Eye and Vision Consortium

Resource 10261

17-JUN-2024

Enabling scientific discoveries that improve human health

PJ Kohler, P Cavanagh, PU Tse. (2017)
Courtesy of Pierre Poulet @EUNOS 2024

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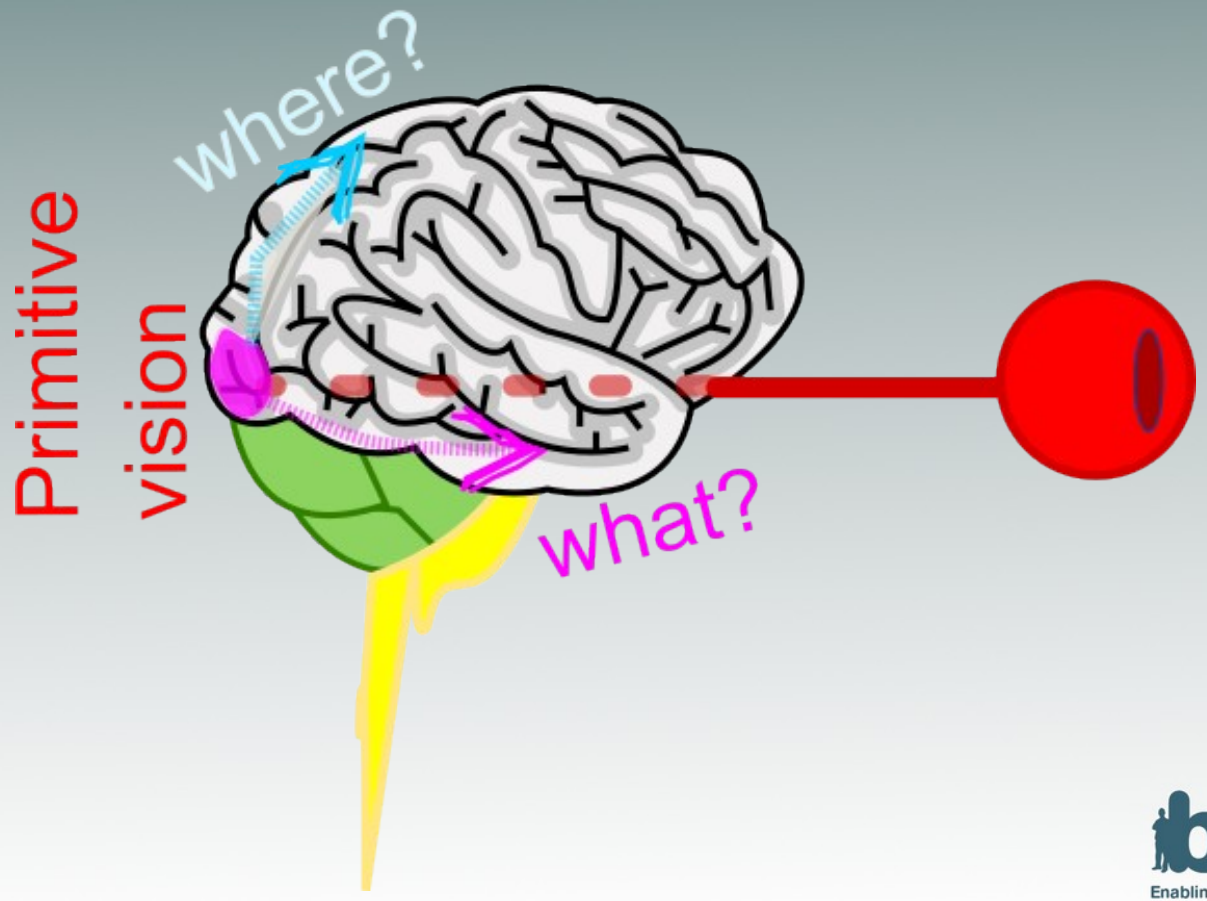
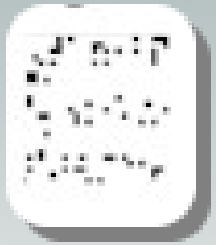
Eye & Brain





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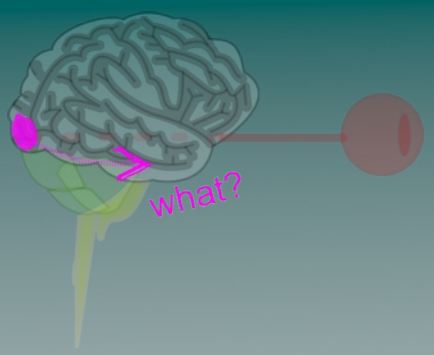

Object recognition

- Depends on intact higher cortical visual function
- Early impaired in neurodegeneration / dementia
- Graded Incomplete Letter Test
- The UKBB GILT: 

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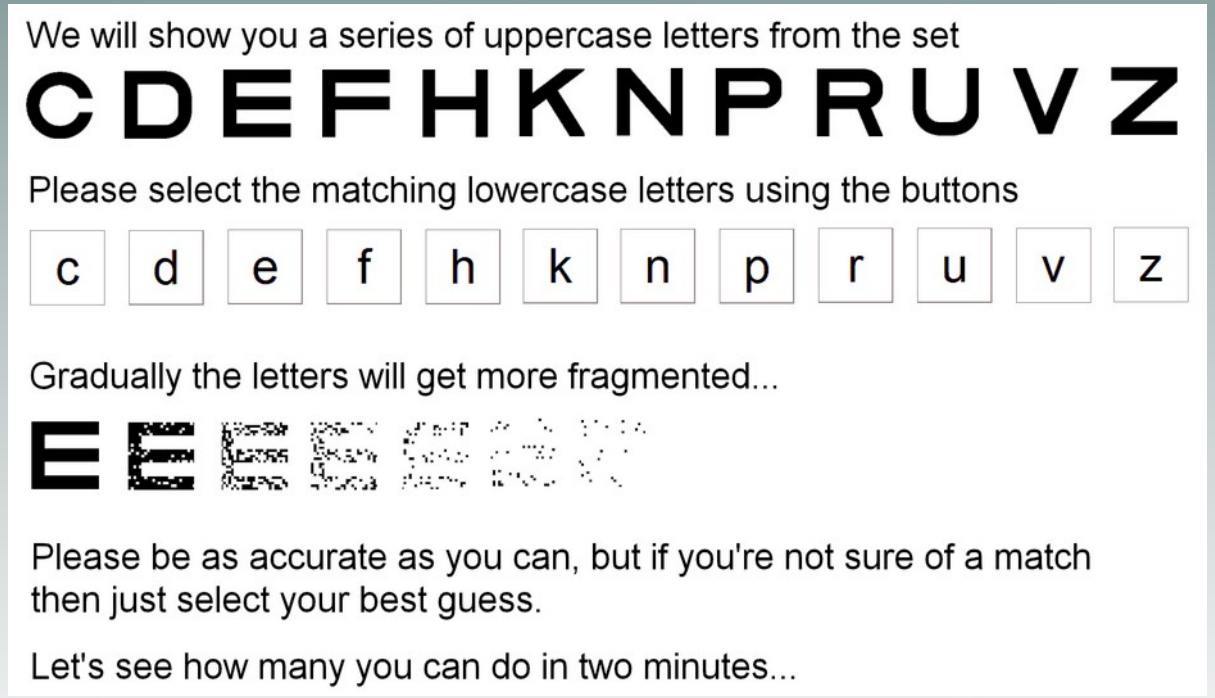
GILT




```
wget  -nd  biobank.ndph.ox.ac.uk/ukb/ukb/images/blinst_full.png
```

