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# Proposing the Affect-Trust Infusion Model (ATIM) to Explain and Predict the Influence of High- and Low-Affect Infusion on Web Vendor Trust

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**Abstract**
Trust is just as essential to online business as it is to offline transactions but can be more difficult to achieve-especially for newer websites with unknown web vendors. Research on web-based trust development explains that web vendor trust can be created by both cognitive and affective (e.g., emotion-based) influences. But under what circumstances will emotion or cognition be more dominate in trust establishment? Theory-based answers to these questions can help online web vendors design better websites that account for unleveraged factors that will increase trust in the web vendor. To this end, we use the Affect Infusion Model and trust transference to propose the Affect-Trust Infusion Model (ATIM) that explains and predicts how and when cognition, through perceived website performance (PwP), and positive emotion (PEmo) each influence web vendor trust. ATIM explains the underlying causal mechanisms that determine the degree of affect infusion and the subsequent processing strategy that a user adopts when interacting with a new website. Under high-affect infusion, PEmo acts as a mediator between PwP and vendor trust; under low-affect infusion, PwP primarily impacts trust and PEmo is dis-intermediated. We review two distinct, rigorously validated experiments that empirically support ATIM. To further extend the contributions of ATIM, we demonstrate how use of specific contextual features-rooted in theory and that drive one's choice of affect infusion and cognitive processing-can be leveraged into a methodology that we propose to further enhance user-centered design (UCD). We further detail several exciting research opportunities that can leverage ATIM.

**Keywords:** Trust, affect infusion, positive website performance, positive emotion, cognition, Affect-Trust Infusion Model, trust transference

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## ABSTRACT

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## KEYWORDS

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## INTRODUCTION

One of the greatest challenges to the growth of e-commerce is improving trust in online vendors (Ba & Pavlou, 2002). Accordingly, several recent studies have sought methods for increasing and accelerating e-commerce trust formation (Cyr, 2008; Dinev et al., 2006; Goo & Huang, 2008; Hwang & Kim, 2007; Pavlou, 2003; Pavlou & Gefen, 2004; Verhagen et al., 2006). Of particular interest to our study, trust strongly impacts purchase intentions (Everard & Galletta, 2006; Kim, Ferrin, et al., 2009), but trust is difficult to establish—especially with lesser-known brands or unknown web vendors (Bart et al., 2005; Lowry et al., 2008). Creating trust usually requires a substantial passage of time, which typically involves several interactions before a consumer feels comfortable conducting a transaction (Chae & Kim, 2004). This time requirement creates a substantial entrepreneurial impediment to millions of new websites and web vendors that offer economic value but have little time or opportunity to sell their value statement before caving in to economic pressures. Finding novel ways to quickly develop trust in unknown web vendors is thus of great value—particularly for the millions of owners of emerging websites that have much economic value to offer but do not have established brands and reputations (Lowry et al., 2008).

This article joins this research conversation and specifically focuses on web vendor trust as the phenomenon of interest. *Web vendor trust* is an individual's trusting beliefs toward a web vendor that is built typically through the interaction with the vendor's website (Lowry et al., 2008; McKnight & Chervany, 2001; McKnight et al., 2002; Pavlou & Fygenson, 2006). *Trusting beliefs* are an individual's judgments regarding the extent to which a trust target is likely to behave with

benevolence, competence, and integrity (McKnight et al., 2002; Stewart, 2003)—in our context, this target is the web vendor. A *web vendor* is a person or an organization that owns a website (Pavlou & Fygenson, 2006).

Importantly, web vendor trust is distinct from *website trust*, which refers to one's trusting beliefs in a transactional or informational technology—not the vendor (Corritore et al., 2003). The important conceptual difference between these two terms—although they are often used interchangeably—is that website trust promotes user interaction with the website (e.g., to search for information, store information, or facilitate communication); whereas web *vendor* trust promotes deeper personal disclosure and interaction with the vendor's website and even direct interaction with the vendor (e.g., to purchase products, provide personal information, or communicate) (McKnight et al., 2002; Pavlou & Fygenson, 2006).

Web vendor trust is a particularly important form of trust that motivates our study because this type of trust is closely equivalent to offline trust, which can involve offline activities such as direct sales or other communication and transactions that are critical to a deeper business relationship (Shankar et al., 2002). For multichannel organizations that maintain online and offline activities, web vendor trust is thus a critical phenomenon of interest to engender. Of further importance, web vendor trust generally drives purchases, online disclosures, and deeper relationships of loyalty, which are primary goals of most e-commerce websites; interaction alone is insufficient (McKnight et al., 2002; Pavlou & Fygenson, 2006).

We thus examine how short-term, perceived positive website performance (PwP) and positive emotion (PEmo) resulting from website interactions can enhance trust of unknown web vendors. This is a promising area of research for two additional reasons: (1) First, PwP has been shown to influence user behavior and evaluations in a variety of settings, including increasing website use (Udo & Marquis, 2001), perceptions of quality (Chen & Yen, 2004), purchase intentions (Jiang et al., 2010; Jiang & Benbasat, 2007), affective involvement (Jiang et

al., 2010), and attitude toward the website (Coyle & Thorson, 2001; Liu & Shrum, 2009). (2) Second, PEmo has also been shown to positively influence user behavior such as promoting increased self-efficacy (Baron, 1990), improved tasking performance (Baron, 1990), enhanced creativity in problem solving (Isen et al., 1987), increased sociability (Isen, 1987), augmented cooperation (Isen, 1987), increased self-disclosure (White, 2004), stronger purchase intentions (Fiore et al., 2005; Oliver, 1977; Oliver, 1981; Spreng et al., 1996), higher IT evaluation (Zhang & Li, 2004; Zhang & Li, 2007), increased system adoption (Sun & Zhang, 2006a), and continued system use (Hsu et al., 2004).

