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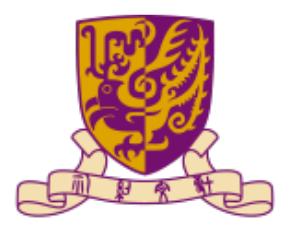
# **CSC4130**

# **Introduction to Human-Computer Interaction**

## **Lecture 3**

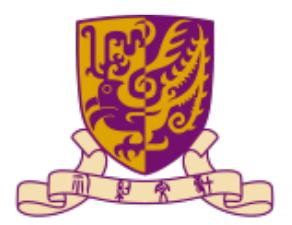
## **Human: Memory**





# Outline

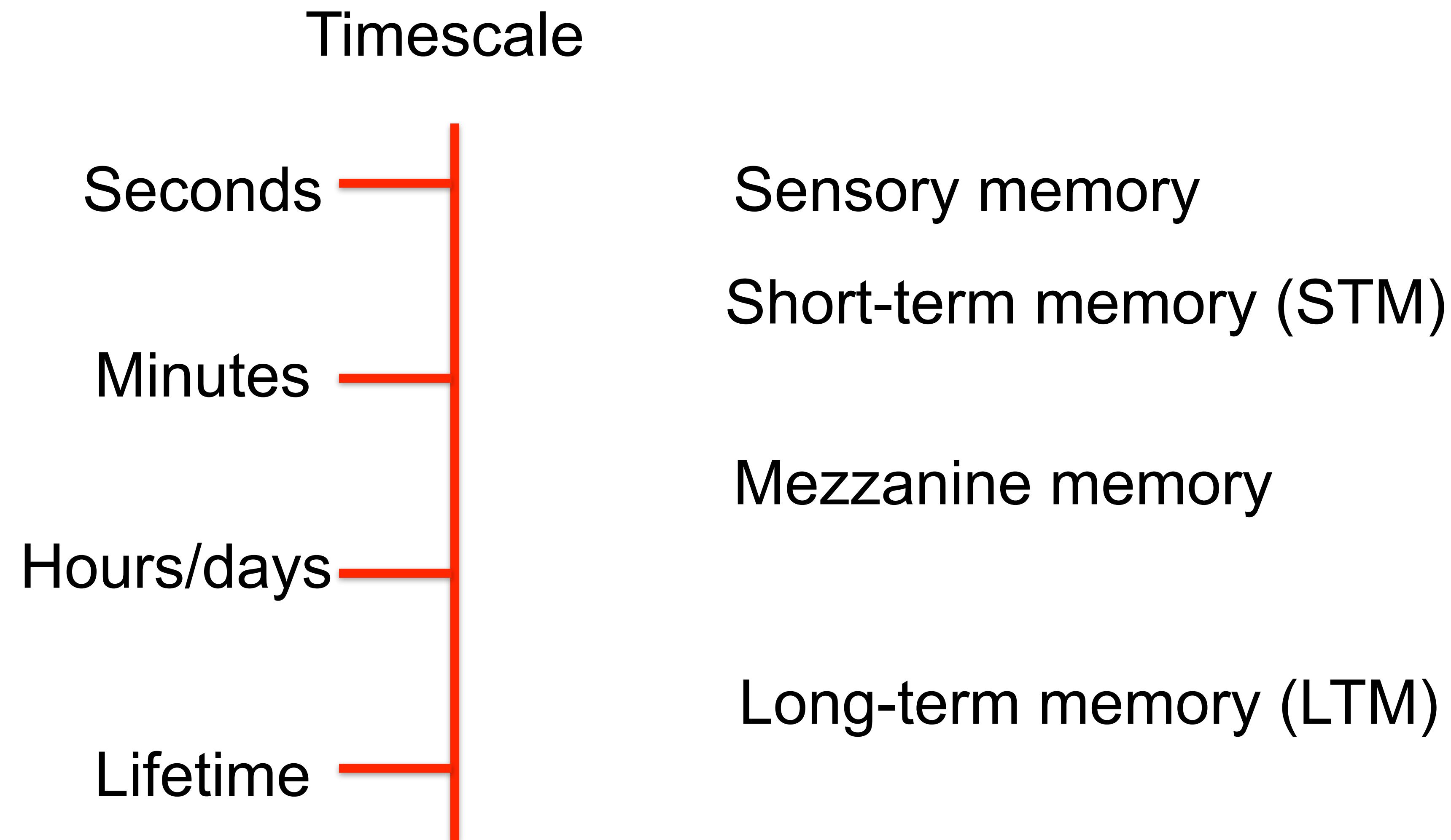
- Types of memory
- Sensory memory
- Short-term memory
- Mezzanine memory
- Long-term memory
- Design notes for memory



# Outline

- **Types of memory**
- Sensory memory
- Short-term memory
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# Types of memory



