

Image © Peter Myers

Tricks of the Psych Trade

An event exploring the How, Why and What of Psychology, featuring: live demonstrations of real psychological stimuli, an exhibition by an artist with Asperger's Syndrome, and a navigable sonic art installation inspired by fMRI data analysis techniques.

During this event, several tools commonly used by psychologists were explored using a variety of media. This pamphlet will give you some further information on some of these methods along with details of some resources to help you find out more.

Brain Imaging

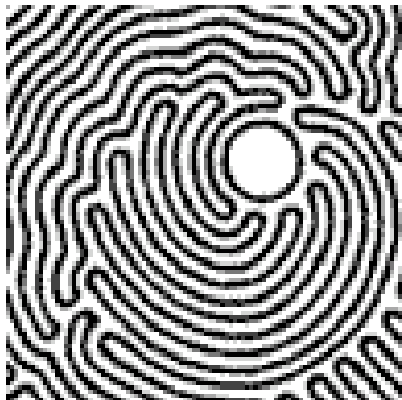
One tool that psychologists use is brain imaging. This is a relatively new technique that has only been around for about 15 years. It gets quite a lot of press so we thought it would be worthwhile expanding on the methods that brain imaging relies upon. It is not uncommon to see statements such as 'the frontal lobe lights up when people reason.' The first point to note is that these kind of statements are actually based on averages i.e. 10 people are scanned, and the areas of brain activity are summed – and this in turn results in data suggesting the frontal lobe is activated during reasoning tasks.

And of course, the brain doesn't actually 'light up'! Brain activity is usually assessed by measuring the amount of bloodflow to a particular area. Magnetic resonance imaging (MRI) measures bloodflow by may taking advantage of the fact that blood contains haemoglobin, which in turn has magnetic qualities. MRI uses a very large magnet to tap into these naturally occurring qualities, and assess the magnitude of bloodflow in any one brain region.

But the brain is dynamic, and controls many different processes at any one time, for instance, breathing, heart rate, attention, memory and emotions. As a consequence, a brain scan will reveal lots of bloodflow in lots of areas of the brain. In order to determine the bloodflow relevant to one particular function, all these extra processes and their corresponding brain activity need to be taken into account. Lets use the example of seeing an angry face. First, brain regions that relate to simply seeing and recognising a face, aside from a face portraying anger, need to be considered. It is only by carefully 'subtracting' bloodflow relevant to these other processes – breathing, heart rate, seeing a face etc - that we can see what area of the brain relates to seeing an angry face alone. So you can see, in order to draw any conclusions from brain imaging data, psychologists need to carefully select and design control tasks to subtract away any irrelevant brain activity...a process that inspired Julie Freeman's sound installation...

In Sound Mind

The sonic art installation that is exhibited draws upon this subtraction technique and explores how sound can be repositioned to try and confuse the listeners usual automatic hearing focusing. We are used to tuning in and out of sounds that we are familiar with but if those sounds are shifted in volume and space can we still focus our hearing so effectively.



The work uses software to generate an 8-channel audio output generated from recordings of emotive sounds both within nature and the human voice. It is a navigable sonic space - layers of sound fade in and out moving between dense complex sound and simple aural clarity. As the listener moves through the space, they will begin to discover that through their own movement they can 'subtract' the unwanted noise and find the 'auditory signal' that they prefer, if they can determine how the sounds are moving.

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Galvanic Skin Response

by Poppy Schoenberg

Electrodermal activity (EDA) is one of the most widely used response systems in the history of psychophysiology and refers to the general electrical changes in the human skin. The empirical study of EDA began roughly 100 years ago by a French neurologist Jean Charcot. Charcot was particularly interested in the electrical properties of the skin for his studies into hysteria and hypnosis, as it is believed that such changes in electrical activity are related to autonomic central nervous system processes, and as such, are largely out of conscious control.

Galvanic skin response (GSR) measures are one aspect of electrodermal activity and show the electrical conductance passed across the surface of the skin. The skin is a selective barrier which is constantly receiving sensory input from the external environment, mediated by activation centres in the brain. One such brain centre is the autonomic nervous system (ANS), which primarily includes the neuroanatomical structures of the premotor cortex, the hypothalamic and limbic centres and the reticular formation. All such centres are heavily involved in sympathetic activation. Sympathetic activation is closely linked to the psychological experiences of emotion, arousal and attention, and for this reason, the sympathetic system is the main reason we have a 'fight-flight' reflex. I say reflex, as because it is related to the ANS, it reflects an automatic response to potentially threatening situations mediated by the more 'core' or basal structures of the brain, developed evolutionarily to protect us from threat and increase chances of survival.

The Role of the Sweat Duct - fundamentally GSR is reflecting sweat gland activity, and so the more emotionally aroused you are, the more active your eccrine sweat glands are and the greater the electrical conductivity of your skin. Each eccrine sweat gland consists of a long coil, which is the secretory portion of the gland. There is also the sweat duct, which is a long tube starting from the sweat gland and connecting to the epidermis or skin layer, which is the excretory section of the gland.

