

MSc Computational Cognitive Neuroscience (C²N)

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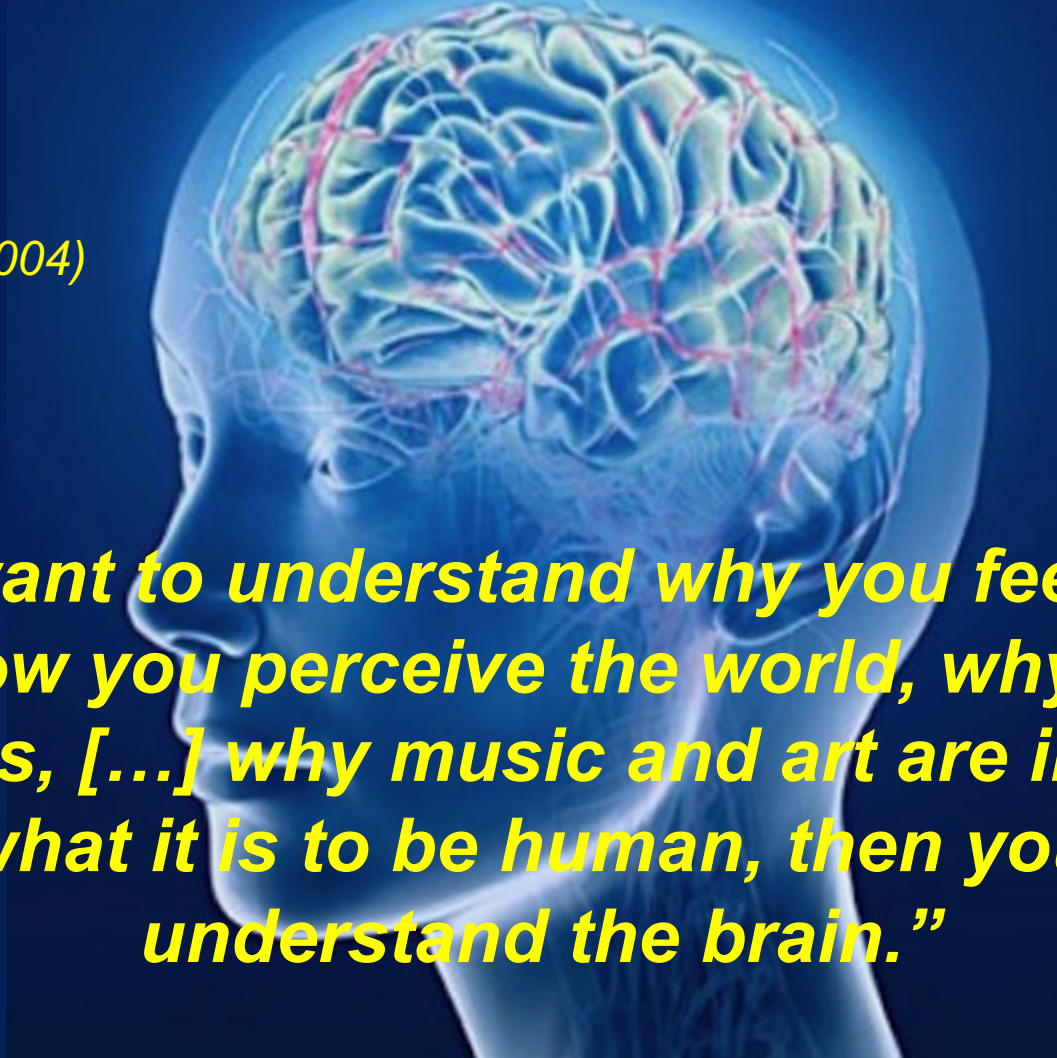
Virtual Postgraduate Open Day

30th May 2024

Goldsmiths, University of London

“You are your brain”

J. Hawkins,
On Intelligence (2004)



“If you want to understand why you feel the way you do, how you perceive the world, why you make mistakes, [...] why music and art are inspiring, indeed what it is to be human, then you need to understand the brain.”

