

Cognitive Ergonomics: A Relationship between Mind and Work

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ABSTRACT

The amount of time, effort, and focus a human mind puts into a task determines its outcome, and indeed the task's nature has an impact on the human mind. There is no denying that engaging in cognitively challenging work gives one a chance to learn, is exciting, boosts self-efficacy, improves engagement at work, and provides one a sense of competence. But what leads to a negative impact is a change in the frequency and intensity of the work. Long-term involvement in challenging tasks can have several negative effects including cognitive fatigue, confabulation, attention problems, and frustration from a subpar performance which causes cognitive strain and psychological distress. Cognitive ergonomics, an emerging area of ergonomics, explains how the mind and work are influenced by one another. It utilizes an applied perspective of psychology in order to achieve the optimization between individuals and their work. This paper examines various ergonomic components that contribute to the overall psychological health of employees in a workplace.

Keywords: *Ergonomics, Cognitive Ergonomics, Human Mind, Work*

Over the past few decades, the nature of work has changed, and this transition is expected to speed up. These changing work practices require new skills from employees, and new technologies affect how people work. The amount of time, effort, and focus a human mind puts into a task determines its outcome, and indeed the task's nature has an impact on the human mind. Therefore, there is a very close relationship between the human mind and the nature of the work and in order to optimize this relationship it is important to focus on both the individual's performance as well as the individual's well-being.

Engaging in cognitively challenging work:

It is well established that engaging in complex activities in one's environment can produce changes in the brain that also promote cognition (Park et. al., 2014). Employees must continue to adapt to changing environmental demands as part of their jobs, whether it is picking up new computer skills, getting used to new workplace rules, responding to new consumer trends, or becoming familiar with a new product line. Change is necessary to adapt in almost all the occupations (Vance et. al., 2010). Even in advanced age and under difficult circumstances, new enhancing technologies can help people learn and perform cognitive activities more effectively.

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However, the main ergonomic technique is to modify the surroundings in order to cater to human needs better. Even while new technologies make it possible to improve people's abilities and skills, these technologies shouldn't be used as a substitute for changing unfavourable working circumstances; instead, employees' health and well-being must be seen as a crucial aspect of their jobs. There is no doubt that working on cognitively demanding tasks is interesting, offers the potential to learn, enhances self-efficacy, increases engagement at work, and gives one a sense of competence.

But what leads to a negative impact is a change in the frequency and intensity of the work. Long-term involvement in challenging tasks can have several negative effects including cognitive fatigue, confabulation, attention problems, and frustration from a subpar performance which causes cognitive strain and psychological distress. A study (Subramanyam, et. al., 2013) conducted on mental work overload highlighted that cognitive fatigue results due to it. Also, cognitive fatigue affects the working memory which is critical for maintaining attention, processing information and resolving conflict.

Work-related cognitive demands are high today and will continue to be so in the future. There are some situations that make it quite difficult for a human to function at their best. Any profession can have considerable cognitive demands, such as those from working in unpredictable situations, juggling numerous activities at once, or having to deal with interruptions or noise at work. Because these diseases affect cognitive function, they may become important job-related factors that can cause mistakes to be made and result in health issues and/or accidents at work. Therefore, it is crucial to take into account human aspects and make use of cognitive ergonomics in safety-critical areas in order to assure performance and safety.

Although the cognitive strain associated with work settings and methods of working is widely acknowledged and actively debated as a significant risk factor, few research studies (e.g. Nelson et. al., 2017; Weseler & Niessen, 2016; Konig, Kleinmann & Hohmann, 2013; Kaser, Fischbacher & Konig, 2013; Kushlev & Dunn, 2015) have explicitly and systematically sought to improve the environment in which people may do cognitively demanding jobs.

Utility of Cognitive Ergonomics to achieve optimization between individuals and their work:

The term ergonomics, which translates to "the science of work," comes from the Greek words *ergon* (work) and *nomos* (laws). The phrases "ergonomics" and "human factors" are frequently used interchangeably or together (for example, "human factors / ergonomics" or "EHF"). The International Ergonomics Association (IEA, 2000) has accepted this usage pattern.

The field of ergonomics uses theory, principles, data, and methodologies to design in order to maximise human well-being and total system performance. Ergonomics is the scientific field concerned with understanding interactions between humans and other components of a system (IEA, 2000).

