CPTS 543 Assignment 2

Critical Review of Meta-Analysis of Correlations Among Usability Measures

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Summary. This paper presented a meta-analysis of correlations among usability measures. The authors argued that understanding the relationship between usability measures is crucial to deepen researchers' conception of usability and to select the right measures for certain usability studies. Usability is widely regarded as a broad notion that indicates the quality-in-use of interactive systems. With the understanding, there are many kinds of measures of usability. Such as completion time, error rates, satisfaction rating and so on. Those measures are important to human-computer interaction area.

However, the authors believe that there is not enough guide on how to select the right set of measures in HCI literature. They investigated this issue and have analyzed the correlations between different usability measures through this paper. From their meta-analysis of usability measures, this paper provides information about how different measures relate to each other, which will help researchers have a better understanding of usability including construct a model of it and select the right measures for their usability studies. In particular, they used raw data and investigated the role of moderator variables for their studies. In such way, they presented implications for both usability research and practical usability studies.

Critical Review. The paper is written and published by the following 2 people: Kasper Hornbæk, a professor at University of Copenhagen in the Computer Science department and mainly focused on issues in human-computer interaction. Kasper is interested in improving human interaction with computer systems through empirical investigations of how computers are used and through explorations of innovative user interfaces. Effie Lai-Chong Law, she is a professor at University of Leicester, Germany in the department of computer science. Effie mainly focused her research on human-computer interaction (usability, user experience), Technology-enhanced learning (game-based learning, computer-supported collaborative learning) and learning theories (situated cognition, creativity, refection).

This paper showed its strength successfully. Firstly, the authors provide the related work section of pervious usability studies analysis before getting into presenting their method of usability analysis. By doing so, readers who are lack of related experiences on usability evaluation would follow the idea of this paper smoothly and readers can also clearly classify the strength of their analysis among other similar studies. Secondly, the paper express its main idea and theory in proper steps with detail. The authors firstly rise their argument by explaining the goal of meta-analysis of usability studies. Then, the authors give out evidences to show that most of the usability measure in studies lack of correlation reporting. Lastly, the authors acquired raw data from their candidate studies to calculate correlations and further testify their idea. Moreover, the authors showed widely research scope in their analyses by quoting support evidence from a large amount of academic papers, which make their argument stronger.

However, this paper also has its own drawbacks in convincing its readers. One weakness is that the discussion is not complete by missing the topic they mentioned in earlier part. The authors argued that *in literature of HCI, there is little help in how to measure usability, in particular how to select measures of usability*. This argument may lead readers to have an assumption that the authors would present some rules of how to select measures. Unfortunately, the authors didn't come up with specific regulations for selecting measures along with their study. The authors mentioned in section Measures used (2nd sub section of Results) that the findings from figure 2 in this paper indicate that convergence of usability measurement selection exists, but no further discussion are made on how to select measures specifically. This weakness make reader feel confusion and make the paper's claim less persuasive.

Another weakness showed in this paper is that the selection of candidate studies shows significant bias. In section Procedures and goals of meta-analysis, the authors made decision on filtering candidate studies by considering only full-length papers reporting original research. The reason is that they assume short papers, poster summaries would not contain the detail they need to perform the meta-analysis. Unfortunately, the authors didn't make further explaining of it. The assumption is clearly made with bias.

In authors words, *the goal of the meta-analysis is to study the relation among usability measures using the raw data from a selection of published studies.* From their own word, we can imply that meta-analysis requires raw data but there is no evidence that meta-analysis cannot be applied in studies other than only limited to full length paper. A better way is to choose studies from different formats, which can conduct to the more generalized results as solid support proof.

Integration with Related Work. Meta-analysis and studies are widely used and discuss in this world. In Christopher D. Hundhausen's paper "*A Meta-Study of Software Visualization Effectiveness*" published in 1996, he claimed that the goal of visualization technology is to be effective which require two things, one is to provide functionality that people want to use and the other one is to provide non-problematic access to that functionality. In the later section of the paper, Christopher discussed and discovered the underneath relationship between effectiveness and substantiate effectiveness form his meta-study. This is a demonstration and evidence that meta-analysis help researchers to understand the model better.

The method of meta-analysis has strong theoretical base and could fit in other related research. For example: Young A Park and Ulrike Gretzel's paper *Success Factors for Destination Marketing Web Sites: A Qualitative Meta-Analysis" published in 2006* talked about the 9 factor they found through meta-analysis They also said that without meta-analysis, the result of web evaluation may not interpreted in the context of specific goals, which make the evaluation less valuable. In Chaomei Chen and Roy Rada*'s paper " Interacting with hypertext: a meta-analysis of experimental studies (1996)"*, they argued that their meta-analysis raised two issues concerned with the present hypertext literature: (a) the absence of a taxonomy of tasks for analyzing and comparing hypertext usability across studies, and (b) the weaknesses of the connections between abstract hypertext reference models and specific hypertext systems. Mo Adam Mahmood's paper *" Variables affecting information technology end-user satisfaction: a meta-analysis of the empirical literature "* express the idea from their meta-analysis that greater levels of user satisfaction will result from greater user involvement in system development which in turn is likely to lead to the design of systems which are perceived to be useful and hence viewed more positively by users with enhanced experience. This will influence expectations and skills and should lead to the development of systems which are easier to use.

Implications for HCI. The implication for HCI researchers from this paper is that applying meta-analysis to their HCI research would help them understand their model better. This is because meta-analysis could find out the covered correlations between different measures. Researchers can utilize those correlation to construct a better model.

An implication for HCI practitioners from this paper is embedding meta-analysis with their evaluation process would help practitioners or designers to design their product with the interface that meets user's underneath requirements. Through meta-analysis, practitioners can figure out what kind of requirement from users are bonded with different type of UIs. As a result, they could design the UI with higher user satisfaction.

One main implication for users of technology is that with applying meta-analysis to product evaluation process, the users will benefit from it. The meta-analysis will helper designers to design the UI that meet users' requirement that could not be found in normal analysis. Standing on the shoes of users, the UI evaluated by meta-analysis is straightforward and concise hence the users would be more satisfied with those UIs.

References Cited

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