Computational Cognitive Neuroscience



***How does the brain
“implement” the mind?***

*How does the physical substance (brain, body)
produce our sensations, feelings, thoughts and
emotions? (mental world)*

Computational Cognitive Neuroscience



Neural mechanisms

For example,

How can we remember facts and events?

Where is the meaning of a word stored in the brain?

How is a decision made?... Is there “free will”?

Why does this matter?

Understanding how the brain works can be used to:

1. Help cure brain-related diseases

- Mental illnesses (e.g, autism, OCD, schizophrenia..)
- Cognitive impairments (e.g., speech, memory...)
- Neurodegenerative diseases (Alzheimer, Parkinson)



HEALTHY BRAIN



BRAIN of FTD PATIENT



Why does this matter?

Understanding how the brain works can be used to:

2. Build new, *human-like* artificial systems

- Improve the *quality of our lives* (speech recognition, deep-learning applications, humanoid robotic assistants for the elderly or the disabled...)
- Help us gain knowledge & understanding about the *world* (e.g, machines endowed with *General Intelligence* or aspects of *creativity*)



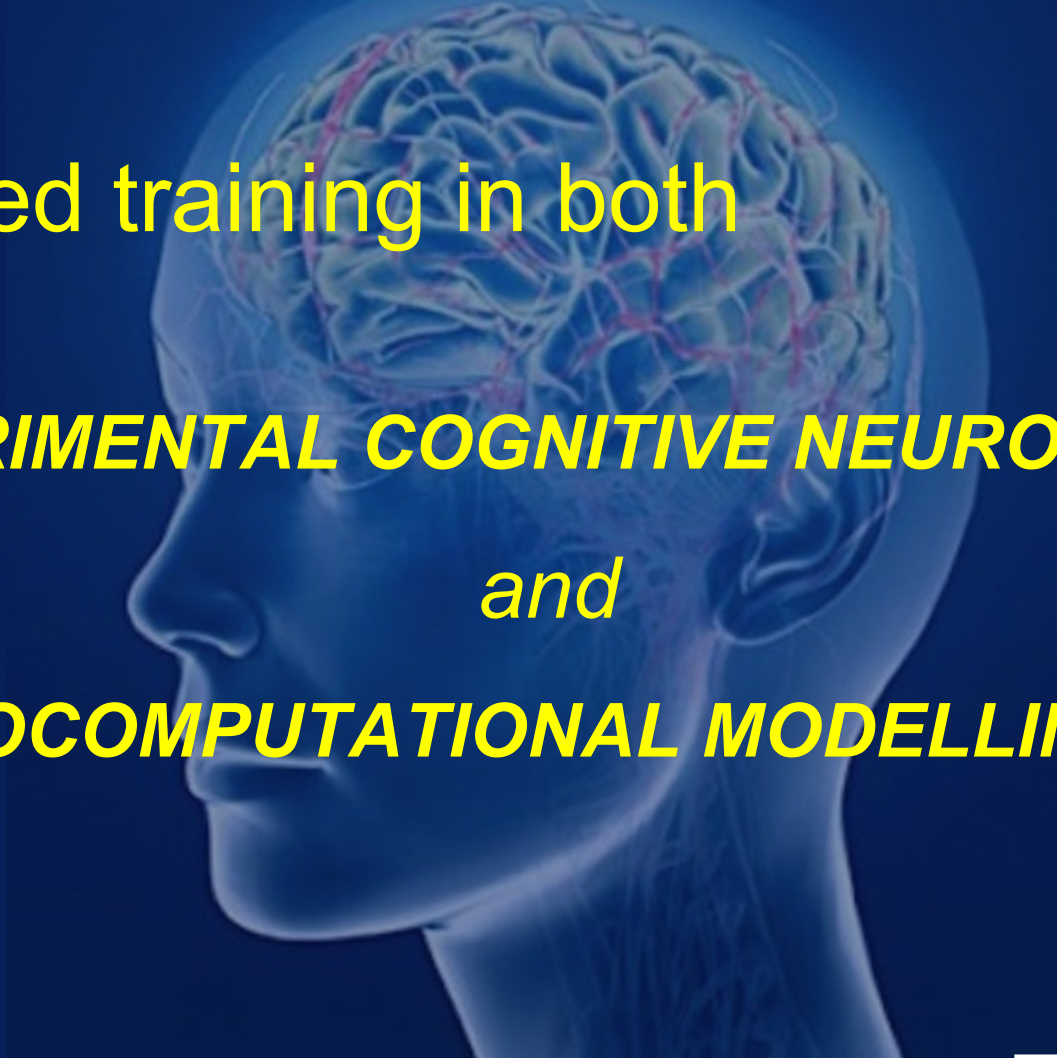
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Advanced training in both

