

Human-Computer Interaction (HCI) research refers to the process of understanding and identifying the way people use computer technology and tools (e.g. software, web sites). By mapping this interaction and applying the acquired knowledge, user-friendly interfaces can be designed and improved. For that purpose, mouse and keyboard use can be recorded, as well as interesting actions of the user, such as verbal expressions. This can be accomplished by using The Observer® XT and uLog™. With The Observer XT, behavior can be scored live and recorded to video files simultaneously for later detailed logging at the speed of your choice. The Observer's Screen Capture Module will allow you to capture the user's computer screen and integrate the images easily with your other data.

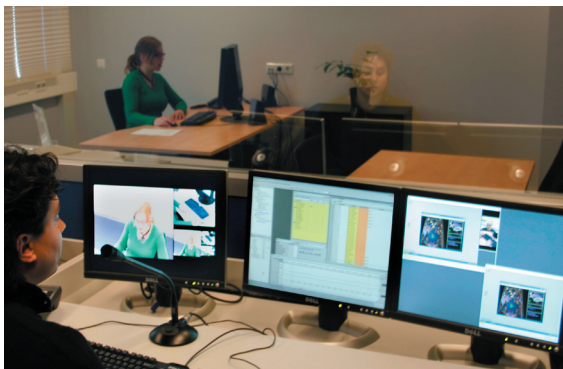


Figure 1. Usability lab.

For the fully automatic capturing of user-computer interaction, uLog is the ideal tool. You can log mouse movement, scrolling, keystrokes, resizing of windows, active windows, active applications, pop-ups, and more. uLog is even able to report typed words or sentences instead of separate characters. uLog is conveniently integrated in The Observer XT, which offers easy configuration, synchronization with video files, and import of the uLog data.

It is possible to use uLog in two different set-ups. In both set-ups, The Observer XT is installed on the observer's PC. In the first set-up, uLog is installed on the observer's PC, which is connected by a LAN to the test person's PC (Figure 2). The uLog logging configuration is installed on

the test PC. Input on this PC is logged and sent back to the observer PC via the LAN.

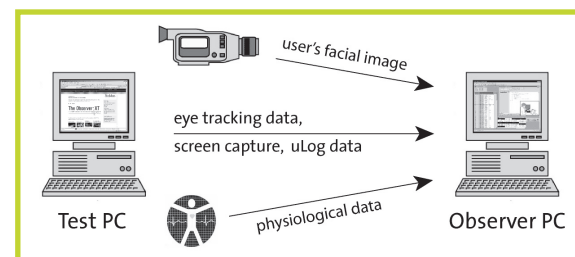


Figure 2. Connected set-up of uLog and The Observer.

In the second set-up, the test PC and observer PC are not connected. uLog can be run or installed on the test PC from a USB stick or other removable device, and gathered data can be stored there as well. After deleting the uLog software, no data is left on the test PC. This is particularly useful when using a portable lab and when installing software on test PCs is troublesome.

If you would like to take your research one step further, you could consider taking facial expressions, eye movements, pupil diameter, and physiological measurements into account. The Observer's External Data Module is the suitable add-on for this: it enables you to integrate your logged behavior, events, and screen captures with data obtained with your other data-acquisition systems, such as physiological data and eye tracking data [1].

COLLECT YOUR DATA

Before you can start collecting data you have to set up the test PC, observer PC, and possible other equipment (e.g. multiple video cameras). Specify in the configuration of uLog (Figure 3) which applications and events to log and start your test.

Note that you do not have to connect your external equipment to the PC which runs The Observer XT. It is possible to synchronize your data later by the timestamps present in the log files or manually by adjusting the start and stop time of your observations. When your equipment is connected to the observer PC, a synchronization signal sent out from The Observer XT to your other data acquisition systems will automatically synchronize your data sets.

With The Observer XT, you can specify all participants, behaviors (e.g. looking confused), and tasks in a coding scheme before or during observing. You do not have to set up a coding scheme first: just add or change elements while observing. Observations are coded by means of key codes or mouse clicks, which are automatically assigned to a timestamp.