Although the literature indicates that both PwP and PEmo can likely be used to increase web vendor trust, PwP and PEmo do not always work together in the same way. Namely, PwP and PEmo do not always influence human behavior and evaluation equally, and their influence depends heavily on context (Forgas, 1995). Thus, the context in which a user interacts likely determines whether PwP or PEmo is most salient in affecting web vendor trust; yet, extant literature does not address this opportunity. Given this compelling theoretical gap and opportunity, this study answers the following research question:

***RQ: How and when will PwP and PEmo influence web vendor trust in users' initial interactions with unknown websites and unknown web vendors?***

The remainder of this paper provides the necessary theoretical background to answer this question, and proposes the *Affect-Trust Infusion Model* (ATIM). We then explain the potential contributions of this theoretical work to research and practice—including proposing a new methodology that can be used to enhance extant user-centered design (UCD) using the ATIM.

## THEORY ON HOW AND WHEN PWP AND PEMO IMPACT TRUST

Here, we propose a new theoretical model, the *Affect-Trust Infusion Model* (ATIM), to address our research question. We first provide a theory-based explanation—rooted in signaling

theory—for why a user's trust generated from a website interaction will transfer to the user's trust in the associated website vendor. Next, we conceptually define affect, PEmo, and PwP, and explain how PwP increases PEmo. Finally, ATIM employs the Affect Infusion Model (AIM) to explain that, in high-affect infusion contexts, PEmo will primarily drive the development of web vendor trust by acting as a mediator between PwP and trust; whereas in low-affect infusion contexts, PwP will primarily drive the development of web vendor trust—dis-intermediating PEmo.

***WEBSITE TRUST WILL TRANSFER TO WEB VENDOR TRUST***

Given that website trust and web vendor trust are conceptually distinct, a fundamental proposal of the ATIM is that website trust, derived from interacting with a website, will automatically transfer to the vendor associated with the website. We support this claim with the theoretical literature on signaling theory by explaining that a web vendor can embed signals into its website to communicate its own quality and abilities; and, therefore, establish trust not only in its website, but also in itself. The signaling theory framework has been applied in fields such as finance (Benartzi et al., 1997; Robbins & Schatzberg, 1986), marketing (Boulding & Kirmani, 1993; Kirmani, 1997; Kirmani & Rao, 2000; Rao et al., 1999), and management (Certo, 2003; Connelly et al., 2011; Turban & Greening, 1997) to explain how a seller can overcome the constraints of limited or hidden information in precontractual (prepurchase or pretransactional) settings. Beyond business, signaling theory has received much attention in disciplines ranging from "anthropology to zoology" (Connelly et al., 2011, p. 40)*.*

At its core, signaling theory is concerned with overcoming information asymmetry between two parties – in our context, the web vendor (information sender) and the website user (information receiver) (Connelly et al., 2011; Spence, 2002). In a seminal work, (Spence, 1973) demonstrated how high-quality job applicants leverage arduous higher education as a costly signal to help overcome the information asymmetry with employers and distinguish themselves

from low-quality job applicants. Most signaling models are concerned with overcoming information asymmetry as it deals with communicating quality (Connelly et al., 2011). Adapting the definition of Connelly et al. (2011, p. 43), we define quality as "the underlying, unobservable ability of the [web vendor] to fulfill the needs or demands of [a website user]". Because of imperfect information about the unknown web vendor's quality, the user is required to rely on other cues sent from the web vendor. These cues, embedded in the website, which convey the web vendor's unobservable quality are referred to as signals (Connelly et al., 2011; Rao et al., 1999; Wells et al., 2011).

Signal credibility is a key theoretical requirement for a signal to be effective in conveying high web vendor quality to the website user. Signals have credibility based on their cost (Connelly et al., 2011; Srivastava, 2001). The increased cost implies increased risk to the vendor if the signal is false. The classic example of a credible signal is a warranty. A warranty implies high repair and replacement costs for vendor if a product is of low-quality. Signal credibility is established by web vendors through a significant investment in their websites. Signaling theory is most applicable when the website users perceive this investment through their evaluations of website performance and quality (Connelly et al., 2011; Wells et al., 2011). Thus, as a user's positive evaluations of a website build website trust, that trust will be transferred to the web vendor (i.e. act as a signal of the web vendors trustworthiness). In this sense, trust will be established simultaneously in the website and the web vendor.

***EXPLAINING HOW PERCEIVED WEB SITE PWP IMPACTS PEMO***

Assuming that trust judgments about an unknown website will transfer to an unknown web vendor, we now explain how PwP affects underlying PEmo in the user interacting with the website. We begin by explaining our adopted conceptualization of PwP and PEmo. We then explain the theoretical ties between the two.

The objective of proposing ATIM is not to extensively conceptualize all possible ways to

look at PwP. Instead, the focus is on how a pragmatic conceptualization of PwP might influence web vendor trust in both low- and high-affect infusion scenarios while accounting for PEmo. We thus carefully chose a PwP conceptualization that is measurable in both low- and high-affect infusion scenarios, relevant to a variety of systems contexts, and within the theoretical scope of AIM.

Accordingly, rooted in a large literature base (e.g., Chen & Yen, 2004; Jiang et al., 2010; Jiang & Benbasat, 2007; Liu & Shrum, 2009), we define and scope PwP as positive cognitive evaluations of an interaction with a website. These positive cognitive judgments are formed or solidified during the interaction, and are a strong predictor of other cognition, attitudes, and future behavior. For example, a website user may determine that he or she had little ability to perform desired tasks—a judgment that would decrease the likelihood of future website use (Liu & Shrum, 2009). Evaluations of a website interaction have been shown to impact other cognitive judgments such as perceptions of quality (Chen & Yen, 2004) and purchase intentions (Jiang et al., 2010; Jiang & Benbasat, 2007), and affective responses, such as affective involvement (Jiang et al., 2010) and attitude toward the website (Coyle & Thorson, 2001; Liu & Shrum, 2009).

