



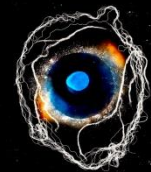


# The Eye's Mind: visual imagination neuroscience and the humanities

UEA 21<sup>st</sup>-22<sup>nd</sup> May 2016



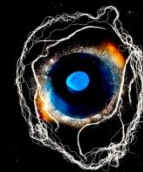
Arts & Humanities  
Research Council



# The Eye's Mind



- John Onians, Art History, UEA
- Adam Zeman, Neurology, Exeter
- Susan Aldworth, Artist, London
- Fiona Macpherson, Philosophy, Glasgow
- Crawford Winlove, Neuroscience, Exeter
- Matthew MacKisack, Art History, London



# The Eye's Mind



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# The Eye's Mind

- The Eye's Mind project
  - The visual imagination and its place in culture
    - The visualising brain (Winlove)
    - Visualisation in historical context (MacKisack)
    - Aphantasia and hyperphantasia (Zeman)





# The Eye's Mind

- Highly interdisciplinary
- Brief talks – bar keynotes
- Loose structure





# The Eye's Mind

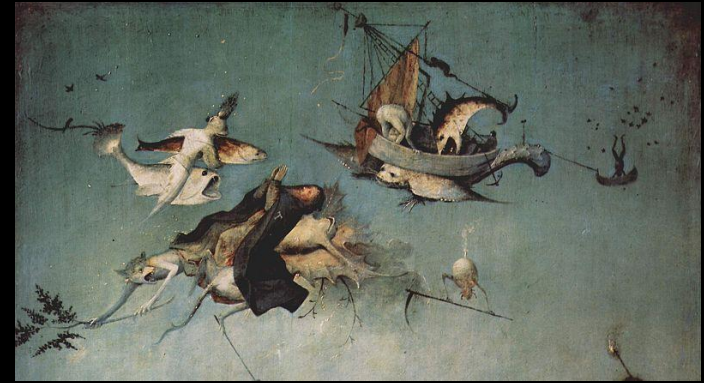
- Highly interdisciplinary
- Brief talks – bar keynotes
- Loose structure
- Thanks to AHRC and Brain











# *Phantasia*

*Adam Zeman*

*Exeter*





*‘What sets us apart is a life in the  
mind, the ability to imagine’*

Robin Dunbar, *The Human Story*,  
2004



You are due to see this gentleman in March following angioplasty in October 2002 which has been successful. Following on from this procedure, [REDACTED] [REDACTED] has become aware of the fact that he is now unable to imagine anything. He notes this particularly at night when he has never been a good sleeper and previously used to imagine things to help himself get off to sleep but now finds that he is unable to do so. He also states that he cannot picture his children or grandchildren in his mind whereas previously he had been able to do so. I myself had not heard of anything similar to this previously and therefore was unable to comment as to whether it was related to any of his medication or treatments that he had undergone and would therefore be grateful for your thoughts. [REDACTED] is happy to wait until he sees you to discuss matters further but we agreed that I would contact you meantime just to let you know his present problem.



## MX – losing the mind's eye

- predormital imagery: faces, places
- novels, dreams and keys
- ‘my monitor has failed; when I try to visualise I experience a complete blank; my visual quotient should be zero’
- perception vs imagination: painting L. Tay
- subjectively: perception + ‘visual memory’ intact but visualisation defective

## MX – summary

- Otherwise well in body and mind
- MRI normal
- Neuropsychology normal
- Subjective imagery impaired
- Visual imagery test performance normal!
  - a case of ‘blind imagination’



# Methods: Experimental Task

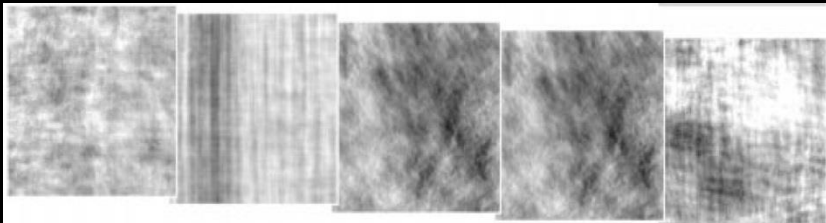
Zeman et al, *Neuropsychologia* 2010;48:145-155



