
ON BABIES AND BATHWATER: ADDRESSING THE PROBLEMS OF IDENTIFICATION OF LEARNING DISABILITIES

Thomas E. Scruggs and Margo A. Mastropieri

Abstract. In this article, we review problems in identification of learning disabilities and consider proposed alternatives to present procedures. We argue that no proposed alternative meets all the necessary criteria for identification of learning disabilities, and that radically altering or eliminating current conceptualizations of learning disabilities may amount to “throwing the baby out with the bathwater.” We conclude that the major problems of identification of learning disabilities — including overidentification, variability, and specificity — can be eliminated by increasing specificity and consistency of state criteria and strict adherence to identification criteria on the local implementation level. Finally, we argue that scarce special education funds should not be employed to address the problems of general education.

THOMAS E. SCRUGGS, Ph.D., is professor, George Mason University.
MARGO A. MASTROPIERI, Ph.D., is professor, George Mason University.

Since the inclusion of learning disabilities (LD) as a category in the Education for All Handicapped Children Act (PL 94-142; 1975), concerns have been expressed over appropriate identification procedures. Although far from alone in its search for more appropriate definitions (e.g., the American Association on Mental Retardation has revised its 1921 definition of mental retardation nine times; see Beirne-Smith, Ittenbach, & Patton, 1998), the field of learning disabilities has experienced some very specific problems in identification (Kavale & Forness, 1995; Scruggs & Mastropieri, 1994-1995). These problems include (a) overidentification, (b) variability, (c) specificity, (d) conceptual considerations, (e) discrepancy issues, (f) early identification, and (g) local implementation. As a consequence, it has been suggested that the cate-

gory of learning disabilities be eliminated or significantly altered (Aaron, 1997; Algozzine, 1985; Lyon et al., 2001).

In this article, we review problems in identification of learning disabilities and commonly agreed-upon characterizations of learning disabilities and consider proposed alternatives to present procedures for identification of learning disabilities. We argue that no proposed alternative meets all necessary criteria for identification of learning disabilities. We conclude that the major problems of identification of learning disabilities — including overidentification, variability, and specificity — can be eliminated by increasing the specificity of state criteria and strict adherence to identification criteria on the local implementation level.

PROBLEMS IN IDENTIFICATION

Overidentification

Since 1975, the population of individuals identified as having learning disabilities has increased about 150% to a level that represents over 50% of all students with disabilities and over 5% of all students in school, a percentage far higher than those of, for example, students with mental retardation or serious emotional disturbance (U.S. Department of Education, 2000). This is frequently the first fact noted in arguments that current definitions are problematic (e.g., Fuchs, Fuchs, & Speece, 2002; Lyon et al., 2001).

These high identification rates may result from imprecision in federal and state definitions of learning disabilities (e.g., Mercer et al., 1996). However, researchers have suggested that a confounding of different high-incidence disabilities has resulted in classifying individuals as having learning disabilities who previously may have been classified as having mental retardation (MacMillan, Siperstein, & Gresham, 1996). Wong (1996) suggested that the concept of learning disabilities may have been overgeneralized, perhaps reflecting "teachers' noble goal of teaching as many problem learners as possible, and not restricting instructional help only to students with learning disabilities" (p. 8; see also Torgesen, 1999, p. 108; Zigmond, 1993). Regardless of the reason, many consider the prevalence rates for learning disabilities to be "alarmingly high" (Algozzine & Ysseldyke, 1987). According to Wagner and Garon (1999), "the prevalence of this disability is likely to be closer to 1-3 percent of school-age children as opposed to recent estimates of 20-30 percent" (p. 100).

Variability

Identification of individuals with learning disabilities has revealed considerable variability across agencies. Finlan (1992) reported that states varied considerably in identification rates, from a low of 2.10% (Georgia) to a high of 8.66% (Rhode Island). Coutinho (1995) found similar variability using more recent data, from a low of approximately 2% (Wisconsin) to over 7% (Massachusetts) (see also Frankenberger & Fronzaglio, 1991; Lester & Kelman, 1997). Although there has been some debate on whether the variability in identification exceeds that of other disability areas (Algozzine & Ysseldyke, 1987; Hallahan, Keller, & Ball, 1986), there is little doubt that the variability is considerable and may reflect lack of consistency or precision in identification procedures. Finlan (1992), for example, identified a systematic relation between identification rate and whether or not states employed a specific discrepancy requirement. Seven of the lowest 10 states in rates of identification employed a specific method of assessing

a discrepancy, while only 2 of the highest 10 states employed such a requirement. Such a finding reflects the position of Dawes, Faust, and Meehl (1989) that more objective procedures in identification may lead to more consistent outcomes. More recently, Lester and Kelman (1997) evaluated state identification rates, concluding that demographic and sociopolitical factors moderately predicted some aspects of state prevalence of learning disabilities, although these factors were not related to prevalence of physical disabilities.

Specificity

It has been argued that individuals with learning disabilities can not be reliably distinguished from individuals with generally low achievement (LA) (e.g., Algozzine, 1985; Ysseldyke, Algozzine, Shinn, & McGue, 1982), or, more specifically, that students with reading disabilities can not be distinguished from "garden variety" poor readers (Fletcher et al., 1992; Fletcher et al., 1994; Spear-Swerling, 1999; Wagner & Garon, 1999). Shaywitz, Escobar, Shaywitz, Fletcher, and Makach (1992) have suggested that "dyslexia" simply reflects the lower tail of a normal distribution of reading ability. Ysseldyke, Richey, and Graden (1982) compared students who had been identified as having learning disabilities with students who had not been identified but had scored lower than the 25th percentile on achievement tests, and concluded that "there were no psychometric differences in the performances of the two groups of students" (p. 83). Citing this and related investigations, Algozzine (1985) noted that "the learning disabilities category has outlived its usefulness" (p. 73). Some researchers, reanalyzing research in which learning disabilities-low achievement comparisons were made, have concluded that differences are reliable and substantial (e.g., Kavale, Fuchs, & Scruggs, 1994; Fuchs, Fuchs, Mathes, & Lipsey, 2000). In response, it has been suggested that even if some differences can be identified, the two groups can benefit from qualitatively similar instructional approaches, and therefore specific identification of learning disabilities is unnecessary (Algozzine, Ysseldyke, & McGue, 1995; Lyon, 2001; Spear-Swerling, 1999).

Conceptual Problems

It has been proposed that differing and inconsistent identification arises from problems in conceptualizing the definition of learning disabilities. Kavale and Forness (2000) evaluated previous definitions and suggested, "... the failure to produce a unified definition has meant that LD lacks two critical elements: understanding — a clear and unobscured sense of LD — and explanation — a rational exposition of the reasons why a particular student is LD" (p. 240).

Until the definition of learning disabilities is clearly conceptualized, problems in identification will continue (Kavale & Forness, 1995; Kavale, Forness, & Lorschach, 1991). Part of the difficulty arises from the lack of agreed-upon positive measures of learning disability, and the partial reliance on exclusionary criteria — that is, things that learning disabilities can not be, including mental retardation, emotional disturbance, or cultural disadvantage (Kavale & Forness, 2000).

Discrepancy Issues

The use of IQ-achievement discrepancy criteria in identification of learning disabilities, although widely employed (Schrag, 2000), has been criticized by many for a variety of conceptual and statistical reasons (Aaron, 1997; Mastropieri, 1987; Scruggs, 1987; Spear-Swerling, 1999; Stanovich, 1991). For example, technical problems include the degree of measurement error associated with discrepancy methods and the problem of statistical regression (Cone & Wilson, 1981; Shepard, 1980). It has been argued that use of IQ tests is not helpful, and that students exhibiting discrepancies do not differ from poor readers with lower IQs on many reading, spelling, language, or memory tests (Siegel, 1999). It has also been suggested that IQ is not predictive of reading achievement (Vellutino, Scanlon, & Lyon, 2000; Fletcher et al., 1998), although this position has been challenged (Naglieri, 2001). Further, Stanovich (1991) argued that discrepancy definitions, at least with respect to reading disability, are threatened by findings that literacy development also develops the cognitive skills revealed on aptitude measures such as IQ tests. Some research suggests that IQ-achievement discrepancies are not predictive of academic growth rates (Lyon, 2001; Vellutino et al., 2000; but see Speece & Case, 2001, for a different perspective). According to Kavale and Forness (1995), an overriding problem with discrepancy is how it has been applied; that is, that “the prominence of discrepancy in conceptualizations of LD has resulted in its reification and deification” (p. 162). In some cases, discrepancy (underachievement) has come to be seen as equivalent to learning disabilities, rather than one possible component of a conceptual understanding of learning disabilities. Lyon et al. (2001) reviewed relevant literature and concluded, “The IQ-achievement discrepancy, when employed as the primary criterion for the identification of LD, may well harm more children than it helps” (p. 266).

