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RESEARCH ARTICLE

THE OTHER SIDE OF ACCEPTANCE: STUDYING THE DIRECT AND INDIRECT EFFECTS OF EMOTIONS ON INFORMATION TECHNOLOGY USE[1]

By: **Anne Beaudry**
John Molson School of Business
Concordia University
1455 de Maisonneuve Boulevard West
Montréal, Québec
CANADA
abeaudry@jmsb.concordia.ca

Alain Pinsonneault
Desautels Faculty of Management
McGill University
1001 Sherbrooke Street West
Montréal, Québec
CANADA
alain.pinsonneault@mcgill.ca

Abstract

Much ado has been made regarding user acceptance of new information technologies. However, research has been primarily based on cognitive models and little attention has been given to emotions. This paper argues that emotions are important drivers of behaviors and examines how emotions experienced early in the implementation of new IT applications relate to IT use. We develop a framework that classifies emotions into four distinct types: challenge, achievement, loss, and deterrence emotions. The direct and indirect relationships between four emotions (excitement, happiness, anger, and anxiety) and IT use were studied through a survey of 249 bank account managers. Our results indicate that excitement was positively related to IT use through task adaptation. Happiness was directly positively related to IT use and, surprisingly, was negatively associated with task adaptation, which is a facilitator of IT use. Anger was not related to IT use directly, but it was positively related to seeking social support, which in turn was positively related to IT use. Finally, anxiety was negatively related to IT use, both directly and indirectly through psychological distancing. Anxiety was also indirectly positively related to IT use through seeking social support, which countered the original negative effect of anxiety. Post hoc ANOVAs were conducted to compare IT usage of different groups of users experiencing similar emotions but relying on different adaptation behaviors. The paper shows that emotions felt by users early in the implementation of a new IT have important effects on IT use. As such, the paper provides a complementary perspective to understanding acceptance and antecedents of IT use. By showing the importance and complexity of the relationships between emotions and IT use, the paper calls for more research on the topic.

Keywords: Emotions, IT use, acceptance, adaptation behaviors, appraisal theory, user reaction, IT-related behaviors

Introduction

Information systems research has made significant strides toward understanding the antecedents of IT use through cognitive-based models such as the technology acceptance model (Davis 1989; Davis et al. 1992), the unified theory of

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The appendices for this paper are located in the "Online Supplements" section of the *MIS Quarterly*'s website (http://www.misq.org).

acceptance and use of technology (Venkatesh et al. 2003), the innovation diffusion theory (Rogers 1983), the decomposed theory of planned behavior (Taylor and Todd 1995), and the social cognitive theory (Compeau et al. 1999). These models predict IT use based on perceptions and beliefs about the instrumental nature of technology such as effort and performance expectancy, perceived compatibility, and relative advantage. However, usage of a new IT is complex and multifaceted and, as research in psychology shows, cognitive models do not capture all of the antecedents of behaviors. Emotions also play a powerful and central role in our lives; they influence our beliefs and attitudes and they help guide our thinking, decision making, and actions (Gratch and Marsella 2004; Lazarus and Folkman 1984; Loewenstein et al. 2001). Emotion-based models of IT use are thus needed to complement cognitive-based approaches.

While the importance of emotions has been recognized in acceptance research, they have been studied only tangentially. Most studies have looked at how ongoing IT use triggers emotions and how these emotions influence subsequent user attitudes, beliefs, and intentions. Little attention has been given to understanding how emotions can influence initial IT use. Further, a limited number of emotions have been studied and they have been studied by integrating them into cognitive models of acceptance (e.g., affect toward use in the decomposed theory of planned behavior, anxiety in social cognitive theory and in UTAUT). Cognitive-based models can hardly capture the full range of emotional reactions of users and account for their relationships to IT use. For example, Zuboff (1988) found that for some workers, the implementation of a new control system triggered frustration, anger, and fear, while others have documented the presence of emotions such as happiness, joy, relief, fear, anger, frustration, irritation, and annoyance (Beaudry and Pinsonneault, 2005; Brown et al., 2004; Cenfetelli 2004; Compeau et al. 1999; Thüring and Mahlke 2007; Venkatesh 2000). There is a need for a framework that can predict the occurrence of emotions and explain their consequences on IT use (Komiac and Benbasat 2006; Lewis et al. 2003; Venkatesh 2000).

This paper addresses these issues. It extends the work of Beaudry and Pinsonneault (2005), which focused on how initial appraisal of a recently implemented IT system influenced user adaptation and performance outcomes, by studying how emotions occurring in the anticipation period of an implementation (i.e., prior to the deployment of the new IT system) affects IT use. The paper develops a framework that classifies emotions and, drawing on the appraisal tendency framework (Han et al. 2007; Lerner and Keltner 2000), studies how emotions are related to usage of a new IT system both directly and indirectly through adaptation behaviors. By studying emotional antecedents of IT use, this paper presents a new and complementary approach to existing cognitive-based models of acceptance. It therefore contributes to predicting user reactions and IT use.

The remainder of the paper is organized as follows. The next section reviews the research on emotions and IT use. The subsequent section develops a framework that classifies emotions and presents the research hypotheses. The method is described next and the results follow. The paper ends with a discussion of the results, contributions for research and practice, and suggestions for future research.

Emotions in Studies of IT Use

Emotions are a mental state of readiness for action that promote behavioral activation and help prioritize and organize behaviors in ways that optimize individual adjustments to the demands of the environment (Bagozzi et al. 1999; Lazarus 1991). As such, emotions influence behaviors or changes in action readiness. Emotions have specific referents and they arise in response to the appraisal of an event perceived as relevant and important to an individual (Bagozzi et al. 1999; Lazarus 1991).[2] Technological artifacts trigger emotional reactions from individuals when they interrupt the sequence of events in one's routine (Rafaeli and Vilnai-Yavetz 2004). In this context, emotions and adaptation behaviors serve to bridge the gap between the moment one's routines are interrupted, including an awareness of a future interruption, and the time new routines are established or the old routines reestablished.

Table 1 summarizes the IS studies that have examined emotions and how they relate to attitudes, beliefs, and IT use. The studies are grouped by period (i.e., whether emotions were studied before (*anticipation*) or after (*impact*) the deployment of the new IT)[3] and by the type of emotions analyzed: system

[2]While moods and emotions are often used interchangeably, moods are generally conceived as being of lower intensity, and often occur without specific referents (Bagozzi et al. 1999). Moods are intra-individual changes, generally non-intentional (i.e., they are not associated with explicit intentions to act) and diffused (Bagozzi et al. 1999; Frijda 1986). Affect is also often conceived and measured as an emotion but, in fact, it is different. Affect is a psychological state that entails an evaluative component (e.g., good–bad, like–dislike) (Bagozzi et al. 1999). As such, an affect is not necessarily triggered by specific events and often constitutes a background to consciousness and to other mental states (Kelly and Barsade 2001; Lazarus 1991).

[3]Emotions can also occur in the last period, *post-impact*, which is when the stressful encounter has ended (Lazarus and Folkman 1984). This period is similar to the routinization period where users have integrated the IT into their work practices and have standardized its usage (e.g., Cooper and Zmud 1990; Tyre and Orlikowski 1994). In this period, new considerations emerge that deal with how one can adjust psychologically and materially with the consequences of the event (Lazarus and Folkman 1984). It is not included here because we found no studies conducted in this period.

Table 1. Emotions in Studies of IT Use

Author	Emotion	Operational Definition	Type of Emotion	Sample	Main Results
Anticipation Period					
Chin and Gopal 1995	Enjoyment	The extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequence (Davis et al. 1992)	Specific	64 undergraduate students surveyed on their intention to adopt a group support system	Across 6 various approaches to analyze the data, enjoyment explains, on average, 15% of the variance of adoption intention
Impact Period					
Bhattacherjee 2001	Satisfaction	Users' affect with (feelings about) prior (online banking) use	Specific	122 online banking users	Satisfaction positively related to continuance intention (β = 0.567***)
Cenfetelli 2004	Positive vs. Negative	*Positive emotions*: Fondness, happiness, joy, contentment *Negative emotions*: Unhappiness, worry, anger, nervousness, regret, disgust, fear, anxiety, irritation		387 members of a marketing firm panel using a travel website	Positive emotions are positively related to perceived ease of use (β = 0.42*) Negative emotions are negatively related to perceived ease of use (β = –0.65*)
Davis et al. 1992	Enjoyment	The extent to which the activity of using the computer is perceived to be enjoyable in its own right		Sample 1: 200 MBA students Sample 2: 40 MBA students	Enjoyment is positively related to intention to use (S1: β = .16, $p < .002$; S2: β = .15, $p < .016$)
Kim et al. 2004	Pleasure	The degree to which a user feels good or happy		218 users of mobile Internet devices	Pleasure is positively related to attitude toward use (β = 0.37***)
	Arousal	The degree to which a user feels excited or stimulated			Arousal is positively related to attitude toward use (β = 0.22**)
Koufaris 2002	Enjoyment	One of the emotion components of flow which is the holistic sensation that people feel when they act with total involvement		280 subjects (from online market research company)	Enjoyment is positively related to one's intention to return to an online shopping website (β = 0.400**)
Trevino and Webster 1992	Flow	A subjective psychological experience that characterizes the human–computer interaction as playful		75 e-mail users and 79 voice mail users	Flow is positively related to attitudes toward the system (.15), effectiveness (.16), and quantity of use (.08) all paths at $p < 0.05$.
Venkatesh 1999	Enjoyment	The extent to which the activity of using the computer is perceived to be enjoyable in its own right		Sample 1: 69 knowledge workers Sample 2: 146 knowledge workers	Enjoyment is positively related to perceived ease of use
Venkatesh et al. 2003	Affect	One's linking for a particular behavior (computer use)		Sample 1: 54 users (online meeting management) Sample 2: 58 users (portfolio analysis) Sample 4: 38 users accounting system)	Affect is not significantly related to intention to use
	Anxiety	The feelings of apprehension or anxiety that one experiences			Anxiety is negatively related to intention to use (β = –0.15*)
Webster et al. 1993	Flow	A subjective psychological experience that characterizes the human–computer interaction as playful		43 users of e-mail	Flow is positively related to use, .82, $p < 0.05$