*'Block' Design*



Block 1 – 'Famous' Faces



Block 2 – 'Scrambled' Faces

*Peter Sellers...Harold Wilson...Ver*

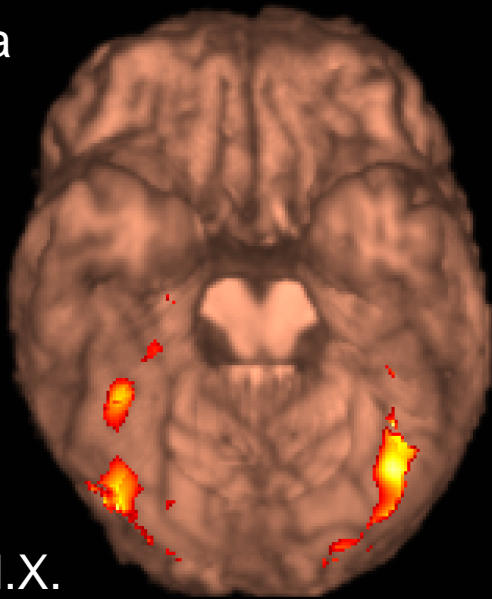
Block 3 – Imagery of Faces

*Hsllr Defs...Mnsdu Dsdfg...Cvsdh*

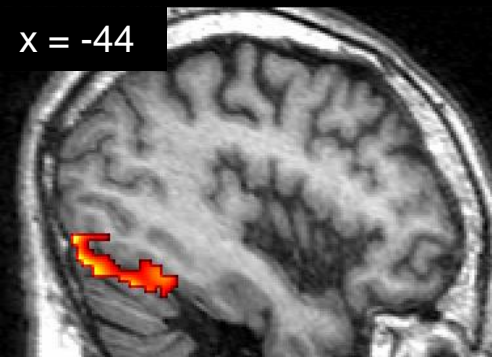
Block 4 – Imagery Control



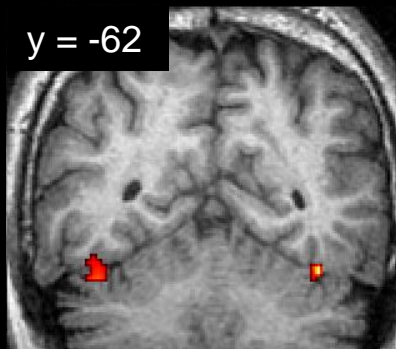
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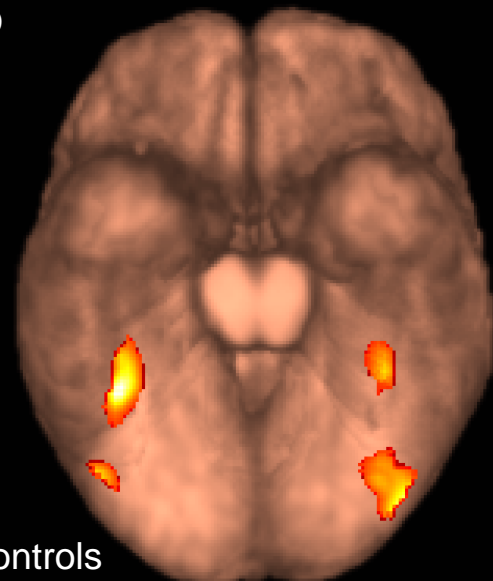
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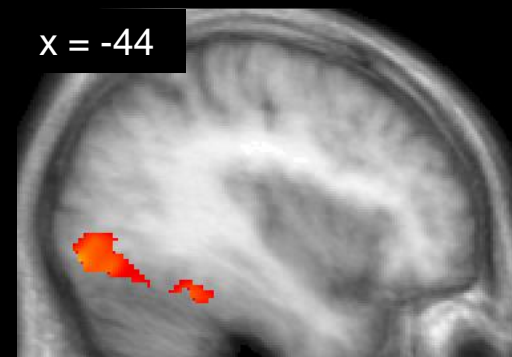
y = -62



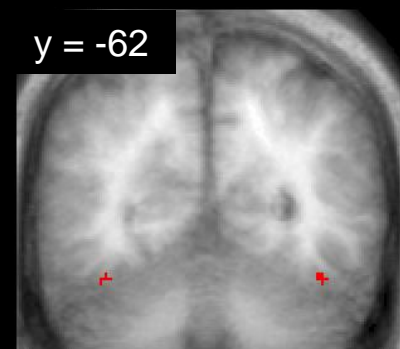
b



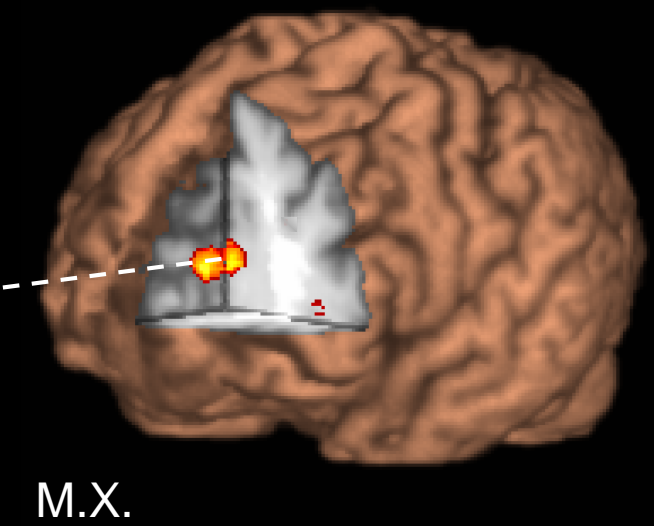
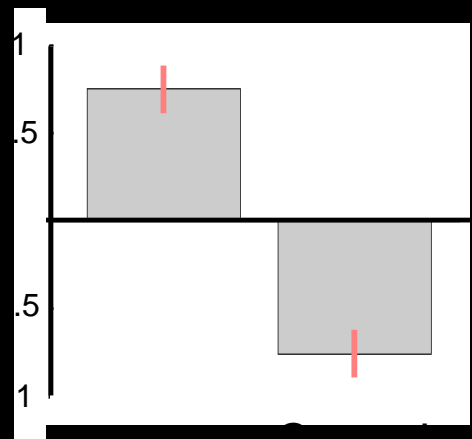
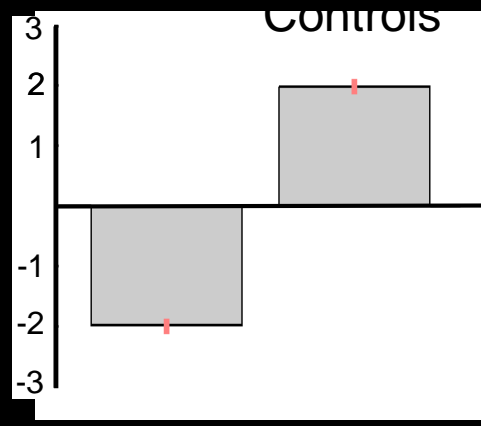
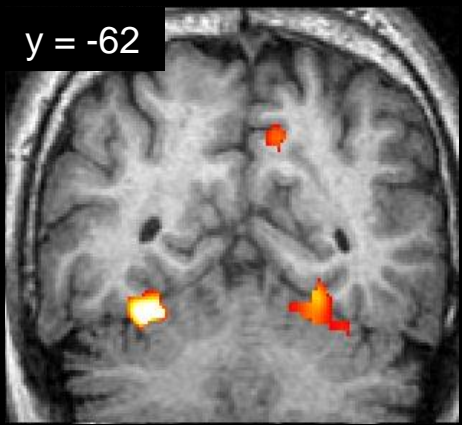
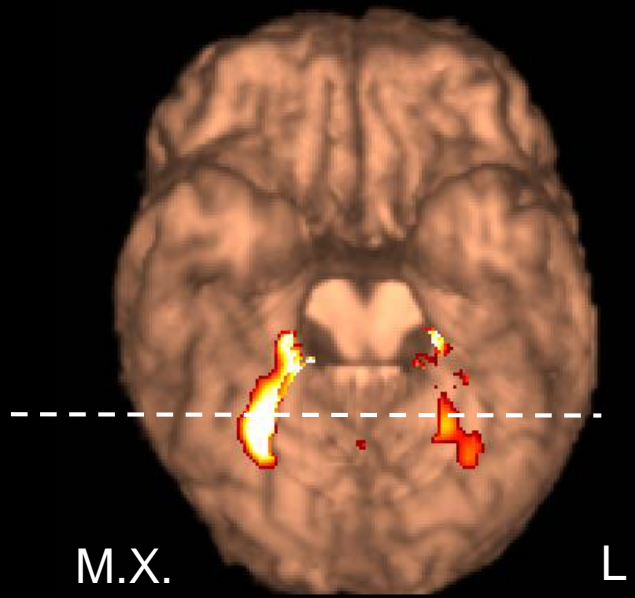
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y = -62

