

# SECTION 1

## Topics in Childhood Language Disorders

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# Models of Developmental Language Disorders

## CHAPTER OBJECTIVES

*Readers of this chapter will be able to do the following:*

1. Describe the core features of developmental language disorders (LDs).
2. Discuss changes in terminology to describe children's language-learning deficits.
3. List aspects and modalities of communication.
4. Discuss diagnostic issues that surround DLD, particularly the role of nonverbal cognitive ability.
5. Describe different methods used to investigate the biological bases of DLD.
6. Summarize current theoretical models of cognition in DLD and how they inform thinking about intervention.

Our senior author and mentor, Rhea Paul, likes to tell a story about her early days as a graduate student, c. 1977. One entire class session was spent debating just what was meant by developmental language disorder (DLD). After a good deal of discussion, it became clear that no one, including the professor leading the session, had a really good definition. Instead, most ways of defining it came down to saying what it was not. The disgruntled students were shocked and confronted the professor in dismay: "You mean we've spent this whole term talking about something, and you don't even know what it is?"

Perhaps even more surprising is that some 40 years later, professionals across the globe are still engaged in similar debates. After years without agreement on what language disorders are, how they should be defined, or even what they should be called, the field has moved toward consensus through the CATALISE initiative (Bishop et al., 2016, 2017). This has provided a clarion call for researchers and clinicians alike (McGregor, 2020; Paul, 2020), though not without controversy (Rice, 2020). CATALISE (Bishop et al., 2017) recommended the terms "Language Disorder" to encompass all conditions in which language development may be compromised and "Developmental Language Disorder" for a condition in which language is impaired but no other associated biomedical condition is present. Let's break that label down:

**Developmental**—a condition that arises from atypical development and is not acquired through illness or injury  
**Language**—a multimodal symbolic system that includes phonology, syntax, semantics, and/or pragmatics to varying degrees

**Disorder**—a serious condition that warrants support and treatment and is on par with other conditions such as "attention deficit hyperactivity disorder"

Developmental language disorder (DLD) supersedes the term "specific language impairment," which has been

common in the research literature, but not in formal diagnostic manuals. DLD is a more inclusive term—all children with specific language impairment (SLI) would meet criteria for DLD, but not all children with DLD would meet conventional criteria for SLI. The CATALISE team further distinguished DLD, in which language is the primary presenting concern and the origin of the deficit is unknown, and Language Disorders, which may be associated with other biological conditions such as autism or intellectual disabilities. In this book we will talk about both; in this introductory chapter, we outline literature that traditionally has focused on DLD of unknown origin and this includes studies that focused on children with SLI.

## CASE STUDY

When 6-year-old Jamie was referred for assessment in September, the school's speech-language pathologist (SLP), Ms. Reese, conducted an intensive assessment and reported that Jamie had language abilities more akin to a 4-year-old. The school psychologist also tested Jamie and reported that his nonverbal skills (as measured by a standard IQ test) were borderline, not low enough to be identified as intellectually impaired or to warrant placement in a special classroom. Therefore Ms. Reese decided to include Jamie in her caseload, because her testing clearly indicated that his language skills were below the level expected for his chronological age.

Ms. Reese left school in October, and Mr. Timmons took over her caseload. He reviewed Ms. Reese's assessment records and the school psychologist's report. He concluded that although Jaime's language was below age level, he was also below age expectations in several areas of development. The school had recently adopted a "response to intervention" model of early intervention, and Mr. Timmons decided to drop Jamie from the caseload and put him in a Tier II, or targeted, school-based intervention program to see if he could catch up without specialist SLP or full special education services.

Who is right? Does Jamie have DLD, or doesn't he? Even his speech-language pathologist (SLP) doesn't know for sure, yet determining who is eligible for services is one of the major functions of the SLP. What goes into making this decision?

## DIAGNOSTIC ISSUES IN DEVELOPMENTAL LANGUAGE DISORDERS

The American Speech-Language-Hearing Association (ASHA) has defined language disorder as a significant impairment in the “acquisition and use of language across modalities due to deficits in comprehension and/or production across any of the five language domains (i.e., phonology, morphology, syntax, semantics, pragmatics)” (ASHA, <https://www.asha.org/practice-portal/clinical-topics/spoken-language-disorders/>). Thus the disorder may involve (1) the form of language (phonology, morphology, and syntax), (2) the content of language (semantics), and/or (3) the function of language in communication (pragmatics), in any combination across modalities. This tells us that language disorder may manifest in spoken, written, or signed language and affects both production and comprehension.

Like other diagnostic frameworks, this definition assumes a perspective in which the condition is characterized as a deviation from the average level of ability achieved by a similar group of people (Tomblin, 2006). In this case, it is useful because it covers a broad range of language behaviors across different modalities. However, it does not help the clinician decide what differences in language behavior constitute a problem or at what level of impairment intervention is warranted. In Jamie's case, we might ask:

- Should the decision be based on deviation from chronological age expectations or general level of cognitive ability?
- How far behind does a child's language need to be to require intervention?
- Is an isolated impairment in one aspect of language as serious as a mild impairment across a range of language skills?

