

Let's not forget the role of deafness in sign/speech bilingualism*

BENCIE WOLL

ESRC Deafness, Cognition and Language Research Centre (DCAL), University College London, UK

MAIRÉAD MACSWEENEY

ESRC Deafness, Cognition and Language Research Centre (DCAL), University College London, UK Institute of Cognitive Neuroscience, University College London, UK

(Received: May 15, 2015; accepted: June 08, 2015; first published online 2 July 2015)

Emmorey, Giezen and Gollan (Emmorey, Giezen & Gollan) address the fascinating question of what can be learnt about language, cognition and the brain from the unique group of people who have grown up learning both a signed and a spoken language. The focus of their review is hearing individuals – referred to as hearing bimodal bilinguals. The review presents an excellent overview of research in this field and highlights the unique insights that this population can provide.

However, the review leaves open an important question: to what extent can research with hearing bimodal bilinguals inform our understanding of the consequences of sign–speech bilingualism in *deaf* people? The answer is probably less than we would wish.

The first issue to consider is one of terminology. Emmorey et al. (Emmorey et al.) refer to deaf bilinguals as ‘deaf bimodal bilinguals’ just as the term is applied to ‘hearing bimodal bilinguals’. However, the use of the term ‘bimodal’ is confusing. Hearing individuals who are bilingual in sign and speech indeed access their languages via two different modalities (here meaning senses): primarily auditory for speech and visual for sign. For those born deaf, access to BOTH languages is through the visual modality. Thus, the application of the term ‘bimodal’ to this group appears misleading. For the sake of clarity in the field it is perhaps more appropriate to refer to these individuals as ‘deaf unimodal sign–speech bilinguals’ or for precision ‘deaf sign language and spoken/written language bilinguals’.

The use of these terms may be rejected by some in the field who prefer the term *sign–print bilinguals* (Piñar, Dussias & Morford, 2011; Kubus, Villwock, Morford & Rathmann, 2014). This makes the strong assumption that written text exists in isolation of what it actually represents – speech. Yet there is ample evidence that deaf

signers make use of elements that are recognisable as being derived from spoken language.

As Emmorey et al. (Emmorey et al.) comment in the final section of their paper “... mouthings from spoken language words ... are often produced silently and simultaneously with signs.” The mouthings referred to are mouth actions (silent – not whispered) produced by deaf signers which represent words from the surrounding dominant spoken language. For the most part the semantics of the mouthing and sign are the same (Bank, Crasborn & van Hout, 2011). This phenomenon has been observed and studied in a large number of sign languages, beginning with the work of Vogt-Svendsen on Norwegian Sign Language (Vogt-Svendsen, 1981; 2001), and including studies of non-Western sign languages such as Adamorobe Sign Language (Ghana) (Nyst, 2007), and Inuit Sign Language (Schuit, 2013) as well as studies of British Sign Language (Sutton-Spence & Day, 2001; Sutton-Spence, 2007), Irish Sign Language (Mohr, 2012), German Sign Language (Hohenberger & Happ, 2001), and Sign Language of the Netherlands (Schermer, 1990). Although there has been very little study of mouthing in ASL, Nadolske & Rosenstock (2007) have demonstrated that the use of mouthing in ASL is comparable to that found in other sign languages. Indeed, the only sign language which has been reported not to make use of mouthings is Kata Kolok, a sign language used by a village community on Bali (de Vos & Zeshan, 2012).

There is ongoing debate about the linguistic status of mouthings, with many studies describing mouthings as part of the sign language lexicon – i.e., the lexical representations of signs includes both oral and manual information (Vogt-Svendsen, 2001; van de Sande & Crasborn, 2009); other researchers have argued the opposite: mouthings and signs are represented and accessed independently and reflect knowledge of two languages (Ebbinghaus & Hessmann, 2001; Vinson, Thompson, Skinner, Fox & Vigliocco, 2010). Using fMRI with deaf native signers we have reported that BSL signs with speech-like mouth actions showed greater superior

* We acknowledge the support of a Wellcome Trust Fellowship to MM (GR075214MA) and a Centre Grant from the Economic and Social Research Council of Great Britain (RES-620-28-6001) to B.W. and M.M.

