eighty percent of nondyslexic control participants said they engaged in a great deal of reading for pleasure. This compared with only 53 percent of the fully compensated group and 37 percent of the partially compensated group. Table IV shows that nondyslexic controls and both groups of individuals with dyslexia read numer-

TABLE 4 ADULT SELF-REPORTED READING HABITS, USING SCALE OF 0 TO 4 FROM THE ADULT READING HISTORY QUESTIONNAIRE.*

	Nondyslexic Controls (n = 10)	Individuals with Dyslexia			Contrasts**	
		Fully Compensated (n = 17)	Partially Compensated (n = 43)	Total Dyslexics (n = 60)	Controls v. Total Dys.	Full v. Partial
Work-related Reading						
(% reporting a great deal)	100%	88%	67%	73%	.063	.101
Mean response (*SD*)	3.7(.5)	3.5(1.0)	3.0(.9)	3.1(.9)	.0683	.0652
Range	3–4	0–4	1–4	0–4		
Pleasure Reading						
(% reporting a great deal)	80%	53%	37%	42%	.025	.265
Mean response (*SD*)	3.4(.8)	2.5(1.1)	2.2(1.3)	2.3(1.2)	.0081	.4049
Range	2–4	0–4	0–4	0–4		
Book Reading						
Mean response (*SD*)	3.7(.6)	2.5(1.2)	2.4(1.4)	2.4(1.3)	.0046	.7966
Range	2–4	0–4	0–4	0–4		

TABLE 4 ADULT SELF-REPORTED READING HABITS, USING SCALE OF 0 TO 4 FROM THE ADULT READING HISTORY QUESTIONNAIRE.* *(cont.)*

	Nondyslexic Controls (n = 10)	Individuals with Dyslexia			Contrasts**	
		Fully Compensated (n = 17)	Partially Compensated (n = 43)	Total Dyslexics (n = 60)	Controls v. Total Dys.	Full v. Partial
Magazine Reading						
Mean response (*SD*)	3.2(1.2)	2.0(1.3)	2.0(1.4)	2.0(1.4)	.0113	1.0
Range	0 - 4	0 - 4	0 - 4	0 - 4		
Daily News Reading						
Mean response (*SD*)	3.5(1.0)	2.9(1.4)	2.7(1.4)	2.8(1.4)	.1142	.6199
Range	1–4	0–4	0–4	0–4		
Sunday News Reading						
Mean response (*SD*)	3.8(.4)	2.9(1.0)	2.7(1.0)	2.8(1.0)	.0019	.4879
Range	0–1	1–4	0–4	0–4		

* (4 = a great deal; 0 = none, or not at all)
** Full data set available upon request (participants' identities withheld)
*** Observed probability levels from the statistical contrasts; the first column of contrasts shows comparisons between the non-dyslexic comparison group and the total number of individuals with dyslexia; the second column of contrasts shows comparisons between fully compensated and partially compensated individuals with dyslexia.

ous books, magazines, and newspapers regularly. However, on average, nondyslexic controls did more of each type of reading than individuals with dyslexia. Nevertheless, of the 30 men and 30 women with dyslexia, 21 men and 20 women read a Sunday newspaper regularly, and 21 men and 16 women read a daily newspaper regularly. These results confirm findings by Finucci and others regarding the reading habits of men with dyslexia (Finucci et al. 1985) and extend the results to include women. Interestingly, there were gender differences in the extent of book reading among adults with dyslexia. Sixteen women with dyslexia, compared to only six men, read more than 10 books per year for pleasure. While the numbers are small, these results fit with data regarding the reading habits of persons without dyslexia; females overall engage in more extensive book reading than males (Finucci et al. 1985).

What was the role of mentors? Although this study was not designed with a focus on mentoring, interesting trends emerged. In elementary school, teachers and tutors played pivotal roles in assisting most of the individuals with dyslexia as they struggled to learn to read and write. Furthermore, parents (especially mothers) provided a strong support system for most participants. William Brewer's memories of his mother were typical.

