

INFI-CG 2016

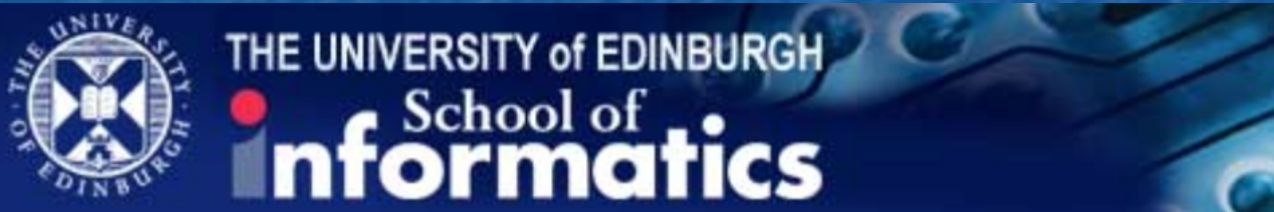
Lecture 23

Memory: Impairments

Richard Shillcock

Tutorials, reading, revision

<http://www.inf.ed.ac.uk/teaching/courses/infl-cg/>



INFORMATICS 1 COGNITIVE SCIENCE (2013/2014)

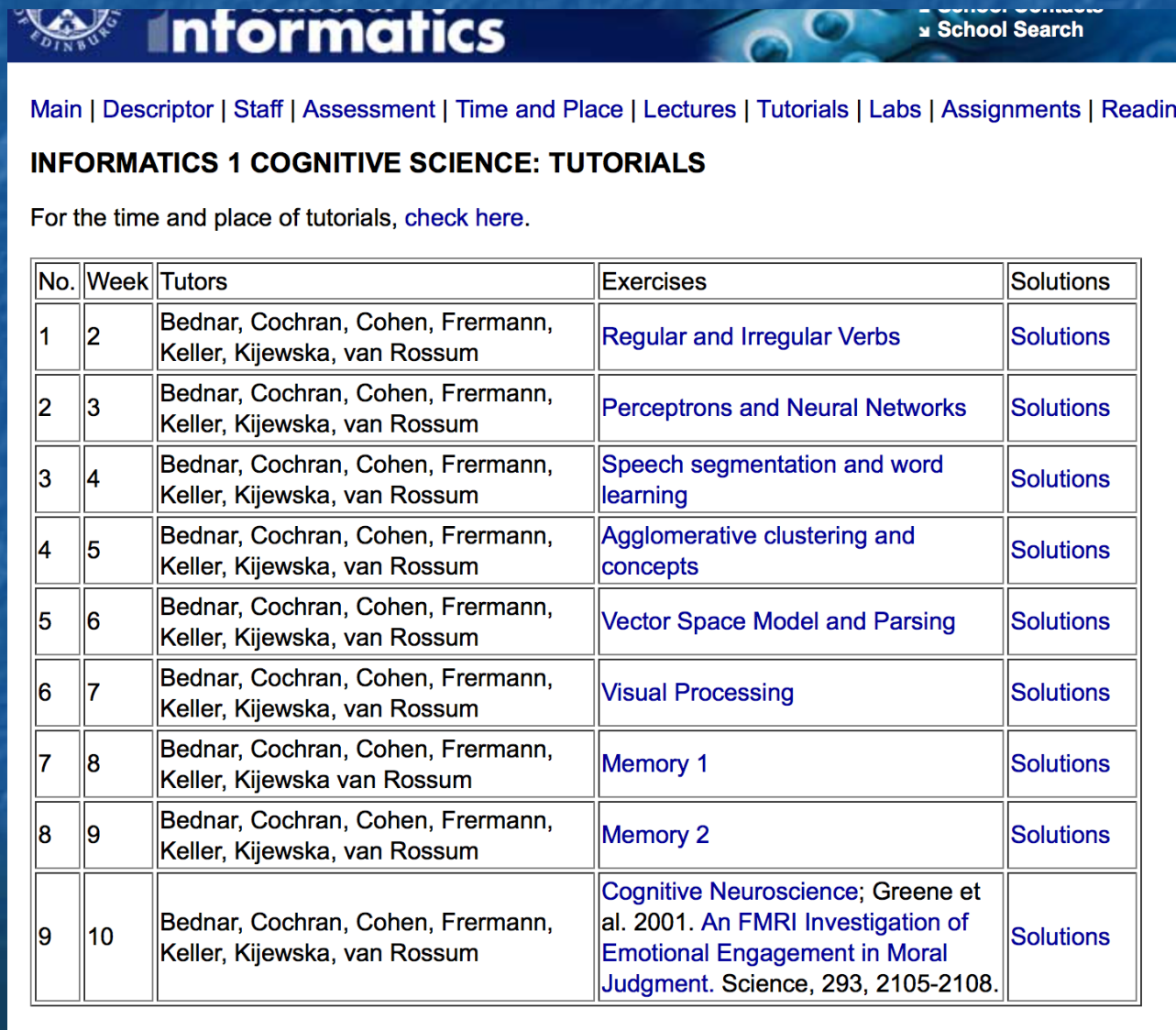
- Course Descriptor
- Teaching Staff
- Time and Place
- Assessment
- Lectures
- Tutorials
- Lab Sessions
- Assignments
- Reading List

