106577.
Cognitive Processes
Artificial Intelligence

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Contents

1. Human cognition (Intro) (2 weeks)
2. Perception and attention (2 weeks)
3. Learning and memory (2 weeks)
4. Language processing (2 weeks)
5. Thinking and reasoning (2 weeks)
6. Cognition, motivation and emotion (2 weeks)
7. Assessment (1 week)

Please read carefully the module guide

Assessment

30%

Team project

Project to design a board game(see specific guide)

35%

Exam 1

20 - 25 multiple-choice questions

Intro + Attention & Perception + Learning & Memory

35%

Exam 2

20 - 25 multiple-choice questions

Language + Thinking & Reasoning + Cognition, Motivation and Emotion

Introduction


FIFA WORLD CUP
Qatar2022
CONVOCATORIA SELECCIÓN ESPAÑOLA
SEGÚN LA INTELIGENCIA ARTIFICIAL
3,71
3,69
3,22
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4,15
3,96
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3,66
3,39
*Valor acumulado con todas las acciones en los minutos jugados esta temporada
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CONVOCATORIA EUROPEAN QUALIFIERS WORLD CUP CATAR 2022

5 NOVIEMBRE 2021


UNAI SIMÓN


DE GEA


AZPILICUETA


CARVAJAL


LAPORTE


ERIC GARCÍA


PAU TORRES


I. MARTÍNEZ


ALBA


GAYÀ


GAVI


C. SOLER


LUIS ENRIQUE


BUSQUETS


RODRI


KOKE


M. MERINO


SARABIA


YÉREMY


BRAHIM


MORATA


RODRIGO


FORNALS


DANI OLMO


ANSU FATI

Qualifiers

GRECIA | ESPAÑA

11 NOVIEMBRE 20.45H

ESPAÑA | SUECIA

14 NOVIEMBRE 20.45H

#VAMOSESPAÑA | #CATAR2022

Is it AI a tool? A science? A philosophy?

¿Qué significa realmente "Inteligencia Artificial"? Subespacios...

1.351.568 visualitzacions • fa 2 mesos

Timestamps:
00:00 PRIMERA PARTE. Vivimos en el futuro.
03:04 ¿Qué es ver? Pareidolias
07:14
11:06
14:29
15:32
MÉS I

Sky News Australia interviews 'free-thinking' artificial intelligence

Sky News Australia
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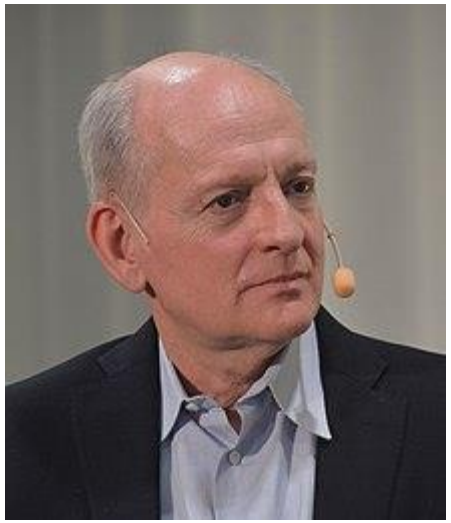
Comparteix

