Translational Centre for Speech Disorders
Centre of Research Excellence
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THE UNIVERSITY OF MELBOURNE

CHILDHOOD APRAXIA OF SPEECH (CAS)

What is CAS?

Childhood Apraxia of Speech (also called CAS) is a motor speech disorder that makes it difficult for people to speak. It is detectable in early childhood but can continue into adulthood.

- CAS has also been known as Developmental Verbal Dyspraxia, Apraxia of Speech, or Verbal Dyspraxia.
- People with CAS have difficulty in saying sounds, syllables, and words accurately and with the correct rhythm
- Although a person with CAS knows what they want to say, their brain has difficulty controlling the movements of the lips, jaw, and tongue to speak clearly

We don't know exactly how many children have CAS but we know it is rare. Only 1-2 children per 1000 enrolled in speech therapy are estimated to have it.

Speaking

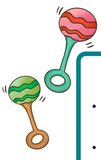
Learning to speak is like learning to perform any skilled movement. Just like playing the piano, you must first concentrate on each step. Then, with practice, this process becomes automatic.

Most children reach this automatic stage easily, but children with CAS must continually re-learn how to produce words by asking:

- Which sounds do I need?
- What order do the sounds come in?
- How do I move my lips, tongue, etc. to make those sounds?
- Which sounds or words do I stress?

Children with CAS can become frustrated when they cannot communicate clearly. Families may also find it hard to understand why speech feels so difficult for their child when it seems easy for others

What are the signs of CAS?



There are many different signs of CAS; they vary between children and change as a child gets older, or as the severity of the condition changes.

Young children with CAS may:

- use a limited range of sounds when they do begin to talk,
- find it easier to understand others than talk themselves,
- visibly struggle to talk; groping or searching for sounds
- be very hard to understand, even to family members

Older children with CAS may:

- struggle with longer words or phrases,
- drop, add, or replace sounds in words (e.g., say 'copa' for 'helicopter' OR 'umbama' for 'umbrella')
- say the same word differently each time (e.g., say 'caterpila', 'catiperla', 'cratapila' for 'caterpillar')
- stress the wrong part of a word or sentence, making their speech sound 'robotic' or 'accented'

- Children with CAS are more likely to have **language and literacy** (reading, spelling) difficulties, or other **neurodevelopmental conditions** such as autism, attention deficit hyperactivity disorder (ADHD), and learning difficulties.

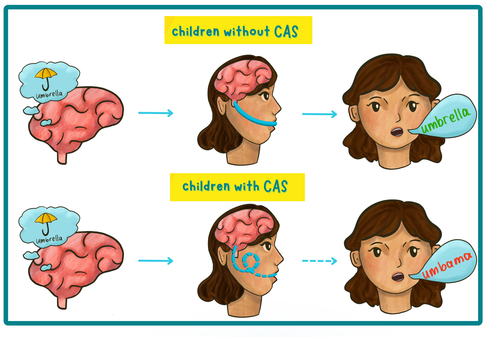
- Some children with CAS will also have difficulty with small muscle movements called **fine motor skills** (e.g., handwriting, cutting) or large muscle movements called **gross motor skills** (e.g., running), or some may have a diagnosis of **motor dyspraxia** or **developmental co-ordination disorder (DCD)**.

- Some children with CAS may also have **dysarthria**
  - Both dysarthria and apraxia are motor speech disorders. While apraxia affects the brain's ability to plan and program the movements for speech, dysarthria affects the brain's ability to control the articulator's (lips, tongue, etc.) ability to produce speech movements.

What causes CAS?

Unfortunately, we often do not know what causes CAS.
We know something interferes with messages getting from the brain to the mouth muscles.

- CAS may be caused by genetic changes. Some changes we can identify, but others are unknown. There have been over 50 single genes linked to CAS (e.g., FOXP2-related speech and language disorder; CDK13-related disorder; SETBP1-haploinsufficiency disorder).
- Chromosomal disruptions involving more than one gene can also be associated with CAS (e.g., 16p11.2 deletion; Koolen-de Vries syndrome). Children with these conditions often have other health, development, or cognitive difficulties.



How is CAS diagnosed?

- It is important to see a **speech pathologist (SP)** (also known as a speech-language pathologist (SLP) or speech therapist) to diagnose CAS. This is because CAS is a complex condition with a number of signs and associated conditions, and SPs are specially trained to recognise them.
- In Australia, a GP, teacher, or other health professional may refer you to an SP, who will carry out several 'talking tests'.
- Speech and language in toddlers naturally varies a lot.

Before age 2-3, children with other conditions may share some early signs of CAS (e.g., slow to talk, few first words). This does not mean they all have CAS.

CAS is rare, so if your SP is unsure about your child's diagnosis, it is best to see an SP with experience diagnosing CAS.

How is CAS treated?

- Early therapy with an SP can improve your child's ability to communicate and reduce frustration.
- Like with any skilled movement, practice or therapy works best when it happens several times a week. Some children overcome CAS with therapy. For others, their communication improves but talking still requires extra concentration or causes tiredness.
- The type of therapy will depend on your child's symptoms, age, severity of their condition, and any other health or development needs. **Current treatments include**:
  - Rapid Syllable Transition Treatment (ReST)
  - Dynamic Temporal and Tactile Cueing (DTTC)
  - Nuffield Dyspraxia Program (NDP3)
  - Prompts for Restructuring Oral Muscular Phonetic Targets (PROMPT)
- You should ask your SP about how effective these programs (or the ones they are recommending) will be for your child, given their age and symptoms.
- Therapy may also include activities designed to strengthen language and skills, as children with CAS have a greater risk of difficulties in these areas

- Children who are experiencing great difficulty with speech may benefit from augmentative or alternative communication (AAC), such as sign language or communication devices
- Many parents are concerned that the use of AAC may reduce their child's speech and language development. However, evidence suggests that providing children with other communication options can reduce frustration and encourage language and speech learning.
- For example, being able to produce sentences with a digital device is very powerful for a child who has difficulty producing one-syllable words, and helps support learning of sentence structure and grammar.
- Depending on your child's needs, they may also benefit from seeing:
  - **A psychologist or counsellor** — if they are struggling at school with learning or relationships
  - **An occupational therapist or physiotherapist** — if they have fine or gross motor challenges
  - **A neuropsychologist** — if they have difficulty with attention, memory, or other cognitive areas

CAS is a difficulty with planning movements for speech. There is no strong evidence to support the use of non-speech oral motor exercises alone (e.g., pursing, blowing, lip massage, etc.) as an effective treatment for speech sound disorders.

Things to remember:

- Children with CAS have difficulty sending the correct signals from the brain to their mouth, making it hard to speak clearly and be understood.
- Genetic causes are increasingly being identified for CAS (*see: https://www.geneticsofspeech.org.au*)
- Ask your GP whether genetic testing may be relevant for your child. If your child has co-occurring global developmental delay or an intellectual disability, they may be eligible for Medicare-funded testing.
- It is beneficial to seek help early and get the right treatment and support for your child's symptoms and age

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