# Mechanism

Long-term

Physical  
Synapse growth

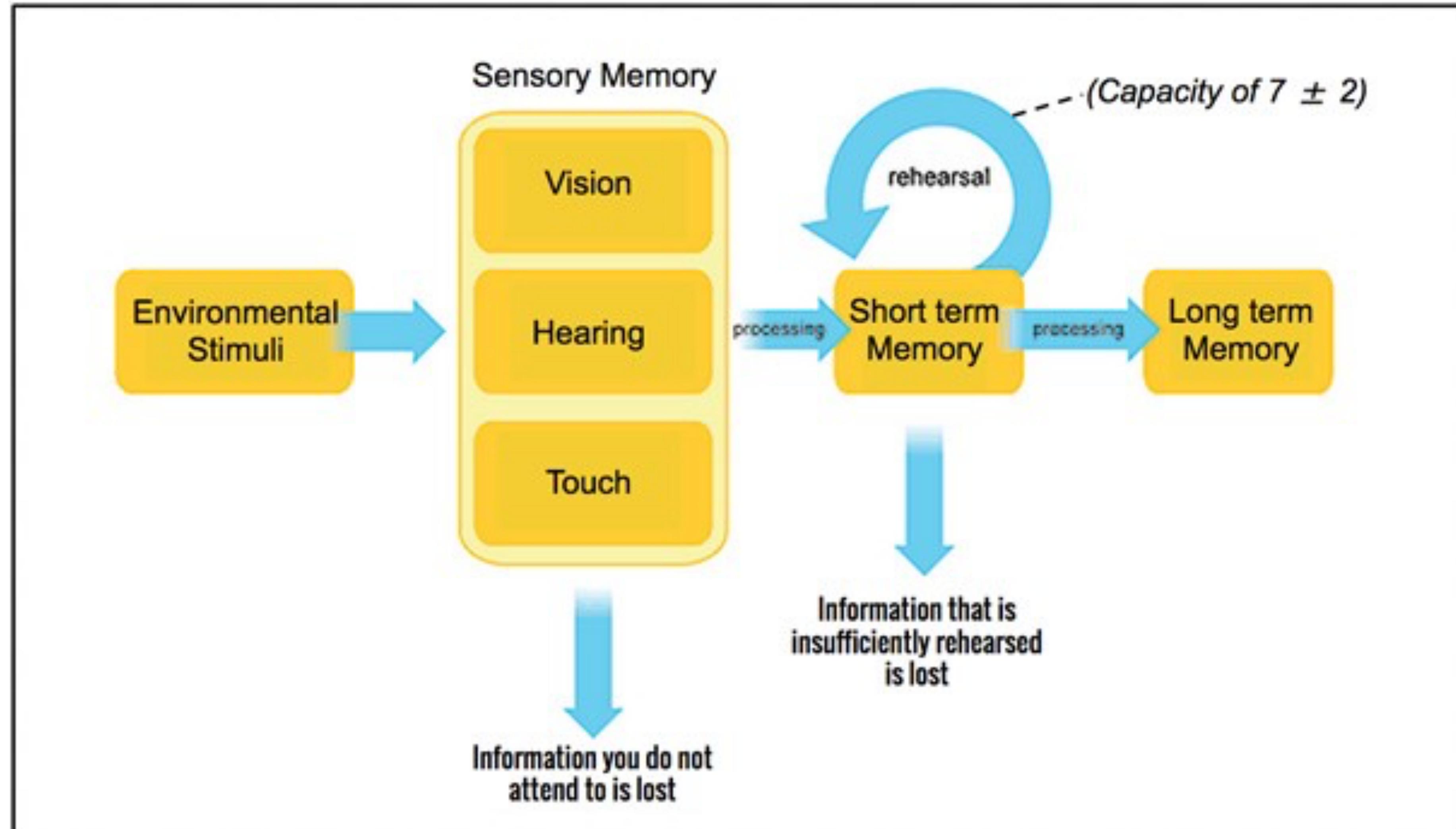
Short-term

Electrical  
Neuron firing

Mezzanine

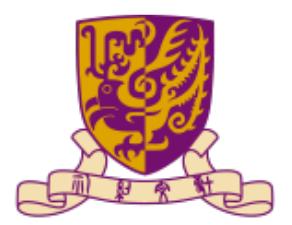
Chemical?  
Long-term potentiation

# Data flow



# Basic laws of memory

- Concentration
- Association
- Repetition

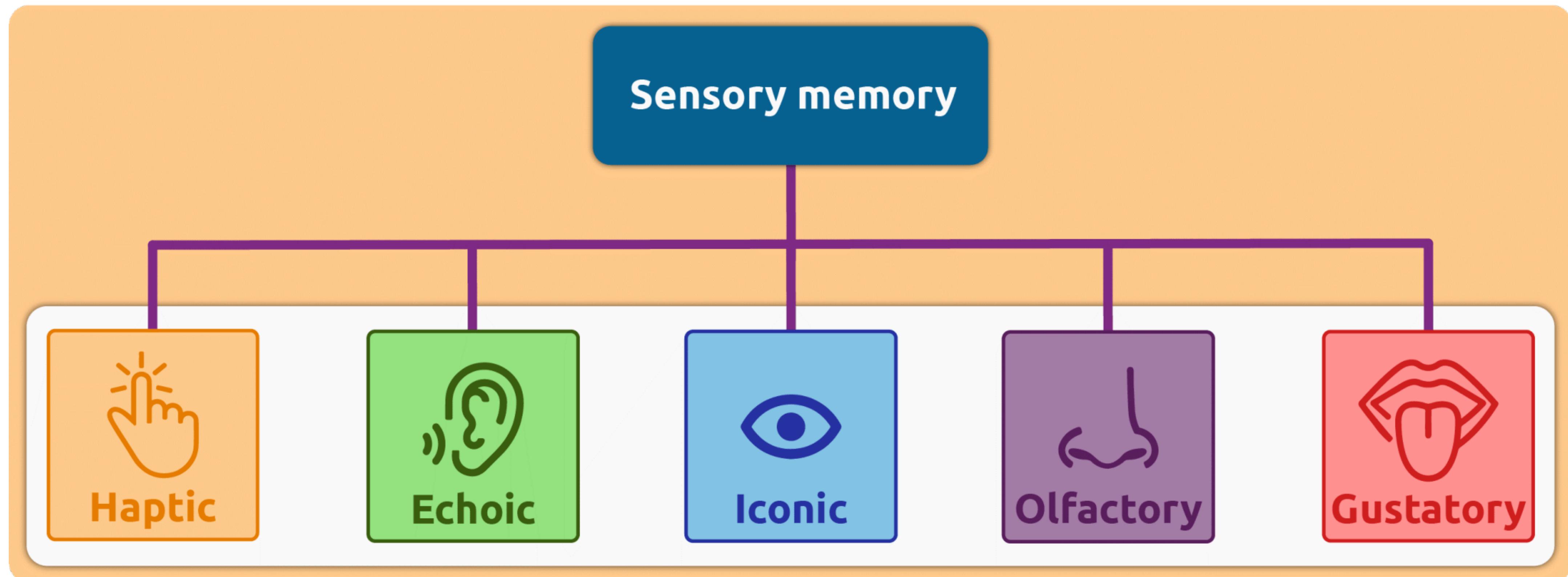


# Outline

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# Sensory memory

- Stored for a few seconds at most
- Come from hearing, vision, smell, touch, and tastes



# Haptic memory

- Related to your sense of touch
- Include sensations like pressure, pain, itching, or something that feels good
- E.g., when you feel a raindrop on your skin, your haptic memory records that sensation, helping you recognize what is happening



# Echoic memory

- Associated with sound and hearing
- Essential to learning a language and that people who have trouble speaking may store echoic memories for shorter amounts of time
- E.g., the ability to understand language



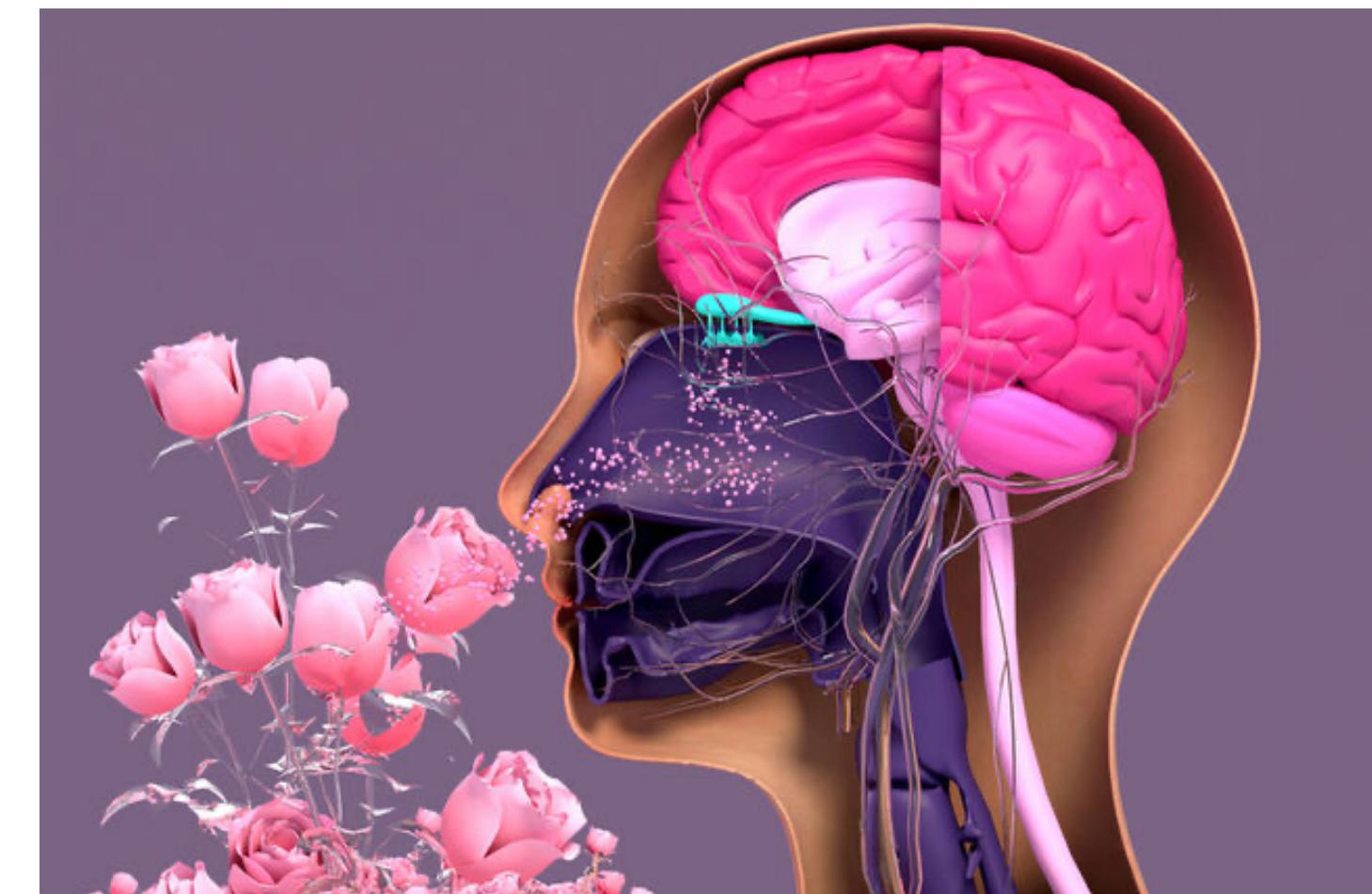
# Iconic memory

- Associated with things that you see
- Has a large amount of storage but stores the memory for less than a second
- The brighter the image, the longer it stays in your iconic memory
- E.g., ride in a car and see cows grazing in a field



# Olfactory memory

- Associated with smell
- Identify tastes because molecules from the food you chew go into your nose
- Without smell, you would only be able to taste basic flavors like sweetness
- E.g., when you smell something from your childhood, it helps your brain bring up other memories associated with that smell



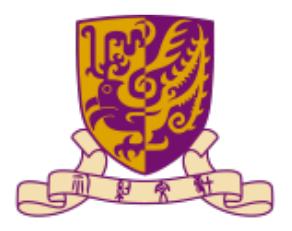
# Gustatory memory

- Associated with taste
- Identify foods through the five basic flavors (i.e., salty, sweet, bitter, umami, sour) your tongue identifies through the gustatory receptor cells
- E.g., if you eat something that once made you sick to your stomach, you may have nausea the next time you eat that food



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# Short-term memory

- Called for working memory
- Limited capacity
  - Only about 7 items can be stored at a time
- Limited duration
  - Storage is fragile and information can be lost with distraction or passage of time
- Encoding
  - Primarily acoustic, even translating visual information into sounds



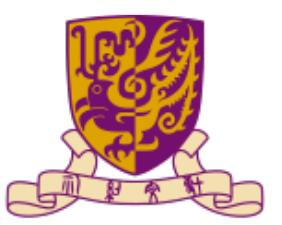
## Millers 7+/-2

- The number of objects an average person can hold in working memory is about seven

