

The use of Cued Speech and Synthetic Phonics to support literacy skills at Exeter Royal Academy for Deaf Education (ERADE)

Report by: Cate Calder, Cued Speech tutor; Gill Banham, Speech and Language Therapist (both of ERADE); including excerpts (in italics) from research 'Can Limited and Late Exposure to Cued Speech Impact the English Skills of Signing deaf Pupils?' by Laura Hayley Jayne Gratton and with additional input from Anne Worsfold, Executive Director of the Cued Speech Association UK (CSAUK).

Introduction

The use of Cued Speech at the newly named Exeter Royal Academy for Deaf Education (ERADE), formerly the Royal West of England School for the Deaf, continues to grow with innovative work by Cate Calder and Academy staff.

Policy at the Academy is to aim for excellence in both English and British Sign Language. To support the English access within this bi-lingual vision, 16 of their 38 students are currently using Cued Speech with adapted 'Synthetic Phonics' materials as part of their literacy learning.

This report will look at signing deaf children's access to literacy through the use of Cued Speech and Synthetic Phonics.

Background to general use of Cued Speech

Cued Speech was devised to give access to full complete spoken language as it is spoken. With early and consistent use, preferably at home, deaf children can understand and use English, reach language milestones at the same time as hearing peers and have age-appropriate literacy. Unlike most deaf children, those with access to Cued Speech from an early age are just as able to benefit from the synthetic phonics approach as hearing children.

However Cued Speech can also be used as a tool for focusing on developing specific language skills such as literacy or speech production.

Deaf children who have an understanding of English through exposure to Cued Speech *from an early age at home* differ from those older children who come to Cued Speech *later through school*.

The following describes some typical groups of deaf children – whose educational needs are different one from another:

1. Children who have early and consistent access to English through Cued Speech at home: This group, who have access to Cued Speech prior to learning to read, are in the most advantageous position. There are a number of pieces of international research and many case studies which show that children who have had early and consistent access to Cued Speech can understand sound-based language and acquire it at the same rate as hearing children.

International research also demonstrates that children with prior access to Cued Speech have reading ages which equal those of their hearing peers. These children are using their previous knowledge of sound-based language (but accessed visually through Cued Speech) to learn to read using the same techniques as hearing children.

2. Children who have some understanding of English and then access Cued Speech later through school: A second group of children are those who do not have access to Cued Speech before school but have some understanding of English.

Case studies demonstrate that for these children Cued Speech can quickly disambiguate both spoken and written language.

3. Children who have limited or very limited understanding of English and then access Cued Speech later through school: This third group are predominantly sign language using students with little prior knowledge or understanding of English, either written or spoken. These students find direct access to English and in particular access to phonics very hard as sign language does not represent the sounds of speech.

These different groups of students must be taught in different ways.

This report looks at pioneering work with the third group described above; primarily sign language users with limited understanding of English, either written or spoken.

The introduction of Cued English to ERADE

Pilot year Sept 2006 to July 2007

Terminology - Cued Speech or cued English?

Cued Speech is the name of the system that visually clarifies spoken English for deaf babies, children and adults. Its primary aim is to make English accessible at the level of *fluent language*. Cued English is the term for Cued Speech used with the English language (just as cued French means Cued Speech used with the French language). To underline the importance of English and to take away any expectation that the students themselves must *speak* when they use Cued Speech (which staff expected would be strongly resisted by the students), the term cued English was used in the school.

Selection of students

Throughout the school the students have widely varying degrees of language ability in sign language and English. All use SSE (Sign Supported English) to some degree and some have lessons to work on their BSL skills.

The main aim of this first year was to see if it was possible for selected students to grasp the system of Cued Speech and to see if it would benefit their phonemic awareness.

The students were selected by Speech and Language Therapists and teachers and were:

- those with cochlear implants or who were already showing some ability with English
- those who staff felt would benefit from measures to improve their lip-reading skills
- all the students of primary age.

Cued Speech was originally devised to address the problem of giving deaf children access to fluent 'spoken' language ideally from as early an age as possible. It is most commonly used by families with young deaf children together with spoken language, as a tool to unlock spoken language. At ERADE however, cued English was used as a tool to access literacy learning and not for general communication. It was necessary therefore to create a new approach to accessing English with cued English to match the needs of the students at the Academy.

Primary age students – introducing Cued Speech

The idea of working with English through cueing was introduced to the primary age students by the CSAUK tutor using the metaphor of 'making a cake'. Three bowls were filled with different 'ingredients'. The first bowl was the actual cake bowl and had ingredients that go into a real cake like sugar, butter, flour and eggs; the second bowl was the 'sign language bowl' and had ingredients that the children thought sign language was 'made of' for example, hand-shapes, facial expression and lip patterns (all drawn on paper); the third bowl was the English bowl and the children put in letters (fingerspelling) and mouths with 'sounds coming out'.

The children watched the tutor modelling either BSL or spoken English and they pointed to the appropriate bowl. This was done to begin to separate out in their own minds sign language from English as they usually saw the two 'mixed together' as Sign Supported English. They quickly saw the difference and were easily able to say which was being used.

