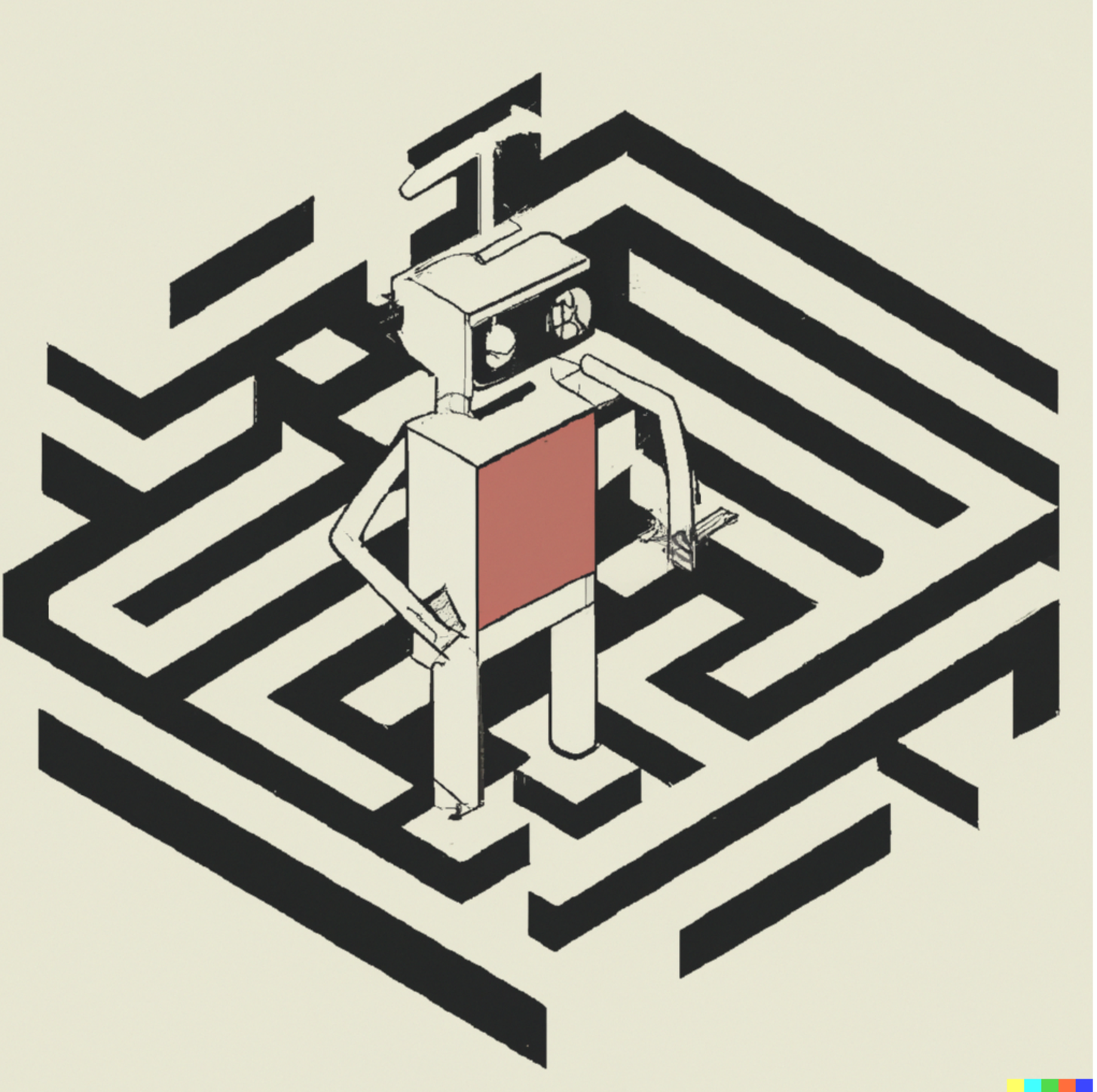


Seminar in Cognitive Modelling

Lecture 2 - How to present
Also, topic allocation day!