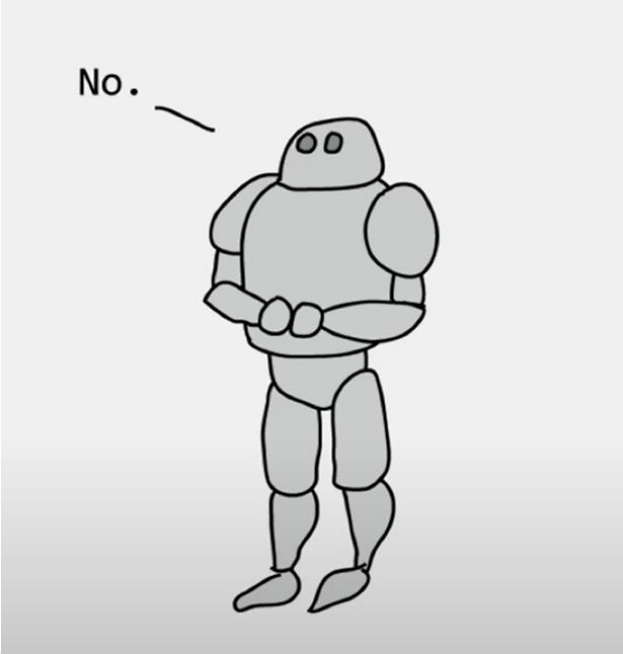
Fundamental things to consider in AI

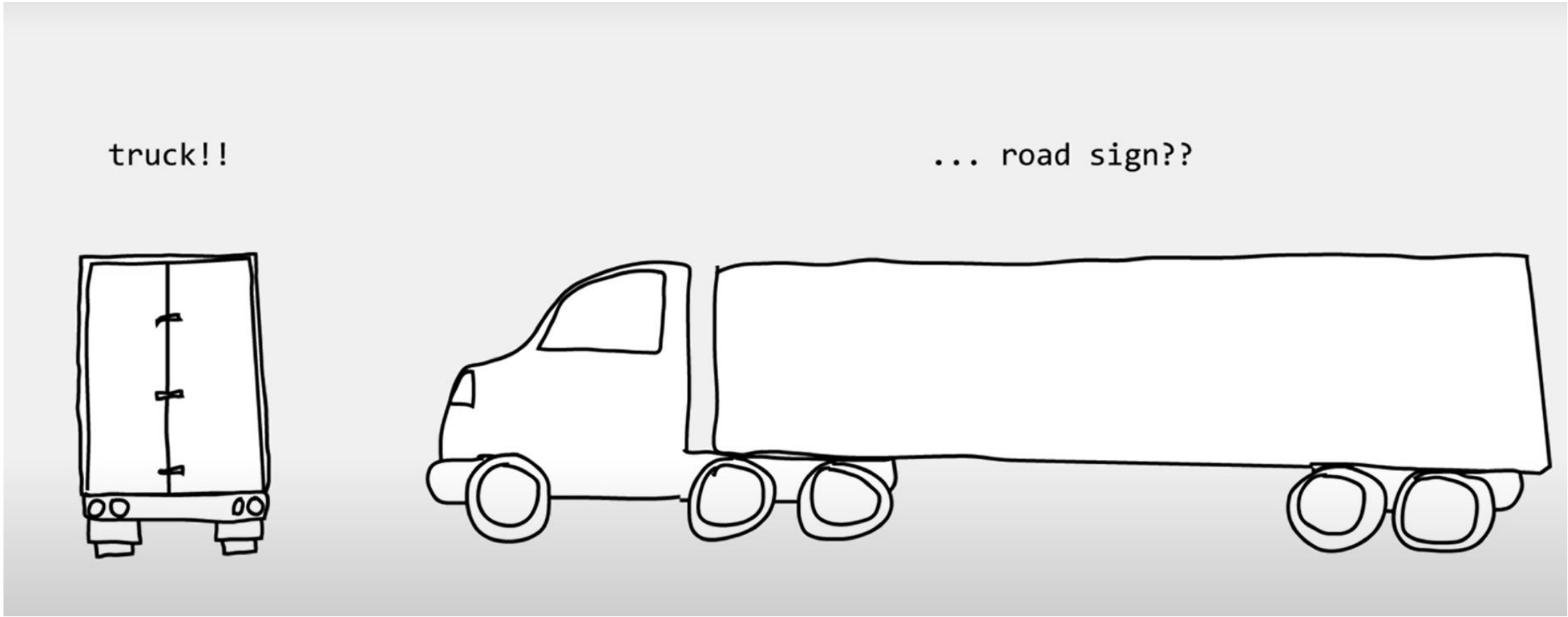
- How will AI change the world... (Stuart Russell)



Are we smart enough to develop AI?