Then the English bowl of ingredients was looked at again and the 'new way' of 'seeing' English was introduced. Everything except the BSL handshapes in the signing bowl was now added to the English bowl and finally the eight handshapes used in Cued Speech were put in.

This showed them that all the visual 'markers' they were used to from sign language would still be there for them but the hands would be used in a different way.

Three 'language' bowls were now offered to them - BSL, spoken English *without* cues and spoken English *with* cues. As each was modelled they again quickly saw the difference and pointed to the appropriate bowl. The children were asked if they would like to try the new 'cake' of spoken English with cues by indicating the new 'cake'. All agreed to try.

Primary age students – learning to cue

Primary age students were seen as a whole group twice a week, one session was led by the CSAUK tutor with the class teacher and a SLT present. The work covered in this session was then further expanded by the SLT in the second session. The class teacher also added some cued words to the vocabulary used every day (such as hello and goodbye) and incorporated some of the topic vocabulary where possible.

Various games were devised to encourage the children to cue-read whole words within the following topics: greetings; names; animal names and sounds; actions; emotions; days of the week; body parts; numbers; colours; clothes; and shopping items. In preparation for such cue-reading, the children were involved in writing cuescript for each of the words involved. Each game usually finished with time for role reversal when the children had turns at being 'teacher' and cueing the words themselves.

Examples of some of the games:

Body parts – following instructions to wash a girl and boy puppet (which also introduced 'his/her')

Numbers – all the children lined up along the far wall and waited for their name and a number to be cued before stepping forward the requested number of steps. The first person to reach 'the caller' had a turn at being the caller and cueing the numbers

Colours – a Bingo game using nos 1-5 in different colours i.e. two-part calls e.g. 'blue five'

Clothes – following instructions to hang clothes on a washing line (later on clothes of different colours were used).

They enjoyed these games and benefited from the repetition involved, i.e. seeing the words cued again during their friends' turns. The process of writing the cuescript (please see appendix for a definition) for the words beforehand definitely helped both their cue-reading and their own cueing of the words. A couple of the children who very rarely used any lip-patterns prior to the introduction of Cued Speech made a noticeable breakthrough in their use of lip-patterns while cueing the words. They also began to look at people's mouths as they talked, suggesting that they now realised that there was information to be gained from 'reading' the lips.

Secondary age students – introducing Cued Speech

Care was taken to get the secondary students 'on-board' with this pioneering approach to learning English. Before introducing it into the curriculum, workshops were given that focused on the concept of English as a language with different forms – spoken and written. It was explained to the students that cueing may give them a new way to 'take in' spoken English which could eventually be linked to written English. All workshops were delivered in BSL by the Cued Speech Association UK's tutor, Cate Calder, who has interpreter-level BSL skills.

The introductory workshops facilitated many interesting discussions between staff and students including the difficulties of lip-reading and the fact that spoken English uses only 44 sounds. Students were very surprised by this; when asked during the workshop to estimate the number of sounds used in spoken English their estimations varied between 'hundreds and hundreds' and a million. The effect on their morale of being told there were only 44 sounds in spoken English was uplifting; it meant that English seemed 'do-able' to them.

The students agreed they wanted to increase their understanding of English and to improve their lip-reading skills; they could see that Cued English was offering them a new approach to learning English and they wanted to try it.

Three short workshops to introduce cueing skills for relevant teachers and assistants were also achieved before lessons for the students were launched. If time had allowed the choice would have been to give staff full training prior to introducing Cued English to students. However the staff 'learning alongside' the students actually added a very useful dynamic to the whole process. The students really enjoyed seeing the staff having to learn this new skill alongside them and found it fascinating that hearing people were not automatically 'masters of the English language'. A lip-reading game – using newly learnt Cued words - was devised which pitted students against staff. It was particularly enjoyable for students to find that their cue-reading skills out-classed the hearing staff's skills in this area.

In order to facilitate the learning of Cued English the academy created 50-minute long 'Access to Language' (ATL) slots in the time-table on 3 days of the week. Two groups of secondary age students attended these sessions, one group had six students and one group had five.

Many students arrived at the classes with behavioural and/or motivational issues and although there were minimal discipline problems within the Cued English sessions their behaviour within the school resulted in four students being withdrawn for 'anger management' classes.

Using Cued English in this way with older deaf children is innovative and staff had no model of good practise to base their work upon. The Cued Speech tutor, Cate Calder, who lead the first group, and Gill Banham, the Speech and Language Therapist who lead the second group, worked in slightly different ways.

Secondary age students - learning to cue

Group one - lead by Cued Speech tutor

Materials and lessons were originally planned to show students the individual phonemes and then build up to whole words. Without exception the students did not respond to this approach. They all wanted to learn whole words and short phrases first and only once this hunger for 'seeing the whole' was sated did they show any interest in learning about consonants and vowels! However this does seem to affirm the findings of research which shows that young deaf children initially see and understand the Cued word in the same way as they see and understand a signed word – as a whole, as a pattern. It is only later they see that each 'whole pattern' is made up of individual 'parts'.

Secondary students requested to see words Cued which were relevant to them. These included their own names and covered subjects such as football, hobbies, food, TV programmes, insults and short phrases such as 'Will you be my girlfriend?' Staff created a huge wall chart with blank diagrams of the consonant handshapes, faces for the vowel positions and the lip-patterns for each phoneme. As students Cued more and more words teaching staff subtly and without comment filled in the chart with the individual phonemes that their chosen words highlighted.

