

DISCUSSION

Speech sound disorder or DLD (phonology)? Towards a consensus agreement on terminology

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Abstract

Background: The publication of phase 2 of the CATALISE project in 2017 clarified terminology for children with developmental language disorder (DLD) or delay but unintentionally muddied the water for children with unintelligible speech. A diagnostic label of DLD (phonology) indicates poor prognosis and phonological disorder that persists into middle childhood. However, in contrast to other diagnostic labels that fall under the overarching term of speech sound disorder (SSD), DLD (phonology) does not elucidate the characteristics of the child's speech nor does it point us in the direction of appropriate intervention.

Aims: The aim of this paper is to discuss terminology in SSD leading to an evidence-based model which builds on the model of DLD developed in CATALISE, supports descriptive diagnosis and signposts intervention.

Methods: Following a focused review of literature proposing or describing terminology for SSD, an expert group of researchers in developmental SSD proposed a revised model of existing terminology. Groups of UK speech and language therapists (SLTs) who provide services for children with SSD were asked to comment on its acceptability and feasibility.

Discussion: A three-level terminology model was developed. This comprised an overarching Level 1 term; Level 2 terms that differentiated SSD of unknown origin from SSD with associated or underlying conditions; and specific diagnostic terms at Level 3 to support further assessment and intervention decisions. Consulted SLTs generally expressed agreement with the proposed terminology and a willingness to adopt it in practice.

Conclusions: Existing terminology for childhood SSD provides a good basis for clinical decision-making. A modified version of Dodd's (2005) terminology was found to be acceptable to UK SLTs. There is an evident overlap of SSD with CATALISE terminology. However more detailed and specialist terminology than 'DLD (phonology)' is required to support clinical decision-making. It is proposed

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that endorsement by the UK Royal College of Speech and Language Therapists would obviate the need for a Delphi process.

KEYWORDS

differential diagnosis, evidence-based practice, intervention, speech sound disorder, SSD, terminology

What this paper adds

What is already known on this subject

- Over nearly a hundred years, as our knowledge and understanding of speech sound disorder (SSD) has increased, so has the terminology that is used to describe those disorders. Current terminology not only describes subtypes of SSD but can also signpost us to effective interventions. With the publication, in 2017, of phase 2 of CATALISE a new term of ‘developmental language disorder (DLD) (phonology)’ was introduced with the unintentional consequence of challenging more specific descriptive terms for SSD.

What this paper adds

- In the context of CATALISE and DLD (phonology), the history and nature of SSD terminology are reappraised. Building on the model of DLD developed in CATALISE, a tiered model that supports descriptive diagnosis and signposts intervention is proposed for discussion.

Clinical implications of this study

- The proposed model of terminology for SSD provides descriptive and detailed labels that will support accuracy in differential diagnosis of developmental SSD by speech and language therapists. Furthermore, a decision-making tree for SSD demonstrates the pathway from diagnostic use of the terminology to the selection of evidence-based, effective interventions.

INTRODUCTION

The publication of phase 2 of the CATALISE project in 2017 (Bishop et al., 2017) clarified terminology for children with developmental language disorder (DLD) or delay. This high-profile project presented consensus terminology achieved through an international Delphi process, involving 57 individuals. An international campaign group adopted the DLD label (<https://radld.org/>) and immediately began to raise awareness of the DLD terminology and the accompanying statements, including establishing an international DLD Day in October each year. The International COST Action (IS1406) *Enhancing children’s oral language skills across Europe and beyond—a collaboration focusing on interventions for children with difficulties learning their first language*, adopted the term DLD (Law & Thordardottir, 2019). This aided the further adoption

of DLD in Europe, Australia and New Zealand by both researchers and clinicians (Law et al., 2019). Higher education institutions in the United Kingdom were also early adopters and taught the details of DLD terminology to their pre-registration speech and language therapy students who, in turn, used the terminology on clinical placement; in their assignments; and in their exams. This included following the CATALISE Flowchart (see Figure 1) and applying the newly formed label of DLD (phonology) to children with unintelligible speech. This had not been the CATALISE consortium’s intention for use of this term (Wren, Y., and Bishop, D., personal communication, 2017).

Terminology for speech sound disorder (SSD) was well established in both research and clinical practice when the CATALISE project was conducted (Bishop et al., 2016, 2017). Indeed, CATALISE did not attempt to address terminology for SSD but only for developmental

language disorders. However, the possibility of DLD (phonology) is both appealing and confusing in its simplicity. This was the trigger for the current paper. A small working group of members of the UK and Ireland Child Speech Disorder Research Network (<https://www.nbt.nhs.uk/bristol-speech-language-therapy-research-unit/bsltr-research/child-speech-disorder-research-network>) was established to develop a proposed terminology for wider discussion.

BACKGROUND

A history of SSD classification

There are several existing classification systems and sub-categories of SSD. These have emerged and been refined over many decades (Waring & Knight, 2013). They are nearly all developed in English-speaking populations, where developmental norms for speech sound development are established in phonetic and phonological domains and for geographic variations.

Early classification focused on the motor aspects of speech production. Articulation and how it can be disrupted is the main consideration in literature from the early twentieth century, with other aspects of speech and language brought together under the broad term of ‘dysphasia’ or ‘aphasia’, both terms that are no longer associated with developmental disorders.

Ward (1923) was already writing about ‘speech defects’ related to cleft palate and ‘other defects, which are generally the result of faulty childhood habits that have not been corrected, can and should be cured’ (p. 1). Although laying blame for some speech disorders on children, their parents and teachers, Ward does acknowledge that some speech disorders can be attributed to known causes but others cannot. Van Riper (1947) proposed four categories of speech disorders: rhythm (fluency), articulation (substitution, omission, addition and distortion of speech sounds), phonation (voice pitch, intensity and timbre), and symbolisation (labelled as ‘dysphasia’ and apparently encompassing all receptive and expressive language difficulties, reading and spelling difficulties) (pp.17-25). Morley (1965) in Newcastle upon Tyne, UK during the 1950s and ‘60s wrote about ‘articulatory apraxia’, ‘defective articulation’ related to sensory or structural defects and ‘developmental aphasia’. Morley supported her classifications with reference to detailed data gathered from children seen in her clinics. In the third edition of her book, Morley (1972) further developed her classification system to differentiate articulation from phonological disorders and developed complex box and arrow models of input and output processes involved in speech.

