Classification System	Category	Subdivision	Name and Code	Criteria	Differentially Diagnosed From
DSM-IV (TR)	Disorders usually first diagnosed in infancy, childhood or adolescence 1	Communication Disorders 1.4	Phonological Disorder 315.39	1. failure to use age and dialect appropriate speech sounds. Errors due to sound production or difficulties with representations, organization and use (i.e. articulation and phonological based disorders	1. general medical or sensory condition; 2. expressive language disorder (315.31) 3. mixed receptive-expressive disorder (315.32) 4. stuttering (307.0); & 5. communication disorder not otherwise specified (307.4)
ICD-10	Mental and behavioural disorders V	Disorders of psychological development F80-F89	Specific disorders of speech and language F80 Specific speech articulation disorder F80.0 Other developmen -tal disorders of speech and language – lisping F80.8	Child's speech is below expected for mental age whilst language skills are in the appropriate range	1. aphasia NOS R47.0 2. apraxia R48.2 3. hearing loss H90-H91 4. mental retardation F70-F79 5. with language developmental disorder +expressive F80.1 + receptive F80.2

Table 1. DSM-IV-TR and ICD-10 Categories and Codes for Childhood SSD

Speech Disorder Subtype	Cause	Percentage Occurrence
Disorders of vocalization (Dysphonia)	Chronic or recurrent laryngitis, over-use of the voice	3%-5% children referred to hospital clinics
Disorders of respiratory coordination (Dysrhythmia)	Defect in the accurate coordination of respiratory and articulatory mechanisms	3%-4%, with 1% persistent
Disorders of speech sound production with demonstrable dysfunction or structural abnormality of tongue, lips, and palate (Dysarthria)	Due to neurological abnormalities or local abnormalities (e.g. cerebral palsy)	Not reported
Disorders of speech sound production not attributable to dysfunction or structural abnormalities	'Mental defect' (intellectual disability), 'hearing defect' (hearing loss), true dysaphasia, psychiatric disorder, adverse environmental factors, combination of these	Not reported
Developmental speech disorder syndrome (specific developmental speech disorder)	Unknown, ?"auditory imperception"; *not* due to intelligence, home background, structure or function of oral mechanism	Not reported
Mixed speech disorders, comprising two or more of the above categories		Not reported

Table 2. T. Ingram's subgroups of speech disorders adapted from Ingram (1959) and Ingram (1972)

SSD Subype	Cause	Percentage Occurrence
Oral Structure Defect	Major and/or minor oral structure defects such as cleft lip and palate, jaw malocclusion, tongue malformation, missing teeth	Not reported
Sensory Deficit	Hearing loss	Not reported
Motor Speech Disorders – apraxia, dysarthria or both	Neurological deficit leading to difficulties with motor planning and/or motor execution	Not reported
Sound system disorder of unknown origin	?mislearning, linguistic-based	Largest subgroup

Table 3. Summary of Ruscello's Sound Systems Disorders Classification System

Typology	**Subgroup Etiology**	**Cause**	**Processes Affected**	**Percentage Occurrence**
Normal/Normalised Speech	-	-	-	-
Speech Delay	1. Genetic 2. Otitis Media with Effusion 3. Psychosocial	Polygenic/Environmental Polygenic/Environmental Polygenic/Environmental	Cognitive-linguistic Auditory-perceptual Psychosocial	56% M>F 30% M=F 12% M>F
Motor Speech Disorders	4. Apraxia 5. Dysarthria 6. Not Otherwise Specified	Monogenic? Oligogenic? Monogenic? Oligogenic? Monogenic? Oligogenic?	Issues with speech motor control	<1% M>>F ? ? ? ?
Speech Errors	7. /r/ 8. /s/	Environmental Environmental	Speech attunement	? M>F ? F>M

Table 4. Summary of Speech Disorders Classification System by typology and aetiology. Adapted from Shriberg (2010).

Subgroup	**Number of Proposed Markers**	**Major Diagnostic Pattern Features**
Speech Delay – Genetic (SD-GEN)	5	Predominately omission errors with few distortion errors Reduced language test scores Reduced performance on nonword repetition
Speech Delay- Otitis Media with Effusion (SD-OME)	10	Frequent middle ear infections; Backing of fricatives Initial consonant deletion Glottal stops Insertion of /h/
Speech Delay – Psychosocial (SD-PSI)	3	Reduced social skills test scores; Low percentage consonants correct-revised (PCCR) and percentage vowels correct – revised (PVCR) scores
Motor Speech Disorder – Apraxia of Speech (MSD-AOS)	10	Late talkers Vowel errors Inconsistent errors Inappropriate lexical stress
Motor Speech Disorder – Dysarthria (MSD-DYS)	10	Reduced DDK scores Slower speech rate Nasality Reduced vocal quality
Motor Speech Disorder – Not Otherwise Specified (MSD-NOS)	Not reported	Speech, prosody and voice behaviours that are consistent with motor speech impairment, i.e. reduced speech rate, imprecision of consonant, but are not specific for apraxia or dysarthria
Speech Errors - /s/ and /r/	Not reported	Lisping or lateralized /s/ /w/ for /r/ substitution