Without exception, and in their own time, every student began to comment that certain words have individual phonemes in common.

"Look, my name has 'L'; it's the same as Liverpool and football".

Once this was happening lessons could go back to the original idea of looking at phonemes and so the 'system' of Cued Speech could be analysed and absorbed using the finished wall chart.

Group two - lead by Speech and Language Therapist and teacher of the deaf

As with the other group, the approach taken was one that embraced whole words and phrases rather than individual phonemes. This was done through a variety of activities, many of which were based on the curriculum for teaching English as a second language or linked to current work within their curriculum. These activities involved the students in cue-reading words or phrases; writing or recognising cuescript for words or phrases; and cueing words or phrases. Games such as Bingo, Chinese Whispers, Hangman and certain board games were used to cover a range of vocabulary. Certain activities were devised specially, such as a TV listings game where they had to cue-read which day of the week; the time of day; and the channel so that they could locate a specific programme and cue its name. As they became more confident with the Cued Speech system, some more phoneme-specific tasks were introduced. For example, they were asked to discriminate singular and plural words; to sort words into those ending with /s/ or /z/ despite all having an s spelling choice e.g. bus vs. Ros; to recognise /k/ vs. /s/ in c words e.g. cat vs. city; and /k/ vs. /ch/ in ch words e.g. chemistry vs. chair. They played circular games where they had to offer a word that started with the same phoneme as the one at the end of the previous person's word. There was considerable focus on identifying vowel phonemes within words, especially ones that might be assumed to be consonants from their spelling choices e.g. pony, Yvonne.

The work was backed up with weekly homework sheets, which usually involved matching written words/phrases to cuescript using, for example, football teams, planet names, film titles and Simpson characters.

The charts which demonstrated the 44 sounds of English used lip-patterns and cuescript for each of the sounds together. The charts also included a common spelling for each of the sounds, for example 'sh' or 'ee'. It is worth noting that staff later regretted the decision to use letters and letter combinations to represent the phonemes on the charts. This is because the letter choices became so strongly associated with the phonemes that the students then had to 'un-learn' their association with them to take on the concept of many spelling choices for one sound that they became aware of later. In retrospect it would have been more helpful to use either International Phonetic Alphabet (IPA) symbols for the more able students and simply pictures of lip-patterns for the younger or less able students.

By the end of the first year most of these secondary students had proved that they could indeed grasp how Cued Speech works. Although expressive cueing is not strictly necessary their visual awareness and dexterity meant that they could cue words fairly easily and most enjoyed doing so. The action of physically forming the words in this way seemed to really support their understanding of how that word 'worked'. It was very useful to be able to see which sounds they thought were in words and which they missed out and how quickly they accepted the concept of the whole word being a sum of its parts.

The area that these students most seemed to enjoy was the cue-reading (lip-reading with cues added to clarify the lip patterns) and they could quickly cue read individual phonemes and single words. By the summer term they were watching with fascination short fairy stories told first in BSL and then in cued English. This gave them a glimpse of the rhythm of spoken English at 'language level' even if they did not understand all of the meaning.

During this year it became clear that the use of residual hearing did not appear to impact any student's success with learning through cued English and it was decided that subsequently any student who showed an interest or who the staff felt may benefit would receive cued English tuition if the timetable allowed.

Progress had been impressive enough to mean that Cued Speech use would carry on for a second year at ERADE. It had been used up to this point to represent the sounds of speech as they were spoken with the rationale that phonemic awareness is the first step to learning to read and write a language. The second year would bring in the written form of English through THRASS combined with cued English.

A total of 19 students and 13 staff and parents received cued English input in this first year.

Quotes from 2 students at the end of year one

"Why didn't I get this (cued English) when I was little? I used to watch people talking to me all day and it just went over my head. With Cueing I can see that the words are different."

Ahmed aged 20.

"I am good at this, it is easy!" 9-year old pupil.

**Activities during the second year of Cued Speech use at
ERADE (September 2007 to July 2008)
and the
introduction of Synthetic Phonics**

What is Synthetic Phonics and how can deaf children learn to read through it?

Synthetic Phonics, a relatively new technique for teaching, is being used to improve low literacy rates amongst hearing children and research showing a high level of success has convinced the government to promote it within schools. Synthetic Phonics specifically teaches speech sounds and the various spelling choices for those sounds. For further information see the appendix.

The Synthetic Phonics programme used at ERADE is THRASS

The THRASS (Teaching Handwriting Reading And Spelling Skills) synthetic phonics programme, pioneered by British Educational Psychologist Alan Davies consists of extensive picture-based training for schools and parents with access to a wide range of resources and support materials. THRASS also run Professional Development Courses.

THRASS provide extensive resources based around their visual 'maps' of the 44 phonemes. The 24 consonant sounds are on one map and the 20 vowel sounds on another. Each phoneme is illustrated by a selection of words and accompanying pictures which contain the common spelling choices; the spelling choices are written beneath.

The great benefit of Cued Speech is that it can clearly represent every phoneme individually but also then shows how those phonemes work in a whole word. Cued Speech children are familiar with each of the 44 'sounds' combined into words and sentences. It perfectly matches with how THRASS works - each system complementing the other.