Early Identification

Nearly 30 years ago, Keogh and Becker (1973) alerted the field to the importance of early identification and treatment and the dangers of misidentification (see also Keogh, 1986). In response, Haring et al. (1992) argued

that if the condition of learning disabilities is defined as a lack of academic progress, such a determination cannot be made on the preschool level, and that different characterizations should be applied. Nevertheless, others have suggested that it may be better not to wait for failures to occur prior to implementing interventions. For example, Fletcher and Foorman (1994) described evidence that learning problems are more easily remediated in the earlier grade levels, concluding that “the focus should be on prevention and early intervention for children at risk for developing learning difficulties” (p. 187).

However, present models of identification that emphasize observable academic failure may lose valuable time for treatment (Hallahan, Kauffman, & Lloyd, 1999). Lyon et al. (2001) argued that the present IQ-achievement discrepancy criterion necessitates a “wait to fail” model, in that many children can not be reliability identified as having learning disabilities until third grade because of psychometric limitations in discrepancy criteria (p. 269). However, grade-level discrepancies (e.g., academic functioning two years below grade level) may be more problematic than IQ-achievement discrepancies, which do not necessarily require long periods of academic failure. Horn and O’Donnell (1985), for example, found that discrepancy scores, even in the first few weeks of first grade, were better predictors of future learning disabilities classification than was a low-achievement criterion. Mastropieri (1988) concluded that when children with learning disabilities are identified and treated early, outcomes are usually positive.

Local Implementation

One extremely important aspect of the identification process that is often lost in purely conceptual or technical analyses is the individual or group judgment of professionals who are part of the referral and eligibility process. Such judgments can be critical in identifying students who might otherwise “fall through the cracks” and lead to false negatives or false positives that may result from blindly applying quantitative criteria. In that regard, MacMillan, Gresham, and Bocian (1998) stated, “the assignment of responsibility to a committee clearly conveys the desire to receive input from varied perspectives and not rely exclusively on test scores” (p. 322). Nevertheless, “actuarial” procedures can result in much more consistent and systematic identification methods, and can be key factors in reducing variability in identification (Dawes et al., 1989; Ysseldyke, Algozzine, Richey, & Graden, 1982). The issue was framed by Meehl (1973) as, “When should we use our heads instead of the formula?” (p. 81). Gresham (2001) described the identification process as involving local criteria for school failure, national norms for assessment, and classification decisions based upon the

degree of presumed “profitability” to the student, rather than established criteria.

Recent research has suggested that “public school practices for diagnosing children with learning disabilities bear little resemblance to what is prescribed in federal and state regulations” (MacMillan et al., 1998, p. 323). Gottlieb, Alter, Gottlieb, and Wishner (1994) reported that urban students identified with learning disabilities had an average IQ of 81.4, concluding, “these children today are classified as learning disabled, when in fact most are not” (p. 463). MacMillan, Gresham, Siperstein, and Bocian (1998), using a California sample, found that fewer than half of the students identified as having learning disabilities met state requirements. In an earlier investigation, MacMillan et al. (1996) identified students with IQ scores lower than 75, and as low as 58, who had been classified as having learning disabilities. McLeskey and Waldron (1990) examined the records of 1,742 Indiana students referred for evaluation for learning disabilities eligibility. They reported that, although students identified as having learning disabilities (52%) differed markedly from students referred but not identified (48%), over one third of students identified as having learning disabilities did not meet existing state criteria.

Although variability may exist across and within states, evidence to date suggests that a very substantial source of overidentification of learning disabilities is the application (or misapplication) of state criteria at the local level. These data suggest that identification frequency could be reduced by as much as one third or more simply by consistent and systematic application of state criteria at the local level. Further research could provide more evidence on the *reasons* for this overidentification and the steps that could be taken to reduce it.

CHARACTERIZATIONS OF LEARNING DISABILITIES

Problems in identification, based to some degree on conceptual inconsistencies, have led some to argue that learning disabilities does not exist as a viable condition. Some have proposed that learning disabilities is, in fact, socially or organizationally constructed to serve the interests of certain elements of society rather than children (Christensen, 1999; Coles, 1987; Skrtic, 1999; Sleeter, 1995; see Kavale & Forness, 1998, for a review). Others have suggested that students characterized as having learning disabilities are not distinguishable from other poor readers or low achievers not characterized as having learning disabilities (Aaron, 1997; Fletcher et al., 1994; Shaywitz, Holahan, & Shaywitz, 1992; Ysseldyke, Algozzine, Shinn, & McGue, 1982), and that perhaps the concept is not useful.

Consideration of such issues has led researchers in two different directions over the years (Lester & Kelman, 1997). On one hand are those who have suggested that improved precision of identification procedures will lead to a resolution of these issues, and support treatment of those who “truly” have learning disabilities. Reynolds (1984), for example, argued:

The tremendous disparities in measurement models adopted in the various states in their respective learning disability guidelines and the varying levels of expertise are obvious, major factors contributing to the difference in the proportion of children served as LD in the various states. Lack of a specific definition, improper or lack of application of the severe discrepancy criterion, and the failure to develop appropriate mathematical models ... are the primary, certainly interrelated causes of these disparities. (p. 455; see also Keogh, 1994)

On the other hand, some have suggested that the concept of learning disabilities has little or no practical utility and should be abandoned: “It is time to quit viewing eligibility decision making as a technical problem. It means putting an end to efforts to try to find better ways of defining concepts and conditions that cannot be defined and may not exist” (Algozzine & Korinek, 1985, pp. 392-393).

Nevertheless, any accounting of learning disabilities, positive or negative, must take into account the existence of descriptive reports dating back to the 19th century or earlier (see Anderson & Meier-Hedde, 2001; Berlin, 1887; Dejerine, 1892; Hinshelwood, 1896; Kussmaul, 1877), the proliferation of professional and advocacy organizations, such as the Council for Learning Disabilities, the Division for Learning Disabilities of the Council for Exceptional Children, and the Learning Disabilities Association of America, and the thousands of service providers who not only testify to the existence of learning disabilities but also advocate for improved services (see Scruggs & Mastropieri, 1988). Although measurement issues are far from resolved, a relatively consistent set of observations has been reported over the years. Wong (1996) suggested, ... those very characteristics observed by parents, educators, psychologists, and medical professionals about children with learning disabilities in 1963 are the very same characteristics that we see today in children, adolescents, and adults with learning disabilities! (p. 22)

As an example, Mastropieri (2001) described the case of “Andrew,” a middle third-grader in a middle-class, suburban school. On a tape-recording of his reading of a grade-level reader, he reads a painful six words per minute. On an early second-grade text, he reads eight words per minute. Psychoeducational testing reveals considerable variability: a Full-Scale IQ of 104, but a

reading standard score of 72, with similar deficits in math and spelling. His vocabulary is above average; his listening comprehension and verbal expression scores are almost exactly average. For a "free writing" activity, he drew a picture that seems to be a comet, and wrote below the picture the single sentence, "It vush the oue wun" [it was the only one]. His teachers describe him as a good-natured student of good verbal ability, but having significant problems in reading and math concepts. As such, Andrew provides a classic example of a student who exhibits many of the characteristics considered "typical" of learning disabilities.

Kavale and Reese (1991) surveyed 547 teachers of students with learning disabilities in the state of Iowa (average learning disabilities teaching experience 8.5 years, 13 years overall), and found substantial agreement on the nature of learning disabilities. More than 80% of the teachers agreed that the condition of learning disabilities is associated with the following statements: (a) a discrepancy between ability and achievement; (b) learning strengths as well as learning weaknesses; (c) academic strengths as well as academic weaknesses; (d) a processing deficit that interferes with learning ability; (e) average or above intelligence; (f) a need for special materials and instructional techniques; and (g) the ability to learn at a different rate than individuals with mental retardation (pp. 146-147).

These statements correspond closely with the three components of learning disabilities conceptualizations over the past 30 years, as described by Keogh (1994): "1) unexpected low achievement relative to aptitude or ability; 2) deficits and uneven profiles in specific perceptual or cognitive processes; and 3) evidence of within-child, presumably causal, neurological condition(s)" (p. 16). Keogh concluded, "although they may have validity on a construct level, these definitional criteria present serious problems of measurement when making diagnostic decisions or assigning individuals to classes" (p. 16).