Address for correspondence:

Mairead MacSweeney, Institute of Cognitive Neuroscience, University College London, 17 Queen Square London WC1N 3AR
m.macsweeney@ucl.ac.uk

temporal activation, whereas signs made with nonspeech-like mouth actions showed more activation in posterior and inferior temporal regions (Capek et al., 2008). Thus, the brain does appear to care about the status of mouthings used in signed languages. This finding suggests that consideration of mouthings, vis a vis code-blends, is crucial to any discussion of bilingualism in a signed and spoken language, especially in relation to deaf signers.

Evidence for the influence of elements of speech on signed languages also comes from fingerspelling. The pattern of ‘reductions’ in fingerspelling by skilled signers indicate that they do not reduce fingerspellings randomly or arbitrarily. Rather their reductions reflect speech rather than simply orthography. For example, in reducing the fingerspelling of the name CHARLES, this is more likely to be reduced to -C-H- than to -C- (Sutton-Spence, 1994).

Research which considers deaf individuals as bilinguals is much rarer than studies of their hearing siblings, which reflects the size of the different populations. An additional factor influencing the difficulty of conducting research in this field is, as Emmorey et al. (Emmorey et al.) point out, the great variability in spoken (and signed) language proficiency within the deaf population, in terms of spoken language comprehension (lipreading) (e.g., Mohammed, Campbell, MacSweeney, Barry & Coleman, 2006) and production, and indeed in accessing a spoken language via text – reading (e.g., Mayberry, del Giudice & Lieberman, 2011). However, this variability should not be a reason to ignore the role of spoken language when considering deaf sign–speech bilinguals.

Although the literature is mixed, at least some studies with deaf adults and children indicate a role for speech phonology when deaf people read text (see Mayberry et al., 2011). This variability suggests that there may be many routes to successful reading for a deaf person. That some deaf people do not appear to make use of speech phonology in their skilled reading is not, we argue, cause to ignore the role that awareness of speech structure may play in the development of reading skills or indeed the enduring role it may play in reading and reading-related skills for some deaf people (e.g., MacSweeney et al., 2009; Emmorey, Weisberg, McCullough, Petrich & Emmorey, 2013).

Whilst studies of hearing bimodal bilinguals can provide great insights into language, cognition and the brain, future research which considers their deaf siblings as ‘sign language–spoken language’ bilinguals may prove even richer.

References

Bank, R., Crasborn, O., & van Hout, R. (2011). Variation in mouth actions with manual signs in Sign Language of the Netherlands (NGT). *Sign Language & Linguistics* 14(2): 248–270.

