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COPING WITH INTERRUPTIONS IN COMPUTER-MEDIATED ENVIRONMENTS: THE ROLE OF COMPUTER EXPERIENCE

Stefan Tams
Clemson University, stefan.tams@hec.ca

Kevin Craig
Clemson University, kevin@kevincraig.net

Jason Thatcher
Clemson University, jason.b.thatcher@gmail.com

Jonathan Panning
Clemson University, jpannin@clemson.edu

COPING WITH INTERRUPTIONS IN COMPUTER-MEDIATED ENVIRONMENTS: THE ROLE OF COMPUTER EXPERIENCE

RESEARCH-IN-PROGRESS

Stefan Tams
Clemson University
stams@clemson.edu

Kevin Craig
Clemson University
kevin@kevincraig.net

Jason Thatcher
Clemson University
jthatch71@gmail.com

Jonathan Panning
Clemson University
jpannin@clemson.edu

ABSTRACT

In the workplace, technology can cause stress ("techno-stress"), which can erode the very productivity gains sought by the introduction of the technology. To treat this problem, our field must gain a more complete understanding of the factors which cause techno-stress, and of factors which may reduce technology-induced stress. This research-in-progress considers whether computer experience can ameliorate workplace stress caused by technology-mediated interruptions (instant messages, for example). If computer experience is revealed to be a factor in the reduction of techno-stress in this way, inferences may be drawn about the relationships between techno-stress, individual differences, and work conditions. By drawing upon existing research in psychology, we offer the hypotheses that more frequent technology-mediated interruptions cause more techno-stress, and that computer experience moderates those stressful effects. Ultimately, our assertions must be tested through an experiment, which we describe in this paper.

Keywords

Coping, Computer Experience, Interruptions, Instant Messages, Techno-stress.

INTRODUCTION

Information and communication technologies should lead to a better and more effective workplace, yet many are familiar with stories about these technologies leading to stress. While these stories may often be amusing, the actual consequences of techno-stress are serious (Ragu-Nathan et al., 2008; Tarafdar et al., 2007). Specifically, technology-mediated (T-M) interruptions have been identified as the source of stress and of reduced productivity in the workplace (Basoglu & Fuller, 2007; Galluch, 2009; Spira, 2007). Accordingly, developing mechanisms to help workers cope with techno-stress should be a prominent goal of the Information Systems field.

Different workers respond to techno-stress in different ways; some are better able to cope (Lazarus, 1966). Coping, which can be seen as the efforts taken to reduce the effects of taxing environmental demands (Lazarus & Folkman, 1984), is an important way that people minimize the threats posed by technology in their workplace (Beaudry and Pinsonneault (2005). Despite this, the issue of how people cope with technology-mediated interruptions is rarely, if ever, studied.

One important mechanism that may help people cope with T-M interruptions is computer experience. Computer experience may extend peoples' ability to do mental work when using computers, allowing them to cognitively cope with such stressors as T-M interruptions (Ericsson & Kintsch, 1995). Although computer experience has been linked to coping behaviors (e.g., Beaudry & Pinsonneault, 2005), research on its role as a coping mechanism in the techno-stress context is lacking. Thus, this work examines *whether the level of stress generated by T-M interruptions depends on computer experience.*

The structure of our paper is as follows: the next section is a literature review, in which we place our model in the context of current techno-stress research. Following that, we develop our hypotheses around the proposition that the frequency of T-M

interruptions induces less stress on experienced users, as opposed to less experienced users. Then, we describe our proposed (and pre-tested) experiment and present pre-test results. Finally, we conclude with a brief description of what we believe our research may contribute to both theory and practice.

BACKGROUND

People are frustrated by T-M interruptions because these interruptions break their concentration on their intended work (Basoglu & Fuller, 2007; Galluch, 2009; Ren et al., 2008). Individual people, however, feel more or less stress as a result of stressors, depending on their ability to cope with them (Lazarus, 1966). Since the effects of stressors depend on users' ability to cope, coping can be interpreted as a moderator of the relationship between a stressor and a stress response.