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Resource 10261 / Category 1358

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Index | Browse | Search | Cat

Category 1358

Assessment centre ▸ Cognitive function ▸ Broken letter recognition

Description

Participants are shown a series of letters of the alphabet with segments removed and are as
displayed. As the test progresses the letters are progressively degraded by removing pixels
The test concludes when either the degree of fragmentation becomes so great that the parti
letters or a time-out threshold is reached.

11 Data-Fields | **1 Parent Category** | **3 Resources**

Field ID	Description
20139	Number of letters correctly identified
20141	Position of first letter not identified
7677	Reason test concluded
7670	Letter displayed to participant
7671	Letter selected by participant
7678	Total duration of test
7673	Duration between presenting an image and participant making selection
7674	Duration between presenting an image and participant pressing Next button
7672	History of actions performed
7669	Image displayed
7676	Number of letters displayed

Data-Field 20139

Description: Number of letters correctly identified

Category: Assessment centre ▸ Cognitive function ▸ Broken letter recognition

Participants	22,956	Value Type	Integer, letters	Sexed	Both sexes	Debut	Dec 2022
Item count	22,956	Item Type	Data	Instances	Defined (2)	Version	Apr 2024
Stability	Accruing	Strata	Derived	Array	No	Cost Tier	dX o1 s1

Data | **2 Instances** | **Notes** | **0 Related Data-Fields** | **3 Resources**

22,956 items of data are available, covering 22,956 participants.
Defined-instances run from 2 to 3, labelled using Instancing 2.
Units of measurement are letters.

Maximum	40
Decile 9	32
Decile 8	31
Decile 7	31
Decile 6	30
Median	29
Decile 4	29
Decile 3	28
Decile 2	27
Decile 1	26
Minimum	1

- There are 36 distinct values.
- Mean = 29.1449
- Std.dev = 2.96812
- 119 items below graph minimum of 20
- 3 items above graph maximum of 38

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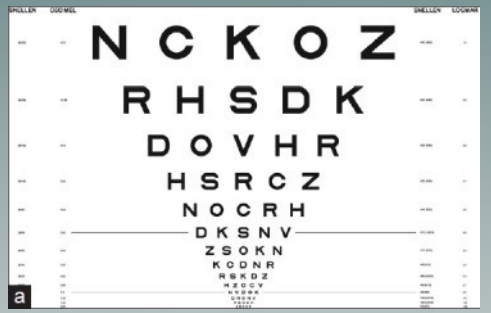
A relative quick test



Data-Field 7678

Description: Total duration of test

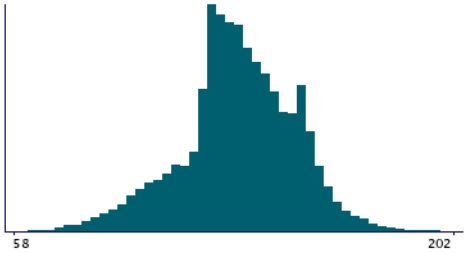
Category: Assessment centre ▸ Cognitive function ▸ Broken letter recogn

Participants	22,992	Value Type	Integer, seconds	Sexed	
Item count	22,992	Item Type	Data	Instanc	
Stability	Accruing	Strata	Primary	Array	

Data | 2 Instances | Notes | 0 Related Data-Fields | 3 Resources

22,992 items of data are available, covering 22,992 participants.
Defined-instances run from 2 to 3, labelled using Instancing 2.
Units of measurement are seconds.

Maximum	1100
Decile 9	154
Decile 8	148
Decile 7	141
Decile 6	136
Median	131
Decile 4	127
Decile 3	123
Decile 2	119
Decile 1	106
Minimum	3



~ 2 minutes

Data-Field 7673

Description: Duration between presenting an image and participant making selection

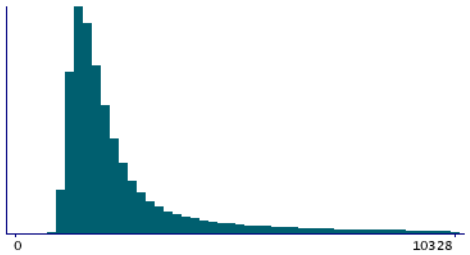
Category: Assessment centre ▸ Cognitive function ▸ Broken letter recognition

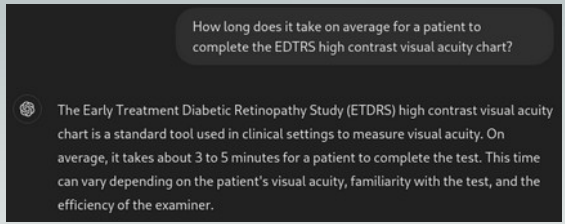
Participants	22,992	Value Type	Integer, msec	Sexed	Both sexes
Item count	763,323	Item Type	Data	Instances	Defined (2)
Stability	Accruing	Strata	Primary	Array	Yes (45)

Data | 2 Instances | Notes | 0 Related Data-Fields | 3 Resources

763,323 items of data are available, covering 22,992 participants.
Defined-instances run from 2 to 3, labelled using Instancing 2.
Array indices run from 0 to 44.
Units of measurement are msec.