William Brewer (psychologist):
My poor mother—she used to spend endless hours on spelling with me, and then I could take the test the next day. And do okay.

Trends in gender differences emerged with regard to mentoring by extended family members. Six men with dyslexia, compared to only one woman, named a relative such as an aunt, uncle, grandparent, or mother-in-law as a mentor.

George Deem (graphic artist):
My aunt was very serious with me, very serious. In college I was taking history and she would see to it that I read every assignment aloud to her so that we could discuss what I was reading.

Charles Bean (neurologist):
My uncle was a surrogate father to me in my intellectual life.

Susan Marlett (artist):
My mother-in-law Daisy got me to go to college. She's very encouraging about learning, and her approach to learning is very inspiring. She inspired me to go to college. . . . And finish.

Men with dyslexia named mentors more frequently overall than women. Beginning with middle school and continuing throughout their education and into the workplace, men recollected over 30 teachers and colleagues, while women recollected only 15 who stood out as taking a special interest in their academic and professional development. These gender differences, based on small numbers, must be interpreted cautiously; however, these results are similar to gender differences reported in the mentoring literature on nondyslexics (Beaman-Smith and Pacier 1996; Woodd 1997). Ronald Davis' memories of teachers who made a difference for him are illustrative of the powerful role played by mentors.

Ronald Davis (biochemist):
My high school biology teacher encouraged me to read more science books and take more science courses. He helped me with my experiments on plants and put me in contact with a biology professor at Eastern Illinois University. Later, when I was a Ph.D. student at Cal Tech, they told me I was gonna flunk out because I kept failing the foreign language tests. But Davidson, my thesis advisor, went to bat for me. He convinced the Graduate Committee to let me do a translation project instead of the language test because I was an unusual circumstance. He wrote me this note: Dear Ron: The Committee decided to accept your translation project for fulfillment of the foreign language requirement. It was the happiest note of my life.

CONCLUSIONS AND DISCUSSION

Results from this study revealed distinct groups of highly successful adults with dyslexia: a fully compensated group and two partially compensated groups. Each group's development was augmented by avid reading in a content area of passionate personal interest. Members of each group currently comprehend complex text at Stage 5, the highest level of reading development. Moreover, they create and write sophisticated, provocative texts of their own, as demonstrated by their publication of important books and scholarly articles. Despite these noteworthy strengths and accomplishments, the partially compensated men and women with dyslexia manifest persistent ongoing weaknesses in phonological abilities and processing speed, as shown by their lags in word recognition, oral

reading accuracy, spelling, and reading rate. Although they manifest ongoing deficits, they have mastered the ultimate goal of reading—the ability to make meaning from highly sophisticated text.

A second finding from this study was that females with dyslexia preferred fiction whereas males with dyslexia preferred nonfiction. While this result fits with findings in the literature on the reading preferences and interests of persons without dyslexia, it merits further examination in an even larger study of adults with dyslexia. Preferences associated with gender regarding fiction and nonfiction could have important implications for instructors who strive to avoid gender stereotyping. How might teachers lure students with dyslexia into reading through their preferred interests and genres without promoting gender stereotypes? This could be a useful area for new research.

Trends in gender differences in mentoring patterns emerged clearly in middle school and continued into the workplace. These trends would be fruitful and important avenues to follow up in future research, especially considering that these trends in the data were based on small numbers. This study was not designed with a focus on mentoring; however, in a future study, additional questionnaires and interview protocols could be included to investigate more closely subtle and important issues regarding gender, dyslexia, and mentoring.

This study confirms and extends results of previous research on the role of personal interests (Fink 1992, 1993, 1995/96, 1998; Renninger 1992; Schiefele and Krapp 1996) to a larger sample that included a control group and equal numbers of men and women with dyslexia. The model of dyslexia constructed in this study explains how individuals with dyslexia, who in adulthood may continue to lack strong integration of basic, lower level "print" skills, develop higher order, sophisticated "meaning" skills. The model includes four main components:

1. Passionate personal interest in a content area requiring reading;
2. Avid, highly focused reading;
3. Deep schema knowledge; and
4. Contextual strategies.