Wong (1996) has described many of these commonly reported features of learning disabilities, including the following.

Learning disabilities involve unexpected or unanticipated underachievement. This unexpected nature of learning disabilities is a commonly cited characteristic (Keogh, 1994). It is not completely separate from other considerations, since the unexpected or unanticipated nature of learning disabilities doubtless has much to do with the concept of deficits in cognitive processing in spite of normal intelligence. Learning problems associated with such factors as low intelligence, sensory impairments, or cultural disadvantage, in contrast, are "expected," and provide a direct conceptual contrast with learning disabilities (Kavale &

Forness, 1995). Mastropieri's (2001) case of a student with average abilities in intelligence and general language skills, who nevertheless exhibited very considerable difficulty in math and literacy tasks, provides an example of this unexpected underachievement. That this level of achievement was not expected from an evaluation of the student's intellectual or linguistic functioning is integrally linked to a general understanding of learning disabilities.

Learning disabilities are multifaceted in that they describe a variety of manifestations in areas of academic and/or psychological functioning. Although most students identified as having learning disabilities exhibit problems in the literacy areas of reading, spelling, and written language, for which considerable co-morbidity has been identified (Beitchman, Cantwell, Forness, Kavale, & Kauffman, 1998), specific problems in mathematics are also often identified (American Psychiatric Association, 2000; Baroody & Ginsburg, 1991; Fleischner, 1994; Kosci, 1981; McLeskey & Waldron, 1991). These problems may (Scruggs & Mastropieri, 1986) or may not (Rourke, 1989; Strang & Rourke, 1983) be associated with problems in reading or spelling. In addition, deficits in specific cognitive processes such as memory (Cooney & Swanson, 1987; Siegel & Ryan, 1988; Swanson, 1993a) or attention (Hallahan & Cottone, 1997) may underlie problems in more than one academic area. Even among students with reading disabilities, it is less clear whether the frequently observed deficits in phonological awareness (Torgesen, 1999) are a foundational element of all reading disorders, responsible also for identified deficits in reading comprehension (Mastropieri & Scruggs, 1997; Sternberg, 1999).

This multifaceted nature of learning disabilities was demonstrated in a multivariate analysis of a large data set (Kavale & Nye, 1985-1986, 1991), which revealed learning disabilities to be most consistently related to deficits in reading and math, as related in turn to deficits in linguistic (e.g., semantic, syntactic, phonological), neuropsychological (e.g., selective attention, memory, cognitive style), and social/behavioral functioning (e.g., interpersonal perception, intrapersonal perception). Such results suggest that learning disabilities, at least as commonly understood and evaluated, are multifaceted rather than unitary in nature. In order to understand the different features observed in students with learning disabilities, attempts have been made to identify "subtypes" (e.g., Lyon, 1985; McKinney, Short, & Feagans, 1985). However, general agreement has not been reached on the nature of such learning disabilities subtypes (Kavale & Forness, 1987).

Learning disabilities are associated with intraindividual differences or deficits, and uneven profiles in specific perceptual or cognitive processes. Although

researchers have observed deficits in a large number of domains, individuals with learning disabilities are frequently observed to demonstrate relative patterns of strengths and weaknesses (Keogh, 1994). These were described by Kirk (1971) as intraindividual differences, and by Gallagher (1966) as “imbalances.” Although not necessarily revealed in large group summaries of sub-type scores (e.g., WISC profiles; Kavale & Forness, 1984), researchers and practitioners have frequently noted relative strengths and weaknesses within individual patterns of functioning (Wong, 1996).

Learning disabilities are associated with within-child, presumably neurological conditions and, as such, are not primarily due to sensory, motor, or intellectual deficits, or cultural disadvantage. This characteristic is included in many definitions of learning disabilities (Kavale & Forness, 2000), and has contributed both to conceptual models of learning disabilities and to the most severe criticisms of the concept of learning disabilities. Since cognitive deficits of known neurological origin have been difficult to measure directly, problems of reliability and validity of psychological “process” measures called the issue of neurological functioning into question (e.g., Larsen & Hammill, 1975). Mercer, Forgnone, and Wolking (1976) suggested, “due to the vague nature of the concept of a process disability, a description of it for the purpose of analyzing definitions of LD is subject to criticism” (p. 378).

Such analysis, however, was helpful in redirecting previous assumptions that learning disabilities generally reflect visual-perceptual processing difficulties, and require perceptual-motor training (Kavale & Mattson, 1983). Nevertheless, modern techniques, including functional magnetic resonance imaging (fMRI) techniques, have suggested that a neuropsychological basis for learning disabilities does exist (Hynd, Clinton, & Hiemenz, 1999), and that “both anatomical and physiological signatures of dyslexia exist,” for example, in decreased activation of the left temporoparietal and superior temporal cortex during phonological processing (Rumsey, 1996, p. 72). Research from autopsy studies (Galaburda, 1991), positron emission tomography (PET) scans (Wood, Flowers, Buchsbaum, & Tallal, 1991), and genetic studies (Olson, 1999) has tended to support these findings, leading Hynd et al. (1999) to suggest, “learning disabilities are most appropriately viewed from a neuropsychological perspective” (p. 60). Although such a characteristic may or may not be a useful component of a definition of learning disabilities (Spear-Swerling, 1999), the consideration that learning disabilities is associated with neuropsychological dysfunction — which may be manifest as disorders of cognitive processes — has been prominent in learning disabili-

ties definitions. Further, measures of cognitive processing, including attention, memory, and linguistic processes, although not necessarily directly related to neuropsychological dysfunction, have revealed processing deficits in students with learning disabilities.

ALTERNATIVE PROCEDURES FOR IDENTIFICATION

Proposed Alternatives

Clearly, the field of learning disabilities is facing a crisis. On the one hand are those who have concluded that problems in identification have critically compromised the concept of learning disabilities, to the extent that it should be abandoned entirely. On the other hand is the considerable volume of research and descriptive evidence that, while acknowledging the problems in identification, nevertheless supports the concept of learning disabilities. Thirty years ago, McCarthy (1971) wrote:

The most important decision you will make is that of definition — because your definition will dictate for you the terminology to be used in your program, the prevalence figure, your selection criteria, the characteristics of your population, and the appropriate remedial procedures. (p. 14)

Today, issues of definition, identification, and assessment are more important than ever in the continuance of the field of learning disabilities. For these reasons, alternatives to the present identification procedures have been proposed, several of which contain overlapping considerations. Alternative identification procedures for learning disabilities include the following.

Double-deficit criteria. Wolf and Bowers (1999) proposed criteria based on deficits on (a) phonological analysis tasks and (b) rapid continuous naming of digits and letters. These criteria have also been seen to discriminate between students with reading disabilities and normally achieving readers in the early grades. Allor (2002) reviewed 16 studies of phonemic awareness and rapid naming conducted between 1990 and 1997, and concluded that performance on each of these two tasks contributes uniquely to development of word reading, and that continued efforts to evaluate the double-deficit hypothesis are warranted. However, more recently, Ackerman, Holloway, Youngdahl, and Dykman (2001), testing a sample of 101 elementary school children with and without learning disabilities, found that these children differed on a number of tasks in addition to the double-deficit criteria, including orthographic tasks, attention, arithmetic achievement, and most WISC-III factors. Further, students with a double deficit were no more limited in reading and spelling than peers with a single deficit in phonological analysis.

Phonological process core difference model. Stanovich (1988) proposed that differences in phonological processes could discriminate between “dyslexic” and “garden-variety poor readers,” particularly in reading achievement at early grade levels. Generally supporting this idea, Torgesen and Wagner (1998) have proposed the use of tests of phonological awareness, rapid automatic naming, and verbal short-term memory in identification of reading disabilities at the early grade levels (Wagner, Torgesen, & Rashotte, 1999). Similarly, Fletcher et al. (1998), arguing against the utility of discrepancy models of learning disabilities, suggested that learning disabilities be considered for any student failing to reach the 25th percentile for specific reading skills, including core reading process measures. They noted that this consideration would result in higher numbers identified, but may have greater relevance than present policy-based decisions, which in their view merely fulfill a “gate-keeping function” (p. 199), that is, to keep numbers down.

Chronological age definitions. As have other researchers, Siegel (1989) suggested that IQ is not relevant to the concept of learning disabilities. Specifically, she noted the bidirectional influence of IQ and achievement, arguing that lack of achievement may in time exert a negative influence on IQ. Instead, Siegel (1989) suggested that students be identified as having learning disabilities if they score below age expectancy in achievement (particularly, reading of pseudowords) and are not mentally retarded. Lyon and Fletcher (2001) suggested that discrepancy criteria be abandoned and replaced by comparing achievement in academic areas with age and grade levels.