Maximum	1.03548e+06
Decile 9	5828
Decile 8	3390.5
Decile 7	2593
Decile 6	2203
Median	1953
Decile 4	1766
Decile 3	1609
Decile 2	1469
Decile 1	1328
Minimum	0





~ 3-5 minutes per eye

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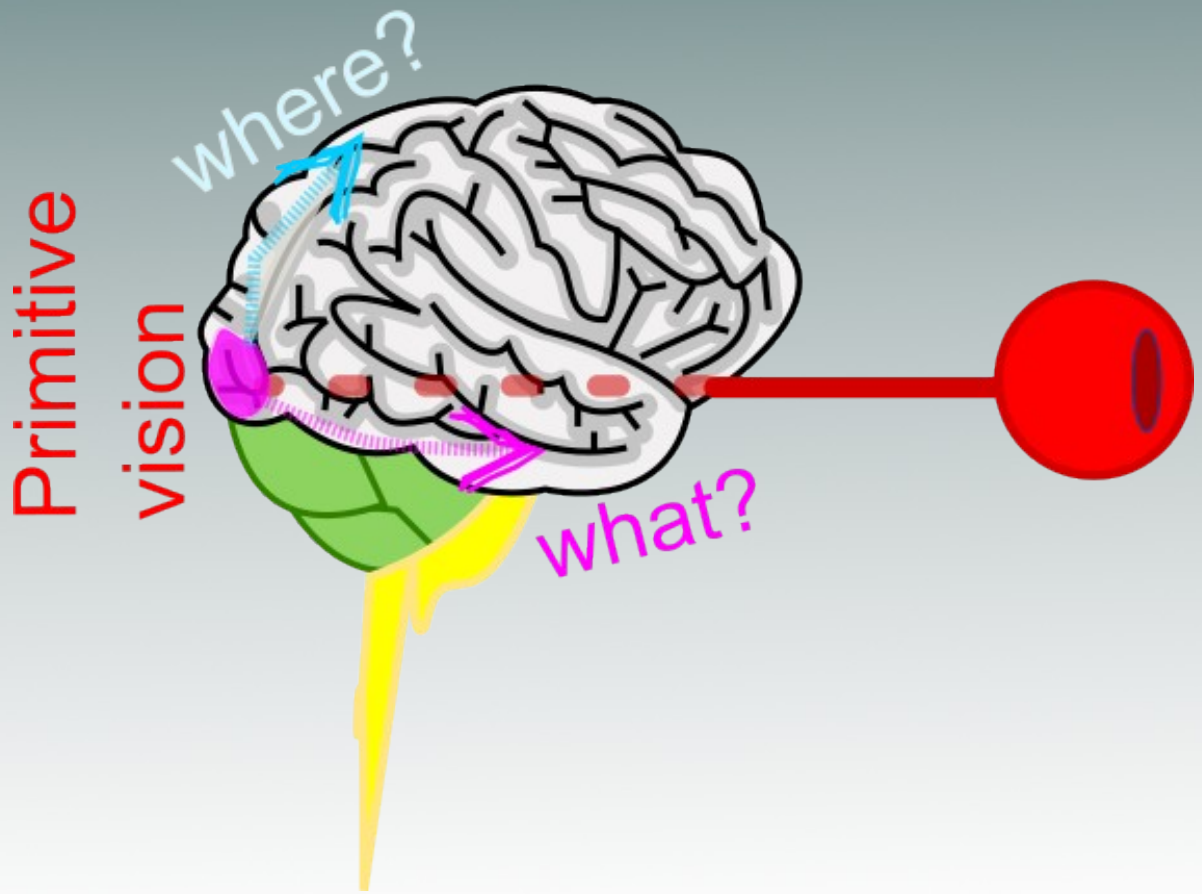
What do we want to do with GILT?



Neurodegeneration:
Dementia / PCA

Neurological diseases
Psychiatric diseases

Systemic co-morbidity &
Modifiable risk factors

Structure-function relationships

Predictive value / prognosis

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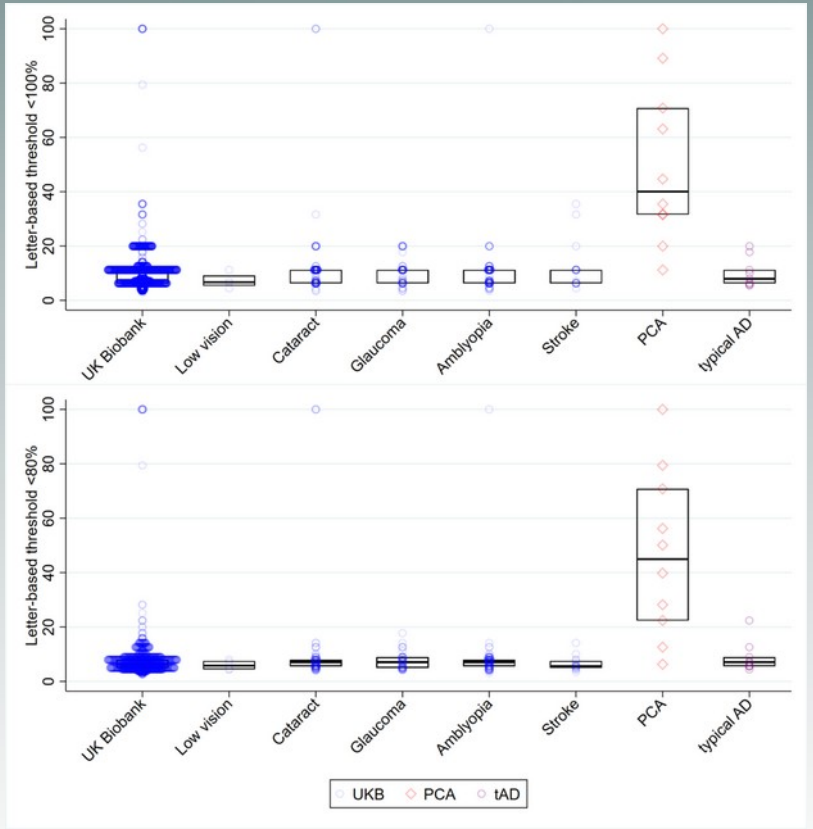
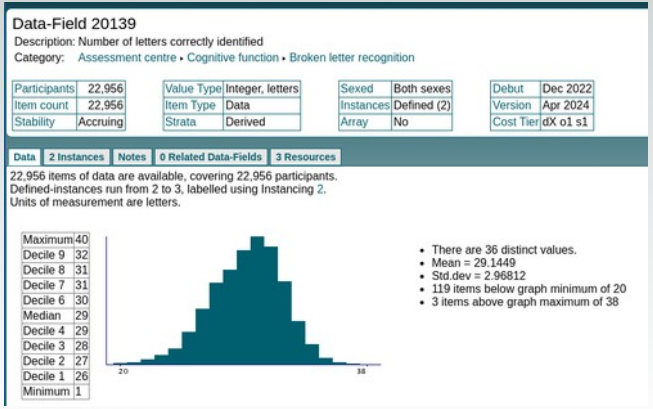
GILT & PCA in UKBB



Letter-based thresholds are presented for all UKB participants without or with visual conditions or stroke who reached accuracy cut-offs of <100% (top; total UKB n=2,052) or <80% (bottom; total UKB n=1,767)