From the 1980s onwards there is a clearer path from those earlier classification systems to the ones in use today. The complexity of speech production is now more readily understood. For both children and adults, speech production requires interaction between motor skills and cognitive-linguistic skills. Underdeveloped or impaired motor skills will generally lead to phonetic problems, that is, incorrect motor production of speech sounds (e.g., lateral release of airflow on /s/ so that [ʃ] is consistently used). Whereas underdeveloped or impaired cognitive-linguistic skills will generally lead to phonological problems, that is, loss of meaningful contrast in words, which is often manifest as a pattern of errors across the entirety of a phonological pattern (e.g., velar fronting leading to substitution of [t] for /k/, [d] for /g/ and [n] for /ŋ/). There is occasional overlap, not least when a phonetic problem is of sufficient magnitude to lead to a loss of contrast.

Berenthal et al. (2009, pp. 122–143) provide a useful overview of organically based SSD and SSD of unknown origin. Organic causes include major structural variations, genetic syndromes, hearing loss, neuromotor disorders (including dysarthria and apraxia). They acknowledge that childhood apraxia of speech (CAS) has been controversial but, following ASHA (2007) guidelines, consider it to be a distinct neurological disorder. The approaches to classification of SSD with unknown origin include aetiological (e.g., Shriberg & Kwiatkowski, 1982a, 1994; Shriberg et al., 1986, 1997); psycholinguistic (e.g., Stackhouse & Wells, 1997) and linguistic perspectives or symptomatology (e.g., Dodd, 2014; Dodd et al., 2005; Dodd & Morgan, 2017).

The explicit adoption of evidence-based practice by the speech and language therapy profession (Reilly, 2004) has led to an increased need for the terminology used by researchers and speech and language therapists (SLTs) to be consistent and well-defined. It is difficult to compare the outcomes of research studies in systematic reviews if the researchers do not use the same descriptive terms for conditions they are investigating. Clinicians will be unable to find the research evidence that applies to their practice if they are using different terminology than the researchers. Diagnostic labels are used in some education systems (e.g., parts of the United Kingdom and United States) to access specialist support or provision (Damico et al., 2013), increasing the importance of terminology that precisely classifies the child’s speech and language.

Waring and Knight (2013), using SSD as the overarching term, provide a useful critical review of terminology for SSD in which they propose that a classification system should:

- classify all children with SSD of unknown origin into discrete subgroups
- have accurate, specific and sensitive diagnostic markers

- have universal applicability
- improve clinical management by directing treatment differentiation
- be feasibly implemented in the clinical setting
- contribute towards an explanation of childhood SSD.

The study of speech sounds encompasses the fields of articulatory phonetics (speech production), acoustics (speech perception) and phonology (the linguistic rules that underpin use of sounds in words). Clinicians who work with children with SSD draw on that combined knowledge. Speech does not exist in isolation but is related to and interacts with language. The overlap of speech with language is evident both in linguistic research and in the clinical work of SLTs. Speech, in the form of phonemes is the means by which language is expressed. The phonological elements of speech are linguistic in nature (compared to the motor elements which are articulatory in nature). It is this linguistic aspect of speech that is included in the CATALISE process.

CATALISE and DLD (phonology)

In phase 2 of CATALISE (Bishop et al., 2017) there are a series of 12 consensus statements that provide support for the concept of DLD. Three will be considered here in relation to SSD:

“Statement 1. It is important that those working in the field of children’s language problems use consistent terminology.” (p. 3)

As a component of the wider speech, language and communication needs (SLCN) umbrella term adopted by CATALISE from Bercow (2008), SSD is acknowledged within the field of children’s language problems. When considering terminology to be used in a clinical setting, it is crucial that it directs the SLT to appropriate evidence-based interventions.

“Statement 2. The term ‘language disorder’ is proposed for children who are likely to have language problems enduring into middle childhood and beyond, with a significant impact on everyday social interactions or educational progress.” (p. 3)

When considering the difference between speech and language development we should take into account the different nature of speech development compared to language development. Language continues to develop throughout the lifespan. At critical times in life, such as starting each

school year or a new job or hobby, we are exposed to new syntactic forms, new vocabulary and new communication contexts. Individuals who are dextrous language learners can cope with these demands and continue to develop language throughout their lifespan through both spoken and written channels. Individuals who have problems learning language can encounter those problems at any stage of their development. Consequently, children are referred to SLTs at early and later stages of language development, depending upon when, and in which language domain, they experience obvious difficulties. In contrast, we have a fairly set number of phonemes in a language which act in a rule-based way to signal meaning. In English, typically developing children have acquired all speech sounds by around 6–7 years of age and are using them to signal meaning in the same way that adults do (McLeod, 2009; McLeod & Crowe, 2018). Precision of motor execution may take longer to establish for some children. In addition, some allophone variation may occur as the child grows into adolescence. Furthermore, if children move from one place to another where a different accent is used, they may modify their speech to include the new allophones related to that accent. We do not have a different set of phonemes or phonological rules for adults, nor do we have a specialist phonological system for different professions in the way that vocabulary and syntactic structures in, for example, law or engineering differ from everyday language. Within a child’s ambient language environment, they will encounter all the speech sounds and phonological rules for their home language(s) every day from the moment they are born (if not before). SSDs can be evident from the early stages of speech development if the usual emergence of intelligible speech in the first 2 to 3 years does not occur. Preschool SSD can affect everyday social interactions and educational progress, with long-lasting impacts from underlying phonological processing deficits if these have not been detected and remediated, even if the SSD itself appears to be resolved (Wren et al., 2021).

