not bind pre-consciously, which would be in line with previous research demonstrating that consciously attending to a grapheme is necessary to fully trigger the synaesthetic concurrent.

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Neural Traces of Consciousness: Towards Molecular Genetic Dissection of Subjective Experience

Konstantin Anokhin, "Kurchatov Institute" National Research Center, Russia

July 5th, 14:00-16:00: Poster Session 2.

Consciousness and memory are tightly linked in neural mechanisms of subjective experience. We have previously shown that memory consolidation involves neuronal expression of immediate-early genes (IEGs) (Maleeva et at., 1989) that can be used to map memory assemblies in the brain (Anokhin, 1989). Behavioral induction of IEGs is triggered by subjective novelty of experience (Anokhin & Sudakov, 1993) and occurs during establishment of single-trial episodic-like memories (Anokhin et al., 1991; Ryabinin & Anokhin, 1993). At the level of neuronal activity it is associated with experience-dependent specialization of neuronal responses (Svarnik et al., 2005). In extension of this line of research I propose that imaging of behaviorally induced expression of IEGs can be used to trace episodes of conscious experience in the nervous system. With this purpose we developed techniques to visualize activation of IEGs during behavior by employing GFP transgenic reporter mice (Anokhin et al., 2012), methods for optical clearing of a whole mouse brain after behavioral episodes of induction of IEGs (Efimova & Anokhin, 2009) and whole brain cell-resolution optical fluorescence tomography to image experience-driven distributed functional systems tagged by IEGs expression (Morozov et al., 2010). I further suggest that linking IEGs promoters to optogenetic tools will allow to move forward from purely correlative to causal analysis of neural bases of subjective experience.

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The Different Faces of One's Self: An fMRI Study into the Recognition of Current and Past Self-Facial Appearances

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July 5th, 14:00-16:00: Poster Session 2.

A plethora of research has investigated the neural basis of the ability to recognise one's current facial appearance in photographs or mirrors. However, one important question has not previously been examined; how are images of one's past facial appearance processed in the brain when they are also recognised as "me"? To examine this question, we used fMRI to investigate brain activity as participants viewed images of themselves, morphed with images of a personally familiar other. The images were morphs between the participants' and the familiar others' current facial appearances or their childhood appearances. The participants performed a self-other judgement on morphed pictures that contained 0%, 20%, 40%, 60%, 80% or 100% "self". We analysed the fMRI data parametrically, to examine activity that covaried with the percentage of "self" present in the stimuli. Activity in areas involved in body-ownership and memory retrieval varied with the amount of the participants' childhood face in the images, but not the amount of the participants' current facial appearance. We also found that activity in a network of face-selective, but not self-face selective areas varied with the amount of current self in the stimuli and not the amount of childhood self. We argue that a representation of one's current facial appearance is maintained and updated in networks that process all faces. In contrast, representations of one's past facial appearances are stored in memory and then are re-experienced as a part of one's own body, allowing them to be recognised as one's own.

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Exogenously Controlled Attention Does Not Inevitably Engage Awareness.

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Jamal Kinsella, University of Durham, UK
Robert Kentridge, University of Durham, UK

July 4th, 14:00-16:00: Poster Session 1.

It has long been suggested that consciousness and attention are inextricably linked. Recent studies have, however, shown that attended stimuli do not necessarily enter consciousness, suggesting that attention and consciousness are mediated by distinct underlying mechanisms. Most of these studies have focused on endogenous attention

The different faces of one's self: an fMRI study into the recognition of current and past self-facial appearances

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I. Introduction

How does your brain process :

(i) Your current face?

❑ Plasticity

(ii) Your past faces?

❑ Representations stored in memory

Current self-face

▪ Uddin et al. (2005) → Areas that show an increased response the more of one's own current face is morphed into the face of a familiar other

▪ Inferior Occipital Gyrus (Occipital Face Area (OFA))
▪ Inferior Parietal Lobule (IPL)
▪ Inferior Frontal Gyrus (IFG)
▪ Superior Frontal Gyrus (SFG)
▪ Temporo-parietal Junction (TPJ)
▪ Middle Temporal Gyrus (MTG)
▪ Inferior Temporal Gyrus (ITG)

▪ Do these areas have plastic properties and process only one's current face and not one's childhood face?