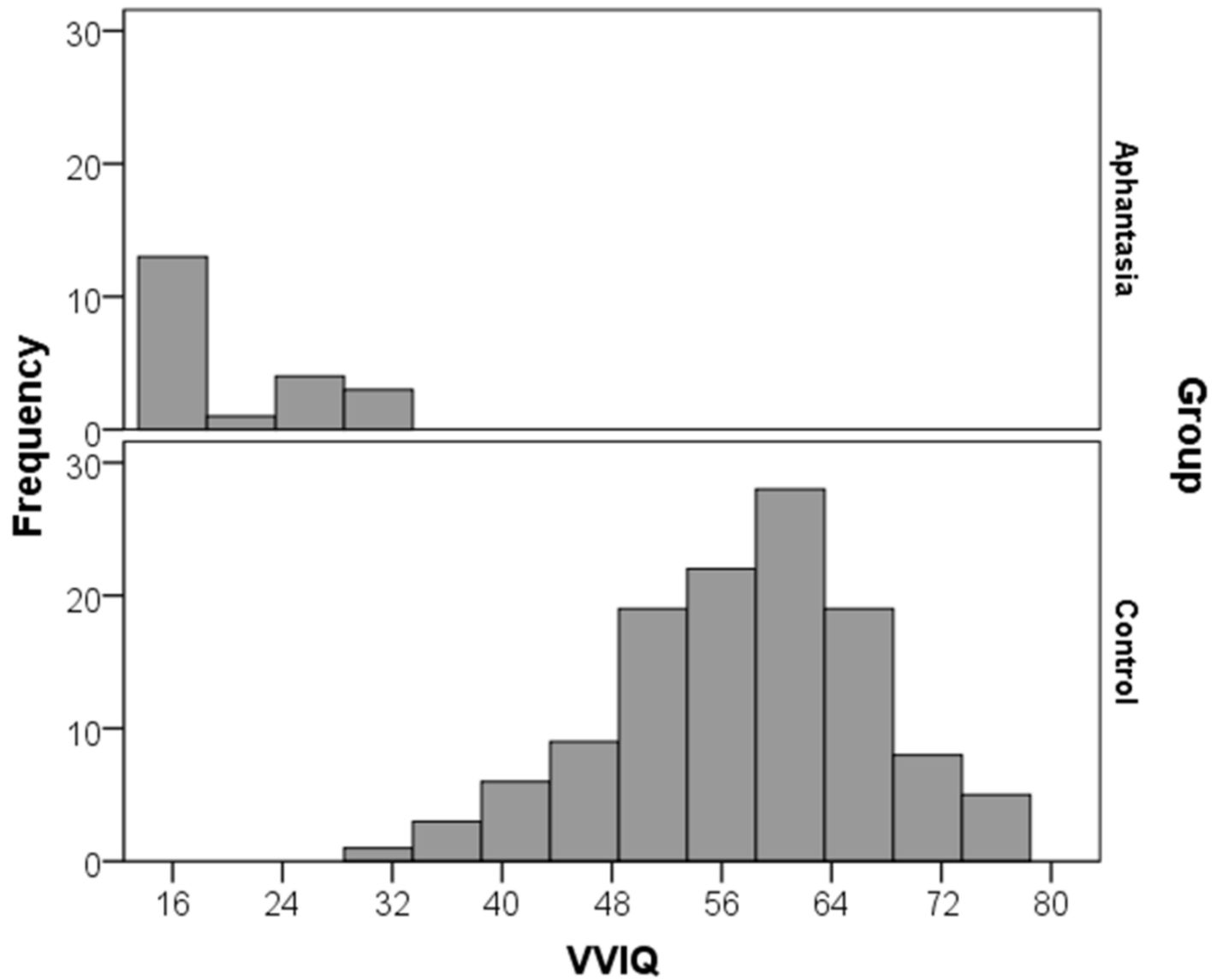


c





Karl Zimmer *The Brain* in *Discover* March 2010



# Lives without imagery- congenital aphantasia

Zeman, Dewar, Della Sala Cortex 2015

- 21 individuals, 19 male, 5 family history
- Early adult life
- Conversation, article, class – real ‘seeing’, not metaphor!
- Emotional impact (9 faces, 4 relationships, 2 sex)
- Circa half all modalities
- 15 partial -10 ‘flashes’ -17 dream
- 2/3 autobiographical memory poor
- Verbal, analytical, mathematical strengths
- How many windows?
  - Thinking, knowing, understanding, remembering
  - Mental models or maps
  - pantomime

*‘Five windows. I remember them but I don't see them. My thought is still intentional and object-orientated though and I still consider the windows to be 'in mind’*”

*‘I sort of fly through the house and inspect every room if the 'idea' of a window is present and where. It's definitely not an image, it's more like understanding the idea of a window being there. I “know” it's there’*



# Aphantasia

- Galton (1880) The Statistics of Mental Imagery

‘the great majority of the men of science to whom I first applied protested that mental imagery was unknown to them....they had no more notion of its true nature than a colour-blind man who has not discerned his defect, has of the nature of colour’

- Faw (2009)
  - 2.1-2.7% ‘claim no visual imagination’
- Congenital prosopagnosia (Gruter et al 2009)
- Synaesthesia (Barnett, 2008)





# Le Monde

Le cas étrange des aveugles de l'imagination

# The New York Times



**Thank you!**

*'..the greatest mystery of my life explained...'*

*'...it was the first time I had heard the word, but I cried when I read it: I had always thought there was something a bit wrong with me...'*

*'...I feel like my mind has been blown! I have always wondered what was wrong with my brain because I can't visualize or meditate the way other people can...'*

**Thank you!**

**prosopagnosia**



**Thank you!**

**SDAM**

**prosopagnosia**

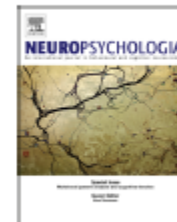


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## Severely deficient autobiographical memory (SDAM) in healthy adults: A new mnemonic syndrome

Daniela J. Palombo<sup>a,b,1</sup>, Claude Alain<sup>a,b</sup>, Hedvig Söderlund<sup>c</sup>,  
Wayne Khoo<sup>a,b</sup>, Brian Levine<sup>a,b,d,\*</sup>

<sup>a</sup> Rotman Research Institute, Baycrest Health Sciences, Toronto, ON, Canada M6A 2E1

<sup>b</sup> Department of Psychology, University of Toronto, Toronto, ON, Canada M5S 1A1

<sup>c</sup> Department of Psychology, Uppsala University, Uppsala 751 42, Sweden

<sup>d</sup> Department of Medicine (Neurology), University of Toronto, Toronto, ON, Canada M5S 1A1





