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Frustration: A Common User Experience

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ABSTRACT

The use of computer applications can be a frustrating experience. This study replicates previous studies of the amount of time users – involuntarily – spend trying to diagnose and recover from problems they encounter while using computer applications such as web browsers, email, and text processing. In the present study, 21 users self-reported their frustrating experiences during an average of 1.72 hours of computer use. As in the previous studies the amount of time lost due to frustrating experiences was disturbing. The users spent 16% of their time trying to fix encountered problems and another 11% of their time redoing lost work. Thus, the frustrating experiences accounted for a total of 27% of the time. This main finding is exacerbated by several supplementary findings. For example, the users were unable to fix 26% of the experienced problems, and they rated that the problems recurred with a median frequency of about once a week. Experiencing the same problems repeatedly is likely to add to the frustration. The users in this study were highly experienced, precluding that frustration is only a concern for novices.

Categories and Subject Descriptors

H.0 [Information Systems General]; H.5.2 [Information Interfaces and Presentation]: User Interfaces – *theory and methods, user-centred design.*

Keywords

User experience, frustration, dissatisfaction, non-usability.

1. INTRODUCTION

The widespread interest in the user experience generally concerns fun, beauty, engagement, motivation, flow, excitement, joy, reflection, and other pleasurable emotions [1, 4-9]. A notable exception is Scheirer et al. [12], who attempt to frustrate the user on purpose to create affective responses. Users' experiences with information technology are, however, not restricted to pleasurable emotions and experiments with the effects of deliberately induced frustration. Rather, frustration appears to be an all too common user experience.

Ceaparu et al. [2] recently reported the disturbing finding that

people lost 47-53% of the time they spent using ordinary computer systems due to frustrating experiences. That is, for about half of the time the 111 users who participated in the study were unproductive because they were, instead, preoccupied with trying to diagnose and recover from frustrating experiences. The excessive amount of time lost in these frustrating experiences was lost during the use of web browsers, email, text processing, and other ordinary systems. While Ceaparu et al. studied frustrating experiences during computer use in non-work contexts, Lazar et al. [11] performed a similar study of computer use at work. A total of 50 users took part in the study, and they lost an average of 43% of their time due to frustrating experiences. The lost time was about evenly split between time spent trying to solve the encountered problem and time spent recovering lost work. In both studies the frustrating experiences were spread across many applications and many problem areas, making it difficult to target efforts aimed at addressing the reasons for the frustrating experiences.

Frustration appears to be a basic notion that requires little explanation. Causes of frustration with computer technology include application crashes, long response times, unclear error messages, inability to satisfactorily complete tasks, confusing interfaces and so forth. In their definition of frustration, Lazar et al. [10, p. 189] emphasize unattained goals: "User frustration can be defined as when the computer acts in an unexpected way that annoys the user and keeps the user from reaching their task goals." Frustration is a frequent companion of computer use and a major reason why many people hesitate to use computers, or avoid computers altogether. Thus, frustration raises important research questions, three of which are addressed in this study:

- How much time is lost due to frustrating experiences?
- How severe are the frustrating experiences?
- Is a solution found or are the frustrations likely to recur later?

The main motivation for this study is that the amount of time lost due to frustrating experiences in the studies by Ceaparu et al. [2] and Lazar et al. [11] is almost too large to be believable. Therefore, this study replicates these previous studies.

2. METHOD

To investigate user frustration empirically we conducted a small diary-based study methodologically similar to Ceaparu et al. [2].

2.1 Participants

A total of 21 computer-science students (5 female, 16 male) participated in the study. Participants' age ranged from 21 to 33 years with an average of 26.3 years of age ($SD = 3.2$). Participants

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had an average of 13.1 ($SD = 4.1$) years of experience with computers, and they were at the third year of their bachelor-degree studies or the first year of their subsequent master-degree studies. All but one of the participants had a European cultural background; one participant had a Chinese cultural background.

2.2 Procedure

The study was presented as an assignment at the first lecture in a course on human-computer interaction. Students were encouraged to participate in the study as a way of adopting a user-centred frame of mind and gaining awareness of negative experiences with computers, but participation was voluntary. Sixteen students did not participate, either because they did not make the assignment or because they chose not to hand in the forms documenting their frustrating experiences.