Past self-face

▪ Arzy et al. (2009) → Artificially aged self-face or Clooney-face

▪ Found activity in the areas that processed the self-face including: MTG, TPJ, IFG, IPL and OFA

▪ Which of these areas processes representations of one's childhood face and not one's current facial appearance?

▪ Do any of these areas process both one's own current and childhood faces?

II. Experimental Design

Methods & Materials

▪ Participants' faces morphed with a personally familiar other

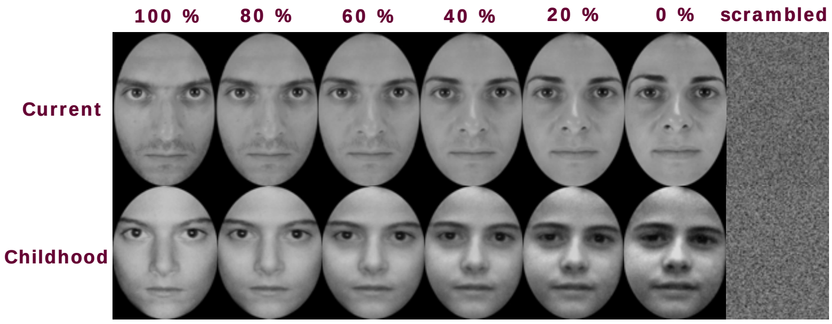
▪ Self-other morphs created between their current faces and their faces from childhood (Aged between 10 and 14 years)

▪ One morphed face presented at a time for 2 s. 20 repetitions of each

▪ They had to respond "self" or "other" on a keypad for each stimulus

▪ A parametric analysis was performed to examine activity that varied with the amount of current face in the stimuli, the amount of childhood self in the stimuli or the amount of self regardless of age.

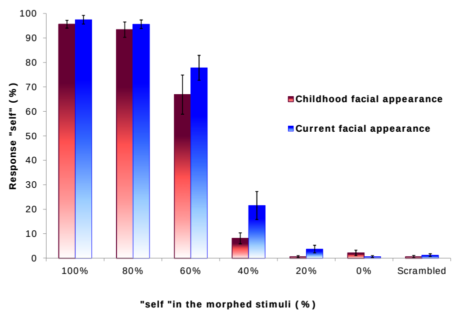
▪ Small volume corrections around coordinates of Uddin et al. (2005)



III. Results

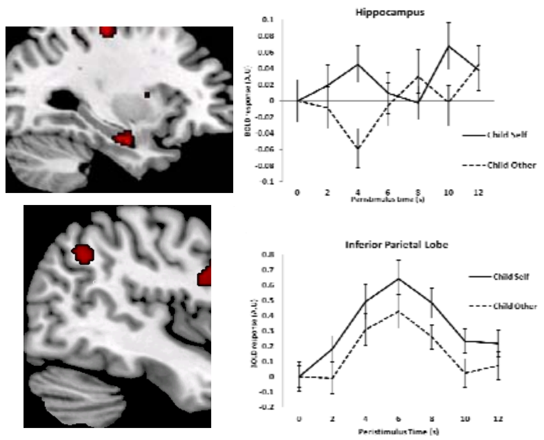
Behavioural Results

▪ Main effect of the percentage of Self in the stimuli (F(1.8, 35.8) = 332.1; p < 0.001) and Age of the individuals in the stimuli (F(1, 35.8) = 6.7, p < 0.05). There was no interaction (F(2.4, 35.8) = 1.9, p > 0.05)



Childhood

▪ Activity in several areas varied exclusively with the amount of current self in the stimuli and not the amount of current self.