- "Can we build AI without losing control over it? (Sam Harris)"
- "The danger of AI is weirder than you think (Janelle Shane)"
- "We continue to improve our intelligent machines year after year after year... until they become smarter than we are, and begin to improve themselves"




truck!!
... road sign??

Group Debate

- Is it AI development good or harmful for humanity?
- Are we prepared to develop safe AI?
- What does it take to guarantee that AI does not go out of control?

4 aproaches to human cognition

01

Cognitive Psychology

02

Cognitive Neuro-psychology

03

Cognitive Neuroscience

04

Computational cognitive science

1. What is cognitive Psychology?

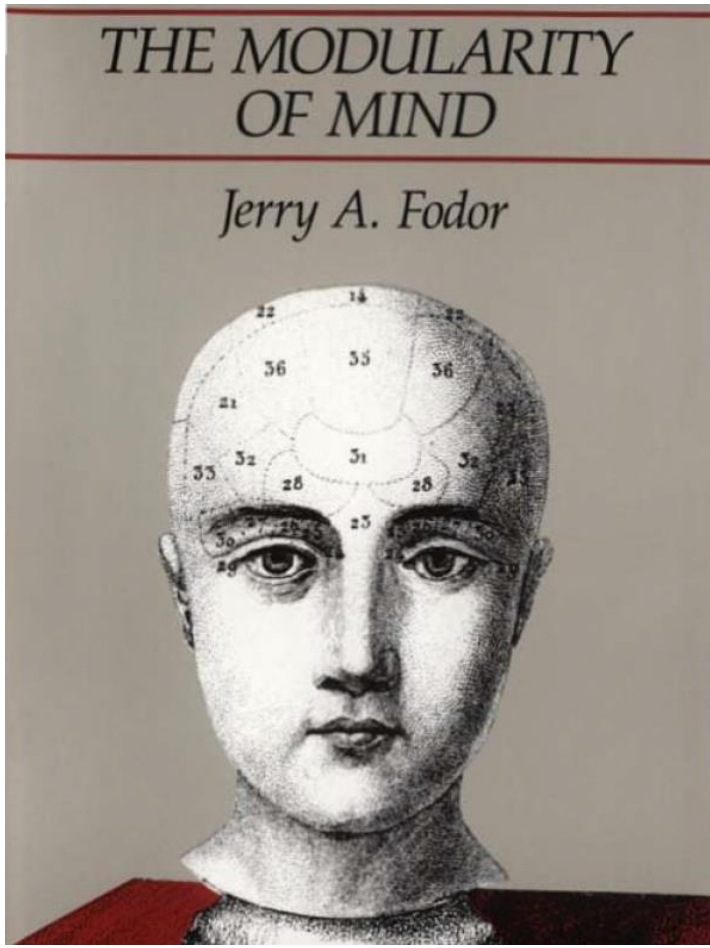
- Internal processes involved in **making sense of the environment** and deciding on **appropriate action**
- Include **attention**, **perception**, **learning**, **memory**, **language**, **problem solving**, **reasoning and thinking**
- We can define cognitive psychology as **aiming to understand human cognition** by observing the behavior of people performing various cognitive tasks

2. What is Cognitive Neuropsychology?

- Focuses on the **patterns of cognitive performance** (intact and impaired) of **brain-damaged patients** having a lesion (structural damage to the brain caused by injury or disease).
- According to cognitive neuropsychologists, **studying brain-damaged patients can tell us much about cognition in healthy individuals**
- Modularity:
  - The assumption that the cognitive system consists of many fairly independent or separate modules or processors, each specialised for a given type of processing. According to this assumption, each module is located in a specific brain area.