COURSE OVERVIEW

This course is suitable for any first-year student. We'll cover a number of topics, including one or more of the contributing disciplines such as psychology, linguistics,

Tutorials, reading, revision

<http://www.inf.ed.ac.uk/teaching/courses/infl-cg/>



The screenshot shows the Informatics website header with the Edinburgh University logo and navigation links: Main | Descriptor | Staff | Assessment | Time and Place | Lectures | Tutorials | Labs | Assignments | Reading. Below the header is the title "INFORMATICS 1 COGNITIVE SCIENCE: TUTORIALS" and a link to check the time and place of tutorials. A table lists 10 weeks of tutorials, each with a list of tutors, a topic, and a link to solutions.

No.	Week	Tutors	Exercises	Solutions
1	2	Bednar, Cochran, Cohen, Frermann, Keller, Kijewska, van Rossum	Regular and Irregular Verbs	Solutions
2	3	Bednar, Cochran, Cohen, Frermann, Keller, Kijewska, van Rossum	Perceptrons and Neural Networks	Solutions
3	4	Bednar, Cochran, Cohen, Frermann, Keller, Kijewska, van Rossum	Speech segmentation and word learning	Solutions
4	5	Bednar, Cochran, Cohen, Frermann, Keller, Kijewska, van Rossum	Agglomerative clustering and concepts	Solutions
5	6	Bednar, Cochran, Cohen, Frermann, Keller, Kijewska, van Rossum	Vector Space Model and Parsing	Solutions
6	7	Bednar, Cochran, Cohen, Frermann, Keller, Kijewska, van Rossum	Visual Processing	Solutions
7	8	Bednar, Cochran, Cohen, Frermann, Keller, Kijewska van Rossum	Memory 1	Solutions
8	9	Bednar, Cochran, Cohen, Frermann, Keller, Kijewska, van Rossum	Memory 2	Solutions
9	10	Bednar, Cochran, Cohen, Frermann, Keller, Kijewska, van Rossum	Cognitive Neuroscience; Greene et al. 2001. An fMRI Investigation of Emotional Engagement in Moral Judgment. Science, 293, 2105-2108.	Solutions

