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Commentary

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Human-Computer Interaction by Using Neural Correlates to Better Understand Situational Task Demands

Stiharu IG*

Human Factors and Ergonomics Lab, Department of Industrial and Systems Engineering, Korea Advanced Institute of Science and Technology (KAIST), South Korea

***Corresponding author:** Stiharu IG*, Department of Mechanical and Industrial Engineering, Concordia University, Canada, Tel: (514) 848-3152; E-mail: ion.stiharu@concordia.ca

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Cognitive ergonomics is a scientific discipline that studies, evaluates, and designs tasks, jobs, products, environments and systems and how they interact with humans and their cognitive abilities. It is defined by the International Ergonomics Association as concerned with mental processes, such as perception, memory, reasoning, and motor response, as they affect interactions among humans and other elements of a system. CE is responsible for how work it's done in the mind, meaning, the quality of work is dependent on the persons understanding of situations. Situations could include the goals, means, and constraints of work. The relevant topics include mental workload, decision-making, skilled performance, human-computer interaction, human reliability, work stress and training as these may relate to human-system design. Cognitive ergonomics studies cognition in work and operational settings, in order to optimize human well-being and system performance. It is a subset of the larger field of human factors and ergonomics. There are several different models which describe the criteria for designing user-friendly technology. A number of models focus on a systematic process for design, using task analysis to evaluate the cognitive processes involved with a given task and develop adequate interface capabilities. Task analysis in past research has focused on the evaluation of cognitive task demands, concerning motor control and cognition during visual tasks such as operating machinery, or the evaluation of attention and focus via the analysis of eye saccades of pilots when flying. Neuro ergonomics, a subfield of cognitive ergonomics, aims to enhance human-computer interaction by using neural correlates to better understand situational task demands. Neuro ergonomic research at the University of Iowa has been involved with assessing safe-driving protocol, enhancing elderly mobility, and analyzing cognitive abilities involved with the navigation of abstract virtual environments. Now, cognitive ergonomics adapts to technological advances because as technology advances new cognitive demands arise. This is called changes in socio-technical context. For example, when computers became popular in the 80's, there were new cognitive demands for operating them. Meaning, as new technology arises, humans will now have to adapt to the change leaving a deficiency somewhere else.

A proposed way of expanding a user's effectiveness with cognitive ergonomics is to expand the interdisciplinary connects related to normal dynamics. The method behind this is to transfer the pre-existing knowledge of the various mechanics in computers into structural patterns of the cognitive space that could be used. This will work with human factors in 1) Developing an intellectual learning support system 2) Apply an interdisciplinary methodology of training. This will help the effective interaction between the person and the computer with the strengthening of critical thinking and intuition. Accessibility is important in cognitive ergonomics because it is one pathway to build better user experience. The term accessibility refers to how people with disabilities access or benefits from a site, system, or application. Section 508 is the founding principle for accessibility. In the U.S Section 508 of the Rehabilitation Act is one of several disability laws and requires federal agencies to develop, maintain, and use their information and communications technology (ICT) accessible to people with disabilities, regardless fit they work for the federal government or not. Section 508 also implies that any people with disabilities applying for a federal government job or any person using the website to get general information about a program or completing an online form has access to the same information and resources that are obtainable by anyone. Accessibility can be implemented by making sites that can present information through multiple sensory channels with sound and sight. The strategic multi-sensory approach and a multi-interactivity approach allows disabled users to access the same information as nondisabled users. In modern digitalized work environments, the performance of work tasks relies heavily on cognitive functioning, that is, the mental processes that are involved in information processing such as attention, working memory, decision-making, and learning. These demands are notable in knowledge work jobs that require working with abstract knowledge and acquiring, creating and applying knowledge, as well as continuous on-the-job learning. Cognitive load is caused by the cognitive demands of work tasks, which easily exceed the natural limitations of human cognitive capacities, but strain may also be further increased by working conditions. Many working conditions impair cognitive performance, as research into disruptions and interruptions has demonstrated. These conditions, as well as requirements related to the fragmentation of work, multitasking and information overload have proven to be typical straining features in many fields.

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