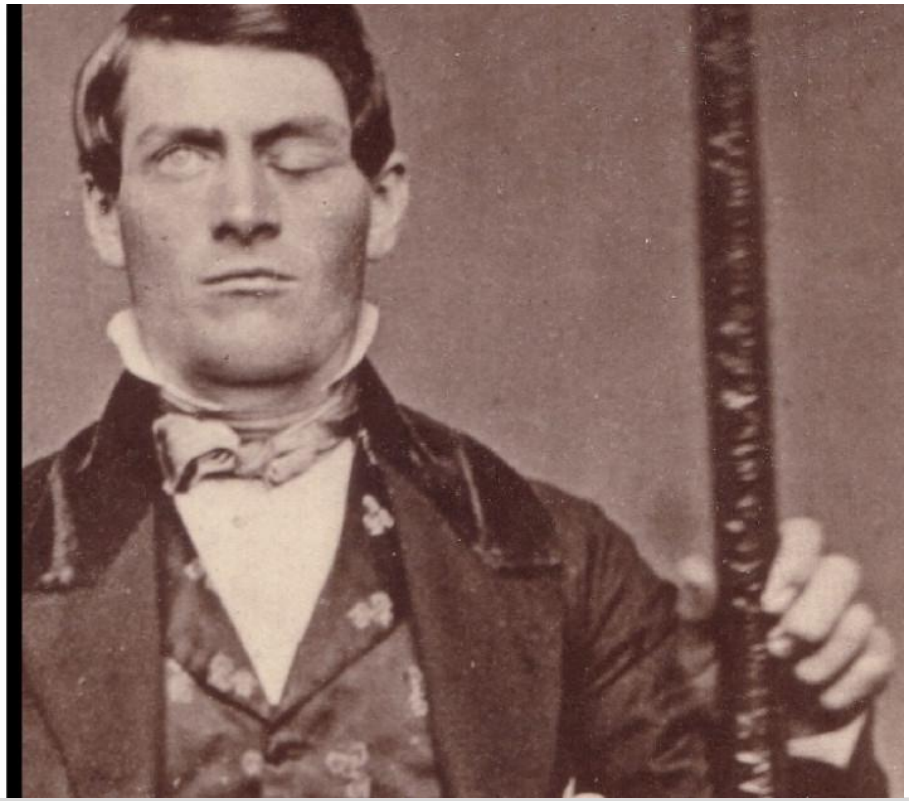
Modularity theory (Fodor, 1983)

- Characteristics of modular systems:
  - Domain specificity
  - Information encapsulation
  - Mandatory (fast) operation
  - Superficiality of computation
  - Innate
  - Neurologically hardwired
  - Specific breakdown patterns
  - Characteristic pace and sequencing in ontogeny



Cognitive Neuropsychology

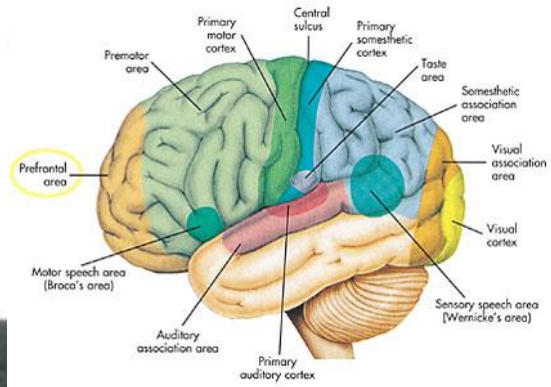
- **Principle of transparency**
- *Performance (damaged) = Performance (healthy) – Impact of the lesion*