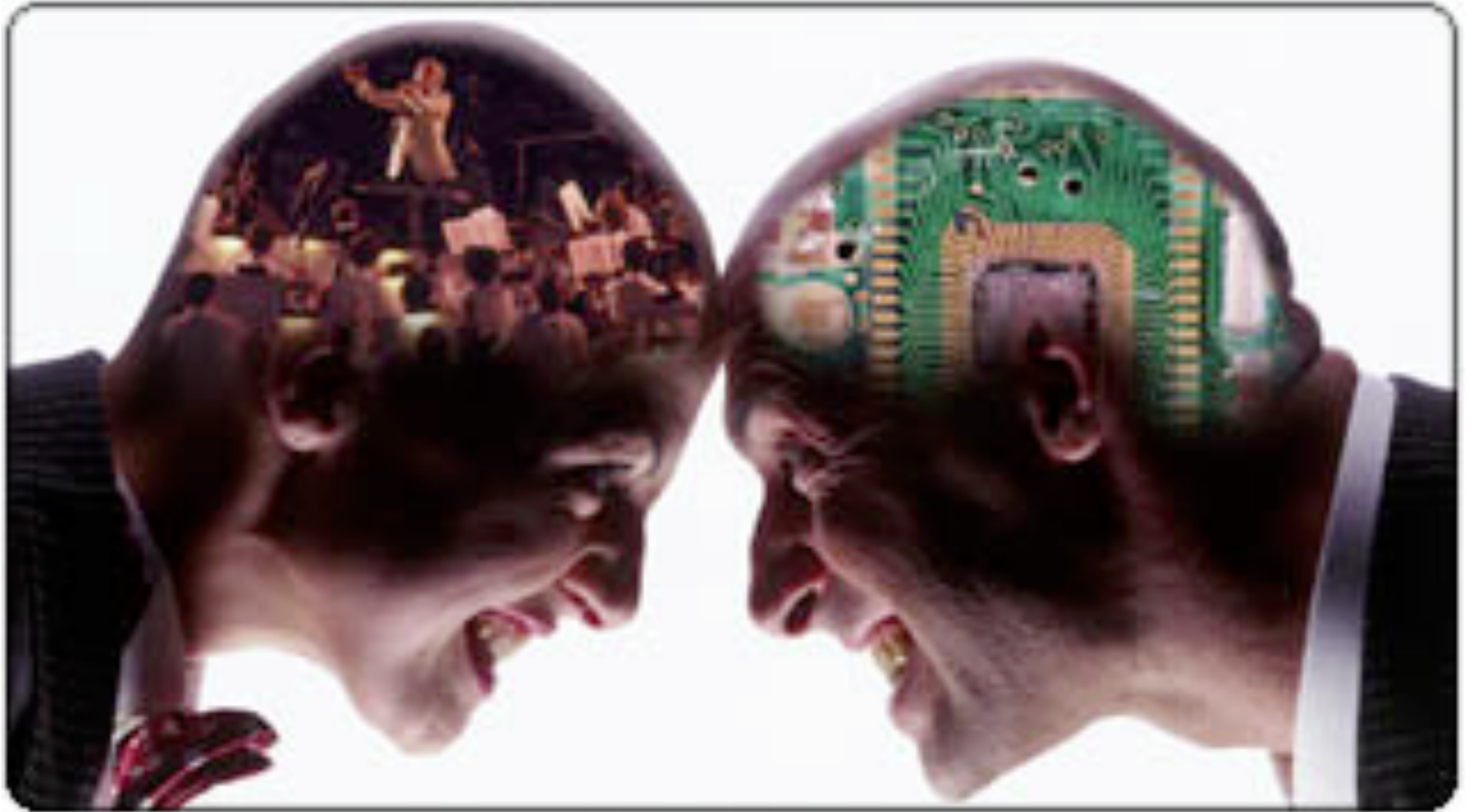
Reading for the memory lectures

https://docs.google.com/file/d/0B76fSg4EW_8GMmlwNWU0NGEtZjZkYy00ZTQxLWEwNTctNjE2N2U5YTc0YmU4/edit

(obtained by Googling [A.R.Luria-The Mind of a Mnemonist-OCRd.pdf](#) - Google Drive)

Luria, A. R., & Solotaroff, L. T. (1987). *The mind of a mnemonist: A little book about a vast memory*. Harvard University Press.