2832

1387430

212348278493202



# Seven chunks meanings

42194520011066

42 1945 2001 1066

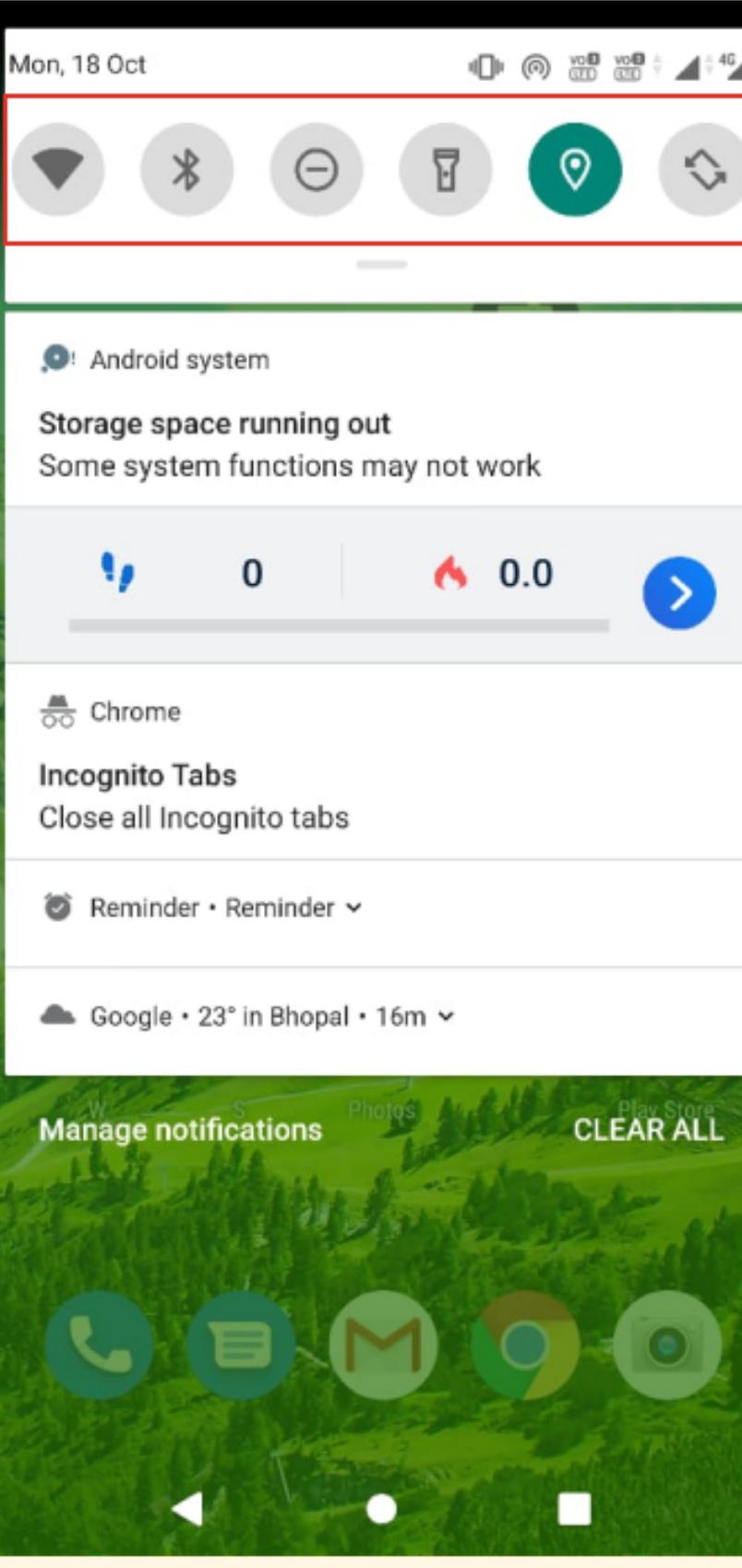
186 8039 2622

HEC ATR ANU PTH ETR EET

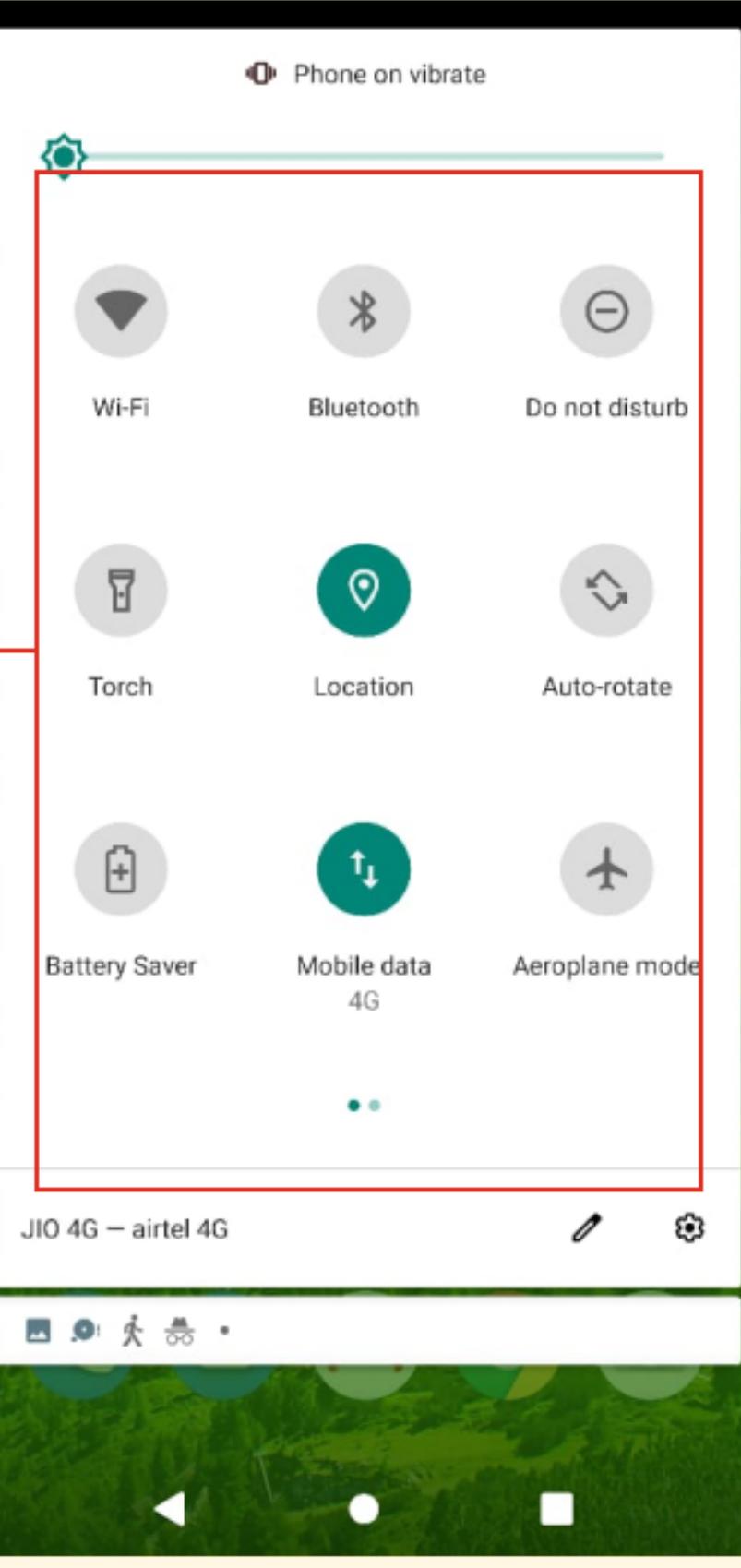
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# Miller's law

Toggle keys are limited to 6 in the notification panel, reducing the cognitive load on the user.

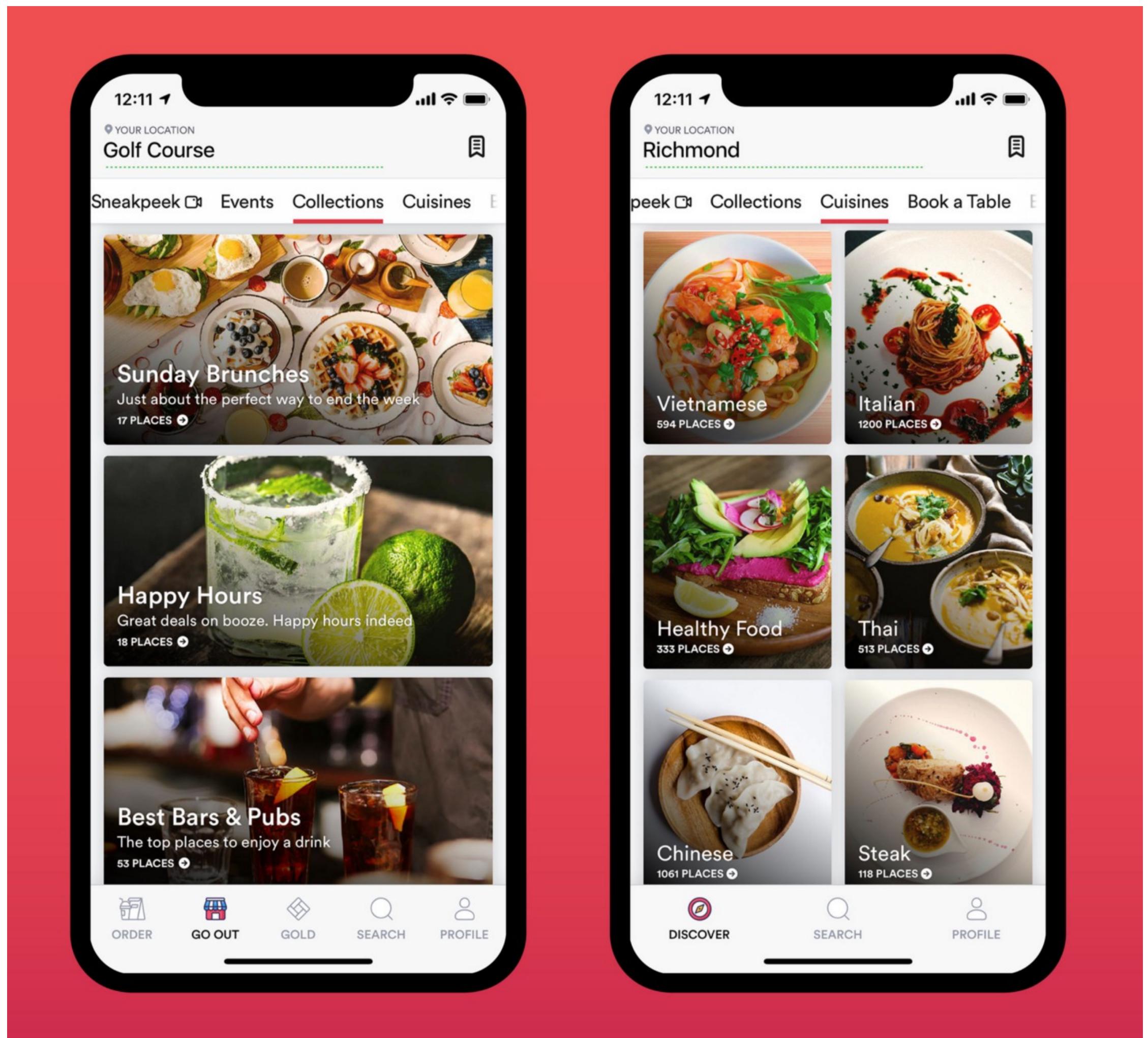


On sliding the notification panel, Users get a view of quick panel settings where toggle keys are placed in rows and columns, making it easier for users to follow.



