

# The Intersection of Computers in Human Communication Behavioral Science

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**Abstract:** The Intersection of computer in human communication behavioral science deals with the methods by which computers and their users communicate. It is the process of designing interface software so that computers are pleasant, easy to use and do what people want them to do. Dealing with Human Computer Interface(HCI) requires the study of not only the hardware of the computer, but that of the human side also. Therefore, attention must be paid to human psychology and physiology. This is because to build a better two-way communication, one must know the capabilities and limitation of both sides. This seminar also deals with concepts and guidelines that should be followed in order to produce a good HCI. Specifically dealt with topics include Dialogue Design, Presentation Design, General Input and Output.

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## 1. INTRODUCTION

HCI (human-computer interaction) is the study of how people interact with computers and to what extent computers are or are not developed for successful interaction with human beings. As its name implies, HCI consists of three parts: the user, the computer itself, and the ways they work together. [2]

By "user", we may mean an individual user, a group of users working together. An appreciation of the way people's sensory systems (sight, hearing, touch) relay information is vital. Also, different users form different conceptions or mental models about their interactions and have different ways of learning and keeping knowledge and. In addition, cultural and national differences play a part. [3]

When we talk about the computer, we're referring to any technology ranging from desktop computers, to large scale computer systems. For example, if we were discussing the design of a Website, then the Website itself would be referred to as "the computer". Devices such as mobile phones or VCRs can also be considered to be "computers". [5]

There are obvious differences between humans and machines. In spite of these, HCI attempts to ensure that they both get on with each other and interact successfully. In order to achieve a usable system, you need to apply what you know about humans and computers, and consult with likely users throughout the design process. In real systems, the schedule and the budget are important, and it is vital to find a balance between what would be ideal for the users and what is feasible in reality. [1]

## 2. MODULE SPECIFICATION

### A. Excellence In HCI

*Quality of life.* Important applications of computers in medicine are possible only if they are both useful and easy to use by doctors, nurses, and aides; similarly, use of computers in education requires that they be both useful and easy to use by students and teachers. Computers can assist disabled individuals; at the same time, special techniques are needed to allow computers to be used by some who are disabled. [7]

*National competitiveness.* Information technology is one of the drivers for increased productivity. As more and more workers use computers in their jobs, training time and ease-of-use issues become economically more and more important.

*Growth of the computer and communications industries.* Powerful, interesting, and usable applications are the fuel for continuing growth of these industries [25]. The current growth cycle is the direct consequence of the graphical user interface developed by Xerox and commercialized by Apple and Microsoft, and of the lower computer costs made possible by the microprocessor. The resulting mass market supports commodity pricing for both hardware and software. Future growth cycles will in part be driven by current HCI research, which will lead to new applications that are increasingly easy to use. [1]

*National security.* Computer-based command, control, communications, and intelligence systems are at the heart of our military infrastructure. Interfaces between operators and computers are found in cockpits, on the bridge, and in the field. To be effective, these systems must have high-quality human-computer interfaces. [4]

### **B. Interface and Specification**

Before one can design an appropriate HCI one has to know the reason for the interface. In other words, an HCI will be part of a larger project developing a complete product for which the HCI is only a component. An HCI can only be designed if the purpose for the product itself is well known and understood. This is the task of Requirements Engineering in which the requirements for the system are elicited from the stakeholders, confirmed and documented in a manner such that a system can be developed from them. There are several diverse techniques available for the Requirements Engineer to use in gathering requirements [24]. One of the components of the results of these techniques will be an interface design. In order to create an interface design, one must begin the task of "Functional Decomposition". Functional Decomposition is the task of examining a system or set of requirements and breaking it down into its individual components [23]. Determine what base functionality you want the system to do. Document these singly and also in such a manner as to show the relationships between the different tasks. Also list each function using a spreadsheet or matrix. From this list of required functionalities, determine the ones that require an HCI. Before deciding the specifications of the HCI, the designer must look at the target market for the product. [6]

#### Levels of Users

##### A. Naive

These are the users who have never encountered or used a computer in their lives. With the fact that computers now permeate our lives to such an extent, this group is becoming quite small, but will always exist.

##### B. Novice

These are users who are slightly familiar with computers but would be quite unfamiliar with your system and how it would work. They are not computer phobic but just lack the exposure and experience.