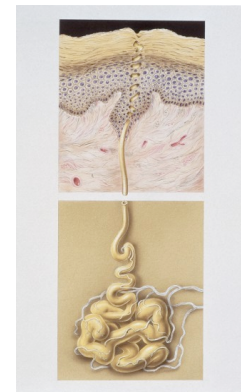


Image from Wellcome Medical Image Library

Essentially skin conductance or GSR is a reflection of the amount of sweat residing in the glands. Thus, everyone has a natural stable level of sweat in their sweat gland. In a highly anxious person for example, this level will be naturally higher, hence, the reason why people with anxiety usually have very high baseline levels of skin conductance and are more prone to unprovoked sweating.

Autistic Spectrum Disorders

Autism is a developmental condition characterised by difficulties in social interaction and communication skills alongside unusually strong and narrow interests, and repetitive behaviour. It is thought to be on a continuum, hence the term *Autistic Spectrum Disorders*. At one end of the spectrum, some people display delays in developing language and have IQs lower than the normal range. At the other end however, an IQ within the normal range (or higher) and no language delay is usual, particularly in those with a diagnosis of Asperger's Syndrome. The National Autistic Society estimate that 535,000 in the UK have autistic spectrum disorders.

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Contact Details/ Biographies

Dr Emma J Lawrence is a Lecturer in Cognition and Neuroimaging at the Institute of Psychiatry, King's College London. Her main research focus is emotion regulation and its impact on empathy and social perception. Neuroimaging is her main research tool, in particular MRI, both functional and structural, and she works with healthy controls and people with a range of different clinical conditions. For instance, asperger's syndrome, and depersonalisation, a condition whereby sufferers talk of feeling emotionally numb or detached from their body and/or mental processes.

Emma also enjoys science communication, and has recently co-authored a self-help book: Baker, D., Hunter, E., Lawrence, E.J., & David, A.S. (2007) *Overcoming Depersonalisation and Feelings of Unreality*. Constable & Robinson Ltd. London.

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Julie Freeman is a digital artist who uses technology to explore and expose the natural systems that surround us to discover hidden worlds. Crossing the boundaries between art, nature and technology, her work often transforms scientific processes into soundscapes and imagery.

Her work has been exhibited nationally, including at the Institute of Contemporary Art and the Science Museum, London, as well as internationally. Julie was also co-founder and co-director of Studio Fish, an artist-led creative technology company. She is a NESTA fellow and is currently artist in residence at the Microsystems and Nanotechnology Centre, Cranfield University.

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Peter Myers has exhibited worldwide and is interested in communicating the nature of autistic spectrum disorders to a larger audience via the showing of his artwork. The exhibition highlights the value of individual testimonies to psychological understanding whilst giving a unique insight into an autistic mind.

Much of Peter's work is detailed, precise and often repetitive - his sculptural pieces appear to have been machined, even though they are patiently hand crafted, and his line drawings have algorithmic qualities. Peter says 'People sometimes assume I may produce my artwork using a computer. However, I am computer 'illiterate'. Instead I produce art 'the old fashioned way', that of hand, eye and brain. This is all I require.' To explore this, two of Peter's artworks, 'Fairy Clocks' and 'Bowling Green' have been animated specifically for this exhibition.

Alongside the animations, a selection of work spanning 15 years was displayed including line drawings, canvases, wall hangings and sculpture. Peter has recently had his work and life story published in a book 'The Exact Mind', edited by Simon Baron-Cohen and Sally Wheelwright and published by Jessica Kingley publishers.

Poppy Schoenberg is currently a postdoctoral researcher at the Institute of Psychiatry, King's College London. Her main research focus is psychophysiology. For her PhD, Poppy explored the physiological profiles of people who report feeling depersonalised, alongside the therapeutic benefits of electrodermal biofeedback.



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Useful Books

Frith, U. (2003) *Autism Explaining the Enigma* – 2nd edition Blackwell publishing

Simon Baron-Cohen (2003) *The Essential Difference – Men, Women and the Extreme Male Brain*. Penguin

Useful Websites

Autism Research Centre	http://www.autismresearchcentre.com
British Association for Advancement of Science	http://www.the-ba.net
Brain Imaging website:	http://www.pbs.org/wnet/brain/scanning/mri.html
The British Psychological Society	http://www.bps.org.uk/
Dana Foundation	http://www.dana.org
Institute of Psychiatry	http://www.iop.kcl.ac.uk/
The National Autistic Society	http://www.nas.org.uk/
The Mental Health Foundation	http://www.mentalhealth.org.uk/welcome/
The National Endowment for Science, Technology and Art	http://www.nesta.org.uk/
Remedi	http://www.remedi.org.uk
Stephen Wiltshire	http://www.stephenwiltshire.co.uk

If you would like full references for the studies described – please email Emma Lawrence.

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