Spoken language development of deaf children may be more possible today than ever before. …we are now presented with the opportunity to learn from earlier mistakes and misunderstandings and to synthesize the best ideas of the past with the technological, programming and social advances of today. …we may finally be able to fulfil the promise of effective support for speech and spoken language with hearing loss.’

(‘Historical and Theoretical Perspectives’ by Marc Marschark and Patricia Elizabeth Spencer in Advances in the Spoken-Language in Deaf and Hard-of-Hearing Children, 2006)

With early identification of deafness and earlier access to audition through hearing aids or cochlear implants, as Marschark and Spencer comment, spoken language development may be more possible for deaf children than ever before. We expect children with normal hearing to say their first real word around the age of 12 months. However, many developments have taken place before this. The precursors include appropriate eye contact, conversational style turn-taking, and auditory awareness of the appropriate time to take a turn in the interaction. Shared attention to objects in the environment is developed as both parent and child follow each other’s line of gaze. Shared attention helps infants discover what is said to them, provided that it is contingent on what is occupying the child’s attention. This is sometimes called the triangle of reference: the parent, the child and the object of interest are at the three points of the triangle, and two sides of the triangle are formed by the parent’s and the child’s visual regard of the object of interest. The importance of hearing the parent’s voice is clear: it forms the third side of the triangle.

However, it may be that these conversational abilities occur in hearing children earlier than previously thought. Studies have revealed that vocal turn-taking increases between the ages of 12 and 18 weeks, and early exchanges may already be intentional. This progress in developing early communication skills continues through infancy: between two and four years of age children become true conversational partners, providing the basis not only for language learning but for later social and emotional development.

This is a vital development: early communication skills are a major predictor of later language ability and also of later interpersonal communication. However, this process is not only reliant on audition – the integration of visual, auditory and motor stimuli is essential to the process of language learning and it can be easy to over-emphasise the role of hearing in spoken language acquisition and to ignore the influences of speechreading and context in spoken communication. Hearing children integrate vision and hearing, are able to live in parallel worlds with an adult in play and share objects of joint attention through vision and hearing.

What about young deaf children – do the same pre-verbal developments take place? What happens if signs are brought into a child’s field of vision alongside their focus of attention? What happens if we use hearing aids or implants to complete the triangle auditorially? If these early communication skills are so vital – can we measure them to ensure that a deaf child is developing appropriate communication skills?

Tait video analysis – monitoring the development of early communication skills – was developed with children with hearing aids and has been used to a large degree in the assessment of children with cochlear implants. It not only charts individual progress, but with large groups of children has been found to predict later performance in speech perception and intelligibility, and has been shown to be reliable across observers, and to correlate with other measures. One criticism that has been made is that it is too lengthy and cannot be incorporated into educational or clinical practice; however, trained users can make an analysis of the appropriate video in 20 minutes, and the information that it gives is very useful and difficult to obtain in other ways.

A video made of parent/carer and child in interaction is taken and a transcript made of the ‘conversation’, showing the adult and child participation – whether by sign or gesture or orally. The transcript indicates where the adult has left a turn in the conversation and whether the child has taken the turn, and if so how – by sign or gesture or orally. We can then obtain measures of the percentage of turns taken and how. We measure:

• turn-taking – vocally and by gesture
• autonomy or initiative – whether the child is showing initiative in the conversation, introducing the ‘topic’ independently
• non-look vocal turns (NLVT) – the percentage of turns taken by the child, without looking at the adult, (for example, while looking at a book) and taken vocally.

We can thus track changes in these developing skills over time. Figure 1 shows video analysis of Child A’s communication skills before implantation and six and 12 months after.

**Figure 1: Child A**

In the case of this child, she was taking 100% turns prior to implantation, 53% by gesture and 47% by sign/gesture. She was taking no turns without looking, having insufficient hearing. Six months after implantation, she was taking 12% of turns by sign/gesture, 76% vocally and 35% vocally without looking. By 12 months after implantation, she was taking 100% of her turns vocally, and 58% without looking – indicating excellent progress in the use of her implant system. Similarly, one can show different progress – for example, with Child B (figure 2). In this case the child is taking 19% of her turns by gesture prior to implantation, and 20% vocally, a low score. Six months after implantation, she is taking 41% of her turns by sign/gesture and 59% vocally, with no emergence of non-looking vocal turns here or at 12 months after implantation, giving rise to concern for this child who has other difficulties. This video analysis can be used with those children who have other difficulties in this way, and together with other measures it can highlight where progress is, or is not, being made, helping to provide evidence for practice.

**Figure 2: Child B**

Tait video analysis has been used to demonstrate that earlier age at implantation is highly predictive of faster development of communication skills and it can also show that children with bilateral implants develop these early communication skills more quickly than those with one implant; for example, with matched groups, as can be seen in figure 3. The groups were implanted below the age of two – 23 unilateral and 27 bilateral. Looking only at non-look vocal turns, neither group was using NLVT prior to implantation; 12 months later, the bilateral group was twice as likely to use NLVT as the unilateral group. This is important – the bilateral group is vocalising and taking turns in conversation in the ‘normal’ way, while able to focus on the shared object of attention.

**Figure 3**
The techniques of this video analysis make it possible to observe minute changes over time in turn-taking and auditory awareness. It can provide objective evidence of the effectiveness of hearing aids or implants in the development of the necessary pre-verbal skills before the emergence of spoken language in a way which is time-effective and readily understood by the non-specialist and parent and so can inform our practice.

With the early diagnosis of deafness and earlier fitting of aids and implants, it is even more vital that we monitor the development of deaf infants’ language development to inform our practice and the management of the interventions of hearing aid or cochlear implant. Tait video analysis is one of the few ways in which this can be done – in a robust and time-effective manner, and in a way that is readily understandable by parents and non-professionals. It is part of the Nottingham Early Assessment Package (NEAP), which is available from The Ear Foundation, and which includes a training DVD.

Sue Archbold is Chief Executive of The Ear Foundation and Margaret Tait was Teacher of the Deaf in charge of the nursery at The Ewing School, Nottingham, where she developed her interest in video analysis. She began the education programme at Nottingham Cochlear Implant Programme with Sue Archbold in 1989, and recently concentrated on research at The Ear Foundation, before retiring in 2009.

Further reading

- ‘The use and reliability of Tait video analysis in assessing preverbal language skills in profoundly deaf and normally hearing children under 12 months of age’ by Margaret Tait et al in the *International Journal of Pediatric Otorhinolaryngology* 21 (February 2007)