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The Great Baby Signing Debate: academia meets public interest

'Baby signing' is an augmentative communication approach that has been developed for use with hearing preverbal infants. It involves teaching babies key word signing that they can use to communicate before they can talk. A baby signing movement is currently sweeping the country. Parents of infants everywhere are reading about the benefits of teaching 'sign' to their children and many are embracing this wholeheartedly. Numerous companies have been set up to promote and sell baby signing materials. All claim immense benefits to be had including facilitating spoken language development, reducing tantrums and even increasing a child's intelligence.

Sound great? This movement is stirring up quite a storm. It is evoking academic dispute, political and even moral arguments. For example does the hearing population have the right to 'hijack' sign language? Is there sufficient research evidence to support BS for hearing children? What about deaf babies, are their communication needs met adequately? These issues are getting 'academic air-time' and featured in a recent debate held by Centre for Deafness, Cognition and Language (DCAL, University College London) as part of the ESRC Festival of Social Science. My personal view is that baby signing has a lot to offer to typically and atypically developing infants. There is something good here and we should not throw the proverbial baby out with the bath water. In addition, this dispute raises many important issues about how we as psychologists deal with implementing and applying knowledge for use by society.

Communication difficulties and behavioural problems.

There is of course nothing new under the sun. Variants of BS have been used by Speech and Language Therapists for decades with children who have speech and/or cognitive impairments (e.g. Clibbens et al, 2002). Clinicians and researchers have highlighted the association between communicative difficulties and behavioural problems in the preschool years (e.g. Paul & Kellog 1997). This link can be explained both by co-morbidity and causal models. In the latter, difficulties communicating and the concomitant frustration, low self-esteem and lack of sense of self-efficacy that this brings, causes behavioural problems (Thorley 2000). A downward spiral of effect can ensue with negative parenting (potentially caused by the child's challenging behaviour) compounding the effect. It is widely recognised that communication is at the heart of child development- cognitive, social, emotional and behavioural (e.g. Vygotsky, 1978). It is therefore crucial that every child, hearing or deaf, experiences the best quality communication from the earliest age possible. Indeed in America, Siegal (2006) argues for a constitutional right to language and communication. He discusses the fundamental communication difficulties that deaf children face and the detrimental impact of these in all areas of their lives including their social, cognitive and educational development. Whether hearing preverbal infants 'need' additional support is one of the contentious issues here. My opinion is that often they do, especially if there are other risk factors involved. Members of the deaf community and those working with deaf infants (especially those of hearing parents) may argue that providing sign to hearing babies is an unnecessary luxury, as deaf children face a lack of provision to meet their communication needs.

Research issues.

Baby signs research. A major research issue is that while BS promoters claim various benefits verified in experimental research there is in fact a dearth of actual research. For some claims there are research studies that can be cited to back them up. For example, the American team led by Linda Acredolo and Susan Goodwyn have been responsible for driving research investigating the effects of BS on child development. They claim that babies readily acquire symbolic gestures when exposed to enhanced gesture training (what they initially

called their approach and later renamed Baby Signs). Furthermore they propose that those taught to sign experience many advantages including larger expressive and receptive spoken language vocabularies, more advanced mental development; a reduction in problematic behaviours like tantrums resulting from frustration; and improved parent-child relationships (Goodwyn, Acredolo, & Brown, 2000; Acredolo, et al., 1999). The mechanisms underlying these benefits include: an increased number of episodes of joint visual attention during interactions between parents and toddlers, known to be associated with improved language skills (Moore, Acredolo & Goodwyn, 2001); empowering of the infant to focus the topic and context of conversation; and the discussion and clarification of concepts (Acredolo et al., 1999). Goodwyn et al. (2000) propose that enhanced gesture training gives added practice with the symbolic function. Analogous benefits are found in the learning disabilities literature. Using augmentative signing (e.g. BSL and Makaton) with children with learning disability such as Down syndrome provides advantages in communicative competence, language and speech development and even speech intelligibility (Powell & Clibbens, 1994; Buckley, 1998).

Support for BS research. A key issue is to ensure that sufficient and appropriately designed research is available to back the claims made in relation to BS. Johnston et al (2005) reviewed 17 studies of the impacts of BS on normally developing hearing children. Although benefits of BS were reported in 13 out of these 17, Johnston et al conclude that certain, and varied, methodological weaknesses leave the evidence unconfirmed. Certainly research into the effects of BS needs better control groups of children e.g. who are involved in equally interesting and fun activities based around adult and child language interaction but not baby signing.

There is therefore some, although controversial, evidence that typically developing hearing children appear to benefit from exposure to BS. There are still many unanswered questions. For example do all typically developing hearing babies respond positively to BS or are there important individual differences relating to e.g. different language acquisition styles?

