Cued Speech

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Reading and Reading-Related Skills in Children Using Cochlear Implants: Prospects for the Influence of Cued Speech

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Abstract

We assessed the reading and reading-related skills (phonemic awareness and phonological short-term memory) of deaf children fitted with cochlear implants (CI), either exposed to Cued Speech early (before 2 years old) (CS1) or never (CS–). Their performance was compared to that of 2 hearing control groups, 1 matched for reading level (RL), and 1 matched for chronological age (CA). Phonemic awareness and phonological short-term memory were assessed respectively through a phonemic similarity judgment task and through a word span task measuring phonological similarity effects. To assess the use of sublexical and lexical reading procedures, children read pseudowords and irregular words aloud. Results showed that Cued Speech improved performance on both the phonemic awareness and the reading tasks but not on the phonological short-term memory task. In phonemic awareness and reading, CS1 children obtained accuracy and rapidity scores similar to CA controls, whereas CS– children obtained lower scores than hearing controls. Nevertheless, in phonological short-term memory task, the phonological similarity effect of both CI groups was similar. Overall, these results support the use of Cued Speech to improve phonemic awareness and reading skills in CI children.

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Health & care information you can trust
The Information Standard — Certified Member

CSAUK is a national charity run by users of Cued Speech (both professionals and parents).
CSAUK - 2015 - a3 cochlear in more depth
Designed March 2015. Reviewed September 2015. Next review June 2016.

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Also see our leaflet 'Cued Speech with cochlear implantation - At a glance'

"Cued Speech (CS) turns languages of sound like English (or any other spoken language) into a language as fully visible as British Sign Language (BSL); this enables deaf babies and children to visually and naturally pick up a language they cannot hear."

Cued Speech and its benefits

Cued Speech (CS) uses eight handshapes in four positions near the mouth to clarify the lip patterns of normal speech.

You cue as you speak to totally clarify lip-reading.

CS IS English - but visual English rather than spoken English. Its use enables deaf babies and children to acquire a complete understanding of full spoken language.

Ruth Campbell, Ph.D. (*Professor Emeritus, Department of Cognitive, Perceptual and Brain Sciences Division of Psychology and Language Sciences University College London) writes in her* Foreword to the book, **Cued Speech and Cued Language for Deaf and Hard of Hearing Children** (edited by Carol J. LaSasso, Kelly Lamar Crain and Jacqueline Leybaert):

"Because Cued Speech makes speech segments (phonemes) visible and discrete, it can be of special use in the earliest stages of reading (e.g. decoding) which require the child to develop automated abilities in isolating and identifying speech segments and mapping them to letter forms. This is where the deaf child who does not have access to the full phonological structure of the spoken language faces a significant and fundamental hurdle. Does the privileged access to the segmental structure of speech afforded by Cued Speech help the deaf child to clear this obstacle to fluent reading and spelling? This was Cornett's goal, and that goal has been supported empirically by the work that Alegria and Leybaert, with collegues led by Périer, started in Belgium 20 years ago. That body of work, with French speakers, has shown conclusively that children exposed consistently to Cued Speech gained and maintained a headstart over deaf children of similar intelligence and skill who did not have Cued Speech. Those who started using Cued Speech before school were even more likely to forge ahead, often with literacy levels and styles indistinguishable from hearing children.

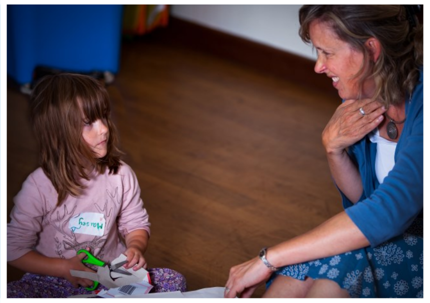
'The importance of Cued Speech is that it opens up the world of spoken language to the deaf child in a clear and simple way, from the outset. This has, as Cornett envisioned, the potential to allow a form of the traditionally spoken language to develop naturally in a deaf child, via a communication modality that the child and the child's caregiver can use easily, fluently, and collaboratively."