- Capek, C., Woll, B., MacSweeney, M., Waters, D., David, A.S., McGuire, P.K., Brammer, M., & Campbell, R. (2008). Both Hand and Mouth: Cortical correlates of lexical processing in BSL and speechreading. *Journal of Cognitive Neuroscience*, 20(7), 1220–1234.
- de Vos, C., & Zeshan, U. (2012). Demographic, sociocultural and linguistic variation across rural signing communities. In U Zeshan & C de Vos (eds.) *Sign languages in village communities: anthropological and linguistic insights*. Berlin: Walter de Gruyter, pp. 2–23.
- Ebbinghaus, H., & Hessmann, J. (2001). Sign language as multidimensional communication: why manual signs, mouthings and mouth gestures are three different things. In P. Boyes-Braem, & R.L. Sutton-Spence, (Eds.) *The hands are the head of the mouth: the mouth as articulator in sign languages*. Hamburg: Signum Press, pp. 133–151.
- Emmorey, K., Giezen, M. R., & Gollan, T. H. (in press). Psycholinguistic, cognitive, and neural implications of bimodal bilingualism. *Bilingualism: Language and Cognition*. doi: 10.1017/S1366728915000085
- Emmorey, K., Weisberg, J., McCullough, S., & Petrich, J. A. F. (2013). Mapping the reading circuitry for skilled deaf readers: An fMRI study of semantic and phonological processing. *Brain and Language*, 126, 169–180.
- Hohenberger, A. & Happ, D. (2001). The linguistic primacy of signs and mouth gestures over mouthing: evidence from language production in German Sign Language. In P. Boyes-Braem, & R.L. Sutton-Spence, (Eds.) *The hands are the head of the mouth: the mouth as articulator in sign languages*. Hamburg: Signum Press, pp. 153–190.
- Kubus, O., Villwock, A., Morford, J.P., & Rathmann, C. (2014). Word recognition in deaf readers: Cross-language activation of German Sign Language and German. *Applied Psycholinguistics*. DOI: <http://dx.doi.org/10.1017/S0142716413000520>. Published online: 27 January 2014.
- MacSweeney, M., Brammer, M., Waters, D., & Goswami, U. (2009). Enhanced activation of the left inferior frontal gyrus in deaf and dyslexic adults during rhyming. *Brain* (132), 1928–1940
- Mayberry, R. I., del Giudice, A. A., & Lieberman, A. M. (2011). Reading achievement in relation to phonological coding and awareness in deaf readers: A meta-analysis. *Journal of Deaf Studies and Deaf Education*, 16, 2, 164–188
- Mohammed, T., Campbell, R., MacSweeney, M., Barry, F., & Coleman, M. (2006). Speechreading and its association with reading among deaf, hearing and dyslexic individuals. *Clinical Linguistics & Phonetics* 20(7–8), 621–630
- Mohr, S. (2012). The visual-gestural modality and beyond: mouthings as a language contact phenomenon in Irish Sign Language. *Sign Language & Linguistics* 15(2): 185–211.
- Nadolske, M.A., & Rosenstock, R. (2007). The occurrence of mouthings in American Sign Language: a preliminary study. In P. Perniss, R. Pfau, & M. Steinbach (Eds.) *Visible variation: comparative studies on sign language structure*. Berlin: Mouton de Gruyter, pp. 35–62.
- Nyst, V.A.S. (2007). *A descriptive analysis of Adamorobe Sign Language (Ghana)*. Utrecht: LOT.
- Piñar, P., Dussias, P., & Morford, J. (2011). Deaf readers as bilinguals: an examination of Deaf readers’ print

- comprehension in light of current advances in bilingualism and second language processing. *Language and Linguistics Compass* 5: 691–704.
- van de Sande, I., & Crasborn, O. (2009). Lexically bound mouth actions in Sign Language of the Netherlands: a comparison between different registers and age groups. *Linguistics in the Netherlands* 26: 78–90.
- Schermer, T. (1990). *In search of a language: Influences from spoken Dutch on Sign Language of the Netherlands*. Delft: Eburon.
- Schuit, J. (2013). Signing in the Arctic: external influences on Inuit Sign Language. In U. Zeshan, & C. de Vos, (Eds.). *Sign languages in village communities: anthropological and linguistic insights*. Berlin: Walter de Gruyter, pp. 181–208.
- Sutton-Spence, R.L. (1994) The role of the manual alphabet and fingerspelling in British Sign Language. PhD Thesis, University of Bristol
- Sutton-Spence, R.L. (2007). Mouthings and simultaneity in British Sign Language. In M. Vermeerbergen, L. Leeson, & O. Crasborn (Eds.) *Simultaneity in signed languages*. Amsterdam: John Benjamins, pp. 147–162.
- Sutton-Spence, R.L., & Day, L. (2001). Mouthings and mouth gestures in British Sign Language (BSL). In P. Boyes-Braem & R.L. Sutton-Spence (eds.) *The hands are the head of the mouth: the mouth as articulator in sign languages*. Hamburg: Signum Press, pp. 69–86.
- Vinson, D.P., Thompson, R., Skinner, R., Fox, N., & Vigliocco, G. (2010). The hands and mouth do not always slip together in British Sign Language: dissociating articulatory channels in the lexicon. *Psychological Science* 21(8): 1158–1167.
- Vogt-Svendsen, M. (1981). Mouth position & mouth movement in Norwegian Sign Language. *Sign Language Studies* 33(1): 363–376.
- Vogt-Svendsen, M. (2001). A comparison of mouth gestures and mouthings in Norwegian Sign Language (NSL). In P. Boyes-Braem & R.L. Sutton-Spence (Eds.) *The hands are the head of the mouth: the mouth as articulator in sign languages*. Hamburg: Signum Press, pp. 9–40.