Emotional Foundations of Individual’s Perception: The Case of Technology Radicalness

Research-in-Progress

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Abstract

Due to the growing importance of enterprise resource planning (ERP) systems, universities and corporate training programs have included such systems into their curricula using novel tools, such as ERP simulation games. To improve our understanding of individuals’ learning patterns, in this study we extend prior cognition based models by incorporating emotions. Moreover, we highlight the role of perceived radicalness, which mediates the relationship between emotions and individual willingness to learn. Our research model draws from the appraisal tendency framework and includes four distinct classes of emotions: challenge, achievement, loss, and deterrence emotions. We conducted a lab experiment to test the model in an ERP simulation game context. The preliminary results indicate that perceived radicalness is an important mechanism via which classes of emotions impact students’ learning behaviors. We also found that, in general, negative emotions had more effect on radicalness perceptions compared to positive emotions.

Keywords: Emotions, technology radicalness, enterprise resource planning, problem-based learning

Introduction

Enterprise resource planning (ERP) systems have gained popularity due to their dramatic influence on increased business performance (Davenport and Beck, 2013; Liang et al. 2007). An ERP implementation requires radical organizational changes that can result in significant modifications to nearly 30% of key routines in contemporary firms (Herold et al. 2007; Morris and Venkatesh 2010). The importance of training has been emphasized in the success of IS systems in general (Chou et al. 2014), and training is a crucial element in reducing the high rate of unsuccessful ERP system implementations in particular (Sykes et al. 2014). Universities, recognizing the importance of ERP systems in the business world and their critical role in training the future users of such systems, have incorporated ERP systems (e.g., SAP or Oracle) into their curricula (Antonucci et al. 2004). In doing so, the employment of simulation games to create more realistic learning environment for ERP learners has been found to be an effective method compared to traditional learning settings (Léger et al. 2011).

However, introduction of a new technology requires that individuals change their allegiance from a familiar incumbent form of technology to a novel version. Information systems (IS) research has made significant strides toward understanding the antecedents of information technology (IT) adoption through cognitive-based models such as the theory of reasoned action (TRA) (Fishbein and Ajzen 1975), the theory of planned behavior (TPB) (Ajzen 1991), the technology acceptance model (TAM) (Davis 1989; Davis et al. 1992), and the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003),
which emphasize the role of perceptions and beliefs about the instrumental nature of technology such as effort and performance expectancy, compatibility, and relative advantage. However, due to IT's increasing levels of usage complexity, we need to go beyond current cognitive models in order to capture all of the antecedents of adoption behavior (Beaudry and Pinsonneault 2005; Beaudry and Pinsonneault 2010; Zhang 2013). Common to all of these prior developments, however, is an underlying set of psychological assumptions that tend to downplay the potential role of emotions as the fundamental inhibitors or enablers of individual ability to respond to the adaptive behavioral challenges of radical innovation.

A possible extension to current models is to consider the role of human emotions (de Guinea et al. 2014; Zhang 2013). Recent research suggests an emotional dimension to individual perceptions (e.g., Dimoka et al. 2011; Riedl et al. 2010). Adopting a new theoretical lens, we account for automatic and unconscious information processing underlying human judgment, the aspect that current models fail to realize. We argue that such an extension can specifically improve educators’ understandings about the application of new teaching tools such as ERP simulation games (ERPsim), which provide an excellent opportunity for students to gain insight into the integration and functionality of business and IT (Cronan et al. 2012). Though providing a more facilitating learning environment, individuals may demonstrate better adoption performance. This is especially the case when we consider novel ERP systems (Morris and Venkatesh 2010). Teaching future business graduates the challenges and impact of such systems has been stressed in both professional and academic literature. Due to the popularity of simulation based learning, this study investigates the learning behavior of individuals in an ERPsim context. Drawing on the appraisal tendency framework (Han et al. 2007; Lerner and Keltner 2000), we develop a model that explains how a learner’s perceptions about the radicalness of a new technology relate her/his emotions (e.g., anger) to willingness to learn intention. For instance, based on the Appraisal Tendency Framework (ATF) research, perceptions of high threat and expected lack of control from using a new system may trigger students’ anger (Han et al. 2007). Our work adds to a growing body of IS research highlighting the role of emotions (Zhang 2013). By studying emotional antecedents of IT usage in a learning context, and the mediating role of individual perceptions of radicalness, we add a new and complementary approach to existing IS education and acceptance models, therefore we contribute to predicting user reactions and IT learning.

