

Visual Experience Lab

Visual information is used by the human brain for a wider range of purposes: to guide action, to gain new knowledge, to recognize other people and their emotional states, and to store information for later use.

At the Visual Experience Laboratory, we investigate how visual information is used immediately (sensory or perceptual functions), and how it is stored (memory functions) and assimilated with other knowledge (learning) after the sensory information is no longer available.

An important aspect of what we do is to ask how and why specific aspects of a visual scene are selected for analysis whilst other equally obvious information is ignored. We study the underlying brain mechanisms that allow this selective visual processing in both the short and long term, as well as the nature of the external physical events that help or hinder these visual processes. We use a wide range of techniques in our investigations and study human adults (of all ages) and adolescents. Some of our studies focus on people with specific medical or mental health problems, but largely our work is directed at understanding how visual experience affects healthy people.

Our aim is to build a very clear picture of how visual processing works, how it creates conscious experience, and how it helps us think. This understanding will help us better understand sensory and cognitive failure that can occur as a result of extreme external events, brain disorder, or advanced age. In the experiments carried out in the Visual Experience Lab we show people carefully constructed visual images (usually on a computer) and asked them to respond, either immediately or after some time has passed. In these studies, we measure visual behaviour (e.g., eye movements), visually guided judgements (including measuring the time it takes to detect, find or discriminate visual objects), choice, and evaluation of visual objects and scenes. We couple these measurements with assessments of brain function using functional brain imaging (fMRI, MEG) and EEG and then link our findings with computational models of visual function. The research probes how briefly presented visual information is extracted from rapidly changing scenes; how visual information is stored for brief periods (visual working memory); how social and emotional information alters how we select information; and how learning and reward influence visual processing.

We link our findings to such diverse 'real world' situations as driving, choosing consumer products, checking bank notes for authenticity, and appreciating art. The lab group is composed of several PhD and master's students, a number of post-doctoral full-time researchers, and three academic staff (Professors J. Raymond, K. Shapiro and H. Bowman).