1. EXPERIMENTAL COGNITIVE NEUROSCIENCE

and

2. NEUROCOMPUTATIONAL MODELLING



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Mandatory taught modules: TERM 1

- *Foundations of Neuroscience*
- *Multivariate Statistical Methods*
- *Introduction to Coding with Matlab and R*

OR

Data Programming (Python)

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Optional modules (students to choose **ONE**):

- *Research Design and Analysis (PSY)*
- *Neural Networks (CMP)*
- *Critical Analysis (PSY)*
- *Physical Computing (CMP)*
- *Behavioural Genetics (PSY)*
- *Artificial Intelligence / Deep learning (CMP)*
- *Machine Learning (CMP, Term 2)*

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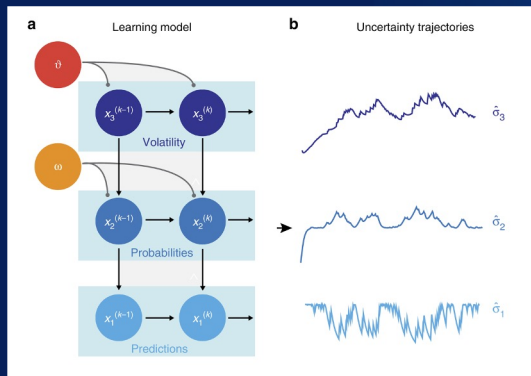
Mandatory taught modules: TERM 2

- *Cortical Modelling*
- *Modelling Cognitive Functions*
- *Cognitive Neuroscience*
- *Advanced Quantitative Methods*

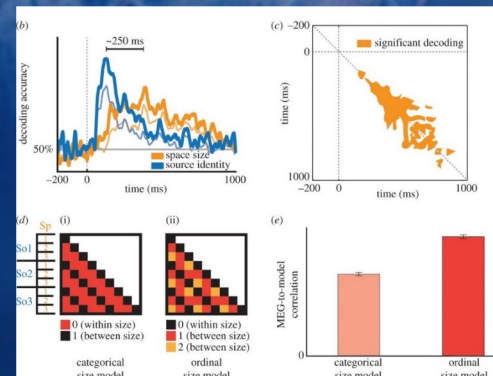
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Mandatory TERM 3 (May-Aug):

