Evaluating the usability of a smartphone application with ACT-R

Sabine Prezenski TU Berlin, Germany

The potentials of using ACT-R (Anderson 2007) based cognitive models for evaluating different aspects of usability are demonstrated using a shopping list application for an Android application. Smartphone applications are part of our everyday life. A successful application should meet the standard of usability as defined in EN ISO-924-110 (2008) and EN ISO-924-111 (1999). In general, usability testing is capacious and requires vast resources. In this work, we demonstrate how cognitive models can answer important questions concerning efficiency, learnability and experience in a less demanding and rather effective way. Further we outline how cognitive models provide explanations about underlying cognitive mechanisms which effect usability. Two different versions of a shopping list application (Russwinkel and Prezenski 2014) are evaluated. The versions have a similar appearance but differ in menu-depth. User tests were conducted and an ACT-R model, able to interact with the application, was designed. The task of the user respectively the model consists in selecting products for a shopping list. In order to discover potential learning effects, repetition of the task was required. User data show, that for both versions time on task decreases as user experience increases. The version with more menu-depth is less efficient for novice users. The influence of menu-depth decreases as user experience increases. Learning transfers from different versions are also found. Time on task for different conditions is approximately the same for real users and the model. Furthermore, our model is able to explain the effects displayed in the data. The learning effect is explained through the building of application-specific knowledge chunks in the model's declarative memory. These application-specific knowledge chunks further resolve why expertise is more important than menu-depth.

References

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