

# How input modality and visual experience affect the neural encoding of categorical knowledge

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Is conceptual knowledge implemented in the brain based on representation that are abstracted from any sensory features, or, alternatively, relies on the activation of representations that are bounded to the input modality and based on sensory experience? To test these conflicting views, we used fMRI to characterize the brain responses to 8 conceptual categories presented acoustically in sighted and early blind individuals, and visually in a separate sighted group. We observed that the right posterior middle temporal gyrus (rpMTG) is the region that most reliably decode categories and selectively correlate with conceptual models of our stimuli space independently of input modality and visual experience. However, rpMTG maintained separate representational format between audition and vision, suggesting distinct representational geometries across the senses. We also observed a robust enhancement in decoding auditory categories in the occipital cortex of blind individuals. Interestingly, this effect was lateralized to the right hemisphere. We then correlated the representational geometries extracted from the sighted group in vision with those from separate groups of blind and sighted in audition in regions that typically show categorical preference for faces (FFA), tools (LO) and scenes (PPA). We found a correlation between the visual and the auditory representational geometry of the stimuli in both hemispheres for the blind, but only in the left hemisphere for the sighted. All together these results demonstrate how input modality and sensory experience impact on the neural implementation of categorical representations and highlight hemispheric asymmetries in their expression.