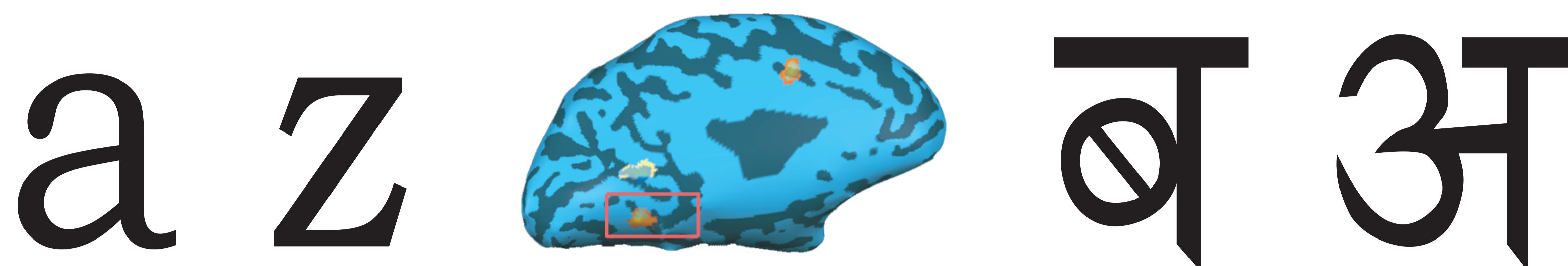


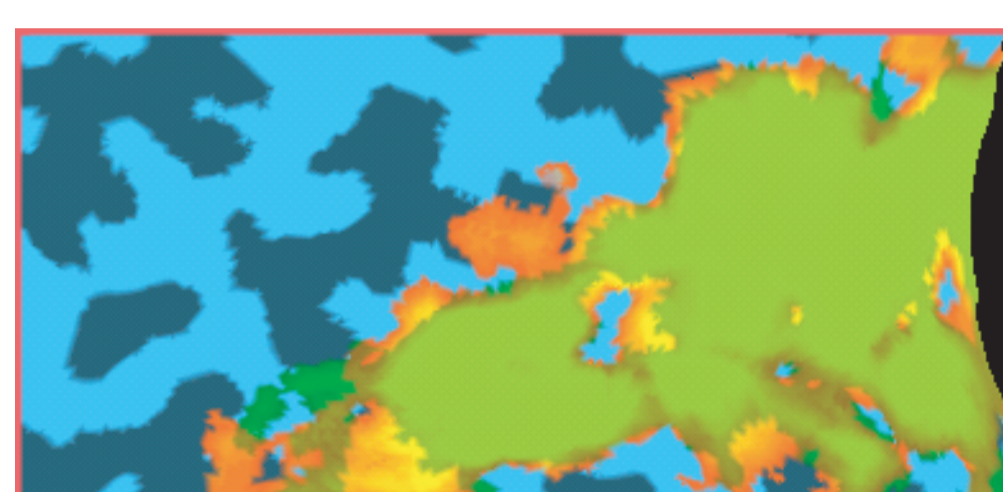
Where are letters processed and learned?

