both - CIS and CA - the number of users preferring CA is higher than previously reported.

We hope that this study, mapping the distribution of CIS and CA users, will become a first step towards understanding the underlying mechanisms that produce the variability in extracting information from temporal and/or spectral cues.

**FP640**

**SPEECH PERCEPTION ABILITIES OF ADULT AND PEDIATRIC NUCLEUS IMPLANT RECIPIENTS USING THE SPEAK CODING STRATEGY**

**Staller, S**

Cochlear Corporation, Englewood, Colorado, USA

Spectral Peak (SPEAK) is the most recent coding strategy of the current Nucleus Spectra 22 Implant System and will be the baseline strategy for the new generation Nucleus system. A series of 90 postlinguistically deafened adults and 34 prelinguistically deafened children were evaluated using SPEAK implemented in the Spectra 22 speech processor.

The consecutively implanted adults from eight investigational sites in the United States and Australia were implanted in series and met the current clinical indications for use of the device in adults. Subjects were evaluated at four postoperative intervals, between two weeks and 6 months, using recorded measure of open-set word and sentence recognition. The adults demonstrated rapid acquisition of open-set speech recognition skills in the initial postoperative period. The results for the study group will be presented for the four evaluation intervals.

Thirty-four prelinguistically deafened children were converted from the Multipeak (MPEAK) strategy to SPEAK at four large pediatric implant centers. Every prelinguistically deaf child between the ages of three and ten years who was converting to SPEAK and whose family was willing to participate in the two year protocol was asked to enroll. A recorded battery of tests designed for young deaf children and based on the CID Early Speech Perception Battery was administered with MPEAK (baseline) and then repeated six and twelve months after conversion to SPEAK. These data indicate that even after extended experience with a given form of electrical stimulation from a cochlear implant, that early deafened children can access additional speech features from advanced coding strategies and develop improved speech perception after reasonable short periods of use.

Preliminary data from adults implanted with the new generation Nucleus implant system using SPEAK will also be presented.

**FP641**

**CURRENT SPEECH PERCEPTION BENEFITS FOR ADULTS USING THE SPEAK STRATEGY WITH THE NUCLEUS 22-CHANNEL COCHLEAR IMPLANT**

**Rod Hollow, Kerrie Plant*, Merran Larratt, Marisa Skok, Lesley Whithof*, Richard Dowell, Graeme Clark**.

Cochlear Implant Clinic, The Royal Victorian Eye & Ear Hospital and The University of Melbourne, East Melbourne, *CRC for Cochlear Implant, Speech & Hearing Research, East Melbourne, Australia

Present day recipients of the Nucleus 22-channel cochlear implant make use of the SPEAK speech processing strategy in the Spectra 22 speech processor. Introduced in 1994, the SPEAK strategy is based upon research conducted at the University of Melbourne and the Bionic Ear Institute. This paper compares the pre- and post-operative speech perception abilities of adults who have used the SPEAK speech processing strategy since the ‘start-up’ of their cochlear implant system. Data was analysed from open-set sentence and word tests administered pre-operatively and at regular intervals post-operatively. Patients showed significant improvement in their ability to recognise speech, when listening with the cochlear implant without lipreading, within the first two weeks. Mean scores for open-set sentences were 15% preoperatively and 64% two weeks after initial programming. Speech recognition scores were also seen to improve over the following six months to a mean score of 88%. The mean open-set speech perception results at six months were then compared with similar data from patients using earlier speech processing strategies. The results show a significant improvement for the SPEAK coding scheme over previous schemes. Mean scores for open-set sentence testing obtained at similar times following implantation were 16% for F0F2, 38% for F0F1F2, 58% for MULTIPEAK and 88% for SPEAK. These four coding schemes represent the main developments in speech coding for the Nucleus multichannel implant over the last 15 years. The data confirmed the findings from comparative studies of the SPEAK and MULTIPEAK schemes. Cochlear implants should now be more widely considered as a viable option not only for totally and profoundly hearing-impaired people, but also for people with severe losses who wish to improve their auditory ability.

**FP642**

**AUDALLION BEAM FORMING NOISE REDUCTION SYSTEM - CLINICAL TRIAL RESULTS**

**Staller, S**

Cochlear Corporation, Englewood, Colorado, United States of America

Beam forming is a method of noise reduction designed to improve speech recognition in noisy environments. Using a digital signal processor, AudioLogic, Inc, has implemented a beam forming algorithm that compares the magnitude and phase of left and right microphone signals to estimate the angle of arrival of the input sounds. Frequency components originating from outside a specified beam width are attenuated, while those from in front of the listener (within the beam) are unaffected.

Preliminary studies were conducted using a prototype beam forming signal processor coupled to the Nucleus Spectra 22 speech processor. The results demonstrated that this technique can significantly improve speech perception of adult cochlear implant users in noisy environments. Based on these results, a multi-site clinical trial was conducted using a small wearable version of the original prototype processor (Audallion). The purpose of the trial was to evaluate the performance of the beam forming algorithm across a wide spectrum of adult cochlear implant users and to assess the qualitative benefits of the device. All adult Nucleus 22 Cochlear Implant users from seven clinics were invited to participate in the trial. The mean (79.3%) and distribution of sentence recognition scores in quiet for the 50 subjects who agreed to participate were similar to that seen in unselected clinical patients using SPEAK. The trial consisted of a two-hour baseline test session, a one month take-home period and a two-hour final test session. For each evaluation, CUNY sentences were presented in quiet and in several noise conditions (using uncorrelated eight talker babble) and the test sequence was counterbalanced across the two sessions. The one month take-home period allowed subjects to experiment with the Audallion in everyday situations. Speech perception performance in noise was significantly improved when using the beam forming algorithm in the test environment. In addition, the performance enhancements in the sound booth correlated with subjects reports in “real world” environments.
both - CIS and CA - the number of users preferring CA is higher than previously reported.