- *Research Project & Dissertation*



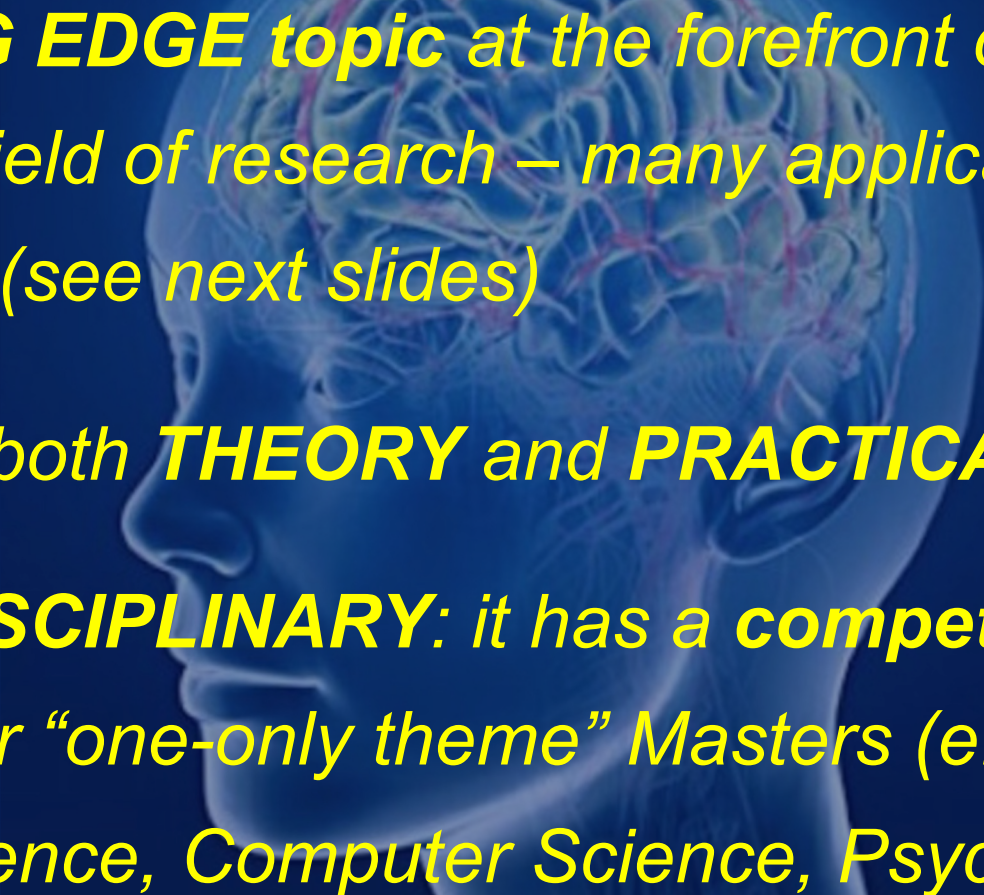
Computational
OR
Data Analysis
(No data
collection)



Experimental
AND
Data Analysis
(Data collection
required)

- Examples of previous projects: <https://coconeuro.com/>

Why *this* MSc degree

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- **CUTTING EDGE** topic at the forefront of a rapidly growing field of research – many applications in **industry** (see next slides)
 - It covers both **THEORY** and **PRACTICAL** methods
 - **MULTIDISCIPLINARY**: it has a **competitive edge** over other “one-only theme” Masters (e.g, Neuroscience, Computer Science, Psychology...)

Careers

- 
1. **ACADEMIA:** Ideal preparation for PhD studies or Research Assistant posts in computational / cognitive neuroscience, leading to a career in research (including **clinical research** posts)
 2. **INDUSTRY:** tech companies developing intelligent systems (Data Engineer / Data Scientist, Analyst, Project Manager). Applications in **brain-computer interfaces (BCI)**, **cognitive robotics**, **deep learning** (including virtual / augmented reality, game intelligence), **clinical- / pharma-Tech industry & consulting**

Current Industry collaborators

Sony CS Labs (Japan)
Square Enix (London, UK)
Anywise (Amsterdam, NL)
Human Experience Dynamics
(Cambridge, UK)

...



- Final project in collaboration with industry
- **Possible POST-MASTER internships**
- **Examples of Final projects & career pathways:**

CoCoNeuro.com

MSc in Computational Cognitive Neuroscience

Thank You!

(slides will be added to the **CoCoNeuro blog**)

Questions?

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www.gold.ac.uk/pg/msc-computational-cognitive-neuroscience/