R

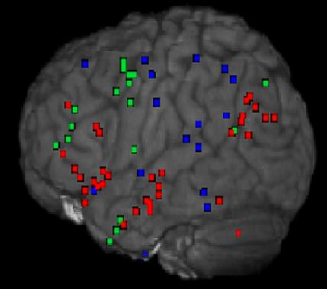
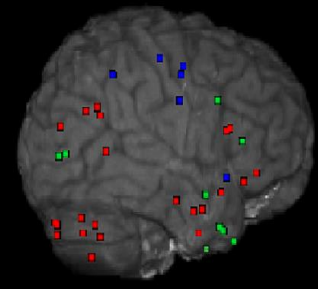
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a

b

# Severely deficient autobiographical memory (SDAM) adults: A new mnemonic syndrome

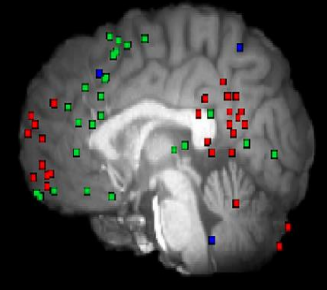
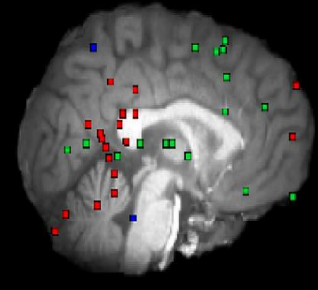
Daniela J. Palombo<sup>a,b,1</sup>, Claude Alain<sup>a,b</sup>, Hedvig Söderlund<sup>c</sup>, Wayne Khoo<sup>a,b</sup>, Brian Levine<sup>a,b,d,\*</sup>

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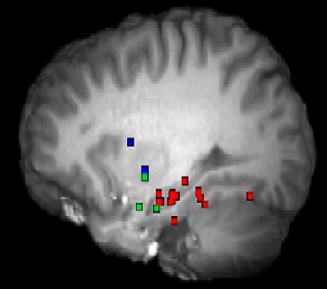
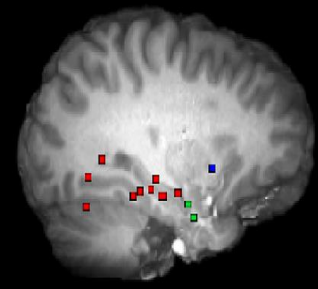
<sup>c</sup> Department of Psychology, Uppsala University, Uppsala 751 42, Sweden

<sup>d</sup> Department of Medicine (Neurology), University of Toronto, Toronto, ON, Canada M5S 1A1



c

d



e

f

Svoboda et al Neuropsychologia  
2006;44: 2189–08



**Thank you!**

**SDAM**

**prosopagnosia**

**ASD**

# DSM 5

**Autism Spectrum Disorder**                      **299.00**  
**(F84.0) Diagnostic Criteria**

‘... difficulties in sharing imaginative play’

**Thank you!**

**SDAM**

**prosopagnosia**

**ASD**

**fiction**

## *fiction...*

...The figures in this boat were those of a strong man with ragged grizzled hair and a sun-browned face, and a dark girl of nineteen or twenty, sufficiently like him to be recognizable as his daughter. The girl rowed, pulling a pair of sculls very easily...

**Thank you!**

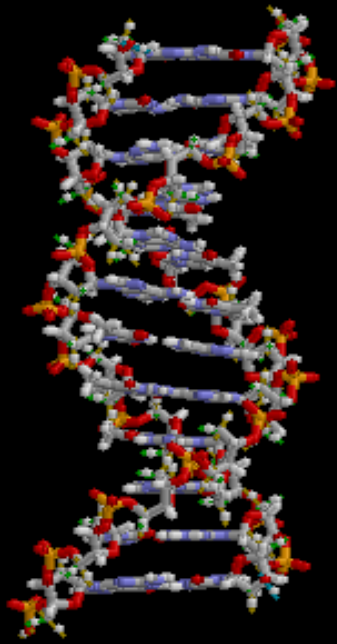
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**prosopagnosia**

