

Ergonomics is the science of maximizing the comfort, efficiency, and safety of objects and environments for their users. You can think of the shaft of a hammer, the interface in a cockpit, and the shape of a computer mouse. Heating and lighting in a work environment, noise levels, repetitive

actions, etc. are also important factors in the field of ergonomics. Health aspects must be taken into account. Efficiently using different data streams, combining all relevant factors can be easily accomplished by using The Observer[®] XT: the professional software tool for data collection, analysis, and presentation. With The Observer XT you can score behavior live and record video files simultaneously to log events at a later stage in more detail and at the speed of your choice.



Figure 1. The interface of a cockpit with the point of gaze of the pilot.

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PEOPLE, PRODUCTS, AND SURROUNDINGS

To improve the fit between people, products, and surroundings, knowledge of anatomy, physiology, and psychology is applied to solve very diverse issues. The challenge in ergonomics research is thus to combine relevant data and subsequently deduce practical recommendations for designers, producers, and users involved. In The Observer XT you exactly see what happens, because all relevant data streams play in sync. Instantly, cause and effect are revealed.

HUMAN-COMPUTER INTERACTION

In recent decades, the use of computers in an office environment has increased exceptionally. This intensive use means that many more employees are exposed to potential problems associated with computer-based work. Factors that could be critical are the amount of repetitive tasks, the periods of work without sufficient breaks, too much computer screen work per day, an excessive workload, and bad posture. The Observer XT enables you to monitor the user's behavior, which is helpful when trying to solve problems occurring frequently in an office environment.

FACTORY WORK

The influence of environmental factors on factory workers is obvious. For instance, assembling cars is inextricably linked to a large amount of repetitive tasks. As a researcher, you may like to know the frequency of these behaviors. Figure 2 shows a The Observer XT project in which researchers recorded and coded factory work.

THE OBSERVER XT

The Observer XT facilitates research in Ergonomics. In The Observer XT you can see, for example, how various tasks contribute to the average physical load, or for how long and how many times workers have to deal with high temperatures. The Observer XT offers you frequencies and durations of behaviors, which enables you to improve the fit between people, products, and surroundings. You can also detect patterns in the structure of behavior.



Figure 2. Screenshot of The Observer XT for RSI research.

THE CASE STUDY: RSI RESEARCH

The case study concerns an experimental setup designed for systematic observation of movements of wrist, elbow and shoulder joints that are liable to cause repetitive strain injury (RSI).

Collect data

In this case study (figure 2), researchers positioned the video camera next to the worker at a car assembly plant, and set up a DAQ system to measure Heart Rate Variability and respiration (external data). HRV, for example, is an important indicator of increased mental workload, induced by a difficult task.

Coding behaviors

In this specific project, researchers coded wrist deviation, hand location, elbow flexion, shoulder abduction, and much more. With The Observer XT, it is easy to specify all behaviors, tasks, and modifiers in a coding scheme before or during observing. You can efficiently view and score one, two, or multiple video recordings.

Import external data

After observing one of the test participants, the external data was imported into The Observer XT. Here, only physiological data was used, but it is also possible to import other data streams.

Synchronize data

To find cause and effect, the researchers synchronized the external data with the observations and started (additional) coding.

Select and analyze your data

In this phase, the researchers specified the relevant parts for analysis by filtering appropriate independent variables and behaviors. The measurements gave great insight into the elbow, wrist, and hand movements in relation to efficiency, comfort, and safety of the work environment.

Export data

For additional calculations and analysis, The Observer XT contains the option to export raw results into a spreadsheet or statistics program, such as SPSS®. In this project, the data was adjusted to ease the transfer in to another program.

Presentation of results

An Episode Selection, one of many presentation options, contains a list of important events based on the content of the data. Characteristics of the events are part of this selection, but also (external) data files and video file references. In this case study, the researchers chose to select a series of events in which the physical load was extremely high. It was easy for them to combine video

fragments and thus to create an original highlights video clip, which illustrated important outcomes.

OTHER APPLICATIONS

Behavior and eye movements

Consider taking eye movements into account to take your research to another level. The Observer XT is the most suitable program for this: it enables you to integrate logged behavior with eye movements [1].

Live observations

Observations can easily be carried out on-site, using a handheld computer with Pocket Observer™. This mobile solution can, for example, be used to observe road workers: code behaviors such as 'preparation', 'smoothing the surface', and 'laying down pavement'.

The OWAS method

The physical workload can be assessed using the Ovako Working-posture Analysis System (OWAS). Combine the OWAS method with The Observer XT. Just create a configuration file with the codes for the defined working postures and observe live using a handheld, or play and code the video afterwards.

Capture Human-Computer Interaction

HCI research will also benefit from The Observer XT's qualities. The program allows you to capture the user's computer screen and easily integrate the images with other data. For the fully automatic capturing of Human-Computer Interaction, uLog™ is the ideal software tool. You can log mouse movement, scrolling, keystrokes, resizing of windows, pop-ups, and much more. uLog is conveniently integrated in The Observer XT, which offers easy configuration, synchronization with video files, and import of uLog data.

Feel free to contact us or one of our local representatives for more references, client lists, or more detailed information about our products and solutions for Ergonomics and Human-Factors research can work for you.

RESEARCH ARTICLES ILLUSTRATING THE USE OF THE OBSERVER XT AND POCKET OBSERVER FOR ERGONOMICS RESEARCH

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[1] See also: How to use The Observer XT with eye tracking. Noldus Information Technology, 2009