**Background**

With a growing emphasis on improving graduate employability, more real world problem solving settings (i.e., simulation based learning) have been included in training programs. ERP-based simulations such as ERPsim (Léger 2006) also prove useful in the area of IS, mainly to teach students the dimensions of enterprise systems and business process integration through a learning-by-doing approach (Cronan et al. 2012; Foster and Hopkins 2011; Seethamraju 2011). Apart from teaching students the concepts and principals of management (i.e., learning objectives), computer-based business simulation games have been used to change students’ attitudes toward a discipline (i.e., attitudinal objectives), and consequently improve the employment of the system (i.e., behavioral objectives) (Anderson and Lawton 2009). Simulation games are associated with the pedagogical approaches of problem-based and experiential learning (Kiili 2005). Compared to the traditional subject-based learning model, they typically reverse the order of presenting course concepts (Anderson and Lawton 2009). Instead of presenting the primary concepts before applying them to a particular problem, instructors let students “discover” the course concepts during the simulation. This attribute of the simulation game approach is similar to the individual’s technology adoption process, in which adopters need to explore the features of the newly adopted system in order to fully reap its benefits. This similarity makes the ERPsim setting interesting to study to see how further learning intentions of students are being influenced by their emotions, such as anger, as well as their perceptions, as technology acceptance literature argues.

In this study we argue that an IT user's specific emotional state plays a major role in determining his/her perceptions of technology characteristics, which in turn influence the user’s tendency to learn behavior. In a technological context, we may define emotion as a mental feeling caused by the new IT event, which may have a short duration with a determining impact on an individual’s interaction with technological artifacts (Rafaeli and Vilnai-Yavetz 2004). Generally, emotion-based and cognition-based mechanisms have been compared and contrasted, albeit their relationship has been a topic of great debate. There are two schools of thought on how these two notions differ. The camp of Zajonc (1980) argues that emotion and cognition are distinct and partly independent mechanisms; whereas, supporters of Lazarus (1982) contend that
emotion requires cognition and the cognitive process of sensing and appraising precedes emotional response. For the sake of this study, we adopt the former conceptualization, which posits that cognition and emotion are interdependent; in a way that emotion influences behavior through cognitive processes, and affective processing often encompasses judgments, thoughts, and other cognitive elements.

Prior studies offer contradictory findings on the relationship between specific emotions (e.g., anxiety) and IT related behaviors (Compeau et al. 1999). The lack a conceptual framework that allows us to distinguish among different classes of emotions might be the reason of these mixed findings. The inconsistency of prior findings can also be explained by acknowledging “affect as information,” as the Affective Infusion Model (AIM) suggests (Forgas 1995). This underlying mechanism of AIM specifies a process, which transfers the effect of an individual's emotions to IS behavior. AIM suggests that rather than forming a judgment based on features of a target (here is ERPsim game), individuals may ask themselves, ‘How do I feel about it?’ and in doing so, they may be guided by their emotions to build a perception and judge a message or a stimulus. Likewise, the appraisal tendency framework (ATF) argues that each classes of emotion carries with it motivational properties that influence the assessment of subsequent actions and events until the resolution of emotion-eliciting event (Lerner and Keltner 2000). Hence, it suggests that emotions are likely to have carry-over consequences on individuals’ beliefs, and learning patterns.

**Research Model and Hypotheses**

Beaudry and Pinsonneault (2005) argue that reactions to new IT-induced changes are determined by primary (i.e., individual’s assessment of the expected consequences of an IT event) and secondary (i.e., individual's assessment of his/her control over the situation) appraisals. In a recent study of emotions and IS behavior, they combined these two dimensions to classify emotions in four distinct groups (Beaudry and Pinsonneault 2010). In primary appraisal, an individual concludes whether use of a new IT creates a threat or an opportunity. In secondary appraisal, individuals consider the level of uncertainty about the outcomes of the use of the new system; more specifically, the degree to which they feel they have control over the realization of the expected consequences of a given event (Bagozzi et al. 2002). These two dimensions are merged to create four classes of emotions: loss, deterrence, challenge, and achievement. Drawing on those, we employ an emotion framework (Figure 1), which classifies potential trainees' appraisals. According to ATF, each class of emotions is being triggered by different appraisals, and emotions representing each class will impact goal behaviors differently and thus lead to distinct learning behaviors (Han et al. 2007). As a first exploratory step, we explore the relationships between one representative state in each category, i.e., happiness, excitement, anxiety and anger, along with perceived radicalness of a new IT in predicting students' learning behaviors.