Turning from PwP, we now explain our use of PEmo in ATIM. Disagreement exists in the psychology literature about the exact definitions of affect and related terms such as emotion and mood (Forgas, 2001; Russell, 2003). In spite of affect's fuzzy boundaries, it is important to study because of affect's strong influences on behavior (Fiore et al., 2005; Forgas, 1995; Oliver, 1977; Oliver, 1981; Spreng et al., 1996; White, 2004). The extant psychology literature conceptualizes affect in several ways. Russell refers to *core affect* as a superset of states that include emotions (Russell, 2003). In contrast, Forgas (1995) conceptualizes *affect* as encompassing moods and emotions. Compared to emotions, *moods* tend to be relatively enduring and of a lower intensity

whereas *emotions* “usually have a definite cause and clear cognitive content” (i.e., are associated with particular cognitions toward an object) (Forgas, 1992, p. 230). Because moods are more inherent and stable in a person’s general disposition, and not easily manipulated, the useful part of affect fundamental to the AIM and the typical focus of empirical studies is the emotional component, not the mood component (Forgas, 1995). Importantly, Russell (2003) also congruently emphasizes that the emotional portion of core affect likewise can be manipulated by an external stimulus and the resulting evaluation.

We thus narrow the scope of the ATIM to focus on the emotion component of affect because we intend to manipulate, explain, predict, and measure PEmo—not general mood, which is more conflated, enduring, not the result of cognitive evaluation, and thus not easy to manipulate directly (Forgas, 1995; Russell, 2003). This theoretical scope decision is particularly useful for our context because ATIM focuses on the PEmo resulting from cognitive performance evaluation of an unknown website (i.e., PwP) and the result of that PEmo on cognitive trust. Pragmatically speaking, website designers have virtually no control over the general mood that users bring to a website interaction, but designers do have control over design considerations that create cognitive evaluations that affect PEmo from website interaction.

For modeling simplicity, we also limit our current theoretical consideration to PEmo—excluding negative emotion. Though PEmo and negative emotions are related, they are separate constructs that are not the opposite of each other and do not share all antecedents (Baron, 1990; Dunn & Schweitzer, 2005; Isen et al., 1987; Murphy & Zajonc, 1993; Russell et al., 1989; Sun & Zhang, 2006b; Zhang & Li, 2007). Our pragmatic research focus is to help website designers create positive, not negative, experiences for website users. Our parsimonious focus on PEmo has been commonly used in other studies for the same basic reason that PEmo is the desired emotional experience that fosters positive outcomes such as consumer satisfaction, increased website use, etc. (e.g., Baron, 1990; Isen, 1987; Isen et al.,

1987; Oliver, 1980; Oliver, 1993; Russell et al., 1989; Schoefer, 2008; Spreng et al., 1996). More formally, ATIM is concerned only with PEmo that results from cognitive evaluation of an object (Forgas, 1995; Russell, 2003)—specifically, a website.

Now that we have defined our use of PwP and PEmo, we explain how PwP directly affects PEmo. First, the emotional component of affect can be changed or manipulated by external stimuli and the resulting evaluation, as demonstrated in Forgas (1995) and Russell (2003). Assuming these results hold in a website context, during an interaction with a new website, a user's PwP can thus act as a stimulus that drives the user's resulting PEmo.

Supporting this assumption, consumer psychology and marketing research have often relied on performance evaluations to predict and explain changes in emotion. Several cognition-based theories explain specific emotions that result from cognitive processing. Example theories in the IS literature include the Theory of Reasoned Action (Ajzen & Fishbein, 1973) and the Theory of Planned Behavior (Ajzen, 1991), which predict that beliefs drive a person's attitude. Expectation-Disconfirmation Theory (Oliver, 1980) similarly predicts changes in satisfaction as a direct result of performance evaluations. The met-expectations theory literature demonstrates the same relationship (Bhattacherjee, 2001; Brown, Hobbs, et al., 2008; McKinney et al., 2002; Oliver, 1981; Spreng et al., 1996). Moreover, because attitude and satisfaction have strong emotional components (Ajzen, 1991; Oliver, 1980), it logically follows that positive cognitive evaluations can at least partially create PEmo.

Several other similar studies further point to this potential link between perceived performance and PEmo. In satisfaction research, performance has been shown to influence consumer emotions (Liljander & Strandvik, 1997; Muller et al., 1991). Specifically, according to Oliver (1993), each cognitively evaluated attribute of a service or product may serve as a potential source of positive (or negative) emotion. Oliver also posits that in general perceived performance influences emotion (Oliver, 1993). Liljander and Strandvik (1997) found significant

empirical support for the link between perceived performance and PEmo. Finally, in the context of service recovery satisfaction, Schoefer (2008) showed that interactional, procedural, and distributive justice—all forms of perceived performance that are cognitively evaluated from the customer's viewpoint—influence positive and negative emotion. This strong theoretical and empirical evidence leads to the first proposition:

***P1. An increase in PwP increases a user's PEmo.***

## WHEN PEMO AND PWP MOST INFLUENCE TRUST AND WHEN THEY DO NOT

The idea that perceived performance impacts trust is well established (e.g., Lowry et al., 2008; McKnight & Chervany, 2001; McKnight et al., 2002; Pavlou & Fygenson, 2006). What has yet to be explained in the literature are the factors of website use that would cause cognitive judgments to have greater impact on trust judgments and the factors that cause PEmo to have greater impact on trust judgments. To address this theoretical gap in the literature, we use AIM to explain and predict when PEmo or PwP will be most influential in the creation of web vendor trust.

Although many studies have focused on a specific type of PEmo such as enjoyment (e.g., Davis et al., 1992; Dickinger et al., 2008; Sherry, 2004; van der Heijden, 2004; Vorderer et al., 2004) or satisfaction (e.g., Au et al., 2008; Bhattacherjee, 2001; Brown, Venkatesh, et al., 2008; Lowry, Romano, et al., 2009; McKinney et al., 2002; Oliver, 1980) to predict trust responses, the AIM provides a more general theoretical framework which more comprehensively explains how one's positive emotions can influence cognitive judgment (Forgas, 1995). Thus, general predictions based on the AIM should have greater explanatory potential than more narrow predictions for specific positive emotional states such as enjoyment or satisfaction alone. Important to ATIM, the AIM posits that affect —although distinct from

cognitive processes—can exert influence on cognitive social judgments (e.g., trust) under certain conditions (Forgas, 1995). Other trust research has hypothesized (McKnight et al., 1998) and empirically validated (Dunn & Schweitzer, 2005) that trusting beliefs can be influenced by PEmo. We believe the AIM provides the strongest explanation as to *why* and *when* this is the case. Again, AIM was conceptualized for more general affect, which includes PEmo. Consistent with our decisions about scope, we adopt our AIM focus on PEmo instead of more general affect.

