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The determinants and expression of computer-related anger

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ABSTRACT

Studies of everyday computer-related anger are rare. To shed more light upon this anecdotally common phenomenon, retrospective self-report questionnaires were used to elicit closed-ended and open-ended responses from 126 members of the general public and students in northern England who supplied psychological and behavioral data connected with a single recently experienced occurrence of computer-related anger. Inter alia, findings show verbal and physical aggression towards equipment to be common in bouts of computer anger, and physical aggression to be associated with greater negative affect prior to incidents but not with stress-related factors. However, stress-related factors and negative affect predicted variance in anger intensity over and above cognitive appraisal variables. It is concluded that computer anger is likely to be a source of stress for a small but significant number of people, that computers' non-sentience leads to physical disinhibition, but that evidence that the expression of computer anger in social environments is inhibited by fear of people's negative evaluations is weak. Further conclusions include the observations that anger is likely to be more intense when theoretically relevant cognitive appraisals are made, a person is in an irritable mood and when physiological arousal is elevated because of ongoing events.

1. Introduction

1.1. Background

Psychological studies of the anger that people experience in their everyday interactions with computers have been limited. While there has been much research on emotion and computing, this work has tended to focus upon issues such as affective computing (i.e. developing technology that can identify and respond to user affect to enhance the user experience, e.g. el Kaliouby, Picard, & Baron-Cohen, 2006; Picard & Klein, 2002), experimental studies of the physiological effects of prolonged system response times (see e.g. Boucsein, 2000), differences in the communication of emotions across computer-mediated and face-to-face situations (e.g. Derks, Fischer, & Bos, 2008), and attempting to use computer games to influence the attributions, emotions and behaviors of aggressive school students in aggression provoking situations (Hobbs & Yan, 2008).

Of the few studies of everyday computer anger that do exist, Wilfong (2006) found that extent of anger in imagined computing scenarios was negatively correlated with computer experience and computer self-efficacy, and positively correlated with computer anxiety. Lower self-efficacy has also been shown to be related to negative response valence (a construct encompassing being angry at the computer, oneself and helplessness or resignation) as opposed to positive response valence (determination to fix a problem) resulting from computer frustration (Bessière, Newhagen, Robinson, & Shneiderman, 2006). Finally, in a study in which an instrument was developed to measure the emotions experienced by people when learning to use new software packages, Kay and Loverock (2008) found that, prior to a course in which preservice teachers used laptops as an integral part of their course, scores on scales measuring positive affect towards computers, negative affect towards computers, cognitions about teachers' and students' interactions with computers, and computer self-efficacy were all related (in the directions that would be expected) to scores on a measure of the anger habitually experienced when learning how to use a new software package. Anger was also found to be correlated with other emotions measured (positively with anxiety and sadness, and negatively with happiness), and, among other observations, both anger and anxiety were shown to be reduced between the start and end of the eight month course.

Although the previously mentioned studies on emotional aspects of computing are informative, none of them gave specific consideration to the circumstances underlying individual instances of computer anger and the behavioral expression of this anger. In seeking to address this general gap in the literature, the presently reported study can be considered to make a novel contribution. After briefly reporting on the frequency of computer anger, the study examines the following research questions:

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(i) Are factors related to ongoing stress and negative affect related to anger intensity and do they predict anger intensity over and above the cognitive factors said to fully specify the occurrence of anger in Smith and Lazarus' (1990, 1993) appraisal model of anger?
(ii) Are people particularly likely to act upon their impulses to overtly display anger towards the computer because it is a non-sentient entity, especially when they are alone?
(iii) Does greater ongoing stress and negative affect lead to increasingly greater expression of computer-related aggression?

From an applied perspective, studies of computer-related anger are important because computer-related stress is a common feature of advanced societies. For example, over 60% of respondents cited slow program and computer speeds as a common source of stress over a two month period in a US study by Hudiburg (1995). More recently, a UK poll for the Symantec Corporation showed 86% of people surveyed to have experienced stressful IT-related incidents (Leyden, 2003).

1.2. Computer anger: concept and antecedents

The present article is predicated upon the assumption that computer anger is a common occurrence, that it has the potential to be a major source of stress, and therefore that its causes and the behaviors associated with it are an important topic for research. However, there is little hard data about the frequency with which computer anger occurs. Therefore a preliminary aim of the present study was to obtain data on the frequency of computer anger.

A second presently considered issue was the extent to which ongoing stress and a person's affective state are implicated in instances of computer anger over and above cognitive factors. With respect to the latter, recent work using part of the same data set as that presently analyzed has compared computing and driving anger within the framework of the Smith and Lazarus (1990, 1993) variant of appraisal theory (Charlton & Kappas, 2009).