An individual's ability to do mental work, impacted by experience, is an important factor in coping (Edwards, 1996; Ericsson & Kintsch, 1995). Since experience can extend peoples' ability to do mental work and allow them to deal with more cognitive demands at the same time (Edwards, 1996; Liu et al., 2004), it could be considered a form of cognitive coping. Thus, computer experience may weaken stressor-stress relationships, implying that it may interact with such stressors as T-M interruptions to impact individual stress. However, little research has examined computer experience's relationship with techno-stress; a comprehensive literature search revealed only one paper. Tarafdar et al. (2007) suggested that computer experience may be of strong explanatory power in the techno-stress phenomenon, and they consequently called for examining the role of computer experience in techno-stress. The present research attempts to begin this endeavor.

As illustrated in Figure 1, prior literature has primarily focused on examining techno-stress, coping, and computer experience in isolation. Some studies have looked at the intersection of two such areas. For example, Tarafdar et al. (2007) looked at the relevance of computer experience to techno-stress, and Beaudry and Pinsonneault (2005) briefly mentioned computer experience in relation to coping. However, no study to date has examined the point at which all three research areas intersect, although this point yields strong potential for explaining coping behaviors with technological stressors. Hence, this study theorizes about computer experience to develop a model of coping with such technological stressors as T-M interruptions.

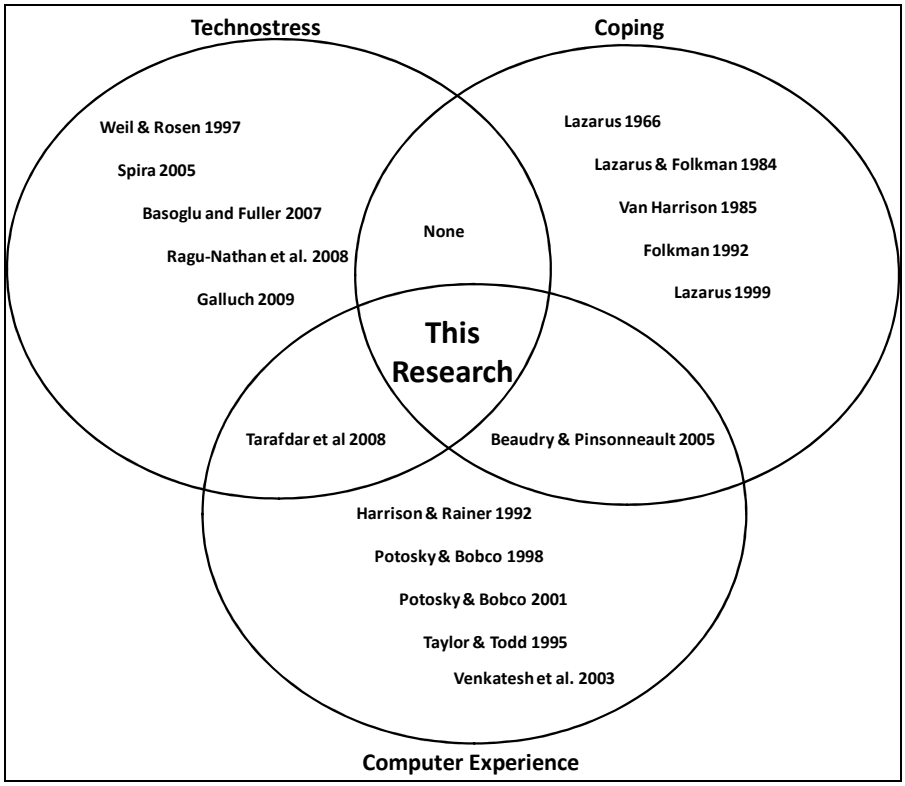

Figure 1. Illustrative Studies on Techno-stress, Coping, and Computer Experience

HYPOTHESES DEVELOPMENT

Our study posits two hypotheses. As shown in Figure 2, our stressor is the Frequency of T-M Interruptions, our dependent variable is Individual Stress, and our moderator is Computer Experience. We align our model with previous studies (e.g., Ragu-Nathan et al., 2008) by incorporating Age, Education, Gender, and Personality Type as control variables.