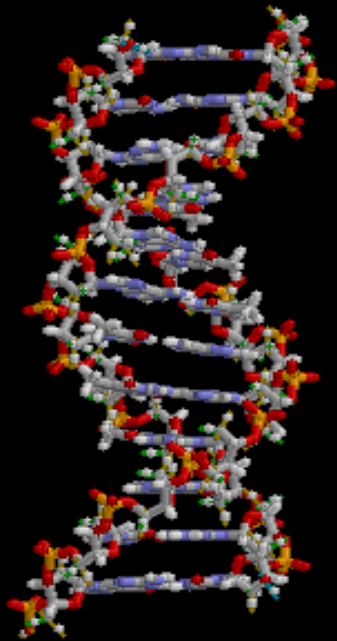
**ASD**

**genetics?**

**fiction**







**Thank you!**

**SDAM**

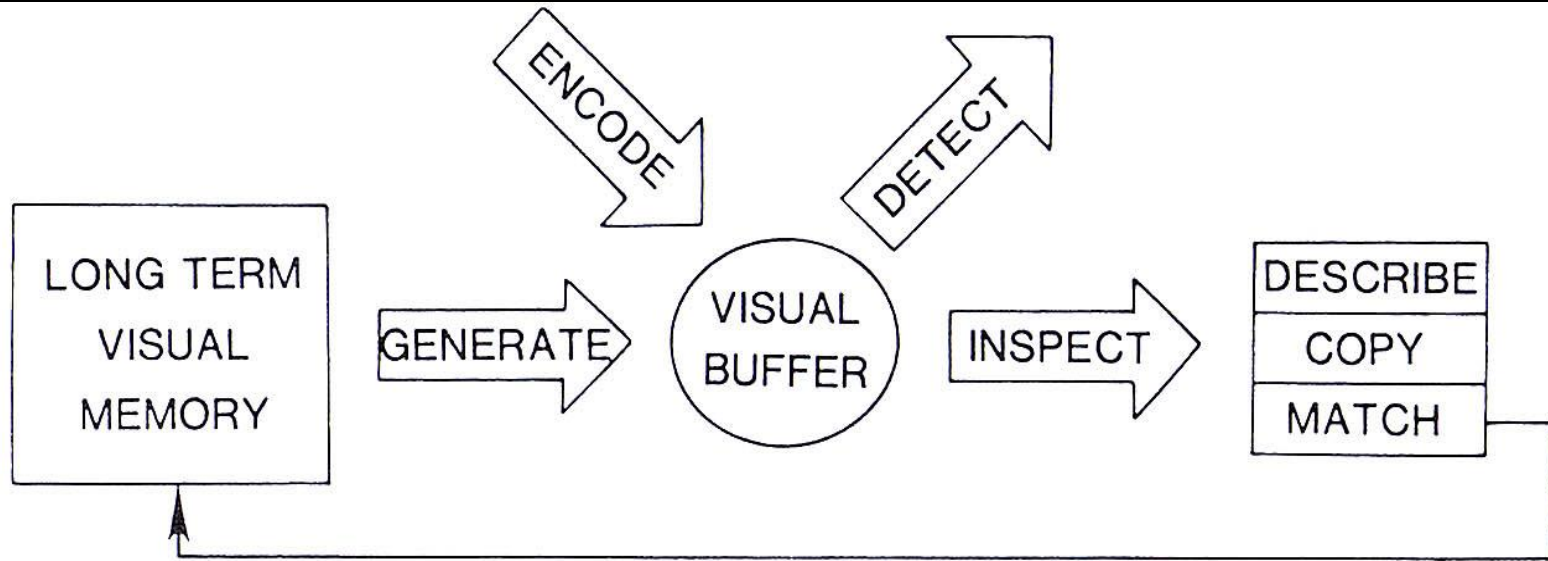
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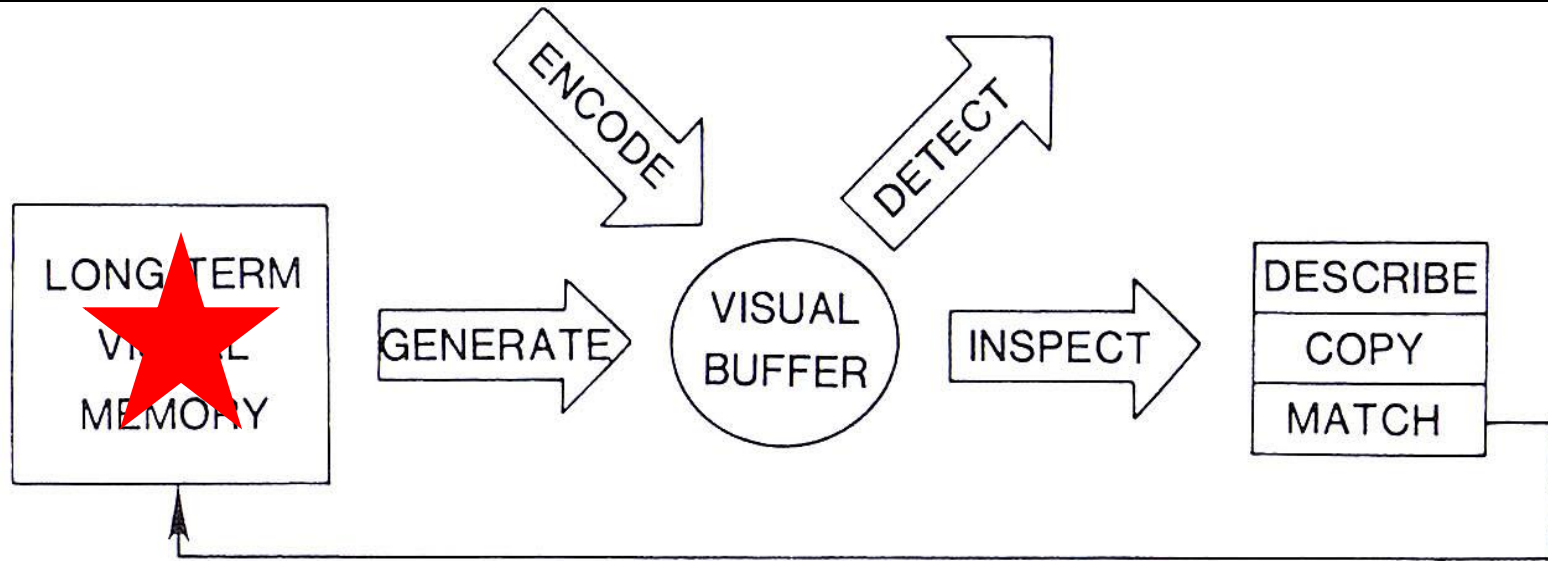
**genetics?**

**fiction**

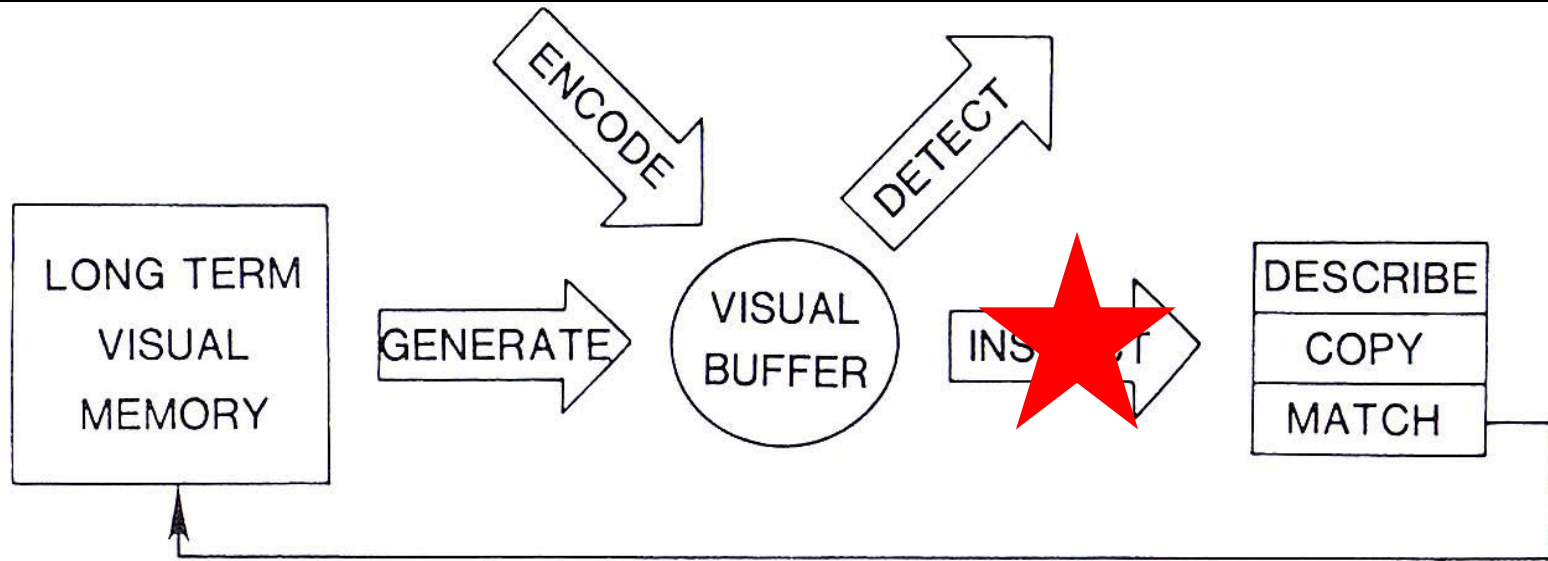
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forms**



