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Guest Editorial

# What is Visual Ergonomics?

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Ergonomics is a broad discipline. Whilst often associated with the physical aspects of workplaces, such as the size of chairs and desks, ergonomics has three domains which can contribute to the comfort, satisfaction and safety of a person in their environment: physical ergonomics (e.g. workstation design), cognitive ergonomics (e.g. how we perceive and process information) and organisational ergonomics (e.g. job design) [1].

There are many highly focussed sub-specialties within ergonomics. Visual ergonomics is one subspecialty, and was formally recognised by the International Ergonomics Association (IEA) as a technical committee in 2009. Although the technical committee has an obvious sounding title, visual ergonomics is more than a meld between the words "vision" and "ergonomics". A definition clarifying the scope of visual ergonomics is necessary for communicating with ergonomists and other stakeholders around the world. When the technical committee searched for a definition, they could not find a formal definition to adopt.

Defining visual ergonomics proved to be a bigger challenge than first envisaged, mostly because visual ergonomics has applications in a wide variety of industries (e.g. transport, healthcare), population subgroups (e.g. children, ageing) and visually demanding tasks (e.g. digital technology, manufacturing) [2]. After several years of consultation and discussion, initially within the Nordic Ergonomics Society and later with the IEA Visual Ergonomics technical committee, a final definition was approved and uploaded onto the IEA Visual Ergonomics webpage in July 2012. This is the definition:

> *"Visual ergonomics is the multidisciplinary science concerned with understanding human visual processes and the interactions between humans and other elements of a system. Visual ergonomics applies theories, knowledge and methods to the design and assessment of systems, optimizing human well-being and overall system performance. Relevant topics include, among others: the visual environment, such as lighting; visually demanding work and other tasks; visual function and performance; visual comfort and safety; optical corrections and other assistive tools." [3]*

When Karen Jacobs, editor-in-chief of WORK, invited the chairpersons of the IEA technical committees to consider collating manuscripts for special themed editions of WORK, the Visual Ergonomics Technical Committee jumped at the opportunity. What better way to explain visual ergonomics than by demonstrating it with practical examples in one compendium?

This issue of WORK boasts 14 original articles closely aligned to the scope of the journal: prevention of injury, illness and disability, assessment to provide effective interventions and rehabilitation using best practice. It includes research papers, conceptual discussions, case studies, literature reviews and a knowledge transfer document.

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The first six research papers explore a variety of tasks and environments for which visual ergonomics is important. We live in an electronic age and visual ergonomics is frequently associated with visual displays, so it is appropriate to begin with discussion of this topic. Toomingas et al reports results from a large prospective cohort study describing risk factors for the incidence of eye-related symptoms among desktop computer users. Hue, Rosenfield and Saá compare the rate of eye-related symptoms and reading performance when reading from handheld electronic devices and traditional hard copy text. Tan, Boon and Dain show that the labels and controls on many appliances and electronic devices are small and of poor contrast and that they may pose difficulties for people with low vision.

Sorting mail in a postal facility has considerable visual demands for workers. Hemphälä et al have contributed two articles on this topic. The first paper describes the physical load on the head and neck from adopting awkward postures when sorting mail and compares worker postures when wearing regular prescription spectacles with spectacles specifically prescribed for the task. The second paper demonstrates how task-specific spectacles can reduce eye-related symptoms and physical discomfort.

The visual-perceptual requirements for driving a train is not a topic commonly associated with visual ergonomics. In their article, Naweed and Balakrishnan present a cognitive ergonomics perspective. They describe the visual and tactical skills required by train drivers to anticipate and respond to the myriad of information within the rail environment.

The diversity of visual ergonomics is also represented in this issue of WORK by the professional backgrounds of the authors. These include occupational therapy, medicine, optometry, psychology, biomechanics, neuroscience and ergonomics. Such a range of professions all working toward the common goal of better visual outcomes in the workplace brings many opportunities for collaboration both in research and in practice.

Mayer sets the scene for the next set of articles by discussing some of the complexities of visual demands in the workplace and calls for closer collaboration between different professions. The following three case studies offer practical illustrations of successful collaborations. Firstly, Long reports the findings from a facilitated discussion where ergonomists and optometrists explored how to improve working partnerships between the two professions to assist computer workers. This is followed by Gowan who describes how an occupational therapist, an optometrist and an employer developed and implemented a vision screening program within a manufacturing facility. Ferronato and Ukovic report how a multidisciplinary approach enabled two vision impaired workers to gain suitable and long-term employment.

Active research is essential for the growth of a discipline, so it is with great pleasure that we include theoretical discussions of visual ergonomics. Using human-computer interaction to illustrate their argument, Fostervold, Watten and Volden explore the concepts underpinning ergonomics (i.e. a fit between the person and their environment) and the implications this has for the development of tools, tasks and working environments. Nylén et al provide a literature review of vision, daylight and ageing and identify shortcomings in our current understanding of this important issue. This has implications for ageing workforces around the world. In an invited Sounding Board opinion article, Hans Richter of the Centre for Musculoskeletal Research at the University of Gävle, Sweden, summarises selective aspects of our current understanding of the relationship between the visual and musculoskeletal system. He proposes avenues for future multidisciplinary research which may explain eye and neck discomfort and help manage this issue within the workplace.

Finally, this issue includes a Knowledge Transfer: Making Information Work document which was developed with the helpful assistance of Dr. Lynn Shaw, the editor of this initiative within WORK. The purpose of this article is to translate research into practice and explain the practical implications of visual ergonomics. Readers are invited to distribute hardcopy or electronic copies of "Visual Ergonomics at Work and Leisure" to colleagues and clients who they think may benefit from a greater understanding of visual ergonomics.

The IEA Visual Ergonomics Technical Committee is indebted to Karen Jacobs for the opportunity to compile this special issue of WORK. This collection of papers presents a small snapshot of many applications of visual ergonomics and helps to answer the question "what is visual ergonomics?" It shows some of the ways visual ergonomics can be used in research and in practice to prevent injury and error, assess work environments and assist in the rehabilitation of workers, and provides a platform for scientific discussion to inform future theoretical and applied research within this field.

We hope that you enjoy reading this issue of WORK and are enlightened by the potential and the importance of visual ergonomics for modern workplaces.

## References

[1] International Ergonomics Association (IEA). Definition and domains of ergonomics. Accessed 2nd January 2014 from: http://www.iea.cc/01_what/What%20is%20Ergonomics.html.

[2] Long J, Long A. Applying research to practice: Specialist and generalist (visual ergonomics) consultancy. Work. 2012;41:3372-8.

[3] Visual Ergonomics Technical Committee. What is Visual Ergonomics? International Ergonomics Association (IEA). Accessed 22nd December 2013 from: http://www.iea.cc/about/technical.php?id=51df9aa27ebf9.