![Figure 1. Proposed Model](image-url)
Influence of Perceived Radicalness

The concept of radicalness is central in the innovation and technology implementation literature, as well as in the business process change literature (Aiman-Smith and Green 2002). Relevant research indicates that perceptions of radicalness may change over time, and relate in turn to individuals' knowledge and acceptance of an innovation (Vowles et al. 2011). IT radicalness is defined as the degree of novelty in the new technology when compared to old ones (Dewar and Dutton 1986). Hence, the role of personal experience and knowledge becomes the determining factor. Therefore, our study reframes perceived technology radicalness as the extent to which a potential adopter has knowledge or experience with the technology or similar ones. This understanding of radicalness is in line with Aiman-Smith and Green (2002), as they recognized radical systems as having a high degree of new knowledge embedded in them, and conceptualized radicalness at user level as the degree to which a technology is new to her/him.

ERP systems (e.g., SAP) are novel, large-scale, integrated, and their interdependent characteristics are quite different from traditional systems, which makes an ERP system radical for its new users (Morris and Venkatesh 2010). ERPs require changes to core routines that make past experience irrelevant (Bala and Venkatesh, 2013), and this is believed to be the main reason for the high adoption failure rate of ERP systems (Plaza and Rohlf 2008). ERPsim learners might perceive the game as a radical medium of training for three reasons. First, in a typical learning environment, students who are being exposed to ERP concepts have no prior relevant experience and knowledge about such systems, which require a substantially new set of skills compared to traditional systems. Second, learning ERP concepts via an ERPsim game is also perceived as radical, since the only interface between participants and the game is a real-life enterprise system (SAP), and students have to run their business (making and implementing business decisions) using a very efficient system similar to those used by the world's largest companies. They must identify and use the system's functions in a timely manner to forecast sales, calculate the material requirement, manage stock, schedule procurement, and execute other administration functions such as accounting and finance. Third, the use of simulation games to teach students might be perceived radical due to the problem-based pedagogical approach that simulation games adapt (Kiili 2005). In such an approach, the instructor asks students to operate the full business cycle (plan, procure, and sell) in a simulated economic environment, without providing all of the concepts of ERP to them. This encourages participants to discover and employ various features of the ERP system, which simulates experiential learning. Based on our discussion of the role of emotions in shaping individual perceptions, we argue that emotions have a direct relationship with perceptions of radicalness by new ERP users. Realizing this link will help instructors to manipulate the perceived radicalness of the new system, which consequently may lead to higher rates of willingness to learn an ERP.

Loss and Deterrence Emotions: Anger and Anxiety

This group of emotions reflects the perception of a new IT as a threat, and the perception of a lack of control over its effects. Viewing adoption of a new IT as a threat accompanied with uncertain consequences leads to emotions such as anger, dissatisfaction, and disgust (Bagozzi et al. 1999). We choose anger and anxiety to represent these classes of emotions in our study.

In the context of IT adoption, it is assumed that negative emotions play a more important role than positive emotions (Dohle et al. 2012). Anger and anxiety seem to be especially important: there is evidence that these two emotions can have significantly different effects on risk estimates and choices (Lerner and Keltner 2000). Keltner et al. (2003) have shown that participants who experienced anxiety or anger interpret stimuli in a manner consistent with these appraisals. That is, anxiety-prone individuals make pessimistic risk estimates and prefer risk-averse decisions, while anger-prone individuals show optimistic risk estimates and prefer risk-seeking decisions (Dohle et al. 2012).