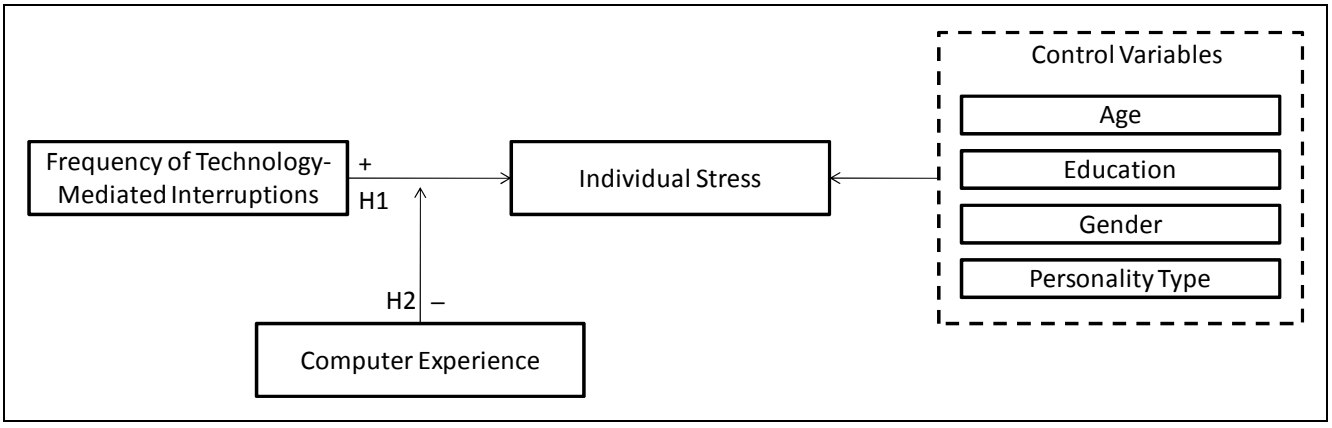

Figure 2. Research Model

The frequency of T-M interruptions refers to the number of technology-mediated interruptions, such as instant messages, that appear in a given time interval. The number of tasks which people can mentally perform at the same time is finite, and under some circumstances may be as low as one (Wickens et al., 2004). As such, interruptions can cause information and communication overload as people need to incorporate the communication and information introduced by the interruption (Ragu-Nathan et al., 2008). As a result of getting more information than they can proficiently process, individuals may not be capable of focusing on the task at hand and may, in turn, view their work burden as increasingly high. Since a high work burden closely relates to threats of low performance (Endsley, 1995), it may lead to techno-stress. Formally:

H1: The frequency of T-M interruptions is positively related to individuals' experiences of stress.

Computer experience refers to the extent to which people have used computers over their lifetimes (Harrison & Rainer, 1992; Taylor & Todd, 1995). As such, it is a form of domain-specific experience, which generally allows people to use their long-term memory as an extension of their short-term memory (Ericsson & Kintsch, 1995). This memory extension can enable people to do more mental work when using computers (Liu et al., 2005), allowing them to accomplish computer-based tasks despite the presence of excessive information processing and work demands. Accordingly, threats of low performance on the basis of T-M interruptions should be less likely to occur and should be weaker. In so doing, computer experience acts as a coping mechanism. Formally:

H2: Computer experience moderates the effect of the frequency of T-M interruptions on individual stress so that the effect is weaker for higher levels of computer experience.

PROPOSED METHODOLOGY

As has been done in the past when investigating the effects of T-M interruptions (Basoglu & Fuller, 2007; Galluch, 2009), we will conduct a laboratory experiment, using undergraduate students to test our hypotheses. Students are highly representative of the population of information and communication technology (ICT) users, and are thus well-suited to test assertions made about T-M interruptions, which are a form of ICT. Moreover, today's students are tomorrow's ICT users in the workplace, so their stress responses to T-M interruptions are particularly relevant to this study.

To account for the relevance of cognitive concentration to our study, such that interruptions are hypothesized to break peoples' concentration on the task at hand, we selected the online browser memory game Concentration as the experimental task. Historically, Concentration has been played by arranging cards face down and flipping one pair of cards at a time. Players attempt to memorize card locations and flip matching pairs of cards. Our version of the game is played on a computer. To make the game more challenging (and thus consume more cognitive resources) than the traditional version with pictures of, say, animals or toys, cards are matched by an abstract concept. A matching pair of cards would look different from each other, but the abstract meaning of the images on each card would be equivalent.