“Statement 3. Research evidence indicates that predictors of poor prognosis vary with a child’s age, but in general language problems that affect a range of skills are likely to persist.” (p. 3)

It can be difficult to predict poor prognosis in children with SSD, just as it is for children with language delay or disorder. However, there is progress in identifying risk factors in SSD (e.g., Eadie et al., 2015; Morgan et al., 2017; Wren et al., 2016) and where there is a difficulty in a range of areas, such as in CAS, prognosis is likely to be poor.

A diagnostic label of DLD (phonology) would exclude those children with SSD of known origin and those with

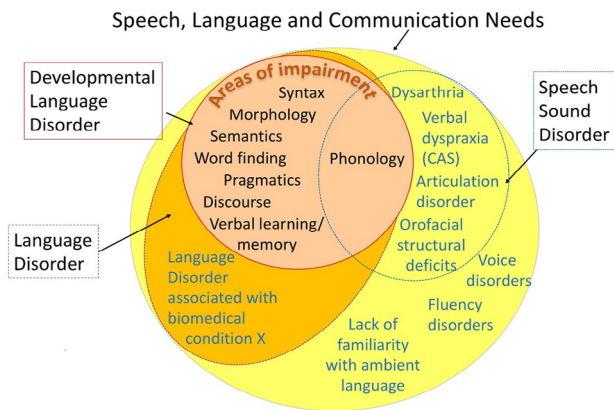


FIGURE 1 From Bishop et al. (2017, p. 1076) Venn diagram illustrating relationship between different diagnostic terms. DLD is nested within the broader SLCN category. [Colour figure can be viewed at wileyonlinelibrary.com] Abbreviations: CAS, childhood apraxia of speech; DLD, developmental language disorders; SLCN, speech, language and communication needs.

SSD of unknown origin who are likely to resolve with intervention before middle childhood (see Figure 1). In contrast to other diagnostic labels for different subcategories of SSD, DLD (phonology) does not elucidate the characteristics of the child's speech, account for the frequent co-occurrence of different types of SSD or point us in the direction of appropriate intervention.

Aims

The aim of this paper is to discuss terminology in SSD leading to an evidence-based model for SSD which builds on the model of DLD developed in CATALISE, supports descriptive diagnosis and signposts intervention.

Methods

This discussion paper represents the consensus view of the UK and Ireland Child Speech Disorder Research Network (CSDRN). The CSDRN is a selected group of 15 SLTs from the United Kingdom and Ireland whose major or primary research focus is SSD. Membership of the group is by application when a space is available. Selection is based on publication, research in progress and the necessity to include specialist researchers that cover a range of subtypes of SSD, including phonological disorders, CAS, childhood dysarthria, cleft palate and lip. The group comprises members from England, Scotland, Northern Ireland and the Republic of Ireland. A full list of past and current members can

be found at <https://www.nbt.nhs.uk/bristol-speech-language-therapy-research-unit/bsltru-research/child-speech-disorder-research-network>. This consensus view was arrived at following a focused literature review of research-based SSD terminology, consideration of the CATALISE DLD (phonology) information (Bishop et al., 2017) and discussions with groups of UK SLTs who provide services for children with SSD.

Procedure

Information about terminology related to developmental SSDs was extracted in a focused review, from textbooks and selected papers that investigated terminology used by SLTs or contributed to the terminology debate amongst SLTs. Research papers that used terminology but were not investigating terminology use were not included.

An iterative discussion amongst the CSDRN members considered the suitability of DLD (phonology) as a diagnostic term for SSDs and range of terms used in the United Kingdom and internationally in relation to how they meet the six criteria set out by Waring and Knight (2013). Groupings of terms from CSDRN, including DLD (phonology), were presented to pre-existing groups of SLTs (via a conference workshop and SSD clinical excellence networks) for discussion as to their acceptability and feasibility and their comments noted anonymously. The SLTs were self-selected as group members providing clinical services for children with SSD and with an interest in SSD terminology. Ethical approval was provided by Newcastle University. This work took place in person, prior to the COVID pandemic, with approximately 60 contributors across both groups.

Terminology that emerged as most acceptable to clinicians (over 80% agreement) was then incorporated into the model developed by the CSDRN and is presented here for further discussion.

DISCUSSION

Focused literature review of terminology describing speech sound disorders

Terminology for SSD serves two different but related purposes. Both researchers and clinicians have the need to describe types of SSD. If researchers investigating causal mechanisms, assessment or interventions wish their findings to be implemented in clinical practice they are advised to use transparent and descriptive terminology that is accessible to clinicians. If clinicians want to utilise the evidence base for assessment, diagnosis and intervention;

communicate with each other and with children/parents/families, they need to use different levels of terminology that fit each of those different purposes. Furthermore, the interchangeable and varying use of SSD terminology is a challenge to student SLTs in both the academic and the clinical aspects of their education. Our focused investigation into the literature revealed a changing picture over time and, in some cases, poor understanding of the complexity of speech and of the clinical world, evidenced by inaccurate use of terminology.

In the introduction to their book of intervention case studies, Dodd and Morgan (2017, p. 2) use *speech impairment* as an overarching term. They further go on to provide a summary update of terms introduced in Dodd (1995) and subsequently refined and supported by evidence (Broomfield & Dodd, 2004a; Crosbie & Dodd, 2005; Dodd, 2014; Dodd et al., 2002; Hesketh, 2001; Ttofari Eecen et al., 2019). These are split into two categories: motor and linguistic. Motor includes articulation difficulties, CAS, dysarthria and cleft speech characteristics. Linguistic difficulties include phonological delay, consistent and inconsistent phonological disorder. Impairment related to hearing loss is a further category. *Speech sound disorder* is dismissed as a term by Dodd and Morgan, as being too general and exclusionary (e.g., bilingualism, motor function) as represented in the literature (as opposed to its use by clinicians, which is not commented on). They further suggest that the term 'speech sound' as opposed to 'speech' further implies a focus on articulation rather than phonology.

