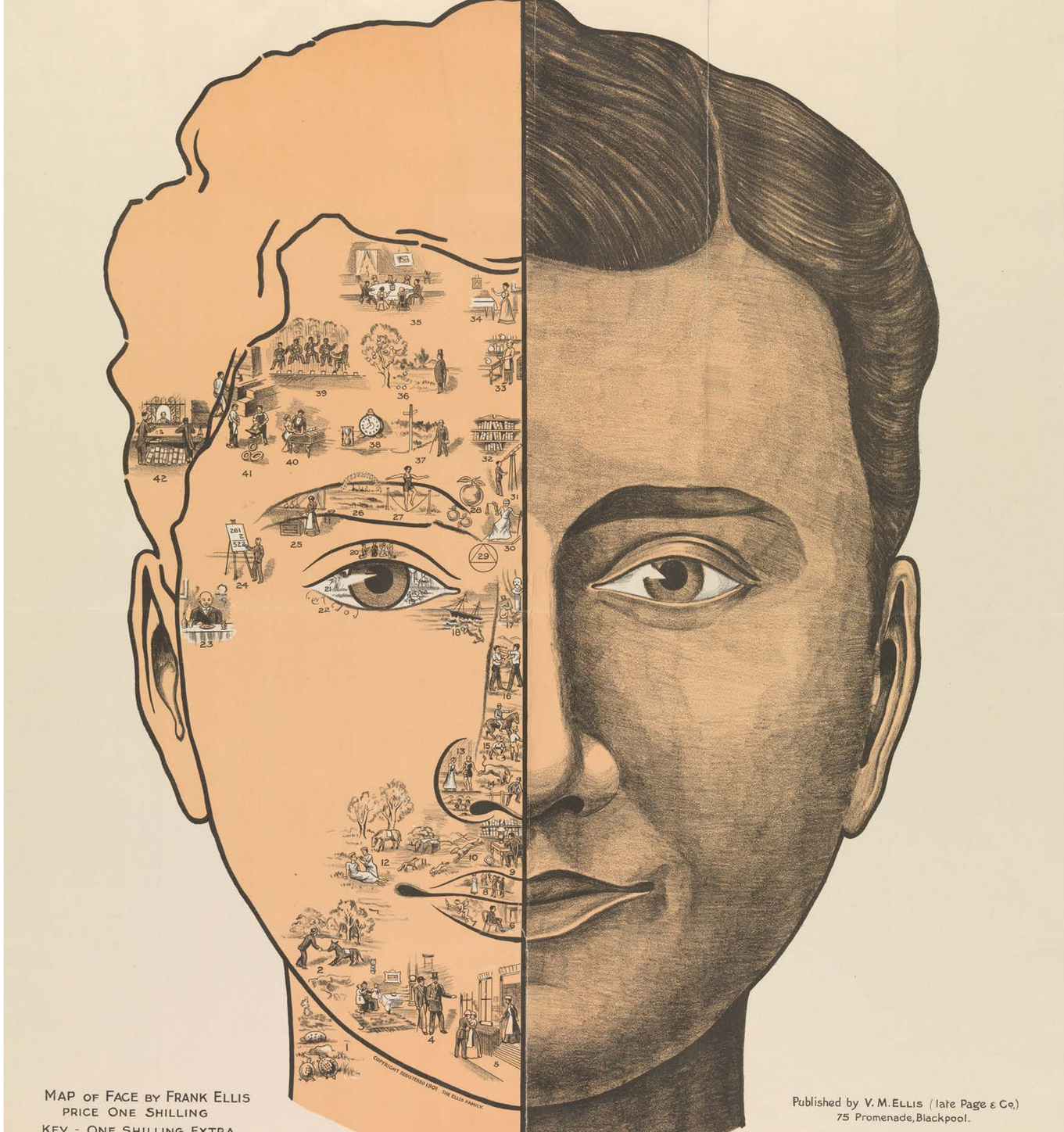
The Human Factor
Week 4 – 4th February 2025

Cognition and Behaviour

Dr. Susan Lechelt
Lecturer in Design Informatics
susan.lechelt@ed.ac.uk

THE UNIVERSITY of EDINBURGH



First - an update on assignment instructions

What is cognition and behaviour?

