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PSYC2013 – COGNITIVE & SOCIAL PSYCHOLOGY

COGNITIVE PROCESSES

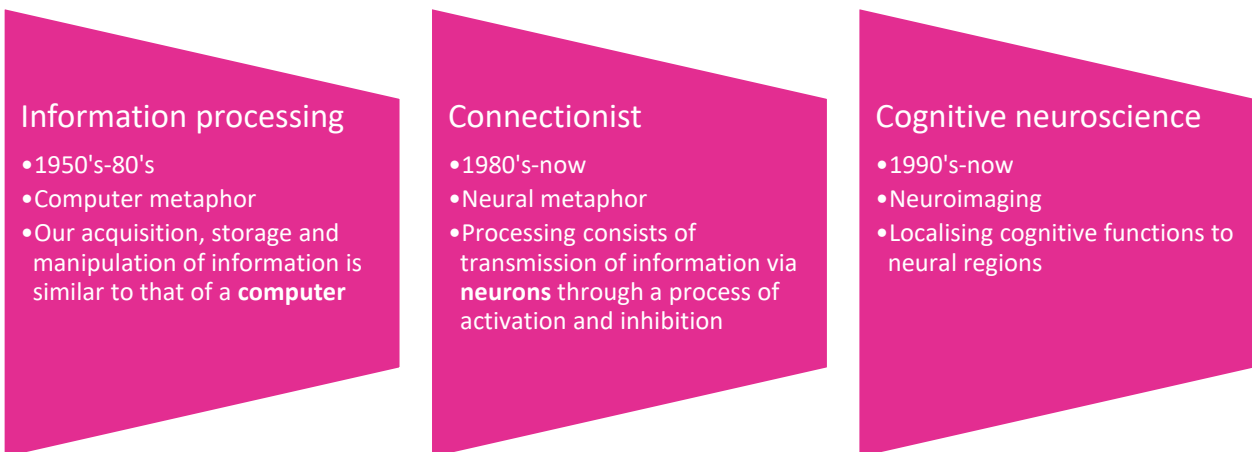
MEMORY

COGNITIVE PSYCHOLOGY

Cognitive psychology is concerned with **internal mental processes** that occur in the brain, which are not directly observable.

Frameworks/metaphors

As cognitive processes are not physically visible, metaphors are often used to help explain theories of how these processes may occur.



Measuring cognitive processes

There are different methods of measuring cognitive processes...

- **Experimental cognitive psychology**
 - The development of theory which is then tested by behavioral evidence
 - Issue: Theories are often abstract and rely on inference not proof
- **Cognitive neuropsychology**
 - Uses brain injuries to observe patterns of impairment and infer functional organization
 - Relies on dissociations between performance on different tasks to determine function
 - Issue: Evidence is usually based on single individual cases
- **Computational modelling**
 - A computer model can be created based on task performance
 - Issue: Doesn't necessarily reflect human methods
- **Cognitive neuroscience**
 - Imaging of brain activity during cognitive tasks
 - Issue: techniques vary in spatial and temporal precision

We need converging evidence and a method of integration.

THE ALLURE OF NEUROSCIENCE EXPLANATIONS

The inclusion of (often irrelevant) neuroscience terms and jargon in explanatory statements was seen to:

- Improve ratings of bad explanations, sometimes above the ratings of a good explanation by itself
- Not seduce experts in the field but significantly effect the judgement of novices
- Increase ratings regardless of the quality of the argument
 - Even more than social or hard science additions did

The inclusion of brain imagery was seen to:

- Increase credibility ratings, especially if 3D images were used

But there was no additional/compounded effect of including the brain image AND the neuroscience.

MIND VS. BRAIN

Marr's explanation

Marr described the brain as having 'certain levels of description', which were:

1. **Computational**
2. **Conceptual** – representation and algorithm
3. **Hardware**

We cannot investigate cognitive processes without understanding the hardware i.e. the brain.

DEFINING MEMORY

Sensory memory – a brief literal copy of an event; iconic and echoic memory

Short-term memory – a 'buffer' for the temporary maintenance of information

Long-term memory – semantic, autobiographical/episodes, procedural

THE TRADITIONAL VIEW OF MEMORY: THE MULTISTORE MODEL



The multistore model suggests that STM and LTM rely on **separate memory systems** with different properties.