# Hick's law

- The more elements people get, the harder it is to make a choice



# Design tips for short-term memory

- Information stored in chunks

Card number

4165998200003424

Card number

4165 9982 0000 3424



# Design tips for short-term memory

- Information stored in chunks

**Long list**

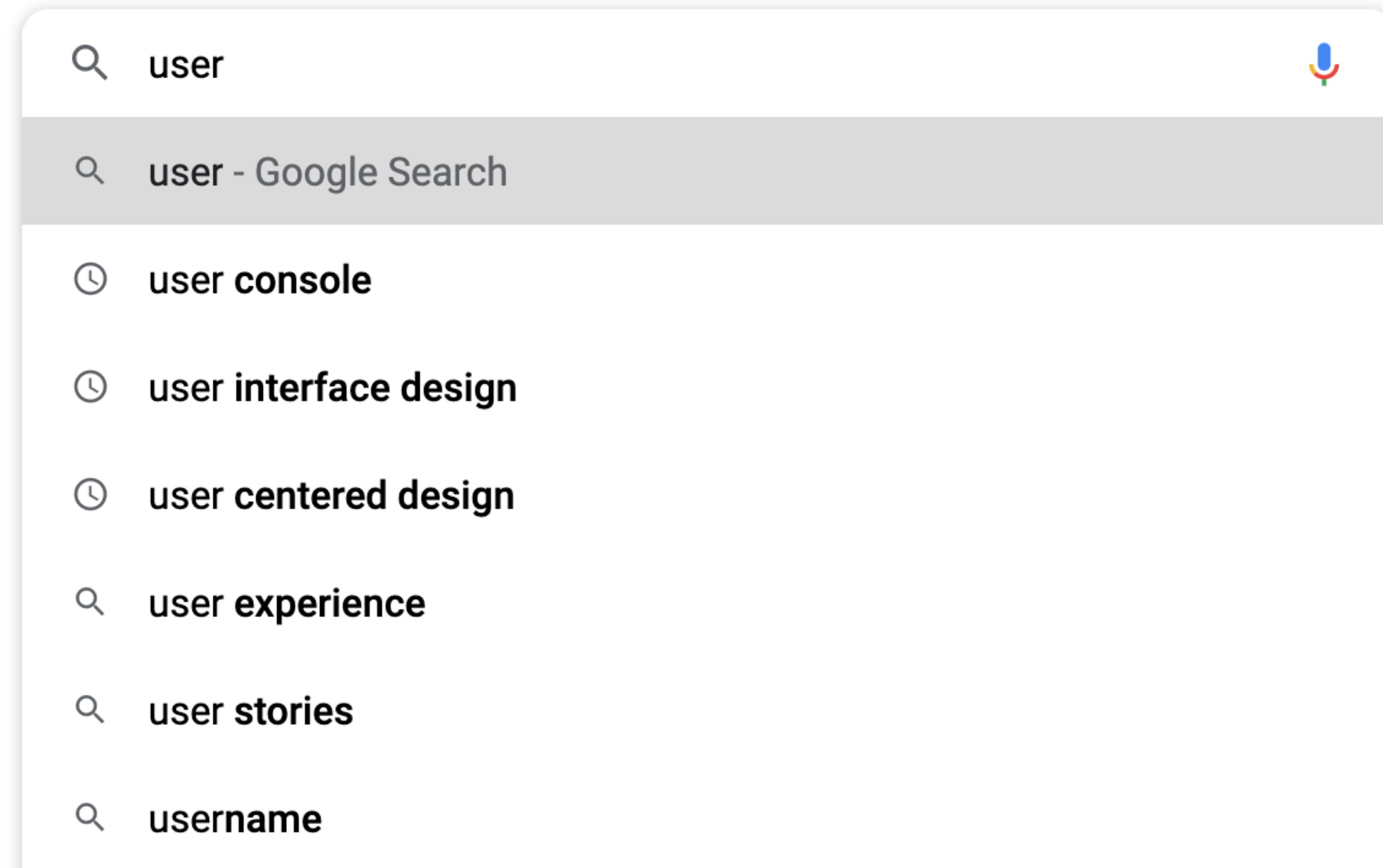


**Long list**



# Design tips for short-term memory

- Recommendation in search





# Design tips for short-term memory

- Change the color of the visited link

## List of Articles

A guide to Usability ← Visited link

A visual guide to best UX books to read

How to apply for UX Job without experience?

Be ready to pave way for your UX career?

# Design tips for short-term memory

- Choice and references

Your preference topics

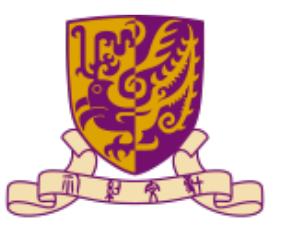


Good

Your preference topics



Better



香港中文大學(深圳)