Bayesian procedures. Alley, Deshler, and Warner (1979) described an approach to identification based upon earlier models proposed by Wissink, Kass, and Ferrell (1975). Bayes’ formula combines prior and current information to determine the probability of learning disabilities. Regular class teachers are asked to complete a checklist for students experiencing learning problems. Each factor on the checklist is assigned a numerical weight, depending on its odds of defining learning disability. Finally, a formula is used that combines probability data. For example, although reading decoding had a probability of only .21 of prediction of learning disabilities, decoding + reading recognition + detecting spelling errors + problems with math algorithms resulted in a .96 probability of prediction of learning disabilities. Further testing was done to verify these considerations.

Neuropsychological assessment. Rourke (1993) described a battery of neuropsychological assessments (e.g., tactile-perceptual tests, visual-perceptual tests, auditory-perceptual and language-related tests) that he argued could be used to identify learning disabilities. He

further suggested that these measures could discriminate among subtypes of learning disabilities (e.g., non-verbal learning disabilities).

Assessment of cognitive processing. In recent years, researchers have proposed the use of tests of cognitive processing that could be useful in providing direct evidence of relevance to identification of learning disabilities. For example, Naglieri (2001) described the Cognitive Assessment System (Naglieri & Das, 1997), and Swanson (1993b) described the Swanson Cognitive Processing Test as a dynamic assessment measure. Either of these measures is suited to examining individual differences in information processing, and as such could be potentially useful in identifying learning disabilities.

Operational interpretation. Kavale and Forness (1995, 2001) suggested an operational interpretation that would permit a number of concepts to be given meaning by describing their individual operational definitions. They proposed a five-level process of identification that included:

1. underachievement/discrepancy as a necessary but not sufficient first criterion;
2. pervasive deficits in basic skills, focusing on the four major academic areas of reading, writing, language, and math;
3. deficits in learning efficiency, including measures of strategy use and rate of learning;
4. psychological process deficits in areas including attention, memory, linguistic processing, and metacognition;
5. the exclusion of alternative causes of learning failure, such as mental retardation, sensory impairment, emotional disturbance, or inadequate instruction.

Students would be identified as having learning disabilities only when all five operational criteria are met.

Failure to respond to validated treatment protocols, or dual discrepancy criteria. Berninger and Abbott (1994) argued that sufficient “opportunities to learn” are often assumed rather than demonstrated, and as a result identification of learning disabilities may not discriminate between constitutional and experiential deficits. They proposed the development of validated protocols of which treatment approaches work best for which learning characteristics (based upon static assessment of learning in 11 domains). When this knowledge is available, learning disabilities can be diagnosed on the basis of treatment nonresponding; that is, failure to make expected gains on treatment protocols demonstrated to achieve positive results for similar students.

Fuchs and Fuchs (1998; see also Speece & Case, 2001) have suggested that deficits in level and slope of learning (as evaluated by curriculum-based measurement [CBM] procedures) would represent a dynamic means

for establishing lower academic functioning. Resistance to instruction could be evaluated by slopes on probes of academic skills, including reading and math. Speece and Case (2001) implemented these procedures on K-2 students in reading, and identified samples that were different in some respects (e.g., lower in age and mean IQ) from students identified according to IQ-achievement discrepancy formulas. Al-Otaiba (2000) suggested,

given widespread and converging evidence that phonological processing deficits often lead to learning disabilities, unresponsiveness to effective treatment protocols can provide an alternative to discrepancy-based formulas currently used to identify students with learning disabilities. (p. 12; see also Berninger & Abbot, 1994; Fuchs & Fuchs, 1998; Vellutino et al., 1996)

Referring to unsatisfactory level of performance in addition to inadequate rate of growth as a “dual discrepancy” (p. 34), Fuchs et al. (2002) described in detail the “treatment validity model” and how it could be used in the identification process. For example, Phase I assessment determines whether the general education classroom environment is sufficiently supportive to warrant decision making for individual students. If not, intervention at the classroom level is indicated to increase the student academic growth rate to a level comparable with the school, district, or nation. If classroom instruction is considered appropriate, Phase II assessment identifies students with dual discrepancies, that is, students functioning dramatically below peers in level and slope of performance on, for example, reading rate. Phase III assessment determines whether adaptations in the general education classroom can produce acceptable learning for individual students. If these adaptations are not successful, Phase IV determines, through CBM procedures, whether learning disability classification and special education placement is effective for a given student. If not, labeling and placement in special education is not considered justifiable.

Based on a recent review of 23 research reports on the characteristics of students who are unresponsive to early literacy intervention, Al-Otaiba and Fuchs (in press) found that most unresponsive students were characterized by deficits in phonological awareness. Other characteristics identified less consistently included deficits in phonological retrieval or encoding, verbal ability, behavior problems, or developmental delays. Al-Otaiba and Fuchs suggested that future research address a common definition of “treatment unresponsiveness” (e.g., reading fluency below 40 words per minute), and that more attention be given to characteristics such as phonological memory and low IQ, and to the training and fidelity of treatment implementation of trainers. Finally, they highlighted the difficulty in describing a “typical” treat-

ment nonresponder, due to the considerable variation both between and within treatment nonresponders.

Recently, representatives of the National Center for Learning Disabilities, the National Association of School Psychologists, and the International Reading Association proposed a “multitiered” approach, applying CBM procedures to identify and serve students with learning disabilities (Horowitz, Lichtenstein, & Roller, 2002). Specifically, Horowitz et al. recommended that students at risk for academic failure be provided with a “research-based, general education intervention” (p. 2) for 8-10 weeks, monitored with CBM. Students who do not display meaningful gains, as measured by slope and level of learning during this intervention period, are considered candidates for special education. This process is intended to eliminate the use of IQ-achievement discrepancies. It is recommended that “at risk” status be determined by a 20th percentile cutoff on standardized, norm-referenced academic measures, and that “meaningful gains” be determined by failure to achieve growth at the 20th percentile on CBM measures.

Horowitz et al. suggested that there is “sufficient evidence” (p. 3) to suggest that these procedures may be implemented appropriately in school settings, with substantial impact: they would not change numbers of children served as LD, although the procedures would reduce referrals to special education by almost one half (p. 3). However, direct empirical tests of this model appear to be lacking. Published research applications would be useful in determining the ultimate usefulness of the model as a replacement for current procedures.

Evaluating Alternative Approaches

Although these and other identification procedures have been proposed, none has achieved general acceptance. However, given the overall characteristics of the nature of learning disabilities, as described previously, it may be possible to generate criteria that need to be met in any valid, generally accepted identification procedure. These could include the following:

- Does the identification procedure address the *multifaceted nature* of learning disabilities? That is, can it be applied to disabilities in reading comprehension as well as decoding skill areas, and other possible areas, including, for example, math, writing, and spelling; or memory, attention, and study/organizational skills? If learning disabilities is considered to be multifaceted, measures of a single area of functioning (e.g., phonological core processes) will be limited in identification of all learning disabilities.
- Can the procedure be applied *across the age spectrum* of students with learning disabilities? That is, although early identification is of great importance,

can the procedures also be used (or modified) to identify students at other age levels? Procedures that focus solely on early identification of learning disabilities either assume that all students can be identified early and remediated, or that no cases of learning disabilities will emerge after the primary grades.

- Can the procedure be applied with known measures with demonstrated *technical adequacy*? That is, have variability problems due to reliability, validity, or administration problems been addressed adequately?
- Will the procedure *reduce overidentification* of learning disabilities from present procedures?
- Will the procedure *reduce inappropriate variability* in identification rates across state and local educational authorities?
- Will the procedure be more likely than current procedures to identify students who *meet present conceptualizations* of learning disabilities, and be less likely to produce false positives (identifying students who do not “really” have learning disabilities) or false negatives (failing to identify students who “really” do have learning disabilities)?

Although many concerns have been expressed regarding existing practice, no alternative to date has gained general acceptance. Clearly, any modification in present identification procedures must address the criticisms that have been raised previously. For example, any substantial study of identification procedures must address the issue of across-state and within-state variability in identification rates. However, that does not necessarily mean that there is no reason for actual prevalence rates to vary, and that future procedures must lower variability. Characteristics of residents can vary by jurisdiction, and these characteristics can lead to lower vs. higher prevalence of specific conditions. For example, the mean percentage of low-birthweight children is 7.03%, but individual percentages by state range from 4.7 to 15.4%. Such an observation does not in itself suggest that procedures for identification of low birthweight should be modified (Lester & Kelman, 1997).