Instead of worrying about absolute level of language impairment, we could ask about the impact of the language impairment on the child's overall development and ability to function in everyday situations. Tomblin (2006) urges that we should take into account society's values and expectations concerning individual behavior. Under this perspective, a language disorder exists when the child's level of language results in unacceptable risk for undesirable outcomes. In other words, a language disorder should only be diagnosed when it interferes with the child's ability to meet societal expectations, now or in the future. This could include difficulties with social relationships, academic achievement and literacy, and future employment prospects.

Such a definition is agnostic regarding the causes of the language impairment; instead, it focuses on those language

behaviors that increase risk for adverse outcomes. But how do we identify the level of language deficit that incurs the greatest risk of poor outcome? And how do we measure the impact of language disorder on the child's everyday activities? To start to answer these questions, let's look back at how the concept of language disorders has evolved.

## A BRIEF HISTORY OF THE FIELD OF LANGUAGE PATHOLOGY

Descriptions of child language disorders date back to the late 18th and early 19th century (see Leonard, 2017, 2020 for more comprehensive reviews). Gall (1835) was one of the first to describe children who said very little even though they seemed to understand what others said to them. He differentiated these children from those with intellectual disability, highlighting that their lack of spoken output was inconsistent with their other abilities. The pattern of language disorder Gall described was similar to the aphasias that neurologists, such as Broca (1861) and Wernicke (1874), were studying in adults. For the first century of its existence, the study of language disorder was dominated by neurologists, focusing attention on the physiological substrates of spoken language.

The neurologist Samuel T. Orton (1937) emphasized the importance of both neurological and behavioral descriptions of language disorder and pointed out the connections with difficulties in learning to read and write. In the mid-20th century, Benton (1959, 1964) provided the fullest descriptions of children with “infantile aphasia” and is credited with evolving the concept of a specific disorder of language that was distinct from other childhood conditions, such as autism, deafness, and intellectual disorders, rather than just a juvenile form of adult aphasia.

At about the same time, educators were providing additional insights about children who failed to learn language as expected. Ewing (1930); McGinnis, Kleffner, and Goldstein (1956); and Myklebust (1954, 1971) were all educators of the deaf and, as such, had developed a variety of techniques for teaching language to children who did not talk or hear. They all noticed that for some deaf children, language skills were worse than expected based on their hearing. This observation led them to focus more on the nature of the language impairment itself and to attempt to develop more effective methods of remediation for children who did not succeed with the standard approaches that were used to teach language.

However, until the 1950s, no unified field specifically addressed the problems of children we might describe as having language disorder. Aram and Nation (1982) give credit to three individuals for developing this new field: Mildred A. McGinnis, Helmer R. Myklebust, and Muriel E. Morley. These pioneers integrated the information currently available on language in deaf and “aphasic” children and devised educational approaches and therapeutic techniques that could be used to remediate language deficits.

For example, McGinnis (1963) developed the “association method,” which was the first highly structured, comprehensive approach to language intervention. McGinnis also initiated making a distinction between expressive language deficits and problems with comprehension or receptive language. Morley (1957) was one of the first to push language and its disorders into the purview of the “speech therapist.” She fostered the use of detailed descriptions of children’s language in making diagnoses and planning intervention. She also provided definitions that allowed clinicians to differentiate language disorders from articulation disorders.

Finally, Myklebust (1954) established a new and distinct field of study and practice, which he called “language pathology.” Like Morley and McGinnis, he was interested in differential diagnosis and developed schemes for classifying language disorders in children, which he called auditory disorders, distinct from deafness and intellectual disability. Myklebust was also concerned with the continuities between oral language disorders and difficulties learning to read. In founding the new discipline of language pathology, Myklebust took a broad view of language disorders to include difficulties producing and comprehending both oral and written language.

As the field of language pathology was established, the study of language itself was revolutionized by the introduction of Chomsky’s (1957) theory of transformational grammar. This led to an explosion of research on typical child language acquisition that could be applied to the study of language disorder. In the 1960s and 1970s, as child language research expanded in focus from syntax to semantics to pragmatics and phonology, so did studies of language pathology, highlighting relevant aspects of language that needed to be described and addressed in clinical practice. New information on typical child language development made it possible to describe a child’s language in great detail and to make specific comparisons with typical patterns of development on a variety of forms and functions. These normative data provided a useful curriculum guide for planning intervention, greatly influencing how language pathology is conceptualized and practiced today.

