BSL Research

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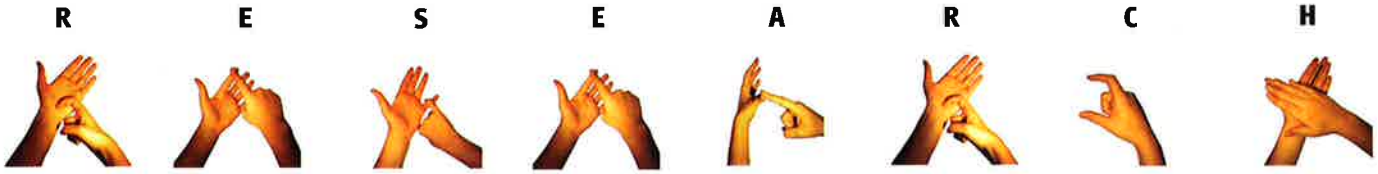
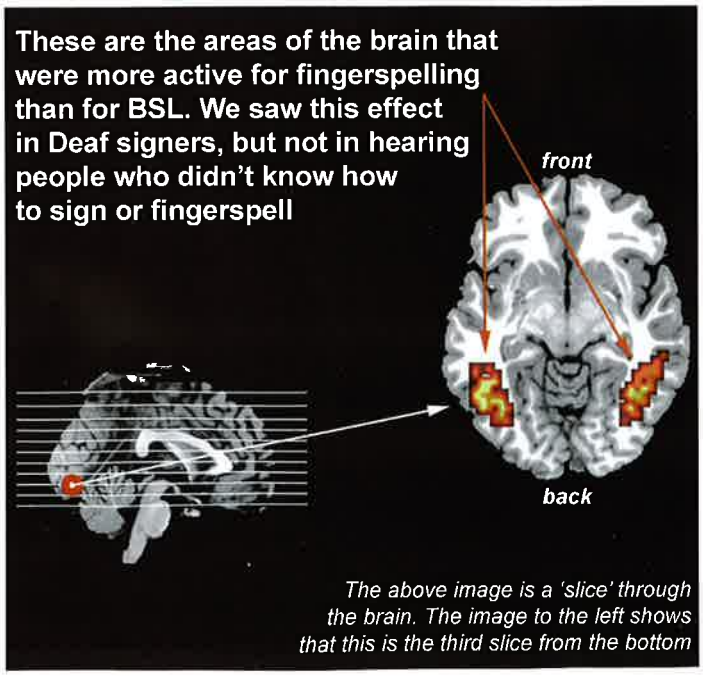


How the brain understands fingerspelling



There has been a good deal of research about how signed languages, like BSL, are processed in the brain. Studies have involved signers from the UK, USA, Sweden and Japan amongst other parts of the world, and findings have shown that many of the areas of the brain used for spoken languages are also used for signed languages. In particular, activity seems to be greatest on the left side of the brain, just as for spoken languages.

Signers most often communicate using signs. However, signers can also use fingerspelling – mostly to spell out the names of people and places, but also for concepts or ideas for which there may not be a sign (at that time). Compared to the attention signed language has received, research on how the brain processes fingerspelling has only just begun. Fingerspelling and signed language are similar in many ways. Both are made using moving hands and fingers, and both unfold over time. But since fingerspelling is made-up of letters, it is also like writing. This is why some people believe that fingerspelling could be a 'bridge to reading' for deaf children.

In a recent brain scan study, we compared the active brain areas used for looking at fingerspelling with those for looking at BSL. In Deaf native signers, the areas of the brain active for fingerspelling were very similar to those for BSL. Both fingerspelling and BSL activated areas at the front (frontal lobe) and side (temporal lobe) of the left and right sides of the brain. As with our previous studies, the left side appeared more active than the right. This suggests that the brain treats fingerspelling and BSL,similarly.

We also found that one particular region of the brain was more active for fingerspelling than BSL. This region is at the back of the brain, roughly behind the earlobes, and called the 'fusiform gyrus' (see figure). Studies have shown that the fusiform gyrus is particularly active when people read, and that it is under-active in hearing children with reading difficulties. The fusiform gyrus may be important in reading because it helps us to recognise the individual letters of words – no matter how they might appear. For example, we might see the letter 'g' in many different ways:

g G *g* g G

However, regardless of the kind of lettering used, we are still able to recognise what we see as the letter 'g'.

Interestingly, we found that the fusiform gyrus was more active when Deaf signers saw fingerspelling than when they saw BSL (see figure). The same was not true of hearing people who didn't know fingerspelling or BSL. Other studies have shown that this region is also active in blind people when they read using Braille (patterns of raised dots representing the letters of the alphabet, which are 'read' with the fingers). Therefore, it is possible that the fusiform gyrus is involved in recognising letters in whatever form they appear – whether they are part of written words, fingerspelled words, or Braille words.

The finding that fingerspelling particularly activates a part of the brain we know is important in reading, suggests that there may be a link between reading and fingerspelling knowledge. This may lend some support to the widely held view that fingerspelling can help deaf children learn to read.

However, there may be other ways to interpret our findings. For example, in terms of the number of movements and handshapes involved, a fingerspelled word is typically more complex than a single sign. Therefore, fingerspelling may generate more activity than signing in the brain generally – and this greater activity might not be related to fingerspelling being made up of letters.

More studies are therefore necessary to find out which of these explanations accounts for the pattern we have seen in our study. This research will help us establish whether there really is a relationship between reading and fingerspelling in the brain. Such a finding may then inform how we teach deaf children to read in the future.

For more information, visit the 'Publications' page on the Imaging the Deaf Brain website: www.ucl.ac.uk/HCS/deafbrain, or email: d.waters@ich.ucl.ac.uk

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