Table 1. Emotions in Studies of IT Use (Continued)

Author	Emotion	Operational Definition	Type of Emotion	Sample	Main Results
Impact of Period					
Brown et al. 2004	Anxiety	One's level of fear of apprehension associated with actual or anticipated use of IT to communicate with others	General & Specific †	193 university students	Computer-mediated communication (CMC) anxiety is negatively related to attitude toward using a CMC tool (β = –0.58***)
Compeau and Higgins 1995	Anxiety	The feelings of apprehension that one experiences	General	1020 knowledge workers (computers in general)	Anxiety is negatively related to use (β = 0.11***)
	Affect	The enjoyment one derives from using computers			Affect is positively related to use (β = 0.19***)
Compeau et al. 1999	Affect	The enjoyment one derives from using computers		394 subscribers of a business periodical (computers in general)	Affect is positively related to use (β = 0.25***)
	Anxiety	The feelings of apprehension that one experiences			Anxiety is not related to system use
Todman and Monaghan 1994	Anxiety	The pressure felt when interacting with a computer		180 undergraduate students (computers in general)	Computer anxiety is negatively related to use (β = –0.69**)
Venkatesh 2000	Anxiety	One's apprehension, or even fear, when faced with the possibility of using computers		Sample 1: 58 users (online help desk) Sample 2: 145 users (property management system) Sample 3: 43 users (payroll application	Anxiety is negatively related to perceived ease of use (T1: β = –0.30***; T2: β = –0.26***; T3: β = –0.25***)‡
	Enjoyment	The extent to which the activity of using a specific system is perceived to be enjoyable in its own right	Specific		Enjoyment is positively related to perceived ease of use (T1: ns; T2: β = 0.18*; T3: β = 0.24**)
	Playfulness	The degree of spontaneity in microcomputer interactions	General		Playfulness is positively related to perceived ease of use (T1: β = 0.20***; T2: β = 0.16*; T3: ns)
Webster and Martocchio 1992	Anxiety	One's tendency to be uneasy, apprehensive, or fearful about use of computers		Sample 1: 61 undergraduate students Sample 2: 158 undergraduate students Sample 3: 95 undergraduate students Sample 4: 77 users (computers in general)	Computer anxiety is negatively related to playfulness (S1: ns; S2: β = –0.60***; S3: β = –.56***; S4: β = –0.46***)
	Playfulness	One's tendency to interact spontaneously, inventively, and imaginatively with microcomputers			Playfulness is positively related to learning (S3: β = 0.24*; S4: β = 0.42***), mood (S3: β = 0.33**; S4: β = 0.34**), involvement (S4: β = 0.49***), and satisfaction (S4: β = 0.32**)

*p < 0.05; **p < 0.01; ***p < 0.001

†Brown et al. (2004) studied two types of anxiety. General computer anxiety measured the tendency of individuals to be uneasy, apprehensive, or fearful about the current or future use of computers at large. Specific computer anxiety related to using e-mail. While the later type was measured for a type of system (rather than for a specific IT system), we still classified it as specific emotion because the referent point is relatively precise and well delimited.

‡T1, T2, and T3 refer to three different times: T1 (following initial training), T2 (after 1 month of use), T3 (after 3 months of use).

specific emotions (emotions associated with a particular IT system) or general emotions (emotions related to IT or computers in general).

Three observations can be made regarding the extant research. First, all studies, with the exception of Chin and Gopal (1995), focused on emotions that occurred during the impact period (i.e., when the new IT had been deployed and was being used). In this period, emotions are generated based on users' perceptions of the features of the new IT and on their use of the new IT. Users assess whether the technology constitutes a threat or an opportunity and they evaluate how they can adapt by changing their work, behaviors, and/or the technology itself (Beaudry and Pinsonneault 2005). The evidence indicates that general emotions, such as anxiety in using computers, general computer playfulness, or affect toward computers, influence users' attitudes and use of specific IT (e.g., Compeau and Higgins 1995; Compeau et al. 1999; Todman and Monaghan 1994; Venkatesh 2000; Webster and Martocchio 1992). In addition, specific emotions (e.g., pleasure, arousal, and enjoyment) are related to users' attitudes toward, and subsequent use of, the new IT (e.g., Brown et al. 2004; Kim et al. 2004; Venkatesh et al. 2003).

Second, the empirical evidence on the relationship between some specific emotions and IT use in the impact period is mixed. For instance, anxiety was found to be both negatively associated with IT use (Compeau and Higgins 1995; Todman and Monaghan 1994) and not significantly associated with IT use (Compeau et al. 1999). This can be explained by the fact that as psychology research suggests (Lazarus and Folkman 1984), transitional adaptation behaviors can mediate the relationship between emotions and IT use, which sometimes can cancel the original effects of an emotion. Research has, however, focused on the mediating effects of attitudes and beliefs (e.g., Brown et al. 2004; Venkatesh 1999, 2000; Venkatesh et al. 2003), but not on intermediate behaviors. Contradictory findings can also result from the fact that we lack a conceptual framework allowing us to distinguish among different emotions on the basis of their fundamental differences and similarities.

Third, the effects of emotions occurring prior to the deployment of a new IT (i.e., in the anticipation period) on attitudes, beliefs, behaviors, and IT use occurring during the impact period are left largely unexplored. Yet research in psychology, and more specifically the appraisal tendency framework (ATF) (Han et al. 2007; Lerner and Keltner 2000), suggests that emotions exert long-lasting effects on judgment, decision making, and behaviors. ATF posits that each emotion carries with it motivational properties that color the appraisal of subsequent events and actions until the emotion-eliciting event is resolved (Lerner and Keltner 2000; Lerner and Tiedens 2006). For example, ATF research shows that because sadness usually occurs with situational control (i.e., individuals are sad when a negative event is seen as resulting from situational factors that are out of their control), sad people will attribute the blame of a new event on situational factors and will adapt accordingly (Han et al. 2007). On the contrary, because anger is associated with human agency and control (i.e., angry people put the blame and responsibility for an event on other individuals), ATF posits that angry people will attribute blame and responsibility of a new situation to other individuals and will react accordingly (e.g., by venting and confronting others). Therefore, ATF suggests that emotions occurring in the anticipation period are likely to have carry-over effects on user attitudes, beliefs, and usage patterns occurring during the impact period. This suggests that, in the anticipation period, emotions are triggered on the basis of the perceived likely impacts that the new IT will have. The appraisal process assesses whether the event will happen, when it will happen, what are the expected consequences of the event, and what can be done about it. Therefore, emotions are likely to be triggered prior to the actual deployment of a new IT based on the users' expectations of how it will affect themselves, their work and performance, and what they think they can do about the situation.

A Framework for Classifying Emotions

We draw on the coping model of user adaptation (Beaudry and Pinsonneault 2005) and on appraisal theories of emotions (e.g., Lazarus and Folkman 1984; Smith and Ellsworth 1985) to develop a framework (Figure 1) that classifies emotions. Beaudry and Pinsonneault (2005) suggested individual reactions to new IT events[4] are based on the assessment of their personal and professional relevance and are determined by primary appraisal and secondary appraisal. We combine these two dimensions in our framework to group emotions into four distinct classes. In primary appraisal, an individual determines whether the new IT constitutes an opportunity or a threat. This dimension is similar to what emotions theorists call goal achievement, the degree to which an event facilitates or hinders achievement of personal goals (Bagozzi 1992). In secondary appraisal, individuals assess the degree to which they feel they have control over the realization of the expected consequences of a given event (Beaudry and Pinsonneault 2005; Lazarus and Folkman 1984). This dimension parallels

[4]We use the term *IT event* to refer to IT-induced changes that are perceived as important and relevant by individuals, which can include the implementation of a new software or package or major changes made to an existing IT. In the present paper, we focus on the announcement of the eminent deployment of a new IT.