10-11am — 21st September 2023

Neil Bramley

Presentation Advice: Overview

1. Stakeholders & Audience Design
2. Content curation
3. Scaffolding
4. Concrete/Abstract/Interaction
5. Slide design
6. Visualisation
7. Analysis vs. Synthesis
8. Ethics

1. Stakeholders & Audience Design

- Who is the talk addressed to?
- Why are they listening?
- What do they want to gain from this?
- What do you want them to get from this?

This guides:

- What you need to define
- How to interest them
- Where to start in the conversation

2. Content curation

- Less is more:
  - Three (3) take-homes is about right for human retention (5 max) — (cf. Memory topic in Week 9!)
- Provide evidence for each take-home
- Don’t make me think!

3. Scaffolding

- Organise the progression of ideas
- Use foreshadowing, and callbacks
- Think in terms of a story (we retain more info when it is connected)
  - Perhaps the story of how you found your way into the topic…
- Roadmap/ repeated motif can help

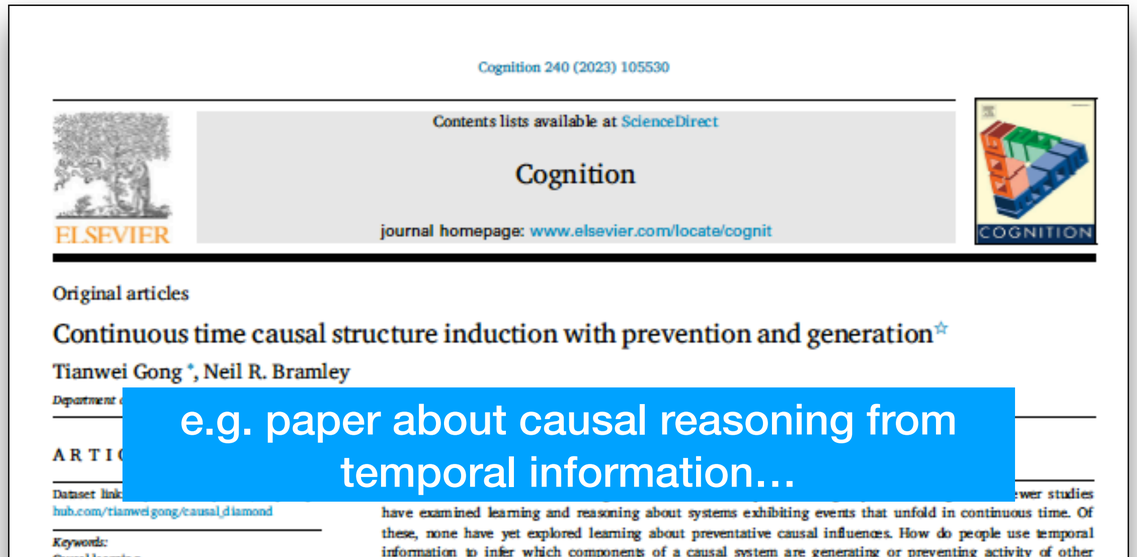
  (but don't fall into trap of explaining things while on overview slide)

e.g.:

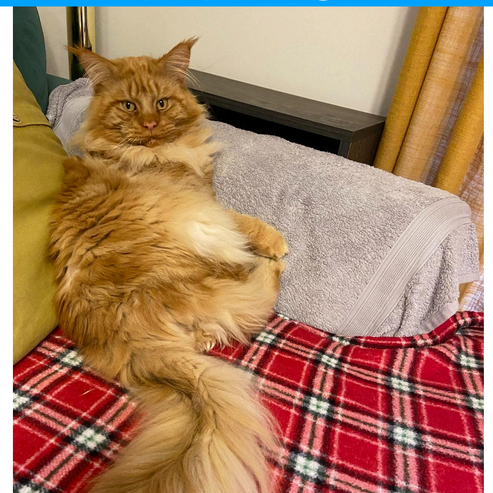
1. Stakeholders & Audience Design
2. Content curation
3. Scaffolding
4. Concrete/Abstract/Interaction
5. Slide design
6. Visualisation
7. Analysis vs. Synthesis
8. Ethics

