1 March 5th, 2021

1.1 Information Processing Theory

Information processing theory is about studying how the mind process information.

Example 1.1
What did you eat dinner yesterday? What happened on your first day of college life?

There are three main fundamental information processes:

Encoding: Initial recording of information

Storage: Information saved for future use

Retrieval: Recovery of stored information

The theory proposes a three-system approach:

Sensory Memory: The initial, momentary storage of information, lasting only an instant

> **Remark 1.2 —** If we are not attentive, then the memory is lost.

Short-term Memory: The capacity for holding a small amount of information in mind in an active, readily available state for a short period of time.

Long-term Memory: Memory that is stored

The interaction between the memory systems is shown in Figure 1

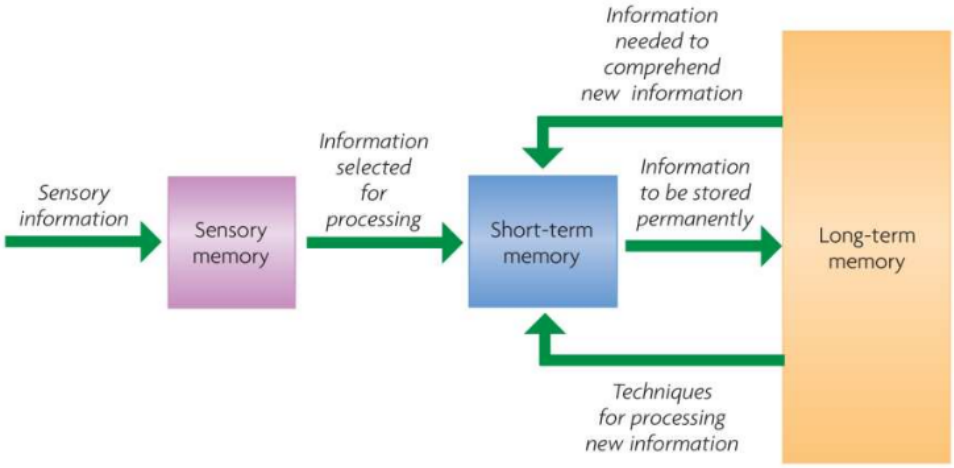

Figure 1: The Three Fundamental Memory Systems

1.1.1 Sensory Memory

- A memory system that accurately but very briefly registers sensory information before the information fades or moves into short-term memory
- THe sensory register acts as a holding bin, retaining information accurately until we select information for **attention**.
- A snapshot of sensory information which lasts for less than **1 second**.

Example 1.3

Today, you probably heard a lot of conversations or faces. However, you probably don't remember them sense you didn't pay attention.

1.1.2 Short-Term Memory

Short term memory is the information you are currently using, this is why it is sometimes called **working memory**.

However, it will disappear unless we undergo **repetitive rehearsal** to prevent the information from vanishing from the short-term memory. This could be by repeating it to yourself, either verbally or mentally.

What if the rehearsal is disrupted? Peterson & Peterson tested this in Figure 2 and found results shown in Figure 3.

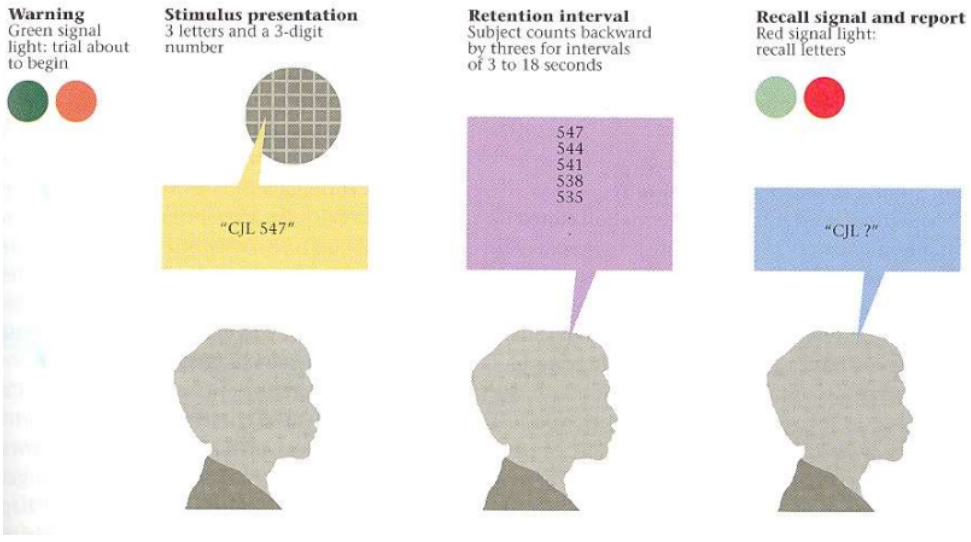

Figure 2: Peterson & Peterson (1959) Disruption of Repetitive Recall

Remark 1.4 — The purpose of counting backwards by three is to prevent repetitive recall.