AIM posits *affect infusion* as the underlying causal mechanism process "whereby affectively loaded information exerts an influence on and becomes incorporated into the judgmental process, entering into the judge's deliberations and eventually coloring the judgmental outcome" (Forgas, 1995, p. 39). Under *low-affect infusion*, cognitive evaluations are the main drivers of judgments. Under *high-affect infusion*, PEmo is the main driver of judgments (Forgas, 1995). Critical to AIM, experiencing high levels of PEmo does not necessarily mean high-affect infusion occurs; neither do low levels of PEmo mean that low-affect infusion will occur. Namely, if high PEmo is present when a person employs a low-affect infusion strategy, PEmo will exhibit little influence on cognitive judgments. Instead, the degree of affect infusion varies depending on the cognitive processing strategy used to make the judgment; and it is the target characteristics, judge characteristics, and situational factors that determine the strategy used. We now describe these cognitive processing strategies.

Based on the target, judge/user, and situation features, AIM identifies four processing strategies one can engage in—direct access, motivational, heuristic, and substantive. Two of the strategies (heuristic and substantive) have high-affect infusion and two (direct access and motivational) have low-affect-infusion. These strategies represent a spectrum of the likelihood that PEmo will impact cognition from the lowest to the highest likelihood of impact:

1. ***Direct access processing*** is a low-affect infusion processing strategy and is the

scenario in which PEmo is least likely to exert influence on cognition. This strategy is most likely used when the target is familiar and has typical features, when personal relevance for the judge/user is low, and when contextual factors do not mandate further elaborative processing (Forgas, 1995; Forgas, 2001) Direct access processing typically involves simple reproduction of a stored reaction to the same scenario in the past, and thus PEmo plays little to no role.

For example, if a person is navigating to an online e-commerce store selling electronics and has used the e-commerce store many times in the past without trouble (thus, high familiarity/typicality), the person would likely not stop to think about potential security vulnerabilities or other factors that would inhibit trust and thereby use. Rather, the person would recall prior performance evaluations of the e-commerce store and rely on these as a cognitive pattern without additional elaboration. These crystallized judgments are robust and resistant against affective states (whether strong or weak), and thus the direct access processing strategy has low-affect infusion (Forgas, 1995). Users will form new judgments based on PwP, and these judgments act as inputs for future evaluations via direct processing. This evolutionary approach to refining one's pre-stored judgments is predicted in the expectancy value theory, which explains that one's attitude is the summation of one's beliefs (Fishbein & Ajzen, 1975). As one receives new beliefs, one's attitude evolves (Fishbein & Ajzen, 1975). Hence, past high PwP would likely increase expectation of positive judgments of trust and reduce the impact of negative experiences in the future.

**2. *Motivated processing*** is a low-affect infusion processing strategy, representing the second least likely scenario in which PEmo impacts cognition. This strategy is most likely used when strong, specific factors motivate a particular outcome to be achieved. It "assumes the imposition of a specific, preexisting preference to guide information search and processing" (Forgas, 1995; Forgas, 2001).

This kind of processing is especially common when evaluation is focused on a specific

judgmental outcome—specifically, if the person has a targeted search goal that is clear and knows what information is needed to achieve that goal (Forgas, 1995). For example, when one needs to find a specific book at a library, one likely uses the electronic catalog system with almost no generative, constructive elaboration. The information searching patterns associated with the outcome of the judgment are guided by a priori motivational goal (e.g., to find the book) and are thus resistant to the influence of PEmo. Accordingly, motivated processing has a low likelihood of affect infusion although slightly more so than in direct access processing (Forgas, 1995); in our context, PwP should thus directly influence trust in the website vendor. If a website cannot help a user achieve his or her interaction goals, or makes the experience unnecessarily difficult when the interaction is pre-judged as a straightforward task, then a user's perception of the system's competency should decrease—undermining a defining characteristic of trust (McKnight et al., 2002; Stewart, 2003).

**3. *Heuristic processing*** is a high-affect infusion strategy representing the second most likely scenario of PEmo impacting cognition. This strategy is most likely used when several of the following contextual features apply (Forgas, 1995): (1) target features lack familiarity, have high typicality, or have low complexity; (2) judge/user features include low personal relevance, lack of motivational goals, high affective state, and limited cognitive capacity; and (3) situation features cause little need for accuracy, low availability of criteria, or low social desirability (Forgas, 1995). Heuristic processing provides a quick alternative to more-elaborate cognitive processing by relying on cues such as one's affective state. People are motivated toward this processing based on the *affect-as-information principle* (Forgas, 2001), which posits that affect can be used as shortcuts to make decisions under conditions requiring fast judgment processing, lack of information, lack of familiarity, and the like. When using heuristic processing, people "ask themselves: 'How do I feel about it?' [and] in doing so, they may mistake feelings due to a pre-existing state as a reaction to the target" (Schwarz, 1990, p. 529). Hence, the

*heuristic processing* strategy has a high likelihood of affect infusion (Forgas, 1995).

To illustrate heuristic processing, recall the example of an individual seeking out a book at the library using the electronic catalog system, except assume the individual is not looking for a *specific* book, but desires to find *any* book on related to topic of interest. Because the individual is less motivated to narrow the information search, he or she will need to evaluate the credibility and usefulness of specific books discovered in the system. The individual is likely to "judge the book by its cover" or rely on reviews of previous readers because he or she lacks the ability to read every book in detail in a timely manner. An attractive image of the book or positive review induces PEmo, which is used as information in the judgment process.