4. Concrete / Abstract interaction

- Use concrete, intuitive, everyday examples to motivate big abstract ideas
- My supervisor used to call this the “zoom lens approach”
- A running example can work great for this (also facilitating ‘callbacks’)



…Uses running example about figuring why cat keeps peeing on floor

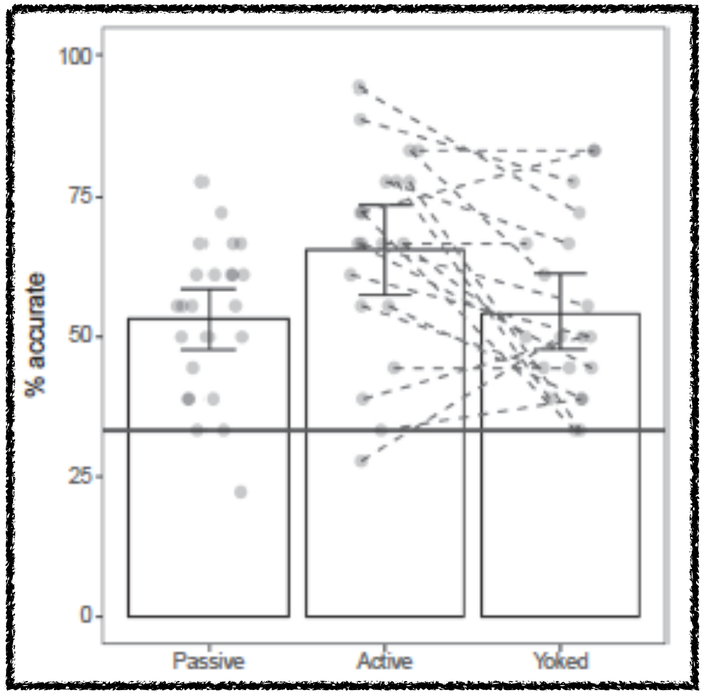


5. Slide design

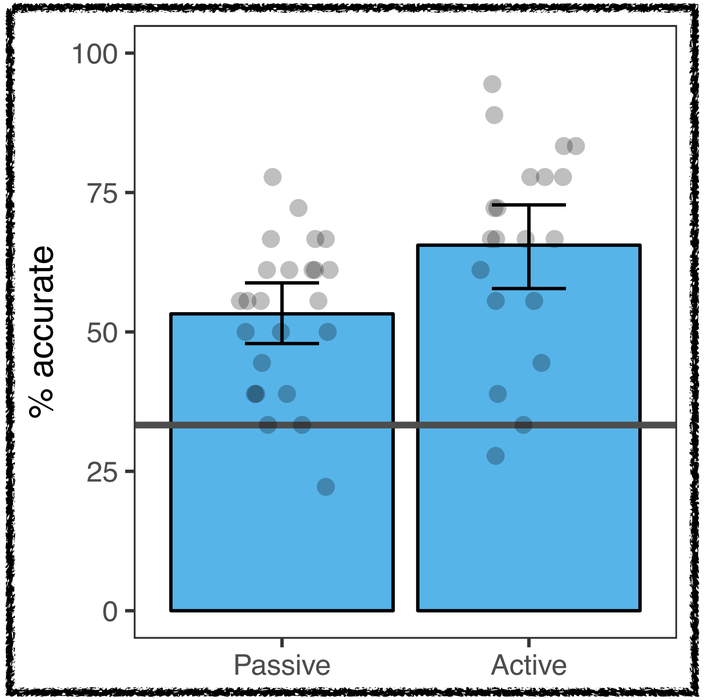
- Fewer words
  - Like, even fewer than I have on my slides!
  - Full sentences in presenter notes only
- Build up slides (helps memory, pacing etc)
- Decorate with (relevant) illustrations

6. Visualisation

- Simply figures
- Avoid tables
- Overwrite/enlarge labels
- Describe axes
- Prediction—Result callbacks
- Highlight where people should look