Participants were asked to select a period of at least an hour of their computer use in the course of the next week. No specific kinds of computer use were assigned or expected. Rather, participants were to perform their ordinary computer-related activities and report any frustrating experiences. Frustrating experiences could be both major problems and minor issues. The possible span of frustrating experiences was exemplified with application crashes, dropped network connections, long download times, error messages, awkward workflows, hard-to-find features, and inconsistencies across applications. Finally, it was emphasized that “any experience that causes you frustration qualifies as a frustrating experience”. That is, frustration was in this study defined as a subjective experience present when, and only when, a participant felt frustrated.

For each frustrating experience participants were to fill in a form similar to the frustrating-experience report in Ceaparu et al. [2, Appendix A]. This form included questions about what participants were trying to do when the frustrating experience occurred, the importance of the task, the level of frustration experienced, how often the problem happens, how long participants spent fixing the problem, how much time they lost in addition to the time spent fixing the problem, and whether they could work on something else during the frustrating experience. Participants were instructed to familiarize themselves with the frustrating-experience form before they started and to fill in a frustrating-experience form right after each frustrating experience. Participants were also asked to fill in a form with background information such as age, gender, and the length of the session during which they tracked their frustrating experiences.

3. RESULTS

Participants kept track of their use of computers for an average of 1.72 hours, and the main result of the study is that 27% of this time was lost due to frustrating experiences, see Table 1. The lost

time consisted of an average of 0.27 hours spent fixing, or trying to fix, the problem that caused the frustration and an additional 0.20 hours of lost work, for example because something had to be redone.

Participants had an average of 2.38 ($SD = 1.47$) frustrating experiences. The frustrating experiences mainly concerned widely used applications such as web browsers, email clients, text processors, social media, music-management applications, and basic operating-system tasks such as the copying of files. A small number of frustrating experiences concerned more specialist applications such as software for compressing files and installing updates. Examples of frustrating experiences include:

(a) “Trying to make internal mic work in Skype.” The participant spent two hours trying to solve this problem but eventually gave up without having found a solution. The experience received the maximum rating for level of frustration.

(b) “I was trying to output a PDF file in Photoshop. I was finishing up work on an A3 poster, a large 300 dpi/CMYK file with multiple layers. After a prolonged waiting time, the exporting of the PDF froze the application and I had to force close Photoshop – losing the latest changes to my poster.” The participant spent 20 minutes fixing this problem and an additional 30 minutes redoing lost work.

(c) “Was trying to update a program I had just installed. The program shows the text ‘Updating’ and you wait... and wait. You don’t know whether you are supposed to wait (because there are many files to update) or whether the program has frozen. No information/progress bar or other signs of activity. I try to cancel, but no reaction. I have to close the program in Windows’ job list. This works but produces a series of error messages, which I simply close.” This frustrating experience lasted 6 minutes, during which the participant felt unable to work on something else.

(d) “Using Microsoft Word 2007 to search for a text in a document. Standard shortcut for this (ctrl-F) not only does not prompt a search option, it made some of the text bold. Because of the changed appearance of Office 2007 there is no File/Edit menu with this option in it. After a while I found the new placement of this function. I realized that this was because it was a Danish localized version where shortcut keys were also changed.” This experience lasted only one minute but received the maximum rating for level of frustration.

Participants’ ratings of their frustrating experiences are summarized in Table 2. Across all the 50 frustrating experiences, participants’ median rating of the level of frustration was 7 on a scale from 1 (not very frustrating) to 9 (very frustrating). Surprisingly, *level of frustration* only approached a significant correlation with the duration of the frustrating experience ($p =$

Table 1. Time lost due to frustrating experiences, $N = 21$ participants

<i>Measure</i>	<i>Mean (hours)</i>	<i>Std. deviation</i>	<i>Percent</i>
Length of reporting session	1.72	1.42	100
Time spent trying to fix the problem	0.27	0.62	16
Time lost to the problem (apart from the time spent trying to fix it)	0.20	0.17	11

Table 2. Ratings of frustrating experiences, $N = 50$ frustrating experiences

<i>Question</i>	<i>Median rating</i>	<i>Correlation with duration of frustrating experience^a</i>
Level of frustration (1: not very frustrating - 9: very frustrating)	7	0.26
Importance of task (1: not very important - 9: very important)	6	0.34 *
Frequency of problem (8-point scale)	4: once a week	0.28 *

^a Spearman ρ correlation with the sum of the time spent fixing the problem and the additional time lost to the problem, * $p < 0.05$.