**4. *Substantive processing*** is the high-affect infusion strategy where PEmo is most likely to influence cognition. This strategy is most likely used when several of the following contextual features apply (Forgas, 1995): (1) target features include low familiarity, low typicality, and high complexity; (2) judge/user features include high personal relevance, high motivation, high affective state, and high cognitive capacity; (3) situational features cause a need for accuracy, where there is a low availability of criteria, and/or where there is high social desirability. This strategy typically involves much constructive processing and is used in complex or atypical decision-making situations, requiring accurate or detailed consideration (Forgas, 1995). In these complex decision-making situations, a person draws on much information to make the decision, including performance evaluations and one's affective states. Substantive processing is based on the *affect priming* theory, which suggests that affect increases access to congruent memories (Murphy & Zajonc, 1993; Zajonc, 1980). PEmo thus will give greater recall to positive memories and therefore bias judgments in the direction of those memories (Forgas, 1995). Substantive processing thus is the highest affect infusion processing strategy.

As an illustration, if a person navigates to an unfamiliar online banking portal, the person

will carefully examine cues on the website to formulate trust beliefs. If the cues induce PEmo (e.g., the website is visually appealing), these cues and the associated PEmo will give greater recall of other websites that the user has had positive experience and trust with. The user will then be more likely to attribute trust to the current website. This process was shown in a study on the negative effect of presentation flaws in unknown websites on trust (Everard & Galletta, 2006). Yet, another study using the network associative model of memory showed how interactions with well-designed unknown websites, with positive branding images, causes users to associate the unknown website with previously known, positive website interactions, and thus increase trust (Lowry et al., 2008).

Table 1 summarizes the four processing strategies used in low- and high-affect infusion as applied to web vendor trust. Under low-affect infusion strategies, PwP would affect trust more than PEmo; under the high-affect infusion strategies, PEmo would affect trust more than PwP. In summary:

***P2. In low-affect infusion contexts, PwP will increase web vendor trust more than PEmo.***

***P3a. In high-affect infusion contexts, PEmo will increase web vendor trust more than PwP.***

***P3b. In high-affect infusion contexts, PEmo will mediate the relationship between PwP and web vendor trust.***

In terms of P3b, as an important note on modeling and testing affect infusion in this manner, we would likewise expect that, in cases of moderate affect infusion, positive emotion is

***Table 1*. Contextual Features that Drive Affect-Infusion Strategies**

| Primary contextual features that drive the affect infusion strategy | **Low-Affect Infusion (Low PEmo) Strategies:** | | **High-Affect Infusion (High PEmo) Strategies:** | |
|---|---|---|---|---|
| | **Direct access** processing | **Motivated** processing | **Heuristic** processing | **Substantive** processing |

| | | (PEmo least likely to influence judgment) | (PEmo 2nd least likely to influence judgment) | (PEmo 2nd most likely to influence judgment) | (PEmo most likely to influence judgment) |
|---|---|---|---|---|---|
| Trust target features | *Familiarity* | **High** familiarity | **Low** familiarity | **Low** familiarity | **Low** familiarity |
| | *Typicality* | **High** typicality | n/a | **High** typicality | **Low** typicality |
| | *Complexity* | n/a | n/a | **Low** complexity | **High** complexity |
| Trustor features | *Personal relevance* | **Low** personal relevance | n/a | **Low** personal relevance | **High** personal relevance |
| | *Motivational goals* | **Low** motivational goals | **High** motivational goals | **Low** motivational goals | **Low** motivational goals |
| | *Affective state* | n/a | n/a | **High** affective state | **High** affective state |
| | *Cognitive capacity* | **Low** cognitive capacity | **High** cognitive capacity | **Low** cognitive capacity | **High** cognitive capacity |
| Situation features | *Need for accuracy* | n/a | n/a | **Low** need for accuracy | **High** need for accuracy |
| | *Availability of criteria* | n/a | n/a | **Low** availability of criteria | **High** availability of criteria |
| | *Social desirability* | n/a | n/a | **Low** social desirability | **High** social desirability |

retained as a partial mediator, and thus the relationship between perceived website performance and web vendor trust is retained. Finally, Figure 2 depicts ATIM, which encapsulates the hypotheses proposed in this section.

## DISCUSSION OF ATIM

We leveraged the AIM and signaling theory to propose a new model, ATIM, which explains and predicts how and when PEmo will increase web vendor trust. Two contexts differentiate ATIM predictions: low- and high-affect infusion. In high-affect infusion scenarios, users engage in either heuristic or substantive processing when making a judgment of trust, and

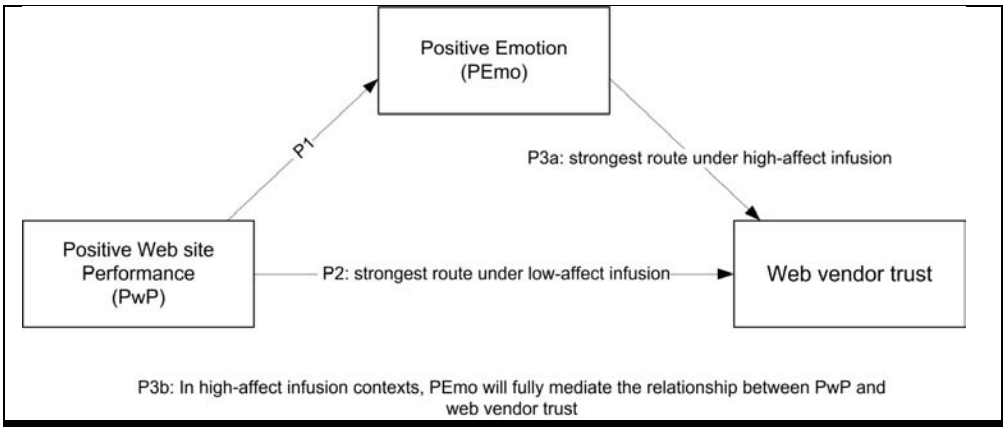


***Figure 2.*** **Newly Proposed Affect-Trust Infusion Model (ATIM)**

thereby PEmo influences trust primarily. In low-affect infusion scenarios, users engage in either motivational or direct access processing when making a judgment of trust, and thereby PwP influences trust primarily not PEmo.