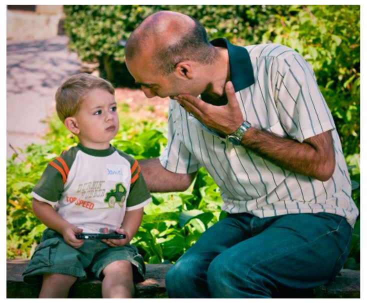
Because CS is a visual version of English it is uniquely beneficial for deaf children both pre- and post-cochlear implant.

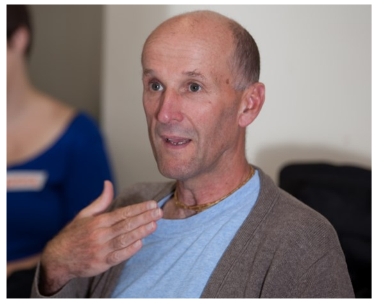
How does CS work?

Put simply, when sounds look the same on the lips (as they are spoken) an accompanying handshape or position will make each lip-pattern look different. For example the sounds /p/ /b/ and /m/ sound quite different to hearing people, but they are indistinguishable by watching the lips. So people who rely on lip-reading alone have no way of distinguishing words such as 'baby' and 'maybe' or 'pay', 'bay' and 'may'. When you use CS each consonant sound has a different accompanying handshape so each sound now looks quite different. Vowel sounds are clarified by positions.

When people speak they join sounds to make words. Similarly, with Cued Speech the handshapes and positions are joined to clarify a word. CS sounds complicated but in practice it's quite easy; there are only 8 handshapes and 4 positions in total. Cued Speech was devised by Orin Cornett in 1966.







Research - Cued Speech for Enhancing Speech Perception and First Language Development of Children With Cochlear Implants (excerpts)

Jacqueline Leybaert, PhD Professor of Psychology, Laboratoire Cognition, Langage, et Développement (LCLD), Université Libre de Bruxelles (U.L.B.), Belgium **and Carol J. LaSasso, PhD** Professor, Department of Hearing, Speech and Language Sciences, Gallaudet University, Washington D.C.

Abstract

Nearly 300 million people worldwide have moderate to profound hearing loss. Hearing impairment, if not adequately managed, has strong socioeconomic and affective impact on individuals.

Cochlear implants have become the most effective vehicle for helping profoundly deaf children and adults to understand spoken language, to be sensitive to environmental sounds, and, to some extent, to listen to music. The auditory information delivered by the cochlear implant remains non-optimal for speech perception because it delivers a spectrally degraded signal and lacks some of the fine temporal acoustic structure.

In this article, we discuss research revealing the multimodal nature of speech perception in normally-hearing individuals, with important inter-subject variability in the weighting of auditory or visual information. We also discuss how audio-visual training, via Cued Speech, can improve speech perception in cochlear implantees, particularly in noisy contexts.

Cued Speech is a system that makes use of visual information from speechreading combined with hand shapes positioned in different places around the face in order to deliver completely unambiguous information about the syllables and the phonemes of spoken language. We support our view that exposure to Cued Speech before or after the implantation could be important in the aural rehabilitation process of cochlear implantees. We describe five lines of research that are converging to support the view that Cued Speech can enhance speech perception in individuals with cochlear implants.

Concluding Remarks (edited)

Cochlear implants have limitations both in the peripheral signal and in the time course of plasticity. Despite this limitation, the fact that most children can develop language with the cochlear implant suggests that the implant signal does not impose absolute limitations on the development of speech and language. A considerable degree of brain plasticity exists. The incredible capacity of the brain to use the sensory input at its disposal, including *multisensory* input, can be enhanced further to expand the benefits of cochlear implants for individuals who are deaf. In this process, Cued Speech still plays an important role.