Two approaches



Two approaches

Idiographic

Case studies

Humanities oriented

Qualitative

Subjective

Holistic

Humanistic

Nomothetic

Group studies

Sciences oriented

Quantitative

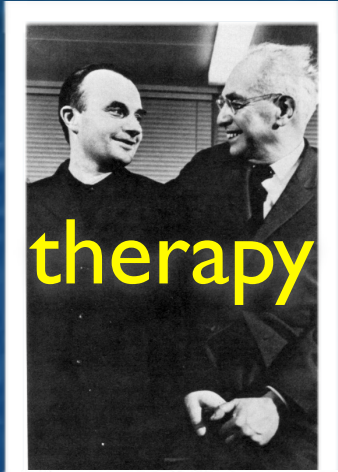
Objective

Analytic

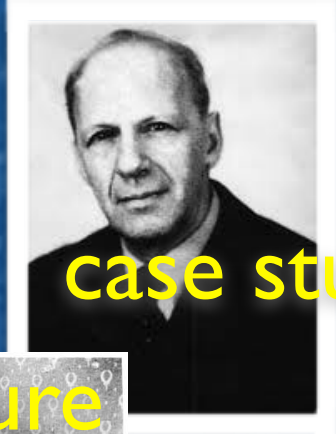
Technological

Idiographic

Nomothetic



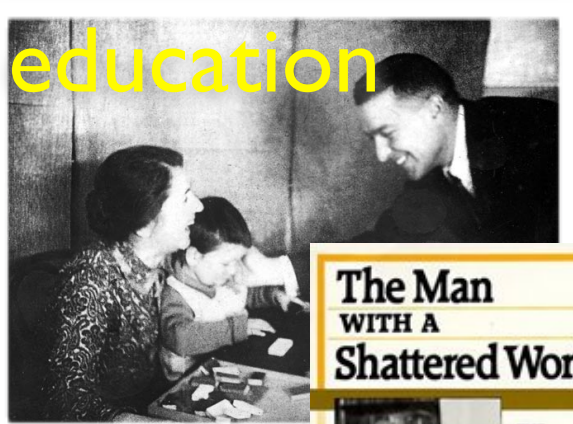
therapy



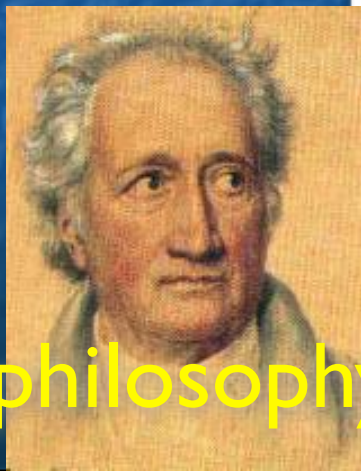
case studies



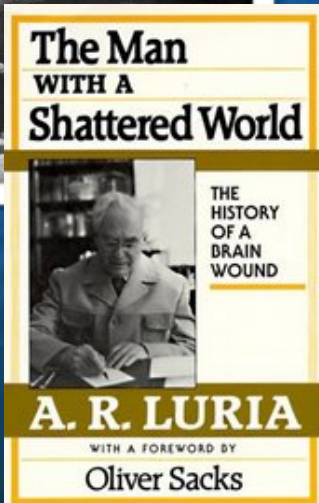
culture



education



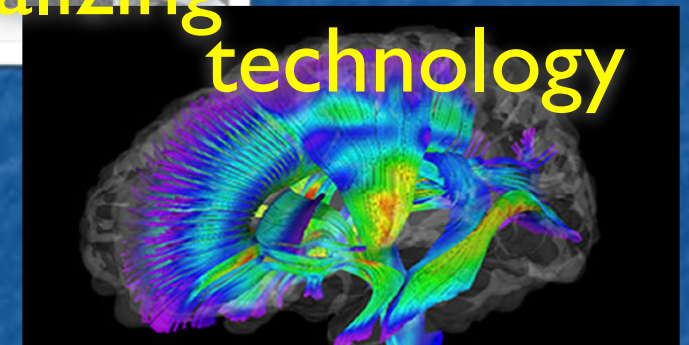
philosophy



experiments



generalizing



technology



quantifying,
formalizing

Is this a unified theory of the brain?

28 May 2008

From New Scientist Print Edition.

Gregory T. Huang

Metatheoretical issues

Is memory monolithic or are there different kinds of memory?

Is it helpful to introspect on memory?

Can different tasks define different types of memory? Is this helpful?