The Chinese University of Hong Kong, Shenzhen

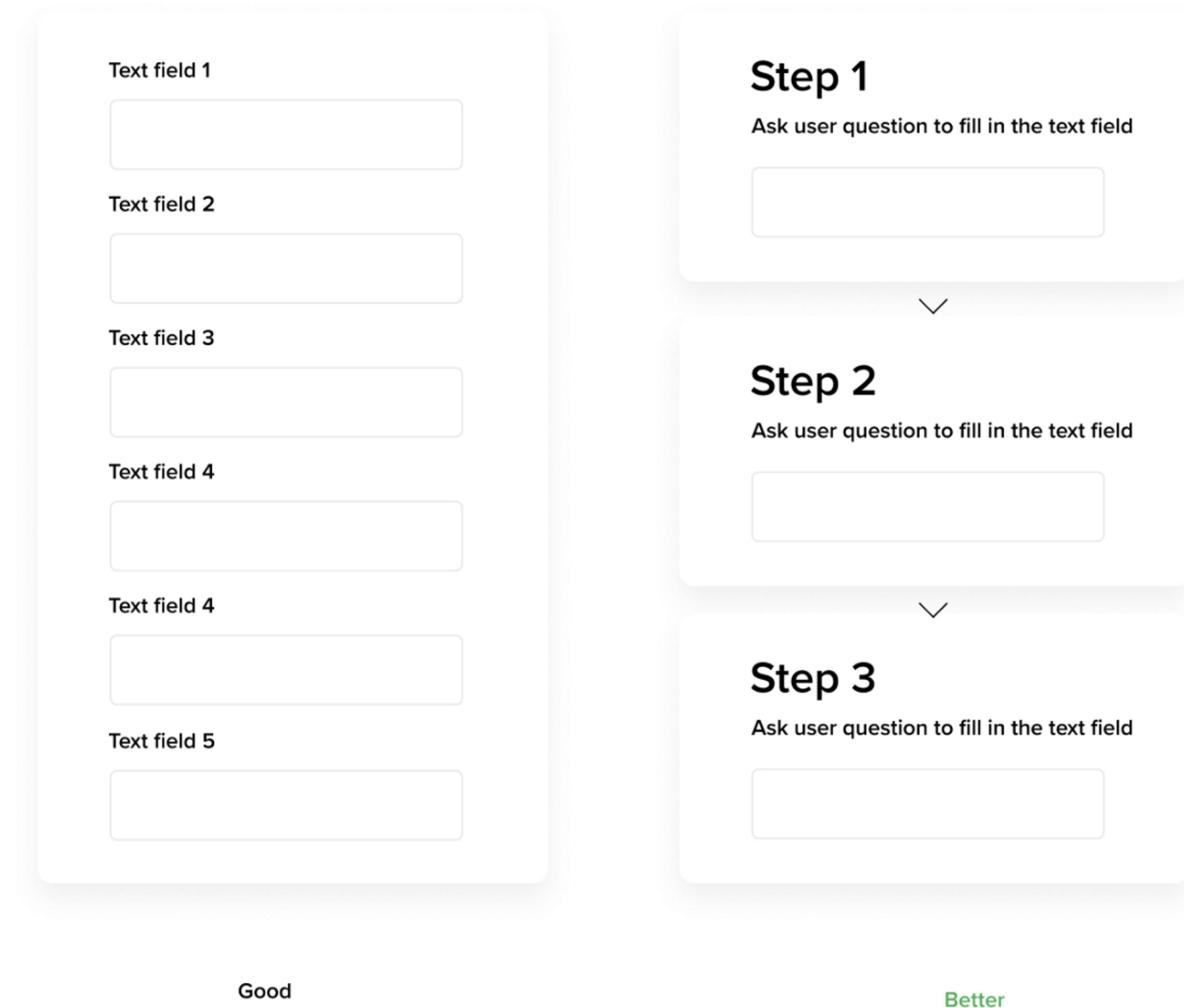
# Design tips for short-term memory

- Remind users of their current location

Home > Clothings > **Shirts**

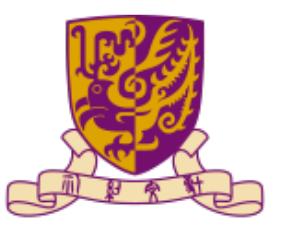
# Design tips for short-term memory

- Multi-tasking is bad



Good

Better



# Outline

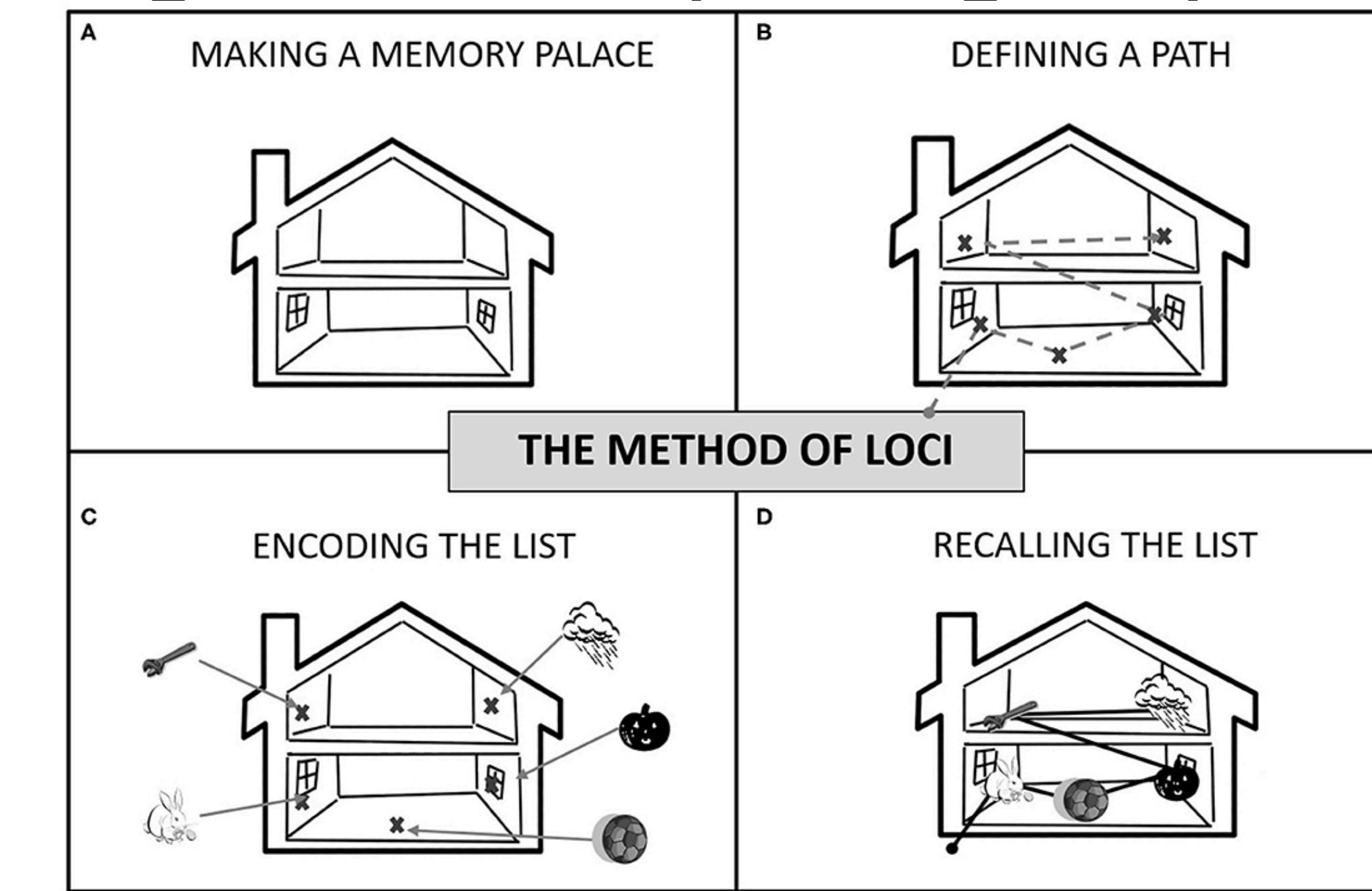
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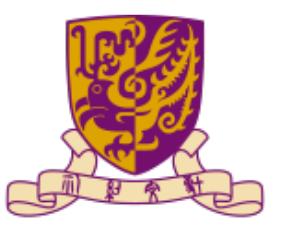
# Mezzanine memory

- What you are doing now
  - Context - activates long-term memory
- What you have been doing recently
  - Short-term episodic memory

# Method of Loci

- A well-known trick for remembering a list of items
- A mnemonic memory strategy to help people remember new information in sequential order
- Involves imagining yourself placing new information around a room and then visualizing going back and picking it up in the order you put it down





# Outline

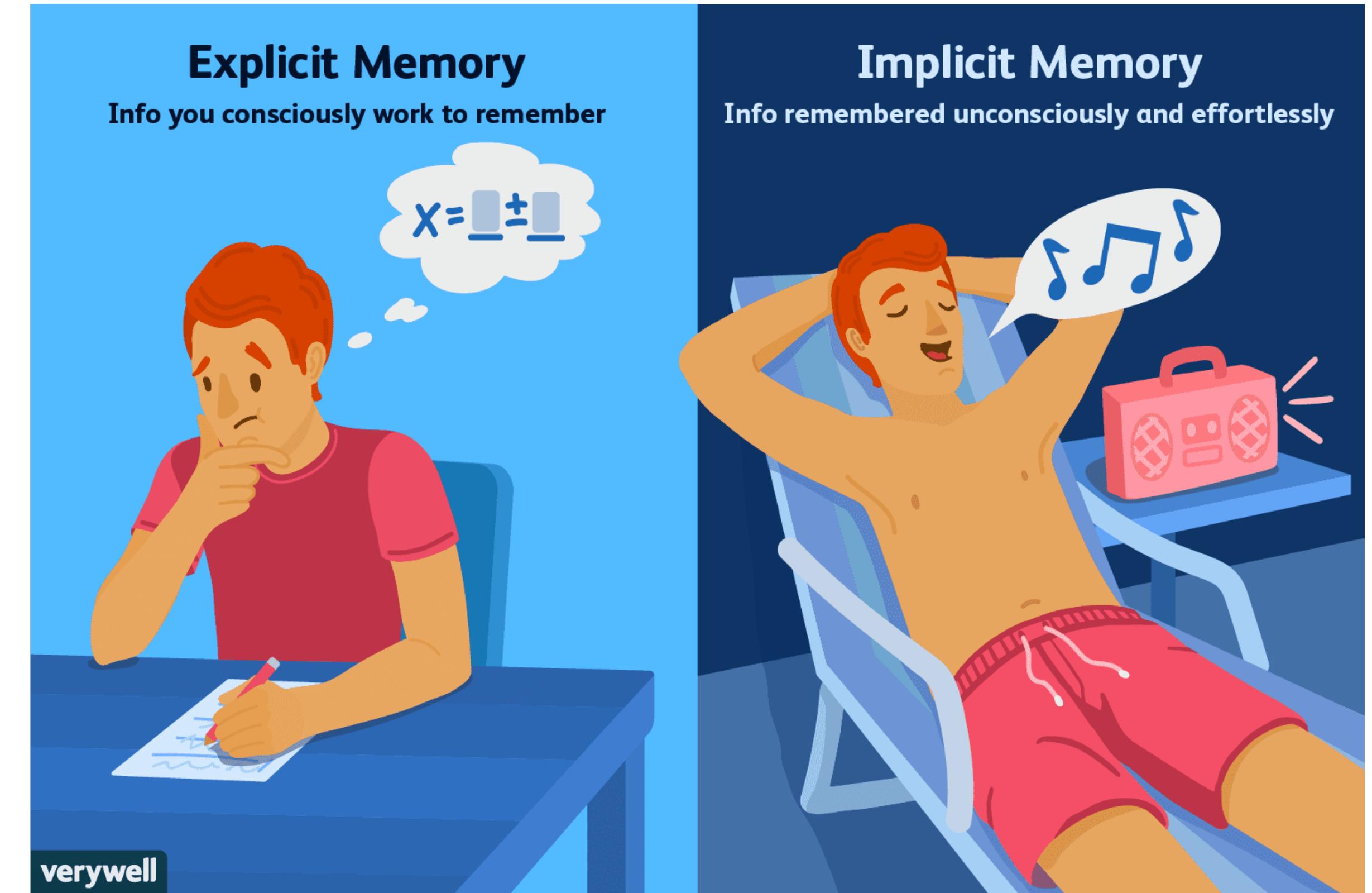
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# Long-term memory

- The memory process in the brain that takes information from the short-term memory store and creates long lasting memories
  - Slow access - relative to short-term memory
  - Slow decay and easy to recall
  - Huge or unlimited capacity

# Types of long-term memory

- Explicit: all the memories and information that can be evoked consciously
  - Episodic
  - Semantic
  - Autobiographical
  - Spatial
- Implicit: the movement of the body in using objects
  - Procedural
  - Priming
  - Category
  - Perceptual
  - Emotional