Working definitions for today:

Cognition: *mental actions or processes through that support knowledge building and understanding*

Behaviour: *how we act on the world, based on our understanding, perception and experience of it*

Why do cognition and behaviour matter in technology design?

1. Help us have reasonable expectations of what users can and cannot be expected to do
2. Help us explain the nature and causes of problems that users encounter
3. Provides theories, modeling tools, guidance, and methods that can lead to the design of better interactive products

Key Reference
Sharp, Helen, Yvonne Rogers, and Jenny Preece. Chapter 4, Interaction Design : Beyond Human-Computer Interaction.

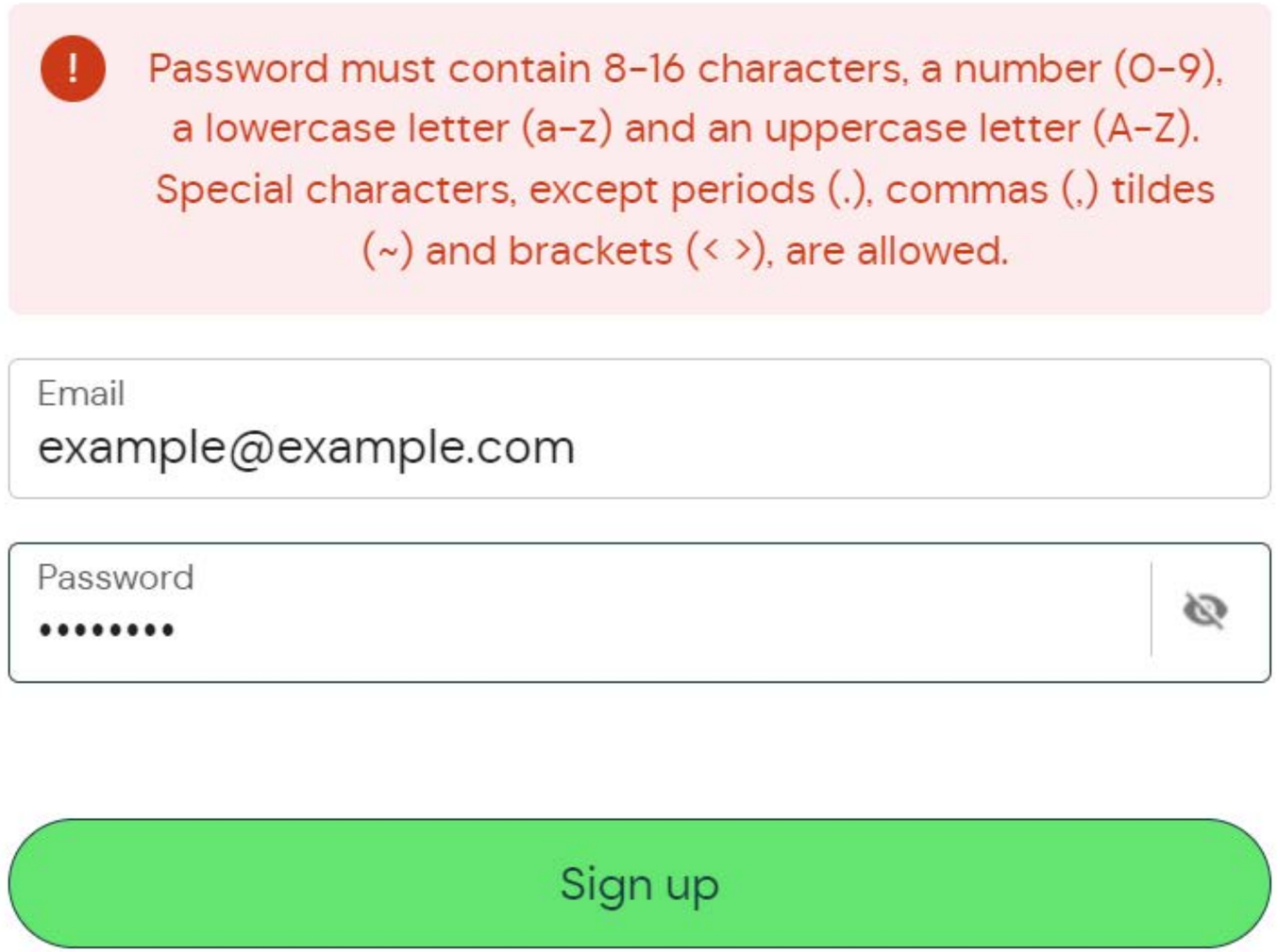
What’s wrong with these stairs?

