The human factors paradigm (and its extension in cognitive ergonomics) has been helpful in determining the characteristics of programming languages and specifications which impact performance. However, these paradigms were not designed to study how knowledge structures grow and are organized. The cognitive ergonomics paradigm uses cognitive explanations, but takes a static view of mental organization. Basically, HCI is concerned with the interaction of users with computers in terms of the syntax of communication languages irrespective of the context of work in which the systems are used, that is of the semantic aspects of work. Clearly this approach is important for the development and optimization of 'application programs' such as word-processors, graphic packages and spread-sheets. Cognitive ergonomics deals with mental processes such as perception, memory, thinking and mobility and the way they are affected by the interaction with the remains of the observed system. The most important aspects include mental effort, decision making, interaction with computers, human reliability and work stress.

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Shubha Sharma Book Sellers
7/38, Basement, Ansari Road
Daryaganj, New Delhi-110002
Email : sdlp50@yahoo.com

₹ 2970.00
ISBN 93-83958-37-5

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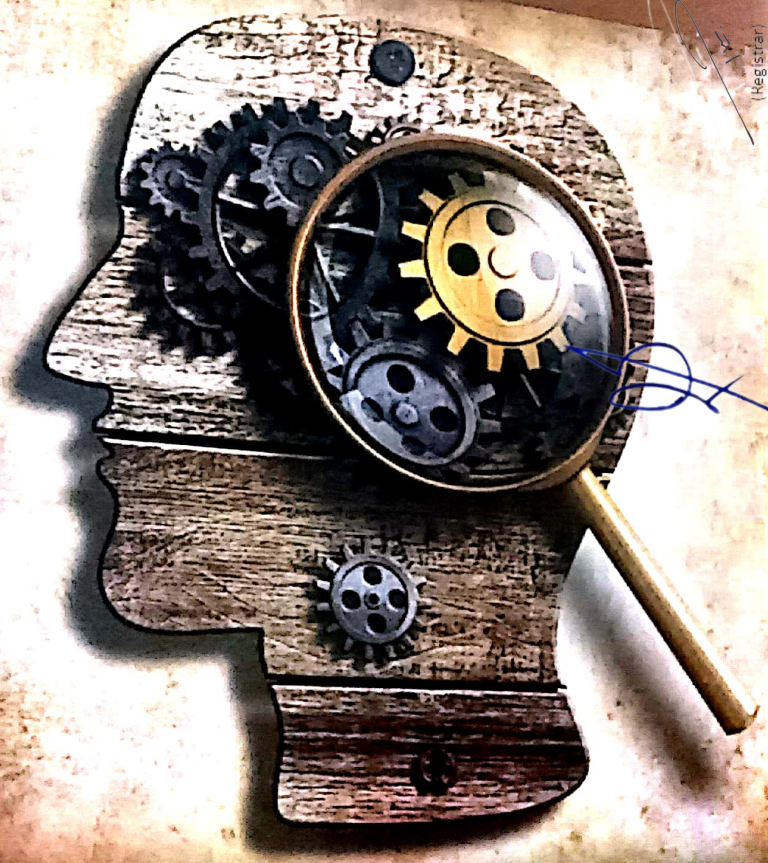

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COGNITIVE ERGONOMICS AND HUMAN-COMPUTER INTERACTION

First Published 2020
ISBN : 978-93-83958-37-5

Published by
Shubha Sharma Book Sellers
New Delhi - 110 002

Exclusive Distributor
Blue Ink International Publishers & Distributors
1/11137, Top Floor, Lane No. 10,
Near Kirti Mandir, Subhash Park,
Shahdara, Delhi - 110 032
E-mail : blueinkipd2021@gmail.com

Printed at : Shree Bala Jee Book Craft, Delhi-53

PREFACE

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. Cognitive ergonomics is responsible for how work is 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.

Human Computer Interaction has a huge part in cognitive ergonomics because we are in a time period where most of life is digitalized. This created new problems and solutions. Studies show that most of the problems that happen are due to the digitalization of dynamic systems. With this it created a rise in the diversity in methods on how to process many streams of information. The change in our socio-technical contexts adds to the stress of methods of visualization and analysis, along with the capabilities regarding cognitive perceptions by the user.

Successful ergonomic intervention in the area of cognitive tasks requires a thorough understanding not only of the demands of the work situation, but also of user strategies in performing cognitive tasks and of limitations in human cognition. In some cases, the artifacts or tools used to carry out a task may impose their own constraints and limitations (e.g., navigating through a large number of GUI screens). Tools may also co-determine the very nature of the task.

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INTRODUCTION

Cognitive ergonomics is the discipline of making human-system interaction compatible with human cognitive abilities and limitations, particularly at work. Cognitive ergonomics utilises the knowledge emerging from the cognitive sciences on mental processes such as perception, attention, memory, decision making, and learning. The methods of these fields of research are applied to gain a better understanding of the factors that affect cognitive function. The practical aim is to improve work conditions and human performance, as well as safety and health, and to avoid human error and unnecessary load and stress.

Cognitive ergonomics is a division of ergonomics (or human factors): a discipline and practices that aim to ensure 'appropriate interaction between work, product and environment, and human needs, capabilities and limitations'. In this human-system interaction, cognitive ergonomics focuses on mental processes, especially on cognitive functions and psychological/behavioural level interactions.

The theoretical background is based on cognitive psychology as well as other cognitive sciences. The goal is to elucidate the nature of human abilities and limitations in information processing. In cognitive ergonomics, these aspects are studied in the context of work and other systems. In recent years, there has also been a trend to exploit the methods of neuroscience also in the field of ergonomics. The term neuroergonomics is used when the focus is on neurological and physiological functions and biological explanations.

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. Cognitive ergonomics is responsible for how work is 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.