Anger is usually accompanied by certainty about the occurrence of an, and usually elicits defensive mechanisms in which individuals systematically de-emphasize the importance of the event itself, oftentimes by limiting the perceived influence of 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 system, and to limit the negative impact of the radicalness of the new system. ATF suggests that anger, as a defensive mechanism, is associated with the belief that other people are responsible for the negative event. Angry individuals will view a new IT less radical since the defensive
mechanism enhances their risk seeking behavior and they adapt more optimistic approach in their interaction with a new system (Dohle et al. 2012). Thus, we posit:

**H1.** Anger will be negatively associated with perceived radicalness of a new IT.

Tobias (1986) argued that even though anxiety is an affective state, cognitive processes mediate the effect of anxiety on behavior and performance. Empirical evidence in IS suggests that anxiety is negatively related to IT use (Compeau et al. 1999). Anxiety has also been found to be negatively related to several antecedents of usage intentions and behaviors, such as perceived ease of use and usefulness (Srite and Karahanna 2006), 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), and attitudes toward use (Venkatesh and Davis 2000). Anxiety is associated with appraisals of uncertainty, which leads individuals to make pessimistic risk estimates and prefer risk-averse decisions (Han et al. 2007); therefore, their perceptions of radicalness will be higher. Thus, we posit:

**H2.** Anxiety will be positively associated with the perceived radicalness of a new IT.

**Achievement and Challenge Emotions: Happiness and Excitement**

Emotions from this class are evoked by the appraisal of an event as being an opportunity likely to result in positive consequences (Beaudry and Pinsonneault 2010). Empirical evidence indicates that experiencing and expressing positive emotions enhances performance at the individual, group, and organizational levels (Barsade and Gibson 2012). Positive emotions are also fundamentally linked with an individual's "active involvement with goal pursuits and with the environment" (Lyubomirsky et al. 2005).

Happiness is a pleasant state experienced by individuals. It usually involves no effort to secure the expected benefits, and has a high degree of certainty about the consequences of an event (Smith and Ellsworth 1985). Empirical evidence has found positive connections between feeling happy with a new technology and the antecedents of IT use, including attitudes toward using it (Kim and Kankanhalli 2009), and perceived ease of use (Venkatesh and Davis 2000).

Due to high levels of certainty of positive outcomes, and feeling content with the existing benefits of an event, happiness leads to a lack of drive and desire to actively pursue a goal (Bagozzi et al. 1999). Happiness leads individuals to be pleased with success and to enjoy the outcome of an event (Scherer and Tran 2001). In the context of IS, we expect that happiness will negatively impact individual perceptions of the radicalness of a new system, because it is associated with a low activation and higher certainty of favorable consequences. Thus we posit:

**H3.** Happiness will be negatively associated with the perceived radicalness of a new IT.

ATF suggests that excitement is accompanied by perceptions that the benefits of the situation originate from the new IT (Han et al. 2007). In such a situation, potential benefits that a new IT may bring lead to excitement, which eventually increases usage intentions (Beaudry and Pinsonneault 2010). Emotions such as excitement have been found to boost explorative activities of individuals (Scherer and Tran 2001). Beaudry and Pinsonneault (2010) found support for this argument that individuals, through willingly modifying their work routines and seeking help from their colleagues, improve their exploitation of the new IT. In fact, we can argue that individuals relying on such a mechanism mitigate the potential challenges due to the newness of the IT.

The psychology literature offers further rationales for the positive connection between excitement and an individual's perceptions of IT radicalness. Excitement leads to higher creativity, better processing of new information, and flexibility in problem solving and thinking (Isen et al. 1987). Empirical IS research also found that excitement leads to higher creativity, better process on new information, and better flexibility in problem solving performances (Isen et al. 1987). Thus, we posit:

**H4.** Excitement will be negatively associated with the perceived radicalness of a new IT.

Empirical evidence indicates that radical innovations are perceived as significantly more successful and beneficial than incremental innovation, and are positively associated with competence acquisition (Gatignon et al. 2002). By introduction of a radical technology, individuals expect sharp breaks with the past and realize that there is less to be gained in terms of savings in switching costs by staying at the
current generation to keep their options open (John et al. 1999). Therefore, the likelihood of users’ wait-and-see attitude is diminished and they become more inclined to further learn and use it. Likewise, Aiman-Smith and Green (2002), in differentiating between the notions of radicalness and complexity, found that radicalness was positively related to speed to competence, while complexity of the technology had an opposite effect. This may imply that learners who are intrigued by the newness of a radical technology may be more open to further learning and consequently using it. A more recent ERP study illustrates that as perceived radicalness increases, individuals exert more mental and physical effort to further understand, execute, and routinize the new system (Bala and Venkatesh 2013). Radicalness perception of a new system implies substantially higher benefits (Chandy and Tellis 1998). Providing a significant increase in benefits has much in common with the constructs of relative advantage and perceived usefulness that have been applied in a range of adoption research (Davis 1989; Davis et al. 1992; Rogers 1995). Therefore, a radical system could offer significantly improved features compared to an incumbent technology, and meet an important unmet need. In sum, individual perceives that the new innovative is radically better than the current technology. Previous adoption research (Chau and Liu 2003; Vowles et al. 2011) illustrates that a substantially higher degree of benefits positively impacts adoption. Thus, we posit:

H5. Perceived radicalness will be positively associated with willingness to learn a new IT.

Method

We conducted a pilot test, an experimental study, in a controlled environment that was chosen to simulate an authentic integrated business process supported by a real ERP system. The subjects of the study were undergraduate students at a large Midwestern US public university who were enrolled in an Introduction to Enterprise Systems class in which SAP was used as the medium with which to learn ERP. A total of forty-eight students from 2 classes participated in the experiment. They were randomly divided into fourteen teams of three to four students, and had to use the system to operate a firm in a made-to-order manufacturing supply chain. Respondents received extra credit for completing the questionnaire. An alternate assignment was provided to those not wishing to participate in the study. The sample was comprised of approximately 64% males, with an average age of 22.7 years.

As mentioned earlier, the research methodology involved the use of simulation software called ERPsim (Léger et al. 2011), which is designed to recreate a realistic business context and manage the main business processes of an organization using SAP. The ERPsim simulation has been used in a number of similar studies (e.g., Caya et al. 2014; Cronan et al. 2012) in the past. The course utilized a traditional classroom meeting with lectures and lab assignments, and then, the ERPsim game to re-enforce ERP learning. In this simulation, participants are required to engage proactively in the decision-making process for their distribution companies and manage the day-to-day operations of their company, while competing against other companies operating in the same market. More specifically, students must interact with suppliers and buyers by sending and receiving purchase orders, deciding on marketing strategies, and delivering the products to complete the entire cash-to-cash cycle. Within the simulation game, the goal was to compete with other teams (each representing a company), in maximizing profits, capturing market share, minimizing costs, etc. Between rounds of game play, participant teams were allowed to analyze their business results, reevaluate current business strategies, and modify these strategies accordingly for the next round. Each simulation lasted an average of 30 minutes, and each team played the simulation for three consecutive rounds.

Participants were requested to complete a pre-test survey that measured their emotions. The second part of the survey was conducted at the end of the experiment, and included items for perceived radicalness and willingness to learn. None of the subjects had any previous experience with the system, and all attended the same ERP training session. In this way, we were able to isolate the effect of prior experience on the model relationships. A threat to internal validity may occur when assigning different participants to different teams, with different team sizes, and in different classes, potentially producing groups of individuals with noticeably different characteristics. Hence, we checked for the impact of these dissimilarities and there were no significance differences in gender across classes (F = 1.342, P = 0.238) and perceived radicalness (F = 1.311, P = 0.219), suggesting no assignment bias.
We used a seven-point Likert scale (“strongly disagree” to “strongly agree”) to measure the constructs. Survey items were adapted from previously used and validated scales. In order to measure anger, we used three items developed by Pekrun et al. (2011). This scale is specifically designed and tested in a training and learning context, similar to our ERPsim setting. A sample item is: “Thinking that I am going to use ERPsim makes me feel angry.” Anxiety was measured by four items developed by Compeau et al. (1999). A sample item for this measure is: “I feel apprehensive about using ERPsim.” Happiness and excitement were measured adapting scales from Holbrook et al. (1984). Sample items for these two constructs are: “I am happy that I am going to use ERPsim” and “Using ERPsim will be exciting.” We customized the reflective five-item construct of Gatignon et al. (2002) to detect perceived radicalness. A sample item is: “The ERP system (here SAP) is a major improvement over previous technologies.” Finally, we modified the three-item usage intentions scale of Davis et al. (1989) to the ERPsim context in order to measure willingness to learn. A sample item for this measure is: “I intend to learn about ERP systems in the future.”