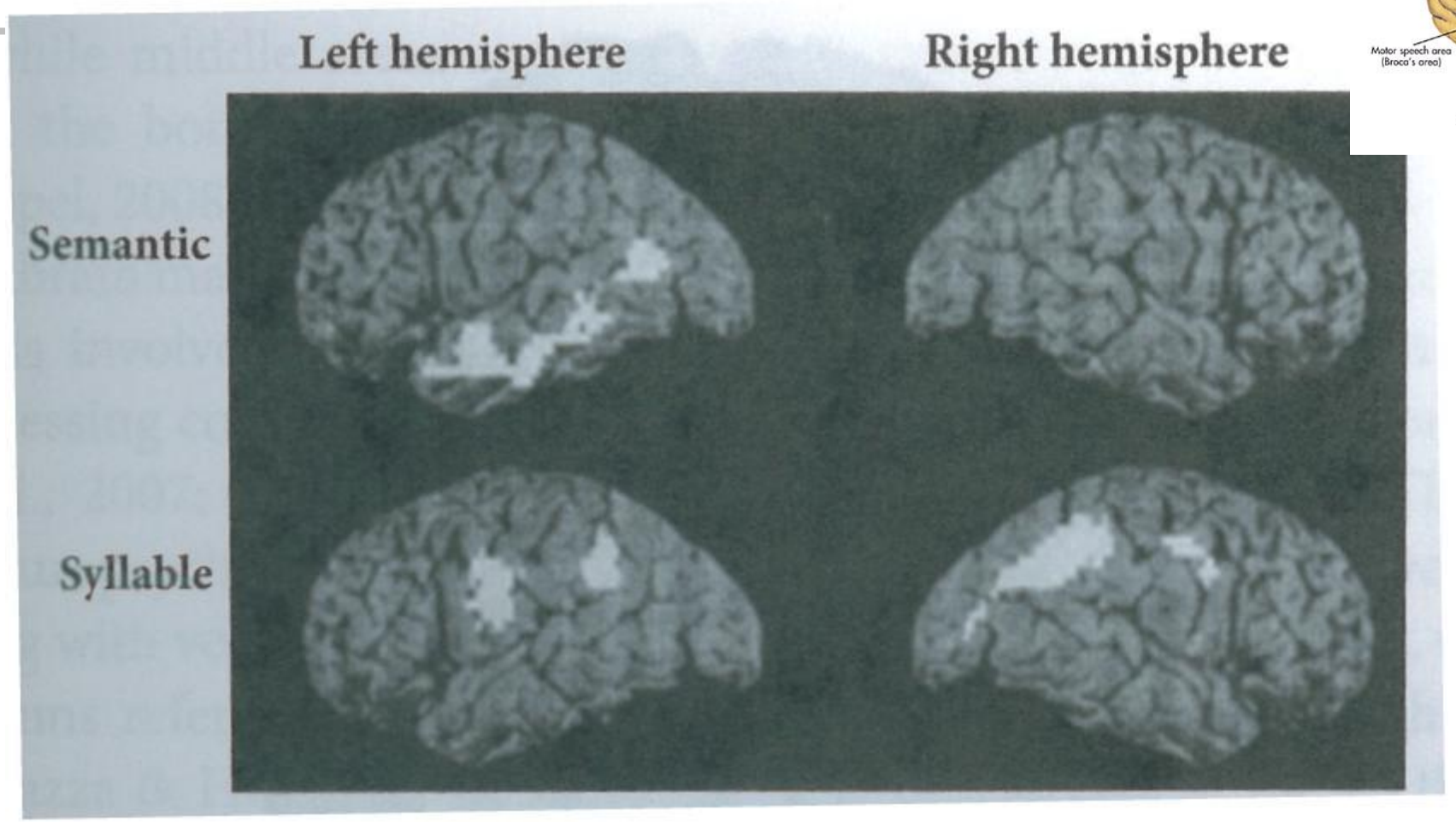


3. What is Cognitive Neuroscience?

- Involves the intensive **study of brain activity as well as behavior**
- The brain is extremely complicated. It consists of **100 billion neurons** connected in very complex ways.
- We must consider how the brain is organised and how the different areas are described to understand **research involving functional neuroimaging**

