Considering the Next Generation(s) of Human Computer Interface
A conceptual framework or theory

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As an Electrical Engineering graduate of the sixties we solved differential equations with Analog Computers. Our Human Computer Interface was the pegboard-wiring matrix to the system's Operational Amplifiers.

There were IBM cards then, special enclosed and carefully air conditioned spaces for the computer, and ambitious young lady operators who enjoyed their sudden employment opportunity in a new industry that welcomed them. The Human Computer Interface was the Service Desk.

As a Medical Device Reliability Engineer of the nineties we designed a Human Computer Interface not perceived by the patient unless the device was programmed to notify of certain circumstances needing attention.

At the other end of the spectrum is the Human Computer Interface evolving to greater levels of stimulation and interaction. Those Medical Device patients have children or grandchildren who play (or work?) with computers for stimulation and interaction (learning?). Children today have constant computer interface, games, homework, and the toaster in the morning. A Gameboy or an IPod is used for the ride to school. Surfing the Internet at night. So extremely computer stimulated today are our children that few would be able to identify each and every Human Computer Interface involved in their daily activities. For these future adults the best business application Human Computer Interface could be the dual-hand video game controllers in such widespread use today. These future adults will grow up accustomed to ubiquitous, pervasive, handheld, interactive, tangible, lightweight, and tacit Human Computer Interface in a multitude of personal computer devices. But the next generation of Human Computer Interface is not going in a single direction. One direction for Human Computer Interface design involves pleasure, the gaming or entertainment possibilities with computers. The intensity or vividness of the "virtual reality" emersion aspect of the Human

Computer Interface is paramount. Virtual and augmented reality developments will be the primary focus in gaming and entertainment.

Another direction involves an informational interface to assist human decision-making. Here an optimal organization and display of information would be paramount. Perceptual interfaces, affective computing, context-aware interfaces, ambient interfaces, embodied interfaces, sensing interfaces, and speech and multi-modal interfaces have significant applications in this area of informational interface to assist human decision making.

Another differentiation of Human Computer Interfaces are those interfaces requiring our human conscious interaction (mental interaction or the informational interface to assist human decision making previously discussed) and the other type of Human Computer Interface not requiring attention, such as all the computer interfaces involved in making a simple gas pump transaction. This category embraces Human Computer Interfaces involving passive or non-command interactions.

The "Unconscious Human Computer Interfaces", (the intelligent refrigerator that orders groceries) will evolve in a Charles Darwin fashion. The design innovations that are most useful and least troublesome to the human user will survive.

The "Conscious Human Computer Interfaces" will develop in a revolutionary fashion with breakthroughs in the technology of making connections with human sensory experience at the neural level. The ultimate "virtual reality" experience is one that rides into our brain on the same nerves that bring it sense experiences. The ultimate Human Computer Interface to our human nervous system.

Connection to visual and auditory nerves will be the next generation of Conscious Human Computer Interface. Several interests drive development of his technology. The Medical Device community has Cocular Implants and some success with surgical connection to the visual nerve. The Computer Simulation community wants connection to visual and auditory nerves so the bulky sound and vision gear (and now "pressure garments" used to simulate touch) can be discarded and the "reality" of the stimulation experience enhanced. The Gaming community wants the most totally absorbing "virtual reality" experience attainable.

That is enough financial pressure to develop this nerve system human

computer interface into working systems. Direct interface with the human brain is a next generation Human Computer Interface.

The other non-mental interaction, service mode of Human Computer Interface is found in our current medical devices, our car computers, our homes, all are increasingly controlled by computers we interface by "programming buttons" or, if next-generation, by voice command. Automobile GPS does that now. There will be a slow and incremental improvement of this "button" interface for many years. The typewriter keyboard (written language) will remain intact even if altered for cell phones and hand-held computers) until language recognition technology sufficiently improves to push aside the cumbersome keyboard entry.

A Next Generation Human Computer Interface will recognize the owner's voice and later computers will recognize their owner's thoughts (as the technology for connection to human nerves develops), and, later still, computers will supplement human thinking. When this occurs the Human Computer Interface becomes one of partnership or companionship.

We recognize each other as intelligent companions because we share a "mind-space" of commonly understood concepts, meanings, and values. This allows us to communicate our thoughts by language. Animals would be considered intelligent if they communicated with us in this manner. We would judge an extraterrestrial being as "intelligent" if able to communicate in "mind-space word concepts" or mathematical concepts. Animals on our planet would be thought of as "intelligent" if they shared thoughts or feelings with us though language communication that can take place only if there is this "shared mind-space".

Communication within the "mind-space" is the ultimate Human Computer Interface. You could think of it as talking with a computer in the same manner one talks to one's self mentally. But, in the same way we might be confused where an idea or concept was originated in our thoughts there might be a difficulty separating the computer's participation in our thought developments and our own natural mental ability.

We as "creators" of computers have produced a potential intelligence that could accumulate enough agility within our human "mind-space" to be undifferentiable from "actual" humans. This is possible now with specific applications such as Chess. Can a Chess player detect if he is playing a human or computer?

The thing that makes us human is the process of taking sensory stimulation and turning those physical experiences into mind space artifacts that other human beings can recognize, value, and understand.

The final Human Computer Interface must be the computer's participation and contribution to our human "mind-space".