Neural specialization for letter processing under different learning conditions

Ragnar Steingrímsson, Najib Majaj, Denis Pelli — New York University

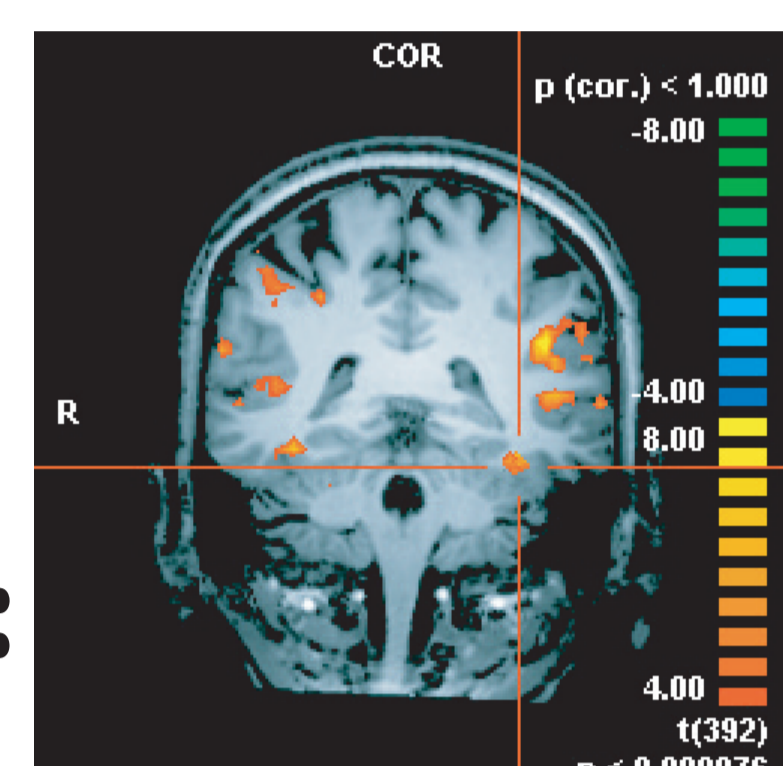


Fluent



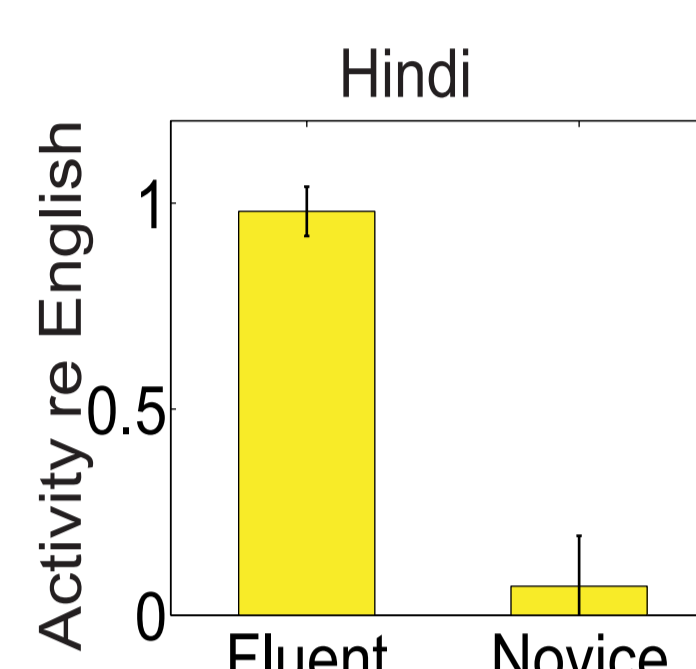
Fluent English (yellow) and fluent Hindi (green) minus blank

Fluent vs. Novice:

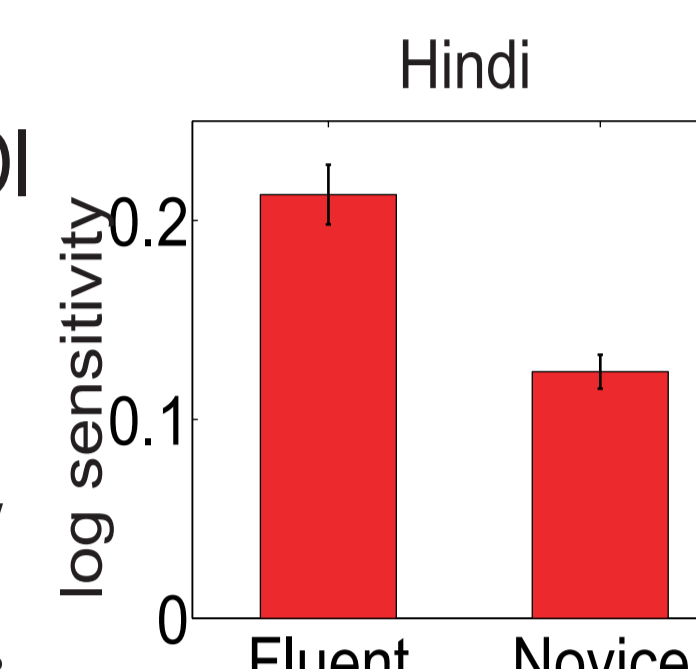


Fluent English minus novice Hindi

The fMRI slice shows fluent English minus novice Hindi activation. The crosshairs indicate the only region in the Fusiform Gyrus responding more to English than Hindi. That is our Region Of Interest (ROI).