Research and anecdote. Not all claims made by the BS companies can be associated with proper research and are based on anecdotal evidence. For example many parents report benefits of BS and sing its praises feeling that it has greatly enhanced for example, their child's ability to communicate and hence their ability to respond appropriately to their child. These anecdotes are used to support and verify the BS approach, something that we scientists shy from. Of course anecdotal reports are not the stuff of science. Nevertheless they can provide sparks of inspiration to researchers. The observations of child development noted by one particular father of ten are testament to this. These observations were on the whole remarkably accurate even though they were made by a Dad with no training in developmental psychology some 130 years ago. The father was Charles Darwin (see Darwin, 1877), so not your run of the mill Dad but you get my point. Furthermore I have heard many positive anecdotes from a range of professionals working in early years communication e.g. speech and language therapists and health visitors. What researchers interested in early communication development need to do is to pursue the topics that are being raised as BS continues to grow.

Baby sign and deaf sign. BS is, as I've said, key word signing and does not involve the linguistic complexities of true Deaf Sign language. This indeed is a major point of contention for sign language researchers who would argue that we cannot simply extrapolate findings from studies of deaf children acquiring sign language to hearing children acquiring BS, and yet this is what some BS promoters have done. For example the 'increased brain activity' plug on www.babysigners.co.uk has a citation to a neuroimaging study of adult deaf native signers of American Sign Language (Bavelier et al, 1998) not hearing children exposed to baby signs.

Benefits for communicative function. Some of the major claims of benefits of BS relate to advancing language development. In some ways we may be barking up the wrong tree here. BS effects may be more generic involving efficacy in symbolic function especially symbolic gestures. One Deaf Sign research study by Capirci et al. (1998) reports a case study of 'Marco' an Italian hearing child of deaf parents. He was raised bilingual with spoken Italian and Italian Sign Language (LIS). Marco had his vocabulary spurt in spoken Italian first and then in the manual modality. Overall his vocabulary was within normal range for monolingual Italian children of his age, therefore there was no evidence of a Sign advantage. Marco used more representational gestures than deictics (in contrast to monolingual hearing infants who primarily use deictics). Volterra et al. (2006) suggest that exposure to Sign may enhance the awareness of the representational potential of gesture/sign. Marco also used combinations of 2 representational gestures at 20 months and used far more cross modal combinations than the monolingual controls in the study. My own observations of an infant exposed to baby signing was the same tendency to use representational gestures/signs/word combinations. This was the case even though the input was only key word signing (suggesting that access to full sign language is not necessary to bring about these effects). Furthermore many of this infant's 2 gesture combinations were supplementary in form (where both elements add information to the other, e.g. "SAD + ME"). Supplementary combinations of two representational gestures are never observed in normal hearing typically developing children (Capirci et al., 1996). Exposure to Sign may not enhance all aspects of language acquisition per se but may enhance representational gesture use- which is likely to have an important role in communicative function.

In this vein, Volterra et al. (2006) conclude that enhanced gesture input for hearing children catalyzes gesture acquisition and especially the use of representational form and hence symbolic communicative function. This enhancement they add is short-lived (between 12-15 months of age). However I would argue that this timescale represents only a general norm. The enhancement and advantage is far more extended in the many toddlers who are not speaking until well after their 2nd birthdays.

Language and gesture research. There are a number of other related areas of research that would in their findings and conclusions lend support to BS as an approach to facilitate communication. Face-to-face communication signals, such as gesture are a central part of human communication. Indeed Goldin-Meadow (1999) proposes that the imagistic and analogue gestures that accompany speech reflect thought and knowledge of the speaker/gesturer that is often not expressed in other more codified forms of communication, such as speech. If visual forms of communication are of central importance to typically developing hearing and speaking adults and children, how much more important will they be if an individual does not have access to spoken language for communication e.g. preverbal infants.

Indeed gestures seem closely linked to the development of spoken language with deictic pointing correlated with first word onset (Bates et al., 1979). Goldin-Meadow (1999) proposes that gesture is a 'way-station' on the road to language over both ontogenetic and evolutionary time. Similarly Corballis (2002) proposes that hand gestures and spoken language are integrally linked in human evolution. He claims that language developed from and within gesture systems rather than from vocal calls. We see clear developments in the use of gesture in children as they develop and acquire language. For example, infants first use pointing to request (around 10-12 months) and then later (around 18 months) to comment on object and events.