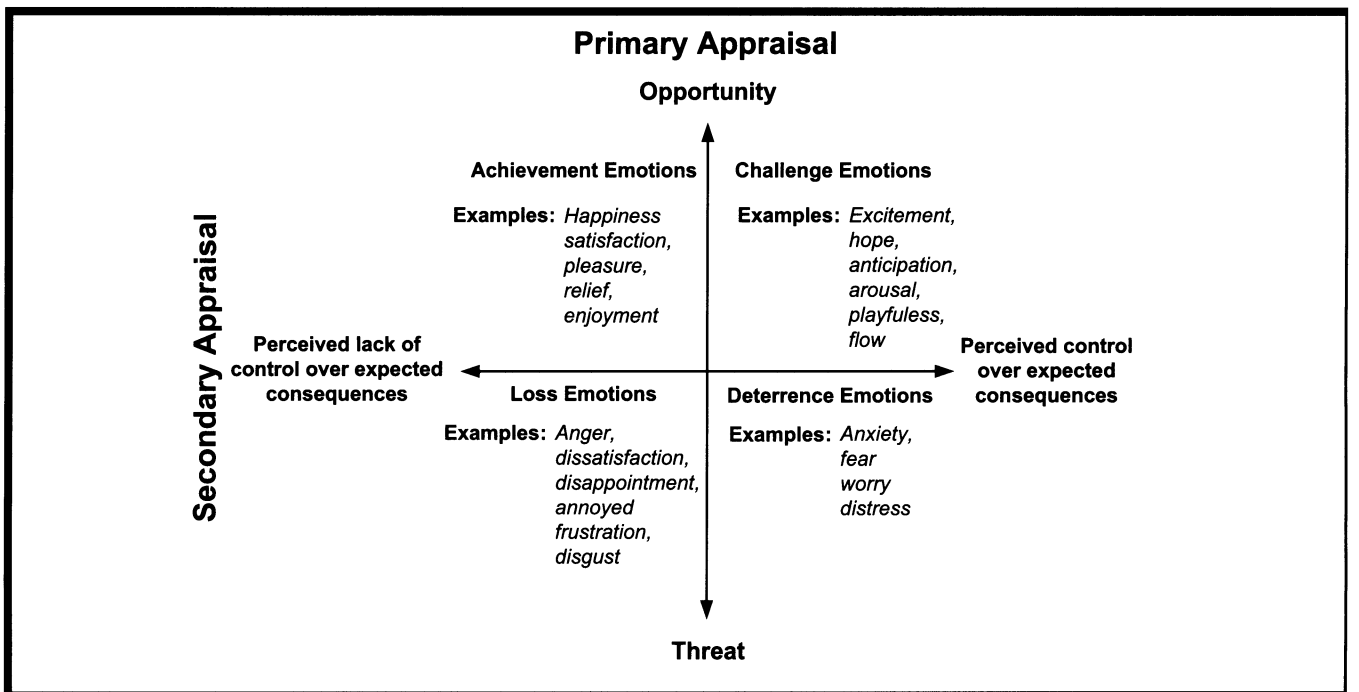

Figure 1. A Framework for Classifying Emotions

the degree of certainty about the event's outcome of emotions theorists (Bagozzi 1992; Smith and Ellsworth 1985).

These two dimensions are combined to create four classes of emotions that we label *loss, deterrence, challenge*, and *achievement.* Because they are triggered by different appraisals, ATF and other emotion theories suggest that emotions from different classes will lead to different adaptation behaviors and will influence goal behaviors differently (Bagozzi 1992; Han et al. 2007). It is important to note that it is not the IT event or the IT artifact per se that triggers emotions but the unique psychological and evaluative assessment of the event/artifact by an individual. Thus, different people can have different sets of emotional responses to a given IT artifact or to a specific IT event. In addition, most events and artifacts have the potential of triggering an array of emotions in an individual, within a given group, and across groups. As a first exploratory step, this paper studies the relationships between one emotion per class (i.e., anger, anxiety, excitement, and happiness) and IT use directly and indirectly through adaptation behaviors.

Loss Emotions (Anger and IT Use)

This class of emotions reflects the perception of an IT event as a threat and the perception of a lack of control over its consequences. In such a case, emotions such as anger, dissatisfaction, frustration, and disgust are likely to be experienced (e.g., Bagozzi 1992; Bagozzi et al. 1999; Lazarus 1991).

Direct effect of anger on IT use. Anger is typically associated with an overriding desire to punish the agent responsible for the frustration (Han et al. 2007; Scherer and Tran 2001). Anger leads to confrontational behaviors and to retribution and usually has dysfunctional effects, impeding the achievement of goal behaviors (Yi and Baumgartner 2004). Since anger is associated with certainty about the occurrence of an outcome, it usually elicits defensive mechanisms in which individuals systematically de-emphasize the importance of the event itself, often times by limiting encounters with the stressor (Han et al. 2007). In the context of an IT implementation, this suggests that anger will be associated with efforts to reduce the importance and personal relevance of the new IT system and to limit its use. In fact, anger triggered by failures in the use of self-service technology has been found to be negatively related to customer satisfaction, loyalty, and frequency of future use (Gelbrich 2009). Thus, we hypothesize

H1a Anger will be negatively associated with IT use.

Indirect effects of anger on IT use. ATF suggests that because anger is associated with the belief that other people are responsible for the negative event, intermediate adaptation

behaviors will mainly target individuals (Lerner and Tiedens 2006). Anger is thus likely to relate to IT use through two adaptation behaviors. First, anger will be related to *venting,* openly expressing emotions to, and blaming others for the expected or actual outcome (Keltner et al. 1993). Anecdotal evidence in IS supports this relationship. Beaudry and Pinsonneault report that respondents who were angry at the introduction of a new IT in their work environment openly complained about it and refused to use the new IT for a while. The literature in psychology also shows that anger is associated with attacks or retaliation toward individuals who were perceived as being responsible for the outcome respondents were experiencing (Ellsworth and Smith 1988). Anger leads to the expression of negative feelings to others (McCrae 1984) and to a tendency to perform emotional discharge (Moos and Billings 1982).

Venting can mediate the relationship between anger and IT use in two ways. On the one hand, in line with catharsis theory, venting can have the effect of "letting off steam" and "clearing the air" (e.g., Bushman et al. 2001) and eventually reestablish emotional stability. On the other hand, venting can also reinforce anger (e.g., Bushman 2002) and be detrimental to IT use. Markus (1983) documented various accounts of users' verbal and written complaints following the implementation of a financial information system. The complaints that continued two years after the implementation seemed related to a lack of acceptance and under-usage of the system by an entire division. Reactions similar to venting, such as open confrontations, gossiping, complaining, and "software bitching" (users' carefully documenting problems and flaws with the computerized system) have been reported following the introduction of a computerized health management system (Prasad and Prasad 2000) and have led to the refusal of using new IT systems (Lapointe and Rivard 2005). Venting makes individuals overly focused on the distress itself (Scheff 1979), exacerbates the salience of the distress (Carver et al. 1989), amplifies adverse effects of negative emotions (Brown et al. 2005), and increases emotional activation (Carver et al. 1989). We thus expect that venting will reinforce the negative link between anger and IT use.

H1b Anger will be negatively associated with IT use through venting.

Second, in an effort to restore emotional stability and be able to face the situation at hand, anger will lead individuals to *seek social support,* that is, look for sympathy, understanding, encouragement, advice, and moral support from family, friends, and colleagues (Bagozzi et al. 1999; Carver et al. 1989; Yi and Baumgartner 2004). Seeking social support is often associated with anger in numerous contexts (Stets and Tsushima 2001), including mergers and acquisitions (Fugate et al. 2002). Given the perceived lack of control of individuals in situations in which anger typically arises, people revert to social support as a mean to get assistance and reinterpret situations (Stets and Tsushima 2001). In the context of the implementation of a new IT, this suggests that anger will be related to seeking the support and sympathy of colleagues, friends, and relatives in trying to overcome the triggering situation.

Social support often acts as a turnaround mechanism in which the initial situation is reappraised and often perceived more positively than initially thought (Lazarus and Folkman 1984; McKee-Ryan et al 2005).[5] Social support is thus likely to allow users to cope with their anger and overcome the perceived loss associated with the new IT, thus facilitating its usage in two main ways. First, social support acts in a manner similar to social influence in user acceptance models. Social support alters one's belief structure and behaviors through compliance with others' expectations (i.e., others expecting one to accept and use the new IT), internalization of values and norms with regard to using the new system, and identification with a group who is accepting it (Venkatesh et al. 2003). The effect of social support is likely to be especially important in early stages of implementation because individuals' opinions are still relatively ill-formed and based on others' views and perceptions (Venkatesh et al. 2003). Research in psychology shows that social-network embeddedness helps individuals feel good about themselves and get reassured, which helps to maintain a positive outlook on events (Carver et al. 1989; McKeen-Ryan et al. 2005). Second, social support plays the role of a buffer that absorbs some of the stress related to the disruption that the new IT causes and it helps mitigate the initial negative perception of the new IT (Viswesvaran et al. 1999). Research in psychology provides additional support for the positive effect of seeking social support. McKee-Ryan et al.'s (2005) meta-analysis indicates that seeking social support is associated with faster reemployment following a lay-off because it allows individuals to reestablish emotional stability rapidly and completely. People are generally reassured by social support, which leads them to more successfully deal with the situation at hand (Carver et al. 1989). For instance, seeking social support enhances the adjustment to a variety of work stressors and is positively associated with job satisfaction even in a stressful environment (Terry et al. 1996). Hence, we expect that seeking social support will counter the negative effect of anger on IT use.

[5]There exists another type of social support which is called *negative social support* (social undermining or social hindrance). Here, individuals seek confirmation and reinforcement of their negative emotions by choosing to talk to people who share similar reactions (McKee-Ryan et al. 2005). This type of social support usually amplifies feelings of anger and anxiety, rather than attenuating them. In this paper, we focus on positive social support (i.e., individuals trying to get help to overcome the situation at hand). We thank a reviewer for pointing out the notion of negative social support.

H1c Anger will be positively associated with IT use through seeking social support.

Deterrence Emotions (Anxiety and IT Use)

Emotions from this class occur when the IT event is perceived as a threat and the individual feels that he/she has some control over its consequences. Emotions such as anxiety, worry, fear, and distress will be experienced in this situation (Bagozzi 1992; Folkman and Lazarus 1985).

Direct effect of anxiety on IT use. The empirical evidence in IS suggests that anxiety is negatively related to IT use (Compeau and Higgins 1995; Compeau et al. 1999; Todman and Monaghan 1994). Anxiety has also been found to be negatively related to several antecedents of IT use such as perceived ease of use and usefulness (Srite et al. 2007), computer playfulness (i.e., anxious users were less spontaneous and involved in their computer interactions) (Webster and Martocchio 1992), computer self-efficacy (Thatcher and Perrewe 2002), attitudes toward use (Brown et al. 2004; Venkatesh 2000), and intention to use (Venkatesh et al. 2003). Users have been said to resist using a new technology when they fear that it might potentially decrease their power (Lapointe and Rivard 2005; Markus 1983). Research in psychology explains the negative relationship between anxiety and IT use. It shows that people cope with anxiety by physically avoiding the stressor (Duhachek 2005) or by engaging in exit strategies such as by asking for a transfer, missing work, or even quitting a job or retiring (Lazarus and Folkman 1984). This is consistent with the literature in organizational behavior which indicates that anxiety leads individuals to distance themselves from their jobs (Hackett and Bycio 1996). Individuals deal with anxiety by reducing their efforts to cope with the situation and by giving up trying to achieve a desired goal behavior (Carver et al. 1989; Yi and Baumgartner 2004).