A scientific field called cognitive ergonomics investigates, assesses, and designs systems, tasks, environments, and products in relation to how people and their various cognitive capacities interact with them. According to the International Ergonomics Association (2000), cognitive ergonomics is the study of mental processes, such as perception, memory,

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logical thought, motor response, and relationships among co-workers, which are involved in the workplace. The relevant tasks include mental workload, decision-making, skill-based performance, the interaction between people and systems, reliance on people, workplace stress, and training. In order to improve both system performance and human well-being, cognitive ergonomics investigates cognition in the workplace and operational settings. It is a subset of the larger topic of ergonomics and human capital. Workers and their surroundings should be viewed as a highly interactive joint cognitive system in every working system (Hollnagel & Woods, 2007). The focus of cognitive ergonomics is on cognitive processes in environment and technology design (Wickens & Hollands, 2000).

The goal of cognitive ergonomics is to create working circumstances and surroundings that promote human performance and cognitive functioning, which will increase productivity, safety, and health at work.

An expanding field of ergonomics called cognitive ergonomics explores the relationship between the mind and work. It makes use of an applied perspective of psychology in order to optimise the relationship between people and their jobs. The Ergonomics and Human Factors Society defines ergonomics (or human factors) practices as those that "seek to assure adequate interaction between work, product, and environment, and human requirements, capabilities, and limitations" (IEA, 2019). The goal of cognitive ergonomics is to make human-system interactions at work consistent with human cognitive capacities and limits. It focuses on human cognitive functioning and the environments that affect it (HFES, 2019; Kalakoski, 2019).

Human performance on cognitively demanding tasks is directly impacted by cognitive strain brought on by work demands or the workplace environment. Office-related tasks are interrupted by noise and speech in the workplace, and interruptions have a negative impact on task performance (Couffe & Michael, 2017; Jahncke et. al., 2011).

Studies on job crafting and human factors from the past have produced examples of solutions that have concentrated on reducing distractions, interruptions, and information overload. For instance, quiet hours without any incoming calls, visitors, or emails are intended to minimize interruptions and enable the employee to concentrate on the task at hand; results show improvement in performance during the quiet hour as well as in overall day-level performance (König, Kleinmann, & Höhmann, 2013).

Additionally, better methods for handling new emails might lessen information overload and stress. For instance, checking emails three times each day as opposed to endlessly can minimise daily stress, which is a predictor of reported productivity improvement (Kushlev & Dunn, 2015).

Furthermore, the effectiveness of information sharing and assistance between employees is increased when multiple questions are gathered and asked simultaneously as opposed to interrupting frequently (Kaser et. al., 2014). An intervention study (Sorenson & Holman, 2014) that incorporated some workplace cognitive ergonomic behaviours was aimed at improving well-being in knowledge work. Initiatives have been taken, for instance, to deal with non-essential interruptions, lessen interruptions, set aside time for thinking, establish open office policies, and display do-not-disturb signs (Sorenson & Holman, 2014).

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High levels of job resources can strengthen a person's capacity to manage demands at work while also enhancing their well-being and reducing stress (Humphrey, Nahrgang, & Morgeson, 2007; Karasek & Theorell, 1990). People usually like to work in a flexible workplace, and they feel energized by seeing and learning about new problems. However, cognitive strain and psychological distress are brought on by multitasking, interruptions while working, diversions, and inadequate standing instructions. Numerous studies have emphasized the importance of ergonomic improvements for an employee's well-being (Kalakoski et al., 2020; Sørensen, O. H., & Holman, 2014; Kushlev & Dunn, 2015). Inappropriate workstation design may have physiological or psychological repercussions, including reduced job satisfaction, increased stress from crowding, weariness, and elevated levels of blood pressure (De Croon, et al., 2005).

Cognitive ergonomics can be offered to employees, through various research-based techniques as mentioned above by various researchers. Reducing cognitive strain by limiting disruptions, interruptions, and distractions; reducing information overload, proper description of tasks and certain other specific techniques would be effective for better task handling and performing without cognitive strain, confabulation, and fatigue. All of these are associated with enhanced performance as well as the overall psychological well-being of an individual.

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Conflict of Interest

The author(s) declared no conflict of interest.

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