Many years previously a group of teachers at ERADE had attended a workshop on using THRASS for literacy learning but attempts (pre-Cued Speech as an Access to Language initiative) to introduce this approach had not been successful because there were no ways to adequately represent the phonemes, at single sound and language level, for the students. With the addition of Cued Speech the deaf students and their teachers could now make sense of the THRASS charts.

One Speech and Language Therapist from ERADE and the tutor from the CSAUK completed a 2 day training with THRASS UK in July 2007.

The staff at THRASS were wonderfully supportive and permission was granted to make some adaptations to their charts for use within ERADE only.

Selection of students for Cued Speech input

In the academic year starting in September 2007, the Access to Language (ATL) sessions had become a permanent fixture but it was decided to change the composition of the groups to reflect language levels rather than age; 'stage not age'. It was also expected that this would facilitate 'peer' support with the older students helping to teach the younger ones.

Two main groups of students in the school received the most exposure to Cued Speech through these ATL sessions. Two primary age students were included in one group, which was made up of students who had been involved in the first year and wanted to carry on. The other group had a mix of experienced and new learners.

Some of the students in the primary group in the previous year had moved to different classes and cueing input was changed from twice-weekly whole class teaching to working with pairs of children once a week.

All students were taught by the CSAUK tutor or Speech and Language Therapists.

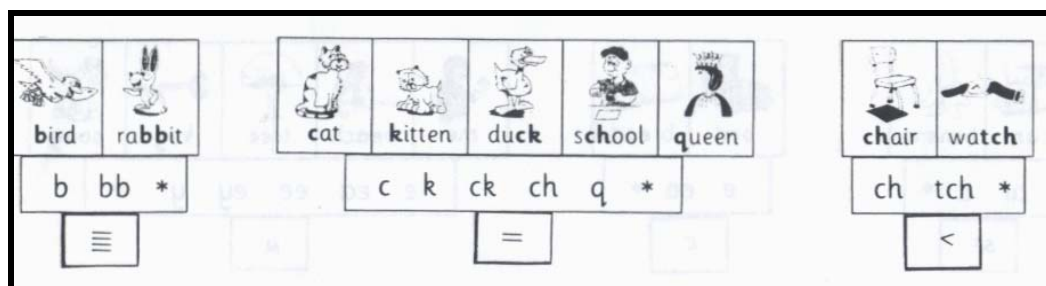
Three students had moved on to the further education department and wished to 'take cueing with them' and another four college students began to learn for the first time.

Secondary age students – literacy learning using Cued Speech and THRASS resources

Group one – lead by Cued Speech tutor

The THRASS consonant and vowel 'maps' had a third layer added underneath the spelling choices box. On the consonant chart this was the cue script (an iconic representation of the handshape; see appendix) to show which phoneme these words were representing and on the vowel chart, it was either a letter M (mouth), C (chin), T (throat) or S (side, SD side down, SF side forward) to show the position of the vowel phoneme these words were representing. This immediately gives teachers the ability to say, for example, "the box with **bird** and **rabbit** are showing you the /b/ sound." The letter line on the consonant chart had fingerspelling added underneath.

A small section of the adapted THRASS chart is reproduced below:



The students chose how they would sign the pictures (important to show a difference between cat/kitten or horse/pony) and they learnt to remember the order of the pictures with games using the signed version of the word. The spelling choices box would be fingerspelled with the letters 'named' using clear lip-patterns. The last 'layer' to be looked at was the key words which were written under the pictures. Students with CE experience were able to work out how to cue the word from the written form with some guidance, for example, "the digraph 'or' in doctor is making a (cued) /uh/ sound but in fork it is making an /aw/ sound." They very quickly understood the concept of there being one phoneme but often more than one letter to represent it. The terms graph, digraph, trigraph and quadgraph were helpful and the students used signs for these words that they created themselves or cued them.

They mainly worked on one consonant line followed by one vowel line but in discussions the whole of both vowel and consonant charts were referred to. Each written word was analysed through discussion, games and worksheets and broken down into the consonant and vowel parts and re-built up into the whole word form which would be cued/cuescripted. Students then had 2 versions of each word in their heads – a signed version and a cued version.

One of the benefits of Cued Speech and thus one of the reasons for introducing it with these students is its positive impact on lip-reading ability. Research shows that people exposed to Cued Speech are still better able to lip-read even if the speaker is not cueing. One part of every lesson was working on lip-reading skills (and indirectly

on lip-pattern production). This began with focusing on the 120 key words individually but by the summer term this group was creating their own story involving all the characters along one of the lines which would be told firstly in BSL then repeated in Cued Speech by the tutor. This enabled them to see spoken English at connected speech level while already familiar with the context. Cued Speech normally works in this way to model fluent language for deaf children to absorb in the same way that hearing children absorb language. As a literacy tool only, the students at ERADE are using the cues to analyse the structure of English words. It is expected that with more exposure to English cued at connected speech level their overall understanding at the language level would increase.