Thus, the following hypothesis:

H2a Anxiety will be negatively associated with IT usage.

Indirect effects of anxiety on IT use. ATF suggests that anxiety will be associated with adaptation behaviors that aim at reducing the risk level of a situation (Han et al. 2007). In our context, this means that anxiety will be related to IT use through two adaptation behaviors. First, in an effort to restore emotional stability and be able to face the situation at hand by reassessing the situation, anxiety will lead to *seeking social support*. Beaudry and Pinsonneault showed that help and support from colleagues were instrumental in the acceptance and use of a new IT by managers who were initially afraid of its potential negative consequences. Research in psychology shows that in the anticipatory period (e.g., prior to taking the exam), anxious individuals tend to seek social support in an effort to get reassurance (Folkman and Lazarus 1985). Similarly, the expectation of a negative outcome in the context of a merger or acquisition and anticipation of personal financial strains were positively associated with seeking social support (Fugate et al. 2002; McCrae 1984). As discussed earlier, seeking social support acts as a turnaround mechanism and allows individuals to overcome their anxiety and reappraise the situation and the new IT more positively, thus facilitating IT use. We thus expect that seeking social support will counter the negative effect of anxiety on IT use.

H2b Anxiety will be positively associated with IT use through seeking social support.

Anxiety will also trigger *psychological distancing*, that is, directing one's attention away from the situation and detaching oneself from it (Folkman et al. 1986; Yi and Baumgartner 2004). Anxiety about the prospective negative consequences of a new IT is thus likely to trigger psychological distancing. While there exist no studies in IS that looked directly at psychological distancing, empirical evidence suggests a link with anxiety. Anxiety has been found to have an adverse effect on the attention users devoted to the task at hand and lead people to direct their attention to off-task activities (Venkatesh 2000). Individuals experiencing anxiety shielded themselves from the event by blocking new information related to that event (Scherer and Tran 2001).

Presumably, the mediating effect of psychological distancing in an IT context parallels its effects found in other contexts such as self-regulation behaviors and test anxiety (Carver et al. 1989) and social anxiety (Carver and Scheier 1986). Psychological distancing minimizes the perceived negative effects of anxiety by directing attention away from the stressor (Yi and Baumgartner 2004). Anxiety is also associated with other reactions closely related to psychological distancing, such as mental disengagement (Carver et al. 1989; Yi and Baumgartner 2004) and wishful thinking (Fugate et al. 2002). Anxiety has also been associated with people avoiding stressing situations by taking their minds off the problem through strategies such as day dreaming and escaping (Yi and Baumgartner 2004). Psychological distancing helps restore emotional stability by redirecting attention away from the stressor. It can, however, also be dysfunctional because it impedes adaptive processes, hinders resolution of problems (Folkman et al. 1986), and leads to maladaptation (Billings and Moos 1984). We thus expect that psychological distancing will reinforce the negative effect of anxiety on IT use.

H2c Anxiety will be negatively associated with IT use through psychological distancing.

Challenge Emotions (Excitement and IT Use)

Emotions from this class are triggered by the appraisal of an event as being an opportunity likely to result in positive consequences and over which individuals feel they have some control. Folkman and Lazarus (1985) argue that an appraisal of challenge might evoke excitement, eagerness, playfulness, arousal, and flow.

Direct effect of excitement on IT use. In such a situation, individuals are excited about the potential benefits the new IT can generate and therefore they will try to pursue these benefits by using the new IT (e.g., Beaudry and Pinsonneault 2005). Scherer and Tran (2001) suggest that emotions such as excitement are likely to fuel the investment of energy into new activities of exploration and provide the necessary drive to attain the objectives associated with goal behaviors. The empirical evidence in IS suggests that excitement is likely to be positively related to IT use. For instance, cognitive absorption, comprising of playfulness and flow (which are in the same class as excitement) was found to be positively related to perceived ease of use and usefulness (Agarwal and Karahanna 2000). Similarly, arousal (i.e., the degree to which a user felt excited or stimulated by the technology) was positively related to attitude toward IT use (Kim et al. 2004). We thus expect that excitement, as do other high positive arousal emotions such as flow and playfulness, will be positively related to IT use.

H3a Excitement will be positively associated with IT use.

Indirect effects of excitement on IT use. ATF suggests that since excitement is associated with a perception that the benefits of the situation originate from the new technology and how it fits with their tasks, users will focus their adaptation efforts on two main behaviors. First, excitement will trigger *task adaptation* (i.e., modifying the work). Beaudry and Pinsonneault found that users try to increase the benefits associated with a given IT application by modifying their tasks so that they better fit with the technology. Lapointe and Rivard (2007) report how "hopeful nurses who weren't afraid of it, who wished and hoped... and who saw the advantages... technically integrated the new system in their work routines" (p. 97). Similarly, flow, another challenge emotion, has been found to be positively associated with experimentation (Webster et al. 1993) and with cognitive curiosity (Malone 1981). Task adaptation results in a higher fit between a technology and a task (Zigurs and Buckland 1998) and a higher compatibility of the technology with the task (Moore and Benbasat 1991), which are positively related to IT use (e.g., Majchrzak et al. 2000).

The literature in psychology provides two additional rationales for the positive relationship between excitement and task adaptation. First, excitement leads individuals to expand their cognitive span (Fredrickson 1998). Excitement promotes creativity and flexibility in thinking and problem solving (Isen and Daubman 1984) and facilitates the processing of new or previously unnoticed information (Folkman and Moskowitz 2000). Second, high arousal positive emotions broaden the scope of actions of individuals (Isen et al. 1987). In a series of experiments, Isen et al. (1987) found that excited individuals were significantly more creative in performing given tasks and achieved their goals significantly more often than did neutral participants. We therefore expect that task adaptation will reinforce the positive effect of excitement on IT use.

H3b Excitement will be positively associated with IT use through task adaptation.

Excitement will also lead to *seeking instrumental support* (i.e., looking for help from colleagues or from on-line or manual support to enhance one's usage of a given IT). That is, users who are excited about a new IT will seek instrumental support in order to better exploit the new technology and secure as much benefit as possible. As playfulness does, excitement will trigger more efforts to learn the new system and will drive users to be more imaginative, inventive in their usage, and self-directed in their learning (Webster and Martocchio 1992). Excitement will also trigger an urge to play and a desire to explore new IT functions, which will increase an individual's knowledge base, leading in turn to further play and exploration (e.g., Malone and Lepper 1987).

Research in psychology shows that high arousal positive emotions, such as excitement, broaden the scope of cognition of individuals when using the triggering object. Positively aroused individuals facing a specific task are significantly more creative and find novel ways of performing the task at hand (Fredrickson 1998). Scherer and Tran argued that emotions such as excitement provide optimal conditions for the acquisition of new required skills and competencies. Excitement will be associated with a desire to investigate, become involved, gather additional information, learn, and live new experiences with the person or object from which the excitement originates (Bagozzi et al. 1999). We thus expect that seeking instrumental support will reinforce the positive effect of excitement on IT use.

H3c Excitement will be positively associated with IT use through seeking instrumental support.

Achievement Emotions (Happiness and IT Use)

Emotions from this class result from the appraisal of an upcoming event that will generate positive outcomes. In this situation, emotions such as happiness, satisfaction, joy, and pleasure will be experienced.

Direct effect of happiness on IT use. Happiness is usually associated with a desire to benefit from a given situation but not to exploit it further by investing additional efforts (Smith and Ellsworth 1985). It is not associated with a strong desire to act and tends to lead individuals to be satisfied with the situation at hand. Happiness is usually described by individuals as an extremely pleasant state involving very little effort and a high level of certainty about the outcome of a situation (Smith and Ellsworth 1985). In IS, happiness has been associated with the satisfaction of an individual feeling that he/she has achieved a goal (Briggs et al. 2008). Similarly, pleasure, the degree to which a user feels good or happy with a new IT system, has been found to be positively related to several antecedents of IT use such as attitude toward IT use (Kim et al. 2004), perceived ease of use (Venkatesh 1999, 2000), and intention to use (Davis et al. 1992). In addition, user satisfaction, measured as a positive feeling with initial system use, was found to be related to intention to continue to use a system (Battacherjee 2001). Happiness is thus expected to be positively associated with IT usage.

H4a Happiness will be positively associated with IT use.

Indirect effects of happiness on IT use. Happiness is associated with situations appraised as safe, having a high degree of certainty, and not requiring efforts to secure the expected benefits (Ellsworth and Smith 1988; Fredrickson 1998). Happiness leads to engagement in passive adaptation strategies like feeling content with the existing benefits associated with a referent. Low activation emotions, such as happiness, lead to a lack of drive and desire to pursue a goal through intermediate adaptation behaviors and even to an absence of action tendency (Bagozzi 1992; Bagozzi et al. 1999; Ellsworth and Smith 1988; Fredrickson 1998). Happiness is often associated with inactivity, "doing nothing," and ceasing vigilance and it leads individuals to be pleased with success and to enjoy the outcome of an event (Ellsworth and Smith 1988; Scherer and Tran 2001). In the context of IS, we expect that happiness, because it is associated with a low activation to perform intermediate behaviors and with the certainty that future benefits of an IT system will occur, will not be related to active adaptation behaviors (i.e., task adaptation and seeking instrumental support). Thus, the following hypotheses:

H4b Happiness will not be associated with task adaptation.

H4c Happiness will not be associated with seeking instrumental support.

