General:

Not simple to study as it cannot be directly observed – its existence is inferred as we know we don't constantly relearn the same things

Methods: Experiments, quasi-experiments, field experiments, diary studies, cross-sectional studies. Also computational models, neuropsychology (cognitive deficits/effect of brain damage), imaging.

Key Processes in Memory

Encoding ---------->	**Storage** ---------->	**Retrieval**
Visual	Changes in	Recognition
Acoustic	the nervous	Recall
Semantic	system. *Internal*	
Motor	*representations*	

How well information is encoded affects how easily it is retrieved

Key Subsystems – James

Sensory Memory → Short Term ←→ Long Term		
	Memory	**Memory**
Raw, unencoded, from senses	Coded, few seconds e.g. phone no's	Long duration, unlimited capacity?

Baddeley & Hitch – STM as working memory – an active store holding information we are consciously thinking about – a mental 'workspace' – combining sensory & LTM.

Primacy & Recency effects operate.

Memory Processes & Retrieval

Conway – study into what psychology students remembered over time after a course. Experimental design & statistics well remembered; memory for names declined quickly. Knowledge stabilised after 3-4 years after the course. Repetition helps remembering.

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Craik & Lockhart – Levels of Processing Theory
Elaborative Rehearsal -> deep semantic processing
Maintenance Rehearsal -> e.g. phone no; shorter retention time

Evidence from **Craik & Tulving**
- Orienting Tasks Experiment

Structural – case of words – low recognition with distractors
Acoustic – words rhyme – med recognition
Semantic – sentence & context – high recognition

The **generation effect** helps with memory most – i.e. you working out the rhyme or sentence to remember.

Spacing effect – spacing out learning works

(Both ideas important for exam revision technique)

Ebbinghaus through the use of nonsense syllables showed initial forgetting is rapid; memories stabilise after 5 days; after 30 days remembrance remains much the same. Ecological validity? – however:

Bousfield demonstrated that even if information is not structured when presented to us, in free recall we naturally ***cluster*** our memories/responses. Findings are backed up by **Bower, Clark, Lesgold & Winzenz** – recall of minerals when presented hierarchically vs unstructured was better.

Stevens – ***real life example*** – waitresses ***cluster*** customer orders.

Retrieval Enhancing Techniques:

Recall everything;
Recall from a different viewpoint;
Recall in different temporal orders;
Reinstate the context (of the learning experience).

Basis of the **cognitive interview** – **Geiselman & Fisher**

This works, due to **Tulving's encoding specificity principle:**

There is a relationship between encoding & retrieval. Overlapping cues improve the effectiveness of both recall and recognition. Recognition provides more cues than recall.

So, the cognitive interview works as:

Context reinstatement – cues available at encoding are available at retrieval
Recall everything – additional cues may be generated
Recall in different orders – increases the number of retrieval routes
Recall from a different perspective – additional cues may be generated

Godden & Baddeley – effect of the physical context of recall on divers. 40% better result if **recall** done in same context. No effect present on recognition. Reinstating the context therefore implies it makes extra cues available at recall.

Retrieval Difficulties:

Tip of the tongue – Brown & McNeill experiment induced this by using rare words. There is a difference between direct access and indirect access (scanning for memories).

Tulving - 'Knowing' is a different memory state to 'Remembering' e.g. a familiar face we can't Name – knowing = feels familiar.

Conway – demonstrated this with his psych. student study – 'knowing' implies greater elaborative processing has taken place in the past. Higher achieving students 'know' rather than 'remember' information.

Constructing & Reconstructing Memories

1. Bartlett - 'Effort after Meaning' - *memory is constructive & dynamic*.

Used meaningful material experimentally, (unlike Ebbinghaus). Important researcher, as he highlighted the impact of social factors on memory.

Example – 'War of the Ghosts' recall – get:
Omission of 'irrelevant' material & **Transformations** – unwitting, makes use of existing knowledge and experiences to automatically make sense of new ones **Rationalisation** (going beyond explicit content). **Brewer** notes the use of 'unwitting' – i.e. memory processes operating outside of conscious awareness.