https://usabilitygeek.com/the-bad-design-of-everyday-things/

Visual cognition/ Perception/attention

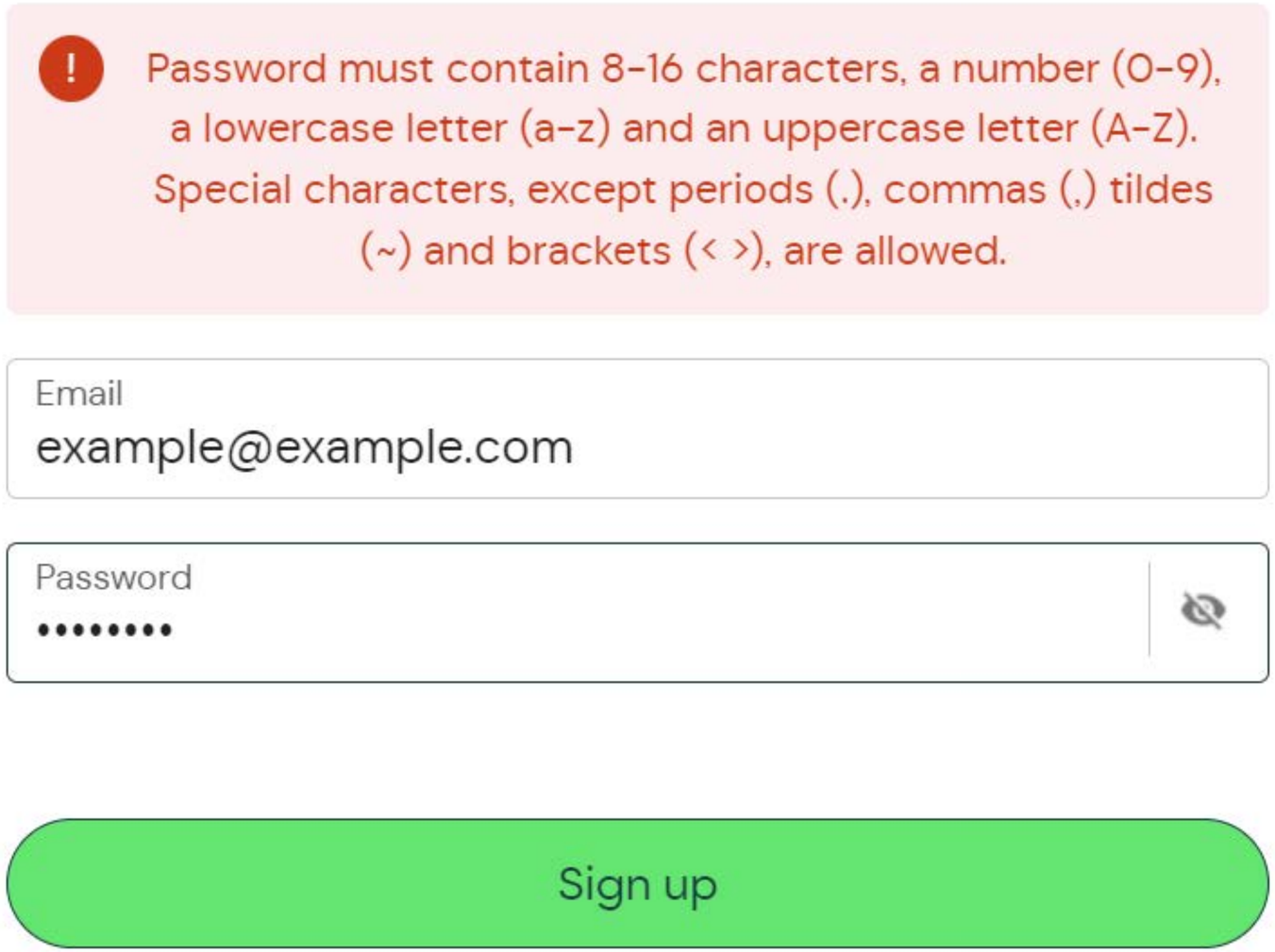
https://usabilitygeek.com/the-bad-design-of-everyday-things/