Research Method

Our study took place in two major North American banks, each of which had implemented a new in-house developed, integrated suite of applications to support account managers.[6] These systems were appropriate for the present study for two primary reasons. First, although different, both systems offered a complete set of functionalities that covered most of account managers' tasks. Second, the account managers from both banks benefitted from significant flexibility in their jobs and could adapt the way they worked, which was important to study adaptation efforts. They were entrepreneurs and were rewarded on a performance basis. While usage of the new systems was not mandatory, account managers from both banks were expected to use their basic functionalities (i.e., opening and closing of accounts and developing portfolios of clients).[7] Account managers, however, had significant flexibility in using the advanced features of the systems. They thus could use the new systems extensively or only in a limited manner. In both banks, the introduction of the new system was a significant event as it replaced the previous systems and paper-based forms that had been used for years. It was also expected to significantly influence the performance and thus the salary of account managers.

[6]Both banks implemented similar systems that provided the basic functions to support account managers. Both systems had transactional applications which allowed account managers to write documents, open and close accounts, assign credit lines, register deposits and loans, buy mutual funds, link with the credit bureau, and register mortgages. Both systems also offered applications supporting analysis of a client's financial situation, risk aversion, and personal financial goals. The systems also helped in developing investment profiles and suggested ideal-type personalized portfolios.

[7]In addition to demographics, respondents were asked to indicate the extent to which they perceived usage of the new system as being mandatory. Results from a seven-point Likert scale ranging from completely voluntary to completely mandatory indicate that, on average, respondents perceived usage of the new system to be "strongly recommended." The scale used to assess perceived mandatoriness was the following: To what extent is [system name] usage mandatory? 1 = Completely voluntary, 2 = Rather voluntary, 3 = Suggested, 4 = Recommended, 5 = Strongly recommended, 6 = Rather mandatory, 7 = Completely mandatory. Responses ranged from 1 to 7 with a mean of 5.3 and a standard deviation of 1.9 (no significant differences were observed across banks).

Measurement Instruments Development

Emotions. Emotions are defined as a mental state of readiness for action that arises from the appraisal of an IT event (in our study, the IT event is the announcement of the imminent deployment of a new system). In order to compare and contrast different emotions, we focused on one emotion per class from our framework: anger (loss emotion), anxiety (deterrence emotion), happiness (achievement emotion), and excitement (challenge emotion). In addition to belonging to four different classes, these emotions were chosen for their prevalence in IS research (e.g., anxiety) and because of they were identified by the managers we interviewed prior to conducting the survey as being salient (see "Data Collection" below). We used Lazarus and Folkman's (1984) measure of emotion intensity and asked respondents to report the degree to which they felt each emotion at the announcement of the deployment of the new system. A five-point Likert scale ranging from "not at all" to "a great deal" was used.

Adaptation behaviors. We define *task adaptation* as the degree to which users modify their work. This can be done either by changing existing work routines and procedures or by adding activities to their jobs (i.e., doing new things). *Seeking instrumental support* is defined as the effort one expends to improve one's usage of the new IT. *Seeking social support* is defined as the effort one expends to obtain moral and emotional support with regard to the new IT. *Venting* is defined as the vocal and open expression of negative emotions to others (Carver et al. 1989; Folkman and Lazarus 1985). *Psychological distancing* is defined as the effort one expends to direct one's attention away from the situation and to detach oneself from it (Folkman et al. 1986). We used Folkman and Lazarus (1985) instruments to measure seeking social support, venting, and psychological distancing. Instruments were developed for task adaptation and seeking instrumental support. We measured the frequency with which users performed the different adaptation behaviors using a seven-point scale ranging from "never" to "many times a day."

IT use. IT use is defined as the extent to which one actively interacts with the new IT while performing one's job. Respondents were asked to indicate, on a seven-point scale ranging from "never" to "many times a day," how often they use the new system to perform a list of specific tasks. The measure included all relevant tasks our respondents performed as part of their role as identified in interviews and outlined in their job description. The tasks were grouped according to five managerial roles (Mintzberg 1973): collecting information, disseminating information, figurehead, resources allocation, and negotiation.

To develop the new measurement instruments for task adaptation and seeking instrumental support, we first generated a list of items from the literature. Then, in-depth interviews were conducted with 17 key informants in both banks to complete and refine the items.[8] This process resulted in a list of 12 items tapping into the two adaptation behaviors. Following the method proposed by Moore and Benbasat (1991), a card sorting exercise was conducted as a preliminary assessment of the validity of the three new measures (task adaptation, seeking instrumental support, and IT use). Ten IS experts (five professors and five Ph.D. students) classified the 29 items into three categories. Items that did not reach the threshold of 80 percent of "correct" placement and of inter-rater agreement among the 10 experts were dropped. Experts also suggested modifications to some items. A second round of card sorting was conducted with seven new IS experts (four professors and three Ph.D. students). The final measurement instrument is presented in Appendix A.

Data Collection

Both banks followed a similar implementation process. Bank A announced the deployment of the new system to account managers three weeks prior to the start of the deployment while Bank B's announcement was made six weeks prior to the deployment. The system was deployed sequentially in both banks over about 12 months.

The interviews conducted for developing the measures also served to better understand the implementation context of each bank, identify key salient emotions felt by account managers, and explore how account managers reacted to the new systems. As indicated in Table 2, the interviews were conducted between one and two months after the deployment of the new IT. Four main emotions were identified during the interviews. Account managers indicated that when the announcement of the deployment of the new system was made, their reactions ranged from being anxious as to what it would do (and not do) and what impact it would have on their performance—which is a very sensitive issue since a large part of account managers' pay was on a commission basis—to feeling happy at the idea of getting rid of all paper forms or excited at the idea of working on a new IT system. Some respondents also indicated that they were angry at the arrival of the new system, especially because they were afraid that it would not fit with their working habits or would negatively affect their performance.

The survey was conducted six months after the end of the deployment of the systems. The questionnaires were sent by

[8]The two CIOs, two branch managers, one project director, the two project managers, two IT trainers, six account managers, a help desk employee, and an administrative assistant were interviewed.

internal mail to the 365 account managers of Bank A and to the 161 account managers of Bank B. Two weeks later, a reminder letter was sent to all account managers. One month after the initial mailing, 260 questionnaires (161 from Bank A and 99 from Bank B) were returned for a global response rate of 49.4 percent. Eleven respondents reported having started in this position after the implementation and were thus removed from the sample, leaving 249 usable responses. To assess non-response bias, t-tests were performed between the initial wave of responses and the wave received following the reminder (e.g., Armstrong and Overton 1977). Results indicated no significant difference on any variable under study. Also, there were no significant differences among respondents from the two banks and therefore they were pooled together to conduct further analyses.

Respondents' average tenure with the banks was 9.4 years and ranged from 2 to 38 years. On average, respondents had been account managers for 6.3 years (ranging from 2 to 18 years). Respondents' age varied from 24 to 62, with an average of 41 years of age. Reported level of education was 23 percent (56) with a high school degree, 21.7 percent (54) with a college degree, and 55 percent (138) with an earned graduate degree. They worked an average of 8.5 hours per day, ranging from 5 to 12 hours per day. In all, 157 account managers (63 percent) had a computer at home.

Assessment of Measurement Properties

We assessed the measurement properties of the model with confirmatory analysis using EQS version 6. This assessment was performed in three steps. First, we tested the fit of the 32 items specified to load on the 10 first order constructs of our model (five adaptation behaviors and five dimensions of IT use). As none of the fit indices met the thresholds, we performed a principal component analysis using all 32 items. As a result, four items were dropped from the IT use measure (one for each of the four dimensions: information collection, information diffusion, negotiator, and figurehead). The final solution, shown in Appendix B, indicated that the remaining items for information collection and information diffusion loaded together on a single factor. We retested the remaining 28 items loading on the nine first order constructs (five adaptation behaviors and four dimensions of IT use). The final measurement model met or exceeded the threshold for all fit indices ($\chi^2 = 402.84$, 287 df, $\chi^2/df = 1.40$, CF1 = 0.91, RMSEA = .04).

We assessed the internal consistency of each dimension by examining estimates of composite reliability and variance (Bassellier et al. 2003). As shown in Table 3, all reliability measures were 0.7 or higher, indicating acceptable internal consistency. In addition, the variance extracted exceeded the minimum .50 level (Fornell and Larcker 1981) for all constructs except venting (.487). The decision was to keep venting as its variance extracted was much larger than its correlation with all other constructs in the model (off-diagonal).

Model Testing

In order to test the relationships between emotions, adaptation, and IT use, we ran two structural models. The first model (Figure 2) contained the two negative emotions (i.e., anger and anxiety) and the second model (Figure 3) included the two positive emotions (i.e., excitement and happiness). Running two models simplified the analysis and gave parsimonious models. The negative and positive emotions were hypothesized to be related to two different sets of adaptation behaviors (i.e., anger and anxiety associated with venting, seeking social support, and distancing; excitement and happiness related to task adaptation and seeking instrumental support). In addition, the two positive emotions were correlated together (.500, $p < .001$) and the two negative emotions were correlated together (.311, $p < .001$)[9] whereas the positive emotions were not correlated with the negative ones. This approach also allowed more powerful analyses since each model had an adequate ratio of observations to measurement items (10-to-1 for the model with negative emotions and a ratio of 11-to-1 for the model with positive emotions). Running two models also provided sufficient degrees of freedom to allow for the inclusion of correlations among adaptation behaviors and between emotions (Folkman and Lazarus 1985) without losing analysis power.