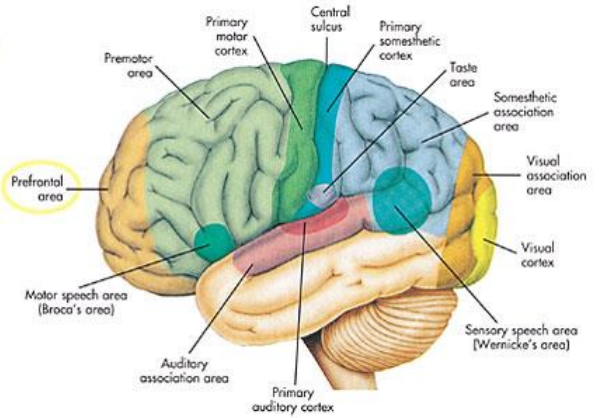
The mental lexicon

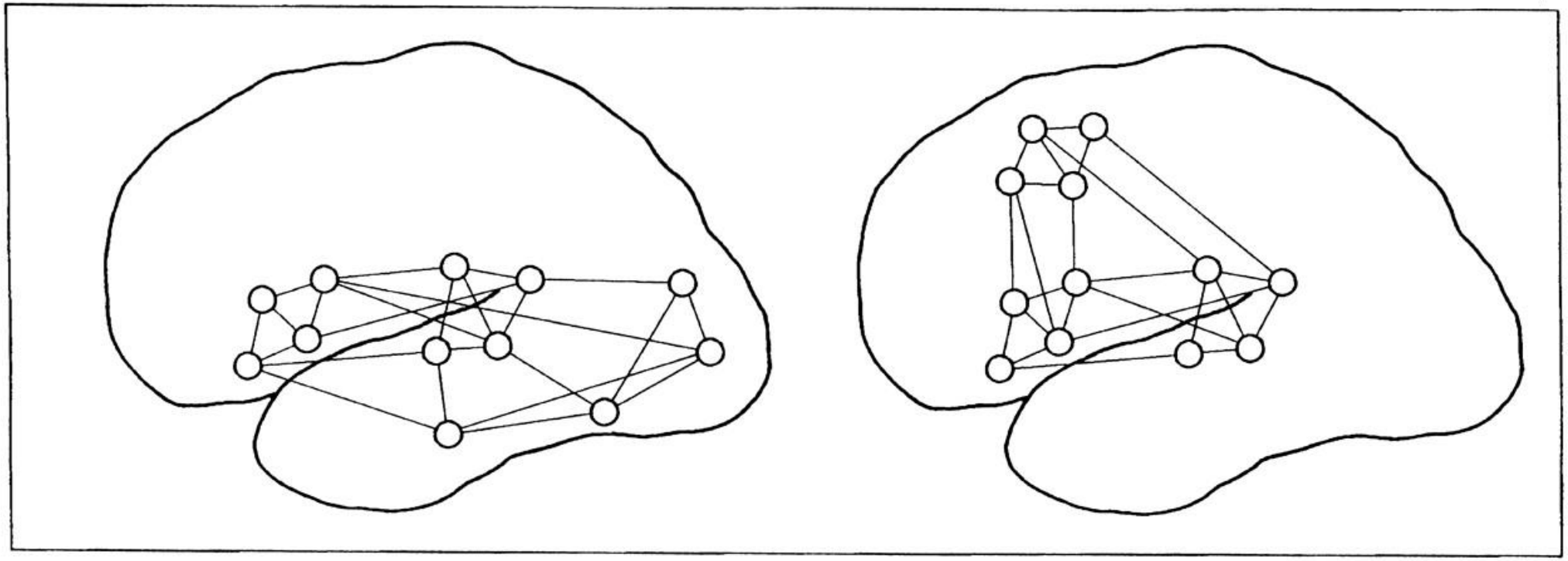




PET Scan (Positron Emission Tomography) where different areas are activated in the brain on a task where participants had to judge the similarity between words (top images) or syllabic similarity (bottom images)