0.06). There was, instead, a significant, though weak, correlation between the *importance of the task* and the duration of the frustrating experience, indicating that the longer frustrating experiences tended to occur during the more important tasks. Participants' median rating of the *frequency of the problems* indicated that the frustrating experiences recurred about once a week. The frequency with which problems recurred correlated significantly with the duration of the frustrating experiences, indicating that the shorter frustrating experiences tended to occur more frequently. Experiencing the same problem repeatedly is likely to add to the frustration.

Participants were also asked how they fixed the problem. For 26% of the frustrating experiences the answer to this question was that participants were unable to fix the problem. Given that participants were computer-science students this percentage is unlikely to be lower for other groups of computer user. Finally, participants indicated that for 60% of the frustrating experiences they were unable to work on something else until the problem was solved. Participants could not simply shift their attention to something else before they had found a solution to a problem or while they were waiting for an application to restart or for information to download. This emphasizes that participants were often unable to compensate for the frustrating experiences by multitasking.

4. DISCUSSION

The participants in this study were frustrated for an average of 27% of the time they spent using computers. The time lost due to these frustrating experiences can be divided into the time spent fixing, or trying to fix, the problems that caused the frustrations and the additional time spent redoing lost work. The participants spent an average of 16% of their time on the former activity and 11% on the latter. The percentage of time lost due to frustrations in this study is about half of the percentage of time lost in previous studies [2, 11]. A reason for this difference has not been identified. The difference appears, however, to be a minor issue compared to the substantial percentage of lost time in this study as well as in the previous studies. Thus, the present study essentially confirms the main finding of the previous studies.

The severity of the main finding is exacerbated by the supplementary findings that the median level of frustration was high, that the longer frustrating experiences occurred during the more important tasks, that the same problems recurred about once a week leading to repeated frustrations, that the participants were unable to work on something else during more than half of the frustrating experiences, and that the participants were unable to fix about one quarter of the problems. The last of these

supplementary findings indicates that the participants were often left with lingering frustrations, rather than with the positive sense of achievement that may accompany the resolution of a problem. Moreover, the participants had an average of more than a decade of experience with the use of computers and they were pursuing a university degree in computer science. This shows that frustrating experiences are not merely a concern for novices, and it suggests that another sample of users is likely to experience more frustrations, rather than fewer.

The duration, recurrence, and severity of the reported frustrating experiences suggest that frustration is a major threat to usability in general and universal usability [13] in particular. This puts emphasis on the implications of our findings for designers, managers, and policy makers in terms of providing the basic, yet pertinent, means of countering user frustration: more consistent terminology, clearer menus, simpler task flows, shorter response times, more informative dialog boxes, strengthened error handling, better training, improved documentation, and, in general, easier-to-use interfaces. In terms of implications for researchers, there is a need for additional studies of the magnitude of the problem. The studies so far show that between a quarter and half of the time spent using computers is lost due to frustrating experiences. If these numbers scale up, it is a major societal problem. In this relation it would be interesting to know whether people experience more frustrations with computers than with other artefacts, including pen-and-paper technologies. There is also a need for research that goes beyond the exploratory level and starts to address how frustrating experiences, which cannot all be eliminated, can best be dealt with in real time. Feild et al. [3] find that the presence or absence of user frustration during information searching can be predicted with good accuracy on the basis of query log data. This may provide opportunities for mitigating increases in user frustration through dynamic changes in the interface and interaction. For other systems sensor data may provide similar opportunities.