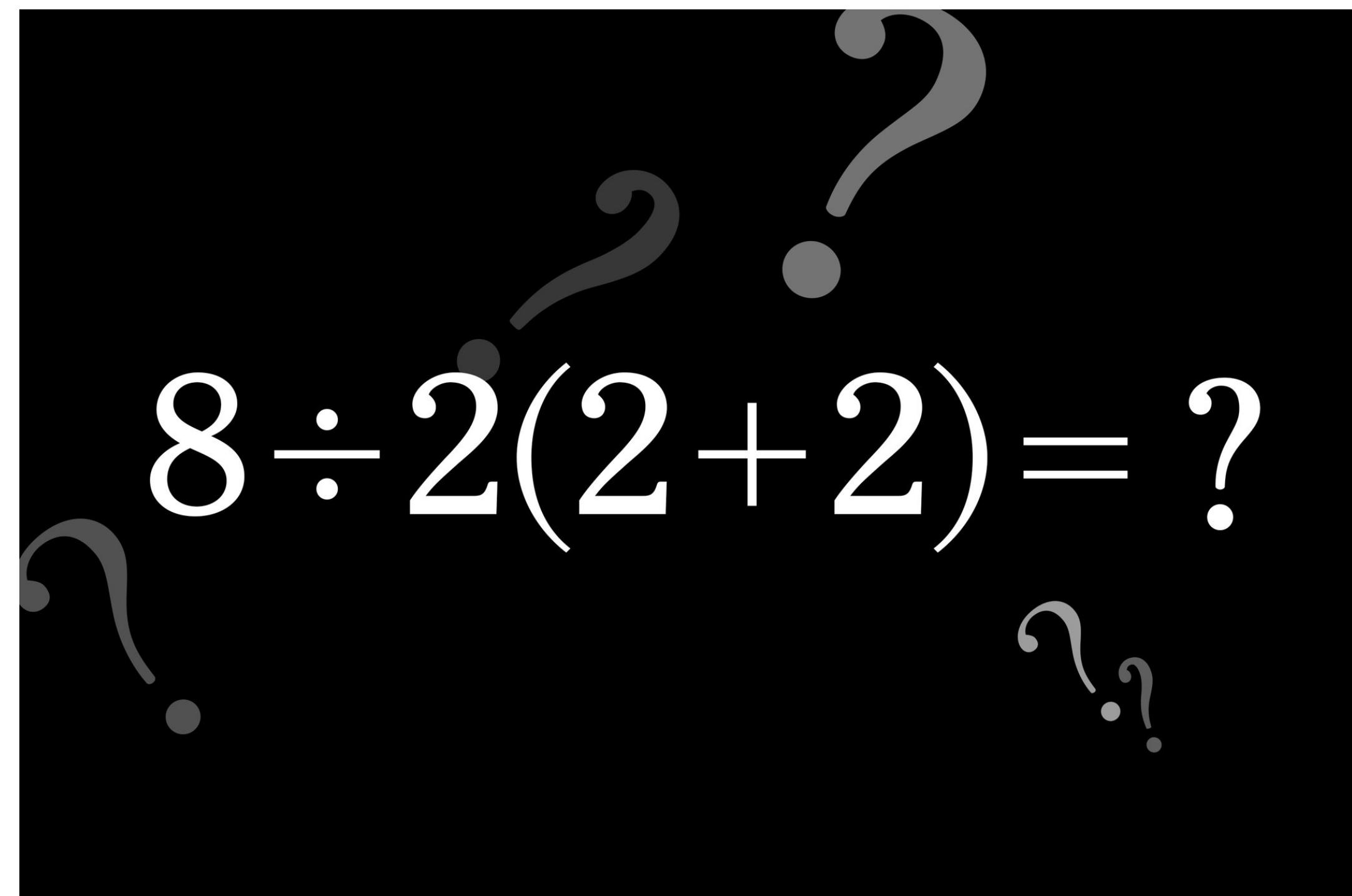
# Explicit memory

- Episodic memory
  - Store information about events that happen in a person's life
  - Refer to knowing the time and place and details of events



# Explicit memory

- Semantic memory
  - Responsible for the storage of factual information such as the meaning of words or general knowledge of things



# Explicit memory

- Autobiographical memory
  - Involves various episodes from the past gathered from our personal history based on a certain time, space, object, or person



# Explicit memory

- Spatial memory
  - Involves the recording of facts concerning an individual's spatial arrangement
  - Account for our ability to readily find our way through familiar towns



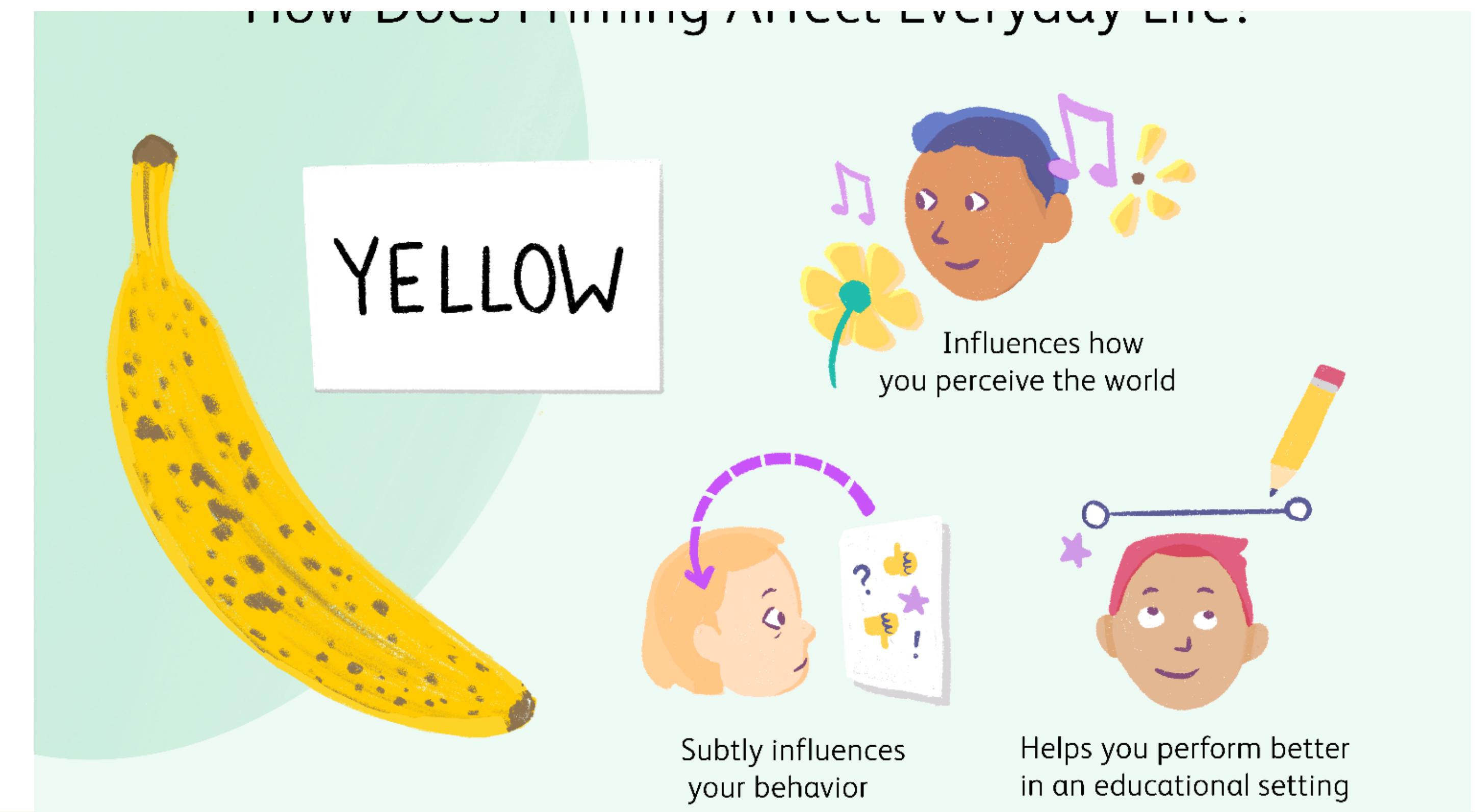
# Implicit memory

- Procedural memory
  - Is the memory of motor skills
  - Is responsible for knowing how to do things
  - Enable task performance without the need for conscious control or attention



# Implicit memory

- Priming memory
  - Concern with perceptual identification of words and objects
  - Can be associative, negative, positive, affective, conceptual, perceptual, repetitive, or semantic



# Implicit memory

- Category memory
  - Involve the attainment of a concept in order to clarify and categorize various entities via grouping
  - Allow for comparisons and indicates subjective divisions for better comprehension



# Implicit memory

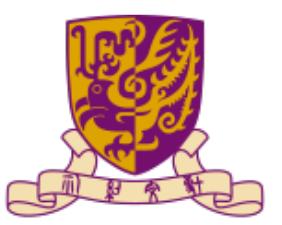
- Perceptual memory
  - Constitute the foundation for cognitive processes, and cooperates with the neural basis to produce the prime effect
  - Improve perception by enabling the distinguishing of similar things from each other

|                                      |                                  |                                     |
|--------------------------------------|----------------------------------|-------------------------------------|
| Lavender<br><br>/lævəndə/<br>#E39FF6 | Purple<br><br>/pɜ:pə/<br>#800080 | Violet<br><br>/vaɪələt/<br>#710193  |
| Grape<br><br>/grɛɪp/<br>#6F2DA8      | Mauve<br><br>/mæʊv/<br>#7A4988   | Mulberry<br><br>/mʌlbri/<br>#7FFF00 |
| Plum<br><br>/plʌm/<br>#601A35        | Lilac<br><br>/laɪlæk/<br>#C8A2C8 | Indigo<br><br>/ɪndɪgəʊ/<br>#4B0082  |

