

# PSYC3317 Cognitive Neuroscience

## Lecture 1

Cognitive neuroscience: the link between the mind and brain. Eg vision, attention, memory, audition, language, emotion, development and executive functions

- It has implications for: research, clinic and everyday life

### Assessment

- Quiz (10%) in week 4 on methods and techniques
  - o Lectures and readings from week 1-3
  - o Chapters 3 & 5
  - o 20 MCQ for 20mins
  - o Tuesday 22<sup>nd</sup> – Wed 23<sup>rd</sup>
- Final Exam (40%): MCQ from textbooks and essay questions from other lectures NOT chapters 1-5
- Lab report (50%)

### Cognition

Attention, memory, thinking, mental processes, reasoning, learning, emotion and language.

- Happens in daily life

### 20th century psychology

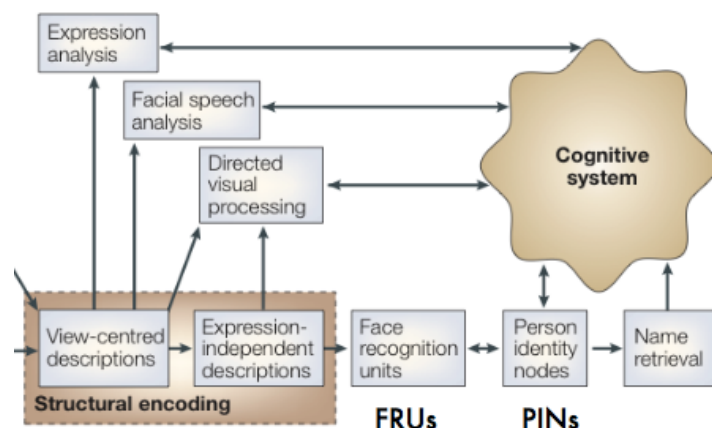
- Observations of *behaviour*, rather than observations of the *brain during behaviour*
- *Models* of cognition that do not make direct reference to the brain. e.g. the information-processing models popular from the 1950s onwards
- About processes not relating to brain!
- Later models were inspired by thinking of the mind as a series of routines, like computers
- Mental representations: the sense in which properties of the outside world (eg colours and objects) are stimulated by cognition
- Minds WITHOUT brain

### Faces

- Can convey significant information about ones face, identity, attractiveness, sex and expression

### An example of a cognitive model of face processing

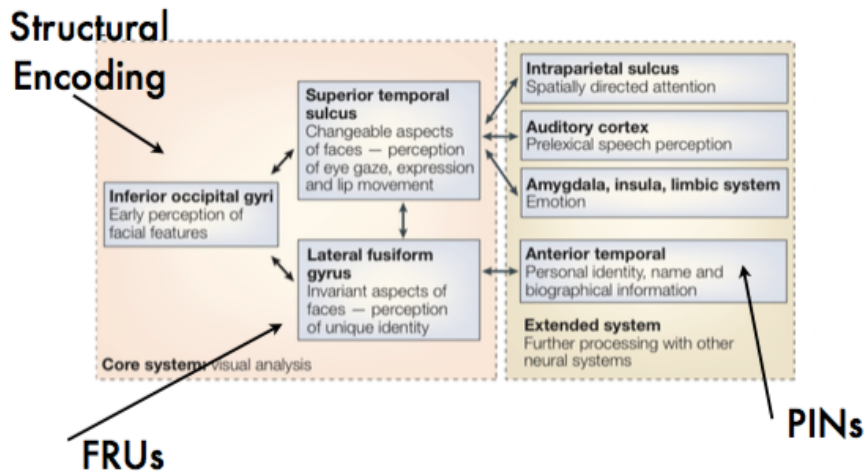
- Nothing to do with brain
- Representations that may happen



**Cognitive Neuroscience:** Provides a brain-based account of cognition.

**Neural representations:** the way properties of the outside world manifest themselves in the neural signal for example different spiking rates for different stimuli

## An example of an anatomical model of face processing



Cognitive neuroscience was made possible due to technological advances in studying the brain

- 1970s: structural imaging methods (CT, MRI) enable precise images of the brain (and brain lesions)
- 1980s: PET adapted to models of cognition developed by psychologists
- 1985: TMS is first used (a non-invasive, safer equivalent of Penfield's earlier brain stimulation studies)
- 1990: level of oxygen in blood used as a measure of cognitive function (the principle behind fMRI)

### Does cognitive psych need the brain?

- Looking at brain provides causal constraints on the nature of cognition (they are NOT independent)
- The things we do depend on our brain

Eg smartgate and Facebook

### Does the brain need cognitive psych?

- Phrenology: different parts of cortex serve different functions
  - o Differences in personality traits due to differences in cortical size and bumps on skull

**Functional specialization:** Different regions specialized for different functions.

Nobody wants to know if one part is specific for one function. They want more than simple localization but also to consider how brain systems interact.

### Are faces special?

- Modules- particular parts for various types of things

### Faces are special: Domain-specificity hypothesis

- 1- Innateness: Infants are born with an innate representation of the structure of a face
- 2- Processing is unique to faces: When you process a face you do it holistically
- 3- Face-specific neural representations: is the brain doing different things. Looked at in lesion, fMRI and timing of face-sensitive processes.

**Categorization:** categorizing things at different levels. It's this categorization that is making it special.

Becoming an "expert"

- 1- Years of experience in the real world