##### C. Skilled

Skilled users have considerable computer experience and would be quite comfortable operating most computer systems. They would know where to go for help with a system functional problem but still would not have the expertise to understand the internal working of a computer or application. [22]

##### D. Expert

The expert user is extremely comfortable with many aspects of computers and systems. They understand how they function and would attempt first to correct many problems themselves before obtaining professional help. [21]

### **Caldron Theory**

The contingent trajectory of HCI as a project in transforming human activity and experience through design has nonetheless remained closely integrated with the application and development of theory in the social and cognitive sciences. Even though, and to some extent because the technologies and human activities at issue in HCI are continually co-evolving, the domain has served as a laboratory and incubator for theory [20]. The origin of HCI as an early case study in cognitive engineering had an imprinting effect on the character of the endeavour. From the very start, the models, theories and frameworks developed and used in HCI were pursued as contributions to science: HCI has enriched every theory it has appropriated. For example, the GOMS (Goals, Operations, Methods, Selection rules) model, the earliest native theory in HCI, was a more comprehensive cognitive model than had been attempted elsewhere in cognitive science and engineering; the model human processor included simple aspects of perception, attention, short-term memory

operations, planning, and motor behaviour in a single model. But GOMS was also a practical tool, articulating the dual criteria of scientific contribution *plus* engineering and design efficacy that has become the culture of theory and application in HCI. [10]

### C. Data Entry Interfaces

Dialogues require that two parties, namely the Human and the Computer communicate. At this stage the future dialogue has been determined and the method by which this dialogue will be implemented has been designed. Once it is determined what inputs are desired when, it remains to implement those input requirements. This section deals strictly with the input function. It mainly deals with the options the designer has and what best practices have been developed that he can utilize? Primary methods of input are still the keyboard, mouse and increasingly, the microphone [19]. The other devices listed tend to be secondary input devices in that the computer usually accesses them as the result of an instruction originally through one of the primary devices. Bar code readers can be the primary input devices, which initiate transactions on devices such as Automated Bank Tellers etc. The keyboard is used to enter data into specific areas on a screen as the result of a response required from the computer [18]. A key aspect of HCI is that the user knows what is required of him in regards to that response. This is done during screen design. As stated above, we know what the screen flow will be and what data we want on or from a specific screen. Improvements can be done to the screen to remove ambiguity and assist the user in understanding what is required from him. [8]

When the data entry form requirements are well-known in advance, and when such data entry forms are identical across all users for the system, creating such entry forms is hardly challenging. The task becomes more arduous, however, if the data entry forms need to be dynamic [17]. For example, consider a company's Internet Web application whose purpose is to collect information about the product purchased by a customer; a sort of online product registration system. With such an application, the questions the user is presented with might differ based on what product they purchased, or if they purchased the product from a store or from the company's Web site. [9]