As the 21st century beckoned, rapid developments in our understanding of genetics and our ability to study brain structure and function greatly enriched the field of language disorders. It has become increasingly clear from family and twin studies that genetic factors exert a strong influence on language development and disorders (Graham & Fisher, 2013). However, it is equally clear that there is no single “gene for language.” In addition, we now know that most children with language disorder do not have obvious neurological lesions that could explain their language difficulty. In fact, children with early focal brain lesions often have more subtle deficits in language learning than children with DLD (Bates, 2004; Lai & Reilly, 2015). This realization has led to the changes in terminology described above, though, as you might expect, getting consensus on what terms to use has not always been easy (Bishop, 2017).



Developmental language disorder (DLD) includes all children who previously received a diagnosis of “specific language impairment.”

## TERMINOLOGY

### Speech, Language, and Communication

A first question might be: “Why do we use the separate terms speech, language, and communication when a single word would be much easier?” The answer is that the three do not always go together, although impairments in one area may well influence development of competencies in another. For instance, a child with a speech sound disorder (SSD) may produce a restricted range of speech sounds, rendering spoken output unintelligible. This is likely to affect the ability to communicate, because conversational partners may not understand the child’s intended meaning. Nevertheless, the child may have normal language skills, in that she understands what others say and uses grammatically complex sentences. She may also have a typical drive to communicate, supplementing impaired speech with gestures and reformulating utterances in order to make herself understood.



Some children with developmental language disorder (DLD) have appropriate communication skills.

A child with DLD may accurately produce speech sounds, but his ability to communicate may be limited by poor understanding of what others say to him, limited vocabulary, and reliance on simple and immature sentence structures. However, he may still use these limited language skills to share his thoughts and experiences with other people. In contrast, other children may have perfect articulation and exceptional vocabularies and be able to express themselves using long and grammatically complex sentences; yet their communication skills are limited by unusual and tangential speech, repetitive language, and a reduced ability to repair breakdowns in conversation, as in the case of some autistic children. Thus researchers and practitioners often draw distinctions among speech, language, and communication in order to highlight the child's strengths and challenges.

### What's in a Name?

Very often, speech, language, and communication impairments occur in the context of an associated biomedical condition, for example, autism or Down syndrome (see Chapter 4). In these cases, descriptive terms such as speech, language, and communication impairment are very helpful in characterizing a child's communication profile. However, when impairments are not associated with another condition, we have struggled to label them in a way that conveys a child's needs or that the wider public readily recognizes and understands.

Bishop (2010) searched the literature published from 1994 to 2010 using all possible combinations of a prefix [e.g., primary, specific, development] + descriptor [e.g., language, communication, language learning] + a noun [e.g., disorder, impairment, delay, deficit]. She found that of the 168 possible combinations, 130 had been used at least once in a published paper, and 33 distinct forms (such as specific language impairment, language delay, language disability, language disorder, or developmental language disorder) had been used 600 times or more during that period. In contrast, other diagnostic terms (such as autism or attention deficit hyperactivity disorder [ADHD]) have remained relatively stable. Bishop concluded that the multitude of labels in use was a barrier to public understanding of language disorder, with negative consequences for research and practice. Unfortunately, when this analysis was repeated a decade later (McGregor, 2020), not much had changed, leading Leonard (2020) to lament that “our use of so many labels has not served us well.”

Recently, an international community of clinicians, researchers, and relevant stakeholders sought to achieve consensus on terminology (Bishop et al., 2017) and, as noted earlier, agreed on the term Developmental Language Disorder or DLD as the consensus term to refer to language deficits that occur in the absence of another known biological condition. DLD is intended to replace the more limited term *specific language impairment* (SLI) that has dominated the research literature since the mid-1980s.

In trying to navigate the complexities of diagnostic terminology, CATALISE made a threefold distinction among

*differentiating conditions*, *risk factors*, and *co-occurring conditions*:

*Differentiating conditions* are biomedical conditions in which language impairment is one of a complex set of symptoms, as may be seen in autism or Down syndrome. In these cases, the term “language disorder associated with X” was advocated to highlight the child's language profile and the associated functional impacts. In differentiating conditions, we cannot always assume that the associated language deficits are caused by the core diagnostic symptoms. For example, despite social differences in autism or intellectual disability in Down syndrome, there is still a very wide range of language outcomes. This suggests that we need to target language directly in intervention.

One reason for abandoning the term “specific language impairment” was the growing recognition that language deficits rarely occurred in isolation. CATALISE advocated that the presence of *risk factors* (biological or environmental) and/or *co-occurring conditions* should not preclude a diagnosis of DLD. *Risk factors* are pre-existing biological or environmental exposures (for example, maternal smoking) that have a weak statistical association with language outcome. *Co-occurring conditions* are conditions like ADHD or dyslexia that are seen in children with DLD at a much higher rate than expected given their prevalence in the general population (for example, dyslexia has a population prevalence of ~5% but more than 50% of children with DLD are likely to have difficulty learning to read). However, we can't be sure what the direction of the causal relationships between these co-occurring conditions might be.