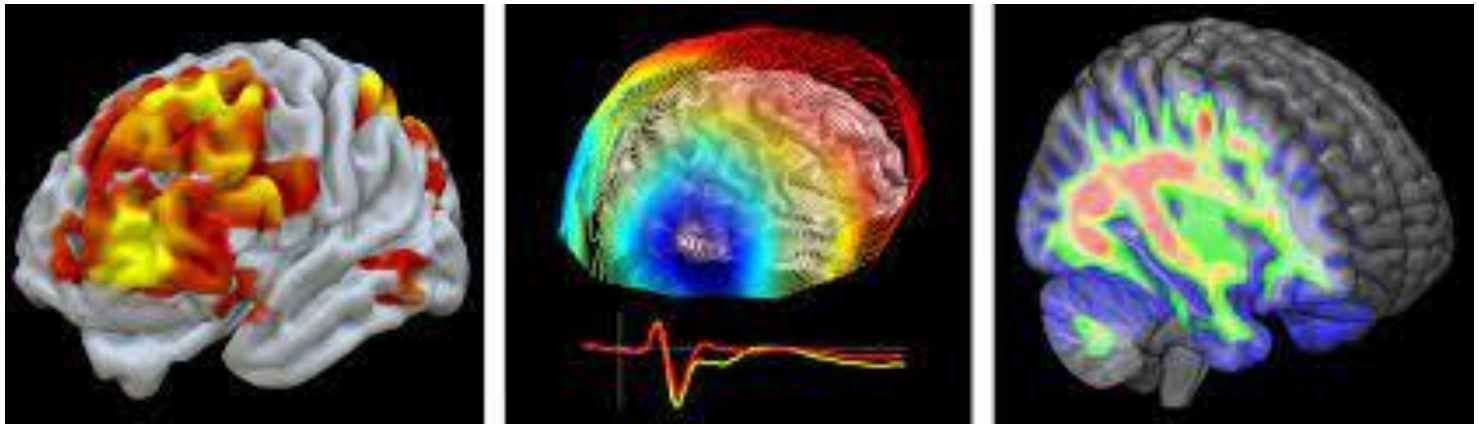
Sketch of possible cortical representations of nouns eliciting visual associations and verbs leading to association of body movements.