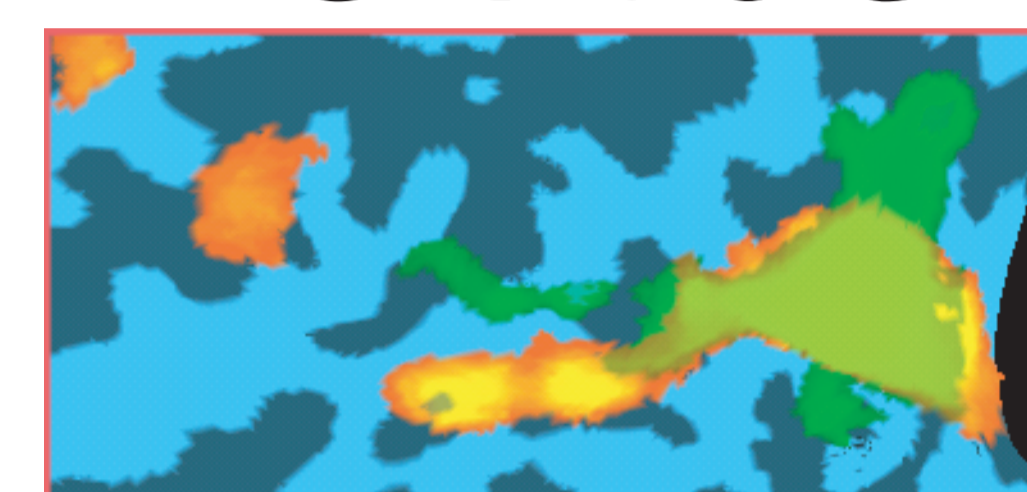


The yellow bars show ROI activation by Hindi for fluent and novice observers normalized by fluent English activation. Fluency increases activation.



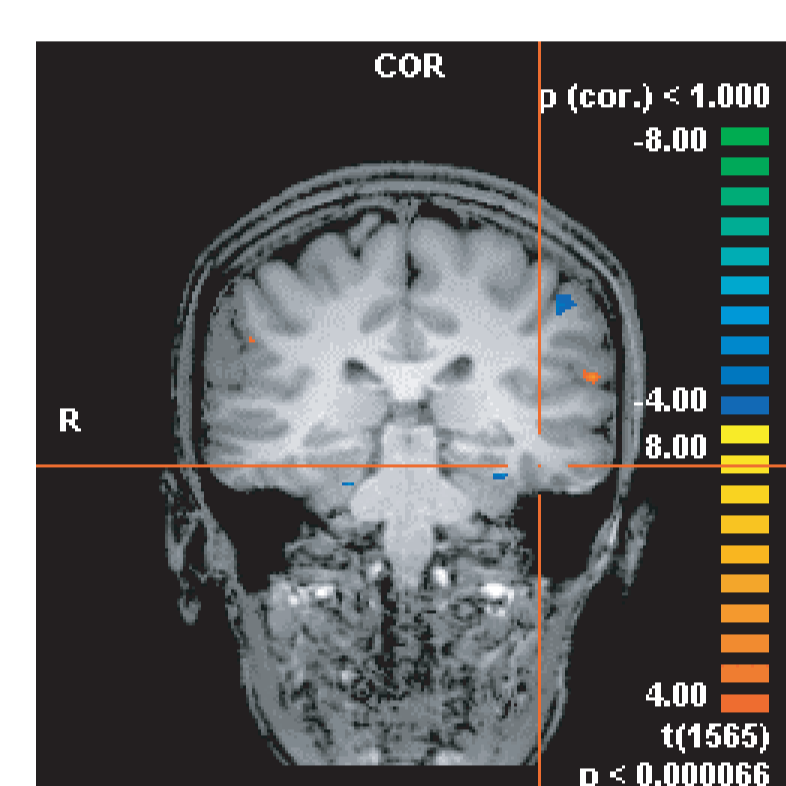
The red bars show the sensitivity (1/contrast) for identifying Hindi letters by fluent and novice observers. Fluency increases sensitivity.