You can imagine that not everyone was wildly enthusiastic about choosing DLD as the consensus term; some felt that labels in general might be stigmatizing and create low expectations for those affected (see Bishop, 2017). Others felt that we should retain the term specific language impairment to ensure continuity with previous research (see Leonard, 2020). Despite these differing views, there was overwhelming agreement that the lack of consensus has been damaging to the field and had done a great disservice to affected children and their families (Bishop et al., 2017; McGregor, 2020). Therefore, consistent terminology was necessary to move the field forward and to support families in learning more about the condition and advocating for appropriate services. Consistent terminology could also reduce stigma by raising public awareness of the learning and behavior challenges associated with language disorder.

Thus, throughout this book, we highlight two groups of children who together will form the bulk of the SLP caseload:

- Children with DLD, for whom language impairments are the most salient presenting challenge, for whom the biological cause of disorder is not yet known, and for whom no other diagnostic label is appropriate (DSM-5; APA, 2012; Bishop & CATALISE consortium, 2017). This term incorporates children with SLI but is more inclusive in encompassing children with a broader range of cognitive and social functioning.

- Children with language disorders (LDs) that are associated with or secondary to another recognized developmental condition, such as autism or intellectual disorder. These differentiating conditions are discussed in [Chapter 4](#).

We do want to draw your attention to another group of children, though, those who may be identified as having reading disorders and again may receive various labels such as dyslexia, learning disability, specific learning disorder, and/or poor reading comprehension. We will refer to these children as having a language-based reading disorder (LBRD), in order to emphasize that many of these children will have an underlying, but often undiagnosed, language disorder. For that reason, we will consider the language contributions to reading disorders in Section III of this book.

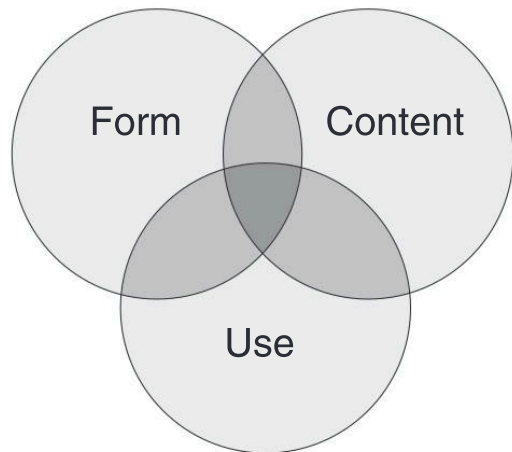
Now that we have agreed on what to call it, we need to decide when a child would qualify for a diagnosis of DLD. It might help to remember the components of our label: *developmental* indicates that a problem arises in childhood, *language* refers to the code we use to communicate, and *disorder* suggests a significant deviation from the typical developmental trajectory. Simple, right? Well, not exactly. One issue is that developmental also suggests a changeable target—a 4-year-old with language disorder will look quite different from a 14-year-old with language disorder, and the challenges that each child needs to overcome may require different therapy approaches. A second issue is that language itself is a multifaceted and highly interactive system that can be conveyed using different modalities, for example, spoken language or written text. Which aspects and modalities should we assess, and what should we prioritize for treatment? Finally, as we've already highlighted, the point at which a difference becomes a disorder is often an arbitrary decision. What factors go into making this decision? Let's take a look.

## ASPECTS AND MODALITIES OF LANGUAGE DISORDER

Bloom and Lahey (1978) and Lahey (1988) provided a useful framework for thinking about language competencies that really have stood the test of time. They suggested that we consider three major aspects of language in formulating assessment and treatment goals ([Figure 1.1](#)).

1. Form: syntax, morphology, and phonology
2. Content: semantics or word knowledge
3. Use: pragmatics, or the ability to use language in context for social purposes

The following sections provide an outline of the key linguistic characteristics of language disorder with respect to form, content, and use (summarized in [Table 1.1](#)). Not all of these features will be present in all children with a diagnosis of DLD, and the features that characterize a child at one age may be very different from the features that stand out as that child gets older. Let's look at these features in a little more detail.



**Figure 1.1** Bloom and Lahey's taxonomy of language. (Adapted from Lahey, M. [1988]. *Language disorders and language development*. New York: Macmillan.)