Infants use gesture plus word combinations to form 2-item strings e.g. "give"+ point to a cup = "give cup". The use of these 2-item gesture/word strings is predictive of the development of 2-word strings (Bates et al., 1979). Capirci, Iverson, Pizzuto and Volterra (1996) report that 16-20 month old Italian babies produced many gesture + word combinations (mostly

complementary where a single referent is singled out by a deictic gesture e.g. *flowers* + POINT to flowers). Combinations of 2 gestures were rare and 2 representational gestures never seen. This may be because babies are seldom exposed to representational gestures and probably never witness combinational sequences of representational gestures. Supplementary combinations increased between 16 and 20 months where each of the combined elements added information to the other (e.g. ALL GONE + *apple*), but again these were primarily gesture-word combinations rather than gesture-gesture. In addition children didn't produce 2-word utterances until they had produced supplementary utterances (see also Butcher & Goldin-Meadow, 2000). As discussed earlier, in hearing infants taught key word signing, there is an extension of this pattern in that there are more gesture + gesture combinations before the occurrence of 2-word utterances. Furthermore these gestures are more likely to be representational rather than just deictics in baby signers.

Effects of language input to deaf children. The study of the impact of gesture or Sign on language development in hearing infants is therefore extremely interesting and raises many issues relating to the evolutionary and ontogenetic development of language. In deaf children the plot thickens as they of course do not have full access to spoken language input. Goldin-Meadow (1998) states that deaf children born into hearing families are without an external language model as they cannot hear the spoken language around them and their parents cannot use sign language. She reports data showing that such children develop their own system of homesigns, gestures that stand for words. Furthermore, these are formed into 'sentences' with structure akin to the ergative structures of natural languages. For example there was some evidence that, when produced (and these structures were infrequent in her dataset), transitive actors occurred in second position after the verb (e.g. eat *you* apple). I have also witnessed a similar second position placement of the subject by a hearing infant taught BS. Around his second birthday he spontaneously began stringing signs together although this was not 'modelled' to him by any adults. Furthermore he could hear and therefore had full access (and comprehension) of spoken English and hence had a model of language in which this structure was never used. Yet his spontaneous 'sign sentences' often had the following structure that does not match what he would hear in spoken language: 'SWIM BROTHER'; 'EAT ME'; 'SAD ME'. If this pattern was found to be reliable across more children it would of course be immensely relevant to questions about the role of environmental input in language acquisition.

Baby sign or BSL in the early years. BS is clearly a much impoverished Sign input in comparison to full sign language (indeed many would argue baby *sign* is a misnomer and should be substituted with something like 'enhanced gesture input'). In relation to this, just as there are special characteristics of child directed speech (e.g. Singh, Morgan, & Best, 2002), there are also special features of child directed signing. When we look at deaf mothers of deaf infants we see that they use a number of strategies to facilitate communication with their children that involve simplification of their signing. Child directed signing tends to be simpler for example often lacking the facial expression markers of questions, and following a more linear subject-verb-object form in contrast to adult directed signing (Kantor, 1982). Changes towards a more complex adult structure occur around 2.5- 3 years of age, probably reflecting the increasing linguistic skills of the child. Certainly it is of interest and relevance to issues of BS that even deaf, fluent signers simplify their signing input to very young children.

In addition, Waxman and Spencer (1997) report that deaf mothers are more likely to use tactile signals (e.g. shoulder tapping) to get their infant's attention before signing. Furthermore the signs themselves tend to be produced rhythmically and to be enlarged and slowed. When deaf mothers wish to refer to an object they are more likely to move the object towards their own face in preparation for the signed message, and importantly are more likely to wait for their child's attention to shift before signing their message compared with signing hearing mothers who often sign before the infant attends. The effect of parents being 'deaf aware', in this way, on the development of deaf children is illustrated by Spencer (2004) who

showed that deaf infants of hearing parents were behind in terms of vocabulary development (sign and words) compared with deaf babies of deaf parents or hearing children of hearing parents. Whether this deficit for deaf babies of hearing parents is associated with poor signing per se or something else e.g. poor attention management is a very important issue especially in relation to BS and the training that should be given to hearing parents of deaf children.

The next step

Parents of today are flooded with advice from government and health agencies, the media and scientists about how to raise their children. The BS movement is only one small part of this. Not all of this advice is based on solid scientific findings and we live in hope that on the whole effects are more positive than negative. However as with every new venture there may be many as yet unforeseen effects of the BS movement. For example do the benefits justify the parental investment of effort? Is this effort actually brought to balance by more effective parenting? The only way to steer this in the 'right' direction is by gaining a better scientific understanding of the effects of BS on both infants and parents.

From my perspective it is unimportant whether BS brings about any type of 'accelerated development'. Why would this be important or indeed desirable in normally developing children? What is crucial is that communication skills, interactional style, and the social/emotional environment are set in good stead for all infants, especially those 'at risk'. For example BS is an excellent preventative measure for infants who are 'late talkers'. For me there are 3 different levels of support for BS: first there is indicative, if not evidentially strong, evidence from BS research for benefits; second there is related evidence from deaf sign and hearing gesture / language research; third there is compelling anecdotal support from families who have embraced the approach. From a researcher's perspective BS provides a fantastic window into the ontogenetic as well as evolutionary development of language. So certainly a field of research ripe for developing if anyone is up for the challenge.

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