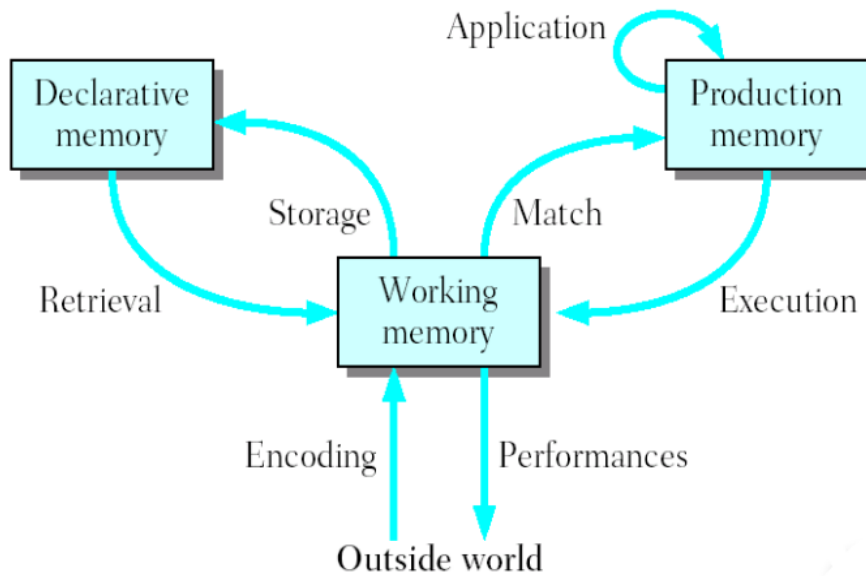
Issues with the multistore model:

- The STM is sensitive to the semantic information of the LTM
 - Shown through the release from proactive interference – when items from different semantic categories were presented, word recall improved. The extent of improvement depended on the similarity of the categories.
- Memory is best when **deep processing** occurs

Types of knowledge

	STM	LTM
Capacity	Limited 7 ± 2	Unlimited
Rate of forgetting	Decays within 30 seconds if not rehearsed	Forgetting due to interference rather than decay
Type of code	Phonological	Semantic

REJECTION OF THE MULTISTORE MODEL: THE ADAPTIVE CONTROL OF THOUGHT MODEL



The ACT model introduced the notion of **working memory** and different **LTM systems**; declarative – consisting of semantic and episodic memory – and procedural memory. The working memory effectively *replaced* the idea of the STM, and the LTM was further defined.

WORKING MEMORY

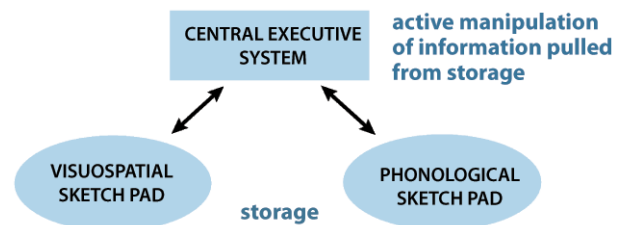
Working memory – the system which processes incoming information and integrates it with existing declarative and procedural memories.

Baddeley's model of the working memory

This model represents the working memory as composed on the **central executive** which is responsible for memory processes, and independent **slave systems** which are responsible for temporary storage.

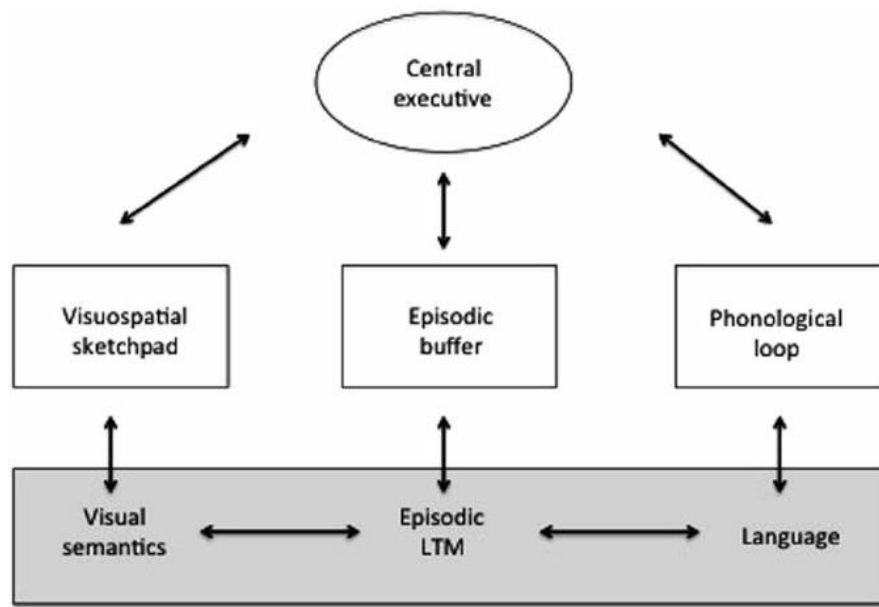
Limitations of his model include:

- His main evidence is gained through dual task testing, but performance is generally poorer when an individual is required to do two tasks at once
- Does not explain the what the central executive does or its limitations in detail



Baddeley's updated model

Baddeley's updated model includes the **episodic buffer**, displaying how the working memory is integrated with the LTM.