**TABLE 1.1 Common Linguistic Characteristics of Developmental Language Disorder**

Form	<p>Errors in speech production and poor phonological awareness (i.e., the ability to manipulate sounds of the language, particularly in the preschool years)</p> <p>Errors in marking grammatical tense, specifically the omission of past-tense -ed and third person singular -s, as well as omission of copular "is," and errors in case assignment (e.g., "Him run to school yesterday.")</p> <p>Simplified grammatical structures and errors in complex grammar; for example, poor understanding/use of passive constructions (e.g., "The boy was kissed by the girl."), wh-questions, and dative constructions (e.g., "The boy is giving the girl the present.")</p>
Content	<p>Delayed acquisition of first words and phrases</p> <p>Restricted vocabulary and/or problems finding the right word for known objects (e.g., uses the word "thing" for most common objects)</p>
Use	<p>Difficulties understanding complex language and long stretches of discourse</p> <p>Difficulties telling a coherent narrative</p> <p>Difficulties understanding abstract and ambiguous language</p>

*Note:* The number of symptoms present in any one child is variable, and profile of language impairment may change over time.

## Form

Deficits in grammar are hallmarks of language disorder across languages and neurodevelopmental conditions (Owen Van Horne, 2020). The most consistently reported grammatical findings in English are:

- omission of morphosyntactic markers of grammatical tense, for example,
  - omission of past tense -ed (“He walk\_\_ to school yesterday”)
  - third-person singular -s (“She walk\_\_ to school every day”)
  - copular form of the verb “be” (“I eating chocolate”)
  - difficulties with pronoun case (“him like ice cream”);
- the understanding and production of
  - wh- questions (“who did Buzz see someone?”; van der Lely, 2011)
  - verb arguments (“the woman is placing \_\_\_\_\_ on the saucapan”; Ebbels et al., 2007)
  - verb alternations (“the girl is opening the door” versus “the door is opening”);
- problems in making grammaticality judgments (Dale et al., 2018);
- difficulties understanding complex grammar, namely
  - passive constructions (“the boy was kissed by the girl”)
  - embedded clauses (“the boy chasing the horse is fat”)
  - pronominal reference (e.g., knowing who “him” refers to in the sentence, “Mickey Mouse says Donald Duck is tickling him”)
  - locatives (“the apple is on the napkin”)
  - datives (“give the pig the goat”; Bishop, 1979).

Although grammatical errors are a striking feature of DLD, it is not the case that children with DLD completely lack grammatical knowledge. Instead, children are inconsistent in their application of this knowledge, behaving as if certain grammatical rules were “optional” (Bishop, 2013; Rice et al., 1995). If children lacked knowledge on formal tests of grammar, we would expect either a systematic response bias (i.e., always interpreting a passive sentence, such as “the boy was kissed by the girl” by word order “boy kiss girl”) or random guessing. In fact, performance on grammatical tests is typically above chance levels, even when nonsyntactic strategies to support understanding are not evident. This suggests that factors other than grammatical knowledge influence performance.

Phonological deficits are frequently described in terms of both a child’s repertoire of accurately produced speech sounds and the nature and consistency of any error patterns in speech production. An epidemiological study of 6-year-olds in the United States found the prevalence of SSDs to be 3.8%, with a co-occurrence of SSD and language impairments of 1.3% in 6-year-olds (Shriberg, Tomblin, & McSweeney, 1999). Studies in other countries identify a similar percentage of persistent SSD in 8-year-olds (Wren et al., 2016). Problems with speech production may be more common in clinically referred cases of DLD, perhaps because they are more readily identified by parents and teachers.

Physical or motor deficits that give rise to speech production problems may be differentiated from problems with phonological processing (Ttofari Eecen et al., 2019). Phonological processing encompasses a range of behaviors, including the ability to discriminate and categorize speech sounds, produce speech sounds and meaningful phonemic contrasts, remember novel sequences of speech sounds, and manipulate the sounds of the language. Children with DLD may therefore fail to recognize which sounds are important for signaling meaning in language, with implications for vocabulary and grammatical development.

## Content

Children with DLD tend to have impoverished vocabularies throughout development (McGregor et al., 2013), meaning that they know fewer words relative to same-age peers (vocabulary “breadth”) and that the words they do know are not well specified (vocabulary “depth”). For instance, children with DLD may not realize that many words, like “cold,” can have multiple meanings; for example, “cold” can refer to the temperature outside, an illness, or a personal quality of unfriendliness. This lack of flexible word knowledge may underpin problems with understanding jokes, figurative language, and metaphorical language, all of which draw on in-depth knowledge of semantic properties of words and how words relate to one another (Davies, Andrés-Roqueta, & Norbury, 2016).

In general, children with DLD require more exposure to word-meaning referents relative to peers in order to learn new words. They may also have difficulty retaining new word labels and encode fewer semantic features of newly learned items (Jackson et al., 2019; McGregor et al., 2020). Children with DLD often make naming errors for words they do know, for instance, using a related word “knife” or less specific language, such as “cutting things” when labeling “scissors.” In addition, a limited repertoire of verbs may impact development of sentence structures because of the unique role verbs have in determining other sentence constituents (arguments) and in signaling grammatical tense (Andreu, Sanz-Torrent, Olmos, & MacWhinney, 2013).

