Exploring sensory architectures within and between the senses using different MR imaging modalities

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Magnetic resonance (MR) imaging has helped researchers understand the architecture of different sensory systems in the brain in both health and disease. Different imaging modalities can provide different information about the brain, including the structural integrity of the grey and white matter, how regions respond to sensory information, and concentration levels of neurotransmitters that modulate neuronal activity. Not surprisingly, studies increasingly combine different imaging modalities to better characterise these sensory architectures. I will briefly outline some MR imaging modalities and illustrate how we use them in the lab to understand how humans combine sensory information within vision, and between vision and hearing. In the first study, we combined functional imaging and diffusion tensor imaging to identify a network of brain regions that process shape, colour and motion. In the second study, we have begun to combine functional imaging and MR spectroscopy to explore how the brain combines sensory information from vision and hearing. In combination with previous studies, our results so far suggest that the brain is wired to form large-scale networks that allow humans to process and combine sensory information in a flexible manner to deal with a complex and dynamic multisensory environment.