Shriberg and colleagues developed the speech disorders classification system over numerous iterations (Shriberg et al., 1997; Shriberg & Kwiatkowski, 1982, 1982a,b). They include four higher level terms: normal or normalised speech acquisition; developmental phonological disorders, non-developmental speech disorders and speech differences. Normal development and speech differences (accents, dialects, regional variations) are usually implicit in SLTs consideration of SSD, but we do need to ensure that these continue to be considered when children are referred into services. Shriberg et al. (1997) explicitly include age as a factor, with speech delay spanning 2.0–8.11 years and 'questionable residual errors' 6.0–8.11 years; residual errors are classified for children 9.0 years and over. 'Questionable residual errors' persisting up to nearly 9 years of age reflects the SLT's clinical preference for phonological delay to morph into phonological disorder as children get older. However, in this classification system, phonological errors go on to be described as articulatory errors, rather than the phonological pattern errors described by Dodd (2005) and observed by SLTs in the children on their caseloads.

The difference between articulation and phonology was established by both Dodd and Shriberg (and others) over

40 years ago, so it is of particular concern that we see *articulation difficulties* used in the same indiscriminate way in literature to include phonological delay or disorders (e.g., Burgoyne et al., 2019).

Dodd's unique contribution to the diagnostic process is the important addition of inconsistent phonological disorder (Dodd, 1995). There is a clear distinction between whole word and phoneme level errors when diagnosing this type of SSD. Inconsistent phonological disorder would be diagnosed only when the child says a word differently on three separate productions, with a 40% inconsistency threshold across at least 25 different words (see Dodd et al., 2002). The incidence of inconsistent phonological disorder is approximately 9% of referred children (Broomfield & Dodd, 2004b). There is a clear explanation of where the breakdown in speech processing occurs that differentiates inconsistent phonological disorder from CAS and from consistent use of multiple different phonemes to signal an individual phoneme (Bradford-Heit & Dodd, 1998; Dodd et al., 2002). Inconsistent phonological disorder is the manifestation of a deficit in phonological assembly (Dodd et al., 2006). It can be mapped onto the psycholinguistic model (Stackhouse & Wells, 1997) at the point of the stored motor program, following the hypothesis that although phonological representations of words are stored in the lexicon, there is no matching motor program assembled for production of the word. Therefore, the child has to plan the motor program for a word (or for multiple words) while in the process of speaking. Unlike children with CAS, children with inconsistent phonological disorder are able to use the non-lexical route to accurately repeat words, making use of the supplied model to copy and their good oro-motor skills. For the choice of effective intervention, accurate diagnosis and labelling of subtypes of SSD is essential for all of these conditions.

Variations of terminology for SSD tend to be based on Dodd or Shriberg (Bowen, 2009; McLeod & Baker, 2017; Rvachew & Brosseau-Lapre, 2012), presenting reasoned explanations for their choice of terms, some of which are due to cultural changes in the acceptability of certain words rather than any theoretical development. Variants of the Dodd terminology are widely used in the United Kingdom and these were taken forward to the discussion stage.

DLD and co-occurring SSD: The CATALISE overlap

Up to two thirds of children who present with a receptive and/or expressive language difficulty will have a co-occurring SSD of some nature (Broomfield & Dodd, 2004b). Detailed, accurate and often ongoing assessment

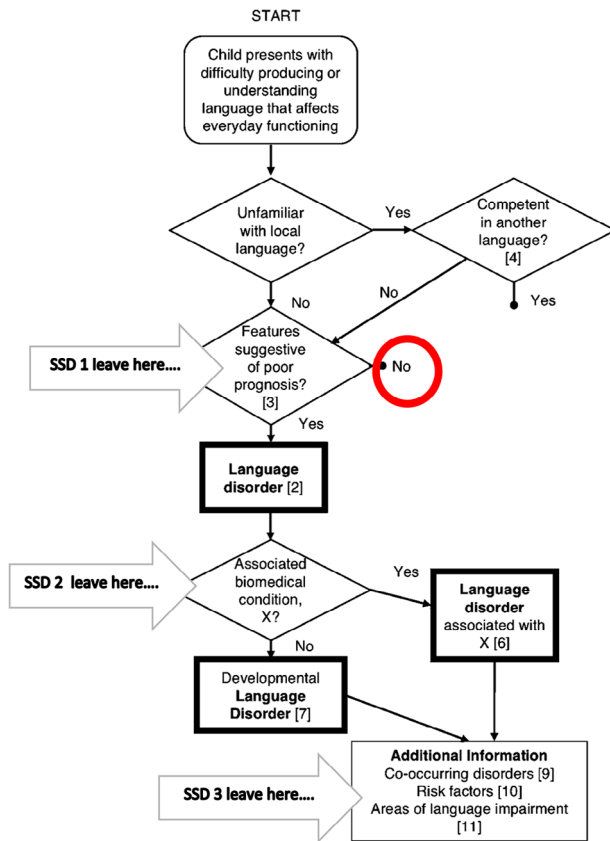


FIGURE 2 Flowchart illustrating pathways to diagnosis of language disorder with additional exit routes for children with SSD not DLD. Numbers in square brackets refer to Statements in the Results section CATALISE 2, flowchart adapted from Bishop, D. V. M., Snowling, M. J., Thompson, P. A., Greenhalgh, T., & CATALISE consortium (2017). [Colour figure can be viewed at wileyonlinelibrary.com]

Abbreviations: DLD, developmental language disorder; SSD, speech sound disorder.

is required for children presenting with SLCN to ensure that an accurate differential diagnosis and effective intervention are provided. Not all of these children, however, will warrant a diagnosis of DLD (phonology). Children with SSD are included in the CATALISE process which is clearly set out in the flowchart (see Bishop et al., 2017, p. 8 and Figure 2 below). The crucial parts of the CATALISE paper that refer to speech more widely and phonology specifically are:

“Phonological problems in preschoolers that are not accompanied by other language problems are a relatively common reason for referral to a SLT/P and often respond well to specialist intervention (Law et al., 2003). Thus, they would not meet our criteria for DLD because the prognosis is good. The more

general term ‘Speech Sound Disorder’ (SSD) can be used for such cases: this is an umbrella term that also includes problems with speech production that have motor or physical origins, or involve misarticulations such as a lisp, where a sound is produced in a distorted way without losing the contrast with other sounds. The classification of and terminology for disorders of speech sound production is a subject of considerable debate (Waring & Knight, 2013). In practice, even for those with specialist skills, it is not always easy to distinguish between phonological disorders and other types of speech production problem.” (Bishop et al., 2017, p. 6)

Here the issue of an SSD that is significant for the child, but can be resolved with intervention, is acknowledged as not warranting a DLD diagnosis. However, no reference is made to the more detailed descriptive terminology required to signpost intervention. We would also contest that the majority of SLTs working in this area can distinguish between phonological disorders and other types of speech production problem, hence their ability to provide successful intervention. Those children for whom this differentiation may be problematic are more likely to be those with persisting SSD, where differential diagnosis of, for example, CAS, inconsistent phonological disorder, dysarthria or submucous cleft palate, may take longer or require a highly specialist SLT. This can be exacerbated by service constraints such as limited time for assessment and triage methods that exclude an oral examination.

“Where phonological problems continue beyond 5 years of age it is important to assess the child’s broader language skills, as persisting phonological difficulties are usually accompanied by other language problems and have a poorer prognosis (Bird et al., 1995; Bishop & Edmundson, 1987; Hayiou-Thomas et al., 2017), so would merit a diagnosis of DLD. Where the child has a mixture of language disorder and motor or structural problems with speech production, a dual diagnosis of DLD with SSD is appropriate.” (Bishop et al., 2017, p. 6)

“Some children have impairment affecting phonological awareness, i.e. they have difficulty explicitly categorising and manipulating the sounds of language. For instance, they may be unable to identify the three phonemes

constituting the word 'cat', or to recognise that 'cat' and 'car' begin with the same phoneme. Phonological awareness has been studied extensively in children with reading disability, where it is commonly impaired, even in children with normal speech production. Although phonological awareness is often deficient in children with DLD, we would not diagnose DLD on the basis of poor phonological awareness alone." (Bishop et al., 2017, p. 6)

If the CATALISE procedure is followed as intended there are clear exit routes for children with SSD who do not have co-occurring language disorder (see Figure 2). The first exit route for those children who enter the flowchart with SSD but no language delay or disorder, that is, as a "child who presents with a difficulty producing or understanding language that affects everyday functioning" is at "Features suggestive of poor prognosis" (SSD 1 in Figure 2). These are the children for whom SLT is going to lead to a resolution of their SSD. NB. Language here is used in the broader sense to include phonology.

Children with language difficulties that can be attributed to their SSD, with mild-moderate SSD indicative of a developmental delay, straightforward articulation difficulties or straightforward phonological pattern errors and who do not have an associated medical condition would exit the process at "Associated biomedical condition X?" (SSD 2 in Figure 2). The expectation for these children is that once their phonological disorder (processing and expressive) is resolved their language delay will resolve with little or no further intervention.

After this point on the CATALISE flowchart we should be considering children who have language disorder as well as SSD. For those children who have an associated biomedical condition, for example, brain injury, cerebral palsy, sensorineural hearing loss, genetic conditions, for example, Down syndrome, autism spectrum disorder, intellectual disability, they will exit the DLD process with a dual diagnosis of DLD and SSD associated with X (their condition) at 'Additional Information' (SSD 3 in Figure 2).

There is a final group of children, with no associated biomedical condition, who have language disorder and severe SSD that prohibits reliable and accurate assessment of expressive language so that the extent or detail of that disorder can be ascertained. These children may be considered for a DLD diagnosis once their speech is intelligible enough for their expressive language to be assessed or earlier if a receptive language disorder is identified. They also exit the process at 'Additional Information' at the end of the flowchart (SSD 3 in Figure 2) with a diagnosis DLD (phonology).

Terminology discussions and the creation of a model

Discussion within the CSDRN of SSD terminology in relation to existing models and to CATALISE initially included all network members before being taken forward by a small working group and taken back to the whole network for comment and final consensus agreement. Drawing on the literature review, discussion focused on the following three classifications: McLeod and Baker (2017), Dodd (in Dodd & Morgan, 2017) and CATALISE (Bishop et al., 2017).

In the classification chapter of McLeod and Baker (McLeod & Baker, 2017), they propose one unified term of *Phonological Impairment* to cover both phonological delay and disorder. This would remove the issues associated with the use of delay as a term that relies on subjective judgement (when does delay become so delayed that it is a disorder?) or that might imply spontaneous catching up. However, they use the term Articulation Disorder for only /s/ and /ʃ/ -type errors, which we considered too restrictive. The subcategories (five types of SSD) they use are:

1. Phonological disorder (most common)
2. Articulation disorder
3. Inconsistent speech disorder
4. Childhood apraxia of speech (CAS)
5. Childhood dysarthria

Dodd and Morgan (2017) suggest *speech impairment* rather than SSD as the first level of terminology. They sub-classify speech impairments into those due to a motor difficulty affecting articulation or a linguistic difficulty affecting phonology. Under each sub-category they use the following terms: *phonological difficulty*: phonological delay, consistent phonological disorder and inconsistent phonological disorder. *Articulation difficulty*: with underlying deficits that indicate further classification to

- Phonetic programming (e.g., interdental or lateral lisp)
- Orofacial structural anomalies (e.g., clefts, velopharyngeal insufficiency (VPI))
- Neuromuscular execution (e.g., dysarthria)
- Neuromotor planning and programming (e.g., CAS)

It is necessary to specify which terms apply only to SSDs of unknown origin. It is also necessary to clearly define inconsistent speech disorder in contrast to inconsistencies that occur at phoneme rather than word level.