## Use

Pragmatics is commonly associated with the notion of “social communication,” which encompasses formal pragmatic rules, social inferencing, and social interaction (Baird & Norbury, 2016). In general, the early social communicative skills of children with DLD are considered to be immature rather than qualitatively different, as in the case of autism (Ellis-Weismer et al., 2021). Nevertheless, children with DLD may have difficulties identifying, understanding, and applying pragmatic rules (Adams et al., 2018). In conversation, these may include initiating and maintaining conversational topics, requesting and providing clarification, turn-taking, and matching communication style to the social context. Children with DLD tend to have more difficulties relative to peers in tasks that measure “theory of mind,” or the ability to reason about other people’s thoughts (Nilsson & de López, 2016), in

understanding emotion from nonverbal facial cues (Bahn et al., 2021; Griffiths et al., 2020), and in inferring emotional reactions from situational cues (Brinton et al., 2007). Individuals with DLD also have difficulties integrating language and context, resulting in difficulties generating inferences (Dawes et al., 2019), understanding figurative language (Norbury, 2004), and constructing coherent narratives (Norbury, Gemmell, & Paul, 2014).



Informal observation of communicative behavior contributes to understanding clients' pragmatic skills.

## Modalities

Miller and Paul (1995) talked about language in terms of its two primary modalities—comprehension (receptive language) and production (expressive language)—integrating each of the three aspects previously listed within these two modalities. It is certainly important for clinicians to assess language competence in both modalities because it can be difficult to accurately judge a child's level of comprehension from observation alone. Historically, a child may have been described as having an “expressive language disorder” or a “receptive-expressive language disorder.”

More recent analyses have used complex statistical models to test the underlying dimensionality of language. These studies show that assessments in either modality tend to go together, and practice tells us it would certainly be unusual to find a child who has very poor understanding of language but age-appropriate language production! For this reason, the *Diagnostic and Statistical Manual of the American Psychiatric Association* (DSM-5; 2022) does not make a receptive/expressive distinction. Statistical tests of the Bloom and Lahey framework have shown interesting developmental trends in the extent to which form, content, and use “hang together.” Pre-kindergarten, all three tend to form one single underlying construct of language (Tomblin & Zhang, 2006). However, as children get older, vocabulary, syntax, and discourse skills become more distinct, although they remain highly associated (Language and Reading Research Consortium [LARRC], 2017). In keeping with these findings, the CATALISE consortium (2017) decided against identifying “sub-types” of language disorder and advocated that

disorders be defined broadly. By keeping the definition broad, we will be able to identify clients who fit the traditional idea of a child with DLD, but we should also be able to identify and, therefore, help a child like Tommy, who is described in the Case Study.

## CASE STUDY

Tommy was a very easy baby. His mother remembers that he was happy to lie in his crib for hours on end, watching his mobile. By age 2, Tommy was using long, complicated sentences and knew the name of every model of vehicle on the road, as well as the names of most of the parts of their engines. At age 4, he took apart the family lawnmower and put it back together. However, his preschool teacher was concerned about him. He took almost no interest in the other children, choosing, when he spoke, to speak only to adults. When he did talk, he invariably asked complex but inappropriate questions on his few topics of interest, such as mechanical objects. He dwelled incessantly on a few events that were of great importance to him, such as the time the doors of the family car would not open. Tommy seemed very bright in many ways and did well on an IQ test that was part of his kindergarten screening. On language assessment, he scored within the expected range on grammar, but vocabulary and narrative production scores were relatively low and he had considerable difficulties understanding figurative expressions or making inferences. In social settings, he just did not know how to relate, and his language was used primarily to talk about his own preoccupations rather than for interactions.

Tommy might be considered a child with autism (see Chapter 4), and the primary manifestation of his language disorder is in social communication, not in the understanding or production of sounds, words, or sentences. Using the CATALISE framework, Tommy would be identified as a child with a “language disorder associated with autism.” Doing so indicates that although Tommy has autism, targeting autistic symptoms or behaviors may not have a major impact on his language concerns. Instead, he should qualify for SLP services to address his difficulties with the use of language for communicative purposes, even though structural aspects of language are relatively unaffected.

## DIAGNOSTIC ISSUES

### When Is a Language Difference a Language Disorder?

Diagnosing language disorder involves comparing the language profile of the child we are assessing to available “normative data” collected from typically developing children at various ages. The traditional focus on “specific” language impairment required researchers and clinicians to consider a child's language development relative to expectations for chronological age *and* the child's overall level of cognitive ability or “mental age.” Mental age is an index of developmental level; it is an age-equivalent score derived from a



standardized test of cognitive ability. In measuring mental age in children with DLD, we try to use cognitive tests that minimize the need to understand or produce complicated language.