Group two - lead by Speech and Language Therapist and Teacher of the Deaf

This group started with 4 students, but 3 other students joined the group over the year (one joined ERADE from another school part way through the year; the other two were moved from the Learning through Play group as it was felt that they had outgrown that group). Only two of these students had had any prior exposure to CE (the ones moving from the Learning through Play group had been part of the Primary group in the pilot year).

The sessions took a two-pronged approach, aiming to familiarise them with both the Cued Speech system and THRASS. In hindsight, it may have been easier for the students if the two systems had been taught separately; for instance, it seemed to take them a very long time to learn the handshapes and positions for the 24 consonants and 20 vowels. Approximately once a month, a BSL interpreter was booked to enable an in-depth discussion about the two systems and the phonological concepts being taught. There were many 'golden moments' within these interpreted sessions where it was evident that these students who had had a very tenuous knowledge of English beforehand were beginning to develop some understanding of the phonological building blocks of spoken and written English. They were starting to grasp the difference between vowels and consonants, and the difference between letters and the various 'jobs' that they perform when acting as graphs, digraphs, trigraphs and quadgraphs in words e.g. the letter a makes many different phonemes as shown by the words ant, baby, banana, zebra, swan and ball. Much of their time was spent on learning the THRASS key word rap (they signed the words) as it was felt important for them to internalise the THRASS map so that it could be a resource for them through life when reading and spelling words.

By the end of the academic year 2007/8 many students knew the positions of the key words on the THRASS charts and knew which phoneme it represented. They could fingerspell the spelling choice for the phoneme when given the key word, they could cue the phoneme when given the spelling choice and key word, they could pick out the consonants and vowels within a word and could sign and cue that word. They could cue-read every word and really enjoyed working out what a word could be purely from the cues (often without lip patterns to help). Work had begun on the next 500 most commonly used words that THRASS provide.

The students who had the exposure to Cued Speech (and therefore had some phonemic awareness) before the introduction of THRASS were most quickly able to benefit from the way THRASS teaches. Having said that, the students who are learning both systems at the same time are perfectly able to do so and simply take a little longer to reach the level where they can recognise whole words cued.

ERADE staff wrote:

'It has been interesting to see how the students are now able to approach new English words in a way they couldn't before. They are now able to pick out individual phonemes within a word and by looking at the spelling choice for that phoneme make increasingly accurate assessments as to which phoneme it is. By having individual phonemes cued to them they can build up a whole word and with reference to the THRASS keyword they can make accurate spelling choices to write the word down.

'The use of Cued Speech simultaneously with Synthetic Phonics gave pupils a real understanding of how spoken languages work and of the relationship between spoken and written English.'

A total of 19 students throughout the Academy had some degree of exposure to CE learning in this year.

Research Project

ERADE managers commissioned a researcher in this second year to assess students' progress in four main areas:

1. Receptive skills – lip-reading with and without cues
2. Expressive skills - ability to cue words and show lip-patterns
3. Relationship to English – confidence and attitude
4. Literacy levels – individual phoneme awareness, ability to build up whole words from phonemes and break whole words down into phonemes, make appropriate spelling choices and widen their vocabulary.

The results of this research would inform the decision to continue the use of CE within the Academy. Staff felt that this was such a ground breaking approach to literacy learning that they very much appreciated having a researcher assess the students' progress.

A summary of the research results follows.

Research during the second year of Cued Speech use at ERADE September 2007 to July 2008

Introduction

The study: 'Can limited and Late Exposure to Cued Speech Impact the English Skills of Signing deaf Pupils?' was undertaken by Laura Gratton - BA, English Language, Cardiff University, currently undertaking MSc Speech and Language. Laura's interests include deafness, phonological processing and literacy development in children. It was overseen by Dr. Michelle Aldridge, Cardiff University and funded by ERADE in order to assess the effectiveness of new initiatives at the school to improve English and literacy using Cued Speech.

The study took place during the **second** year of Cued Speech use at the school.

An overview of the work and research at ERADE

Year one (prior to the research) – introduced the following concepts and skills:

- There are 44 phonemes used in spoken English
- That spoken and written forms of English are different. .
- Cued Speech gives a way to **see** the individual sounds as they are spoken.
- Learning to use Cued Speech receptively by 'cue-reading' individual phonemes and whole words; i.e. to understand what sounds and words are represented when a teacher or another student uses the handshapes and positions of Cued Speech to clarify the lip patterns of speech – even, in the case of another student, if the words are pronounced silently or without clear lip patterns.
- Learning to use Cued Speech expressively; i.e. the deaf student uses the handshapes and positions of Cued Speech themselves with the correct lip-pattern.

Year two (the year researched) – introduced the following concepts and skills:

- Written English has many irregular spellings, one phoneme can be spelled in more than one way using one or more letters.
- THRASS charts were used to give visual maps of the consonant and vowel sounds and their most common spelling choices.
- Key word analysis – how to break a whole word down into phonemes and build a whole word up from phonemes.
- Continued cue reading skills at word and sentence level.
- Continued expressive use of Cued Speech at word level.

The students' ability to learn Cued Speech (ie understand the system enough to be able to cue-read and cue phonemes and words themselves) was assessed alongside the 4 main areas of research, which were:

- Lip-reading skills
- Lip-pattern production
- Literacy skills
- Confidence/relationship to English.