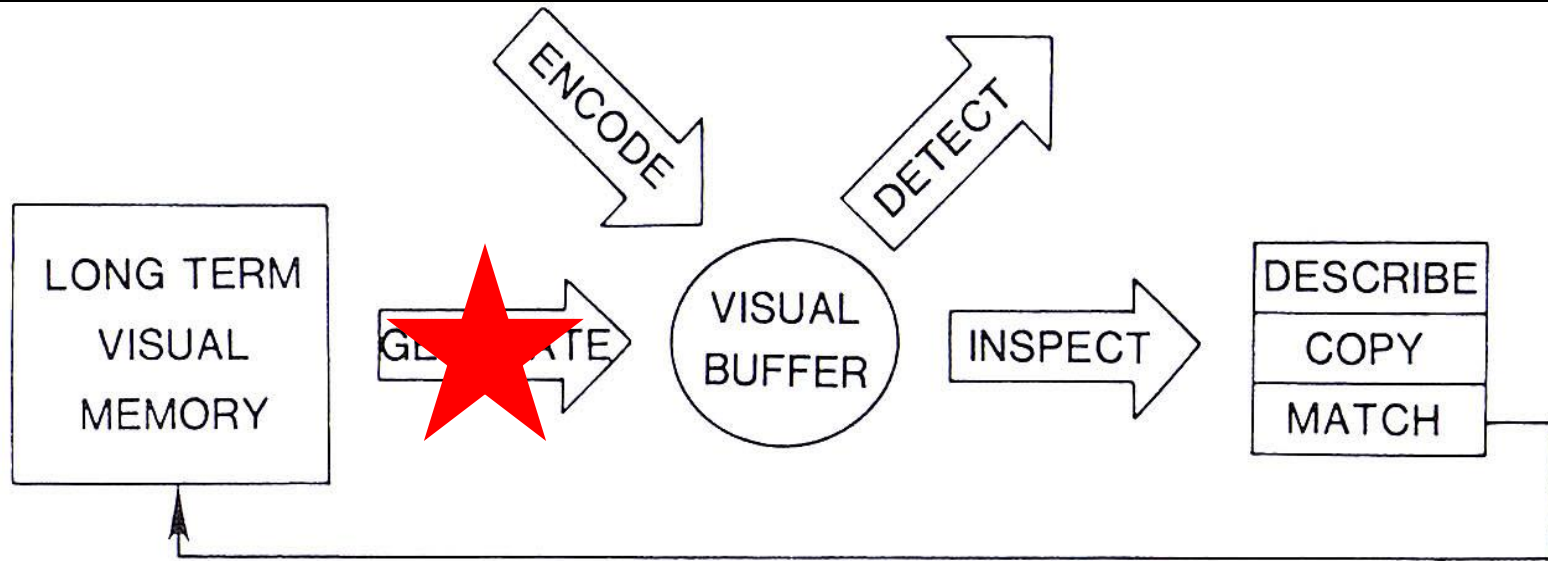
Martha Farah *Cognition* 1984;18:245-72



Martha Farah *Cognition* 1984;18:245-72



Martha Farah *Cognition* 1984;18:245-72



Martha Farah *Cognition* 1984;18:245-72

**Thank you!**

**SDAM**

**ASD**

**prosopagnosia**

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**Neurogenic  
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**Psychogenic  
forms**



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## Commentary

# Refusing to imagine? On the possibility of psychogenic aphantasia. A commentary on Zeman et al. (2015)



Stefania de Vito <sup>a,b,\*</sup> and Paolo Bartolomeo <sup>a,b</sup>

<sup>a</sup> INSERM U 1127, CNRS UMR 7225, Sorbonne Universités, and Université Pierre et Marie Curie-Paris 6, UMR S 1127, Institut du Cerveau et de la Moelle épinière (ICM), Paris, France