So why did people use mental age, rather than chronological age, as part of the diagnostic criteria for DLD? For one thing, it is unusual for a child's language skills to be better than the general level of development, although this does sometimes happen (Rice, 2016). But should we expect a child with cognitive skills similar to a 3-year-old to understand and produce language more typical of his chronological age of 8 years?

Lahey (1990) was perhaps the first in the field of language pathology to argue against "cognitive referencing." She pointed out that many psychometric problems are associated with measuring mental age. In brief, it is not psychometrically acceptable to compare age scores derived from different tests of language and cognition that were not constructed to be comparable, were not standardized on the same populations, and may not have similar standard errors of measurement or ranges of variability. In addition, there are fundamental problems in using age-equivalent scores at all to determine whether a child's score falls outside the expected range (see Chapter 2). Finally, Lahey emphasized theoretical challenges in deciding which of the many possible aspects of cognition should be the standard of comparison for oral language. For all of these reasons, Lahey suggested that chronological age is the most reliably measured benchmark against which to reference language skill in order to identify language disorder.

Remember Jamie? The two clinicians involved in his case differed on precisely this point. ASHA (2000a) has argued strongly against cognitive referencing in making decisions about eligibility for services. Nevertheless, the role of nonverbal IQ in diagnostic criteria and treatment decisions has been extremely controversial (Norbury et al., 2016; Rice 2016). In fact, nonverbal IQ scores are still used in many countries as exclusion criteria, in effect limiting access to SLP services for children who have cognitive deficits (Dockrell, Lindsay, Letchford, & Mackie, 2006). But such decisions are not evidence based. For a start, longitudinal studies of children with language disorder have reported more instability in nonverbal ability scores and sometimes a drop in nonverbal ability scores over time (Conti-Ramsden, St Clair, Pickles, & Durkin, 2012). It is unlikely that this reflects an actual loss in ability; rather, it demonstrates that language is a fantastic problem-solving tool and that many linguistically able children use verbal strategies to help them reason out the answers on nonverbal tests. This puts the child with DLD at a distinct disadvantage. In addition, Norbury and colleagues (2016) specifically evaluated the clinical profiles of children aged 5 to 6 years with varying levels of nonverbal ability in a population study. They found that those children with nonverbal IQ standard scores between 70 and 85 did not differ from those with nonverbal IQ scores above 85 on the profile or severity of language deficit, nor did they have more severe academic deficits or broader social, emotional, or

behavioral problems. Only when language disorder was associated with intellectual disability and/or another biomedical condition was the profile qualitatively different.

It remains possible that children with low-average nonverbal IQ scores (standard score range 70 to 85) will show evidence of qualitatively different error patterns on some measures of language or that the developmental trajectory of certain language constructs may diverge from more cognitively able children (Rice, 2016). However, a categorical denial of services to children because of generally depressed nonverbal IQ scores is not consistent with the ethos of the Individuals with Disabilities Education Act (IDEA Amendments of 1997, Public Law 105-17), which stipulates that services be determined on an individual basis (Whitmire, 2000a). Furthermore, nonverbal IQ does not associate with language growth (Norbury et al., 2017) or language stability (Bornstein et al., 2016) over time. In other words, children with lower levels of nonverbal cognitive skill make just as much progress in language as more cognitively able peers; they just start (and finish) at a lower language level.

Unfortunately, children with lower nonverbal abilities are typically excluded from research studies, and therefore there is little evidence regarding the role of nonverbal cognition in predicting response to treatment, or indeed, what treatment approaches affect meaningful change for children with additional cognitive challenges. However, there is mounting evidence that growth in language is a powerful driver of growth in other cognitive skills (Griffiths et al., 2021; Kievit et al., 2019), highlighting the possibility that improving language could have positive impacts on nonverbal tasks and vice versa.

So even if we do not use mental age to identify children with DLD, we do need to include children with a wide variety of developmental profiles in intervention, to build the evidence base and to develop guidelines about what adaptations to intervention programs are needed to benefit children with varying language, cognitive, and behavioral profiles. By getting a general idea of a child's developmental level, through standardized tests as well as through instruments that measure adaptive behavior, we can identify reasonable behaviors to target in intervention. For example, we want to evaluate the child's current level of functioning and target language behaviors that are both just above current developmental level and are important for success in the child's immediate home or school environment.

## How Low Can You Go?

As we saw earlier, Tomblin (2006) noted that "disorder" can be variably defined, depending on your perspective. Tomblin (2006) favored an approach that takes account of societal expectations and/or cultural norms. In other words, differences in language ability become problematic when they are associated with adverse outcomes such as getting bad grades at school or difficulty finding a job. The alternative approach focuses on the extent to which measured skills deviate from average performance, using data from standardized tests. These tests enable us to compare an individual child's performance against the average abilities of children of a similar

age. However, where we set the cut-off for significant deviation from the average is entirely arbitrary; in medical diagnoses, the “normal” range is often taken to be scores within 2 SD of the mean, which encompasses 95% of the population (see Chapter 2). One might therefore diagnose children scoring more than 2 SD below the mean (equivalent to the third percentile and below) with DLD.