Data collected over the past 30 years have demonstrated that the use of Cued Speech can be a powerful tool for language development and subsequent formal reading achievement by profoundly deaf children without a cochlear implant. Cued Speech enhances speech perception through the visual modality, the acquisition of vocabulary and morphosyntax, and metalinguistic development, as well as the acquisition of reading and spelling (see Leybaert & Alegria, 2003; Leybaert, Colin, & LaSasso, 2010).

The processing of cued information activates in profoundly deaf early cuers some brain areas common with those activated by the processing of spoken language. In an fMRI* experiment on adults who were early cuers (Aparicio, Charlier, Peigneux, & Leybaert, in press), preliminary findings indicate that the identification of words presented in Cued Speech activates the bilateral superior temporal gyrus and the left inferior frontal gyrus in deaf subjects who are early cuers (these areas are also activated by words presented audiovisually in normally hearing participants listening to words delivered auditorily, Hickok & Poeppel, 2000). If confirmed by data with a larger number of cueing participants, these data would indicate that the superior temporal gyrus constitutes an area of processing oral language, regardless of the modality (visual vs. spoken) in which the language is delivered. Further research is needed to establish whether this area also constitutes a site of convergence of auditory, visual (speechreading), and visuomotor (manual cues) information for deaf cuers who are fitted with a cochlear implant.

*fMRI, or functional magnetic resonance imaging, looks at blood flow in the brain to detect areas of activity.

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Prior exposure to Cued Speech, prior to cochlear implantation, also seems to prevent the loss of cerebral plasticity due to late implantation. The fact that children fitted with a cochlear implant, even after 8 years of age, are able to develop oral language abilities (both receptive and expressive) post-implantation, has potential implications regarding the age limit and content of the “critical period” for language development.

The data for the late-implantees in the Kos et al. (2008) study suggest that there is no absolute age limit regarding auditory stimulation: **even if auditory stimulation occurs “late”, good results can be obtained provided that the auditory cortices have already been “prepared” to process the information about the phonological contrasts of oral languages.**

What seems important is not the fact that deaf children in the Kos et al. study could *hear* during their first years of life, but that they could get complete, effortless, unambiguous *access* from an early age *to a set of clear, complete phonological contrasts used in their particular language*, regardless of the modality (visual vs. auditory) through which these contrasts are delivered. In our view, exposure to a visual language (for example, cued English or another cued language) instigates a process for which infants’ brains are neurally prepared, during which the brain’s networks commit themselves to the basic detection and recognition of phonological patterns in the native language. It is important that this brain activity related to the processing of visual communicative signals or auditory communicative signals occurs early in life. Experiencing a cued language early in a child’s development will have long-lasting effects on the child’s ability to learn that language auditorily later, when they receive the cochlear implant.

Early and intensive use of Cued Speech prior to implantation is likely to become increasingly rare because most children are now fitted with a cochlear implant around the age of 1 year. Audiologists and other related service providers for deaf pediatric populations need to remember that during the first months or years of cochlear implant use, speech perception of an implanted child remains imperfect. Oral comprehension does not develop exclusively by the auditory channel but necessitates audiovisual integration.

A strong case can be made for the addition of Cued Speech to the signal delivered by the cochlear implant in order to help deaf children overcome present limitations of cochlear implants. It is clear that perception of place of articulation, and speech perception in noisy environment can be enhanced by adding the manual cues to the audiovisual message; and, as a consequence, children with a cochlear implant can benefit from Cued Speech experience for the development of precise phonological representations through audition *(Descourtieux et al., 1999).* These phonological representations can then serve as a platform to launch subsequent development of morphosyntax *(Le Normand, 2003; Le Normand et al., in press; Moreno-Torres &Torres-Monreal, 2008, 2010),* phonological awareness, phonological short-term memory *(Willems & Leybaert, 2009),* reading and spelling (see *Bouton, Bertoncini, Leuwers, Serniclaes, & Colé,* in press; *Leybaert, Bravard, Sudre, & Cochard, 2009*, for a description of the effect of the combination of Cued Speech and cochlear implants on reading acquisition).

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This research has been re-formatted for ease of reading.