K. Young et al. [in press]



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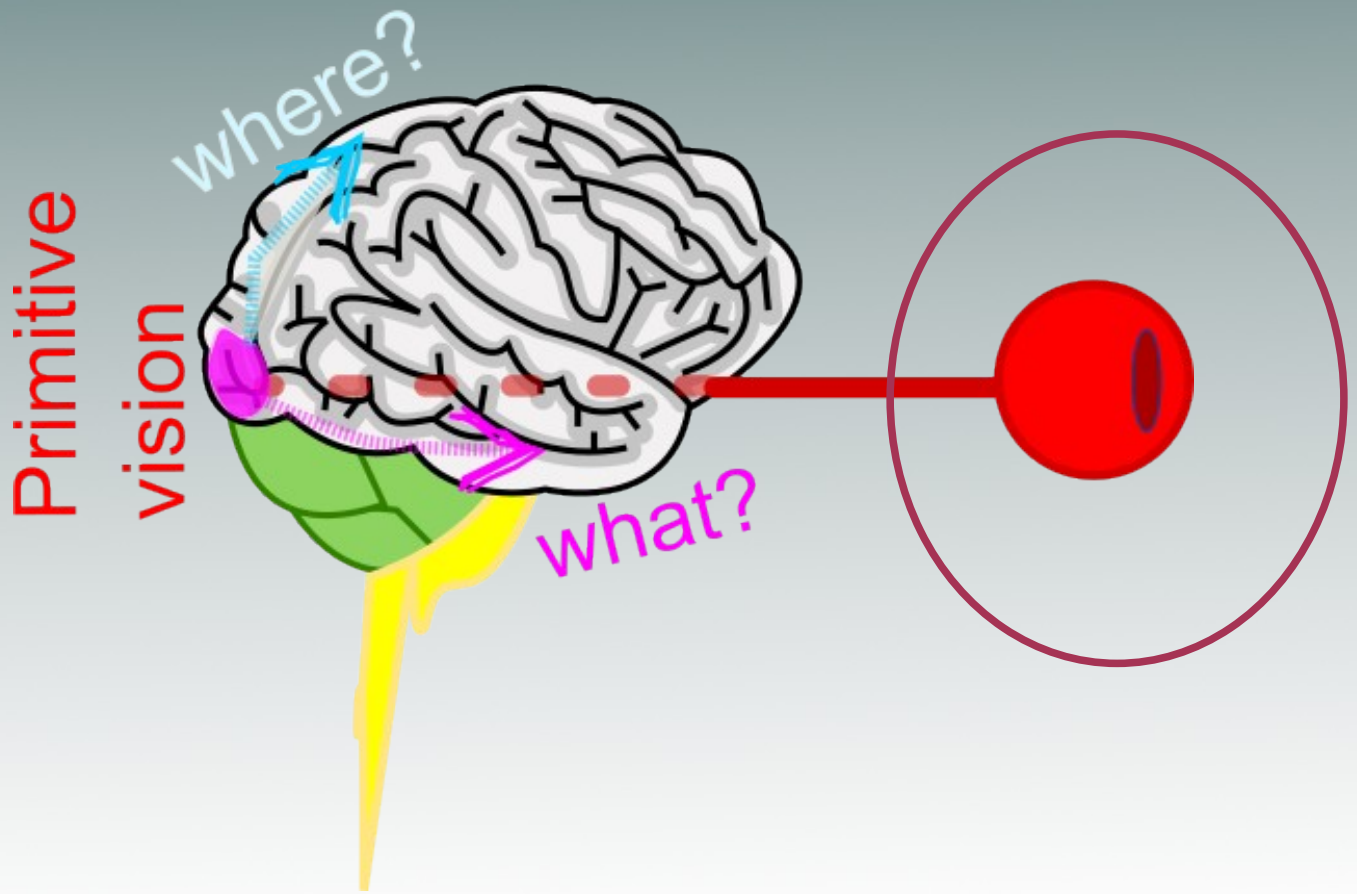

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UKBB Eye & Vision 2023

RESEARCH ARTICLE OPEN ACCESS

Retinal Optical Coherence Tomography Features Associated With Incident and Prevalent Parkinson Disease

Siegfried Karl Wagner, MSc, MD, David Romero-Bascones, BSc, Mario Cortina-Borja, PhD, Dominic J. Williamson, MSc, Robbert R. Struyven, MSc, Yukun Zhou, MSc, Salil Patel, MD, Rimona S. Weil, PhD, Chrystalina A. Antoniades, PhD, Eric J. Topol, MD, Edward Korot, MD, Paul J. Foster, PhD, Konstantinos Balaskas, MD, Unai Ayala, PhD, Maitane Barrenechea, PhD, Iñigo Gabilondo, MD, PhD, Anthony H.V. Schapira, MD, Anthony P. Khawaja, PhD, Praveen J. Patel, MD, Jugnoo S. Rahi, PhD, Alastair K. Denniston, PhD, Axel Petzold, MD, PhD, and Pearse Andrew Keane, MD, for UK Biobank Eye & Vision Consortium

Correspondence
Dr. Wagner
s.wagner@ucl.ac.uk

Neurology® 2023;101:e1581-e1593. doi:10.1212/WNL.0000000000207727

Abstract

Background and Objectives

Cadaveric studies have shown disease-related neurodegeneration and other morphological abnormalities in the retina of individuals with Parkinson disease (PD); however, it remains

RELATED ARTICLE

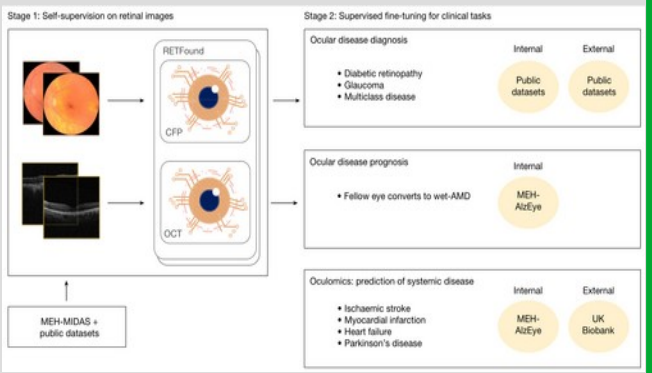
Editorial
Inner Retinal Thickness Changes in Prevalent and

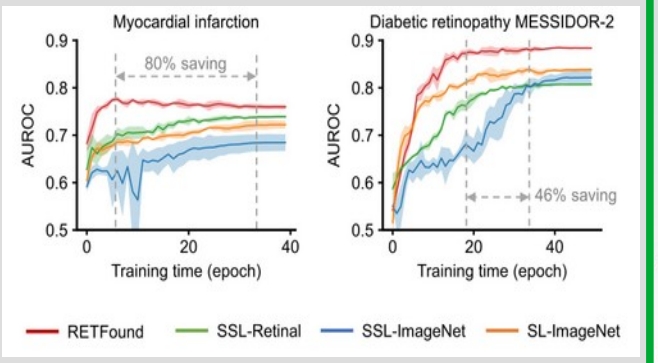
Article

A foundation model for generalizable disease detection from retinal images

https://doi.org/10.1038/s41586-023-06555-x
Received: 5 December 2022

Yukun Zhou[1,2,3,11], Mark A. Chia[3,4], Siegfried K. Wagner[3,4], Murat S. Ayhan[1,3,4], Dominic J. Williamson[1,2,4], Robbert R. Struyven[1,2,4], Timing Liu[5], Moucheng Xu[1,5], Mateo G. Lozano[3,6], Peter Woodward-Court[1,2,6], Yuka Kihara[7,8], UK Biobank Eye & Vision