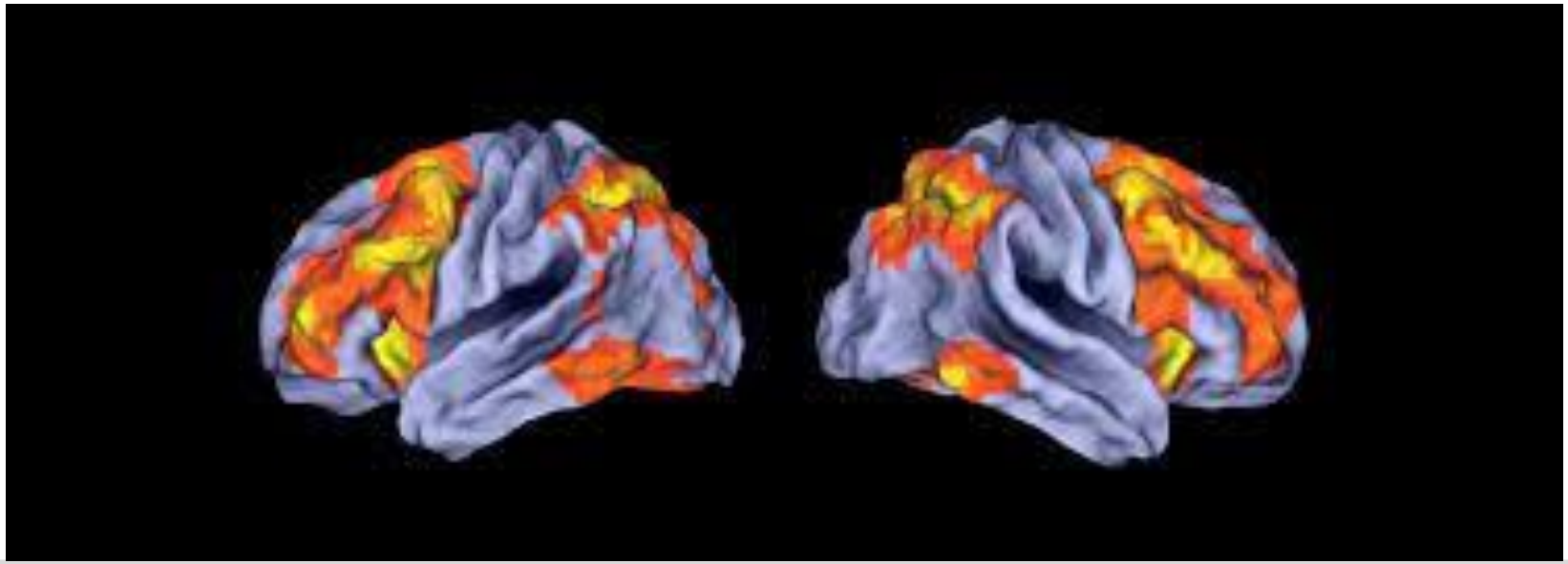




Pulvermüller F et al. Cereb. Cortex 1999;9:497-506

Cognitive Neuroscience





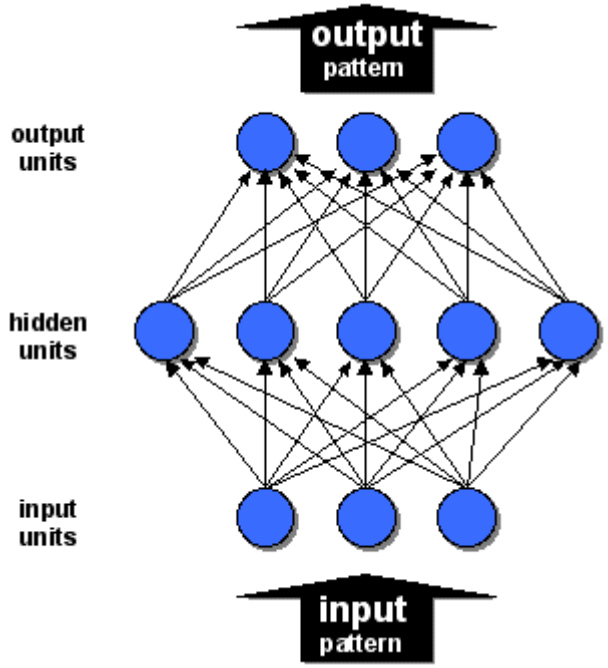
4. What is Computational cognitive science?

- Distinction between computational modelling and artificial intelligence:
  - **Computational modelling** involves programming computers to model or mimic human cognitive functioning. Thus, cognitive modellers "have the goal of understanding the human mind through computer simulation" (Taatgen et al., 2016, p. 1)
    - *Aim: Understand the human brain*
  - **Artificial intelligence** involves constructing computer systems producing intelligent outcomes but typically in ways different from humans.
    - *Aim: Design machines to solve problems*

Types of models

Computational models provide cognitive architectures – "models of the fixed structure of the mind" (Rosenbloom et al., 2017, p. 2)

Connectionist models (also called neural network models) typically consist of interconnected networks of simple units (or nodes) that exhibit learning



Connectionist model stages

- **Input nodes**
  - Code the input pattern
  - Spread to a layer of hidden nodes
- **Hidden nodes**
  - Spread to a layer of output nodes
- **Output nodes**
  - Activate based on info from hidden nodes
  - Generate an output pattern
- **Model adjustment**
  - Compares the actual output to the correct output
  - Corrects discrepancy: ***Backward propagation***

Types of models

- Production systems consist of numerous "IF . . . THEN" production rules. Production rules can take many forms.
- **Characteristics**:
  - Numerous IF . . . THEN **rules**;
  - A **working memory** containing information;
  - A **production system** that operates by matching the contents of working memory against the IF parts of the rules and then executing the THEN parts;
  - If information in working memory matches the IF parts of two rules, a **conflict-resolution strategy** selects one.

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