Executive functions

Executive functions are described as systems which **control thought and action**. They play a role in **updating**, **shifting** and **inhibiting** information in mental processes.

Psychometric approaches to the WM

The work done by the WM can be measured using **simple vs complex span tasks**, where complex tasks require storage of information in addition to the processing required in simple tasks.

- These tasks can be verbal/numerical/spatial
- Demonstrate that individuals with higher WM are less vulnerable to **distraction** by 'seductive details' and loss of **attention** by 'mind wandering'

Performance in many WM tasks is inclusive of strategies used to aid WM processes e.g. rehearsal and chunking. When these are removed, the capacity of the WM is estimated to be **less than 7 ± 2** .

Structure vs. processes of the WM

Perhaps there is a **single store of memory content**, but the processes that operate on it **differ as a function of demand**. Neuroscience evidence suggests this may be the case:

- The same posterior brain regions are involved in STM and LTM encoding or accessing of information
- Frontal areas appear to be involved in attentional/executive functions

MEASURING MEMORY

Traditionally, memory was measured by participants being given a list to study, experiencing a delay, then being tested on this list.

Encoding conditions

Memory is better when...

- Material is **semantically encoded** and **self-relevant**
 - The best cues relate to the meaning of the information not its surface form

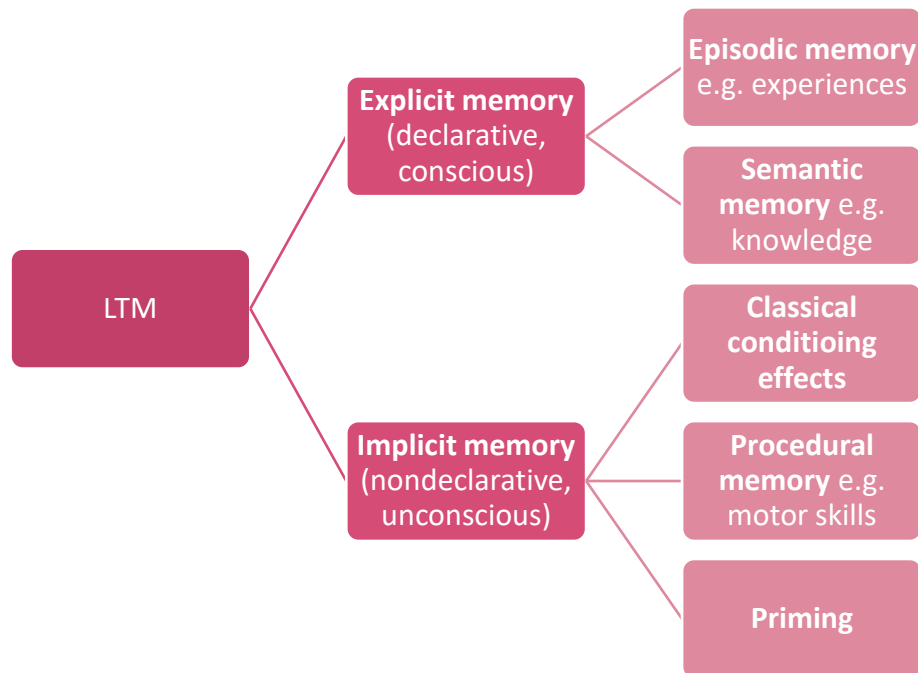
- **Recognition** is tested instead of recall
 - Recognition provides a specific cue which can activate memory
- The **context** of encoding matches the context of retrieval
 - Land/water recall task

Explicit vs. implicit memory tasks

Explicit tasks – when encoding and retrieval is intentional

Implicit tasks – when the participant is not told to remember material and is then tested

LONG-TERM MEMORY SYSTEMS



Memory systems view: Evidence for separate memory systems

Neuropsychological evidence: **amnesia** - many amnesia patients have impaired explicit but not implicit memory.

HM had a bilateral removal of the hippocampal region as a treatment for epilepsy. This caused severe memory loss.

- He failed to establish new memories and had amnesia for the recent years prior to the surgery
- But he could still learn new skills, suggesting an intact STM and thus **supporting** the theory of **separate memory systems**

Dissociation – when a variable affects performance on one memory task (e.g. implicit) but not another (e.g. explicit). Some examples include:

- Single dissociations e.g. matching modality of encoding and retrieval only impacts implicit not explicit tasks
- Double dissociations e.g. explicit memory is better after deeper encoding, implicit memory is better after shallow processing

Memory processes view: Evidence against separate memory systems