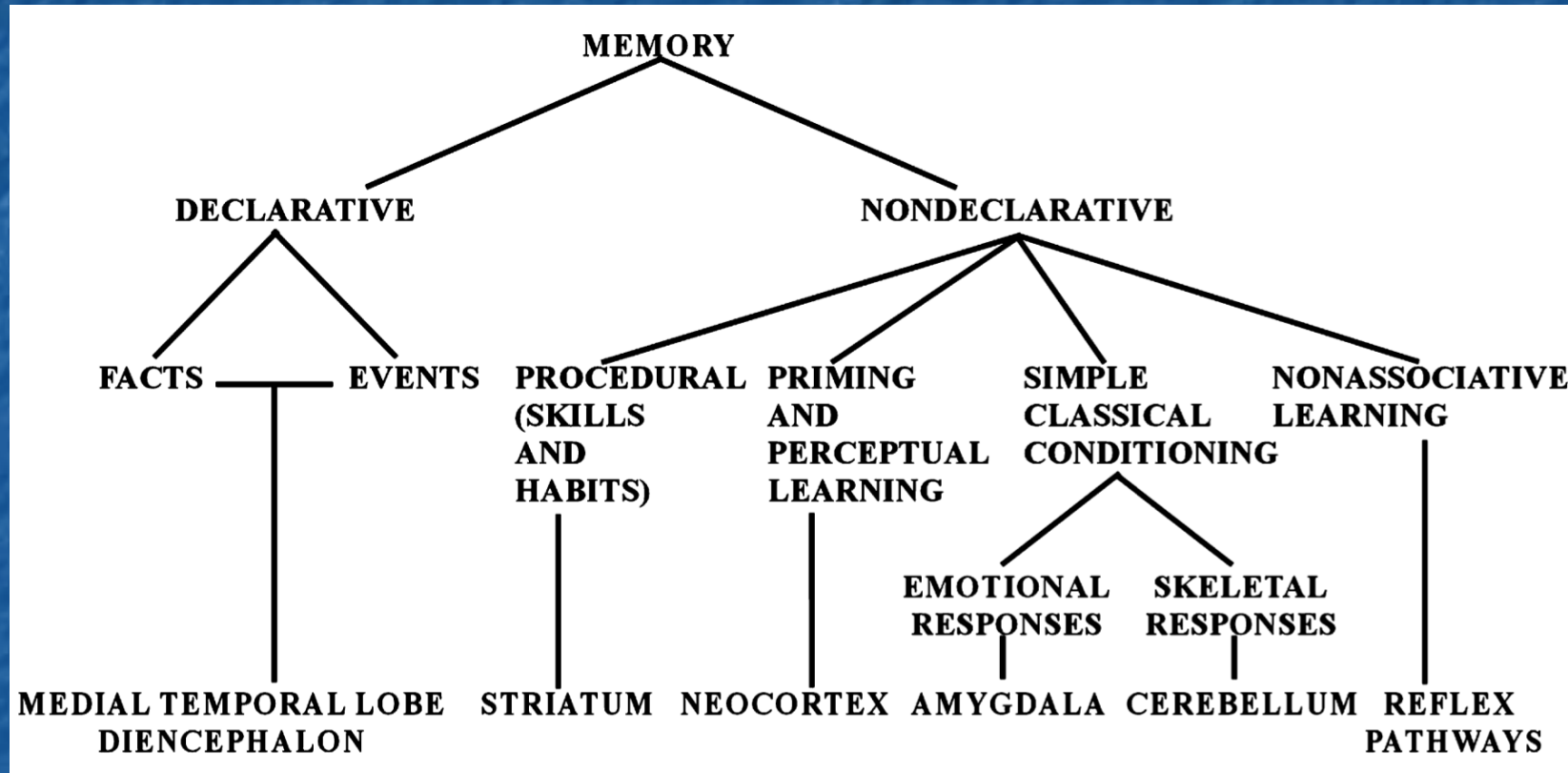
Can animal experiments help?

Can “natural experiments” define different types of memory?

What are we *actually* doing when we make these definitions between aspects/types of memory?

Types of longterm memory

Squire (2004)



These are *abstract universals*. They give us some initial traction on the domain. We can talk about *ordered relations* between them, and we can make anatomical associations, but what else?

Case studies

Case studies as “natural experiments”.

The non-homogeneity of case studies; are even neurotypical individuals homogeneous?

What can a case-study provide that an experiment cannot?

I: Henry Gustav Molaison “HM”



In 1953 doctors removed patient HM's hippocampal lobes, nearby medial temporal lobes, and other structures to cure debilitating epileptic seizures, without knowing that this brain area had a primary responsibility for long-term memory.