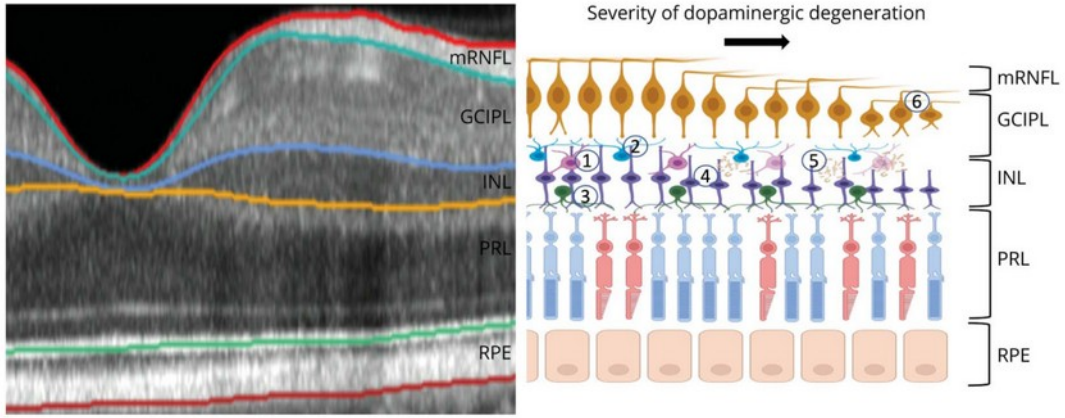




Neurology 2023 & Nature 2023

UKBB Eye & Vision 2023

Figure 4 Illustration of Cell Type Distribution in the Retina



Dopaminergic interactions:

(1) pre-synaptcic plexi in IPL and INL to amacrine AII cells

(2) dopaminergic projections to horizontal cells

(3) post-synaptic to bipolar cells

(4) protein aggregation, α synuclein, in INL

(5) resulting in neurodegeneration (GCL)

(6) anterograde trans-synaptic propagation of neurodegeneartion

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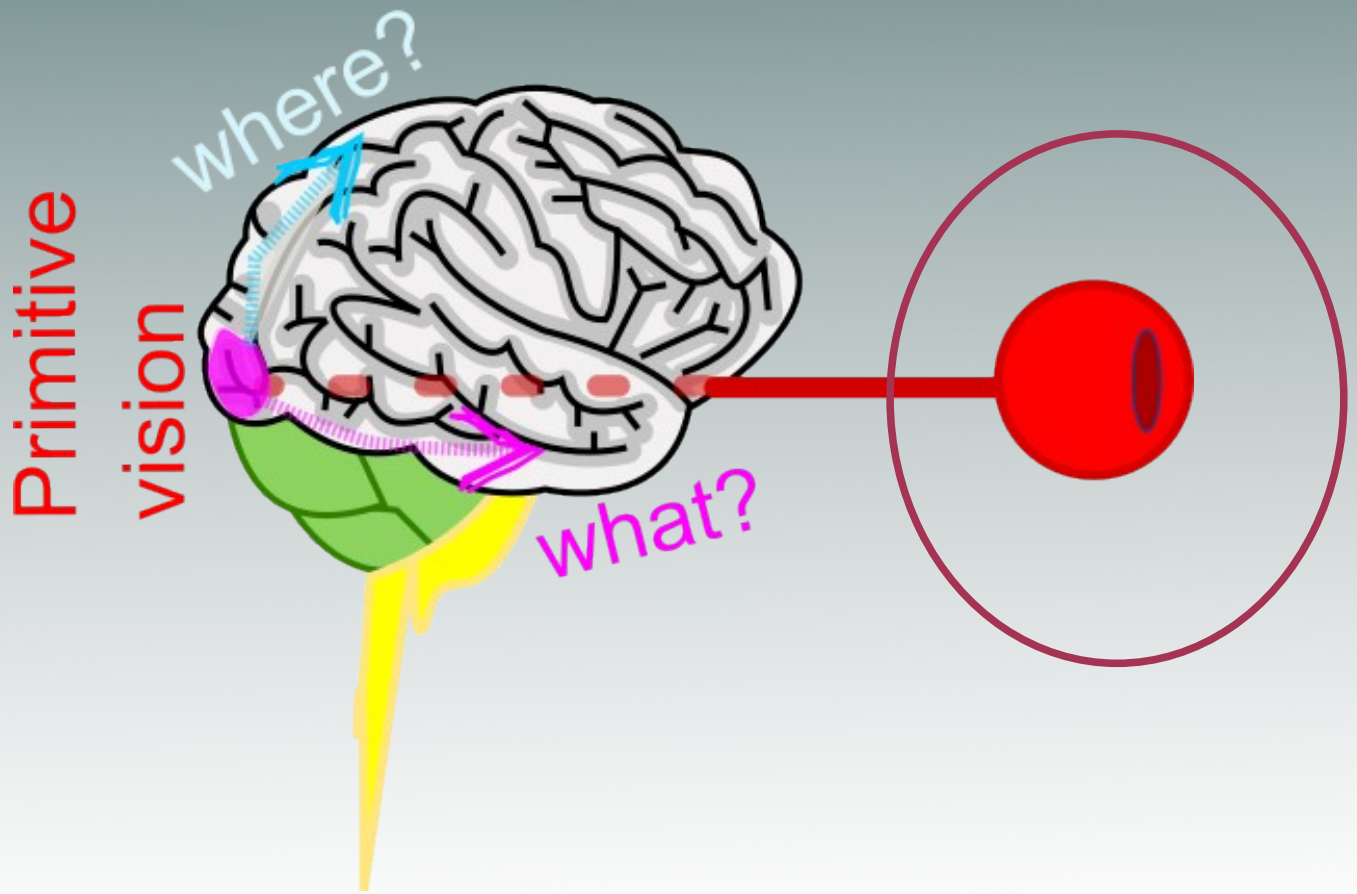

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JAMA Network Open

Original Investigation | Neurology

Associations of Alcohol Consumption and Smoking With Disease Risk and Neurodegeneration in Individuals With Multiple Sclerosis in the United Kingdom

Iris Kleerekooper, PhD; Sharon Chua, PhD; Paul J. Foster, PhD; S. Anand Trip, PhD; Gordon T. Plant, MD; Axel Petzold, PhD; Praveen Patel, MD(Res); for the UK Biobank Eye and Vision Consortium

Abstract

IMPORTANCE Understanding the effects of modifiable risk factors on risk for multiple sclerosis (MS) and associated neurodegeneration is important to guide clinical counseling.