***POTENTIAL CONTRIBUTIONS TO RESEARCH***

Our key theoretical contribution is the introduction of the AIM into web-vendor trust research via our newly proposed model, ATIM. ATIM can be leveraged to help predict trust formation in a full range of cognitive processing scenarios that systematically vary in the level of affect infusion involved—from the two low-affect infusion processing strategies (direct access processing and motivated processing) to the two high-affect infusion processing strategies (heuristic processing and substantive processing).

Moreover, one's processing strategy and consequent degree of affect infusion, can be more finely predicted using theory-based orthogonal components that predict which of the four major cognitive processing strategies is used in scenarios involving cognitive judgment toward a target. Because the underlying causal mechanisms of web vendor trust involve cognition, the ATIM should be extendable to other Web-oriented studies involving cognitive judgment. These components include *target features* (e.g., familiarity, typicality, and complexity), *judge or user features* (e.g., these include personal relevance, motivational goals, affective state, and

cognitive capacity), and *situation features* (e.g., these include the need for accuracy, availability of criteria, and social desirability). Using these features in an experimental setting, researchers can manipulate context to be high- and low-affect infusion.

ATIM provides an additional theoretical base to support studies showing emotion influences trust (Dunn & Schweitzer, 2005; 2007; McKnight et al., 1998; Zhang & Li, 2004; 2006). Notably, ATIM could help account for apparently contradicting findings on the influence of PwP and PEmo on trust. For example, Kim et al. (2009) found that firm reputation associated with past performance was not a predictor of initial trust; yet, Qureshi et al. (2009) found that reputation associated with past performance was a predictor of trust. ATIM thus may be able to explain these contradictions as follows: In the Kim et al. study, the phenomenon of interest was initial trust for an unfamiliar mobile banking system. Hence, in this unfamiliar environment (specifically without existing knowledge or relationships), users would most likely engage in heuristic or substantive processing to assess initial trust—depending on task complexity. They would then experience high-affect infusion when interacting with the mobile application. It is thus possible that the PEmo experienced during the system interaction drove users' underlying system trust, which was then transferred to the vendor.

Meanwhile, in the Qureshi et al. (2009) study, respondents were required to have past purchasing experience of the website. In this scenario, because they were familiar with the website, users would have more likely engaged in a direct-access processing strategy, which involves low-affect infusion. ATIM would thus predict that under such strategies that performance would be a significant predictor of trust. This trust would initially be based on the users' PwP and then transferred to the web vendor as long as the new interaction demonstrated effective and expected PwP, based on previous interactions.

Of course, these suggested explanations rooted in ATIM require controlled experimentation to test and establish the efficacy of ATIM. Accordingly, we suggest that

researchers should carefully consider context and specifically affect infusion in interpreting past studies that infer a relationship between PwP and PEmo with a social judgment such as trust. Contradictions in these findings point to opportunities to collect further data that illuminate the findings based on our new model. Likewise, future web-vendor trust studies should consider including PEmo as a mediating variable between PwP social judgment variables.

ATIM also built on signaling theory literature to explain how trust transfers between from website to web vendor, apart from known findings in IS research (e.g., Kim, 2008; Lim et al., 2006; Stewart, 2003). ATIM predicts the PEmo experienced while using an unknown website positively influences the user's trust in the vendor behind the website. Unlike other models, we did not leverage trust from a known and trusted source (Lim et al., 2006; Lowry et al., 2008; Stewart, 2003); instead, ATIM can explain trust solely based on the PwP of an unknown site and transferred the trust to an unknown target.

***POTENTIAL IMPLICATIONS FOR PRACTICE: LINKING TO UCD***

Should ATIM hold in empirical settings, the implications for practice are potentially profound and yet can be integrated pragmatically with current leading practices of user-centered design (UCD). Namely, the ATIM can guide web vendors in adjusting their website designs to improve the user experience and further induce web vendor trust. Based on the target features, judge features, and situation features, web vendors can identify the possible level of affect infusion for different situations and different kinds of users. For example, the web vendor would need to consider not only the experience level of a user (e.g., a new visitor or a highly loyal user) but also the target goals involved in a user's request (e.g., is he or she searching, browsing, purchasing, malingering, etc.?). This could be a particularly powerful way for unknown web vendors with new websites to get over the trust hurdle that can cause new sites to fail.

Specifically, we posit that great gains in design practice may result if the theoretical orthogonal components of ATIM (i.e., *target features*, *judge or user features*, and *situation*

*features*) that predict cognitive processing strategies are introduced into personalization practices of UCD (e.g., Karat, 1997; Kramer et al., 2000; Mao et al., 2005; Nielsen, 1993; Vredenberg et al., 2001). For example, in a high-affect infusion context, web vendors can utilize tools such as multimedia, social networking, and visually appealing wizards to promote PEmo. The same approach applies if a person is casually browsing through a product catalog—specifically not conducting a targeted search. However, if a website user is highly experienced with the site, the web vendor can use personalization to refine the website further to improve the user's targeted use. For example, the website could suggest quick transactions for search, purchasing, and the like, which suggestions can be based on the user's last few visits. Rather than wizards, the system could suggest additional information that the user would likely want to consider based on his or her previous requests, product returns, concerns raised with the product support department, etc. Such improvements can enhance control, interactivity, and two-way communication to support the focused outcome-orientation of the user.