What’s wrong with this password setting feature?



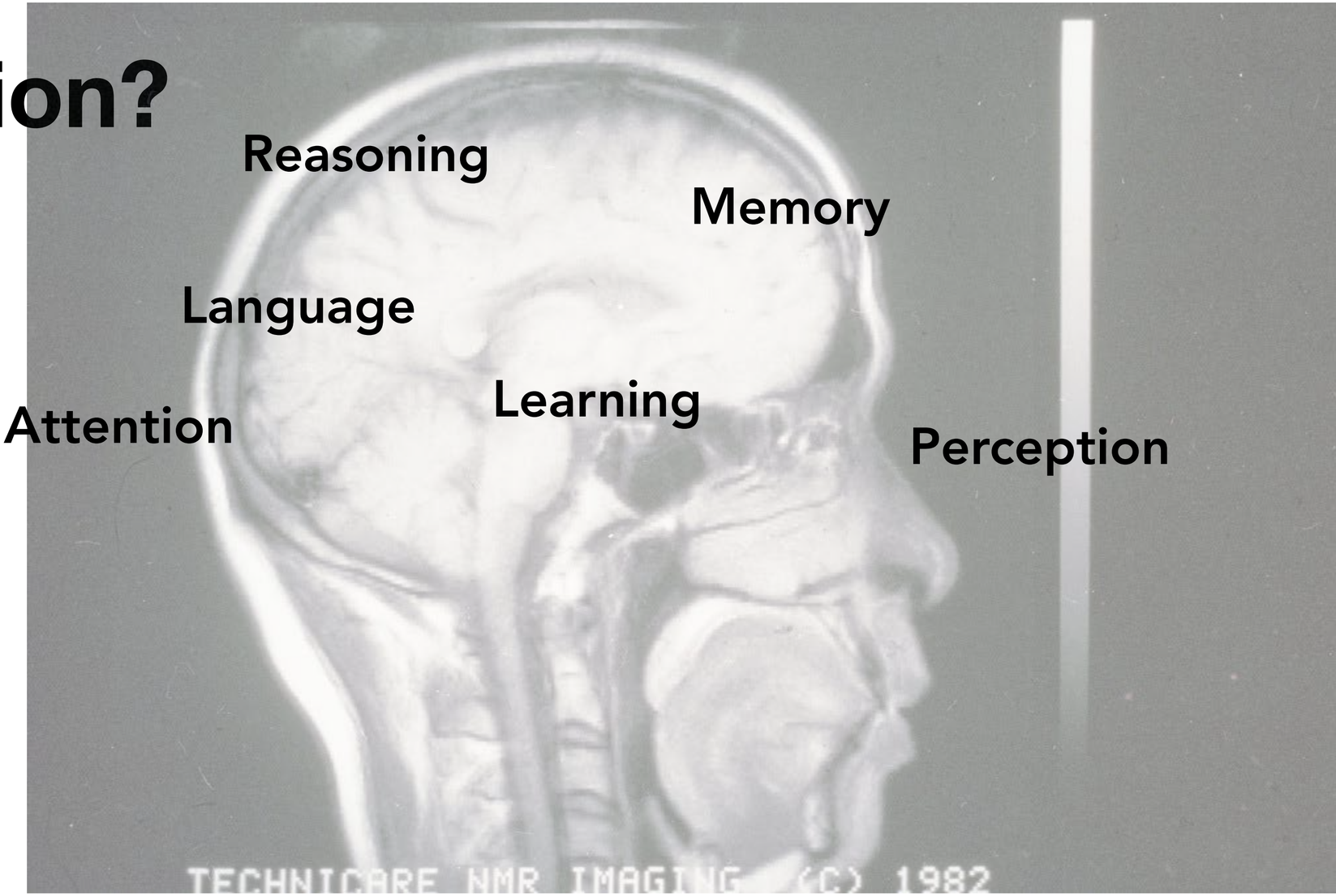
https://
dumbpasswordrules.com/
sites/airasia/