# Implicit memory

- Emotional memory
  - Involve autobiographical memories entangled with emotions



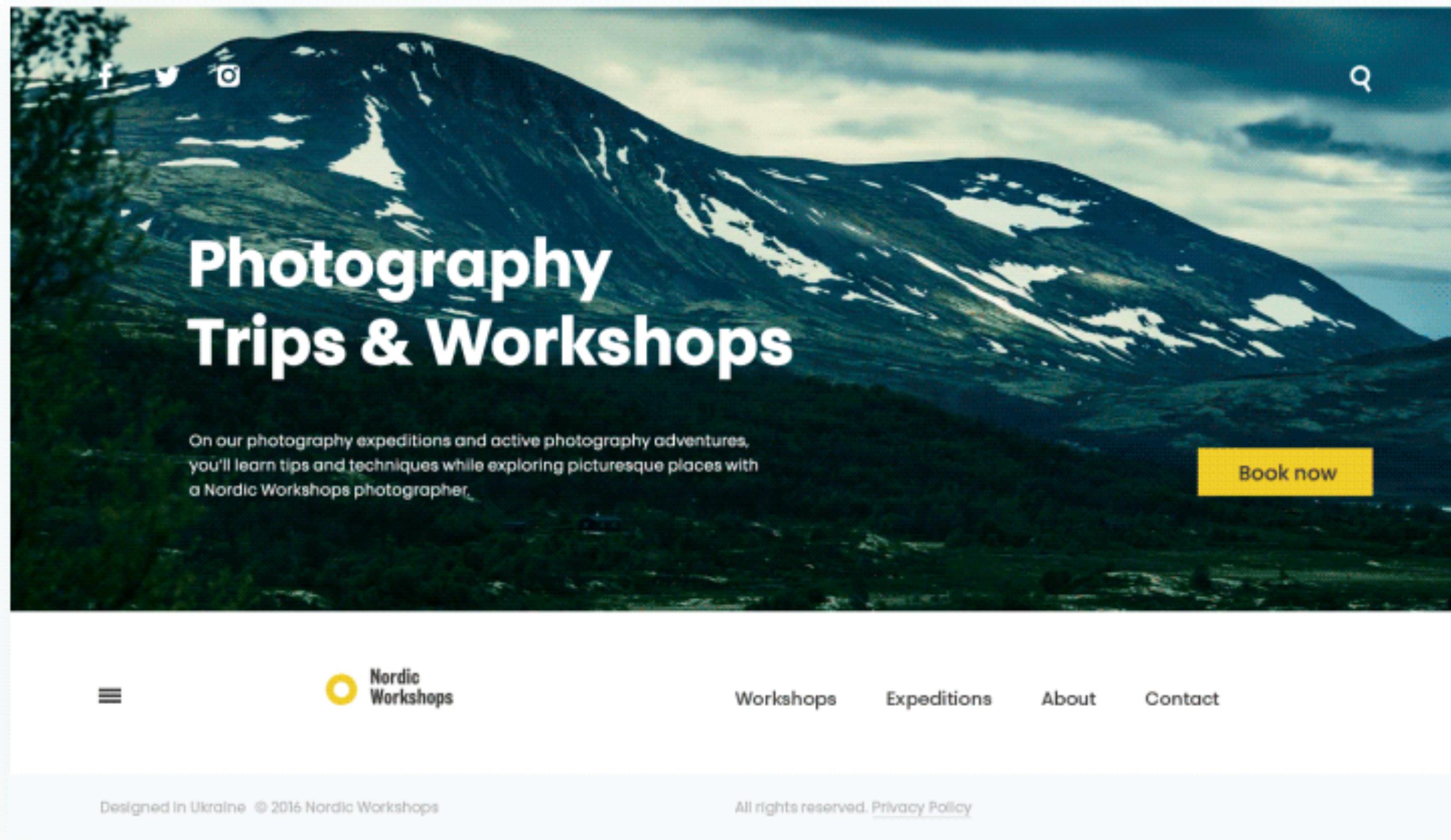


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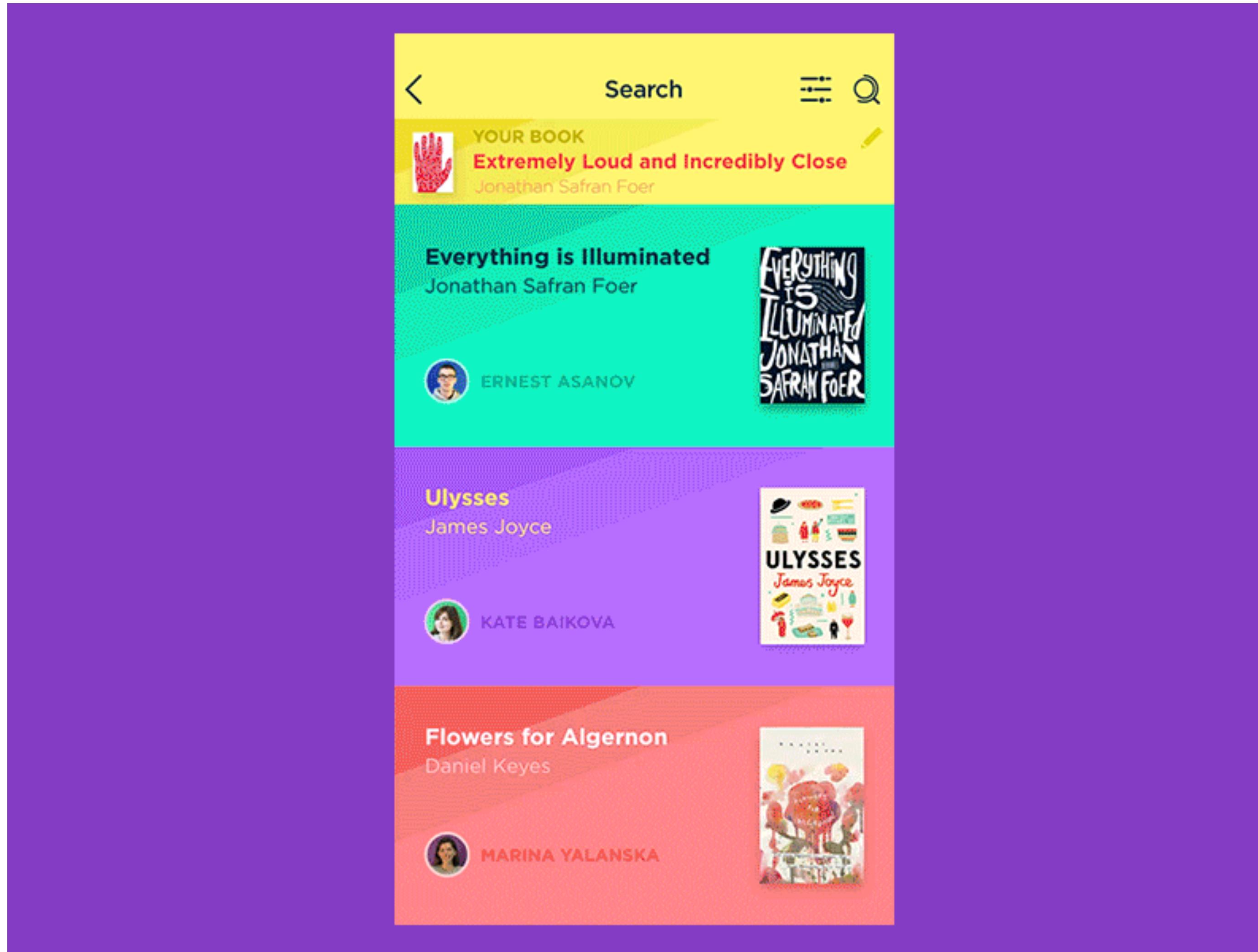
# Design notes for memory