<sup>b</sup> Department of Psychology, Catholic University, Milan, Italy



**Thank you!**

**SDAM**

**ASD**

**prosopagnosia**

**genetics?**

**fiction**

**Artists/writers/makers**

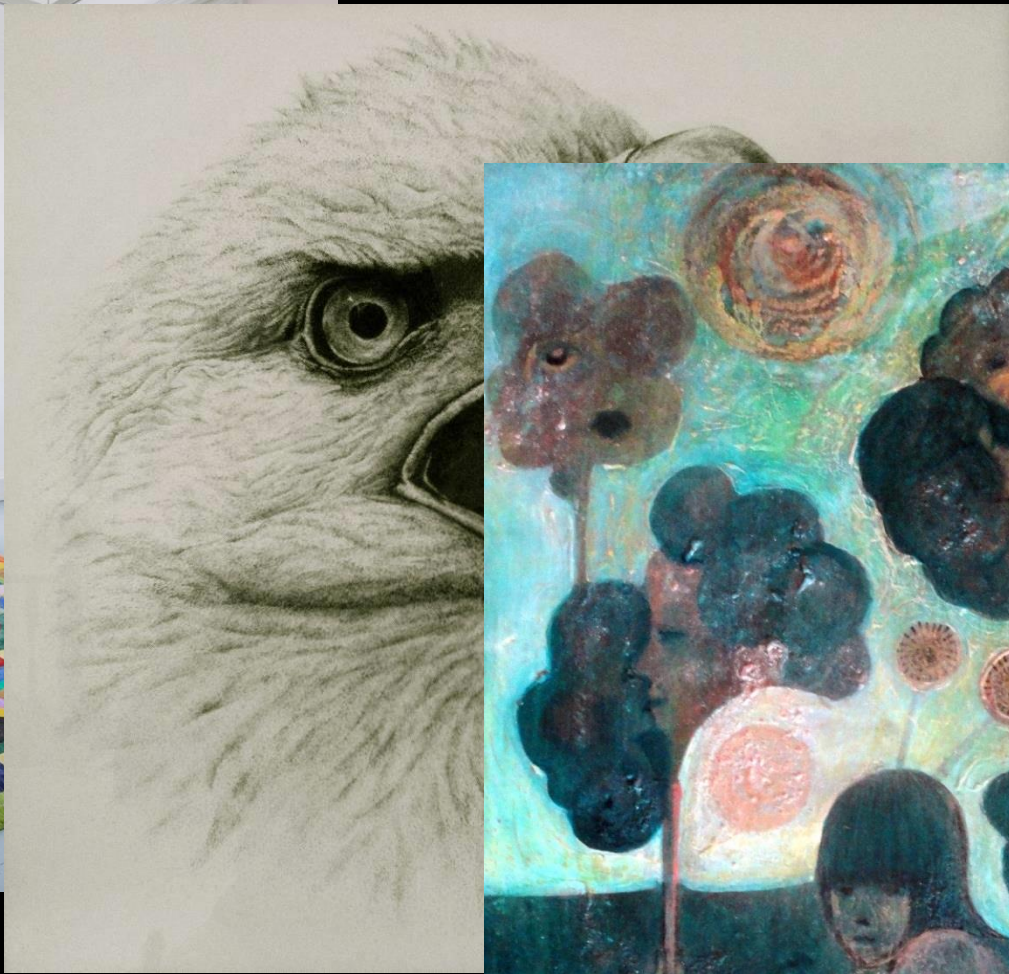
**Neurogenic  
forms**

**Psychogenic  
forms**









**Thank you!**

**SDAM**

**ASD**

**prosopagnosia**

**vol/invol**

**genetics?**

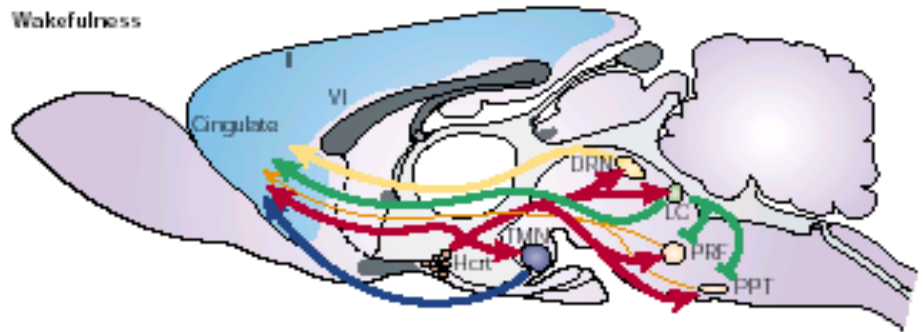
**fiction**

**Artists/writers/makers**

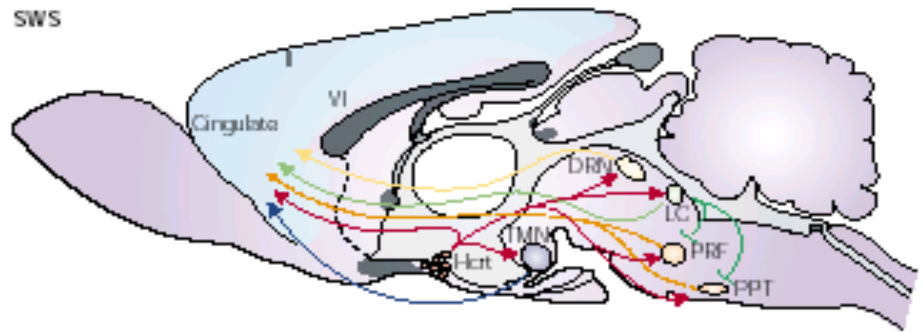
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forms**

**Psychogenic  
forms**

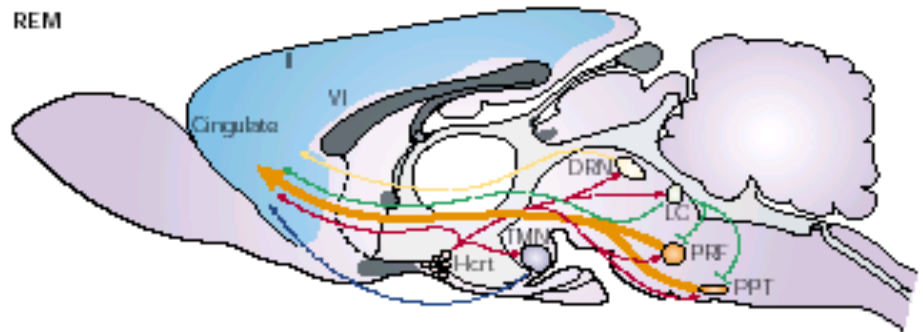
Wakefulness



SWS



REM



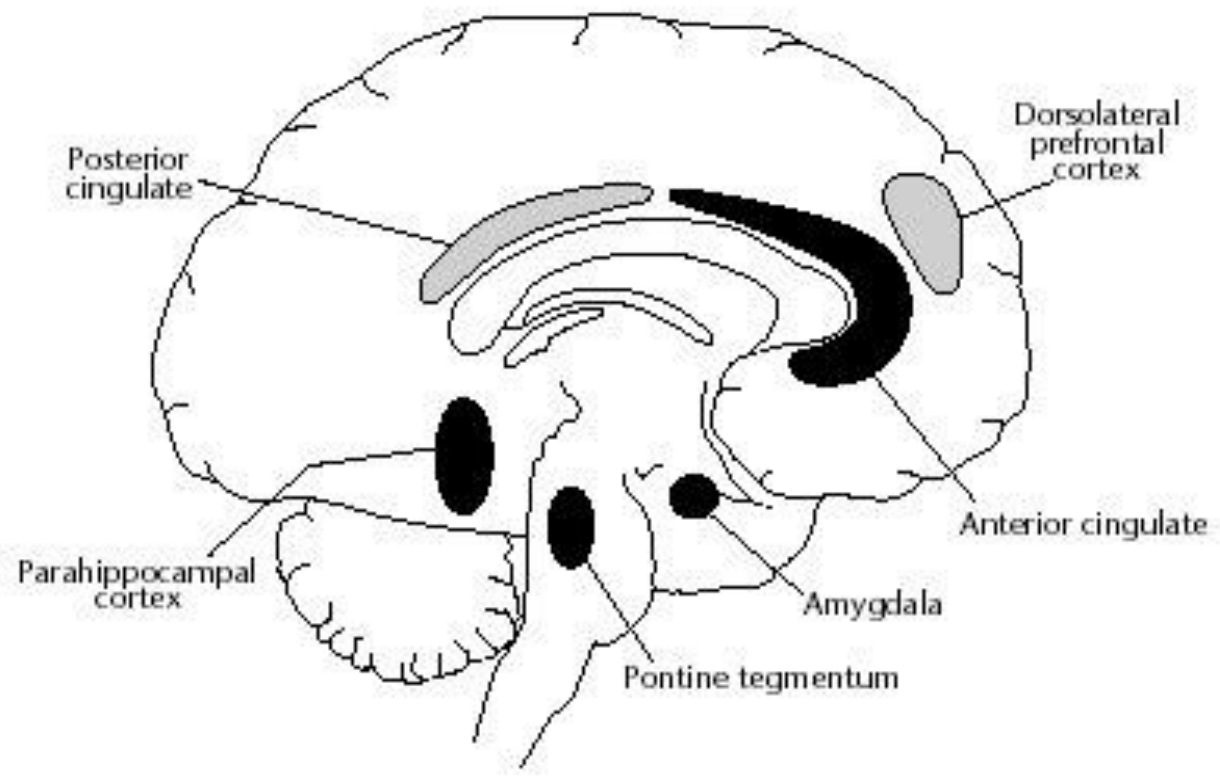
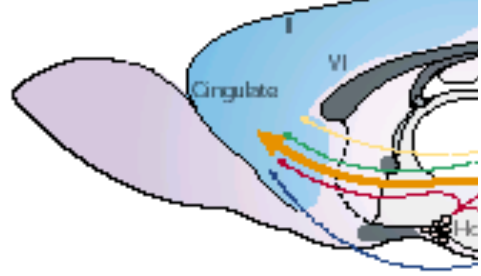
Wakefulness