Pre-tests have confirmed that undergraduate students are significantly more challenged by our version of concentration than the traditional one with simple pictures, and expressed that they "have to pay more attention" when playing. Our pre-tests also modulated the frequency of T-M interruptions (which take the form of random text messages) to arrive at two factor levels (frequent vs. not frequent interruptions). Statistical significance tests of mean differences and verbal protocols evidenced that our manipulations are valid (see Figure 3).

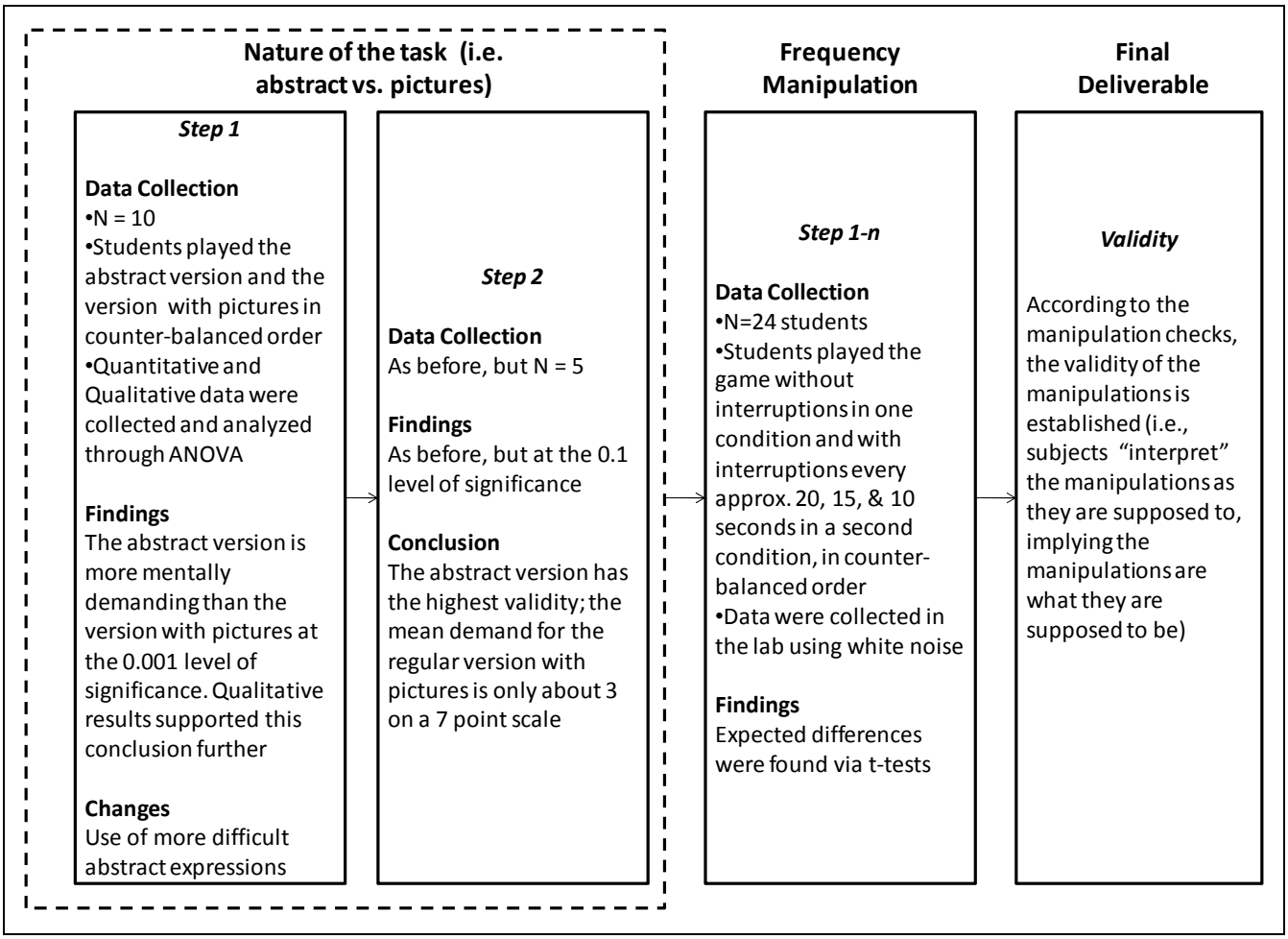

Figure 3. Overview of the Pre-Test Procedure and Findings

Together with the frequency manipulation, we also constructed the survey instrument for this research. We will evaluate computer experience using Taylor and Todd's (1995) and Harrison and Rainer's (1992) well-validated items. To measure stress, we use both a subjective instrument (adapted from Moore's 2000 work exhaustion scale) and an objective reading of the stress hormones in subjects' saliva, a state-of-the art physiological measure of stress. Using these two measures allows us to triangulate our measurement of stress. In addition, we will use a manipulation check related to the frequency of T-M interruptions, and we will administer diverse measures for the control variables, such as experience with