Although this would be a reasonable approach, there are a number of issues with it. First, children with DLD often have uneven profiles of language skill and deficit. Remember Jamie? If we gave him 10 tests tapping different aspects of language and he only achieved a “deviant” score on 1 of those tests, would that constitute DLD? On the other hand, Jamie might score between  $-1$  and  $-2$  SD on 9 of those 10 tests. If we stick rigidly to our  $-2$  SD cut-off, Jamie would not meet criteria for DLD and yet might have considerable difficulty coping in everyday situations.

In some agencies or school districts, cut-off scores for eligibility for services are mandated, and the clinician must abide by them, having leeway only in choosing which instruments to use to measure performance. In other contexts, this decision is made on the basis of caseload considerations. For example, if a clinician were to accept into the caseload all the children who scored more than 1 SD below the mean on a single standardized test (equivalent to 16% of the population), the result might be chaos and rapid burnout. On the other hand, sticking rigidly to the  $-2$  SD cut-off would serve only about 3% of the population, limiting access to support for children who may really need it. Often, researchers and clinicians adopt the middle ground and consider those children scoring in the bottom 10th percentile (equivalent to a standard score of 80, or  $-1.25$  SD below the normative mean) to have DLD, if associated with functional impact.

Is there any empirical evidence to support this middle ground? In an epidemiological sample, Tomblin and colleagues (1997) used a battery of tests that tapped three language domains (vocabulary, grammar, and narrative) in two modalities (production and comprehension), yielding five composite scores. They diagnosed primary DLD at school entry if at least two of the five composite scores were more than  $-1.25$  SD (10th percentile), the standard score on a nonverbal intelligence test was 87 or greater, and the child met typical exclusionary criteria. In a population sample, this yielded a prevalence estimate of 7.4%. However, 46% of children identified by Tomblin and colleagues as having DLD at school entry did not meet diagnostic criteria for DLD a year later, suggesting these criteria identify a large number of false positives (Tomblin et al., 2003).

Norbury et al. (2016) compared a variety of cut-off scores against a measure of functional impact—the degree to which children met early education targets. Using Tomblin criteria yielded a similar prevalence estimate, with 28% of these children meeting their education targets. Norbury et al. then applied CATALISE criteria for DLD, in which children with lower nonverbal IQ scores were included, but the cut-off for language impairment was more severe ( $-1.5$  SD on two out of five language composites). These criteria yielded more

evidence of functional impact, in that only 12% of children meeting these criteria met their education targets.

In both studies, only a minority of children who met the research criteria for DLD had been identified by parents or practitioners as having language difficulties (ranging from 29% to 50%). This suggests that the features that lead to identification of DLD in everyday circumstances may be different from those identified by standardized tests (Bishop & Hayiou-Thomas, 2008). Notably, the diagnostic criteria employed in the Tomlin and Norbury studies did not include measures of phonological skill or pragmatic ability, both of which impact educational and/or social development. Interestingly, Bishop and Hayiou-Thomas (2008) reported that in a population sample of twins with DLD, children referred for speech-language evaluation were more likely to have phonological deficits. Thus, inclusion of phonological measures in assessment may increase concordance between population and clinical samples.

### What Is the Impact of Language Disorders on Daily Living?

Standardized test scores can give us some useful information about a child’s abilities relative to his or her peers. But sometimes, we may need to go beyond the standard score in determining whether or not speech-language services are required. Why is that? To begin with, tests with adequate psychometric properties (such as validity, reliability, and large, representative normative data) are not always available for testing at all age levels, for all language communities, or for all aspects of language and communication. For instance, measuring pragmatic language and social communication abilities is notoriously difficult (Norbury, 2014), largely because these skills are so context dependent. Thus, any attempt to structure and standardize the context removes a large degree of the challenge. In addition, although the situation is improving, many of our standardized instruments are culturally and linguistically biased, putting children from less mainstream cultural backgrounds at a disadvantage (Norbury & Sparks, 2013). One solution is to develop tests that are not reliant on cultural or linguistic knowledge and instead assess the ability to “process” novel information, such as a nonword repetition (NWR) task. Although these tasks reliably distinguish language difference from language disorder (Windsor, Kohnert, Lobitz, & Pham, 2010), they do not provide the clinician with a picture of the child’s linguistic capabilities, making them of limited use in intervention planning. Thus, in some situations, age-appropriate scores on a standardized test may occur even when the child is having significant difficulty communicating in everyday situations. On the other hand, sometimes children obtain lower-than-expected scores on a test, yet their communicative skills are very much in line with other individuals from their cultural background (see Chapter 5).

In common-sense terms, functional impact means a deficit big enough to be noticed by ordinary people such as parents and teachers—not just language development