**Data Analysis and Results**

Due to the small sample size, we analyzed the data using regression in SPSS 22. The mean values of the scores for each construct were calculated to use in running our model. The reliability and validity criterion were all satisfied for our pilot study (Table 1). Results generally support our model, as all but one of the hypotheses were supported. Three out of four antecedents of perceived radicalness had significance associations, as hypothesized. Anger ($\beta = -0.35; p < 0.05$), anxiety ($\beta = 0.34; p < 0.05$), and excitement ($\beta = -0.35; p < 0.05$) have a significant effect on perceived radicalness perceptions, supporting H1, H2, and H4, while the path from happiness to perceived radicalness was insignificant ($\beta = -0.12; p = 0.37$), hence H3 was not supported. Perceived radicalness was found to have a significant impact on the ultimate dependent variable, willingness to learn ($\beta = 0.76; p < 0.05$). The results indicate that the classes of emotions explain 50 percent of the variance in perceived radicalness, which in turn explains 52.5 percent of willingness to learn. We did not find significant links between the control variables gender ($\beta = 0.00; p = 0.99$) and age ($\beta = -0.09; p = 0.51$) and perceived radicalness, and likewise gender ($\beta = -0.22; p = 0.51$) and age ($\beta = 0.17; p = 0.21$) had no significant impact on willingness to learn. The model explained substantial variance in both perceived radicalness ($R^2 = 0.50$) and willingness to learn ($R^2 = 0.52$).

The change in the $R^2$ value when a specific independent variable is omitted from the model can be evaluated to determine whether the omitted construct has a substantive impact on the dependent variable (Hair et al. 2009). We also calculated the effect sizes of variables in our model using the Cohen’s $f^2$ formula (Cohen 1988). The two negative emotions (anger and anxiety) have the biggest effects on perceived radicalness (0.343 and 0.338, respectively). In the case of the two positive emotions, happiness has the smallest effect size (0.075), while the effect size of excitement on perceived radicalness is moderate (0.323) and comparable to that of the negative emotions (Cohen et al. 2003).

### Table 1. Confirmatory Factor Analysis Results

<table>
<thead>
<tr>
<th>Constructs</th>
<th># of Items</th>
<th>Mean</th>
<th>SD</th>
<th>CR</th>
<th>AVE</th>
<th>Cronbach’s Alpha</th>
<th>Correlations</th>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>(1) Anger</td>
<td>3</td>
<td>2.79</td>
<td>1.19</td>
<td>0.86</td>
<td>0.68</td>
<td>0.86</td>
<td>0.82</td>
</tr>
<tr>
<td>(2) Anxiety</td>
<td>2</td>
<td>3.66</td>
<td>0.96</td>
<td>0.79</td>
<td>0.65</td>
<td>0.71</td>
<td>0.81</td>
</tr>
<tr>
<td>(3) Happiness</td>
<td>3</td>
<td>4.01</td>
<td>1.00</td>
<td>0.89</td>
<td>0.72</td>
<td>0.86</td>
<td>-0.16</td>
</tr>
<tr>
<td>(4) Excitement</td>
<td>3</td>
<td>4.10</td>
<td>1.27</td>
<td>0.95</td>
<td>0.87</td>
<td>0.89</td>
<td>0.12</td>
</tr>
<tr>
<td>(5) Perceived Radicalness</td>
<td>4</td>
<td>4.67</td>
<td>1.01</td>
<td>0.91</td>
<td>0.73</td>
<td>0.88</td>
<td>-0.31</td>
</tr>
<tr>
<td>(6) Willingness to Learn</td>
<td>3</td>
<td>4.33</td>
<td>1.42</td>
<td>0.91</td>
<td>0.77</td>
<td>0.91</td>
<td>-0.39</td>
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*Square-root of AVE values represented along the diagonal*
Discussion and Conclusion