HM





A non-monolithic view of memory

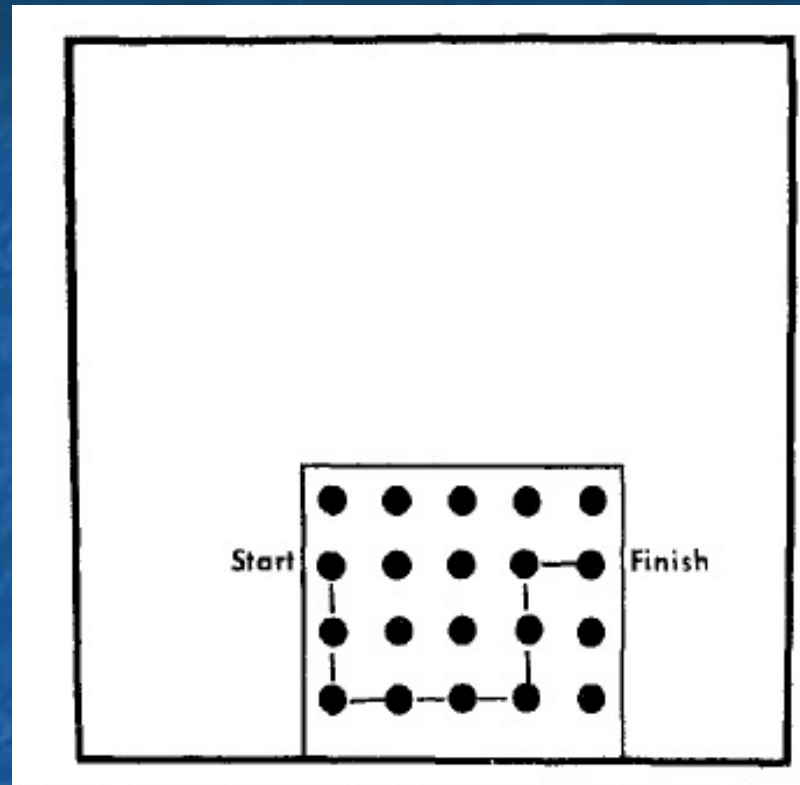
HM's experience demonstrated that the hippocampus was involved in memory.

Memory isn't simply distributed across the whole brain.

Only certain aspects of his memory were affected.

Memory isn't monolithic.

A non-monolithic view of memory



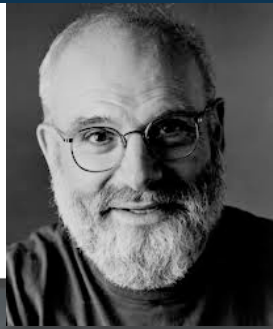
Over hundreds of training trials HM was able to learn a route through a maze, and retain it over days (Milner, 1968). Performance was not perfect, though, although it was so on other more “perceptual” tasks.

THE ABYSS

Music and amnesia.

