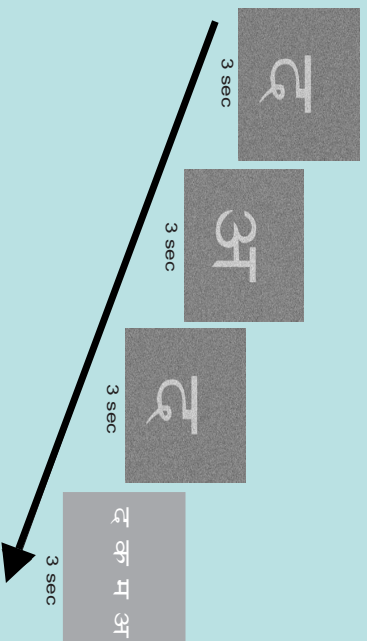


WHERE ARE LETTERS LEARNED? AN fMRI STUDY

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INTRODUCTION

How modular is the brain? Polk et al. (2002) identify a brain area in the fusiform gyrus that seems to be specialized for letter processing, responding more to known letters than to digits or shapes. We have found that within 2,000 trials, observers' sensitivity for identifying letters of an unfamiliar alphabet improves to match that of fluent readers. Do these unfamiliar letters activate the "letter area"? How does the activation change with learning?



Task: Participants 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.

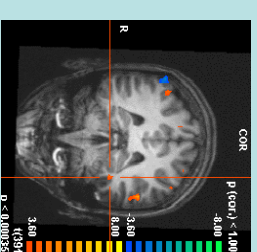
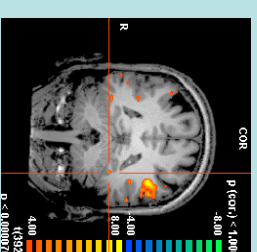
METHOD

Pre-scan: Threshold contrast was determined for each participant to equate the difficulty of the conditions. **Scan:** Conditions during the fMRI scan included English/Blank, Hindi/Blank, and English/Hindi. Blank conditions were the same as the other conditions but with no letters.

Post-scan: Training involved repeating the task with the Hindi condition over 2,000 trials, which allowed the participants to attain the same proficiency in identifying letters of the Hindi alphabet as fluent readers of Hindi (Pelli et al. 2003).

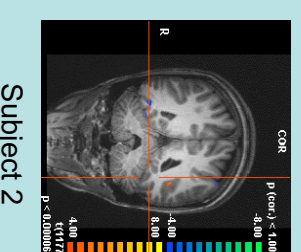
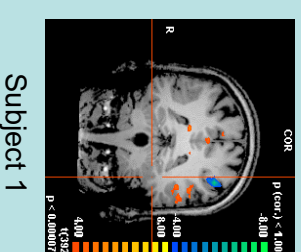
RESULTS

BEFORE: English and Hindi activated the same area in the fusiform gyrus, but English activation was stronger. The images show English minus Hindi activation.



DURING: We measured the *threshold contrast*, the faintest contrast at which the observer can identify the letter correctly 95% of the time. Before training, threshold contrast for English was half that for Hindi. After 2,000 trials of identifying Hindi letters, the observers' threshold contrast for Hindi improved to reach that of fluent Hindi readers.

AFTER: English and Hindi still activate the same area, but the activations are now equal (statistically indistinguishable).



CONCLUSION

Familiar and unfamiliar alphabets are processed and learned in the same part of the fusiform gyrus.