E.g. in the paper
(Bramley, Gerstenberg, Tenenbaum & Gureckis, *Cogn Psych,* 2018)



vs in the talk
larger labels, simpler figure, more colour etc

7. Analysis vs synthesis

- **Analysis** - break phenomenon into its parts
- **Synthesis** - putting parts together to draw insights about how it works
- See also ‘analysis by synthesis’ (e.g. Liberman, 1967)
  - Understanding a cognitive phenomenon by building a model that does same thing
  - & claim about how brains do perception: Both *analyse* sensory inputs (data driven/ bottom-up) and *synthesise* these inputs (i.e. generate top-down, from priors)

8. Ethics

- Consider when to be silent
- You can choose what ideas to platform etc

How to begin

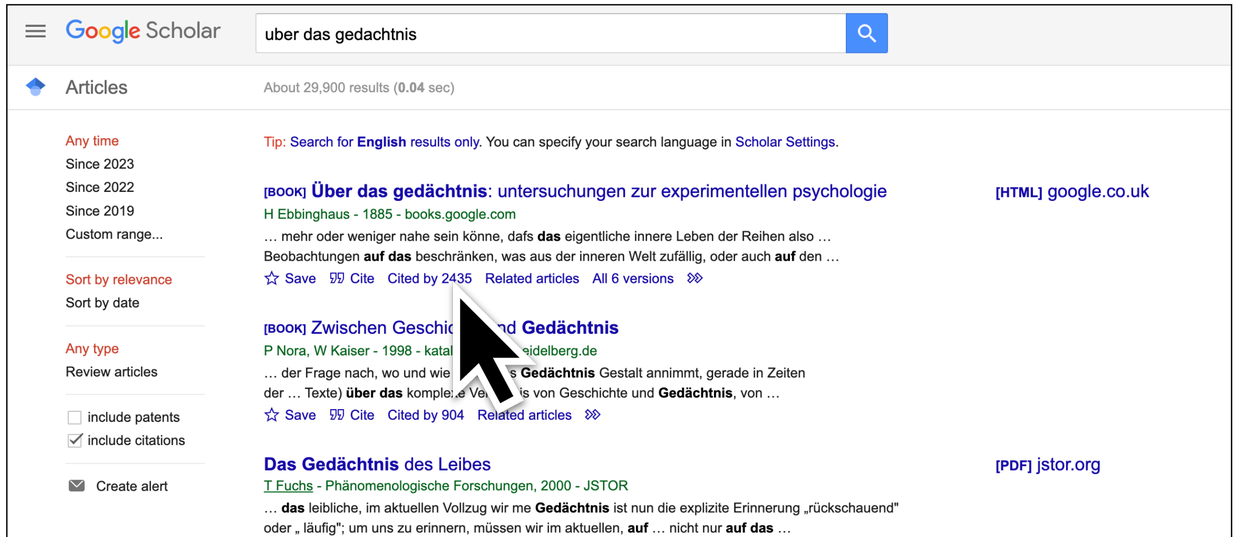
“It is a tremendous act of violence to begin anything. I am not able to begin. I simply skip what should be the beginning.”
—Rainer Maria Rilke