The terms associated with speech within the CATALISE Venn diagram (see Figure 1) comprise the overarching term of SSD and then subcategories of: Dysarthria, Verbal dyspraxia (CAS), Articulation disorder, Orofacial structural deficits and Phonology. Phonology also falls

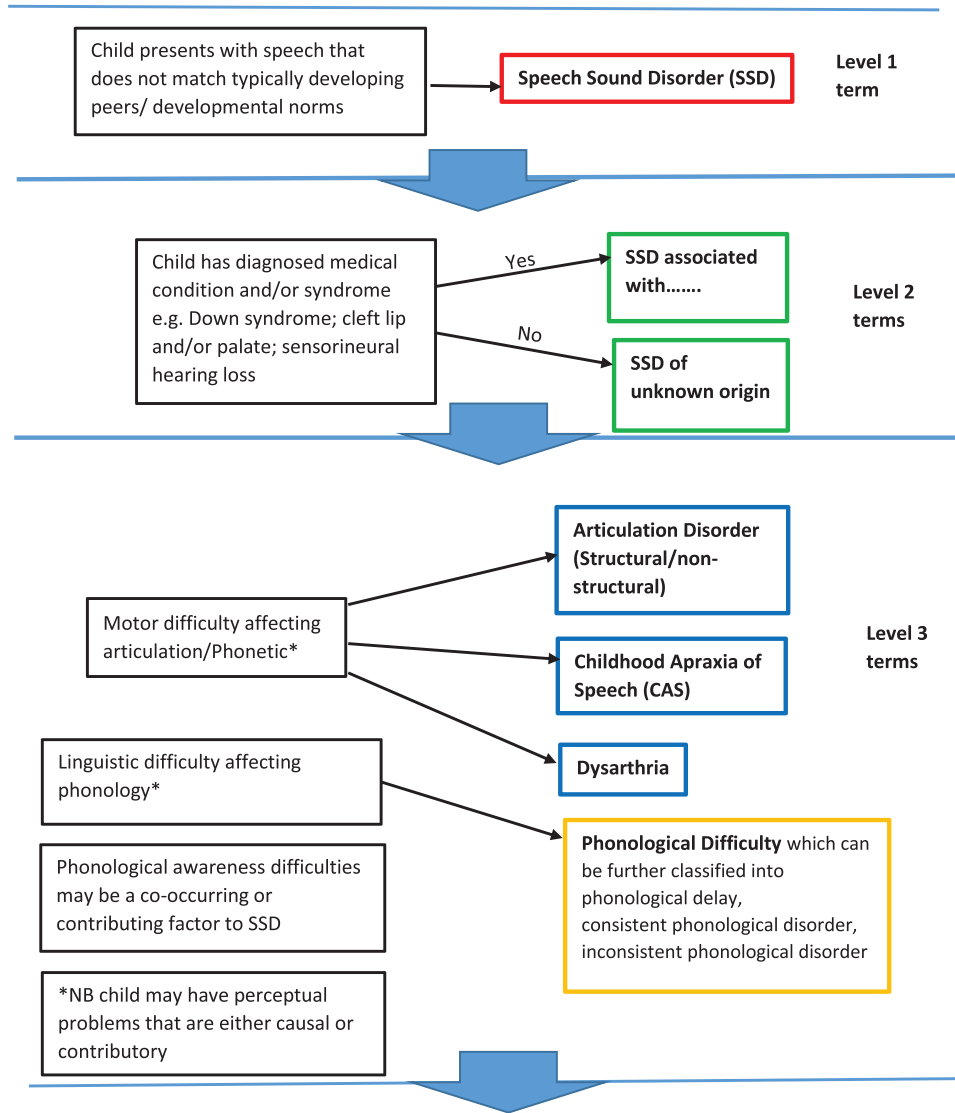


FIGURE 3 Flowchart illustrating pathways to diagnosis for children with atypical speech development. [Colour figure can be viewed at wileyonlinelibrary.com]

within areas of impairment for DLD but there is no differentiation between different types of phonological impairment.

Such is the complexity and diversity of SSD that we propose an approach that has different levels of analysis and detail. Figure 3 details three levels, but there could be more, depending on the level of detail required by the user. It is envisaged that, for example, researchers or specialist clinicians may use a fourth level of terms for a specific purpose or population. A diagnosis could have three or more labels depending on the nature of the child’s difficulty and the purpose of the diagnosis. It is important to note that SSDs change over time due to development, response to intervention and discovery of new information, so that an initial tentative diagnosis should be given and then modified to fit change in the child’s speech. It should also be noted that

this terminology covers only speech output and some factors that contribute to or may explain it, not phonological processing, auditory memory etc.

For users of this terminology, we are assuming familiarity with typical speech development and use of the Good Practice Guidelines for Transcription of Children’s Speech Samples in Clinical Practice and Research and the Good Practice Guidelines for the Analysis of Child Speech (Bates et al. 2021; Child Speech Disorder Research Network (CSDRN) 2017).

Proposed levels of diagnostic label

- **Level 1 term:** We propose that speech sound disorder (SSD) is used as the overarching term for all speech disorders occurring in childhood.