Cognitive load / Memory



https://
dumbpasswordrules.com/
sites/airasia/

What is cognition?



Each aspect of human cognition is interlinked with others; each filters information to make cognition efficient and ***useful***; this also leads to limitations!

Attention

- Selecting things on which to concentrate at a point in time from the mass of stimuli around us
- Allows us to focus on information that is relevant to what we are doing
- Involves sensory information
- Goal-oriented (driven by the task at hand) and saliency-based (what is particularly noticeable)

Attention

Prices of double rooms

Pennsylvania
Bedford Motel/Hotel: Crinaline Courts
(814) 623-9511 S: $118 D: $120
Bedford Motel/Hotel: Holiday Inn
(814) 623-9006 S: $129 D: $136
Bedford Motel/Hotel: Midway
(814) 623-8107 S: $121 D: $126
Bedford Motel/Hotel: Penn Manor
(814) 623-8177 S: $119 D: $125
Bedford Motel/Hotel: Quality Inn
(814) 623-5189 S: $123 D: $128
Bedford Motel/Hotel: Terrace
(814) 623-5111 S: $122 D: $124
Bradley Motel/Hotel: De Soto
(814) 362-3567 S: $120 D: $124
Bradley Motel/Hotel: Holiday House
(814) 362-4511 S: $122 D: $125
Bradley Motel/Hotel: Holiday Inn
(814) 362-4501 S: $132 D: $140
Breezewood Motel/Hotel: Best Western Plaza
(814) 735-4352 S: $120 D: $127
Breezewood Motel/Hotel: Motel 70
(814) 735-4385 S: $116 D: $118

South Carolina

City	Motel/Hotel	Area code	Phone	Rates Single	Rates Double
Charleston	Best Western	803	747-0961	$126	$130
Charleston	Days Inn	803	881-1000	$118	$124
Charleston	Holiday Inn N	803	744-1621	$136	$146
Charleston	Holiday Inn SW	803	556-7100	$133	$147
Charleston	Howard Johnsons	803	524-4148	$131	$136
Charleston	Ramada Inn	803	774-8281	$133	$140
Charleston	Sheraton Inn	803	744-2401	$134	$142
Columbia	Best Western	803	796-9400	$129	$134
Columbia	Carolina Inn	803	799-8200	$142	$148
Columbia	Days Inn	803	736-0000	$123	$127
Columbia	Holiday Inn NW	803	794-9440	$132	$139
Columbia	Howard Johnsons	803	772-7200	$125	$127
Columbia	Quality Inn	803	772-0270	$134	$141
Columbia	Ramada Inn	803	796-2700	$136	$144
Columbia	Vagabond Inn	803	796-6240	$127	$130

Key Reference
Sharp, Helen, Yvonne Rogers, and Jenny Preece. Chapter 4, Interaction Design : Beyond Human-Computer Interaction.

Attention

Design implications:

- Context: Make information salient when it needs to be attended to at a given stage of a task
- Use techniques to achieve this:
  - For example, color, ordering, spacing, underlining, sequencing, and animation
- Avoid cluttering visual interfaces with too much information

Key Reference
Sharp, Helen, Yvonne Rogers, and Jenny Preece. Chapter 4, Interaction Design : Beyond Human-Computer Interaction.