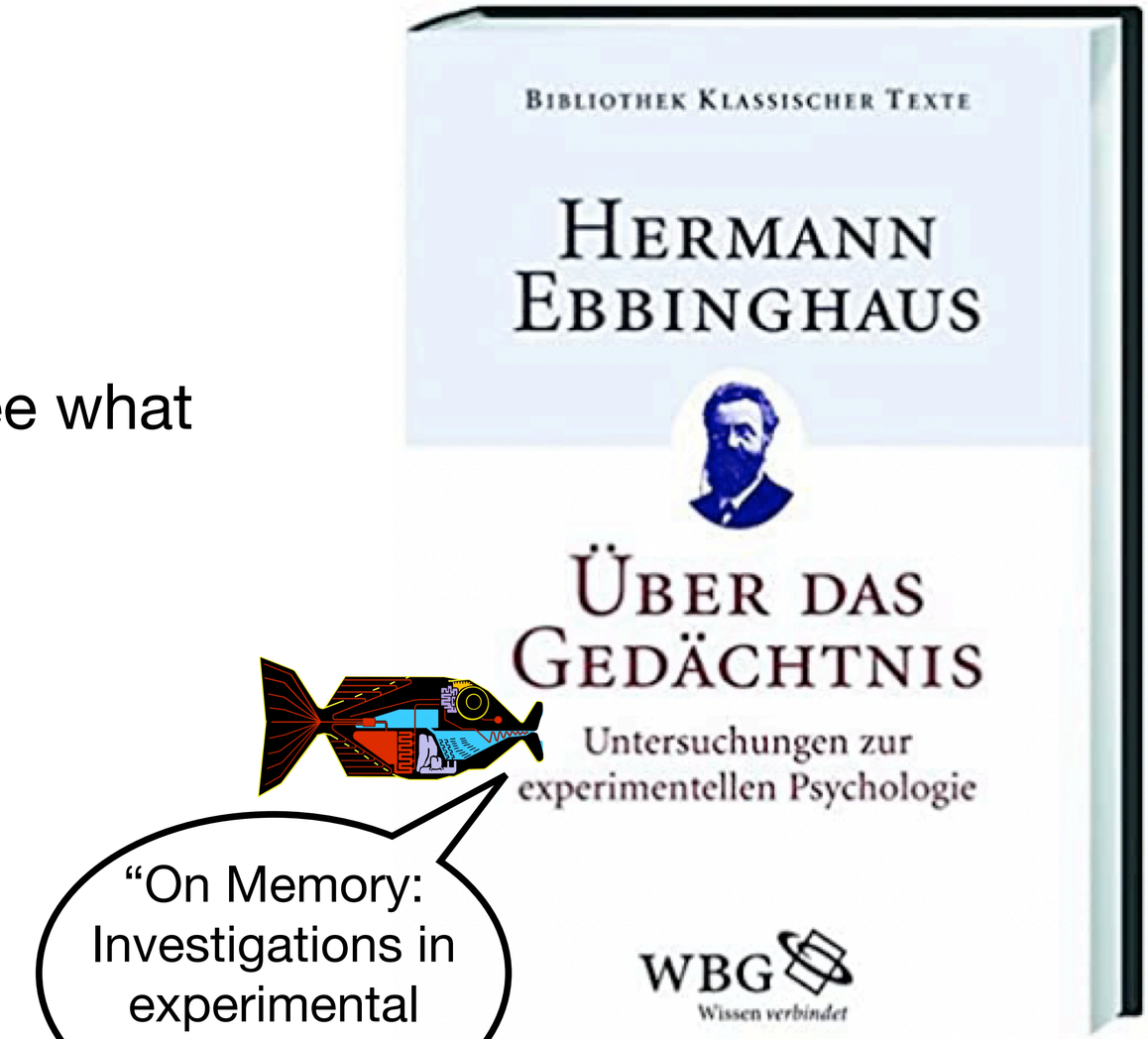
🌎 Live
👂 Listen
👨‍🔬 Talk
📕 Skim contents of journals/conference proceedings

Literature review

Forward:

- Take an ancient, scared source:
- Look it up (e.g. on google scholar) to see what has happened since





"On Memory: Investigations in experimental psychology"

Literature review

Backwards:

- Take a State of the Art paper:
- Look at the past by seeing who it cites (reference list)

Visual long-term memory has a massive storage capacity for object details

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Edited by Dale Pur[illegible]uke University Medical Center, Durham, NC, and approved August 1, 2008 (received for review April 8, 2008)

One of the majo[illegible]of memory research has been that human memory is fallib[illegible]precise, and subject to interference. Thus, although observers [illegible] remember thousands of images, it is widely assumed that these memories lack detail. Contrary to this assumption, here we show that long-term memory is capable of storing a massive number of objects with details from the image. Participants viewed pictures of 2,500 objects over the course of 5.5 h. Afterward, they were shown pairs of images and indicated which of the two they had seen. The previously viewed item could be paired with either an object from a novel category, an object of the same basic-level category, or the same object in a different state or pose. Performance in each of these conditions was remarkably high (92%, 88%, and 87%, respectively), suggesting that participants successfully maintained detailed representations of thousands of images. These results have implications for cognitive models, in which capacity limitations impose a primary computational constraint (e.g., models of object recognition), and pose a challenge to neural models of memory storage and retrieval, which must be able to account for such a large and detailed storage capacity.

