

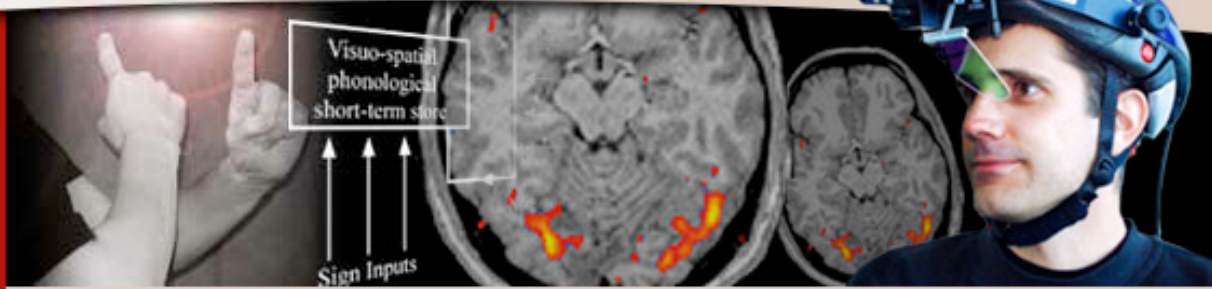


**LLCN**

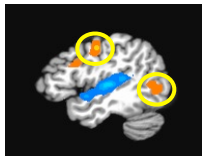
LABORATORY FOR LANGUAGE  
AND COGNITIVE NEUROSCIENCE

**SAN DIEGO STATE  
UNIVERSITY**

Laboratory for Language  
and Cognitive Neuroscience  
6495 Alvarado Road #200  
San Diego, CA 92120

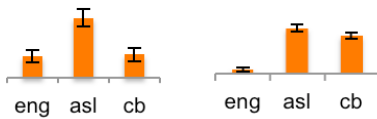


## The neural correlates of comprehending ASL-English code-blends



L Precentral gyrus

L occip. temp.



Bimodal bilinguals fluent in English and American Sign Language (ASL) often “code-blend”, producing signs and words simultaneously. We recently showed that code-blending facilitates comprehension in both languages (Emmorey et al., 2012). In a new study, we investigated the neural basis of this facilitation using fMRI to examine cortical recruitment during bimodal bilingual perception of code-blends. Fourteen hearing native ASL-English bilingual adults made semantic decisions (“Is it edible?”) to audiovisual clips of a native hearing signer producing a) an ASL sign; b) a spoken English word; or c) a sign and spoken word simultaneously. We presented two 30s task blocks of each condition (10

trials/block) and control blocks displaying signer at rest. Code-blending recruited a combination of brain regions active for each language alone, with increased activation for simultaneous perception of sign and speech in relevant modality-specific regions (auditory cortex and visual cortex). We also found reduced activation during code-blend comprehension, compared to ASL alone, in several regions, including bilateral occipitotemporal cortex (visual motion perception area) and left precentral gyrus (motor function area). These decreases may be a neural reflection of the behavioral facilitation found for code-blend comprehension. Increased activity during ASL comprehension may also reflect greater effort during ASL processing when cues from spoken English are absent.

Weisberg, J., McCullough, S., Petrich, J. & Emmorey, K. (2014). The neural correlates of comprehending American Sign Language-English code-blends. To be presented at the International Society of Gesture Studies, July, San Diego.

## Cross-linguistic competition and inhibitory control in bimodal bilinguals

Findings from recent studies suggest that spoken-language bilinguals engage nonlinguistic inhibitory control mechanisms during auditory word recognition to resolve perceptual competition between similar-sounding words in their two languages. Using eye-tracking techniques, we investigated the extent of inhibitory control recruitment during auditory word recognition in ASL-English bilinguals, whose two languages do not perceptually compete. Relative to a control group of English monolinguals, ASL-English bilinguals looked longer at cross-linguistic phonological competitors (for instance, a picture of *train* when hearing the target word ‘chair’; the ASL signs for TRAIN and CHAIR are phonologically related) than at unrelated distracters in the first 500ms post word-onset, suggesting they co-activated ASL signs during English auditory word recognition. Furthermore, cross-linguistic competitor activation correlated significantly with performance on a spatial Stroop task, a measure of nonlinguistic inhibitory control. Smaller Stroop effects (indexing more efficient inhibition) were associated with reduced competitor activation during the early stages of auditory word recognition. These results suggest that the role of inhibitory control in bilingual auditory word recognition is not limited to resolving perceptual competition in phonological input, but is also used to moderate competition between two languages in different articulatory and perceptual modalities.

Giezen, M.R., Blumenfeld, H.K., Shook, A., Marian, V., & Emmorey, K. (under review). Parallel language activation and inhibitory control in bimodal bilinguals.

**THANK YOU!** None of our studies could happen without the contributions of hearing signers like yourselves. We would like to take the opportunity to thank each of you who have generously given your time. For more info, [www.emmoreylab.sdsu.edu](http://www.emmoreylab.sdsu.edu)