Sackler Centre for Consciousness Science

Multidisciplinary research on the science of human consciousness

Aims and approach

Established in 2010 with a generous donation from the Dr Mortimer and Theresa Sackler Foundation, the Sackler Centre for Consciousness Science pursues an interdisciplinary approach to basic and clinical science to understand the biological, particularly the neurophysiological, basis of human consciousness. In doing so, the Centre, co-directed by Anil Seth (Professor of Cognitive and Computational Neuroscience) and Hugo Critchley (Professor and Chair in Psychiatry, Brighton and Sussex Medical School) will gain a greater understanding of disorders of consciousness and apply this to develop new methods and therapies for managing mental illness and neurological conditions.

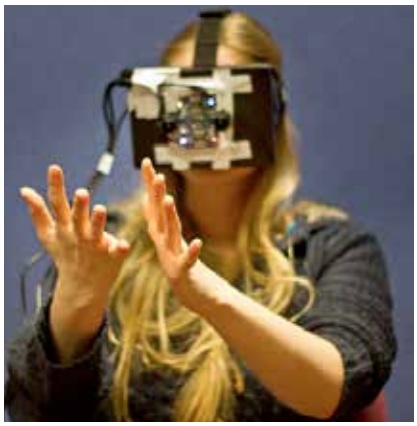
The great strength of the Centre is its strategic goal of integrating leading-edge theoretical and basic research, in areas of neuroscience, psychology, mathematics and computer science, with clinical research in psychology, psychiatry and neurology. Ultimately, the aim is to make the Centre's research translationally relevant by developing new interventions to treat brain disorders.

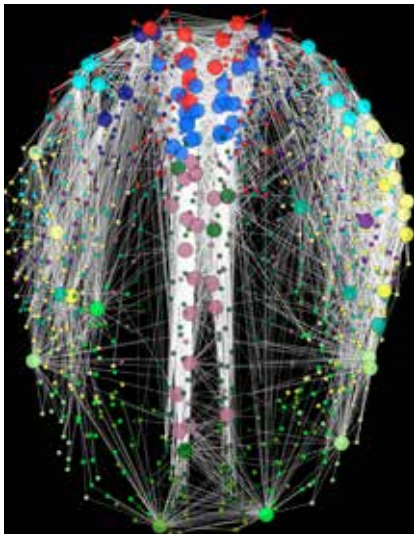
Research excellence

Sackler Centre research is organised along two interrelating strands. In basic science, the Centre seeks to understand the mechanisms that give rise to consciousness, by integrating theory, computational modelling, and behavioural and neuroimaging experimentation. By developing theories of consciousness from studies in healthy individuals, basic science insights can then be translated into the understanding and management of neuropsychiatric and neurological disorders, specifically those involving disturbances of conscious selfhood. In turn, clinical research feeds back into and stimulates developments in basic science. These strands are closely integrated across the three Schools at Sussex – Engineering and Informatics, Psychology and Brighton and Sussex Medical School – that house Sackler Centre scientists.

Pursuing experimental work in healthy individuals and in those with psychological or neurological disorders allows the Centre to develop novel experiments and technology to measure consciousness and then examine how consciousness is expressed under conditions where sensory experience or internal states are perturbed. An illustration of this is a sophisticated virtual reality adaptation of the famous 'rubber hand illusion', which uses simultaneous stroking of a real hand and a fake hand to persuade someone that the fake hand is part of their body. In the Sackler Centre setup, experimental participants are given a 'virtual' hand that enables implementation of innovative embellishments of the basic rubber hand experiment, notably flashing onto the virtual artificial hand information that comes from the participant's own internal bodily state (like the heartbeat). This increases the experience of 'ownership' of the hand. Such techniques allow the study of an individual's representation of self and their susceptibility to distortions of reality and illusions. These approaches show whether individuals with a strong physical sense of self are more or less likely to be taken in by the illusion.

