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Speech disorder: articulation and phonological disorders

What are speech disorders?

Speech disorders are any problem with the sounds produced which affects a child or young person's ability to make themselves understood. This is known as intelligibility.

A child with speech problems may have difficulty physically producing sounds or, more typically, can say the sounds on their own but has not learnt to use the sounds in the correct place in words. Sometimes both types of difficulty can be present. Although many parents and carers, educators and health professionals think that a physical problem is the cause of speech sound difficulties, it is often more likely that the child has **phonological** difficulties.

Articulation

Articulation is the physical production of speech sounds from the vocal tract. This involves pushing air out from the lungs, through the larynx (voice box) and then shaping, squeezing or blocking the air using the articulators. The larynx houses the vocal folds (or vocal chords) which can stay open for 'quiet' (voiceless) sounds such as 'p' and 's' or make a buzz for 'loud' (voiced) sounds such as 'ah', 'm' and 'z'. Air can pass through the mouth (for sounds such as 's') or the nose (for sounds such as 'n'). Vowels are made by changing the shape of the mouth using the lower jaw (mandible), tongue and changing the shape of the lips. The articulators for standard English include:

- **Lips** for sounds 'p', 'b' and 'm'

- **Lip and teeth together** for the sounds 'f' and 'v'

- **Teeth and tongue together** for the sounds 'th' (as in '**th**in') and 'th' (as in '**th**ese')

- **Alveolar ridge** (the shelf of bony gum behind the top teeth) for the sounds 't', 'd', 's', 'z', 'r' and 'n'

- **Post alveolar** (just behind the bony ridge) for the sounds 'sh' and 'zh' (as in 'trea**s**ure')

- **Velum** or soft palate for the sounds 'k', 'g' and 'ng' (as in 'lu**ng**')

Causes of articulation disorder

If any part of the vocal tract is missing, damaged or affected by difficulties of muscle coordination or strength and movement then an articulation problem may occur. Children may also try to produce a sound and mispronounce a sound, using a sound that is close to the target sound. When the sound is 'distorted' and the sound used does not change the meaning of the word, then this is an articulation disorder. If the child substitutes a sound which is another English sound which might change the meaning of the word, then this is a phonological error (see below). Difficulties which cause or contribute to articulation disorders include:

- **Open bite**. When the teeth do not meet creating a gap between the upper and lower teeth. This allows the tongue to poke through. This is often caused by excessive dummy use or dummy use after the age of twelve months.

- **Missing teeth**. If a child has lost teeth through natural growth or dental caries this may affect the quality of sounds, especially those using the teeth such as 'f', 'v', 'th' (as in '**th**in') and 'th' (as in '**th**ese').

- **Cleft lip and / or palate**. During development before birth the lips, alveolar ridge, hard palate and soft palate grow together from two separate

arches. If they do not meet and fuse correctly they may leave a gap or 'cleft'. This allows air to move from the mouth to the nose. This requires surgery shortly after birth and intensive speech and language therapy in many cases**.**

- **Tongue tie**. Surprisingly a tight lingual frenulum (tongue tie) is rarely a cause of speech problems. If the baby has difficulty feeding then it should be treated. For most children, it causes a heart-shaped tongue on protrusion but does not affect speech. A speech and language therapist should examine a child prior to considering surgery. **Surgery is rarely successful in resolving speech errors** as most speech errors are phonological and not related to the tongue tie at all.

Phonology

Sound production is linked to the meaning of words. A phoneme is a sound which contrasts with other sounds to carry meaning in a sound system for a particular language. In English for example, if you change the first sound of '**p**in' by making it a loud (voiced) sound, it becomes '**b**in'. 'pin/bin' is a **minimal pair**, a pair of words which differ in meaning by only one small sound change.

Children start with a simple sound system and gradually add more contrast as they hear more words and language. This allows them to say different words to express many different meanings. This process develops with time as long as the child hears enough spoken language.

Typically developing children simplify speech according to expected error patterns. This is not conscious and children are not being 'lazy'. Children do not yet know when to use sounds in a particular way. As they develop, children begin to add more sounds to their speech and the error pattern is removed. The ages when most children achieve this for each error pattern is listed below.

Phonological disorders

The vast majority of children experiencing speech sound disorder are experiencing a form of phonological disorder. There are three sub-categories of phonological disorder, which are described below. Children with phonological difficulties may be at a higher risk of literacy difficulties.

Phonological delay

If a child's speech still contains an error pattern after the age when more than 90% of typically developing children have stopped using that error pattern, then the child's speech is said to indicate **phonological delay**. This can only be said for error patterns observed in younger children's speech. See the table, below.

Consistent phonological disorder

If a child uses an error pattern (phonological process) which is **not** found in the speech of typically developing children then this is termed **phonological disorder**. If the child makes the same error every time s/he says a word this is termed **consistent phonological disorder**.

Inconsistent phonological disorder

If a child says words differently each time s/he attempts it for a large percentage of their word productions then this is termed **inconsistent phonological disorder**. The child in effect has no phonological system or rules to link meaning to the sound system. This can only be diagnosed if the child is observed saying the same words on two or more occasions and so careful assessment is vital for accurate diagnosis.

Assessment of speech sound disorder

A speech and language therapist will listen to your child speaking and write down their attempts using a special form of notation called **phonetic transcription**. Typically they will ask your child to name a set of pictures in order to hear single words and spoken sentences. They will then write your child's attempt down using the **International Phonetic Alphabet** (IPA). Unlike English, this system uses one symbol for each sound and allows therapists to read exactly how your child said the word. Please note that your child may be able to say a sound on its own, but not within a word. The ability to articulate a single sound is called **stimulability**.