the primary task. An illustration of our scale development process is found in Figure 4. As of the writing of this research-in-progress, our measures are being purified on the basis of an extensive data collection effort (n = 42) specifically for measure purification purposes. Importantly, undergraduate students at a large Southeastern University played a very active and vital role in the development of our research instruments through their participation in question sorting tasks and the provision of extensive and creative qualitative and qualitative advice.

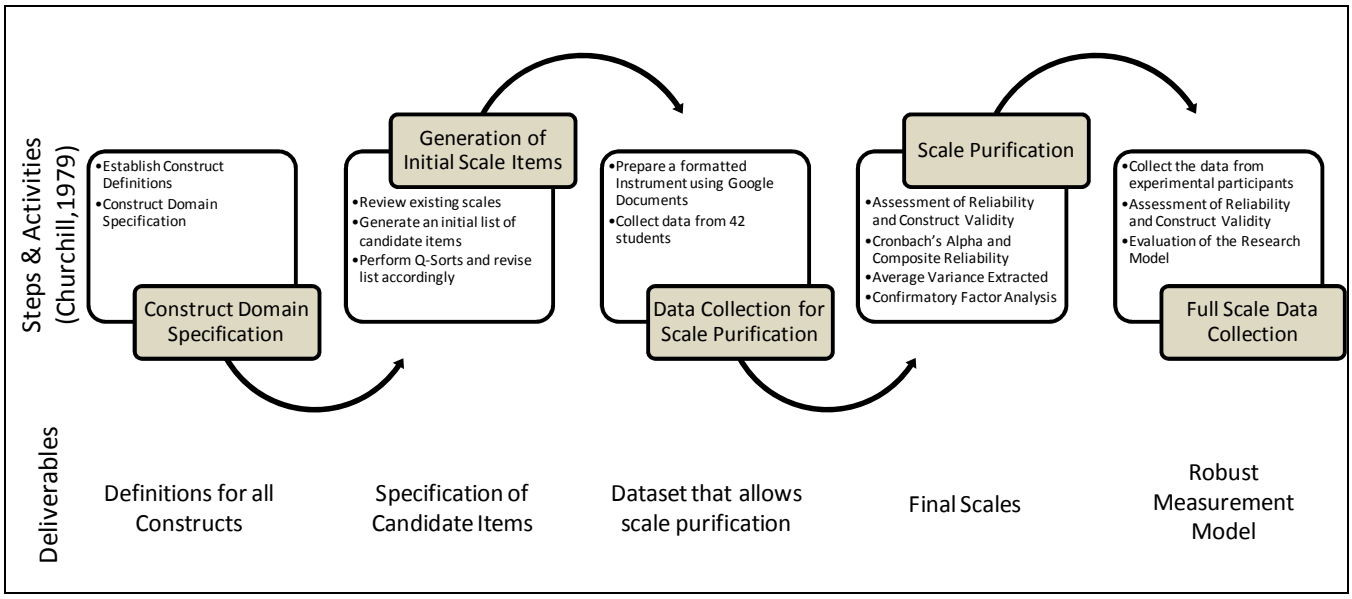

Figure 4. Overview of the Scale Development Process

Once the scales will be in their final forms, we will pilot our experimental tasks and procedures through the process presented in Figure 5. Student volunteers will be recruited through course credit and monetary rewards. Once arriving at the research laboratory, they will be briefed, will relax to calm down to a baseline stress level, and take a practice trial of the Concentration task. Following the practice trial, they will be taking the actual experimental task. Lastly, our research subjects will fill out all manipulation checks and perceptual measures and will be debriefed. After our pilot study with 25 subjects, we plan to conduct the full-scale experiment with at least 90 participants.