Extending UCD, designers should understand the mental models of a website's users and then map these models against the actual contextual features that drive their affect infusion strategies (Table 1). Done systematically, this enhanced UCD-based process could dramatically improve personalization strategies to increase web vendor trust. Mapping these components to mental models is a logical extension of our work because user mental models are critical to design. A user's *mental model* of a system is how the user believes a system will work based on his or her past experience with systems and even everyday objects that have nothing to do with systems (e.g., a VCR, remote control, elevator buttons). The importance of users' mental models is demonstrated not just in applied HCI research for practice (e.g., Norman, 1988; Preece, 1994) but also in highly theoretical mental models research rooted in psychology (e.g., Goodwin & Johnson-Laird, 2005; Johnson-Laird, 2005). Scores of studies have shown perceived system usability and satisfaction are diminished when a system's design—

particularly, its models of how things work (e.g., icons, graphics, menus, organization, and any kind of representations)—is not in alignment with a user's mental models of how he or she thinks a target system should work (e.g., Agarwal & Venkatesh, 2002; Beyer & Holtzblatt, 1998; Costantine & Lockwood, 1999; Faulkner, 1998; Hix & Hartson, 1993; Lowry, Roberts, et al., 2009; Lucas & Ball, 2005; Nielsen, 1993; Norman, 1988; Preece, 1994; Rubin, 1994; Shneiderman, 1998). Hence, a substantial gain in usability results when a system's design model matches the target users' mental models. For example, Google™ search is so deeply ingrained in how users search that when Web sites provide a drastically different approach to search, the new search model more often than not conflicts with the users' expected mental search model, and thus creates substantially decreased perceived usability and satisfaction.

We complete this section by illustrating how web designers can systematically understand the mental models of a website's users and then how the designers can systematically map these mental models against the actual contextual features that drive the affect infusion strategy (Table 1). We explain this process with a hypothetical case as follows: Suppose a new web vendor wants to tap into the cloud computing market by providing scalable, completely Web-based small-business accounting. Suppose the two primary target markets for this software are (1) small-business entrepreneurs who have little accounting experience and do not have the resources to hire full-time bookkeeping and accounting support and (2) small-business entrepreneurs who have accounting knowledge but simply want to create a highly virtual organization that has as few functional-support employees as possible.

The first step in our proposed methodology is to discover the actual requirements for what these users want in a system, but just as important is figuring out the mental models that best fit how the users visualize and understand these requirements. To discover these requirements and mental models systematically, the practitioner would simply follow a traditional UCD-based series of methodologies designed to elicit the target users' requirements and

mental models. These standard methodologies that are well described in the practitioner and academic literature include approaches such as participatory design using techniques such as paper prototyping and high-fidelity throw-away prototyping, think-aloud protocols, task analysis, surveys and questionnaires, focus groups and interviews, contextual inquiry, usability testing, heuristic evaluation, and so on (e.g., Agarwal & Venkatesh, 2002; Beyer & Holtzblatt, 1998; Costantine & Lockwood, 1999; Faulkner, 1998; Hix & Hartson, 1993; Lowry, Roberts, et al., 2009; Lucas & Ball, 2005; Nielsen, 1993; Norman, 1988; Preece, 1994; Rubin, 1994; Shneiderman, 1998).

Based on the derived mental models and requirements, the web designers would then systematically go through the list of contextual features in Table 1 and map the requirements and models to these features, a process that will indicate key elements necessary in design to evoke specific processing strategies. Once a designer maps everything for a website, the designer can go through the actual values represented for the target website, and discover the column that best fits the intended website use. The column best represented would then most likely represent the affect infusion strategy that a typical user would employ when using a website, and thus highlight whether to put increased emphasis on PwP-focused features or PEmo-focused features. This process can also help designers make further refinements if their designs send signals that would confuse—not aid—affect infusion in conjunction with the users' actual mental models. For example, if half of the features of a website showed up in the direct-access processing column (least likely for affect infusion) and the other half showed up in the substantive processing column (most likely for affect infusion), this is a signal to the designer that something is incongruous with the website design and, if left uncorrected, could signal counterbalancing, crossed signals that will not aid trust development.

In our proposed UCD-based process, the ultimate point would be to make sure that when these choices are corrected they specifically match the users' mental models so that the

underlying affect infusion processing strategy is congruous with the users' mental models. Namely, to create congruous UCD and to evoke the greatest improvements in usability and trust, website designers must fit the website's design model with the target user's mental models. This then has the added additional design benefit of being able to know which of the four processing strategies the target users are most likely to engage in.

For example, in our hypothetical case, these two potential major segments of the market would almost certainly create a potential split in the trust-target features, trustor features, and situation features—depending on the level of accounting knowledge the entrepreneur actually has. These differences would thus create different processing strategies for the two target markets. To adhere to fundamental principles of UCD that will enhance usability and trust, the designers must personalize the system in a manner that creates different interfaces for the different mental models that will drive the processing strategies. If the likely processing strategies invoke bi-polar affect infusion scenarios, then the designers must create radically different designs. In some scenarios, if the likely processing strategies are close on the affect infusion spectrum and there is a lot of overlap in the features, a designer could conceivably refocus one set of designs to push both target markets into exactly the same processing strategy.

As illustration, consider the importance of whether the target users not only have accounting experience but also the kinds of accounting packages with which users are familiar. The most common small-firm accounting package on the market is QuickBooks™. Hence, for users who are familiar with QuickBooks, the interface needs to be similar to this accounting package if the designer wants the user to experience low complexity, high familiarity, and high typicality; otherwise, the designer is by default creating an experience for these users that has low familiarity, low typicality, and high complexity.

A similar trade-off exists for users who do not have knowledge of a particular package

but have knowledge of accounting. For those who understand accounting, terms such as "credits" and "debits" would be familiar, and thus, there would be typical and atypical ways to work with these terms that could tie to a user's underlying mental models—such as depicting these terms in a tabular form found in a standard introductory-level accounting book. Those unfamiliar with accounting would have no familiarity with these terms and thus no useful mental models. Worse, the typical accounting textbook depiction of debits and credits would have a high likelihood of confusing, not aiding, a user with no accounting experience because of the lack of mental models that relate to these concepts. For such users, eliminating the use of typical design models of "credits" and "debits" altogether may be necessary through hiding these underlying ideas within mental models that the users understand and are comfortable with such as a checkbook ledger.

As an example, in this simple accounting scenario the motivational goals of the two target markets would likely depend on the time of the year and whether they are seeking a cash infusion into their firm. A typical entrepreneur is primarily motivated on a daily basis on market development, sales, customer service, and the like. Accounting would rarely be a primary motivator on a daily basis, but could be strong focus during the close of year-end financials or when seeking external funding. For brevity, we do not continue through every contextual feature and potential mental model for our accounting case, but we conclude with a summary table of what this might look like (see Table 2). If conducted systematically, use of ATIM with the contextual features that drive affect infusion strategies can improve leading UCD practices.