Table 5. Summary of proposed SDCS diagnostic markers by subgroup. Adapted in part from Shriberg (2010) and Shriberg et al (2010)

Category	Description
Persistent normal processes	Typical error patterns of younger children remain after an age when they should have disappeared
Chronological mismatch	Uneven speech development so that earlier patterns co-occur with characteristics of later speech development
Unusual processes	Use of rare or atypical error patterns
Systematic sound preferences	Overuse of one sound for a large range of target consonants
Variable use of processes	Multiple realizations for the same target consonant

Table 6. Grunwell's (1985) Categories of phonological disorders

Type	Description
Phonological Delay	Children show phonological patterns of younger, typically developing children, and have vocabularies consistent with phonological level.
Developmentally Distinct Phonology	Children have acquired relatively large vocabularies but express the words with patterns used in the very earliest stages of speech development
Socially Influenced Phonological Patterns	Children use uncommon phonological pattern due to an awareness of speech difficulties and try their own extreme measures to improve
Supralaryngeal Developmental Delays	Children with advanced development of the voice feature relative to place distinctions, e.g. a child develops /b/, /p/, /d/ before the more typical sequence /b/,/d/, /g/

Table 7. Summary of Ingram's (1997) descriptive linguistic typology of phonological impairment

Type	Subtype	Features	% Occurrence
Phonetic	Articulation Disorder	Substitutions or distortions of the same sound in isolation, words and sentences, during imitation, elicitation and spontaneous speech tasks	12.5%
Phonemic	Phonological Delay	Presence of usual phonological error patterns that are typical of younger children	57.5%
	Consistent Atypical Phonological Disorder	Consistent use of one or more unusual, non-developmental error patterns such as backing or initial consonant deletion. A child may also display some developmental error patterns that are delayed or age appropriate	20.6%
	Inconsistent Phonological Disorder	Variability/inconsistency in speech production, as indicated by multiple error forms for the same lexical item while having no oro-motor difficulties	9.4%
Motor Planning, Programming and Execution	Childhood Apraxia of Speech (CAS)	Multiple deficits involving phonological planning, phonetic programming and motor programming implementation	<1%

Table 8. Dodd's five subgroups.

	Reliability	Validity	Coverage	Feasibility	Future Requirements
Speech Disorders Classification System	High interjudge and intrajudge agreement reported for narrow phonetic transcription and prosody-voice coding which is used to describe and classify children with SSD (Shriberg et al. 2010b).	Atheoretical – starting from position of pathology rather than normality. Supporting evidence from Identification of diagnostic makers. *Evidence level* multiple quasi-experimental studies	Potentially overlapping groups; not all children can be classified into a single group	Currently research only tool; clinical feasibility unknown Clinical value dependent on future repercussions of genetic research on treatment of SSD.	Further evidence on exhaustiveness of classification system; matching of subgroups to intervention to determine if there is a differentiated treatment response would aid predictive validity of SDCS
Differential Diagnosis	Reliability improved with publication of standardised tests (DEAP); high test-retest reliability and inter-rater reliability on quantitative test measures reported in DEAP manual.	Theoretically driven. Supporting evidence from Classification by surface error patterns *Evidence level* Nonexperimental study Subgroup profiling profiles *Evidence level* Quasi-experimental studies Intervention studies *Evidence level* RCT; quasi experimental studies; case studies Cross-Language Studies *Evidence level* Nonexperimental study	All children can be diagnosed; possibility of overlap between groups (i.e articulation and consistent atypical phonological disorder; & articulation and phonological delay)	Specific standardised test (DEAP) which guides assessment and differential diagnosis process; test widely available to clinicians' in Western countries	Replicated studies, conducted by different research groups, using larger sample sizes

Psycho-linguistic Framework	Reduced reliability due to potential variations in diagnosis between clinicians and variations in assessment tasks administered	Theoretically driven. Supporting evidence from: Specific deficits and profile studies *Evidence level:* Quasi-experimental studies; case studies Intervention studies *Evidence level:* Quasi experimental studies; nonexperimental studies; expert committee report/clinical experience of respected authorities	Inclusive – all children can be profiled for strengths and weaknesses ; differentiates between typically developing and children with SSD; each child regarded as unique.	Specific tasks published (some with normative data) to match framework	Further empirical evidence from single case treatment design rather than case studies to provide stronger predictive validity

Levels of evidence as utilized in Williams, McLeod and McCauley (2010)

Table 9. A summary of evidence for the three classification systems