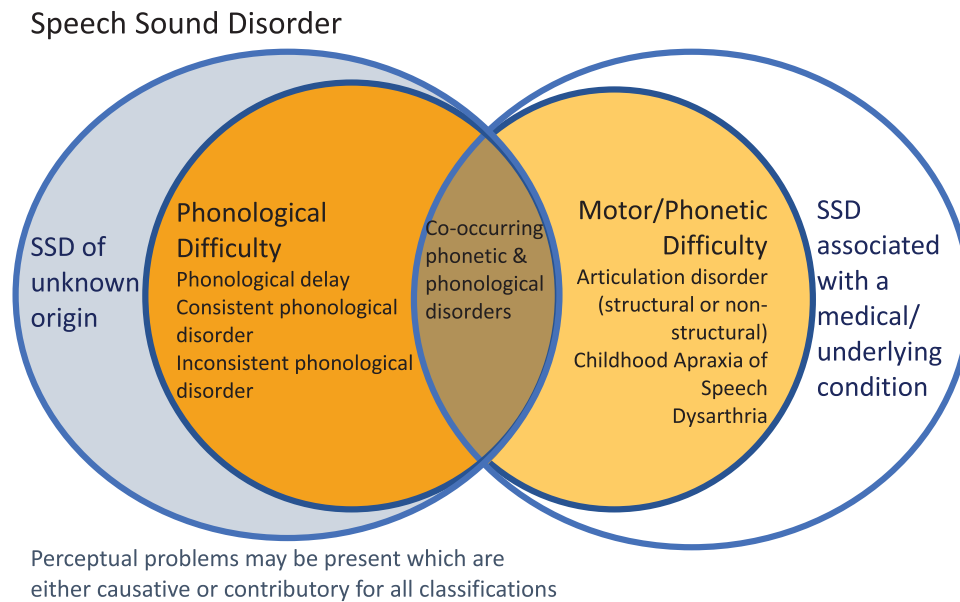


FIGURE 4 Venn diagram illustrating possible co-occurrence of subtypes of SSD. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/1460-6984.12989)] Abbreviation: SSD, speech sound disorder.

- **Level 2 terms:** SSD is further differentiated into SSD of unknown origin or SSD associated with a diagnosed medical condition and/or underlying deficit including, for example, Down syndrome, sensorineural hearing loss; cleft palate ± cleft lip; cerebral palsy. More than one classification can apply at this level.
- **Level 3 terms:** At the third level the origin of SSD is further classified as a **motor difficulty affecting articulation** or a **linguistic difficulty affecting phonology**. These terms relate to phonetic and phonological difficulties respectively and each has more specific diagnostic labels attached. Motor/phonetic difficulties include articulation disorder (structural or non-structural); CAS; childhood dysarthria. Linguistic/phonological difficulties can be further labelled, according to detailed analysis as phonological delay, consistent phonological disorder and inconsistent phonological disorder. See Figure 3 for further detail. More than one classification can apply at this level.

CAS is preferred over the term developmental verbal dyspraxia because the former is used internationally whereas the latter is restricted to the United Kingdom; current evidence and new research refer to CAS and parents searching the internet for information will be better informed under the term CAS (Broomfield et al., 2022). CAS remains an infrequent but important diagnosis due to the severity and long-term impact of this subtype of SSD, there is no evidential support for an alternative term. Careful differential diagnosis is required to distinguish CAS from other persistent SSD which may have similar

presentation in some children, for example, speech motor delay (Shriberg & Wren, 2019) or submucous cleft palate (Murray et al., 2015).

As noted previously, a child could have more than one diagnostic label applied to their SSD. For example, SSD associated with cleft palate +/- cleft lip plus consistent phonological disorder or consistent phonological disorder plus articulation disorder. We would expect that SLTs will use the most appropriate and helpful term when talking to parents, often remaining at the SSD level.

Speech and language therapists

Discussion with two groups of UK SLTs working with children with SSD reflected current terminology usage in the clinical context and the sensitivity of clinicians to the well-being of their clients and their families. The three levels of terminology were accepted by the SLTs as useful in different contexts. Some thought that *SSD of unknown origin* was redundant or unnecessary as it does not add anything to our description of SSD. Whereas the conditions that are associated with SSD are helpful when talking to parents and colleagues, flagging the need for resources to commissioners and pointing towards intervention. However, for researchers, the two terms are still potentially useful. Throughout the discussions it became clear that the diagnostic categories were not necessarily discrete subgroups as proposed by Waring and Knight (2013), but were overlapping subgroups, as different types of SSD can co-occur.