Nevertheless, variability in identification must be understood far better than it is today, so that judgments can be made on whether such variability is the result of variability in the characteristics of state populations or the result of inconsistently applied identification procedures. A true and complete understanding of the observed variability in identification can lead directly to proposals for policies to reduce such variability, or to a better understanding of existing variability in learning disabilities.

Addressing Problems in Identification

To date, there have been considerable criticisms of identification of learning disabilities. Several proposals for modifying identification procedures have been made, none of which is backed by sufficient research to document the likely consequences of implementation. Additional research should be conducted to determine which, if any, of the proposed alternatives result in improved identification of learning disabilities over present methods. Before wide implementation, these procedures should be shown to be superior to present methods in conceptual, technical, and implementation domains.

It should be remembered, however, that any modification in identification must address effectively the aspects of identification that are presently most widely criticized. A review of the literature critical of current learning disabilities identification reveals that these problems include (a) overidentification, (b) variability, (c) specificity, (d) conceptual considerations, (e) discrepancy issues, (f) early identification, and (g) local implementation. Following is a set of suggestions that may be employed to address all of these concerns.

1. *Overidentification*. Overidentification is often assumed because the proportions of students identified as having learning disabilities have been consistently growing, and because the present percentage of identified students (over 5%) seems higher to many than reasonable for a “disability” status. Research in local and state identification procedures reveals that many students — perhaps as many as one third to one half — are identified as having learning disabilities without meeting state criteria. One reason is that school personnel realize that many students require special attention, which in many cases can only be provided by referral to special education. Another commonly described reason for overidentification is that other categories of exceptionality — particularly mental retardation and emotional disturbance — are seen to be more stigmatizing than learning disabilities. Therefore, students are identified as having learning disabilities so that they can be provided with special services without use of a more stigmatizing label (MacMillan & Siperstein, 2001). Overidentification, then, can be significantly reduced not by provision of a new definition on the federal level, but by requiring local educational authorities to employ strict adherence to state definitional criteria.

If this is done, however, some provision must be made for other students who need assistance but do not meet learning disabilities criteria. For students who are simply low achievers, or those who were formerly referred to as “slow learners” (e.g., IQs from 70-85), schools should provide, and states should support,

some form of additional assistance. Since this could include over 15% of the school population, scarce special education funds should not be used to support these learners. Better training for general education teachers, emphasizing educational methods for low-achieving students, could also do much to reduce referrals for learning disabilities. Finally, for students who are identified as having learning disabilities because more appropriate categories are thought to be stigmatizing, perhaps these other categories could be described differently, using terminology with more neutral connotations.

2. *Variability.* If local implementation procedures become more consistent, variability will also likely decrease. States can also do much to reduce variability by employing more consistent and specific criteria (perhaps encouraged by the U.S. Department of Education). For example, all states could employ a specific discrepancy formula (or other comparable criteria), and discrepancy formulas could be made more consistent. Since regression formulas are generally considered technically superior (Kavale & Forness, 2000), states could specify that regression formulas be employed, and provide specific input on the types of measures that are acceptable.

3. *Specificity.* Present evidence suggests that earlier concerns that learning disabilities could not be distinguished reliably from general low achievement were overstated. Nevertheless, it is important to establish that students identified as having learning disabilities are reliably different from general low achievers, and that there is reason to infer a deficit in psychological processing that results in a disability to learn. This can be accomplished by strict adherence to explicit state criteria and careful exclusion of alternative explanations of discrepant functioning, including an inability to learn normally in spite of adequate learning opportunities, cultural disadvantage, emotional disturbance, mental retardation, or sensory impairments.

4. *Conceptual considerations.* Conceptual considerations can also be addressed by careful adherence to state criteria and application of the understanding that IQ-achievement discrepancy is not equivalent to learning disabilities, but in fact is only one consideration used as evidence of the existence of learning disabilities. Adequate previous opportunities to learn should be carefully evaluated. Preferral interventions should be implemented in the general education classroom, and shown to be inadequate, before students are identified. If all students identified as having learning disabilities demonstrate average general abilities, but significant problems in areas relevant to academic functioning in spite of adequate and even intensified general education, many of the conceptual concerns will have been met.

5. *Discrepancy issues.* Lyon et al. (2001) argued that “no definitional element of LD has generated as much controversy as the use of IQ-achievement discrepancy in the identification of students with LD” (p. 265). And, in fact, some individuals will never accept the idea of discrepancy as a criterion for identification (e.g., Aaron, 1997). Nevertheless, it remains clear that discrepancy is a most objective indicator of learning disabilities, and that its elimination would result in overidentification and variability at even higher levels than those at present. Further, it is difficult to understand contemporary characterizations of learning disabilities without some notion of intraindividual differences between ability and achievement (Mastropieri, 2001). More careful application of discrepancy criteria, in conjunction with carefully documented exclusion criteria, can greatly improve present identification practices. For example, the five-level process recommended by Kavale and Forness (2001) includes specific discrepancy criteria in addition to documentation of pervasive basic skills deficits, deficits in learning efficiency, psychological process deficits, and exclusion of alternative causes of learning failure. Such a procedure, when carefully implemented, could potentially address many concerns with present identification practices.

6. *Early identification.* Students with learning disabilities who are identified and treated early have a brighter future than students with learning disabilities who are not identified early. However, it is possible that the present relatively lower identification rates during the primary years are to a large extent the consequence of reluctance to categorize at early ages rather than limitations of present psychometric measures. Early identification can be increased through state and federal initiatives that encourage such practices and emphasize that students who are identified early are more likely to be successfully treated. Nevertheless, it does not follow that “the idea that special education funds can be used for early identification and prevention is critical” (Lyon et al., 2001, p. 281). Special education funds, never fully provided by the federal government, are too limited to be employed in general education prevention efforts. Such efforts — in the form of improved instruction and careful attention to the lower 25% in achievement — can do much to limit referral to special education, but should be provided through general education funds. Limited special education funds should be reserved for support of intensive, high-quality interventions for students meeting strict standards of disability.

7. *Local implementation.* As has been argued, improvements in local implementation of state and federal criteria in the identification of learning disabilities may be the key to addressing other problem areas. If state criteria for learning disabilities were carefully implemented

by local school districts in all cases, many if not most of the criticisms of identification of learning disabilities would be addressed. On the other hand, as long as local practices remain subjective and idiosyncratic, any number of changes in definition or federal policy will be unsuccessful.

SUMMARY AND CONCLUSION

We have reviewed criticisms of present practices in identification of learning disabilities. Much criticism involves concerns with overidentification, variability in identification, and specificity in reliably discriminating learning disabilities from general low achievement. In addition, the definition of learning disabilities has been challenged on conceptual grounds, particularly with respect to discrepancy criteria, which, it has been suggested, cannot provide for early identification. Finally, local implementation practices have been described as subjective and arbitrary.

In response to these concerns, several alternative methods for identification have been proposed. These include deficits in level and slope of academic performance as assessed by curriculum-based measurement, deficits in phonological core processes, and failure to respond to validated treatment protocols. Each of these procedures has addressed some aspects of learning disabilities, but to date none has been demonstrated to provide results superior to present procedures. It was suggested that any alternative approach must address conceptual, technical, and implementation aspects of the identification process, across age levels and skill areas, and that it must identify individuals who share characteristics commonly associated with learning disabilities.

Finally, we suggest that radically altering or eliminating the concept of learning disabilities because of problems with current identification procedures amounts to "throwing the baby out with the bathwater." We have proposed that many of the commonly heard criticisms of identification of learning disabilities can be addressed by careful attention to the local implementation aspect of identification. Such practices could reduce numbers of students identified by one third or more, and could increase the homogeneity of identified populations. Although these practices would be more valid, and more within the spirit of IDEA legislation, general education programs should also be implemented for the students who would not be served as having learning disabilities, but who nonetheless need additional assistance in acquiring important academic skills. Such programming would be very beneficial for general education students, and would likely reduce referrals to special education. However, it is important that scarce special education

funds not be used for this purpose. Federal and state general education funds could provide for low-achieving students in need of academic assistance, while special education funds can continue to be reserved for students identified as having disabilities. As numbers of students identified as having learning disabilities diminish, federal support — not fully provided since the inception of IDEA — can pay a more equitable share of the costs of special education.

