Exploring Human Memory: An HCI Perspective

Welcome to an insightful journey into the intricate world of human memory. Understanding how memory works is fundamental to Human-Computer Interaction (HCI), as it directly influences how we design intuitive and effective user experiences.

Introduction

In the domain of Human-Computer Interaction (HCI), memory plays a crucial role in how users learn, remember, and perform tasks on digital platforms. As stated in our syllabus, "Our memory contains our knowledge of actions or procedures." This ability allows us to repeat common actions, understand commands, and process new information received through our senses.

Memory also gives us a sense of identity, as it stores past experiences. It is considered an important component in the human information-processing model, which is foundational in HCI.

Why to learn Human memory?

Human memory plays a key role in how users interact with digital systems.

It helps users remember actions, procedures, and interface elements.

Memory allows us to repeat tasks, use language, and process new information.

It forms the second part of the human information-processing model in HCI.

Memory provides a sense of identity by preserving information from past experiences.

It is involved in every level of user interaction and cognitive processing.

Understanding human memory helps in designing user-friendly interfaces.

By analyzing these types of memory, designers can build systems that are not only functional but also cognitively intuitive, reducing user errors and frustration. For example, we design interfaces that rely more on **recognition than recall, knowing that recall is harder for users due to short-term memory limitations.

The Three Types of Memory

Human memory is broadly categorized into three distinct types, each playing a crucial role in how we perceive, process, and retain information. These include sensory memory, short-term memory (STM)/working memory, and long-term memory (LTM).

Sensory Memory

Briefly holds information from our senses, acting as a buffer for stimuli.

Short-Term Memory (STM) / Working Memory

Temporarily holds and processes information we are actively thinking about.

Long-Term Memory (LTM)

Stores factual information, experiential knowledge, and procedural rules for extended periods.

Sensory Memory

Sensory memories act as buffers for stimuli received through the senses.

They briefly hold information before it is either forgotten or transferred to short-term memory via attention. These brief, high-capacity stores capture the raw sensory input from our environment.

These sensory memories are constantly overwritten by new incoming information.

There is a specific sensory memory for each sensory channel:

Iconic Memory (visual)

Example: You briefly see a flash of lightning — even after it's gone, you retain a visual trace for a split second.

Echoic Memory (aural)

Example: Someone asks you a question, and you say “What?” — but answer it anyway because your brain replays the last few seconds of what you just heard.

Haptic Memory (touch)

Example: You feel the vibration of your phone, and even after you move your hand, you can still sense that vibration for a short while

Short-Term Memory (STM) / Working Memory

Also called working memory

This system includes everything you are thinking of at the current moment. It is the information we temporarily hold while performing another task.

Function

Used to store information that is only required briefly.

Capacity

Has a limited capacity for storing information.

Duration

Holds data for a very short duration – around 70 ms to 200 ms.

> **Example:** When you mentally repeat a phone number while dialing it — that's short-term memory in action.

Information disappears quickly from STM unless we make a conscious effort to remember it, often through rehearsal.

Long-Term Memory (LTM)

Long-term memory is where we store factual information, experiential knowledge, and procedural rules of behaviour — in short, everything we know.

- First, it has a huge, if not unlimited, capacity.
- Second, it has a relatively slow access time, about a tenth of a second.
- Third, forgetting happens slowly in long-term memory, if at all.

It can store information for an extremely long time — sometimes for a whole lifespan. Its capacity is immeasurably large.

Types of Long-Term Memory

Long-term memory is not a single, monolithic system but comprises various sub-types that handle different kinds of information.

Episodic Memory

Stores personal experiences and life events.

Example: Remembering your last birthday party.

Semantic Memory

Stores general knowledge, facts, and concepts.

Example: Knowing that Paris is the capital of France.

These different types of LTM highlight the complexity and versatility of human memory, enabling us to recall both personal narratives and universal facts.

Human Memory Model in HCI