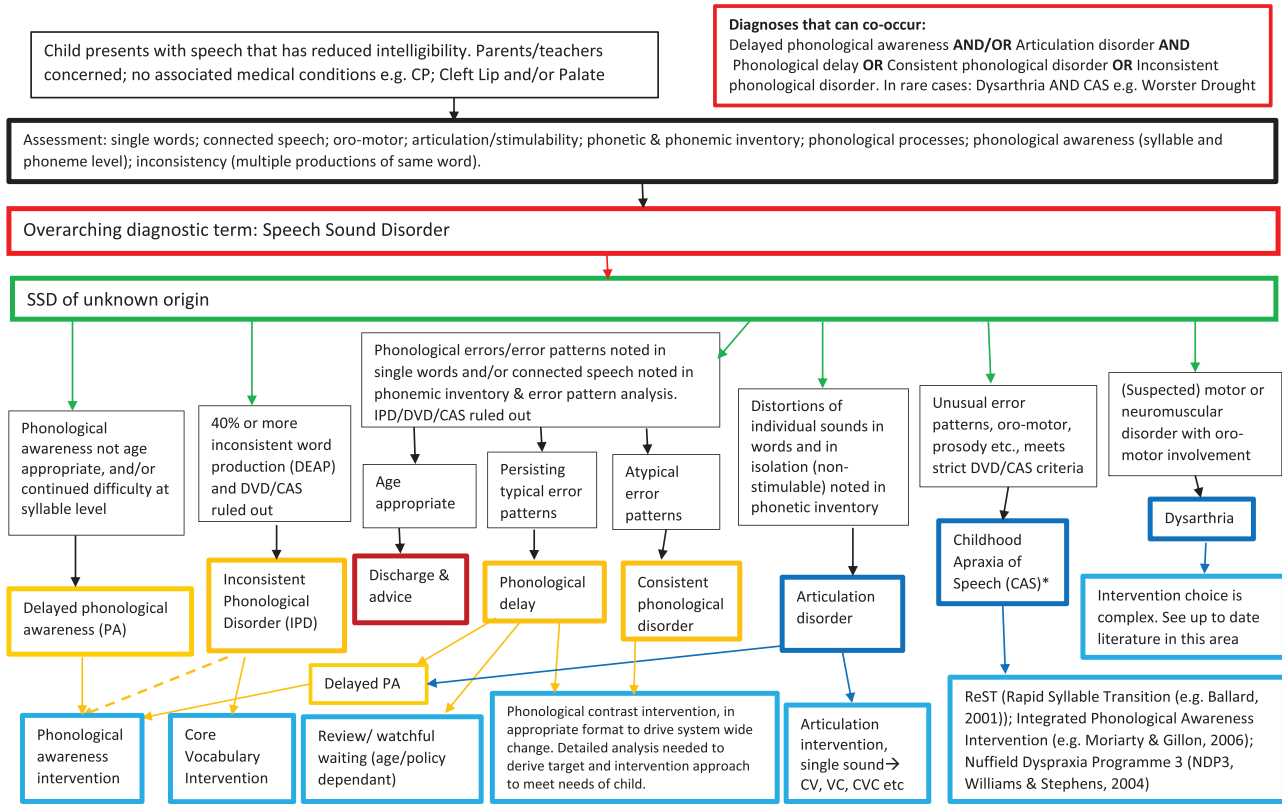


FIGURE 5 The decision-making tree for SSD v5.3 (Stringer, 2022). [Colour figure can be viewed at wileyonlinelibrary.com] Abbreviations: CAS, Childhood Apraxia of Speech; CP, Cerebral Palsy; CV, consonant-vowel; CVC, consonant-vowel-consonant; DEAP, Diagnostic Evaluation of Articulation and Phonology; DVD, Developmental Verbal Dyspraxia; SSD, speech sound disorder; VC, vowel-consonant.

Words such as *impairment*, *disorder*, *difficulty* were acceptable to some and not to others but in each case the audience for these terms was crucial. SLTs were anxious not to upset or alarm parents, while still impressing upon them the serious potential impact of their child’s speech production. They were clear that service commissioners should also be made aware of the potentially serious consequences of SSD, and therefore found *difficulty* and *delay* problematic in that context. When discussing clients with other SLTs the importance of precision and mutual understanding of terminology was highlighted.

The difference between *delay* and *disorder* in relation to phonological error patterns was an area where the majority of SLTs failed to agree with Dodd’s (2005) definition of phonological delay. There was strong opinion that *delay* implied that there would be continued normal speech development, albeit slower than is typical. This was seen as a barrier to providing intervention for these children, many of whom require SLT support to make timely progress. Although there is evidence that children with atypical phonological patterns have different outcomes than those with no atypical patterns (Waring et al., 2022), there is also

evidence indicating that intelligibility and stimulability are important predictors (To et al., 2022). Given this contradictory evidence, and the adverse consequences of SSD that persist into the school years, SLTs commented on the need for children with SSD to receive intervention before they start formal literacy education, whether they had typical or atypical phonological error patterns. In many parts of the United Kingdom, children go to school in the academic year in which their fifth birthday falls; consequently some children who have just had their fourth birthday will have literacy instruction (phonics). In a heterogeneous group such as children with SSD, the SLTs did not agree on one single age cutoff point or a critical number of developmental error patterns that would indicate *disorder* rather than *delay*. Instead, they suggested that this was a clinical judgement based on knowledge of the child, detailed assessment and response to intervention.

During discussions SLTs demonstrated a willingness to adopt new terminology into their clinical practice that was endorsed and recommended by their professional body, the Royal College of Speech and Language Therapists (RCSLT).

Co-occurring subtypes of SSD

Within the broad classification of SSD, the various subtypes can co-occur. This is not evident in the linear model in Figure 3. For example, it is possible for a child with SSD associated with (caused by) cleft palate to have co-occurring consistent phonological delay and phonological awareness disorders. CAS may co-occur with dysarthria. Phonological delay or disorder can co-occur with articulation disorder and phonological awareness difficulties. To show the extent of this overlap a Venn diagram was developed by members of the CSDRN (see Figure 4).

However, this is perhaps still not an entirely satisfactory picture of co-occurring disorders due to the complexity of some conditions. For example, paediatric dysarthria affects all speech systems, including respiration, phonation, resonance, articulation and prosody, some of which fall outside the scope of SSD yet contribute to overall intelligibility (Mei et al., 2020). In addition, co-occurring conditions may mask each other as demonstrated by Murray et al. (2015), indicating that SLTs should investigate more deeply and broadly when considering diagnosis for complex disorders. Lack of progress in intervention should perhaps be a red flag for more assessment and consideration of less common disorders.

Signposting treatment options

Waring and Knight's (2013) recommendation that terminology should improve clinical management by directing treatment differentiation broadly favours Dodd's (2005) terminology. The applicability of the terminology in countries where there are different funding and service delivery models (e.g., Dodd et al., 2006; Ttofari Eecen et al., 2019) supports this. DLD (phonology) is too broad a term here to fulfil that purpose. The following decision-making tree was developed to illustrate the path from assessment through diagnosis to choosing evidence-based intervention (Figure 5), incorporating the proposed three levels of terminology.

CONCLUSIONS

Terminology for speech disorders has evolved over time reflecting the development of researchers' and clinicians' knowledge and understanding. Several different terms are required to fulfil different functions and for appropriate use in different contexts. SLTs have clear requirements of terminology for SSD and indicated that there can be flexibility in terminology while it remains clear and specific. Endorsement by the RCSLT would support uptake

of any changes in defined terminology. Researchers in the field of SSD are recommended to align to the terminology that is used by clinicians to facilitate implementation of their findings into clinical practice. Comparison with the CATALISE terminology for SSD supports the view that DLD (phonology) has limited applicability in a clinical or research context (Bishop et al., 2017). The terminology presented by the CSDRN is broadly acceptable to UK SLTs but, as with any terminology, will likely be updated as our knowledge and understanding of SSD increases.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

PERMISSION TO REPRODUCE MATERIAL FROM OTHER SOURCES

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