REFERENCES

- Aaron, P. G. (1997). The impending demise of the discrepancy formula. *Review of Educational Research*, 67, 461-502.
- Ackerman, P. T., Holloway, C. A., Youngdahl, P. L., & Dykman, R. A. (2001). The double-deficit of reading disability does not fit all. *Learning Disabilities Research & Practice*, 16, 152-160.
- Algozzine, R. (1985). Low achiever differentiation: Where's the beef? *Exceptional Children*, 52, 72-75.
- Algozzine, R., & Korinek, L. (1985). Where is special education for students with high prevalence handicaps going? *Exceptional Children*, 51, 388-394.
- Algozzine, R., & Ysseldyke, J. E. (1987). In defense of different numbers. *Remedial and Special Education*, 8, 53-56.
- Algozzine, R., Ysseldyke, J. E., & McGue, M. (1995). Differentiating low-achieving students: Thoughts on setting the record straight. *Learning Disabilities Research & Practice*, 10, 140-144.
- Alley, G. R., Deshler, D. D., & Warner, M. M. (1979). Identification of learning disabled adolescents: A Bayesian approach. *Learning Disability Quarterly*, 2, 86-83.
- Allor, J. H. (2002). The relationships of phonemic awareness and rapid naming to reading development. *Learning Disability Quarterly*, 25, 47-57.
- Al-Otaiba, S. D. (2000). *Children who do not respond to early literacy intervention: A longitudinal study across kindergarten and first grade*. Unpublished doctoral dissertation, Vanderbilt University.
- Al-Otaiba, S. D., & Fuchs, D. (in press). Characteristics of children who are unresponsive to early literacy intervention: A review of the literature. *Remedial and Special Education*.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). *Text Revision*. Washington, DC: Author.
- Anderson, P. L., & Meier-Hedde, R. (2001). Early case reports of dyslexia in the United States and Europe. *Journal of Learning Disabilities*, 34, 9-21.
- Baroody, A. J., & Ginsburg, H. P. (1991). A cognitive approach to assessing the mathematical difficulties of children labeled "learning disabled." In H. L. Swanson (Ed.), *Handbook on the assessment of learning disabilities: Theory, research and practice* (pp. 177-228). Austin, TX: PRO-ED.
- Beirne-Smith, M., Ittenbach, R. F., & Patton, J. R. (1998). *Mental retardation* (5th ed.). Columbus, OH: Merrill.
- Beitchman, J. H., Cantwell, D. P., Forness, S. R., Kavale, K. A., & Kauffman, J. M. (1998). Practice parameters for the assessment and treatment of children and adolescents with language and learning disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, 37 (Supplement), 46S-62.S
- Berlin, R. (1887). *Eine besondere art der wortblindheit: Dyslexia* [A special type of wordblindness: Dyslexia]. Wiesbaden: Bergmann.
- Berninger, V. W., & Abbott, R. D. (1994). Redefining learning disabilities: Moving beyond aptitude — achievement discrepancies

- to failure to respond to validated treatment protocols. In G. R. Lyon (Ed.), *Frames of reference for the assessment of learning disabilities: New views on measurement issues* (pp. 163-183). Baltimore: Brookes.
- Christensen, C. A. (1999). Learning disability: Issues of representation, power, and the medicalization of school failure. In R. J. Sternberg & L. Spear-Swerling (Eds.), *Perspectives on learning disabilities: Biological, cognitive, contextual* (pp. 227-249). Boulder, CO: Westview Press.
- Coles, G. S. (1987). *The learning mystique: A critical look at learning disabilities*. New York: Pantheon.
- Cone, T. E., & Wilson, L. R. (1981). Quantifying a severe discrepancy: A critical analysis. *Learning Disability Quarterly*, 4, 359-371.
- Cooney, J. B., & Swanson, H. L. (1987). Memory and learning disabilities: An overview. In H. L. Swanson (Ed.), *Memory and learning disabilities: Advances in learning and behavioral disabilities* (Supplement 2, pp. 1-40). Stamford, CT: JAI Press.
- Coutinho, M. (1995). Who will be learning disabled after the reauthorization of IDEA? Two very distinct perspectives. *Journal of Learning Disabilities*, 28, 664-668.
- Dawes, R. M., Faust, D., & Meehl, P. E. (1989). Clinical versus actuarial judgment. *Science*, 243, 1668-1674.
- Dejerine, J. (1892). Contribution a l'etude anatomo-pathologique et clinique des differentes varietes de cecite verbale. *Memoriale Societe Biologique*, Fev. 27, 61-63.
- Finlan, T. G. (1992). Do state methods of quantifying a severe discrepancy result in fewer students with learning disabilities? *Learning Disability Quarterly*, 15, 129-135.
- Fleischner, J. E. (1994). Diagnosis and assessment of mathematics learning disabilities. In G. R. Lyon (Ed.), *Frames of reference for the assessment of learning disabilities: New views on measurement issues* (pp. 441-458). Baltimore: Brookes.
- Fletcher, J. M., Francis, D. J., Rourke, B. P., Shaywitz, S. E., et al. (1992). The validity of discrepancy-based definitions of reading disabilities. *Journal of Learning Disabilities*, 25, 555-561, 573.
- Fletcher, J. M., & Foorman, B. R. (1994). Issues in definition and measurement of learning disabilities: The need for early intervention. In G. R. Lyon (Ed.), *Frames of reference for the assessment of learning disabilities: New views on measurement issues* (pp. 185-200). Baltimore: Brookes.
- Fletcher, J. M., Francis, D. J., Shaywitz, S. E., Lyon, G. R., Foorman, B. R., Stuebing, K. K., & Shaywitz, B. A. (1998). Intelligent testing and the discrepancy model for children with learning disabilities. *Learning Disabilities Research & Practice*, 13, 186-203.
- Fletcher, J. M., Shaywitz, S. E., Shankweiler, D. P., Katz, L., Liberman, I. Y., Stuebing, K. K., Francis, D. J., Fowler, A. E., & Shaywitz, B. A. (1994). Cognitive profiles of reading disability: Comparisons of discrepancy and low achievement definitions. *Journal of Educational Psychology*, 86, 6-23.
- Frankenberger, W., & Fronzaglio, K. (1991). A review of states' criteria and procedures for identifying children with learning disabilities. *Journal of Learning Disabilities*, 24, 495-500.
- Fuchs, D., Fuchs, L. S., Mathes, P. G., & Lipsey, M. W. (2000). Reading differences between low-achieving students with and without learning disabilities: A meta-analysis. In R. Gersten, E. P. Schiller, & S. Vaughn (Eds.), *Contemporary special education research: Syntheses of the knowledge base on critical instructional issues* (pp. 81-105). Mahwah, NJ: Erlbaum.
- Fuchs, L. S., & Fuchs, D. (1998). Treatment validity: A unifying concept for reconceptualizing the identification of learning disabilities. *Learning Disabilities Research & Practice*, 13, 204-220.
- Fuchs, L. S., Fuchs, D., & Speece, D. L. (2002). Treatment validity as a unifying construct for identifying learning disabilities. *Learning Disability Quarterly*, 25, 33-45.
- Galaburda, A. (1991). Anatomy of dyslexia: Argument against phrenology. In D. D. Duane & D. B. Gray (Eds.), *The reading brain* (pp. 119-131). Pankton, MD: York Press.
- Gallagher, J. J. (1966). Children with developmental imbalances: A psychoeducational definition. In W. Cruickshank (Ed.), *The teacher of brain-injured children* (pp. 20-34). Syracuse, NY: Syracuse University Press.
- Gottlieb, J., Alter, M., Gottlieb, B. W., & Wishner, J. (1994). Special education in urban America: It's not justifiable for many. *Journal of Special Education*, 27, 453-465.
- Gresham, F. (2001, August). *Responsiveness to intervention: An alternative approach to the identification of learning disabilities*. Paper presented at the U.S. Department of Education LD Summit, Washington, DC.
- Hallahan, D. P., & Cottone, E. A. (1997). Attention deficit hyperactivity disorder. In T. E. Scruggs & M. A. Mastropieri (Eds.), *Advances in learning and behavioral disabilities* (Vol. 11, pp. 27-68). Stamford, CT: JAI Press.
- Hallahan, D. P., Kauffman, J. M., & Lloyd, J. W. (1999). *Introduction to learning disabilities* (2nd ed.). Boston: Allyn & Bacon.
- Hallahan, D. P., Keller, C. E., & Ball, D. W. (1986). A comparison of prevalence rate variability from state to state for each of the categories of special education. *Remedial and Special Education*, 7, 8-14.
- Haring, K. A., Lovett, D. L., Haney, K. F., Algozzine, B., Smith, D. D., & Clarke, J. (1992). Labeling preschoolers as learning disabled: A cautionary position. *Topics in Early Childhood Special Education*, 12, 151-173.
- Hinshelwood, J. (1896). A case of dyslexia: A peculiar form of word-blindness. *Lancet*, 2, 1451-1454.
- Horowitz, S. H., Lichtenstein, B., & Roller, C. (2002, February). *An intervention-oriented, multi-tiered approach for identifying and serving students with learning disabilities*. Straw man prepared for the Learning Disabilities Roundtable "Finding Common Ground" Initiative, Washington, DC.
- Horn, W. F., & O'Donnell, J. P. (1985). Early identification of learning disabilities: A comparison of two methods. *Journal of Educational Psychology*, 76, 1106-1108.
- Hynd, G. W., Clinton, A. B., & Hiemenz, J. R. (1999). The neuropsychological basis of learning disabilities. In R. J. Sternberg & L. Spear-Swerling (Eds.), *Perspectives on learning disabilities: Biological, cognitive, contextual* (pp. 60-82). Boulder, CO: Westview Press.
- Kavale, K. A., & Forness, S. R. (1984). A meta-analysis assessing the validity of Wechsler Scale profiles and recategorizations: Patterns or parodies? *Learning Disability Quarterly*, 7, 136-156.
- Kavale, K. A., & Forness, S. R. (1987). The far side of heterogeneity: A critical analysis of empirical subtyping research in learning disabilities. *Journal of Learning Disabilities*, 20, 374-382.
- Kavale, K. A., & Forness, S. R. (1995). *The nature of learning disabilities: Critical elements of diagnosis and classification*. Mahwah, NJ: Erlbaum.
- Kavale, K. A., & Forness, S. R. (1998). The politics of learning disabilities. *Learning Disability Quarterly*, 21, 245-273.
- Kavale, K. A., & Forness, S. R. (2000). What definitions of learning disability say and don't say: A critical analysis. *Journal of Learning Disabilities*, 33, 239-256.
- Kavale, K. A., Forness, S. R., & Lorschach, T. C. (1991). Definition for definitions of learning disabilities. *Learning Disability Quarterly*, 14, 257-266.
- Kavale, K. A., Fuchs, D., & Scruggs, T. E. (1994). Setting the record straight on learning disabilities and low achievement. *Learning Disabilities Research & Practice*, 9, 70-77.

