

Modality-Independent Coding of Concepts in Prefrontal Cortex

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Presentation Abstract Summary We human beings process various kinds of stimulations such as images, sounds, or smells from the external world to construct the inner mind. How does sensory information from different sensory modality channels is integrated and converge on a meaningful concept? Here, we report the cross-modal neural coding of concepts in the prefrontal cortex, which generalizes across visual and auditory domains. We focused on the categories of natural environment, which are likely to have various objects from each sensory domain, all contributing to form the same concept. In the prefrontal cortex, but not in any other brain regions, we found that categories of scene images and sounds appear to be represented in similar activation patterns, suggesting that neural codes for scene information in the prefrontal cortex are modality-independent. Furthermore, the error patterns of the neural decoders indicate that the scene category-specific neural activity patterns in the middle and superior frontal gyri are tightly linked to human categorization behavior. Our findings suggest that scene category information is represented at a conceptual level in the prefrontal cortex, regardless of the sensory modality of the stimulus.

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