Novice



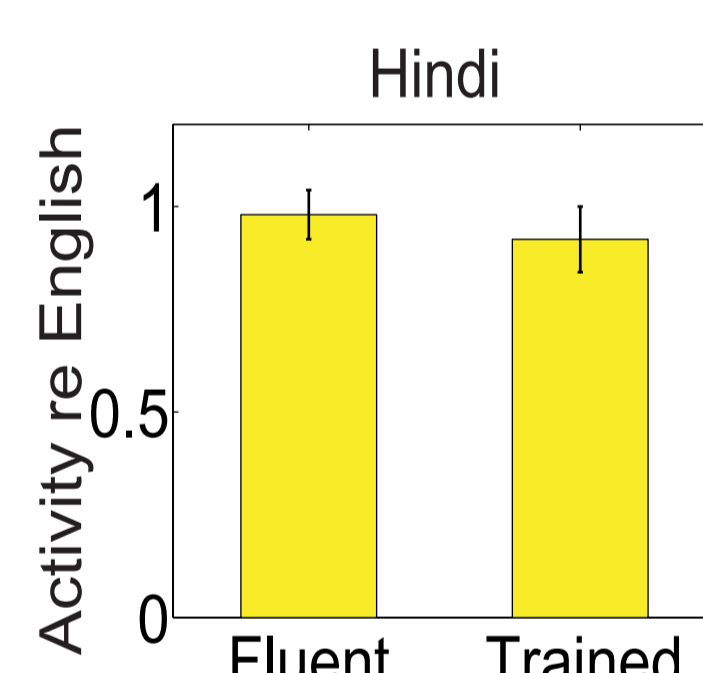
Fluent English (yellow) and novice Hindi (green) minus blank

Fluent vs. Trained:

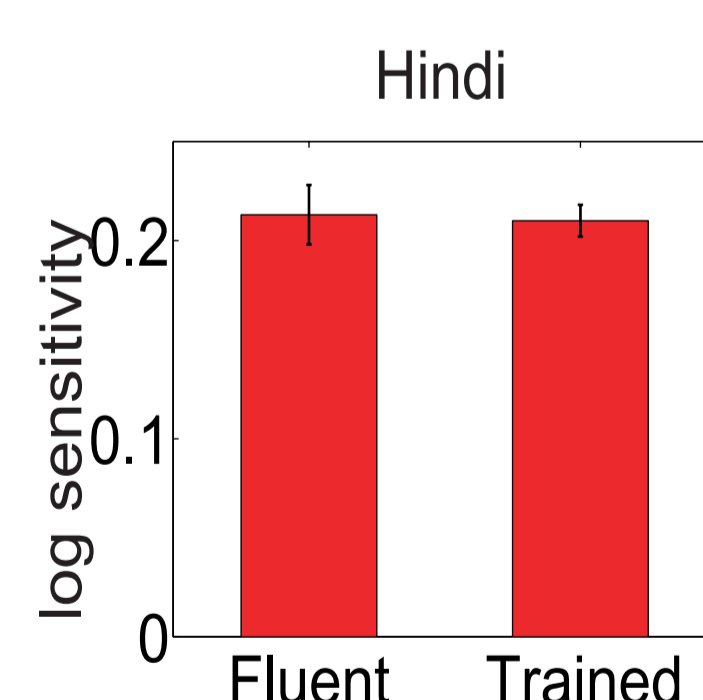


Fluent English minus trained Hindi

The fMRI slice shows fluent English minus trained Hindi activation. The crosshairs indicate the ROI defined above, showing no more activation for English than Hindi.

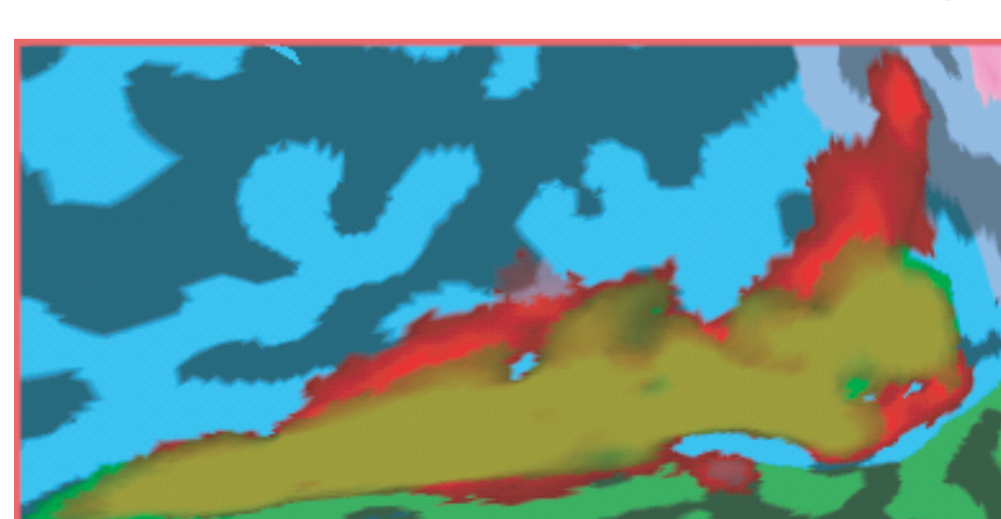


The yellow bars show ROI activation by Hindi for fluent and trained observers, normalized by fluent English activation. They're the same.