The finding of domain-specific contextual strategies for reading confirms and extends results from previous research by Blalock (1981) and Bruck (1990), who independently found that adults with dyslexia are extremely skilled at using contextual cues, and that use of context improved their reading speed and accuracy. The 60 successful men and women with dyslexia in this study used domain-specific context and developed Stage 5 skills through scaffolding provided by avid reading in a content area of passionate personal interest. In many cases this occurred in conjunction with systematic phonics instruction. This analysis emphasizes the need for a balanced approach to literacy instruction that includes both "print" and "meaning" aspects. Both systematic phonics and literature-based approaches need to be included simultaneously in a thoughtful, theoretically sound, integrated program of instruction.

This study's identification of three groups of individuals with dyslexia (one compensated and two partially compensated) is consistent with the double-deficit hypothesis, in which phonological deficits and processing speed deficits are "depicted as separable concurrent sources of reading disability whose combined presence leads to the most profound forms of reading impairment" (Bowers and Wolf 1993; Wolf 1997; Wolf and Bowers in review). In this study, the partially compensated individuals with the most jagged profiles fit the double-deficit pattern of profound reading impairment. As adults, these individuals are slower in reading speed and weaker in phonological skills as attested to by their weak word recognition, oral reading, spelling, and reading rate scores. Instructional techniques that have been suggested for ameliorating literacy difficulties in the most severely affected double-deficit readers include increased emphasis on instruction that stresses fluency training to promote automaticity. Theoretical models of reading acquisition have long suggested that development of fluency and automaticity are central components of skilled reading (Adams 1996; LaBerge and Samuels 1974; Perfetti 1977, 1991; Stanovich 1980). However, as Meyer and her colleagues (1997) recently noted, no commercial programs currently exist for fluency training.

I propose here that interest-driven instruction be used to help develop fluency and automaticity. The results of this study suggest that interest-based teaching approaches can provide the necessary practice and exposure to print required for fluency development. The success of these 60 men and women with dyslexia, who developed Stage 5 skills through scaffolding provided by avid reading of high interest texts, argue for integrating solid interest-based approaches as a centerpiece of instruction.

These results indicate the need for teachers to select and provide reading materials based on students' passionate interests.

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APPENDIX I.

Professionally Successful Men and Women with Dyslexia

MEN

J.William Adams
Headmaster
The Gow School;
South Wales, New York

S. Charles Bean
Neurologist
Clinical Associate Professor
Jefferson Hospital
Philadelphia, Pennsylvania

Baruj Benacerraf
Immunologist
Professor of Immunology
Chair, Dept. of Pathology
Harvard Medical School

William Brewer
Psychologist
Professor of Psychology
University of Illinois;
Champaign, Ill.

Michael L. Commons
Psychometrician
Lecturer/Research Associate
Dept. of Psychiatry
Harvard Medical School

Heriberto Cresto
Social Worker
Latino Health Institute
Boston, Mass.

Ronald W. Davis
Biochemist
Director, Stanford DNA
Sequencing/Technology Ctr.
Professor,
Stanford University
School of Medicine
Stanford, California

George Deem
Graphic Artist
New York City
Adjunct Professor of Art
University of Pennsylvania
Philadelphia, PA

G. Emerson Dickman
Attorney at Law
Maywood, New Jersey

H .Girard Ebert
Interior Designer and CEO
H. Girard Ebert, Inc.
Baltimore, Maryland

Donald Francis
Virologist/AIDS Researcher
Genentech, Inc.
Founder & President
VaxGen, Inc.
San Francisco, California

Miles Gerety
Attorney at Law
Conn. Public Defender
Bridgeport, Connecticut

Daniel Gillette
Learning Specialist
Boston Architectural Center

Alexander Goldowsky
Program Developer
New England Aquarium
Boston, Mass.