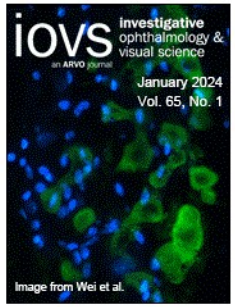
OBJECTIVE To investigate associations of alcohol use, smoking, and obesity with odds of MS diagnosis and macular ganglion cell layer and inner plexiform layer (mGCIPL) thickness.

Ophthalmology Glaucoma
Volume 6, Issue 4, July–August 2023, Pages 366-379

Original Article

The Association of Alcohol Consumption with Glaucoma and Related Traits: Findings from the UK Biobank

Kelsey V. Stuart MBBCh, MSc [1], Robert N. Luben PhD [1 2], Alasdair N. Warwick MBBS, FRCOphth [1 3], Kian M. Madjedi MD, MPhil [1 4], Praveen J. Patel MD, FRCOphth [1], Mahantesh I. Biradar PhD [1], Zihan Sun PhD [1], Mark A. Chia MBBS, MMed [1], Louis R. Pasquale MD [5], Janey L. Wiggs MD, PhD [6], Jae H. Kang ScD [7], Jihye Kim PhD [8], Hugues Aschard PhD [8 9], Jessica H. Tran BS [5], Marleen A.H. Lentjes PhD [10] *, Paul J. Foster PhD, FRCS(Ed) [1] *, Anthony P. Khawaja PhD, FRCOphth [1] *, Modifiable Risk Factors for Glaucoma Collaboration, the UK Biobank Eye and Vision Consortium, and the International Glaucoma Genetics Consortium
Members of the Modifiable Risk Factors for Glaucoma Collaboration



January 2024
Volume 65, Issue 1
ISSUE

OPEN ACCESS

Clinical and Epidemiologic Research | January 2024

Smoking, Corneal Biomechanics, and Glaucoma: Results From Two Large Population-Based Cohorts

Kelsey V. Stuart; Kian M. Madjedi; Robert N. Luben; Mahantesh I. Biradar; Siegfried K. Wagner; Alasdair N. Warwick; Zihan Sun; Pirro G. Hysi; Mark J. Simcoe; Paul J. Foster; Anthony P. Khawaja; on behalf of the Modifiable Risk Factors for Glaucoma Collaboration and the UK Biobank Eye and Vision Consortium

+ Author Affiliations & Notes

Investigative Ophthalmology & Visual Science January 2024, Vol.65, 11.
doi:https://doi.org/10.1167/iovs.65.1.11

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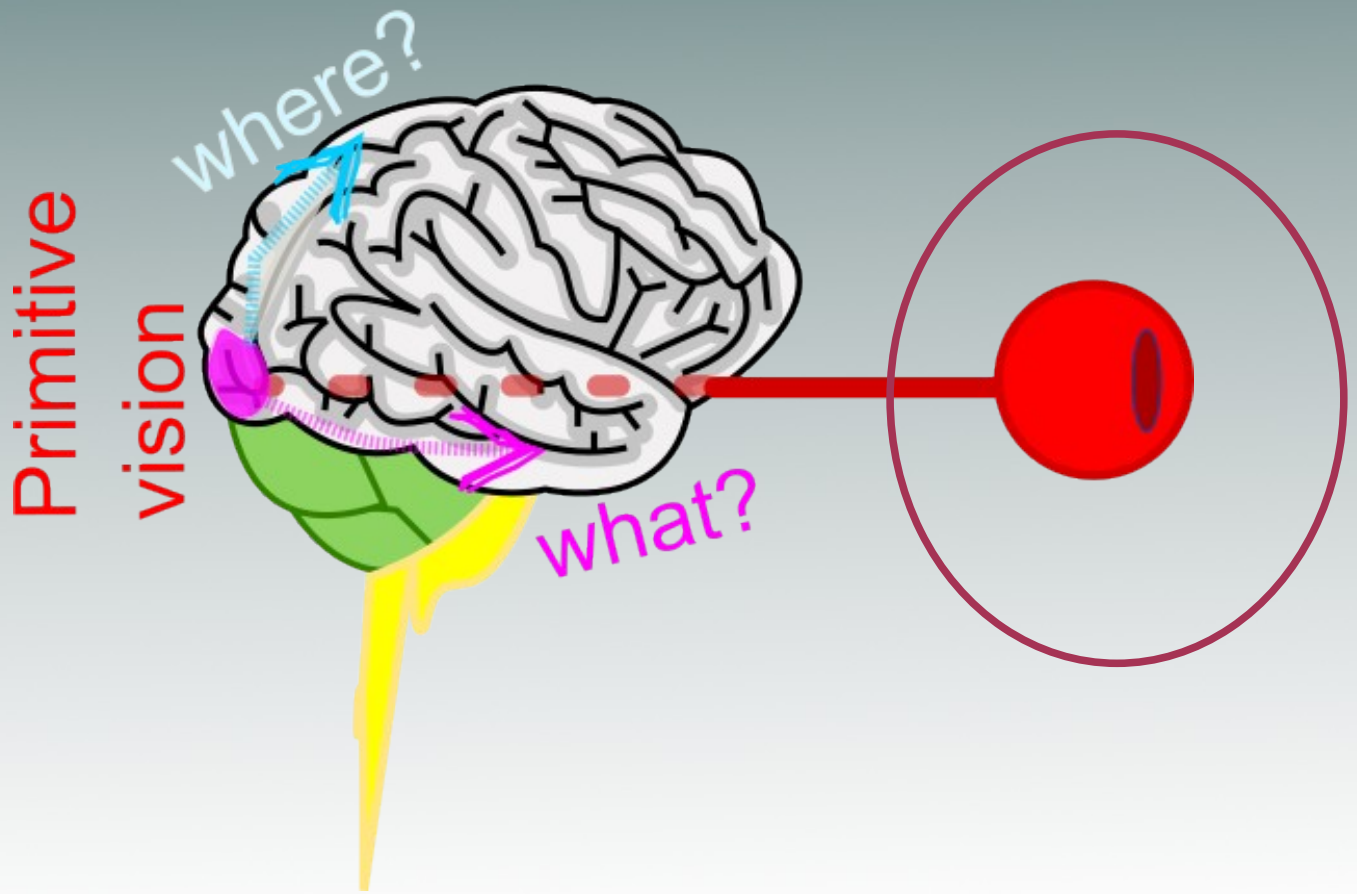
What do we want to do with GILT?



Neurodegeneration:
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Research

JAMA Neurology | Original Investigation

Association of Retinal Nerve Fiber Layer Thinning With Current and Future Cognitive Decline
A Study Using Optical Coherence Tomography

Fang Ko, MD; Zaynah A. Muthy, BSc; John Gallacher, PhD; Cathie Sudlow, DPhil; Geraint Rees, PhD; Qi Yang, PhD; Pearse A. Keane, MD; Axel Petzold, PhD; Peng T. Khaw, PhD; Charles Reisman, MSc; Nicholas G. Strouthidis, PhD; Paul J. Foster, PhD; Praveen J. Patel, FRCOphth; for the UK Biobank Eye & Vision Consortium

IMPORTANCE Identifing potential screening tests for future cognitive decline is a priority for developing treatments for and the prevention of dementia.