The red bars show the sensitivity (1/contrast) for identifying Hindi letters by fluent and trained observers. They too are the same.

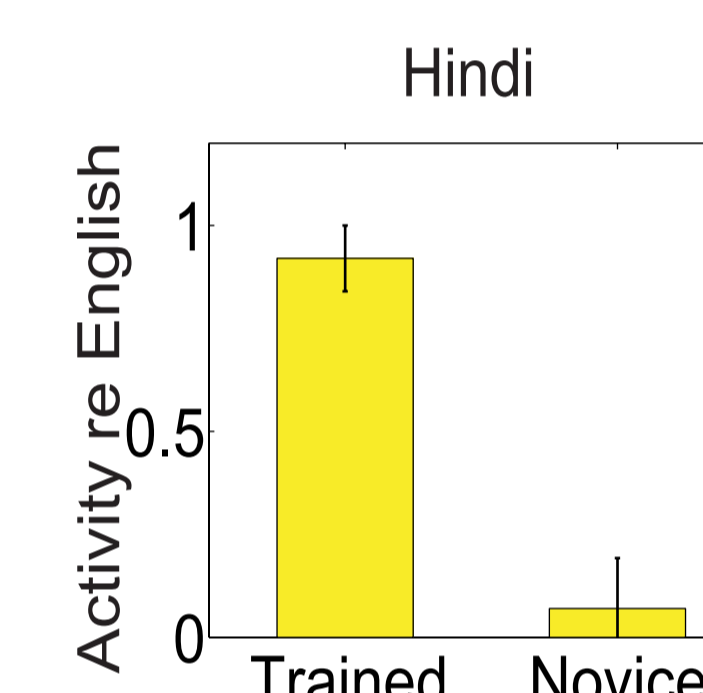
Trained



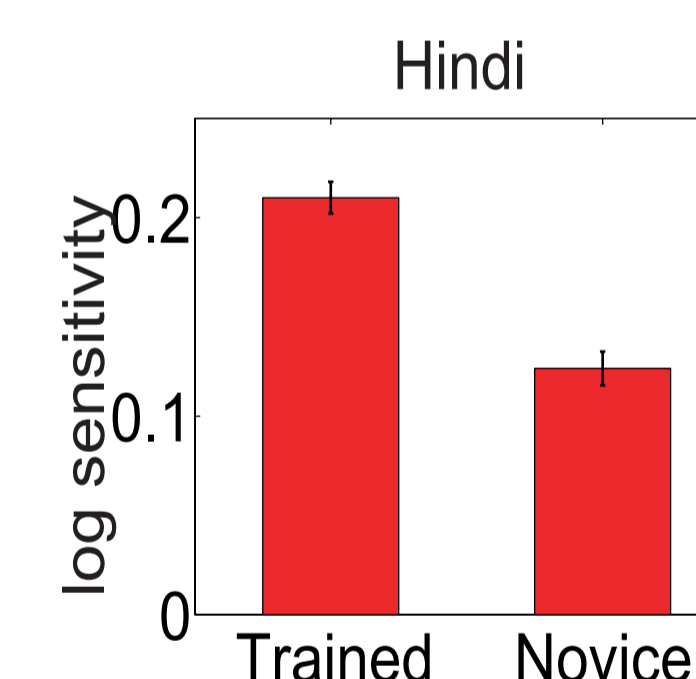
Fluent English (green) and trained Hindi (red) minus blank

CONCLUSION — Comparing activity for identifying letters in familiar and unfamiliar alphabets defines a letter area in the fusiform gyrus. Comparing activity before and after training identifies the same area.

Trained vs. Novice:



The yellow bars show ROI activation by Hindi for trained and novice subjects, normalized by fluent English activation. Training increases activation.



The red bars show the sensitivity (1/contrast) for identifying Hindi letters by trained and novice observers. Training increases sensitivity.

METHOD: Observers viewed a sequence of three letters in visual noise, one after the other. They were then asked to identify the "odd-man out," the letter that differed from the other two. An answer screen followed, showing four possible letters from which to choose. We tested a familiar alphabet, English, and an unfamiliar alphabet, Hindi. All observers were fluent in English. In Hindi, some were novice, some were trained, and some were fluent. Threshold contrast was determined for each observer to equate the difficulty of the conditions. After 2,000 trials of training, novice observers' thresholds reached that of fluent readers.