Anatomical region	Hemisphere	Brodmann Area (BA)	MNI Coordinate (x, y, z)	Z-value
Parietal				
Inferior Parietal Lobule - Angular Gyrus	R	BA 7	30 -62 36	4.53
Intraparietal Sulcus	L	BA 7	-18 -42 60	3.61
Precuneus	L	BA 7	-32 -34 -6	3.34
Frontal				
Precentral Gyrus	L	BA 6	-12 -4 62	5.47
Middle Frontal Gyrus	L	BA 9/46	-54 18 34	5.33
Medial Superior Frontal Gyrus	L	BA 8 & BA 32	-4 38 54	4.97
Orbital Gyrus	L	BA 13	-28 26 -16	4.44
Middle Frontal Gyrus	R	BA 9/46	50 16 28	4.3
Orbital Gyrus	R	BA 13	24 30 -16	3.90
Precentral Gyrus	R	BA 6	18 0 60	3.77
Superior Frontal Gyrus	R	BA 8	22 32 56	3.62
Cingulate				
Posterior Cingulate Gyrus	L	BA 23	-2 -14 32	3.31
Isthmus of the Posterior Cingulate Gyrus	L	BA 26 or29	-4 -36 30	3.11
Temporal				
Hippocampus	L		-34 -10 -20	4.4
Inferior Temporal Gyrus	R	BA 37	54 -48 -16	3.55
Inferior Temporal Gyrus	L	BA 37	-44 -46 -14	3.42
Temporal Parietal Junction	L	BA 39or 40	-54 -38 14	3.2
Temporal Parietal Junction	R	BA 39 or40	60 -26 10	3.13
Cerebellum				
Lobule VI	R		16, -46, 16	4.06

** All areas whole-brain FDR (p < 0.05) corrected for multiple comparisons

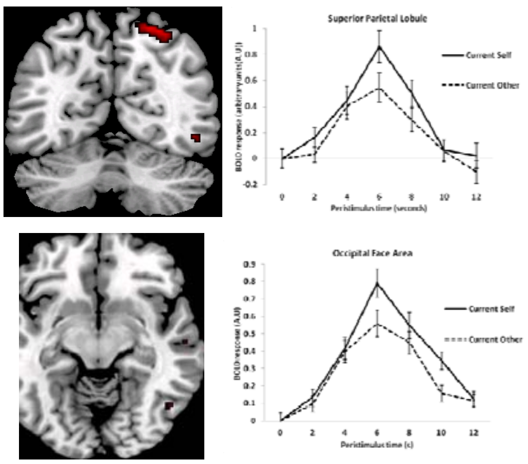
Current

▪ Activity varied exclusively with the amount of current self in the stimuli in:

▪ ITG (BA 20)(62, -12, -16, Z = 3.04, p < 0.05svc)

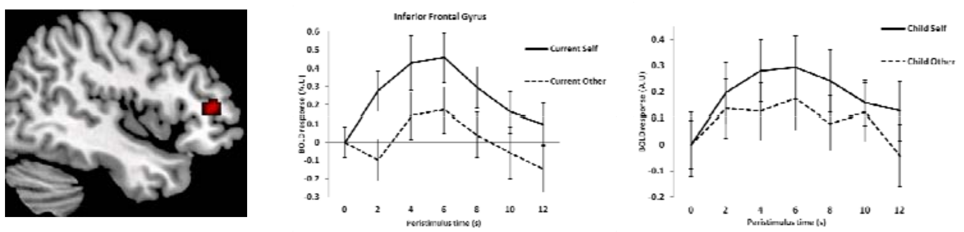
▪ inferior occipital gyrus/OFA (BA18/19), (48, -62, -8, Z = 3.21, p < 0.05svc)

▪ SPL (BA 7/BA19) (28, -62, -8, Z = 3.71, p < 0.005svc)



Conjunction

▪ Activity in only the IFG (BA46) covaried with both the amount of current and childhood self (48, 42, 6, Z = 3.41, p < 0.05svc)



IV. Discussion

▪ Largely distinct neural circuits process one's own current and childhood faces

▪ Childhood self-recognition recruits circuits involved in memory retrieval (Maguire et al., 1999) and body-ownership (Tsakiris et al., 2008), which may process representations of one's past appearance

▪ Current self-recognition engages areas within the core face perception network

▪ This network may have plastic properties updating a representation of one's current facial appearance. Such plasticity may also support the process of adapting to changes in one's face following traumatic events or reconstructive surgery

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