Author Au

Suppleme

ORIGINAL ARTICLE

european journal of neurology

Relationships between retinal layer thickness and brain volumes in the UK Biobank cohort

Sharon Y. L. Chua[1] | Gerassimos Lascaratos[2,3] | Denize Atan[4,5] | Bing Zhang[6] | Charles Reisman[7] | Peng T. Khaw[1] | Stephen M. Smith[8] | Paul M. Matthews[9] | Axel Petzold[1] | Nicholas G. Strouthidis[1] | Paul J. Foster[1] | Anthony P. Khawaja[1] | Praveen J. Patel[1] | The UK Biobank Eye, Vision Consortium

Received: 21 May 2023 | Accepted: 12 March 2024
DOI: 10.1111/ene.16288

ORIGINAL ARTICLE

european journal of neurology

Structural correlations between brain magnetic resonance image-derived phenotypes and retinal neuroanatomy

Zihan Sun[1] | Bing Zhang[2] | Stephen Smith[3] | Denize Atan[4,5] | Anthony P. Khawaja[1] | Kelsey V. Stuart[1] | Robert N. Luben[1] | Mahantesh I. Biradar[1] | Thomas McGillivray[6] | Praveen J. Patel[1] | Peng T. Khaw[1] | Axel Petzold[7,8] | Paul J. Foster[1] |
on behalf of the UK Biobank Eye and Vision Consortium

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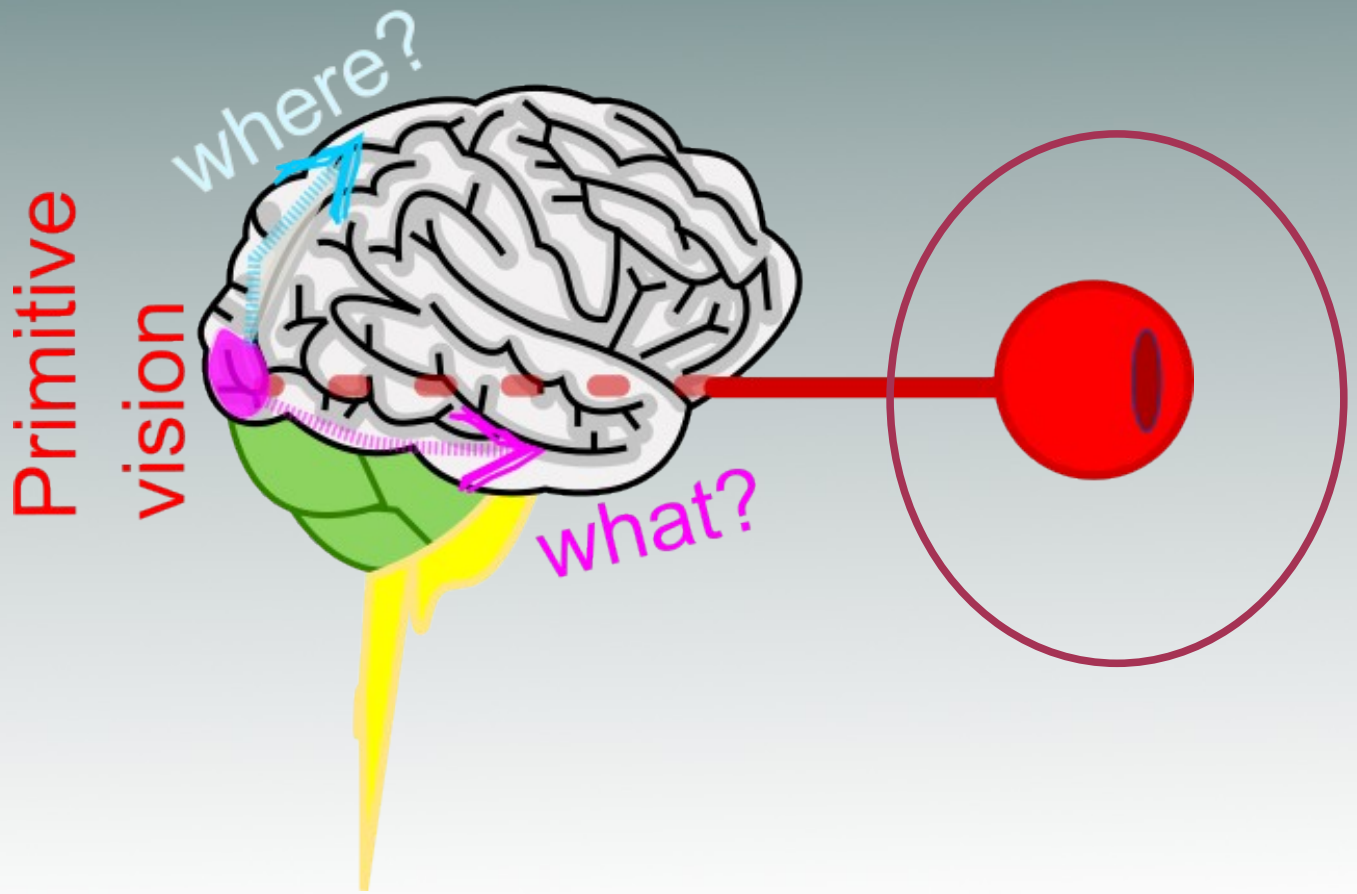