2. Memory is pliable

Loftus & Palmer – study of car accidents; estimated speed of impact increases as the violence of the word used to describe accident is greater – 'smashed' > 'hit'.

Our recall is influenced by the way in which questions are asked – the **misinformation effect.** E.g. **Crombag** – recall of dutch air crash affected – most people thought they'd seen the moment of impact, when it had not been broadcast.

Happens by us reconstructing memories from 'common sense' & what else we hear – as well as from attempts to deliberately mislead.

3. *We have Enduring Memories*

Bahrick – Questions about high school graduating classes – both recall and recognition tasks. ***Quasi experiment***, ***cross-sectional design***. Hardly any forgetting for matching(recognition) tasks; much more so in recall (up to a 35 year time period after graduation)

Has ecological validity (c.f. Ebbinghaus) – but difficult to control confounding effects – e.g. the amount of contact between participants since graduation.

4. Autobiographical Memories

Conway – these memories include location & time and factual knowledge – e.g. 'my first trip abroad'

Linton – diary study. By 6th year, 30% events forgotten. First & last similar events (eg mtgs) recalled more easily than intervening ones. Importance & emotional significance as rated at time of event not correlated to ability to recall. Many events ordered chronologically could be recalled by a temporally ordered search – at first. At >2 yrs, thematic search dominates.

Supports **Conway** – autobiographical memories are hierarchically organised, interlocking between time periods & themes.

Flashbulb memories – **Brown & Kullick** study. Determinants are high surprise + personal relevance.

Reminiscence bump – **Conway** (ties into Erikson – adolescence important for identity formation – the self)

5. Collective Memories

Piaget - false memory from family – kidnapping.
Miller – collective family memories express identity
Gergen - collective memories extend to national identity – e.g. SA truth & reconciliation; **Leonard -** Highland kilt 'tradition' after act of union

Atypical Memory Functioning

Case study evidence shows that memory can operate differently to 'normal'

1. Neurophysiological impairments

Damage to the brain illustrates **localisation of function.** PET & fMRI can be used to study brain activity during task performance. **Double dissociation** case studies are most informative – e.g. STM but not LTM impairment and v.v. However, damage is rarely tidy – and can be used as a justification by some for animal research. e.g. - ***KF*** – no STM; ***HM*** – no LTM. Brain **plasticity** also causes 'problems' for this type of research.

Double dissociation example:

Vargha-Khanden - study of 3 children with damage to hippocampus – episodic & personal experiences not remembered indicating STM damage, facts were – LTM intact. c.f.
Warrington, Bozeat et al - damage to temporal cortex, episodic/personal remembered (STM), facts not (LTM)

This finding supports **Tulving's** suggestion that STM & LTM are separate memory components. However, it challenges **Conway's** argument that episodic memory is the basis for semantic memory. This has not yet been resolved – but brain plasticity may account for it?

2. Exceptional Memory

Wilding & Valentine study of mnemonists

Three groups – memory strategists
naturally gifted (particular tasks)
both!
Luria's 'S'

Perfect recall of Divine Comedy 15 years later on demand. 'S' used semanticisation, association & imagery to remember things. Also had **synaesthesia -** a ***biological*** capacity to sense (e.g.) sounds as colours. But, couldn't 'remember' simple mathematical sequences without using these techniques – couldn't see the underlying formula. Suggests 'S''s memory was qualitatively different to other people's. Also came from a Jewish background – oral history much prized.

Maguire – Taxi Drivers – changes in the hippocampus revealed by PET scanning after learning 'the knowledge' – while visualising their routes.

3. Atypical Memory & Everyday Life

Alzheimer's - Roth says that although steady progress is being made in understanding the biological processes, there is no way of reversing these processes at present.

Clare showed rehabilitation in early stages possible by adopting memory strategies.