A possible limitation of this study is that the participants self-reported their frustrating experiences during a relatively brief session; they may have selected their session so as to have something to report. Ceaparu et al. [2] addressed this possible limitation by having each participant perform one session in which they self-reported their frustrating experiences and a second session in which they observed another user and reported his or her frustrating experiences. The self-reported and observational sessions were similar with respect to the duration of the frustrating experiences, their severity, and the other investigated aspects of user frustration.

5. CONCLUSION

This study has replicated previous studies of the amount of time users lose due to frustrating experiences with computers. Twenty one users recorded their frustrating experiences in a variant of time diaries during an average of 1.72 hours of computer use. As in previous studies the amount of time lost due to frustrating experiences was disturbing. The participants in this study were frustrated for an average of 27% of the time they spent using computers. The frustrations were generally experienced as severe, and during more than half of the frustrating experiences the participants were unable to work on something else for the duration of the frustrating experience. These findings, and other supplementary findings, underline that frustration is a common user experience.

The frustrating experiences were spread across a number of mostly ordinary applications, such as web browsers, email clients, text processors, social media, and music-management applications. The frustrating experiences were also spread across many problem areas. Consequently, it is difficult to target efforts aimed at addressing the reasons for the frustrating experiences. It is, nevertheless, an important challenge for researchers as well as practitioners to eliminate the sources of unnecessary frustration and seek ways of mitigating the frustrating experiences resulting from sources that cannot be eliminated.

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7. REFERENCES

- [1] Blythe, M., Hassenzahl, M., and Wright, P. 2004. More funology [Introduction to special section]. *ACM Interactions*, 11, 5 (2004), 37.
- [2] Ceaparu, I., Lazar, J., Bessiere, K., Robinson, J., and Shneiderman, B. 2004. Determining causes and severity of end-user frustration. *International Journal of Human-Computer Interaction*, 17, 3 (2004), 333-356.
- [3] Feild, H., Allan, J., and Jones, R. 2010. Predicting searcher frustration. In *Proceedings of the SIGIR 2010 Conference on Research and Development in Information Retrieval* (pp. 343-341). ACM Press, New York.
- [4] Hallnäs, L., and Redström, J. 2001. Slow technology - Designing for reflection. *Personal and Ubiquitous Computing*, 5, 3 (2001), 201-212.
- [5] Hassenzahl, M. 2004. The interplay of beauty, goodness, and usability in interactive products. *Human-Computer Interaction*, 19, 4 (2004), 319-349.
- [6] Hassenzahl, M., Schöbel, M., and Trautmann, T. 2008. How motivational orientation influences the evaluation and choice of hedonic and pragmatic interactive products: The role of regulatory focus. *Interacting with Computers*, 20, 4&5 (2008), 473-479.
- [7] Helander, M. G., and Khalid, H. M. 2006. Affective and pleasurable design. In G. Salvendy (ed.), *Handbook of Human Factors and Ergonomics. Third Edition* (pp. 543-572). Wiley, New York.
- [8] Hertzum, M. 2010. Images of usability. *International Journal of Human-Computer Interaction*, 26, 6 (2010), 567-600.
- [9] Law, E. L.-C., Roto, V., Hassenzahl, M., Vermeeren, A. P. O. S., and Kort, J. 2009. Understanding, scoping and defining user experience: A survey approach. In *Proceedings of the CHI2009 Conference on Human Factors in Computing Systems* (pp. 719-728). ACM Press, New York.
- [10] Lazar, J., Jones, A., Hackley, M., and Shneiderman, B. 2006. Severity and impact of computer user frustration: A comparison of student and workplace users. *Interacting with Computers*, 18, 2 (2006), 187-207.
- [11] Lazar, J., Jones, A., and Shneiderman, B. 2006. Workplace user frustration with computers: An exploratory investigation of the causes and severity. *Behaviour & Information Technology*, 25, 3 (2006), 239-251.
- [12] Scheirer, J., Fernandez, R., Klein, J., and Picard, R. W. 2002. Frustrating the user on purpose: A step toward building an affective computer. *Interacting with Computers*, 14, 2 (2002), 93-118.
- [13] Shneiderman, B. 2000. Universal usability. *Communications of the ACM*, 43, 5 (2000), 84-91.