To facilitate coding video, The Observer XT offers detailed time settings. You can play up to four digital media files simultaneously backward or forward and at multiple speeds.

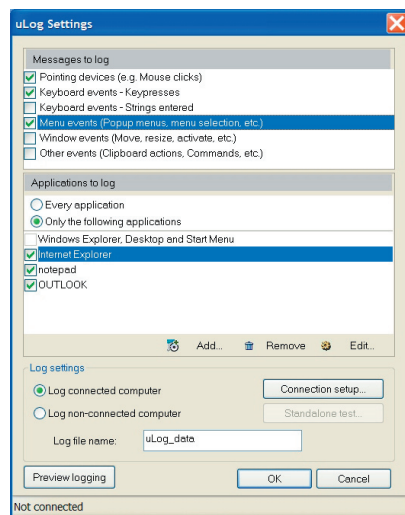


Figure 3. Configuration window of uLog.

After observing your test participant, you can import any other external data you would like to use into The Observer XT, such as the uLog data and physiological signals. Heart rate variability, for example, is an important indicator of increased mental workload, induced for instance by a difficult computer task. By using heart rate variability as an (additional) indicator of stress, behavior is measured more objectively. After importing data from your data acquisition system(s), you can, if necessary, synchronize them with your observations and start (additional) coding. Coding can be

refined as many times as you like, without losing previously coded data.

SELECT AND ANALYZE YOUR DATA

The Observer XT provides detailed visualizations, which help you to explore the data. Customized charts and statistics are accessible in a few mouse clicks, and ample selection options give access to the video images you require. Specify the relevant parts for analysis by filtering or nesting the appropriate independent variables, participants, and behaviors. These measurements will give you insight into the efficiency, effectiveness, and satisfaction of use of your system.

More complex patterns in behavior can be detected by exporting your data to Theme™ for structural analysis. Theme is able to detect complex patterns of events in raw behavioral data and quantifies the complexity of the behavior as a whole. Where patterns in time-based data are difficult, if not impossible, to find with standard statistical methods, Theme can discover them. With this software, common paths followed by users on a web site, for example, are measured in an objective manner.

For additional calculations and analysis, The Observer XT also contains the possibility to export raw results to the spreadsheet or statistics program of your choice.

PRESENT YOUR RESULTS

A wide range of presentation options is offered as well, to facilitate communicating your results to others. You can create a list of important events based on the content of the data. This Episode Selection contains the characteristics of the event, but also (external) data file and video file references. By selecting a certain event in the Episode Selection, the associated scene and data are displayed. Combine interesting video fragments and thus create your own highlights video clip or data file to illustrate your outcomes. Transitions between scenes and subtitles can be added to this clip as well.

RESEARCH ARTICLES ILLUSTRATING THE USE OF THE OBSERVER AND ULOG FOR HUMAN-COMPUTER INTERACTION:

- Berry, L.; Bartram, L.; Booth, K.S. (2005). Role-based control of shared application views. *Proceedings of the 18th Annual ACM Symposium on User Interface Software and Technology*, Seattle, October 23-26, 2005.
- Blackler, A.; Popovic, V.; Mahar, D. (2003). The nature of intuitive use of products: an experimental approach. *Design Studies*, **24**, 491-506.
- Laakso, M.; Salakoski, T.; Grandell, L.; Qiu, X.; Korhonen, A.; Malmi, L. (2005). Multi-perspective study of novice learners adopting the visual algorithm simulation exercise system TRAKLA2. *Informatics in Education*, **4**, 49-68.
- Rice, M.; Fels, D. (2004). Low vision and the visual interface for interactive television. *Proceedings of the 2nd European Conference on Interactive Television: Enhancing the Experience*, Brighton, March 31-April 2, 2004.

Feel free to contact us or one of our local representatives for more references, client lists, or more detailed information about The Observer XT, uLog, Theme, and our usability labs. Noldus Information Technology is authorized reseller of eye tracking equipment from Tobii and physiological data acquisition equipment from Biopac Systems and Polar.

[1] See also: How to use The Observer XT with eye tracking. Noldus Information Technology, 2005.