# **Group 5**

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# **COM 415: Human factors in computer (HCI)**

***Question 5:*** *Psychological, social and technical aspects of interaction between human and computer*

**Psychological aspects;**

The ﬁeld of Human-Computer Interactions (HCI) is fundamentally interdisciplinary. The ﬁelds of cognitive, social, and organizational psychology are all important to research in the area, but other social sciences such as sociology and anthropology have played key roles, as have such related ﬁelds as communication, management, operations research, and ergonomics.

The human mind is also an information-processing system.

Human factors psychology examines the capabilities of humans and how these constraints and abilities affect the design. The goal is to design systems with these capabilities and limitations in mind.

The description is approximate when applied to the human, intended to help us remember facts and predict user-computer interaction rather than intended as a statement of what is really in the head. But such a description is useful for making approximate predictions of gross human behavior. We, therefore organize our description of the psychological science based around a model of this sort to distinguish the simplified account of the present model from the fuller psychological theory we would present in other contexts, we call this model the *Model Human Processor*.

The Model Human Processor can be divided into three interacting subsystems:

(1) The perceptual system,

(2)The motor system, and

(3) The cognitive system, each with its own memories and processors.

The perceptual system consists of sensors and associated buffer memories, the most important buffer memories being a Visual Image Store and an Auditory Image Store to hold the output of the sensory system while it is being symbolically coded.

The cognitive system receives symbolically coded information from the sensory image stores in its Working Memory and uses previously stored information in Long-Term Memory to make decisions about how to respond. The motor system carries out the response. As an approximation, the information processing of the human will be described as if there were a separate processor for each subsystem: a Perceptual Processor, a Cognitive Processor, and a Motor Processor. For some tasks (pressing a key in response to light) the human must behave like a serial processor. For other tasks (typing, reading, simultaneous translation) integrated, parallel operation of the three subsystems is possible, in the manner of three pipelined processors: information flows continuously from input to output with a characteristically short time lag showing that all three processors are working simultaneously.

**The Perceptual System**

The perceptual system carries sensations of the physical world detected by the body's sensory systems into internal representations of the mind by means of integrated sensory systems. An excellent example of the integration of a sensory system is provided by the visual system: The retina is sensitive to light and records its intensity, wavelength, and spatial distribution.

**The Motor System**

Let us now consider the motor system. A thought is finally translated into action by activating patterns of voluntary muscles. These are arranged in pairs of opposing "agonists" and "antagonists," fired one shortly after the other. For computer users, the two most important sets of effectors are the arm-hand-finger system and the head-eye system.

**The Cognitive System**

In the simplest tasks, the cognitive system merely serves to connect inputs from the perceptual system to the right outputs of the motor system. But most tasks performed by a person are complex and involve learning and retrieval of facts or the solution of problems. As would be expected, the memories and the processor for the cognitive system are more complicated than those for the other systems.   
Cognitive issues that must be considered include:-

**Memory** (span, retrieval, storage capacity).

**Visual and auditory** capabilities/interpretations.

**Attention** capacity (selected, focused, divided).

The judgment of tone, size, loudness, brightness.

Interpretation of coding e.g. traffic lights

**The ‘User Model’**

It is what the user thinks happens (within the system).

Much of the user’s model is a logical model of the system. A logical model may be detailed, so the user must know quite a few details to operate the system.

**The ‘System Model’**

It is what really happens (within a complex computer system).

This is the designer’s model (of the system).

Problems for example with User Interfaces can be considered as resulting from ‘mismatches’ between the user’s model of the system and the designer’s model.

The design of HCI is a problem that primarily involves the designer’s meaning and what the user understands.

***Social aspects;***

The interaction of human beings occurs at a point of contact, whether it be visual, auditory, or physical. Human-computer interaction not only involves the physical point of contact; it also includes temporal, spatial, cultural, and experiential contexts. Social aspects of interaction between human and computer may be described in terms of:

1. **Humans are social beings**

Several studies reveal that our brain, senses, and perception were adapted to work well with our social context. Social interactions dominate our area of perception, and we can attribute social meaning to basically anything that others do around us, be it as simple as a direction of their gaze.

1. **We are hyper social – even with our computer**

Humans are prone to socialize with their peers, but also will readily perceive inanimate objects as social agents. Computers are especially good subject for this personalization, as they have human traits that is, they give words for output, they are interactive and they are playing the same roles traditionally humans play, therefore making it obvious to answer socially to their actions.

1. **Computers are social actors**

This theory states that those phenomena observed in the social sciences, such as the norm of politeness, the norm of reciprocity, or the norm of reciprocal self-disclosure can be observed during the examination of human-computer interactions. We tend to express similarity preference that is, introverted people prefer being in contact with a computer that shows introverted traits. Others view computers as their teammates.

1. **Chatbots**

They are artificial intelligence programs that simulate human conversations. In the last few decades, the need for social machines increased immensely. Thus, if we could ask our computer a favor, and it could give us a feedback about what he understood and what information is still needed for completing the task, our interaction would be much more efficient and enjoyable. This insight makes it understandable that chatbots got into the center of the attention. The first chatbot was *ELIZA,* who imitated a non-directive therapist, soon to be followed by *PARRY*.

1. **Future directions**

The status of chabots’ development hasn’t reached its goal yet: the software capable of imitating human behavior faithfully is yet to come. Artificial intelligence is expected to improve on the ultimate social machines (chatbots).

***Technical aspects;***

All interaction between humans and the computer must go through our senses. We have in this respect a set of “input-channels” (in to our senses from the technical environment) and “output-channels” (out from our senses to the technical environment)

An interaction technique starts when the user does something that causes and electronic device to respond, and includes the direct feedback from the device to the user.

Examples include:

* Physical buttons and switches, for instance one can go back to the previously visited page on a web browser by either
* On-screen menus, used to make adjustment to display
* Scrolls bars operated by a mouse, touch screen widgets and gestures such flick-to-scroll, used to navigate documents.
* Text entry on computers or touch screens,
* Consumer electronics controls.