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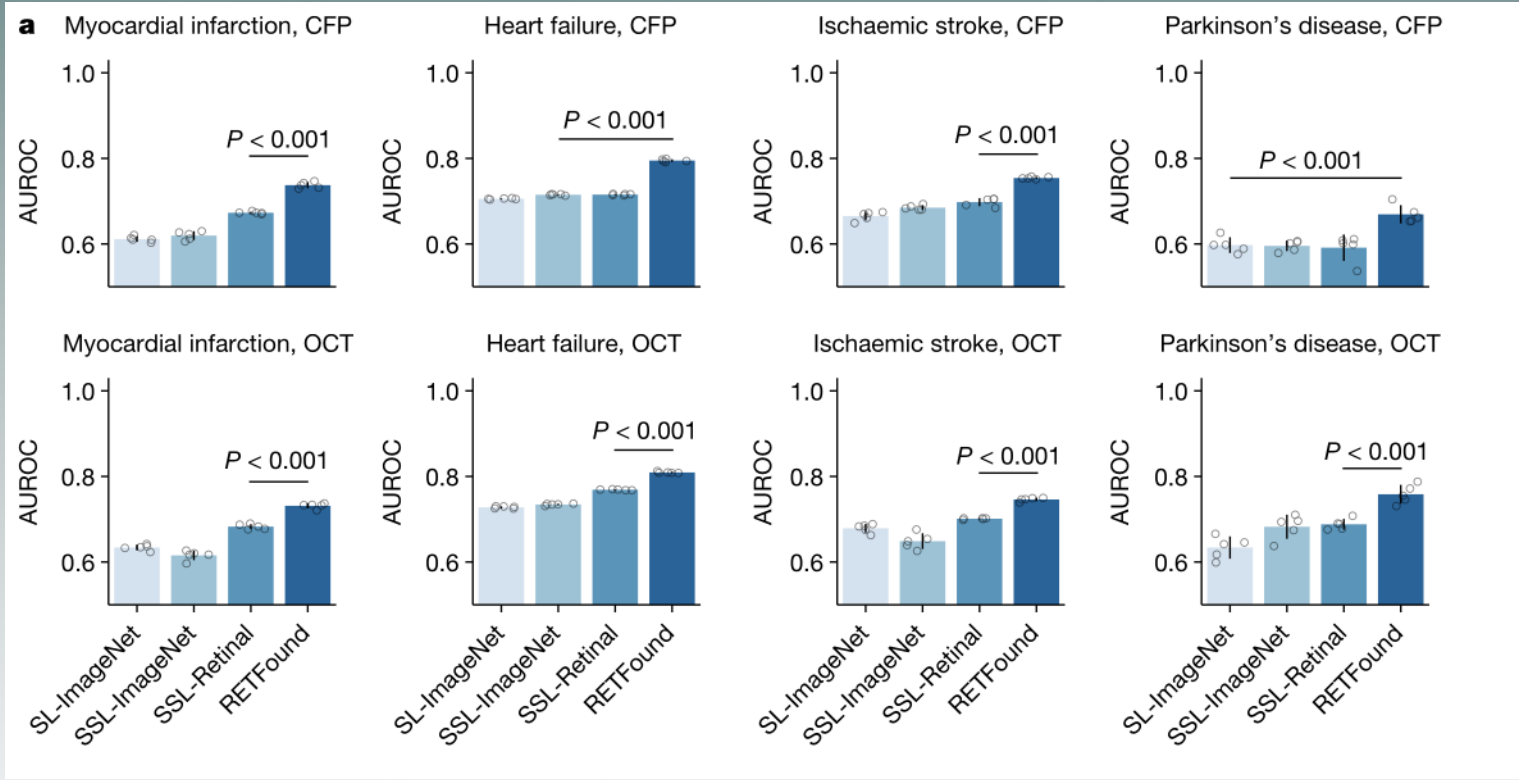

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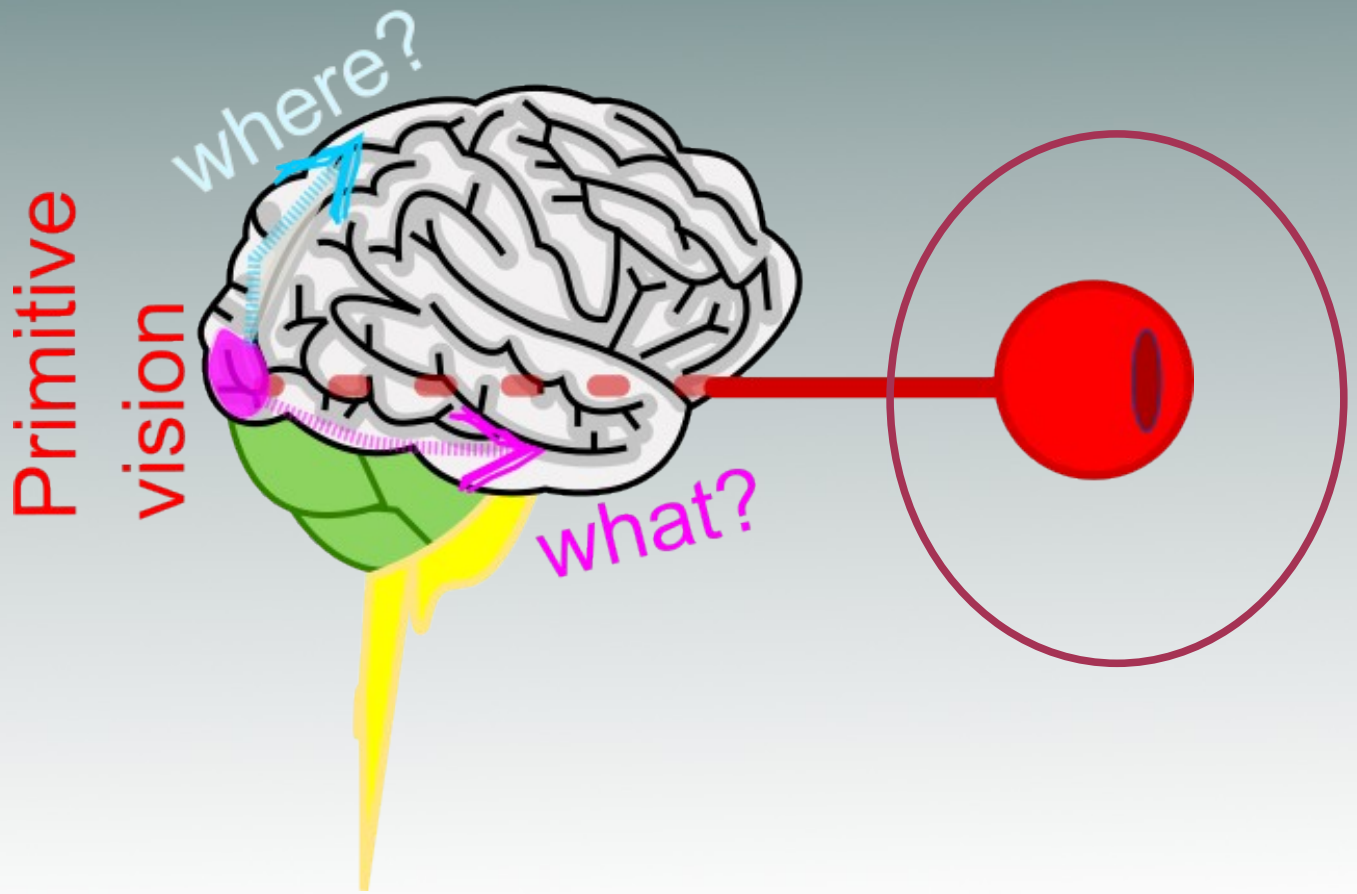

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Acknowledgement

- Professor Paul Foster and the E&V Consortium
- Dr Praveen Patel (more on OCT next time)
- Steve Bell and Alan Young from the UKBB
- Professors Sebastian Crutch and John Greenwood, Drs Keir Yong and Andre Altmann from UCL
- Chan Zuckerberg Foundation for funding

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