- Kavale, K. A., & Mattson, P. D. (1983). "One jumped off the balance beam": Meta-analysis of the efficacy of perceptual motor training. *Journal of Learning Disabilities, 16*, 165-173.
- Kavale, K. A., & Nye, C. (1985-1986). Parameters of learning disabilities in achievement, linguistic, neuropsychological, and social/behavioral domains. *Journal of Special Education, 19*, 443-458.
- Kavale, K. A., & Nye, C. (1991). The structure of learning disabilities. *Exceptionality, 2*(3), 141-156.
- Kavale, K. A., & Reese, J. H. (1991). Teacher beliefs and perceptions about learning disabilities: A survey of Iowa's practitioners. *Learning Disability Quarterly, 14*, 141-160.
- Keogh, B. K. (1986). Future of the LD field: Research and practice. *Journal of Learning Disabilities, 19*, 455-460.
- Keogh, B. K. (1994). A matrix of decision points in the measurement of learning disabilities. In G. R. Lyon (Ed.), *Frames of reference for the assessment of learning disabilities: New views on measurement issues* (pp. 15-26). Baltimore: Brookes.
- Keogh, B., & Becker, L. D. (1973). Early detection of learning problems: Questions, cautions, and guidelines. *Exceptional Children, 40*, 5-11.
- Kirk, S. A. (1971). *Psycholinguistic learning disabilities: Diagnosis and remediation*. Urbana: University of Illinois Press.
- Kosc, L. (1981). Neuropsychological implications of diagnosis and treatment of mathematical learning disabilities. *Topics in Learning and Learning Disabilities, 1*, 19-30.
- Kusmaul, A. (1877). Disturbances of speech. In H. von Ziemssen (Ed.), *Cyclopedia of the practice of medicine* (trans. J. McCreery). New York: William Wood.
- Larsen, S. C., & Hammill, D. D. (1975). The relationship of selected visual perceptual abilities to school learning. *Journal of Special Education, 9*, 281-291.
- Lester, G., & Kelman, M. (1997). State disparities in the diagnosis and placement of pupils with learning disabilities. *Journal of Learning Disabilities, 30*, 599-607.
- Lyon, G. R. (1985). Identification and remediation of learning disability subtypes: Preliminary findings. *Learning Disabilities Focus, 1*, 21-35.
- Lyon, G. R., & Fletcher, J. M. (2001, Summer). Early warning system. *Education Next, 23-29*. www.educationnext.org/20012/22.html
- Lyon, G. R. (2001, March). *Measuring success: Using assessments and accountability to raise student achievement*. Statement to Subcommittee on Education Reform, Committee on Education and the Workforce, U.S. House of Representatives, Washington, DC <http://edworkforce.house.gov/hearings/107th/edr/account3801/lyon.htm>
- Lyon, G. R., Fletcher, J. M., Shaywitz, S. E., Shaywitz, B. A., Torgesen, J. K., Wood, F. B., Schulte, A., & Olson, R. (2001). Rethinking learning disabilities. In C. E. Finn, Jr., A. J. Rotherham, & C. R. Hokanson, Jr. (Eds.), *Rethinking special education for a new century* (pp. 259-287). Washington, DC: Thomas B. Fordham Foundation.
- MacMillan, D. L., Gresham, F. M., & Bocian, K. M. (1998). Discrepancy between definitions of learning disabilities and school practices: An empirical investigation. *Journal of Learning Disabilities, 31*, 314-326.
- MacMillan, D. L., Gresham, F. M., Siperstein, G. N., & Bocian, K. M. (1996). The labyrinth of I.D.E.A.: School decisions on referred students with subaverage general intelligence. *American Journal on Mental Retardation, 101*, 161-174.
- MacMillan, D. L., & Siperstein, G. N. (2001, August). *Learning disabilities as operationally defined in schools*. Paper presented at the U.S. Department of Education LD Summit, Washington, DC.
- MacMillan, D. L., Siperstein, G. N., & Gresham, F. M. (1996). A challenge to the viability of mild mental retardation as a diagnostic category. *Exceptional Children, 62*, 356-371.
- Mastropieri, M. A. (1987). Statistical and psychometric issues surrounding severe discrepancy: A discussion. *Learning Disabilities Research, 30*, 29-31.
- Mastropieri, M. A. (1988). Learning disabilities in early childhood. In K. A. Kavale (Ed.), *Learning disabilities: State of the art and practice* (pp. 161-179). Boston: College-Hill/Little Brown.
- Mastropieri, M. A. (2001, August). *Discrepancy models in the identification of learning disabilities*. Paper presented at the U.S. Department of Education LD Summit, Washington, DC.
- Mastropieri, M. A., & Scruggs, T. E. (1997). Best practices in promoting reading comprehension in students with learning disabilities. *Remedial and Special Education, 18*, 197-213.
- McCarthy, J. M. (1971). Learning disabilities: Where have we been: Where are we going? In D. Hammill & N. Bartel (Eds.), *Educational perspectives in learning disabilities* (pp. 10-19). New York: Wiley.
- McKinney, J. D., Short, E. J., & Feagans, L. (1985). Academic consequences of perceptual-linguistic subtypes of learning disabled children. *Learning Disabilities Research, 1*, 6-17.
- McLeskey, J., & Waldron, N. L. (1990). The identification and characteristics of students with learning disabilities in Indiana. *Learning Disabilities Research, 5*, 72-78.
- Meehl, P. (1973). *Psychodiagnosis: Selected papers*. Minneapolis: University of Minnesota Press.
- Mercer, C. D., Forgnone, C., & Wolking, W. D. (1976). Definitions of learning disabilities used in the United States. *Journal of Learning Disabilities, 9*, 376-386.
- Mercer, C. D., Jordan, L., Allsopp, D. H., & Mercer, A. R. (1996). Learning disability definitions and criteria used by state education departments. *Learning Disability Quarterly, 19*, 217-232.
- Naglieri, J. (2001). Do ability and reading achievement correlate? *Journal of Learning Disabilities, 34*, 304-306.
- Naglieri, J., & Das, J. P. (1997). *Cognitive assessment system*. Itasca, IL: Riverside.
- Olson, R. K. (1999). Genes, environment, and reading disabilities. In R. J. Sternberg & L. Spear-Swerling (Eds.), *Perspectives on learning disabilities: Biological, cognitive, contextual* (pp. 3-21). Boulder, CO: Westview Press.
- Reynolds, C. R. (1984). Critical measurement issues in learning disabilities. *The Journal of Special Education, 18*, 451-476.
- Rourke, B. (1989). *Nonverbal learning disabilities: The syndrome and the model*. New York: Guilford Press.
- Rourke, B. (1993). Arithmetic disabilities, specific and otherwise: A neuropsychological perspective. *Journal of Learning Disabilities, 26*, 214-226.
- Rumsey, J. M. (1996). Neuroimaging in developmental dyslexia: A review and conceptualization. In G. R. Lyon & J. M. Rumsey (Eds.), *Neuroimaging: A window to the neurological foundations of learning and behavior in children* (pp. 57-78). Baltimore: Brookes.
- Schrag, J. (2000). *Discrepancy approaches for identifying learning disabilities*. Alexandria, VA: National Association of State Directors of Special Education.
- Scruggs, T. E. (1987). Theoretical issues surrounding severe discrepancy: A discussion. *Learning Disabilities Research, 3*, 21-23.
- Scruggs, T. E., & Mastropieri, M. A. (1986). Academic characteristics of behaviorally disordered and learning disabled children. *Behavioral Disorders, 11*, 184-190.
- Scruggs, T. E., & Mastropieri, M. A. (1988). Legitimizing the field of learning disabilities: Does research orientation matter? *Journal of Learning Disabilities, 21*, 219-222.
- Scruggs, T. E., & Mastropieri, M. A. (1994-1995). Assessing students with learning disabilities: Current issues and future directions. *Diagnostique, 20*, 17-31.