Memory

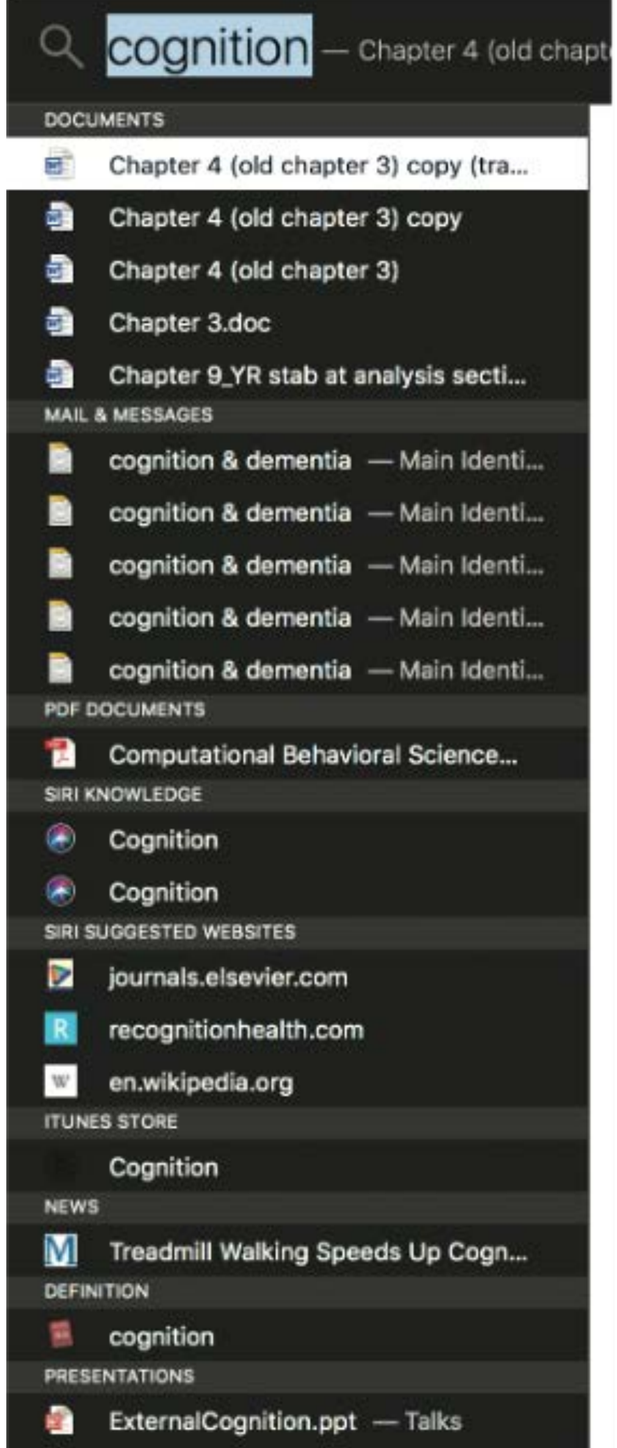
- Memory is not complete - we filter what our brains think is important
- We first *encode* then *retrieve* knowledge - this is tied to attention
- The more attention paid to something…The more it is processed in terms of thinking about it and comparing it with other knowledge…The more likely it is to be remembered
- Context is important as to how we remember (that is, where, when, how and so on)
- We recognize things much better than being able to recall things

Key Reference
Sharp, Helen, Yvonne Rogers, and Jenny Preece. Chapter 4, Interaction Design : Beyond Human-Computer Interaction.

Memory

Design implications:

- Reduce cognitive load by avoiding long and complicated procedures for carrying out tasks
- Design interfaces that promote recognition rather than recall
- Provide users with various ways of labelling digital information to help them easily identify it again
  - For example, folders, categories, color, flagging, and time stamping



Key Reference
Sharp, Helen, Yvonne Rogers, and Jenny Preece. Chapter 4, Interaction Design : Beyond Human-Computer Interaction.