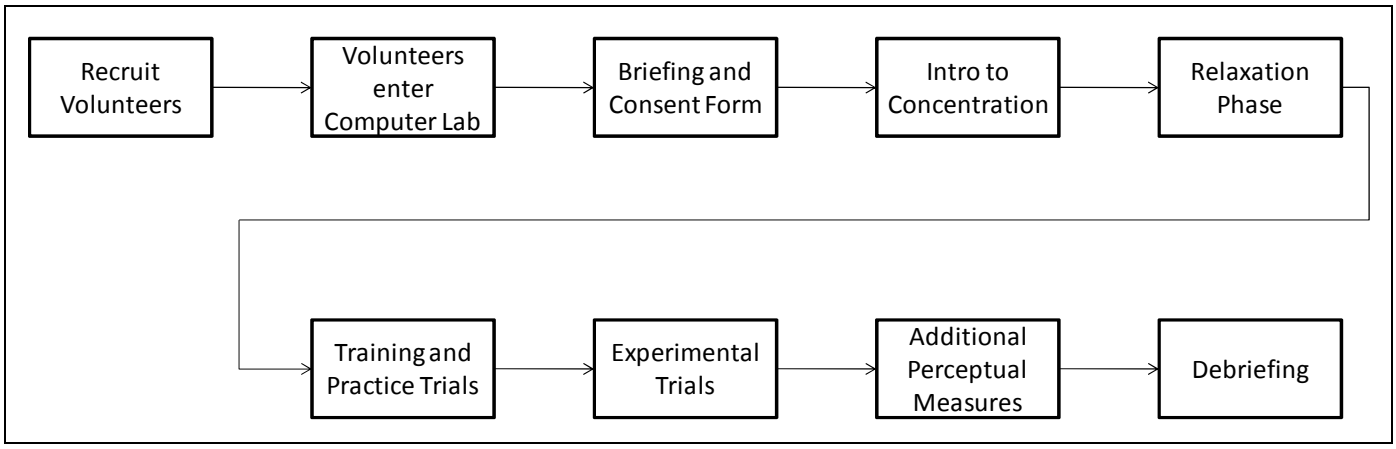

Figure 5. Flowchart of the Experimental Procedure

CONCLUSION

This work-in-progress was motivated by the intriguing question of whether peoples' experiences of stress generated by T-M interruptions depend on their computer experience. We propose that computer experience acts as a coping mechanism by extending individuals' capability to do mental work. With a greater capability for mental work, they may experience less stress from such technological stressors as T-M interruptions.

Consistent with Lazarus (1999), who suggested that coping is an integral part of the stress process that should complement any study of stress, this study contributes to the techno-stress literature by suggesting that coping plays an important role in

the generation of techno-stress and may need to be incorporated in future studies on the subject. This research further contributes to the techno-stress literature by clarifying the role of computer experience in techno-stress and by arguing that this role is sufficiently complex to merit further research. In so doing, this study answers to recent calls for integrating computer experience and techno-stress (Tarafdar et al., 2007), and it improves our fields understanding of the stress process from an IS point of view. By incorporating techno-stress, coping, and computer experience into a single model, we open the door for more complete theories of techno-stress, with stronger explanatory power (Kuhn, 1970).

Regarding practice, the contributions of our research are fairly straightforward. Managers might read our results as a call to reduce T-M interruptions in contexts involving users with low computer experience. In environments where frequent T-M interruptions are unavoidable, managers may find that raising the level of computer experience, which may be accomplished through training (Yi & Davis, 2003), can remedy the resulting techno-stress.

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