It is important that the speech and language therapist looks at your child while they speak to see their articulators moving. They should also carry out a **speech systems examination** where they look inside your child's mouth to check all the structures. On rare occasions, a referral to the Ear, Nose and Throat (ENT) Specialist may be required.

The speech and language therapist should listen to your child saying the same words more than once. This is essential to the diagnosis of inconsistent speech disorder.

Therapy for speech sound disorder

Children who require therapy for speech sound disorder will typically be referred to Audiology for a hearing check. This is to ensure that your child can

hear a full range of sounds as listening to sounds and words is often a key element of therapy.

Articulation therapy consists of showing your child where to place their articulators and producing the correct sound many times in 'drill' work. This might involve looking in a mirror, imitating the therapist and checking the articulation with a child-friendly drawing of how the sound is made. This can be dull work and the speech and language therapist may recommend games to motivate your child. The therapist may recommend waiting until your child is older or more able to identify the articulation error in their own speech prior to commencing therapy.

Therapy for delayed phonology should involve showing your child that their errors change the meaning of the word they are saying. There are a wide range of techniques and programmes based on research evidence (see Bowen, 2015 and Brumbaugh and Bosma Smit, 2013 for a full discussion).

The core vocabulary approach has been shown to be effective for children presenting with **inconsistent phonological disorder** (McIntosh and Dodd, 2008), where articulation and phonological contrast approaches have not been effective.

Therapy may involve listening to words and developing **phonological awareness skills**, which are thought to help the child to analyse words. Tasks involve breaking words into smaller units, from syllables, to individual sounds (segmentation), or comparing words by alliteration awareness (words that start with the same first sound), and rhyme awareness (same word ending).

Therapy techniques and programmes are being developed and improved so your child's therapy may differ from that described.

Bilingual children and speech disorders

Articulation errors are present in both/all languages a child speaks and so therapy in one language (English) will not resolve errors in the child's home language. As phonological errors are caused by errors mapping meaning onto the sound system, and bilingual children have separate lexicons then phonological therapy in one language (English) will not generalise to the child's home language. Assessment and therapy must therefore be carried out in both/all of the child's languages in order to be effective (Stow, 2006).

References

Brumbaugh K and Smit A (2013) Treating Children Ages 3-6 Who Have Speech Sound Disorder: A Survey. *Language, Speech & Hearing Services in Schools (Online)* 44(3), 306-319

Bowen C (2014) *Children's Speech Sound Disorders*. Chichester: John Wiley & Sons, Ltd

Dodd B Holm A and Crosbie S (2003) Phonological development: a normative study of British English-speaking children. *Clinical Linguistics and Phonology*. **17,** 617-643

McIntosh B and Dodd B (2009) Evaluation of Core Vocabulary Intervention for Treatment of Inconsistent Phonological Disorder: Three Treatment Case Studies. *Child Language Teaching and Therapy 25*(1), 9-29. doi:10.1177/0265659008100811

Stow C (2006) *The identification of speech disorders in Pakistani heritage children.* (Doctor of Philosophy), University of Newcastle, Newcastle upon Tyne. Retrieved from: http://hdl.handle.net/10443/1588

Please note: Afasic does not hold copies of any referenced material. These publications should be available at academic libraries.

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Phonological error patterns observed in the speech of typically developing children

Error pattern Phonological processor	Description and examples	Age when more than 90% of children stop using this error pattern – Children older than this who still have this error pattern have speech with phonological delay (age span)
Voicing	Using a loud sound (voiced) for a quiet sound (voiceless), e.g. "b" for 'p' saying 'bee' for 'pea'	**Less than 3 years old** (2;0-2;11)
Stopping	Using a short sound (plosive) instead of a long sound (fricative), e.g. "t" for 's' saying "tea" for 'sea'	**3 years 6 months** (2;0-3;5)
Weak syllable deletion	Missing off a quiet part of a word, e.g. saying "mato" for 'to**mato**'	**4 years 0 months** (2;0-3;11)
Fronting velar plosives	Saying a sound at the 'front' of the mouth (at the alveolar ridge) instead of the 'back' of the mouth (velum) i.e. "t" for 'k'/'c' and "d" for 'g' e.g. "**t**ar" for '**c**ar'; "**d**irl" for '**g**irl'	**3 years 11 months** (2;0-3;11)
Fronting of velar nasal	Saying "n" for 'ng' e.g. "fishi**n**" for 'fishi**ng**' (Note that this could also be attributed to accent/dialect)	**5 years**
Cluster reduction	For words which start with two or three consonants before the vowel, e.g. "**p**ider" for '**sp**ider' e.g. "**st**ing" for '**str**ing'	**4 years for two consonant clusters** **5 years for three consonant clusters** (2;0-4;11)
De-affrication	Affricates are sounds consisting of one short and one long sound made smoothly together, i.e. 'ch' and 'j' / 'dg' e.g. "**t**ips" for '**ch**ips' e.g. "**d**acket" for '**j**acket'	**5 years** (2;0-4;11)
Gliding	Saying "w" or "y" instead of 'l' or 'r' e.g. "**w**abbit" for '**r**abbit' e.g. "**y**am" for '**l**amb'	**6 years** (2;0-5;11)
Final consonant deletion	Missing off the last sound in a word, e.g. "we" for 'we**b**'	**2;0** (-2;0)

After Dodd *et al.* 2003: 634

N.B. If an error pattern occurs it may affect a sound at any place within a word, not just at the beginning of the word as shown in these examples.