The evolution of such novel experimental methods proceeds in tandem with the development of new research infrastructure, such as a dedicated virtual reality laboratory





and a cutting-edge TMS/EEG laboratory. The latter facility allows researchers to study direct causal interactions within the brain by precisely stimulating areas of the brain using transcranial magnetic stimulation (TMS) while simultaneously recording its electrical responses using electroencephalography (EEG). This work complements the ground-breaking brain imaging work by Sackler researchers at the Clinical Imaging Sciences Centre (CISC).

The Sackler Centre's academic excellence is demonstrated through prolific scientific output. Since, 2010, the Centre's high-quality research has been published in 250 peer-reviewed articles. There have been numerous invited scientific presentations and, in 2012, the Centre hosted the 16th annual meeting of the Association for the Scientific Study of Consciousness (ASSC16). With over 500 attendees representing over 30 countries, it was the largest gathering to date of this most prestigious symposium in the field and was widely regarded as the best in its now 18-year series. In addition, in November 2014, Oxford University Press announced the launch of a new open-access academic journal, *Neuroscience of Consciousness*, with Anil Seth appointed as Editor-in-Chief.

Achieving impact

The integrative and translational approach of the Sackler Centre makes it unique in the field of consciousness research. Its research findings, which are considerable, have helped build its academic reputation and have captured the public's imagination, engaging them in this increasingly popular area of research.

The Sackler Centre has a significant impact in the academic world, providing an international focus for consciousness science. One powerful aspect of this impact is in changing academic and public perceptions of the study of human consciousness, from something that was difficult to study empirically to a robust, scientific programme that integrates the study of biological and psychological mechanisms and that has very real and practical clinical applications. As an illustration of this mind/body integration approach, techniques developed in basic science (such as the virtual reality rubber hand experiments), have significant potential translational impact and are now being used to study dissociation and weakened representation of self in patients with a range of mental disorders such as anxiety, schizophrenia and dissociative disorders that arise, for example, from childhood trauma.

Because of the unique interdisciplinary nature of the Sackler Centre's research, it is able to engage new scientists and clinicians in its broad and inclusive approach, thereby training the next generation of researchers in the field and promoting their career progression. An exciting new development for 2016–2019 is to set up six PhD studentships that will be jointly funded through the University and the Sackler Centre.

The Centre's rapidly growing reputation has meant that it has become the go-to group when someone wants an opinion on consciousness science, and its impact in terms of public engagement activities has been extensive. This includes many invited presentations at prestigious venues such as Royal Institution and New Scientist Live lectures. In parallel with ASSC16, in 2012, the Sackler Centre set up a unique one-day 'consciousness expo' that was open to the general public, attracting over 1,800 people over two days. In 2013, it collaborated with the Science Museum in London on an exhibit called Zombieland, which attracted over 10,000 visitors, with the Centre providing considerable scientific content. Also, the 2014 book, *30-Second Brain*, targets a public audience and was written jointly by mainly Sackler Centre researchers.

Other strands of public engagement include a partnership between Jamie Ward (Professor of Cognitive Neuroscience), Anil Seth, and the Courtauld Institute of Art in London on a lecture series on neuroscience, visual perception and how we understand art. In 2015, the Sackler Centre will work with the Wellcome Trust on a year-long exhibition exploring the 'edges of consciousness', to be hosted in the recently refurbished, semi-permanent exhibition space at the Wellcome Collection building in London.

Research by Professor Hugo Critchley has revealed how our hearts control our emotions: for example, our sensitivity to other people's fear and shock is reduced just before, and increased just after, each heartbeat. Tracing how this occurs in the brain casts light on the heart's role in thoughts and feelings, with implications for novel psychiatric treatments.

Funding and partnership

The Sackler Centre continues to be supported through the Dr Mortimer and Theresa Sackler Foundation. The virtual reality rubber hand work was initially supported by ERC FP7 project CEEDS (FP7-ICT-258749). In 2013, Hugo Critchley received a prestigious ERC Advanced Grant of £1.49 million over four years for the project 'Cardiac Control of Fear in the Brain'. Anil Seth's research (2009–2013) has primarily been supported through a Leadership Fellowship from EPSRC (£1.1 million), and the Centre has recently received a new H2020 FETPROACT grant of ~£300,000 to conduct research on time perception.

Working with us

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