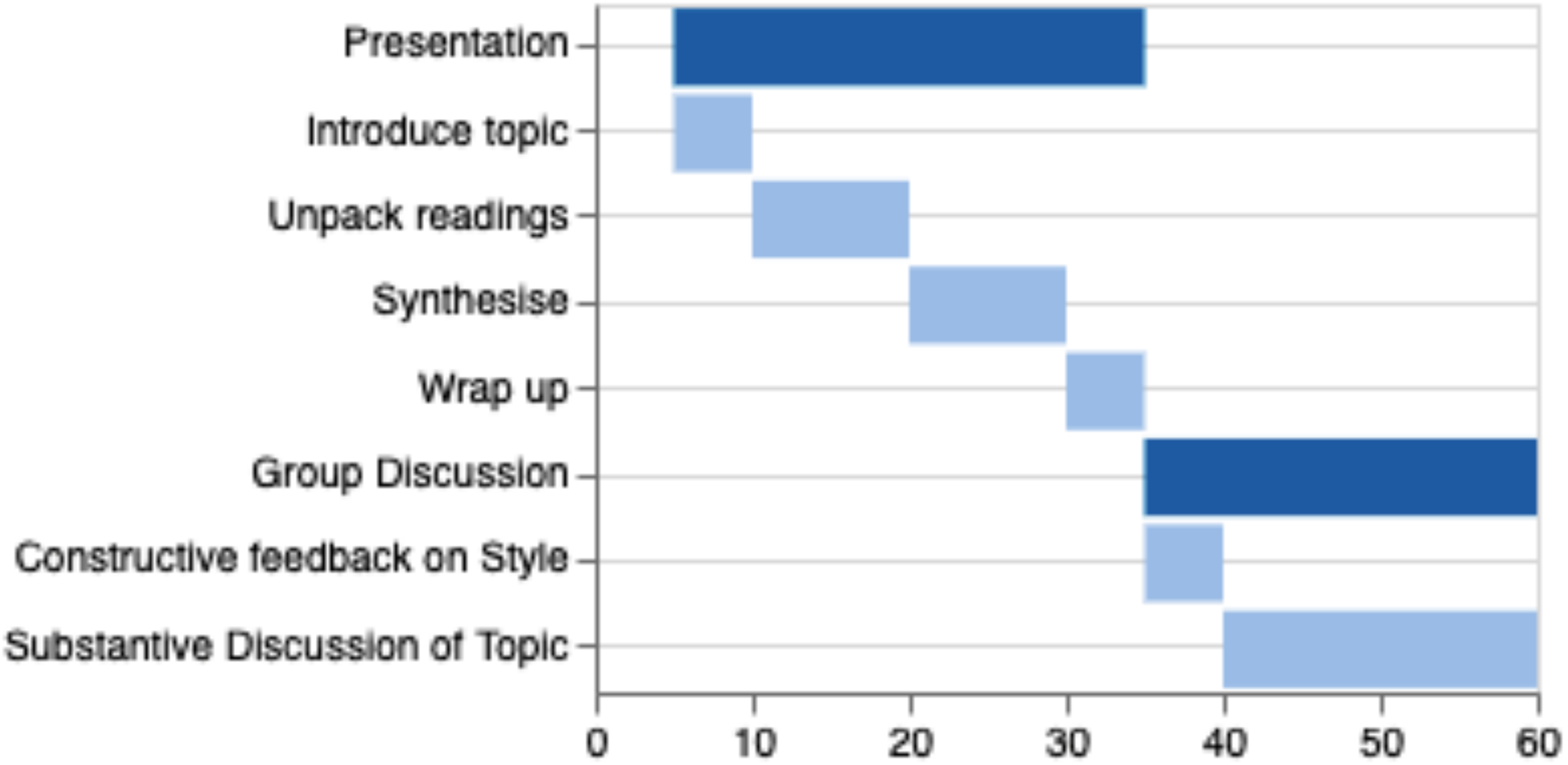
object recognition | gist | fidelity

We have all had the experience of watching a movie trailer and having the overwhelming feeling that we can see much more than we could possibly report later. This subjective experience is consistent with research on human memory, which suggests that as information passes from sensory memory to short-term memory and to long-term memory, the amount of

studied images, making it impossible to conclude whether the memories for each item in these previous experiments consisted of only the "gist" or category of the image, or whether they contained specific details about the images. Therefore, it remains unclear exactly how much visual information can be stored in human long-term memory.