- Shaywitz, S. E., Escobar, M. D., Shaywitz, B. A., Fletcher, J. M., & Makach, R. (1992). Evidence that dyslexia may represent the lower tail of a normal distribution of reading ability. *The New England Journal of Medicine*, *326*, 145-150.
- Shaywitz, B. A., Fletcher, J. M., Holahan, J. M., & Shaywitz, S. E. (1992). Discrepancy compared to low achievement definitions of reading disability: Results from the Connecticut Longitudinal Study. *Journal of Learning Disabilities*, *25*, 639-648.
- Shepard, L. A. (1980). An evaluation of the regression discrepancy method for identifying children with learning disabilities. *Journal of Special Education*, *14*, 79-91.
- Siegel, L. S. (1989). I.Q. is irrelevant to the definition of learning disabilities. *Journal of Learning Disabilities*, *25*, 618-629.
- Siegel, L. (1999). Learning disabilities: The roads we have traveled and the path to the future. In R. J. Sternberg & L. Spear-Swerling (Eds.), *Perspectives on learning disabilities: Biological, cognitive, contextual* (pp. 159-175). Boulder, CO: Westview Press.
- Siegel, L. S., & Ryan, E. B. (1988). Development of working memory in normally achieving and subtypes of learning disabled children. *Child Development*, *60*, 973-980.
- Skrtic, T. M. (1999). Learning disabilities as organizational pathologies. In R. J. Sternberg & L. Spear-Swerling (Eds.), *Perspectives on learning disabilities: Biological, cognitive, contextual* (pp. 193-226). Boulder, CO: Westview Press.
- Sleeter, C. E. (1995). Radical structuralist perspectives on the creation and use of learning disabilities. In T. Skrtic (Ed.), *Disability and democracy: Reconstructing (special) education for postmodernity* (pp. 153-165). New York: Teachers College Press.
- Spear-Swerling, L. (1999). Can we get there from here: Learning disabilities and future education policy. In R. J. Sternberg & L. Spear-Swerling (Eds.), *Perspectives on learning disabilities: Biological, cognitive, contextual* (pp. 250-276). Boulder, CO: Westview Press.
- Speece, D. L., & Case, L. P. (2001). Classification in context: An alternative approach to identifying early reading disability. *Journal of Educational Psychology*, *93*, 735-749.
- Stanovich, K. E. (1988). Explaining the differences between the dyslexic and the garden-variety poor reader: The phonological core-variable difference model. *Journal of Learning Disabilities*, *21*, 590-604.
- Stanovich, K. E. (1991). Conceptual and empirical problems with discrepancy definitions of reading disability. *Learning Disability Quarterly*, *14*, 269-283.
- Sternberg, R. J. (1999). Epilogue: Toward emerging consensus about learning disabilities. In R. J. Sternberg & L. Spear-Swerling (Eds.), *Perspectives on learning disabilities: Biological, cognitive, contextual* (pp. 277-282). Boulder, CO: Westview Press.
- Strang, J. D., & Rourke, B. P. (1983). Concept-formation/non-verbal reasoning abilities of children who exhibit specific academic problems with arithmetic. *Journal of Clinical Child Psychology*, *24*, 28-37.
- Swanson, H. L. (1993a). Working memory in learning disability subgroups. *Journal of Experimental Child Psychology*, *56*, 87-114.
- Swanson, H. L. (1993b). Theoretical, technical, and practical aspects of the S-cognitive processing test: The development of a dynamic assessment measure. In T. E. Scruggs & M. A. Mastropieri (Eds.), *Advances in learning and behavioral disabilities* (Vol. 10, Part A, pp. 135-208). Stamford, CT: JAI Press.
- Torgesen, J. K. (1999). Phonologically based reading disabilities: Toward a coherent theory of one kind of learning disability. In R. J. Sternberg & L. Spear-Swerling (Eds.), *Perspectives on learning disabilities: Biological, cognitive, contextual* (pp. 106-135). Boulder, CO: Westview Press.
- Torgesen, J. K., & Wagner, R. K. (1998). Alternative diagnostic approaches for specific developmental reading disabilities. *Learning Disabilities Research & Practice*, *13*, 220-232.
- U.S. Department of Education. (2000). *Twenty-second annual report to Congress on the implementation of the Individuals with Disabilities Education Act*. Washington, DC: Author.
- Vellutoni, F. R., Scanlon, D. M., Sipay, E. R., Small, S., Chen, R., Pratt, A., & Denkla, M. B. (1996). Cognitive profiles of difficult-to-remediate and readily remediated poor readers: Early intervention as a vehicle for distinguishing between cognitive and experimental deficits as basic causes of specific reading disability. *Journal of Educational Psychology*, *88*, 601-638.
- Vellutino, F. R., Scanlon, D. M., & Lyon, G. R. (2000). Differentiating between difficult-to-remediate and readily remediated poor readers: More evidence against the IQ — discrepancy definition of reading disability. *Journal of Learning Disabilities*, *33*, 223-238.
- Wagner, R. K., & Garon, T. (1999). Learning disabilities in perspective. In R. J. Sternberg & L. Spear-Swerling (Eds.), *Perspectives on learning disabilities: Biological, cognitive, contextual* (pp. 83-105). Boulder, CO: Westview Press.
- Wagner, R. K., Torgesen, J. K., & Rashotte, C. A. (1999). *Comprehensive Test of Phonological Processes*. Austin, TX: PRO-ED.
- Wissink, J. F., Kass, C. E., & Ferrell, W. R. (1975). A Bayesian approach to the identification of children with learning disabilities. *Journal of Learning Disabilities*, *8*, 58-66.
- Wolf, M., & Bowers, P. G. (1999). The double-deficit hypothesis for the developmental dyslexias. *Journal of Educational Psychology*, *91*, 415-438.
- Wong, B.Y.L. (1996). *The ABCs of learning disabilities*. New York: Academic Press.
- Wood, F., Flowers, L., Buchsbaum, M., & Tallal, P. (1991). Investigation of abnormal left temporal functioning in dyslexia through CBF, auditory evoked potentials, and positron emission tomography. *Reading and Writing: An Interdisciplinary Journal*, *3*, 379-393.
- Ysseldyke, J. E., Algozzine, B., Richey, L., & Graden, J. P. (1982). Declaring students eligible for learning disability services. Why bother with the data? *Learning Disability Quarterly*, *5*, 37-44.
- Ysseldyke, J. E., Algozzine, B., Shinn, M. R., & McGue, M. (1982). Similarities and differences between low achievers and students classified learning disabled. *Journal of Special Education*, *16*, 73-85.
- Zigmond, N. (1993). Learning disabilities from an educational perspective. In G. R. Lyon, D. B. Gray, J. R. Kavanagh, & N. A. Krasnegor (Eds.), *Better understanding learning disabilities: New views from research and their implications for education and public policies* (pp. 251-272). Baltimore: Brookes.

Requests for reprints should be addressed to: Thomas E. Scruggs, MSN 4B3, Graduate School of Education, George Mason University, Fairfax, VA 22030.