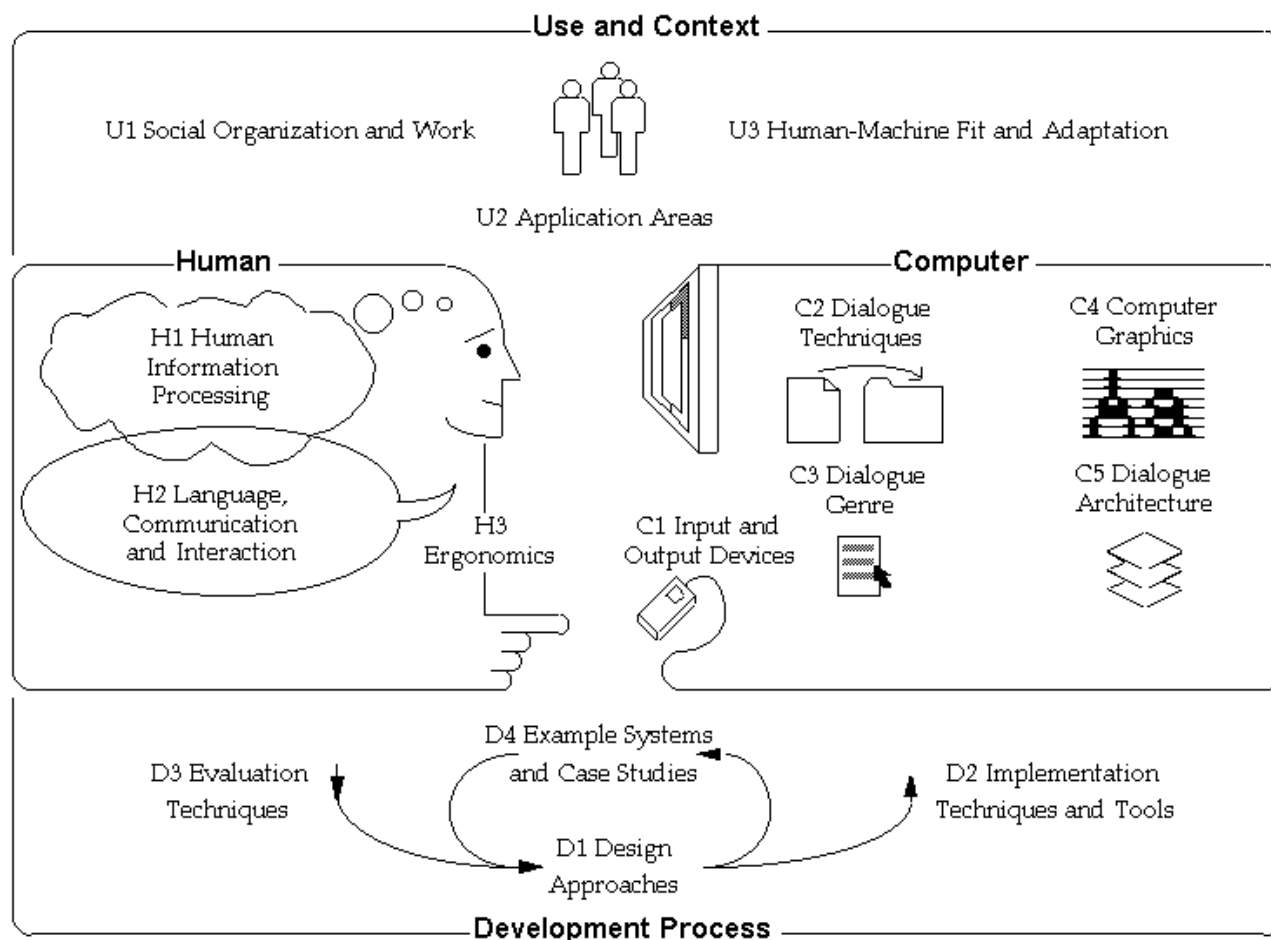


Figure 1.0

#### D. Data Retrieval Interfaces

Information can be retrieved from a computer in many ways. It is possible to read the output either on a screen or from a paper copy. It is also possible to have a voice synthesizer which will output the data through a speaker if the reader is vision impaired. Other methods for retrieving information are: printers, plotters, signals to devices to start a device, stop a device etc., writing to storage devices [14]. HCI deals mainly with screens, printed material, and audio. Similar principles apply to both screen and printed output as they are both visual. In other words, visual and audio are the two main HCI interfaces. The section on human physiology and psychology examined the capabilities and limitations of the human visual and audio senses. A successful HCI must adapt to these. [15]

When the designer has a chance to use graphics, they should take that opportunity. It is especially true with HCI that a picture is worth a thousand words. Data that is spatial in nature should be shown on a map. Graphs or pie charts should be used to represent statistical data. Ensure that any graphs are well labelled [27]. All axes should be labeled with legends for all displays. It should also be ensured the scale is known. All key points should be labeled so that anyone using the graph can clearly see what is being represented [13]. The software engineering process is followed for the design of an HCI. As with any stage in systems design, the user must be involved early in the design process. Mockups and prototypes have clearly been proven as effective tools to improve HCI design and the sooner the end user gets a chance to comment on the product, the better the product will be. [16]

### 3. CONCLUSION

The techniques that can be used from a computer perspective are changing quite rapidly. The fact that this field has undergone and will go through a lot of changes is reflected in the way computer technology has developed [26]. Only some years back an HCI involved punch cards, paper tape and massive printouts. [12] Today terminals, keyboards, mice, speakers, touchpads etc. take up the main role. Twenty years from now it is possible to have highly advanced forms of 3D virtual reality displays and voice interpreters, all which are on the market now in a primitive way. Recent technology that enables transmission of the sense of touch is only an indication of the things to come. HCI will be an ongoing area of research for many years to come. [11]

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