Learning and mental models

- Question: How much can we expect people to learn/know about how technology works?
- E.g., how much do *you* know about how contactless card payment works, or how a thermostat works?

Key Reference
Sharp, Helen, Yvonne Rogers, and Jenny Preece. Chapter 4, Interaction Design : Beyond Human-Computer Interaction.

Learning and mental models

- As technology designers and developers, we may assume people have a more complete understanding of technology; however, as people we our mental models are often “poor, often incomplete, easily confusable, based on inappropriate analogies and superstition” (Norman, 1983)

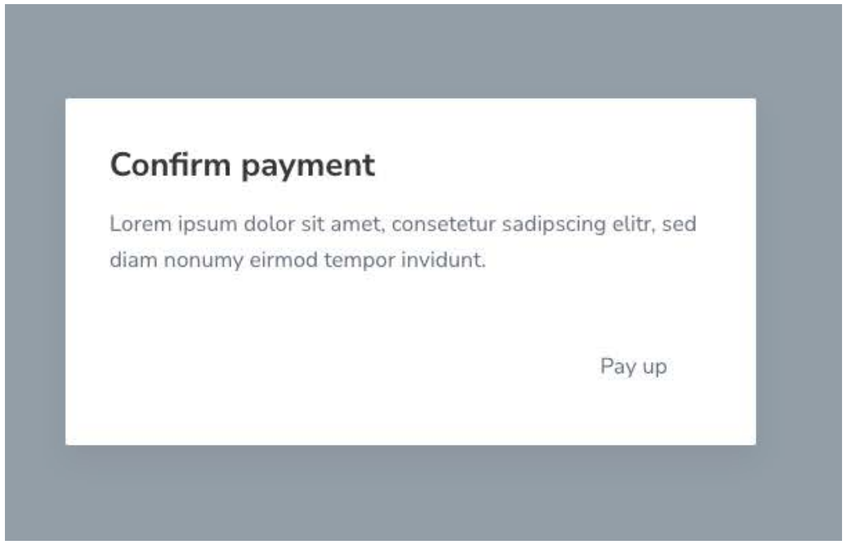
- People prefer to learn by doing rather than following manuals

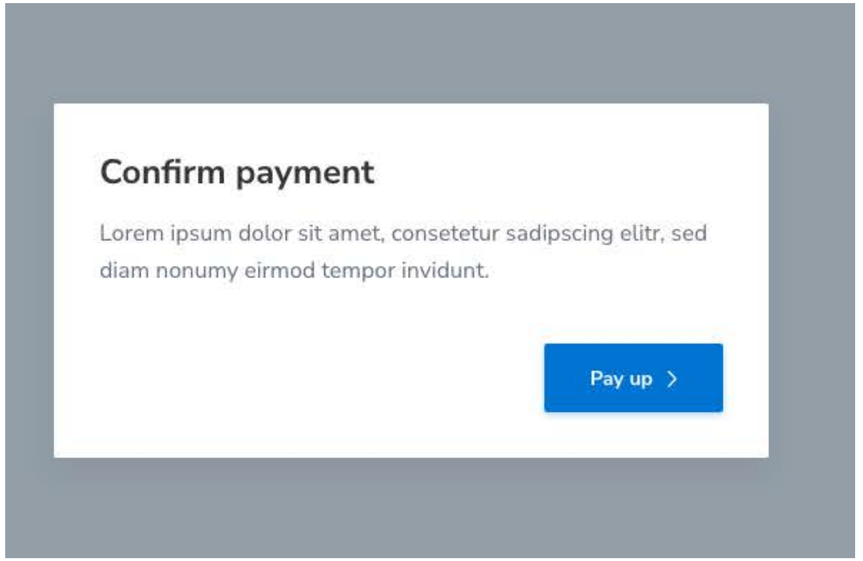
Key Reference
Sharp, Helen, Yvonne Rogers, and Jenny Preece. Chapter 4, Interaction Design : Beyond Human-Computer Interaction.