Anger, Anxiety, and IT Use. As shown in Figure 2, all paths, except the one between anger and IT use and the one between venting and IT use were significant at the $p < 0.05$ or better. As shown in Figure 2 and in Table 4, all fit indices met or exceeded the thresholds (e.g., Bassellier et al. 2003). More specifically, our results indicate that contrary to our expectations, anger was not directly related to IT use (H1a not supported). Anger was positively related to venting (0.14, $p < .05$) but venting was not significantly related to IT use (H1b not supported). Finally, as expected, anger was positively related to seeking social support (.14, $p < .05$), which, in turn, was positively related to IT use (.44, $p < .001$) (H1c supported). Anxiety was directly negatively related to IT use (−.08, $p < .05$) (H2a supported) and positively related to

[9]The appraisal of an IT event often triggers different emotions. As such, emotions are not completely independent and mutually exclusive. One could experience both anger and anxiety or happiness and excitement at the same time. We thank a reviewer for pointing this out.

Table 2. Study Time Line

	System Design, Development, and Testing	Announcement of Implementation	Deployment	Interviews	Building and Pilot Testing Questionnaire	Data Collection (Questionnaire)
Bank A	1997–1998	February 1999	March 1999 – April 2000	June 2000	June – July 2000	August 2000
Bank B	1998–1999	March 1999	April 1999 – March 2000	May 2000	June – July 2000	August 2000

Table 3. Reliability and Variance among Constructs

	Reliability	Venting	InstSup	TaskAd	SocSup	Dist	ResAll	Info	Neg	FigHead
Venting	.81	.487								
InstSup	.76	.274	.758							
TaskAd	.71	.116	.223	.780						
SocSup	.75	.267	.294	.336	.860					
Dist	.77	.191	.108	.009	.156	.606				
ResAll	.89	.128	.429	.487	.366	.001	.775			
Info	.76	.073	.204	.468	.281	.071	.591	.926		
Neg	.81	.001	.057	.444	.166	.124	.215	.559	.908	
FigHead	.70	.040	.023	.237	.127	.029	.380	.445	.476	.610

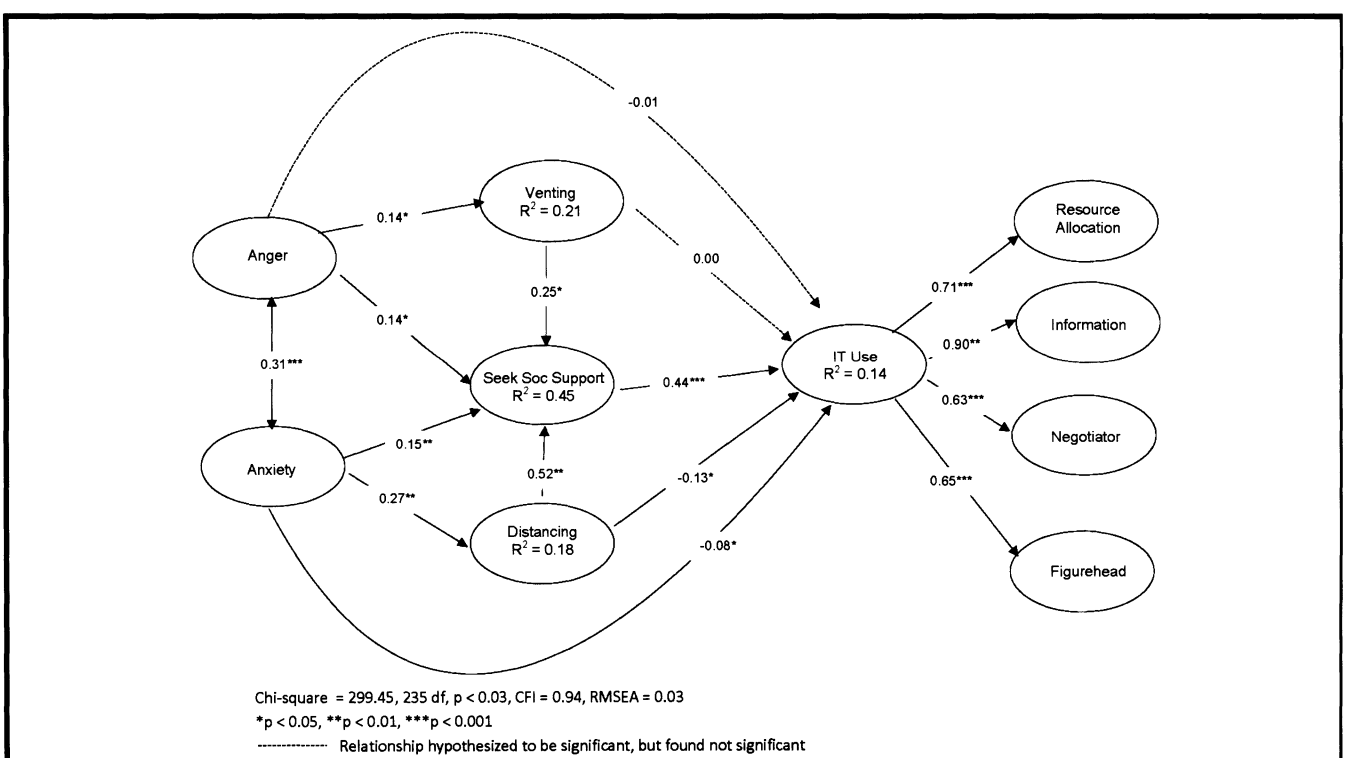

Figure 2. Structural Model: Anger and Anxiety

Table 4. Fit Indices for the Measurement and Structural Models

Fit Indices	Thresholds	Measurement Model	Structural Model "Anger & Anxiety"	Structural Model "Happiness & Excitement"
χ^2	Smaller	402.84	299.45	253.72
	Non-significant	$p < 0.00$	$p < 0.03$	$p < 0.00$
(d.f.)		(287)	(235)	(174)
χ^2/d.f.	< 3	1.40	1.27	1.46
CFI	> 0.90	0.91	0.94	0.92
AGFI	> 0.80	0.81	0.83	0.83
NNFI	> 0.90	0.89	0.93	0.90
GFI	> 0.90	0.90	0.94	0.90
RMR	< 0.05	0.06	0.07	0.07
RMSEA	< 0.08	0.04	0.03	0.04

seeking social support (.15, $p < .01$), which was positively associated with IT use (H2b supported). Finally, as hypothesized, anxiety was positively associated with psychological distancing (.27, $p < .01$), which was negatively related to IT use (–.13, $p < .05$) (H2c supported). The model explained 14 percent of the variance of IT use.

Excitement, Happiness, and IT Use. Figure 3 shows that, contrary to our expectations, excitement was not significantly directly related to IT use (.04, n.s.) (H3a not supported). It was, however, positively associated with task adaptation (.20, $p < .01$), which was also positively associated with IT use (.64, $p < .001$) (H3b supported). Finally, excitement was positively associated with seeking instrumental support (.16, $p < .01$), which was not associated with IT use (.11, n.s.) (H3c not supported). As for happiness, it was directly positively related to IT use (.05, $p < .05$) (H4a supported). H4b and H4c suggested that happiness would not have a significant indirect effect on IT use because it would not be significantly associated with either task adaptation or seeking instrumental support. Our results indicate that happiness was negatively related to task adaptation (–.06, $p < .05$) (H4b not supported), which was positively related to IT use. Finally, happiness was found to be negatively related to seeking instrumental support (–.43, $p < .001$), which was not associated with IT use. As can be seen in Figure 3 and Table 4, all fit indices for the model met or exceeded the thresholds. The model explained 47 percent of IT use.

Since the data were collected using self-reported measures, common method bias was assessed. Following Podsakoff et al. (2003), a first-order latent method factor was added to the models of Figures 2 and 3 with all items used to measure the constructs of the models as indicators of the method factor. The fit indices of both models with the method factor were not as good as those of Figures 2 and 3 and all factor loadings remained significant despite the inclusion of the common method factor. This suggests that method bias is unlikely to have occurred (Podsakoff et al. 2003).

Post Hoc Analyses

The SEM analyses provide answers to several questions but they also trigger additional ones. For example, does someone who is excited by a new IT and who adapts his/her task have a higher subsequent IT use than an excited user who seeks instrumental support? Does an anxious user who distances himself and seeks social support eventually use the new IT more than someone who distances himself but does not seek for support?[10] To answer these questions, we compared the usage levels of groups of individuals who experienced high levels of specific emotions but who relied on different adaptation behaviors through *post hoc* analyses. We created three groups[11] of respondents using the following procedure. For each emotion (i.e., happiness, excitement, and anxiety), we selected respondents with scores of either 4 or 5 (our measure for emotions ranged from 1 "not at all" to 5 "a great deal"). We then divided each group into four subgroups using the median score on each of the two adaptation behaviors that were related to a given emotion. For example, the 85 users who scored high on anxiety were divided into four subgroups: (1) high seeking social support and high distancing (n=22), (2) high seeking social support and low distancing (n = 18), (3) low seeking social support and high distancing (n = 12),

[10]We thank the senior editor for suggesting the idea of exploring these questions.

[11]Our sample contained too few highly angry individuals to perform a *post hoc* analysis on this group.