SWS



REM



**Thank you!**

**SDAM**

**ASD**

**prosopagnosia**

**vol/invol**

**genetics?**

**fiction**

**Artists/writers/makers**

**Uni/multimodal**

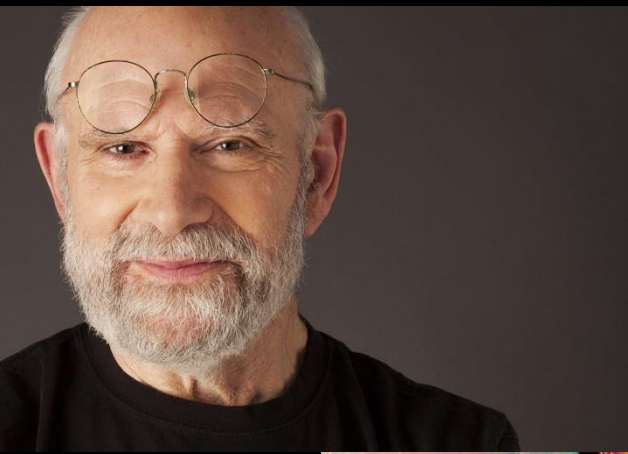
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**Psychogenic  
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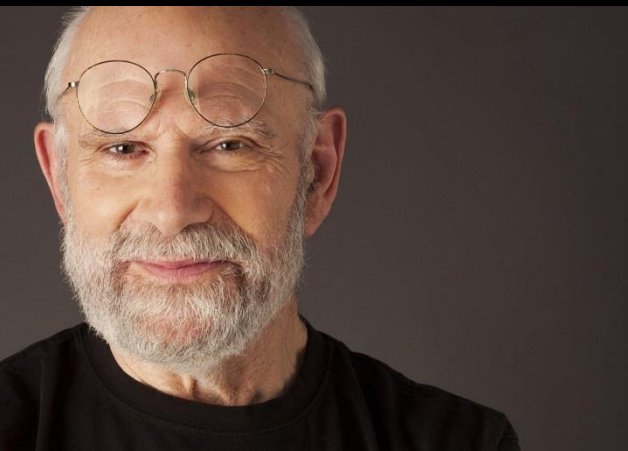












**Thank you!**

**SDAM**

**prosopagnosia**

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**genetics?**

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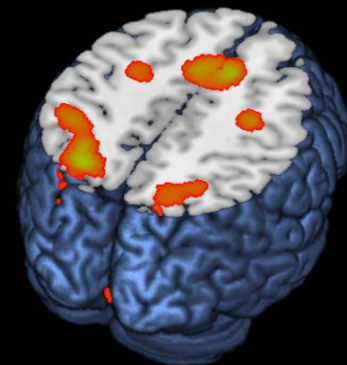
**fiction**

**Artists/writers/makers**

**Uni/multimodal**

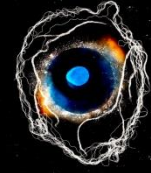
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**Psychogenic  
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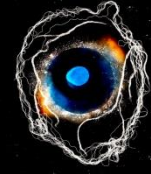


- *Why does this topic touch a chord?*
  - *Deliberate imagination (representation in absence) is such a fundamental human act*
  - *It is an intimate and emotional act – we compare our dreams and daydreams, reminisce with those close to us*
  - *Visualisation is a salient component – for most of us*
  - *If 2% prevalence - friends will probably be puzzled or disbelieving: hence gratitude*
  - *98% will be intrigued by this unexpected dimension of individual difference*



- *How do you cope with all those images getting in the way?*
- *How do teenage male visualisers ever leave their bedrooms?*





- *Next steps*
  - *Archive of responses*
  - *More detailed qualitative study*
  - *Aphantasia, hyperphantasia, average groups*
  - *Neuropsychological/behavioural measures*
  - *s, r, fMRI, DTI*
  - *MEG*
  - *Family studies/genetics*







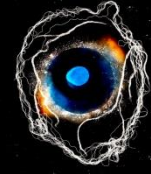
# Aphantasia



- The variety of human experience
  - Aphantasia, hyperphantasia
- ...easily escapes attention
- Multiple routes to ‘imagination’/modes of representation
- What does imagery add?

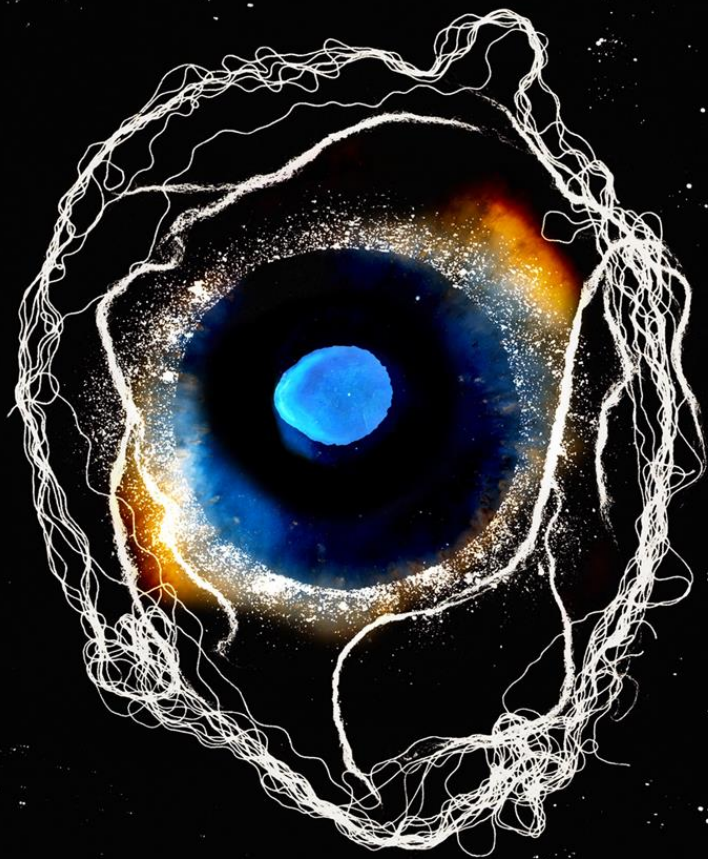






# Aphantasia

- Edinburgh
  - Prof Sergio Della Sala
  - Dr Michaela Dewar
- Exeter
  - Dr Jon Fulford
  - Dr Fraser Milton
  - Dr Crawford Winlove
- London
  - Dr David Mitchell
  - Dr Matthew MacKisack
- Thanks to Karl Zimmer, very many contributors to the Eye's Mind study and our Exeter student interns



**Thank you!**

**SDAM**

**vol/invol**

**prosopagnosia**

**ASD**

**genetics?**

**Chess players,  
molecular  
chemists**

**fiction**

**Artists/writers/makers**

**Spelling,  
directions**

**Neurogenic  
forms**

**Psychogenic  
forms**

**Uni/multimodal**