As with other versions of appraisal theory, the Smith and Lazarus model seeks to specify the cognitions underlying various emotions. The model splits the appraisal process into two parts; primary appraisals which determine whether an event is of motivational importance and motivationally congruent or incongruent, and secondary appraisals which, assuming that an event is motivationally important and depending upon whether the event is motivationally congruent or incongruent, determine the emotional response. According to the model, anger resulting from frustrating computing situations would be explained by the event being appraised as motivationally important and motivationally incongruent during the primary appraisal process, with anger occurring because an appraisal of other accountability is made during the secondary appraisal process.

The recent work of Charlton and Kappas (upon which the present article builds) found that all three appraisal components taken to fully specify the generation of anger in the Smith and Lazarus model were predictive of anger intensity both when computing and when driving. The observation that other accountability, in the form of computer accountability, was just as highly related to intensity of computer anger as other human accountability was to driving anger intensity is consistent with the idea that people have relationships with, and expectations of, computers which are similar in many respects to the relationships and expectations that they have with regard to other humans (e.g. Ferdig & Mishra, 2004; Reeves & Nass, 1996), although, in general, studies directly comparing humans' responses to inter-human interactions and human–computer interactions show that computer-elicited responses tend to be weaker (Aharoni & Fridlund, 2007). Also, the findings for motivational incongruence and importance suggest that having one's goals blocked is important in computer anger, the blocking of one's goals leading to frustration (which is the most commonly cited negative computing experience – Bessière et al., 2006). In turn, frustration often, but not always, leads to anger.

Consistent with the above, in his landmark series of studies on anger, Averill (1982) found that 'frustration, or the interruption of some ongoing or planned activity' (p.173) was the most commonly mentioned instigator of anger. However, frustration was not usually a sufficient condition for anger: most people also cited other factors including; 'violations of important personal expectations or wishes... (and) violations of socially accepted ways of behaving' (p.173). These seem particularly relevant to computer anger. Thus, given the similarity of people's expectations of humans and computers (e.g. Ferdig & Mishra, 2004; Reeves & Nass, 1996), it can be argued that, for example, when using a word processing program we expect our words to appear on the VDU almost instantaneously, and when this does not happen we become angry both because our goal of finishing our task is being blocked and because the computer is not meeting our expectations. Similarly, the failure of a computer to respond in a timely manner to input might also be said to violate socially accepted ways of behaving. The fact that the above types of goal blocking often seem to occur for no known reason is also likely to add to anger, experimental work showing that frustrations occurring for arbitrary reasons evoke greater hostility than those which appear more justifiable (Dill & Anderson, 1995).

It is reasonable to propose that, along with cognitive factors, ongoing stress and affective state at the time of an incident should also be implicated in computer anger. Here, Marcus-Newhall, Pedersen, Carlson, and Miller (2000) refer to work by Isen and various colleagues (e.g. Isen & Shalker, 1982) showing that negative and positive moods lead people to have more negative and positive perceptions of events respectively, and that the existence of negative moods therefore increases the likelihood of aggression occurring. One useful explanatory framework here is Zillman's (e.g., 1996) concept of excitation transfer, whereby residual autonomic arousal resulting from prior events is transferred to a current event, resulting in greater intensity of emotion. Although computer anger is not always displaced anger, the literature on displaced anger is also of relevance. Anger is said to be displaced when a level of aggression occurs that is disproportionate to the provocation provided by the target because of a failure to respond aggressively towards a previous provocation (Marcus-Newhall et al., 2000). Marcus-Newhall et al. note that Dollard (1938) and Dollard, Doob, Miller, Mowrer, and Sears (1939) considered that the three key attributes of targets of displaced anger are that the target acts as an irritant, is available and lacks power, and that even minor provocations by such targets are likely to trigger aggressive behavior in circumstances where a failure to respond aggressively towards a previous provocation results in the energizing of aggressive behavior and a lowering of the threshold for the instigation of such behavior. In addition to computer anger often being disproportionate to the provocation provided by the computer, these three key attributes of targets of anger usually pertain during episodes of computer anger (and when anger is directed towards other inanimate objects too).

Not surprisingly then, mood has previously been shown to be predictive of computer-related frustration (Bessière et al., 2006), and appraisal theorists recognize that moods can lower the threshold at which emotions are triggered and the intensity with which emotions occur. For example, Roseman and Smith (2001) point out that being in an irritable mood should result in anger more readily occurring, and result in anger of greater intensity, in the presence of the correct configuration of triggers, with Frijda and Zeelenberg (2001) suggesting that mood and heightened arousal