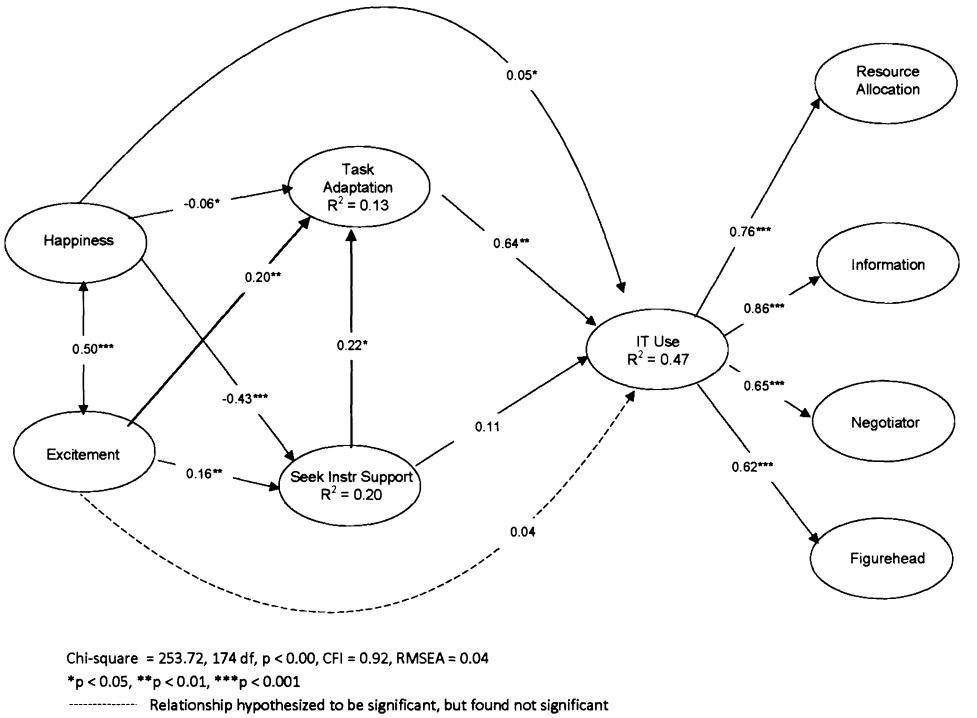

Figure 3. Structural Model: Happiness and Excitement

and (4) low seeking social support and low distancing (n = 33).[12] The level of IT use of each respondent was calculated by adding the scores of the 13 items of IT use (which was between 1 and 7, thus giving a total score ranging from 13 to 91). The average usage levels for each cell were then compared using ANOVA (Tukeys' HSD).[13]

The results indicate that for anxious individuals, the positive effect associated with seeking social support countered the negative effect of distancing. That is, individuals who distanced themselves from the new IT but who also sought high levels of social support used the new IT more than individuals who distanced themselves but did not highly seek social support (Equation 1). Also, users who distanced themselves from the new IT but who also sought social support had higher usage levels than users who did not perform much of either adaptation behavior (Equation 2). The usage levels among the groups of anxious users were as follows:

High Dist. & High SSS (32.27) > High Dist. & Low SSS (22.83) ($p<.05$) (1)

High Dist. & High SSS (32.27) > Low Dist. & Low SSS (25.33) ($p<.05$) (2)

SSS: Seeking Social Support
Dist.: Distancing

Recall that the results from the SEM analysis indicate that while happiness was directly positively associated with IT use, it was negatively related to both task adaptation and seeking instrumental support. The results of the ANOVA analyses provide additional insights and indicate that the two adaptation strategies had significant effects on IT use. Happy users who relied extensively on both seeking instrumental support and task adaptation used the new IT significantly

[12]The 78 users who scored high on excitement were subdivided as follows: (1) high task adaptation and high seeking instrumental support (n = 21), (2) high task adaptation and low seeking instrumental support (n = 15), (3) low task adaptation and high seeking instrumental support (n = 19), and (4) low task adaptation and low seeking instrumental support (n = 23). The group of users who scored "high" on happiness (n = 158) was subdivided as follows: (1) high task adaptation and high seeking instrumental support (n = 40), (2) high task adaptation and low seeking instrumental support (n = 28), (3) low task adaptation and high seeking instrumental support (n = 29), and (4) low task adaptation and low seeking instrumental support (n = 61).

[13]Since all subgroups for a given emotion had equal variance (Leven test of homogeneity of variances), we performed Tukey's HSD test to compare the scores of IT use across groups. We also tested with Scheffé and LSD tests and obtained similar results.

more than happy users who relied less on these two adaptation strategy (Equation 3). Also, happy users who sought instrumental support and adapted their tasks used the new IT significantly more than users who only sought instrumental support (Equation 4). In addition, users who relied mainly on task adaptation used IT significantly more than users who relied mainly on instrumental support (Equation 5). Finally, as expected based on the SEM results, happy individuals who relied mainly on task adaptation used the new IT significantly more than individuals who did not rely much on any adaptation strategy (Equation 6). In summary, the following results were obtained:

High SIS & High TA (32.09) > Low SIS & Low TA (22.59) ($p<.001$) (3)

High SIS & High TA (32.09) > High SIS & Low TA (22.69) ($p<.001$) (4)

Low SIS & High TA (31.32) > High SIS & Low TA (22.69) ($p<.01$) (5)

Low SIS & High TA (31.32) > Low SIS & Low TA (22.59) ($p<.01$) (6)

SIS: Seeking Instrumental Support
TA: Task Adaptation

Finally, the ANOVA analyses indicate that highly excited users who adapted their tasks and sought instrumental support used the new IT significantly more than those who did not rely much on any adaptation strategy (Equation 7). Users relying on both adaptation strategies also had a higher usage level than those who only sought instrumental support (Equation 8). Our results also suggest that task adaptation had stronger positive effects on IT use than seeking instrumental support. Users who relied mainly on task adaptation used the new IT more than users who relied mainly on instrumental support (Equation 9). Finally, as expected based on the SEM results, individuals who relied mainly on task adaptation used the new IT more than individuals who did not rely on any adaptation strategy (Equation 10).

High SIS & High TA (33.00) > Low SIS & Low TA (23.08) ($p<.001$) (7)

High SIS & High TA (33.00) > High SIS & Low TA (22.02) ($p<.001$) (8)

Low SIS & High TA (31.61) > High SIS & Low TA (22.02) ($p<.01$) (9)

Low SIS & High TA (31.61) > Low SIS & Low TA (23.08) ($p<.01$) (10)

SIS: Seeking Instrumental Support
TA: Task Adaptation

Discussion

Our results support six of our twelve hypotheses and suggest that emotions triggered in the anticipation period of an IT implementation are important antecedents of subsequent IT use. The two positive emotions (excitement and happiness) explain 13 percent, 20 percent, and 47 percent of the variance of task adaptation, seeking instrumental support, and IT use, respectively. The negative emotions (anger and anxiety) explain 21 percent, 45 percent, 18 percent, and 14 percent of venting, seeking social support, psychological distancing, and IT use, respectively.

As expected, each emotion is related to IT use through different paths. *Excitement* (a challenge emotion) is not directly related to IT use. While this is surprising, it is consistent with past results that showed rather weak links between other challenge emotions such as flow and IT use (Trevino and Webster 1992; Webster et al. 1993). Excitement is, however, indirectly positively related to IT use through task adaptation, which is consistent with the evidence in psychology indicating that excitement promotes creativity and flexibility in thinking, problem solving, and performing specific tasks (Isen and Daubman 1984; Isen et al. 1987).

Our results show a positive link between excitement and seeking instrumental support, which is not related to IT use. This suggests that excitement leads users to explore, "play" with the new IT, and learn it, but this does not necessarily increase their functional use of the new system as we measured it (i.e., using IT to support different roles of account managers such as resource allocation, negotiation, figurehead, and informational roles). Our *post hoc* analyses support the SEM results and showed that highly excited individuals who adapted their tasks used the new IT more than users who only sought instrumental support.

Happiness (an achievement emotion) was found to be weakly positively related to IT use. Prior research findings indicate that achievement emotions such as enjoyment, pleasure, and satisfaction are positively related to intention to adopt (Chin and Gopal 1995), intention to use (Davis et al. 1992), and intention to continue to use (Bhattacherjee 2001; Koufaris 2002). Our results also indicate that happiness is negatively

related to seeking instrumental support and task adaptation. This suggests that happiness, being a low activation emotion, may reduce the perceived need for adaptation. Alternatively, one could argue that happiness is triggered because respondents perceive the new IT to nicely fit with themselves and with their jobs. As a result, they might not feel the need to perform adaptation behaviors. Still, our *post hoc* analyses indicate that highly happy individuals who sought instrumental support and adapted their task used the IT significantly more than those who did not perform much adaptation behavior. This calls for more research on the role of happiness and other achievement emotions in IT usage.

Contrary to our expectations, our results show that *anger* (a loss emotion) is not related to IT use directly. Anger is, however, positively related to seeking social support which, as hypothesized, is positively associated with IT use. This suggests that seeking social support acts as a turnaround mechanism and angry respondents who seek social support feel better, positively reappraise, or are encouraged to use the new IT. Interestingly, anger is also positively related to venting, which is not related to IT use. Venting seems to be a good way of letting off steam and reestablishing emotional stability (Bushman et al. 2001) but it does not lead to IT use. Alternatively, venting may also reinforce anger as suggested by Bushman (2002). It could also be that individuals who initially vent do not subsequently use the IT in order to prevent themselves from experiencing cognitive dissonance that could result from performing a behavior they overtly belittled. These results call for further research efforts on the role of loss emotions in IT implementation.

Finally, *anxiety* (a deterrence emotion) was found to be related to use in a way that is more complex than recounted in the extant IS literature. Our results suggest that the total effect of anxiety on IT use is made of the combination of a direct negative link and indirect positive and negative links which partially offset each other. The indirect relationships are of two types. First, anxiety is positively associated with seeking social support which, in turn, is positively related to IT use. Second, anxiety is positively related to psychological distancing which is negatively related to IT use. The complex relationships between anxiety and IT use found in the present study might shed light on the mixed empirical evidence of the extant literature. Our results suggest that the negative direct effect of anxiety might be reinforced if users distance themselves from the technology, ensuing in a strong total negative effect. However, it is also possible that a non-significant, or even a positive, relationship between anxiety and IT use exists when users are socially embedded, which can provide a turnaround mechanism countering the negative direct effect of anxiety. Our *post hoc* analyses further indicate that highly anxious individuals who performed both psychological distancing and seeking social support use the IT significantly more than those who did not perform much adaptation behavior. This suggests that the positive effect of seeking social support might be stronger than the negative effect of distancing. This calls for further studies of the effects of anxiety and other deterrence emotions on IT use.