Characteristics of students taking part in the research; including extent of exposure to Cued Speech, student age and auditory support

Age and problems in addition to deafness

Six pupils were involved in the study; they were chosen to give a range of age and ability. They were aged between 6 and 15 years and, in addition to profound sensorineural deafness, five out of the six had mild/moderate to severe unspecified learning and language processing disorders. One has Charge Syndrome.

Extent of exposure to Cued Speech in the first year (prior to the research)

The pupils with the most exposure had 150 minutes a week whilst others had only 30 minutes a week. The teaching began well into the autumn term and so at most the students had approximately 26 weeks during which they attended some cued English lessons. This meant that the students who had the most Cued Speech exposure had a maximum of 39 hours whilst those who had the least exposure had 13 hours in the Cued Speech classroom. This is a generous assessment of the hours as it always takes time for the students to arrive and days are lost to other appointments, absence due to illness and many other extracurricular events and trips which take precedence.

Of the six students studied, two received 39 hours exposure in the first year, the other four received 13 hours.

Extent of exposure to Cued Speech lessons in the second year (the year researched).

The study took place over 9 months in the second year of teaching.

Four of the students received 75 hours exposure in the second year and two received 15 hours. (It is worth noting that the two with the least exposure also had mild to severe comprehension and processing disorders).

Total hours of exposure to Cued Speech lessons by final assessment.

Taking both year one and year two together, two of the students received 114 hours exposure, two received 88 hours and two 28 hours.

Student number in study	Age at baseline assessment	Hours of exposure by final assessment
1.	8 yrs	88
2.	9 yrs	88
3.	10 yrs	28
4.	6 yrs	28
5.	15 yrs	114
6.	15 yrs	114

How late was the exposure?

Student number in study	Age at start of year one
1.	7 yrs
2.	8 yrs
3.	9 yrs
4.	5 yrs
5.	14 yrs
6.	14 yrs

Levels of auditory support

Three of the students were implanted but only two made any use of their implants, the third child's implant was not functional and provided no access to sound at the time. The other three students wore hearing aids only. This study did not make conclusions about the impact of residual hearing on students' progress but staff believed that the levels of hearing did not impact on the results.

Summary of the research: Can limited and Late Exposure to Cued Speech Impact the English Skills of Signing deaf Pupils?

Abstract

'Vast studies report that the deaf exposed to Cued Speech (CS) from birth, or a very early age, at home, school and socially have advanced English skills compared to the non-CS-exposed D/deaf. The present study investigated whether CS can impact English skills when applied to signing D/deaf pupils late in life and in limited doses. Firstly, whether the pupils grasped CS was investigated. Secondly, whether CS affected the pupils' lip-reading, lip patterns, phonological awareness, spelling and reading (English skills) was examined. Finally, whether the pupils altered their confidence and attitude towards English was investigated. Results showed that CS was grasped despite limited and late exposure improving English skills. Consequently, the pupils' confidence and attitude towards English did improve also.'

Assessments

Baseline assessments in the 4 areas to be studied were done in September 2007; these were followed by 3 more assessments in December 2007, March 2008 and June 2008.

The following assessments were used:

- Lip reading assessments devised with speech and language therapists to assess single word and contextualised lip-reading skills with and without cues. (Instructions given using Sign Supported English (SSE)).
- The Schonnel Reading test.
- The Schonnel Spelling test.
- CELF – (Clinical Evaluation of Language Fundamentals) to assess phonemic awareness.
- Interviews in sign language to assess progress in understanding and using of the system of Cued Speech.
- Interviews in sign language to discuss confidence and relationship to English.
- Teacher questionnaire on students' confidence and relationship to English.

Summary of results

Grasping the system

After 9 months of term time limited and late Cued Speech exposure:

- 3 of the 6 children could independently produce the whole CS system (2 were BSL users, 1 was a Sign Supported English (SSE) user)
- 1 could produce 97.7% (43 of the 44) phonemes
- And the others produced 38.6% and 29.6% (these two had 15 hours exposure over the academic year, the others had had 75 hours)
- All distinguished letters from sounds
- All could correctly produce a word containing a given sound.

The four main areas of study were:

- Lip-reading skills
- Lip-pattern production
- Literacy skills
- Confidence/relationship to English.

Lip-reading skills

Averages of all of the children's scores:

- with cues single word lip-reading improved by 20.0% (56.7% to 76.7%)
- without cues single words lip-reading improved by 10.0% without cues (66.7% to 76.7%)
- with cues sentence lip-reading improved by 20.8% (54.2% to 75.0%)
- without cues sentence lip-reading improved by 34.8% (34.7% to 69.5%).

'Student Five (BSL user) stated (after CS exposure): "When I work in the garden (work experience) I am watching lips to try to lip-read and then I remember cueing(.) I think it (lip-reading) has improved. I know what is said(.) (lip-reading) is easier now."

Lip pattern production

This was assessed at the individual phoneme level only. Averages of all of the children's scores:

- Lip pattern accuracy improved by 39.8% (44.7% to 84.5%)
- Three of the six pupils could accurately produce lip patterns for all 44 phonemes
- Student Two could produce 43
- Student Four could produce 32
- Student Three could produce 19.