David Gordon
Marketing Consultant
Adaptive Computing
Beverly, Mass.

Philip Hulbig
Tutor
Walpole, Mass.

Robert Knapp
Gynecologist
Professor and Chair
Dept. of Gynecology
Harvard Medical School

John Moore
Social Worker
Boston, Mass.

Jonathan Pazer
Attorney at Law
Law Offices of Pazer & Epstein
New York City

Bart Pisha
Computer Specialist
Director of Research
Center for Applied
Special Technology (CAST)
Peabody, Mass.

Cruz Sanabria
Early Childhood Educator
Boston, Mass.

Michael Schweitzer
General and Vascular Surgeon
Virginia Surgical Specialists
Richmond, Virginia

David Selib
Sales Manager
Reebok International
Medfield, Mass.

Larry B. Silver
Psychiatrist and Writer
Clinical Professor of
Psychiatry
Georgetown University
School of Medicine
Washington, DC

James Soberman
Dentist
Clinical Ass't. Professor
of Prosthodontics
New York University

Michael Spock
Co-Director/Researcher
Chapin Hall
Center for Children
University of Chicago
Chicago, Illinois

A. McDonald Vaz
Writer
Miami Beach, Florida

Michael Van Zandt
Research Scientist
Institute for
Diabetes Discovery
Branford, Connecticut

Thomas G. West
Writer
Visualization Research
Institute
Washington, DC

Glenn Young
Learning Disabilities Specialist
Washington State Dept. of
Social & Health Services
Seattle, Washington

WOMEN

Hannah Adams
Elementary School Teacher
Cambridge, Mass.

Tania Baker
Biochemist
Assistant Professor
Mass. Institute of
Technology (MIT)

Barbara Bikofsky
Special Educator
Adjunct Instructor
Lesley College
Cambridge, Mass.

Lori Boskin
Director
Alumni Relations,
Special Projects, &
Promotions
UCLA School of Law
Los Angeles, California

Lora Brody
Cookbook Author
TV and Radio Personality
Newton, Mass.

Terry Bromfield
Special Educator
Adjunct Ass't. Professor
Lesley College
Cambridge, Mass.

Ann L. Brown
Researcher/Educator
Professor of Education
University of California
Berkeley, California

Susan E. Brown
Filmmaker
New York City

Jane Buchbinder
Fiction Writer
Boston, Mass.

Susan Cobin
Administrator/Principal
Talmud Torah Day School
Saint Paul, Minnesota

Ellen Gorman
Social Worker
New Haven Adult
Education
New Haven, Connecticut

Stacey Harris
Attorney at Law
Brookline, Mass.

Florence Haseltine
Gynecologist/Director
Ctr. for Population Research
National Institutes of Health
Washington, DC

Marlene Hirschberg
Arts Administrator/Director
Jewish Community Center
Milwaukee, Wisconsin

Melissa Holt
Head Teacher
South Shore Day Care
Quincy, Mass.

Annette Jenner
Neurobiologist
Biology Teaching Fellow
Harvard University

Anita Landa
Educator
Associate Professor
Lesley College
Cambridge, Mass.

Sylvia Law
Attorney at Law
Professor of Law,
Medicine, and Psychiatry
New York University
School of Law

Nancy Lelewer
Writer
Research Associate in Neurology
Harvard Medical School

Joanne Lense
Social Worker
Bronx Lebanon Hospital &
Knight Education,
New York City

Susan Marlett
Artist
Clearway Technologies
Fort Lee, New Jersey

Robin Mello
Storyteller/Actress
Adjunct Instructor
Tufts Univ. & Lesley College

Fiona Moore
Social Worker
Human Resource Institute
Brookline, Mass.

Tania Phillips
Elementary School Teacher
Northampton, Mass.

Priscilla Sanville
Arts Educator
Adjunct Ass't. Professor
Lesley College
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Marla Silver
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Learning Specialist
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Jane Smith
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Executive Vice President
New England Innkeepers

Lezli Whitehouse
Language Clinician
Boston, Mass.