The overall relationships between negative emotions and IT use thus result from the combination of the direct negative links, the indirect negative link through psychological distancing, and the indirect positive link through seeking social support. This result is consistent with research in psychology, which indicates that people often need to reestablish emotional stability and reduce emotional distress before they can work on the problem they face (Folkman and Lazarus 1985; Folkman et al. 1986; Lazarus and Folkman 1984).

Our results further indicate that the direct relationship between emotions and IT use is somewhat limited and that emotions are strongly related to IT use via indirect relationships through intermediate adaptation behaviors. More specifically, we identified two types of indirect paths. One is an *amplifying* path, where an emotion triggers adaptation behaviors that increase the valence of the felt emotion. This is the case with psychological distancing, which reinforces the negative effect of anxiety, and with task adaptation, which reinforces the positive effect of excitement. There is also an *attenuating* path where the effect of the original emotion is reduced by the adaptation behaviors of the users. Seeking social support, for instance, seems to attenuate the effects of anger and anxiety.

Contributions to Research and Practice

This study makes three contributions to research. First, by studying users' responses from an emotion-based perspective, this paper complements existing cognitive-based models and helps predict and explain a wide range of IT-related behaviors including IT use. The paper provides an integrated picture of emotions and their relationships with IT use and various intermediate behaviors. The paper shows that emotions experienced by anticipation of a new IT implementation can have important subsequent implications for users. It thus suggests that emotions can be instrumental in furthering our understanding of user acceptance and resistance in IT implementation research in general. Also, grounding the predictions in users' emotional reactions allows for variations to occur among individuals facing a given IT, thus offering predictive power while retaining an agency view of IT-related behaviors.

Second, the framework developed in this paper classifies emotions, specifies the conditions under which different emotions are triggered, predicts when emotions with the same valence will have similar or different effects, and helps to predict and explain how emotions relate to IT use directly and indirectly through intermediate adaptation behaviors. Our framework allows for integrating prior studies and research results on emotions in IS. It can thus serve as the foundation for future research on emotions in IS.

Third, our paper provides insights into the different paths through which emotions are related to IT use. By mapping these paths, our paper explains the mixed evidence on the relationships between anxiety and IT use. In addition, by showing how emotions occurring during the anticipation period have carryover effects on subsequent IT use, this paper opens a new avenue for future research on acceptance that can have significant implications for both research and practice.

The paper's main contribution to practice rests on the fact that it can help managers to stimulate IT use by managing emotions in two ways. First, managers can try to trigger specific challenge emotions in users, such as excitement, which is positively associated with task adaptation which, in turn, is related to IT use. While future research is needed to identify the strategies that can trigger specific emotions, the paper suggests that managers can stimulate challenge emotions (such as excitement) by insuring that a new IT is perceived as an opportunity and by providing users with sufficient autonomy and appropriate incentives for them to adapt their tasks to the new IT. Efforts should be made so that the implementation of a new IT is seen as an occasion for allowing users to change their work routines and habits. Managers can try to increase the positive effect of specific emotions by stimulating different adaptation behaviors. For instance, users who are happy with a new system may not perform the required adaptation behaviors. Managers can further stimulate usage by showing users how adapting work routines can lead to additional benefits. This could be done by sharing best practices among users and rewarding innovative adaptation of work practices that take advantage of the new IT.

This research can also help managers deal with negative emotions during the implementation of new IT. While more research is needed, our paper suggests that managers can help reduce the occurrence of loss and deterrence emotions, such as anger and anxiety, by communicating effectively how the new IT constitutes an opportunity for users. Managers can also work on the adaptation behaviors themselves. For example, providing social support can help reduce the negative impacts of anger and anxiety and can act as a turnaround mechanism. Managers could provide opportunities for users to share positive experiences and provide support through user groups, on-line sharing such as blogs or wikis, and regular informal meetings where users share best practices about how to use the new IT. When faced with anxious individuals, managers should also try to prevent them from distancing themselves because anxiety coupled with psychological distancing has the most negative effect on IT use. Creating user groups and having users participate and be involved in the development of the new IT system might help prevent distancing.

Limitations and Future Research

This study has two main limitations. First, the fact that emotions were studied retrospectively might have left room for some recall bias. To minimize this potential bias, we designed our study carefully and followed common practices from psychology for studying emotions retrospectively. First, we focused on an event that brought major changes in the work context of respondents. Preliminary interviews served to identify two systems that were very significant to them because they brought major changes to their work and they could significantly affect their performance and salary. Also, the interviews served to identify emotions that were salient to the respondents when the announcement of the eminent deployment occurred. Second, we provided strong anchor points to respondents in the questionnaires (i.e., we used the system name in the questionnaire items and we framed all questions in such a way as to focus the respondents' attention on the announcement of the deployment). Third, we asked participants to recall the intensity of specific emotions with regard to the event (i.e., emotions were listed in the questionnaire). Fourth, by grouping the positive emotions in one structural model and the negative emotions in another one, we limited the potential effect of differences in recall between positive and negative emotions. While some recall bias might have occurred, its effect is likely to have led to an underestimation of the intensity of emotions (Walker et al. 1997). This suggests that our results are presumably conservative with regard to the effects of emotions on adaptation behaviors and IT use.

A second limitation lies in the fact that different emotions and adaptation mechanisms might be triggered by the organizational context. Our study was conducted in two banks where usage of some basic features of the two systems was considered quasi-mandatory but usage of advanced features was perceived as being voluntary. It is possible that the context influences the types of emotions that are triggered. For example, in a completely mandatory situation, stronger loss or achievement emotions may be expected, whereas in completely voluntary situations, challenge or deterrence emotions might be stronger, hence triggering a different set of adapta-

tion behaviors and the emergence of diverse usage patterns. Such questions require empirical validation. More research is thus needed to understand the social and organizational bases of user and group emotional reactions to new IT and their outcomes.

This research suggests many avenues for research. First, although individuals experience emotions privately, emotions are likely to be influenced by group and contextual factors such as group norms, peer reactions, top management, and organizational culture. Emotions can be contagious in groups (Barsade 2002). In addition, different emotions and adaptation mechanisms might be influenced by the cultural context. For instance, in cultures where anger is quite strictly regulated and strongly discouraged, so too would confrontational adaptation behaviors such as venting. Similarly, seeking social support might be more accepted in collectivist cultures than in individualist ones. Some cultures might have a higher degree of tolerance for anxiety and uncertainty than others.[14] Therefore, the reactions of users might differ significantly across cultures and research is needed to study the role of emotions on IT-related behaviors in various contexts and cultures.

Second, it is important to study the link between the general emotions elicited by IT (such as computer phobia or computer anxiety) and the particular emotions triggered by specific IT applications. It is plausible that general attitudes can act as overarching frames that guide user emotional reactions to a specific IT application. As such, general IT-related attitudes might be good predictors of specific emotional reactions.

A third avenue for future research is to study how and what technological features can trigger emotions. Rafaeli and Vilnai-Yavetz (2004) suggest that in an organizational context, emotional responses are triggered by three dimensions of technological artifacts. Artifacts trigger negative emotions when they are perceived as hindering performance and positive emotions when they are perceived as useful. Emotions can also be triggered by the sensory aesthetics (e.g., screen colors) and formal aesthetics (e.g., screen layouts, design, and look of the computer) of technological artifacts (Thüring and Mahlke 2007). Finally, emotions can be elicited by the symbolism and the complex set of messages, values, and assumptions associated with new IT (Rafaeli and Vilnai-Yavetz 2004). For example, a new IT application can cause anxiety because individuals associate it with potential layoffs or it may cause anger and frustration to professionals who associate it with the deskilling of their work.

Fourth, there is a need to study a wider range of emotions and intermediate behaviors in IS. Among all of the deterrence emotions, only anxiety has been studied in IS. As empirical results indicate the nontrivial role of anxiety on adoption, use, and adaptation, as well as in forming related attitudes and beliefs, it seems relevant to study the role of other deterrence and loss emotions, such as annoyance, frustration, and worry. Research is also needed to build a comprehensive inventory of IT-related user emotions, develop a typology of adaptation patterns, and analyze their respective relationships to IT use. In addition, future studies should examine the sequencing and interplay of emotions, adaptation behaviors, and IT use throughout the anticipation, impact, and post-impact phases of IT implementations. For instance, emotions arise in the post-impact period based on the user's assessment of the personal meaning and significance of the new IT for the long term. Post-impact emotions and considerations also feed into new anticipatory emotions of what to expect next (Lazarus and Folkman 1984). The consequences of the new IT have already occurred and they contain the seeds for reflections of what is next to come and how it will affect users in the long term. Research efforts are required to study the role and consequences of emotions experienced during the post-impact period.

This study provides preliminary evidence on the importance of emotions in understanding user reactions to the implementation of new IT. While this paper provides some insights about the link between emotions and IT use, it also uncovers several questions that need to be addressed. It is hoped that the ideas and results put forth in this paper will stimulate research on emotions and IT use, which remains a relatively unexplored area in our field.

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About the Authors

Anne Beaudry is associate professor at the John Molson School of Business, Concordia University. She earned her Ph.D. at HEC-Montréal. Her research focuses on IT-related user behaviors and reactions and on impacts of IT use. Her work has been published in various journals including *Communications of the AIS*, *International Journal of Information and Operation Management Education*, *International Journal of Knowledge Management*, and *MIS Quarterly*.

Alain Pinsonneault is a James McGill Professor and the Imasco Chair of Information Systems in the Desautels Faculty of Management at McGill University. His current research interests include the organizational and individual impacts of information technology, user adaptation, ERP implementation, e-health, e-integration, group support systems, strategic alignment of IT, and the business value of IT. He has published papers in *Management Science*, *MIS Quarterly*, *Information Systems Research*, *the Journal of MIS*, *Small Group Research*, *Decision Support Systems*, *Organization Science*, and *European Journal of Operational Research*.