'Student Three's Teacher said (after CS exposure): "Her lip patterns are good and she can make a reasonable attempt at some words although she sometimes adds extra syllables"

NB The quality of any vocalisations were not a part of this study and students were not requested to use their voices in these assessments.

Literacy skills

Phonological Awareness improved by an average of 44 months (3 years and 8 months).

Individually:

Student One	7 years 3 months to 12 years 11 months (+5.8)
Student Two	6 years 3 months to 6 years 5 months (+0.2)
Student Three	5 years 0 months to 5 years 6 months (+0.6)
Student Four	5 years 0 months to 5 years 5 months (+0.5)
Student Five	6 years 6 months to 6 years 8 months (+0.2)
Student Six	6 years 6 months to 12 years 11 months (+6.5)

Reading and spelling

Averages of all of the children's scores:

Reading improved by 3 months
Spelling improved by 9 months

Individually:

Student One	reading: 8 years 7 months to 9 years 3 months (+0.8)
8.11 - 9.8*	spelling: 9 years 8 months to 11 years 9 months (+2.1)
Student Two	reading: 5 years 9 months to 6 years 4 months (+0.7)
9.8 - 10.5*	spelling: 6 years 4 months to 6 years 4 months (same)
Student Three	reading: 5 years 3 months to 5 years 3 months (same)
10.3 - 11*	spelling: 5 years 0 months to 5 years 3 months (+0.3)
Student Four	reading: 5 years 1 month to 5 years 2 months (+0.1)
6.8 - 7.5*	spelling: 5 years 0 month to 5 years 3 months (+0.3)
Student Five	reading: 8 years 4 months to 8 years 4 months (same)
15.9 - 16.6*	spelling: 7 years 7 months to 8 years 7 months (+1.0)
Student Six	reading: 8 years 5 months to 8 years 5 months (+0.1)
15.2 - 15.11*	spelling: 9 years 2 months to 10 years 6 months (+1.4)

*Students' actual ages.

All pupils developed the phoneme-grapheme skill after 9 months of CS and THRASS. They then could attempt spellings/text that were not rote learnt.

'Moreover their confidence improved. For example, One could not visually recall "increase" in the first spelling test, before Cued Speech exposure, and thus refused to try a spelling. In the second test, after Cued Speech exposure, One still could not visually recall the word, in this attempt however he "sounded-out" the word with the help of Cued Speech and produced "inkres" a valuable phoneme-grapheme attempt (Henderson & Chard 1980).

'Before CS-exposure Six also would not attempt any spellings that she had not rote learnt however subsequently she too "sounded-out" words using Cued Speech and made phonological phoneme-grapheme attempts, for example spelling "direct" as "dirakt".

'Similarly, Two was not confident in the initial spelling test to attempt "call" instead she wrote "c-". Two's teacher stated in the first Teacher Questionnaire that "She is beginning to link Cued English (Cued Speech) handshapes and lip-reading and has been able to give an initial letter from lip-reading & cues- her knowledge of spellings is poor so this is useful to her" based upon the Cued Speech -exposure Two had received in the previous academic year (three one hour lessons). Thus "c-" is a positive attempt. However, subsequently to the current academic year's nine months of Cued Speech -exposure Two attempted to spell "call" as "coll". In this attempt Two had "sounded-out" the word with the help of Cued Speech, unfortunately she selected an incorrect spelling choice for /ɔ:/ [the sound /aw/]. "Sounding-out" words to spell suggests that in the nine months of CS-exposure Two had developed from the "pre-phonetic" to "early phonetic" spelling stage (Bradely & Bryant 1983).'

Relationship to English

Based on teacher questionnaire or pupil interviews **all** pupils improved their confidence and attitude to some degree e.g. going from 'strongly disagreeing' liking English to 'agreeing' to liking English or going from 'sometimes' liking it to 'nearly always' liking it.

'Furthermore limited and late Cued Speech exposure improved the pupils' attitude towards and confidence with literacy according to the Pupils Interview.

'For instance, before Cued Speech exposure students One, Two, Three, Four and Five stated: "reading is hard", however after nine months of Cued Speech exposure they all said: "it [reading] is a little bit easy (.) a little bit hard". Student Two added "I like reading it is easy now".

'Before Cued Speech-exposure Student Five also stated: "I never get books from the library (.) I don't like it there". In the second interview after Cued Speech-exposure Student Five altered his opinion: "[reading is] sometimes easy (.) sometimes hard (.) depends on the word

(.) before I would think I don't want to [read] but now it is a little bit easy (.) [I] can try and break down words (.) I always like to look at the newspaper".'

'The Teacher Questionnaire further documented the attitude alteration towards reading. For instance after the Cued Speech-exposure Student One's teacher remarked: "He has a wide range of vocabulary and is confident in breaking down new words to read them".