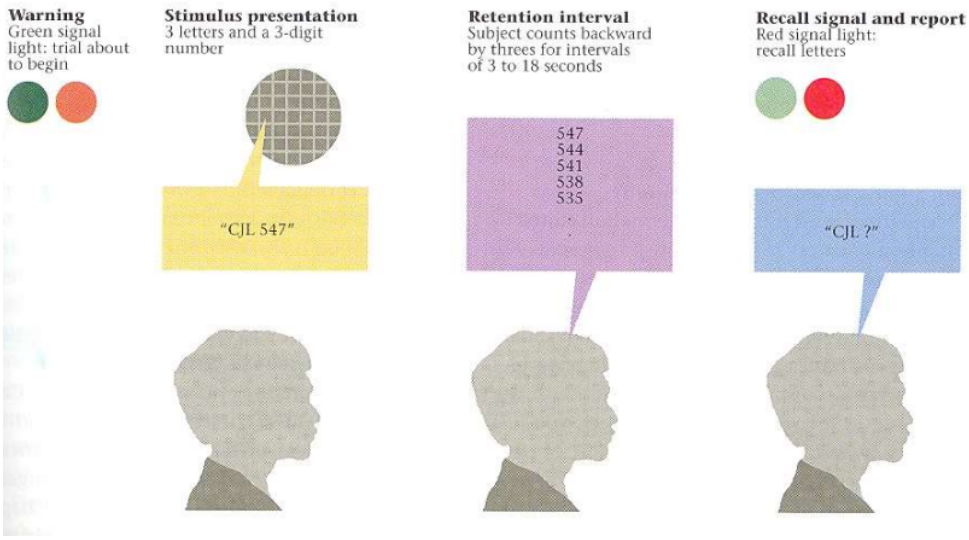

Figure 3: Results of Peterson & Peterson (1959)

Remark 1.5 — After about 15-25 seconds, memory begins to fade.

Our short-term memory also has a capacity, which is seven $\pm$ 2 units. George Miller (1956) tested this by asking people to recall numbers in a random order.

1.1.3 Long-Term Memory

- Long term memory is a seemingly unlimited capacity store that can hold information over lengthy periods of time.
- Information being maintained in STM through **elaborative rehearsal** is gradually absorbed into LTM.

  Definition 1.6. Elaborative rehearsal is when undergo deep semantic processing of a to-be-remembered item, such as jotting down notes or paraphrasing.

1.2 Age-Related Changes in Information Processing

As we age, our memory capacity increases, as shown in Figure 4.

Besides capacity, we also have increased processing efficiency. One example of this is **automaticity**, where we can recall long-term memory without using short-term memory.

Example 1.7
For example, what is 3×7?

With automaticity, short-term memory is freed up for more complex tasks.

Out attention also increases as we age. There are three aspects:

Attention Span: How long you can concentrate (e.g. in a lecture) without being distracted.

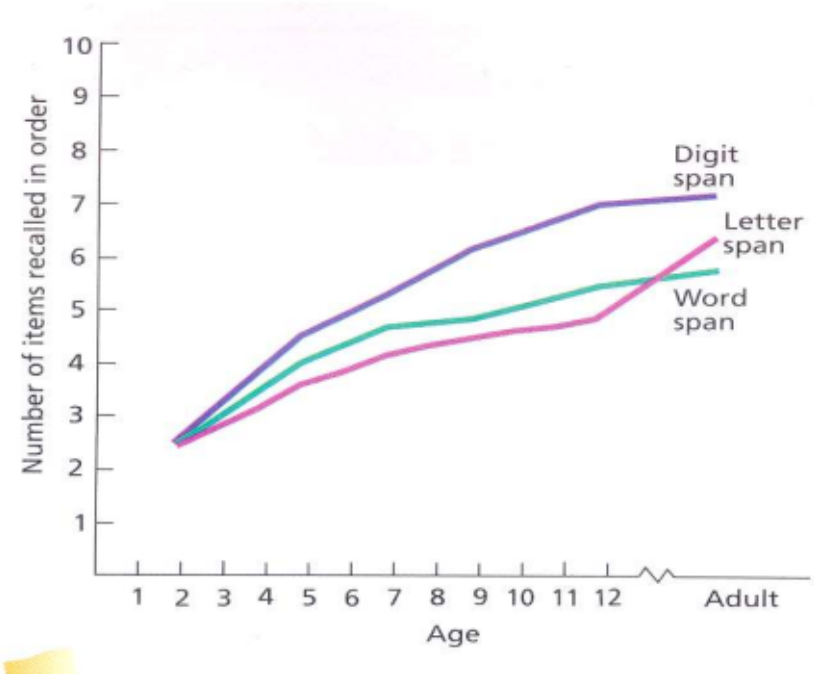

Figure 4: Increase of Memory Capacity as we Age

Example 1.8

A two-year old can stay attentive for about 5 minutes. Most adults can stay attentive on one thing for around 20 min. However, we are better able to refocus on our task.

Selective Attention: Focus on one stimulus and tune out other.

Example 1.9

Listening to a zoom class in a noisy environment.

Divided Attention: Pay attention to two or more sets of stimuli at the same time.

There are a few different memory techniques:

- Clustering: Grouping things together, start at around 2 years old.
- Create a story (elaborative rehersal).
- Repetitive rehearsal: the process of repetitively verbalizing or thinking about information.

Example 1.10

Children under 5 seldom use repetitive rehearsal, but children from 6-10 used it more.