Summary of Findings

It is crucial to maximize the effectiveness of learning and using ERP systems with respect to the work performed by individuals. In light of this, our study focused on the ERP introduction stage when initial learning takes place, by emphasizing the role of learners' emotions in a simulation game context. We developed a model identifying four classes of emotion based on the ATF (Han et al. 2007; Lerner et al. 2000): anger, anxiety, happiness, and excitement. Moreover, borrowing from the Affective Infusion Model (Forgas 1995) and notions from prominent technology acceptance models (Fishbein and Ajzen 1975; Davis 1989; Ajzen 1991), we tested perceived radicalness as a mediator of the relationships between individuals' affective appraisals and willingness to learn. Four out of three tested classes of emotions were significantly associated with students' willingness to learn via their perceptions of technology radicalness. This result supports our argument about the centrality of an individual's radicalness perceptions in relation to his/her emotional status and willingness to learn.

Our findings are in line with recent research on emotion, which shows that affective influence is often stronger and more far-reaching than previously considered (e.g., Beaudry and Pinsonneault 2010; Wood and Moreau 2006). Results support four of our five hypotheses, and suggest that emotions triggered in the early period of an IT training are important antecedents of the radicalness perception of potential users and their subsequent IS behaviors.

Limitations

Some limitations of the study should be noted. Recall bias may be a problem in this study, since we studied the emotions retrospectively. To reduce this potential bias, we followed common practices from similar studies (e.g., Beaudry and Pinsonneault 2010) in providing strong anchor points to respondents in the questionnaires (i.e., we used the system name, ERPsim game, in the questionnaire items). We also attempted to minimize recall bias by measuring the emotions prior to introduction of the ERPsim, and perceived radicalness and willingness to learn after conducting the experiment. Furthermore, we asked participants to recall the intensity of specific emotions with regard to the event (i.e., emotions were listed in the questionnaire). However, the occurrence of recall bias can likely lead to underestimation of the intensity of emotions (Walker et al. 1997). Hence, our results are presumably conservative with regard to the effects of emotions on radicalness perceptions and willingness to learn. Although student subjects likely represent the target population of the phenomenon being examined, additional studies with actual users in real business environments are needed to strengthen the generalizability of our findings.

Contributions and Future Research Directions

The main contribution of this paper is to draw attention to the pedagogical strategies required to engage students in a context where learning the IT artifact is facilitated by simulation game features. By examining users' responses from an emotion-based perspective, our study supplements existing cognitive-based models and helps explain and predict a focal IT-related belief. We partially address the limitation of technology acceptance research by studying a neglected user behavior (i.e., learning), which is highly relevant to broaden our understanding of system use (Benbasat and Barki, 2007). Also, the framework we develop classifies emotions predicts when emotions with the same valence have distinct effects; hence, the model helps to predict and explain how emotions link with IT related perception of radicalness. Moreover, by empirically testing the centrality of perceived radicalness in an ERP simulation game setting, we provide a better understanding of the concept of radicalness, which has rarely been studied at the individual level of analysis and in learning environment.

Our findings can help instructors to stimulate willingness to learn by managing emotions in three ways. First, educators can try to trigger specific challenge emotions in users in order to increase radicalness perception of the students. Especially, by decreasing loss (i.e., anger) and promoting deterrence (i.e., anxiety) emotions, which are found to be associated with willingness to learn. Further research is required to identify what kind of strategies can trigger specific emotions. For example, evoking challenge emotions (such as excitement) by offering incentives may not be an effective idea especially in the first stages of a new system introduction, since it may dampen individuals' radicalness perceptions and consequently
their willingness to learn the new system. Second, if instructors have accurate information on the levels of learners’ tendencies to specific emotions, they may select more appropriate course designs and personalized curricula. For example, for students with higher propensity to anxiety, use of simulation games might increase their continuance learning behavior, while for others with lower anxiety and/or higher positive emotion tendencies, simulation game might not be similarly effective. Finally, the results can encourage educators to consider use of more radical and novel technologies instead of known and legacy systems, since infusion of higher radicalness perceptions among students could result in more explorative learning. The findings could also help simulation game designers to incorporate and communicate specific features and interfaces. For example, offering step-by-step built-in help or sharing best practices at introduction phase of simulated training might not improve students’ learning performance. It could reduce anxiety and consequently lowers further learning willingness of the individuals.

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