There are reasons for thinking that the memories for each item in these large-scale experiments might have consisted of only the gist or category of the image. For example, a well known body of research has shown that human observers often fail to notice significant changes in visual scenes; for instance, if their conversation partner is switched to another person, or if large background objects suddenly disappear (7, 8). These "change blindness" studies suggest that the amount of information we remember about each item may be quite low (8). In addition, it has been elegantly demonstrated that the details of visual memories can easily be interfered with by experimenter suggestion, a matter of serious concern for eyewitness testimony, as well as another indication that visual memories might be very sparse (9). Taken together, these results have led many to infer that the representations used to remember the thousands of images from the experiments of Shepard (5) and Standing (4) were in fact quite sparse, with few or no details about the images except for their basic-level categories (8, 10–12).

However, recent work has also suggested that visual long-term memory representations can be more detailed than previously believed. Long-term memory for objects in scenes can contain more information than only the gist of the object (13–16). For instance, Hollingworth (13) showed that, when requiring mem-


Presentation
Introduce topic
Unpack readings
Synthesise
Wrap up
Group Discussion
Constructive feedback on Style
Substantive Discussion of Topic
0
10
20
30
40
50
60
Seminar time

Scoring Rubric for Presentation

	Poor				Excellent
PRESENTATION SKILLS	**1**	**2**	**3**	**4**	**5**
Was the introduction clear and attention grabbing? …….	·	·	·	·	·
Were the main ideas presented in an orderly and clear manner? …….	·	·	·	·	·
Were the visuals appropriate and helpful to the audience? …….	·	·	·	·	·
Did the talk maintain the interest of the audience? …….	·	·	·	·	·
Was there a theme or take-home message to the presentation? ……..	·	·	·	·	·
Did the presentation fit into the time allotted? …….	·	·	·	·	·
Was the presenter responsive to audience questions? …….	·	·	·	·	·
KNOWLEDGE BASE					
Was proper background information on topic given? ……..	·	·	·	·	·
Was the material selected for presentation appropriate for this topic? ……...	·	·	·	·	·
Was enough essential information given to allow the audience to ……..	·	·	·	·	·
effectively evaluate the topic?					
Was irrelevant or filler information excluded? ……..……...	·	·	·	·	·
Did the presenter have a clear understanding of the material presented? …….	·	·	·	·	·

Let’s allocate topics!

- https://www.random.org/

Nominally emphasising representations vs processes vs perspectives

Representation

Jul 1, 2023

Cognitive Science is the science of mental representations and processes. But what *are* representations?

Processes

Jul 1, 2023

Cognitive Science is the science of mental representations and processes. What are processes?

Concepts

Jul 1, 2023

"*Concepts are the glue that holds our mental world together*" (Murphy, 2002, p1).

This session will explore recent attempts to model the structure of human concepts. This will involve engaging with a historical debate and distinction between more "statistical" and more "rule-based" models and their implications but also thinking about how our concepts relate to how we categorize things but also how we think and generate new ideas.

Categorization

Jul 1, 2023

Plato famously characterised humans as seeking to 'carve nature at its joints' (Phaedrus). The rough idea is that we find ways to classify and group the things in our experience in ways that somehow respect their natural clustering and separation.

This topic looks at cognitive models that have tried to capture how and why we partition the world in the ways we do.

Objects & Events

Jul 1, 2023

Light hits our eyes and somehow we perceive 3 dimensional 'objects'. What is an object? In representational systems like programming languages, objects are core structure. Is the same true for our cognitive system? Are objects learned or innate?