- Don't make users memorize many items at once



# Design notes for memory

- Don't present too many elements for the choice together



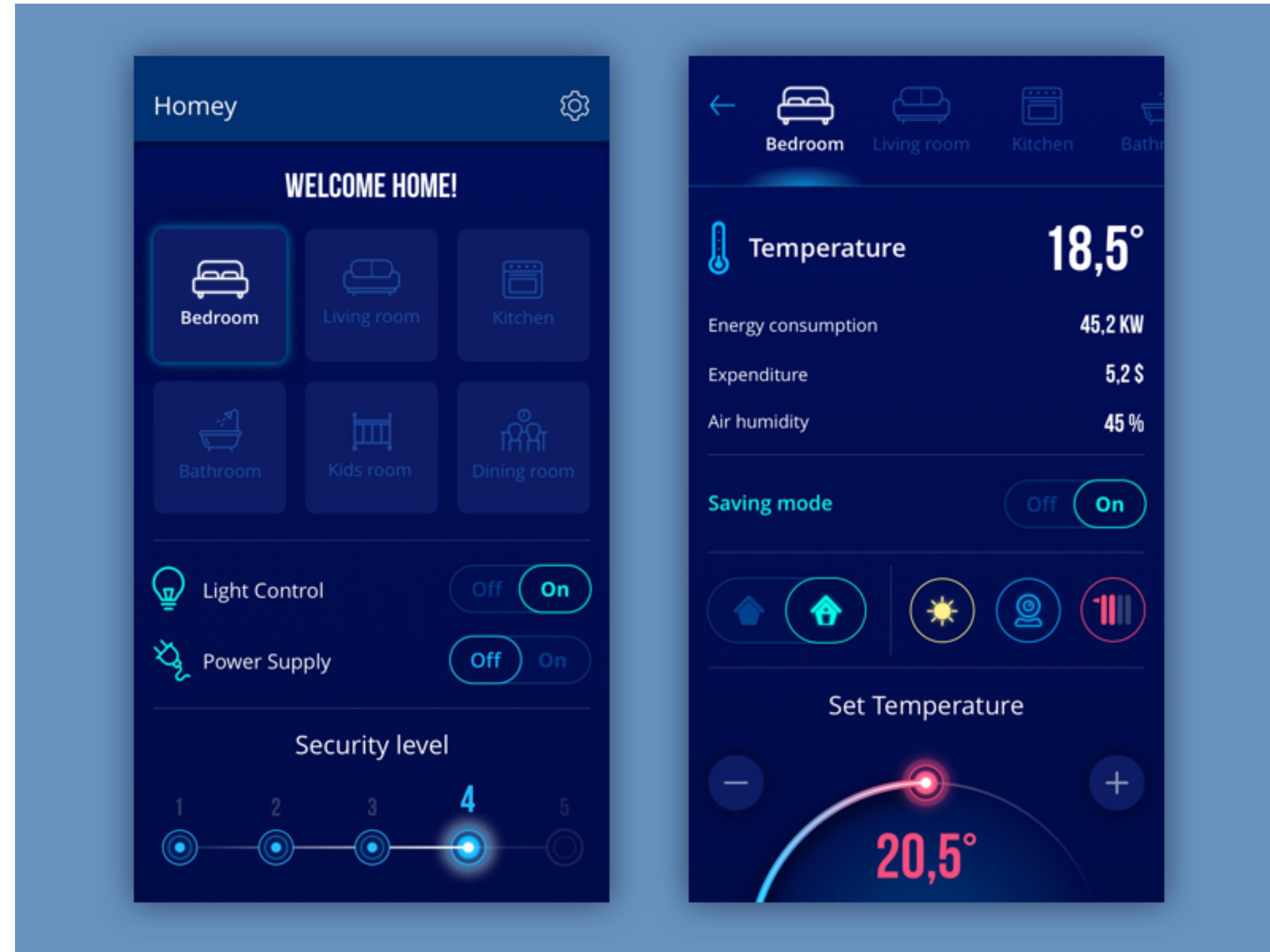
# Design notes for memory

- Save memory effort with recognizable patterns and symbols



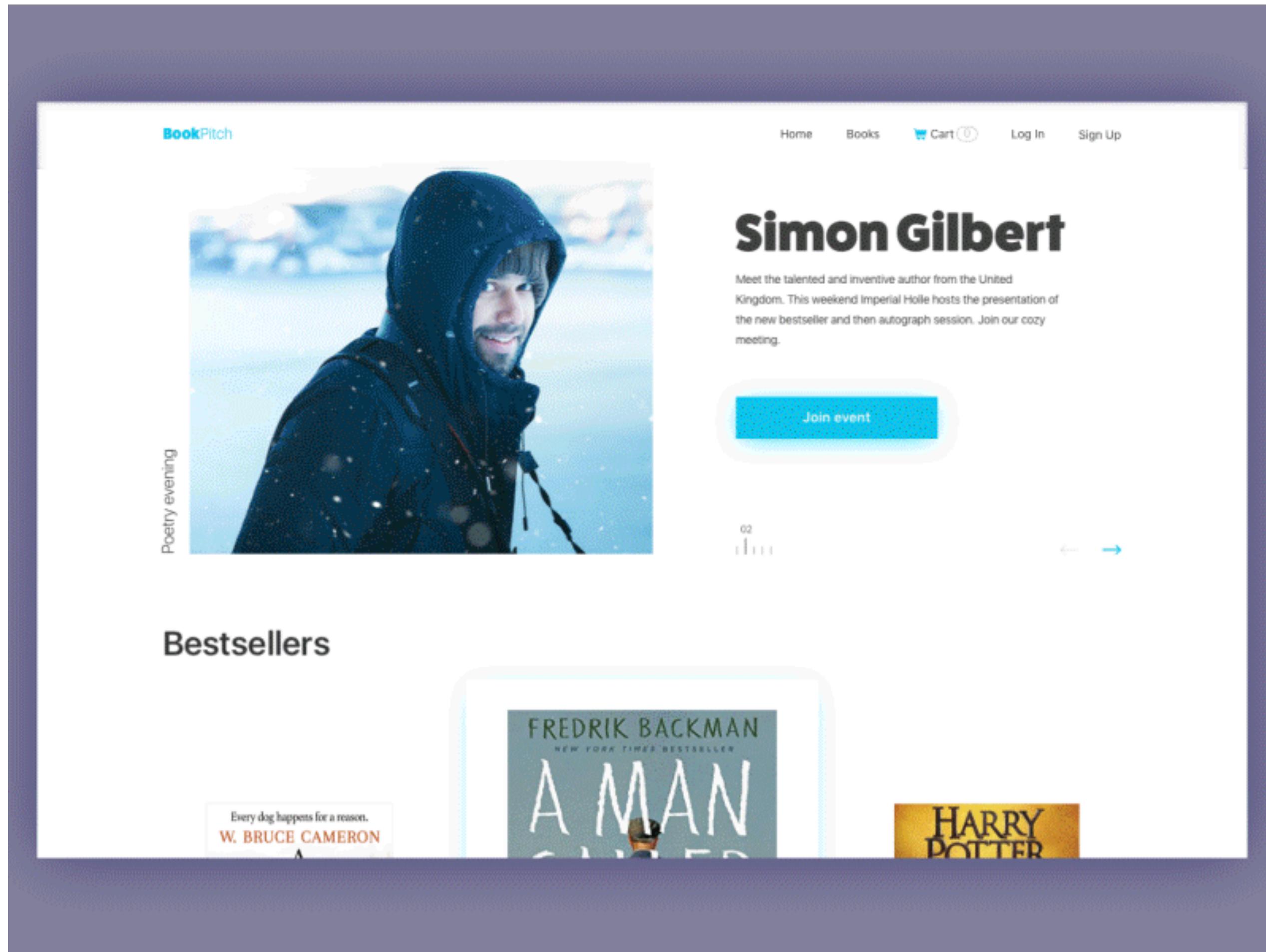
# Design notes for memory

- Apply consistent markers in navigation



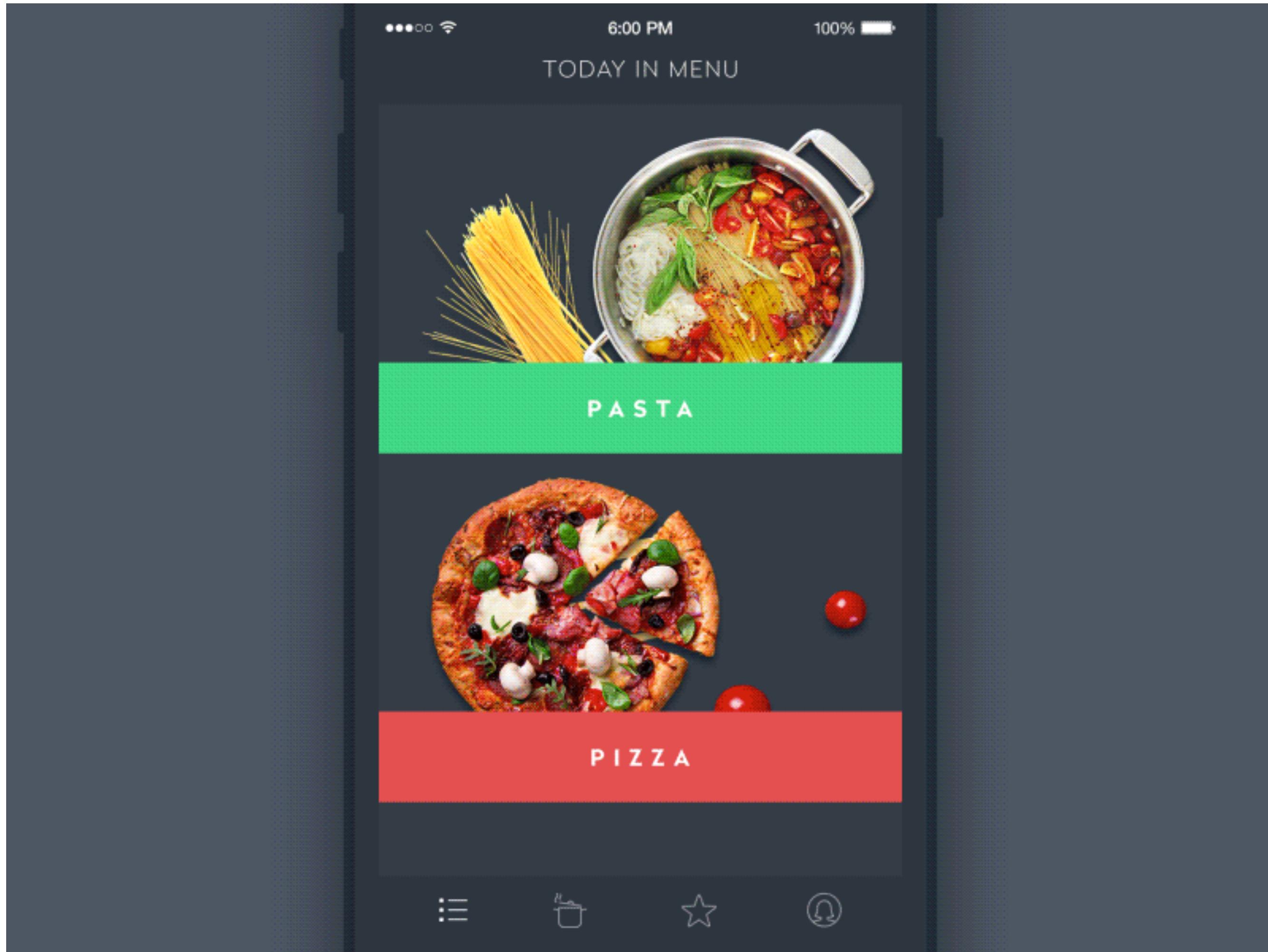
# Design notes for memory

- Don't hide the core elements of navigation



# Design notes for memory

- Stimulate different types of memory



# Design notes for memory

- Remember about emotions

