When acoustic information up to 1 kHz was provided, acoustic information below 125 Hz was provided. Speech perception performance rose to 75% correct for bilateral implant (CI) alone. Dramatically, however, only 45% when information up to 1 kHz was provided. Words when information below 500 Hz was provided, even a small amount of low-frequency acoustic hearing in the unimplanted ear.

Cochlear implants are wonderful but they don’t restore normal hearing because they only provide useful information from the middle frequency range up to the higher frequencies and thus an acoustic hearing aid might be able to fill in the lower frequencies. Recent research from the University of Arizona led by Michael Dorman and his colleagues has explored this topic (see Figure 1).

Professor Summerfield stated that an average hearing level of 115 dB (averaged over the frequencies from 250 Hz to 4 kHz, inclusive) would be the lowest limit. He added that modern digital hearing aids can often deliver amplification at low frequencies without the distortion that was present in earlier devices.

Quentin then presented evidence of simulations to establish whether emotion in the spoken word can be identified more actively between the two modes of CI + HA and CI + CI. The conclusion was that identification of emotion in speech may be more accurate with a CA + HA than with a CI + CI.

Turning to the bilateral approach and what might the second implant add to a first implant (see figure 2) accuracy reached 90% correct. The conclusion is that even a small amount of low-frequency acoustic hearing in the other ear may improve the accuracy of speech perception with a CI. Asked about the lowest level of hearing in the unimplanted ear above which an HA might give these benefits, Professor Summerfield stated that an average hearing level of 80 dB would be the lowest limit. He added that modern digital hearing aids can often deliver amplification at low frequencies without the distortion that was present in earlier devices.

Concerning speech perception in noisy environments Quentin explored the different configurations to show the effects of spatial release from masking. This arises because the user’s head shields the implanted ear from noise and thus the accuracy of speech perception improves when the noise source is on the opposite side of the head to the implant. The conclusions were that the benefits of bilateral implants (CI + CI) showed that spatial release from masking occurs when the noise is moved to either side of the head whereas for users of CI + HA then spatial release from masking only occurs when the noise is moved to the side away from their implant. Quentin drew all these developments and conclusions together and explained the advantages and disadvantages between the two considered situations (see Figure 4).

New study of adults that he and his research team are conducting to establish not only the differences in listening skills but also the quality of life between the three conditions of a unilateral implant, an implant plus a hearing aid, and bilateral implants. The research study will establish the advantages and disadvantages all three modes and, importantly, how much the differences matter to the adult users. He explained that the research would be conducted in York and volunteers would have all travel and accommodation expenses paid for their visit during which there would be up to six hours of evaluation and tests. Any adult members of the Association who routinely use bilateral implants, or an implant and a hearing aid, and who might like to take part should contact Dr Pádraig Kitterick (p.kitterick@psych.york.ac.uk) to learn what would be involved, if they are not already in correspondence with Professor Summerfield.