BY OLIVER SACKS

SEPTEMBER 24, 2007



2: Clive Wearing

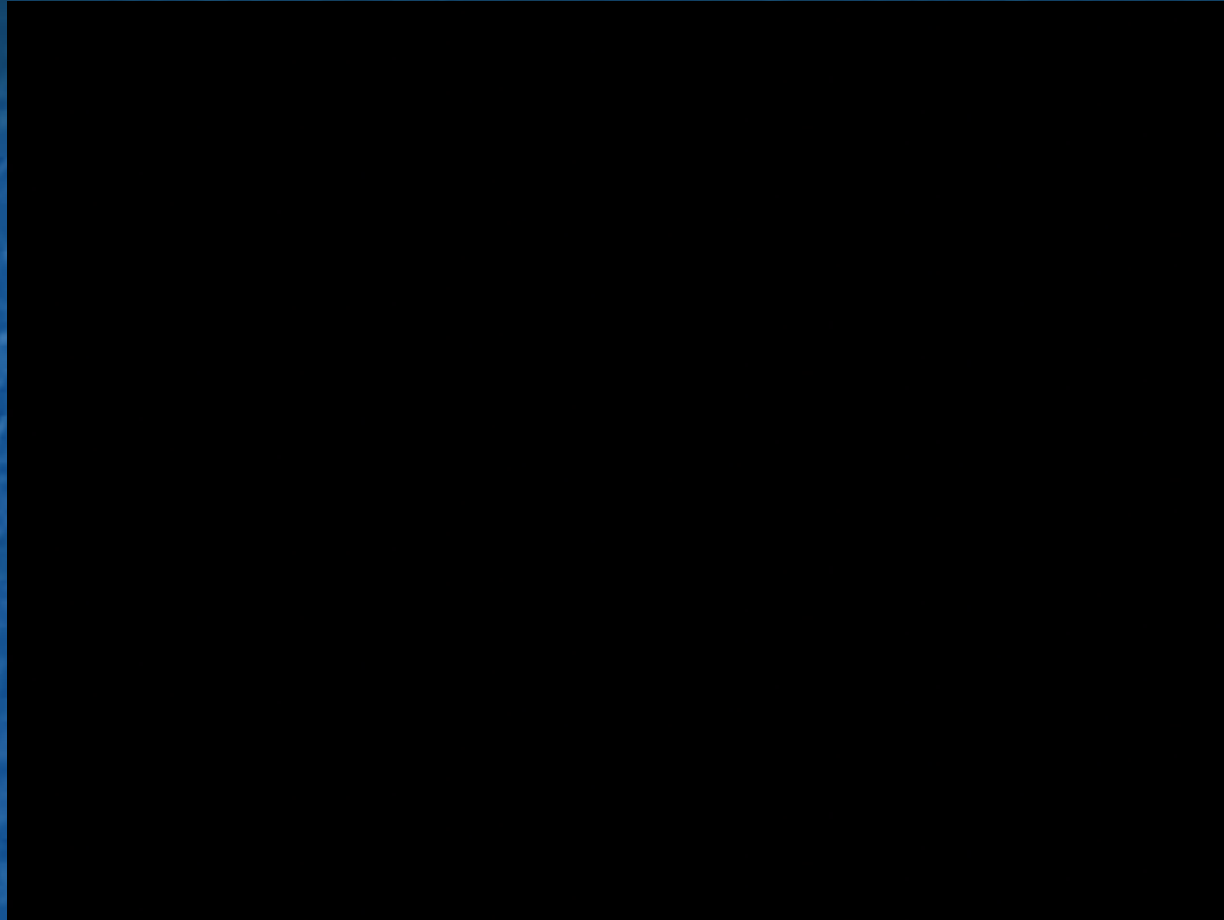
Clive Wearing (UK) suffered encephalitis and has complete retrograde and anterograde amnesia. He lives in a window of 30 seconds or less and is always consciously aware of “just waking up for the first time”, unless distracted by activity.

2: Clive Wearing



Clive meets his wife effusively every time. He has very little knowledge of his past life, even of the last sentence he heard. He cannot form new memories. He keeps up what is often a monologue around particular themes.

2: Clive Wearing



He can talk profusely, make jokes, interact, play music, conduct a choir, recognize his wife and children, find his way around his house. He has extensive semantic knowledge. He behaves coherently when producing a sequence.

2: Clive Wearing

The world initially appeared confusing. Sacks retells Clive's wife's story of him continually rediscovering a chocolate in his hand.

Clive went from confusion, to despair, to depression, and finally towards coping.

Clive has no personal narrative.

Clive's pattern of impairment suggests some distinctions between "types" of memory ...

Some distinctions

Memory involves retaining information over varying timescales, and varying aspects of storage and retrieval.

Memory is not monolithic: e.g. semantic memory *versus* episodic memory.

Retrograde amnesia *versus* anterograde amnesia.

Retrieval can alter memories.

Some distinctions

The language and manner in which we are questioned can distort the content of memory.
It's social.

Confidence in the accuracy or completeness of a memory is a poor predictor of what we actually remember.

Long term memory (LTM) versus short term memory (STM).

Explicit memory (or declarative memory) can be consciously retrieved and stated. It can be episodic or semantic.

Implicit memory (or non-declarative memory, or procedural memory) refer to performance or to fixed action patterns.

An ethical question



Can someone like HM or Clive give *informed consent* to participate in research?

Challenges

Think about how having a memory makes us human.

Think about how much is actually *social*. If we grew up alone (in a benign jungle) what sort of memory would we have? What sort of memory would we need?

How clearly delimited are the proposed different types of memory?

What *computational* implications are there from all this?

References

Squire, L. R. (2004). Memory systems of the brain: a brief history and current perspective. *Neurobiology of Learning and Memory*, 82(3), 171-177.

<http://www.youtube.com/watch?v=Lu9UY8Zqg--Q&feature=related>

<http://www.youtube.com/watch?v=Vwigmktix2Y>

Milner, B., Corkin, S., & Teuber, H. L. (1968). Further analysis of the hippocampal amnesic syndrome: 14-year follow-up study of HM. *Neuropsychologia*, 6(3), 215-234.

Sacks, O. (2007). *The Abyss*. The New Yorker.