People find changes in user interfaces annoying

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The advantage of a computational model is that it is now possible to produce large quantities of ergonomically better user interfaces in which easy learnability also plays an important role.

Researchers modelled learning and visual search and predicted how users learn new or partially changed user interfaces. The model shows that even small changes can disturb visual search and impede use.

'The problem even with new, high-performance user interfaces is that the user must learn something new, and this is time-consuming. Especially in the beginning, searching for important functionalities may take so much time that the user will not change to a more powerful user interface, but gets frustrated. In our study, we examined how much time users at different stages of learning need in order to find the functionalities, and how learning progresses', explains Postdoctoral Researcher Jussi Jokinen from the Aalto University Department of Communications and Networking.

Psychological models help designers

Researchers combined mathematical models and the basic psychological phenomena of learning and measured participants' gaze and the time they spent searching for user interface functionalities. This way they monitored changes in the paths of users' gaze, as learning progressed, and how searching for the functionalities speeded up as users gained more experience.

'Based on the observations, we modelled the way people learn to use different types of user interfaces. We considered long-term memory, visual short-term memory, and eye movements and showed that it is possible to optimise user interfaces for learnability. Therefore, making the user interface as efficient as possible is not the sole objective of design, but the designer has to strike a balance between efficiency and learnability', says Jokinen.

'A similar psychological model predicting both eye movements and learning has not been available to designers before', he continues.

The model created as a result of the study was used to assess how changes in user interfaces affect the use of familiar systems. When a person familiar with QWERTY changed to the Dvorak keyboard, known

for its better ergonomics, the time required for finding a key was increased by 0.6 seconds, which slows down typing significantly. The Sath keyboard, which is more efficient in terms of ergonomics but has been designed for a person who is well familiar with QWERTY, increased search times by 0.4 seconds.

'The advantage of a computational model is that it is now possible to produce large quantities of ergonomically better user interfaces in which easy learnability also plays an important role. The model can be used to assess automatically and fast how easily a new user interface can be learned', says Jokinen.

'The same model can be used to develop websites and user interfaces for various occupations. For example, many interfaces can be a visually appealing, but difficult to learn. Therefore, it is good that we know more about human learning and can model learning in different ways', he continues.

The results will be presented at the world's largest computer-human interaction conference CHI in Denver, USA, in May 2017. The study has been carried out in cooperation with Kochi University of Technology in Japan. The research group of Professor Antti Oulasvirta focuses on computational methods that apply mathematical models to human behaviour.

More information: The complete publication is available on the research group's website: users.aalto.fi/~jokinej10/visual-search/

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