We hope that this study, mapping the distribution of CIS and CA users, will become a first step towards understanding the underlying mechanisms that produce the variability in extracting information from temporal and/or spectral cues.

**FP640**

**SPEECH PERCEPTION ABILITIES OF ADULT AND PEDIATRIC NUCLEUS IMPLANT RECIPIENTS USING THE SPEAK CODING STRATEGY**

**Staller, S**

Cochlear Corporation, Englewood, Colorado, USA

Spectral Peak (SPEAK) is the most recent coding strategy of the current Nucleus Spectra 22 Implant System and will be the baseline strategy for the new generation Nucleus system. A series of 90 postlinguistically deafened adults and 34 prelinguistically deafened children were evaluated using SPEAK implemented in the Spectra 22 speech processor.

The consecutively implanted adults from eight investigational sites in the United States and Australia were implanted in series and met the current clinical indications for use of the device in adults. Subjects were evaluated at four postoperative intervals, between two weeks and six months, using recorded measure of open-set word and sentence recognition.

The adults demonstrated rapid acquisition of open-set speech recognition skills in the initial postoperative period. The results for the study group will be presented for the four evaluation intervals.

Thirty-four prelinguistically deafened children were converted from the Multipeak (MPEAK) strategy to SPEAK at four large pediatric implant centers. Every prelinguistically deaf child between the ages of three and ten years who was converting to SPEAK and whose family was willing to participate in the two year protocol was asked to enroll. A recorded battery of tests designed for young deaf children were evaluated using SPEAK implemented in the Spectra 22 speech processor.

The results demonstrated that this technique can significantly improve speech recognition in noisy environments. Using a digital signal processor, AudioLogic, Inc, has implemented a beam forming algorithm that compares the magnitude and phase of left and right microphone signals to estimate the angle of arrival of the input sounds. Frequency components originating from outside a specified beam width are attenuated, while those from in front of the listener (within the beam) are unaffected.

Preliminary studies were conducted using a prototype beam forming signal processor coupled to the Nucleus Spectra 22 speech processor. The results demonstrated that this technique can significantly improve speech perception of adult cochlear implant users in noisy environments. Based on these results, a multi-site clinical trial was conducted using a small wearable version of the original prototype processor (Audallion). The purpose of the trial was to evaluate the performance of the beam forming algorithm across a wide spectrum of adult cochlear implant users and to assess the qualitative benefits of the device. All adult Nucleus 22 Cochlear Implant users from seven clinics were invited to participate in the trial. The mean (79.3%) and distribution of sentence recognition scores in quiet for the 50 subjects who agreed to participate were similar to that seen in unselected clinical patients using SPEAK.

The trial consisted of a two-hour baseline test session, a one month take-home period and a two-hour final test session. For each evaluation, CUNY sentences were presented in quiet and in several noise conditions (using uncorrelated eight talker babble) and the test sequence was counterbalanced across the two sessions. The one month take-home period allowed subjects to experiment with the Audallion in everyday situations. Speech perception performance in noise was significantly improved when using the beam forming algorithm in the test environment.

In addition, the performance enhancements in the sound booth correlated with subjects reports in "real world" environments.

**FP641**

**CURRENT SPEECH PERCEPTION BENEFITS FOR ADULTS USING THE SPEAK STRATEGY WITH THE NUCLEUS 22-CHANNEL COCHLEAR IMPLANT**

**Rod Hollow, Kerrie Plant*, Merran Larratt, Marta Skok, Lesley Whifford*, Richard Dowell, Graeme Clark.**

Cochlear Implant Clinic, The Royal Victorian Eye & Ear Hospital and The University of Melbourne, East Melbourne, *CRC for Cochlear Implant, Speech & Hearing Research, East Melbourne, Australia

Present day recipients of the Nucleus 22-channel cochlear implant make use of the SPEAK speech processing strategy in the Spectra 22 speech processor. Introduced in 1994, the SPEAK strategy is based upon research conducted at the University of Melbourne and the Bionic Ear Institute. This paper compares the pre- and post-operative speech perception abilities of adults who have used the SPEAK speech processing strategy since the 'start-up' of their cochlear implant system. Data was analysed from open-set sentence and word tests administered pre-operatively and at regular intervals post-operatively. Patients showed significant improvement in their ability to recognize speech, when listening with the cochlear implant without lipreading, within the first two weeks. Mean scores for open-set sentences were 15% preoperatively and 64% two weeks after initial programming. Speech recognition scores were also seen to improve over the following six months to a mean score of 88%. The mean open-set speech perception results at six months were then compared with similar data from patients using earlier speech processing strategies. The results show a significant improvement for the SPEAK coding scheme over previous schemes. Mean scores for open-set sentence testing obtained at similar times following implantation were 16% for FOF2, 38% for FOFIF2, 58% for MULTIPEAK and 88% for SPEAK. These four coding schemes represent the main developments in speech coding for the Nucleus multichannel implant over the last 15 years. The data confirmed the findings from comparative studies of the SPEAK and MULTIPEAK schemes. Cochlear implants should now be more widely considered as a viable option not only for totally and profoundly hearing-impaired people, but also for people with severe losses who wish to improve their auditory ability.
Author/s:
Hollow, R. D.; Plant, K.; Larrantt, M.; Skok, L.; Whitford, L. A.; Dowell, R. C.; Clark, Graeme M.

Title:
Current speech perception benefits for adults using the speak strategy with the nucleus 22-channel cochlear implant

Date:
1997

Citation:

Persistent Link:
http://hdl.handle.net/11343/26991