

The Human: I/O channels – Memory

In human-computer interaction (HCI), understanding the human side, particularly their I/O channels, memory, and cognitive processes like reasoning and problem-solving, is crucial for designing effective interfaces. These aspects dictate how humans perceive and interact with technology, influencing usability and overall experience.

1. I/O Channels:

- **Input:**

Humans receive information from the computer through various channels, including visual (displaying information), auditory (sound), haptic (touch, like vibration or pressure), and movement (gestures or physical actions).

- **Output:**

Humans provide input to the computer through similar channels. For example, typing on a keyboard is a visual and tactile input, while speaking into a microphone is an auditory input.

- **Multimodal Interaction:**

Effective HCI often involves using multiple input and output channels simultaneously to create a more intuitive and natural interaction.

2. Memory:

- **Sensory Memory:**

Briefly stores sensory information (visual, auditory, etc.) before it's processed further.

- **Short-Term Memory (Working Memory):**

Holds a limited amount of information for a short period, actively used during tasks.

- **Long-Term Memory:**

Stores information for extended periods, accessed for recall and knowledge application.

- **Memory and HCI:**

Understanding memory limitations and capabilities is vital for designing interfaces that minimize cognitive load and support efficient information processing.

3. Reasoning and Problem-Solving:

- **Reasoning:**

Humans use various reasoning methods, including inductive, deductive, and abductive reasoning, to make sense of information and solve problems.

- **Problem-Solving:**

Involves identifying a problem, developing solutions, and evaluating the outcomes. Effective problem-solving requires understanding the problem, generating potential solutions, and selecting the best course of action.

- **HCI and Problem-Solving:**

HCI design should support users in their problem-solving process by providing clear information, intuitive tools, and feedback mechanisms.

4. Key Principles and Considerations:

- **Ergonomics:**

Consider the physical and cognitive capabilities of users when designing interfaces.

- **Usability:**

Ensure that interfaces are easy to learn, efficient to use, and satisfying for users.

- **User-Centered Design:**

Focus on understanding user needs and preferences throughout the design process.

- **Accessibility:**

Ensure that interfaces are usable by people with a wide range of abilities.

- **Error Handling:**

Design interfaces that minimize errors and provide helpful feedback when errors occur.

By considering these aspects of the human user, HCI researchers and designers can create more effective and user-friendly interfaces that enhance human-computer interaction.

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What is Input/Output channel?

A person's interaction with the outside world occurs through information being received and sent: input and output. In an interaction with a computer the user receives information that is output by the computer, and responds by providing input to the computer – the user's output becomes the computer's input and vice versa. Input in the human occurs mainly through the senses and output through the motor control of the effectors.

What are the types of memory or memory function?

(i) Sensory buffers ,(ii) Short-term memory or working memory, (iii) Long term memory

What is meant by sensory memory?

The sensory memories act as buffers for stimuli received through the senses. A sensory memory exists for each sensory channel: *iconic memory* for visual stimuli, *echoic memory* for aural stimuli and *haptic memory* for touch. These memories are constantly overwritten by new information coming in on these channels.

What is iconic memory?

We can demonstrate the existence of iconic memory by moving a finger in front of the eye. Can you see it in more than one place at once? This indicates a persistence of the image after the stimulus has been removed. A similar effect is noticed most vividly at firework displays where moving sparklers leave a persistent image. Information remains in iconic memory very briefly, in the order of 0.5 seconds.

Write brief on existence of echoic memory.

The existence of echoic memory is evidenced by our ability to ascertain the direction from which a sound originates. This is due to information being received by both ears. However, since this information is received at different times, we must store the stimulus in the meantime. Echoic memory allows brief 'play-back' of information.

Write short notes on short term memory or working memory.

Short-term memory or working memory acts as a 'scratch-pad' for temporary recall of information. It is used to store information which is only required fleetingly. For example, calculate the multiplication 35×6 in your head. Short-term memory can be accessed rapidly, in the order of 70 ms. However, it also decays rapidly, meaning that information can only be held there temporarily, in the order of 200 ms. Short-term memory also has a limited capacity. There are two basic methods for measuring memory capacity. The first involves determining the length of a sequence which can be remembered in order.

What are the two types of long term memory?

☐ Episodic memory

☐ Semantic memory