'The pupils' attitude towards spelling improved similarly. Before Cued Speech-exposure Student Five stated: "writing scares me (.) I don't know what's missing (.) I don't remember so I ask staff to help me with writing (.) they sign to me whether it is a right or wrong spelling (.) if it's wrong I've made the mistake (.) my fault"

'Conversely after Cued Speech-exposure Student Five stated: "I have to concentrate but Cued English [Cued Speech] helps me to break it [spelling] down"

'Similarly before Cued Speech-exposure Student One commented: "I don't like writing English". One's opinion shifted to: "it [spelling] is a little bit easy (.) a little bit hard"

'After the nine months of Cued Speech-exposure, Student One's teacher wrote: "In a recent spelling test he was able to make a good attempt at spelling a word when it was broken down using Cued English [CS] & lip-reading"

Conclusion

'Considering their average, the deaf signing pupils of mixed age, ability, signing preference and Cued Speech exposure time (though all was limited and late) could produce 77.7% of the Cued Speech system after nine months of Cued Speech-exposure. Thus the pupils did grasp the Cued Speech system.

'The more CS-exposure a pupil received the better their production of the Cued Speech system. As the pupils developed their knowledge of the Cued Speech system their English skills improved in correlation. Therefore, though limited and late Cued Speech exposure allowed all of the pupils to grasp Cued Speech and subsequently developed their English skills, those with more Cued Speech-exposure improved their English skills the most.

'Considering the average of all six pupils; lip-reading improved by 66.0%, lip patterns improved by 40.1% and literacy improved by six months (reading improved by three months whereas spelling improved by nine months) in the nine months of Cued Speech exposure. The English skills' improvement was due to an improvement in the pupils' phonetic awareness. Considering the pupils' average ages, phonetic awareness improved by two years and three months over nine months of Cued Speech exposure. Phonetic awareness improved with Cued Speech exposure because Cued Speech illustrates the phonemes (sounds) of the English language. Furthermore, due to the improved English skills and having a tool (Cued Speech) to tackle English whether the spoken word (lip-reading/lip patterns) or text (reading/spelling), the pupils' confidence with the English language was improved and with that their attitude towards the language was more positive subsequently to the nine months of Cued Speech exposure.

'In conclusion, limited and late exposure to Cued Speech can positively impact the English skills of signing deaf pupils when considering lip-reading, lip patterns and literacy, as well as confidence and attitude, as hypothesised. Future work with a larger participant sample could justify whether all schools working with D/deaf pupils could adopt CS (with THRASS) to convey English to their pupils (from a literacy perspective if nothing else).'

Appendix

Cued Speech

Cued Speech is a system which uses eight handshapes in four positions near the mouth to clarify the ambiguous or invisible lip-patterns of speech. It gives complete access to 'spoken' language for deaf babies, children and adults. With complete access deaf children and adults can think in full English and use this understanding to inform their speech, literacy and their lip-reading of people who do not cue.

Hearing and deafened people who already know English will learn the system of Cued Speech within about 20 hours.

Babies and young children do not learn the Cued Speech system as such but simply learn English through it, at about the same speed as hearing children learn speech.

Older deaf children and adults who do not understand full English will have to learn the Cued Speech system and English (through it) simultaneously. It is not therefore expected that they can learn the system of Cued Speech in 20 hours.

Hearing people usually cue as they speak aloud. Deaf people brought up with Cued Speech usually communicate using speech or sometimes, 'voice off' cueing with other deaf cuers.

More about Synthetic Phonics

Many people are familiar with the old phonetic method used for teaching reading: a child would be taught to associate a letter with a sound ('a is for apple') then look at a word like 'cat' and 'sound it out' c – a – t. This technique worked for regular words (words which sound how they are spelt) but had inherent problems because English is so irregular. A single letter can represent several sounds (e.g. the letter 'c' sounds like 'k' in the word cat but like 's' in the word city) and some sounds have many different ways of been represented (for example /aw/ /ough/ /oor/ /ore/ all can be used for the same sound).

Like the old phonetics system Synthetic Phonics also teaches children to associate sounds with letters or combinations of letters but it approaches the issue from the opposite direction. Synthetic Phonics teaches children to recognise the sounds first and then teaches the many different ways in which these sounds can be spelt. For example the children will be taught that the 'aw' sound can be represented by many different spellings. When taught in this way children who are trying to read a new word will have in their minds a selection of possibilities. The irregularities of English spelling – which damages the confidence of so many – are specifically taught and can thus be mastered.

What is the difference between phonetic and phonemic?

Phonetics is the study of speech sounds, without reference to the meaning that these sounds convey in words. Each sound can be accurately described and represented using international symbols.

Phonemics involves a system of speech sounds that are specific to a given language and that signal differences in meaning when used in words (most languages have 30-40 phonemes in their individual system). A phoneme is the smallest unit of spoken sound that distinguishes one word from another e.g. /p/ versus /b/ in 'pin' and 'bin'.

Teaching literacy through phonics involves teaching the association between phonemes and the letters which represent them.

Cued Speech is a phonemic system which can give deaf children access (visually) to complete 'spoken' language and to phonic literacy teaching.

What is Cuescript?

Cuescript is a diagrammatic way of illustrating the 8 handshapes and four positions of Cued Speech. For example the handshape which uses 4 fingers is shown by the symbol which uses four lines.

What are graphs, digraphs, trigraphs and quadgraphs?

A graph is one letter representing one sound, e.g. 'a' in zebra

A digraph is two letters representing one sound, e.g. 'er' in teacher

A trigraph is three letters representing one sound, e.g. 'ure' in measure

A quadgraph is a group of four letters representing one sound, e.g. 'ough' in thorough.