Learning and mental models

Design implications:

- Clear and easy to use instructions
- Appropriate tutorials and contextual sensitive guidance
- Provide online videos and chatbot windows when needing help
- Transparency: to make interfaces intuitive to use
- Affordances of what actions an interface allows
  - For example, swiping, clicking, or selecting





Key Reference
Sharp, Helen, Yvonne Rogers, and Jenny Preece. Chapter 4, Interaction Design : Beyond Human-Computer Interaction.

Aspects we haven’t covered today

- Differences in cognition and behaviour (see Week 7)
- Social aspects of cognition and behaviour (see Week 3)

Activity 1 - Explore relationships between Nielsen's heuristics and aspects of cognition and behaviour (10 minutes)

Cognitive processes

Attention

Memory

Perception

Learning

Planning

Problem-solving

Reasoning

[…. others?]

Nielsen's Heuristics

1: Visibility of System Status

2: Match Between the System and the Real World

3: User Control and Freedom

4: Consistency and Standards

5: Error Prevention

6: Recognition Rather than Recall

7: Flexibility and Efficiency of Use

8: Aesthetic and Minimalist Design

9: Help Users Recognize, Diagnose, and Recover from Errors

10: Help and Documentation

https://www.nngroup.com/articles/ten-usability-heuristics/

The Five Whys

This easy research method will help you uncover the deep motivations and assumptions that underpin a person's behavior.

STATS

Suggested Time

15 minutes

Level of Difficulty

Easy

Materials Needed

Pens, paper

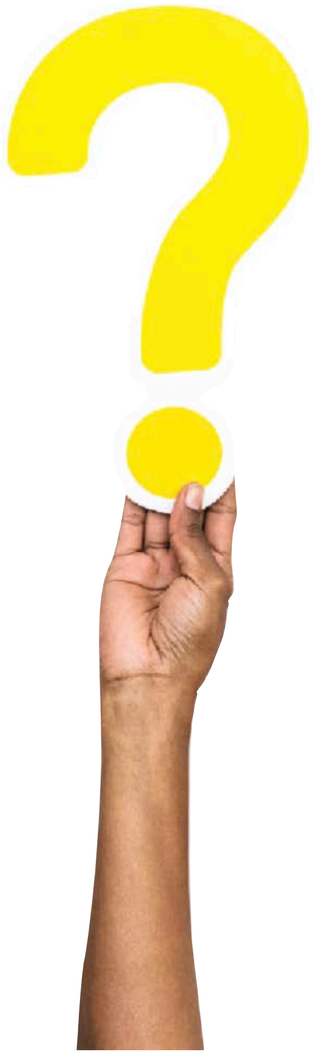
Participants

Design team, person you're designing for

The Five Whys is a fantastic method to use to get to the core of a person's beliefs and motivations. Sure, you may feel like a four-year-old asking "why" every time a person answers your previous question, but if you stick with it, and give the person you're interviewing the time, space, and permission to really go deep, you're likely to wind up with a few key insights. You'll use this method while you're conducting an Interview and start with really broad questions like "Do you save much money?" or "How was your harvest this year?" Then, by asking why five times you'll get to some essential answers to complicated problems. This can be a great method to use if you're trying to get at the human and emotional roots of a problem.

https://www.designkit.org/methods/the-five-whys.html

Activity 2 - Observation + The five whys (20 minutes)



1. Get one person in your group to interact with a website or app they have not used before, and complete a simple task (e.g., logging what they ate for breakfast, looking up flights to Canada) and video record them completing this task. Make sure both the screen and person is visible in the recording.

2. Together as a group, rewatch the video. As you watch, ask them questions about why they completed the task in the way they did. Why did they chose to click certain buttons, why did they hesitate at certain points, why did they scroll at a particular point? For each question you ask, repeat the question ‘why’ five times - do you.

Further reading

Pages 81 - 223 in Frank E. Ritter. (2014). Foundations for Designing User-Centered Systems: What System Designers Need to Know about People. Springer London.