Similar to object, events seem like a great candidate for an ontological type. Formal semanticists have illustrated time and time again that they are important for explaining language. But are events core conceptual knowledge?

Inductive Reasoning

Jul 1, 2023

While Sherlock's over there blogging *The Science of Deduction*, I'd argue most of human reasoning is **inductive**. We see lot's of examples (e.g., 10 million white swans) and then try to explain them (swans are white). Checks out, right?

Nominally emphasising representations vs processes vs perspectives

Causality

Jul 1, 2023

The search for a causal understanding of the world is at the heart of human cognition. It In this session, we will think about how to model the cognition involved in learning, representing and exploiting a causal model of the world.

Physical Reasoning

Jul 1, 2023

From pouring a cup of coffee to playing frogger through the streets, physical reasoning is ubiquitous in human behavior. Arguably these goals have been stable throughout the evolution of our species, so are we optimal physical reasoners?

Rationality

Jul 1, 2023

In popular culture, we often think of *rationality* as in tension with *intuition*. We see this in caricatures of hyper-rational agents like Spock in Star Trek. The probabilistic revolution in cognitive science has changed this notion. It is not rational to treat every task as logical deduction when the world itself is underdetermined and radically uncertain. This session will explore the notion of being rational in an uncertain world.

Development & Learning

Jul 1, 2023

Compared to other animals, humans are flexible generalists. We are born "half baked", with relatively little in the way of initial skills or "core knowledge". We spend decades growing and maturing and even once mature can continue to be able to learn new things. This session will explore a zoomed out perspective on how the human mind achieves this impressive flexibility. This touches on how the ability to learn and change shifts over our lifespans and the benefits and costs of childlike cognition.

Expertise

Jul 1, 2023

Most of us specialize in something in our lives, perhaps even achieving expert status.

On the other hand, these models struggle far more than people to *generalize* this expertis to even slightly different tasks, or indeed to master more than one thing at all. What is expertise in cognition? This session will explore how we can model expertise, how expertise changes our how a cognizer approaches a task, and what trade-offs this can come with.

Time

Jul 1, 2023

Unlike most computational systems, humans experience and must respond to their environment through time. One of the most basic forms of human and animal learning is to associate things that happen close together. Everyday activities like speech, music, dance demand precise time control, while imagination, mental simulation, and memory ("mental time travel") seem to require encoding of (and ability to regenerate events) in the right temporal sequence. What then is the role of time in the various cognitive processes and representations we have been discussing throughout this course?

Nominally emphasising representations vs processes vs perspectives

Decision Making

Jul 1, 2023

Humans are said to be 'predictably irrational', departing from the ways that economists would like to think they will behave. Businesses, policy makers, marketers and consultants and increasingly economists would all like to understand how and why people make the decisions they do. The judgment and decision making topic focuses on these questions

Attention

Jul 1, 2023

The world isn't neatly carved into units aligned with our mental representations. Instead it's presumably a "blooming, buzzing confusion." Presumably the goal of attention is to filter this confusion such that we can better process signals in the environment.

Memory

Jul 1, 2023

Memory is the process of encoding, storing, and retrieving information when it is needed. This topic will explore the structure and function of memory in cognitive systems and relate it to the other themes of the course.

Ecology

Jul 1, 2023

Agents operate in an environment but most experiments construct sterile, artificial environments to exert epistemic control. So is looking at the environment worthwhile or can we understand cognition by looking at agents in fixed environments?

Number

Jul 1, 2023

Of all the terrifying things humans have created, perhaps maths are a fairly tame, although remarkable, invention. While we clearly created maths, did we create numbers?

Space

Jul 1, 2023

Space. The final frontier. How do we move in space? Vectors, scalars, navigation? Is spacial reasoning a cognitive instinct or a cognitive technology?

Theory of Mind

Jul 1, 2023

This session will think about how people reason about others and how we might make machines that can do the same.

Analogy

Jul 1, 2023

Analogies help highlight similarities between different situations. Sometimes they just help us make pretty prose and literary points; however, they can also help us with problem solving. Is analogical reasoning responsible for creative solutions and "aha!" moments of insight?