***FUTURE RESEARCH USING ATIM***

The crucial next step in establishing ATIM as a useful theoretical model is to conduct a series of empirical tests and extensions. As establishing causality is of foremost importance, we recommend first testing ATIM in an experimental setting (McGrath et al., 1982). Researchers should design early experiment tasks to manipulate the degree of affect infusion based on the

target, judge, and situational features summarized in Table 1. Ideally, such experiments will have four treatment groups that represent contexts in which each of the four affect-infusion processing strategies would likely be employed—direct access, motivated, heuristic, and substantive processing. This will allow future research to examine the influence of PwP and PEmo on trust in both high- and low-affect infusion scenarios. Researchers can perform a manipulation check using perceptual measures of the target, judge, and situational indicators summarized in Table 1.

Measures of the ATIM constructs can include either traditional survey instruments or more innovative techniques. Perceptions of web vendor trust can be measured using validated survey instruments (McKnight et al., 2002), or trust can be measured objectively using fMRI technology (Dimoka, 2010). Researchers should chose the operationalization of PwP to represent the most salient performance aspects desired in the experimental task scenarios. Notably, the practice of selectively choosing sub-dimensions of PwP is common in leading information systems literature (e.g., Everard & Galletta, 2006; Lowry et al., 2008; Tung et al., 2009; Webster & Ahuja, 2006; Zhu et al., 2010). One common measurement of PwP that is congruent with the constructs of AIM is interactivity (Liu, 2003). Extensive IS and marketing literature has established that website or systems interactivity strongly indicates the degree to which users are cognitively and emotionally involved in a Web site; the degree to which they find it compelling, usable, and effective to use; and thus can strongly positively influence desirable outcomes such as continued involvement, sense of presence, trust, collaboration, positive attitude, satisfaction, loyalty, purchase intentions, etc. (Burgoon et al., 2000; Burgoon et al., 1999; Burgoon et al., 2002; Chen & Yen, 2004; Cyr et al., 2009; Fiore et al., 2005; Gao et al., 2009; Jiang et al., 2010; Jiang & Benbasat, 2007; Lee, 2005; Liu, 2003; Liu & Shrum, 2002; Lowry, Romano, et al., 2009; Lowry et al., 2008; McMillan et al., 2003; Song & Zinkhan, 2008; Teo et al., 2003; Zhu et al., 2010) Other relevant measures of PwP may include Information

quality perceptions (McKinney et al., 2002) and measures of attention and usability that can be objectively obtained using eye tracking technologies (Nielsen & Pernice, 2009). Finally, positive emotion (PEmo) can be measured using a survey instrument (Zhang & Li, 2007) (Zhang and Li, 2007), or it can also be measured using fMRI technology (Fossati et al., 2003). Table 3 summarizes potential construct measurements of ATIM.

**Table 3. Construct Measurement**

| **Construct** | **Possible Operationalizations and Instruments** | **Primary Source Authors** |
|---|---|---|
| Web vendor trust | Trusting beliefs perceptions | (McKnight et al., 2002) |
| | Disposition to trust perceptions | (McKnight et al., 2002) |
| | Institution-based trust perceptions | (McKnight et al., 2002) |
| | Functional neuroimaging (fMRI) trust measure | (Dimoka, 2010) |
| Positive website Performance (PwP) | Interactivity perceptions | (Liu, 2003; Liu & Shrum, 2002; Lowry, Romano, et al., 2009) |
| | Information quality perceptions | (McKinney et al., 2002) |
| | Eye tracker readings of usability and attention | (Nielsen & Pernice, 2009) |
| Positive Emotion (PEmo) | Positive emotion perceptions | (Zhang & Li, 2007) |
| | Functional neuroimaging (fMRI) of emotion | (Fossati et al., 2003) |

The scope of this proposed version of ATIM is limited to how PwP influences positive emotion. Future research should examine whether ATIM is generalizable to other forms of affect—including negative emotion or mood—and to determine whether ATIM needs to be extended to accommodate these. For example, research shows negative emotion as distinct from positive emotion and to have different antecedents (Baron, 1990; Dunn & Schweitzer, 2005; Isen et al., 1987; Murphy & Zajonc, 1993; Russell et al., 1989; Sun & Zhang, 2006b; Zhang & Li, 2007). Mood as defined in psychology literature is different from emotion in that *mood* tends to be relatively enduring and of a lower intensity (Forgas, 1995). Hence, separate

theoretical models are likely necessary to explain the antecedents of mood and negative emotion and their impact on web vendor trust.

Aside from the most important opportunity of testing the ATIM extensively with various empirical tests, several opportunities remain to extend ATIM further. The current conceptualization of ATIM does not consider other contextual factors that could influence cognitive trust and trust transference toward a website, which are further limitations and opportunities. We believe that other promising factors to consider include cultural differences (Dinev et al., 2006; Kim, 2008); perceived risk (Verhagen et al., 2006); governance (Goo & Huang, 2008); uncertainty (Datta & Chatterjee, 2008); computer anxiety, computer self-efficacy, and personal innovativeness with IT (Thatcher et al., 2007); and so forth. For example, in light of Kim's (2008) recent findings on the cultural differences in the salience and effectiveness of branding and referrals, it would be useful to see if cultural differences drive PwP. Future research should examine the influence of these contextual factors on PEmo, cognitive trust, and trust transference.

## CONCLUSION

We introduce PEmo and PwP as sources of initial trusting beliefs toward unknown website vendors. We propose a new model, ATIM, that builds on AIM and trust transference to explain how PwP and PEmo influence cognitive trusting beliefs depending on whether one is engaged in a low- or high-affect infusion processing strategy. Through the trust transference process, the trusting beliefs developed during an interaction with an unknown website automatically transfer to an unknown vendor associated with the website. ATIM can also further inform practice on how to extend leading UCD-based website design to maximize web vendor trust. We thus suggest a methodology that couples UCD and ATIM to improve extant practice of improving web vendor trust.

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| ***Table 2*. A UCD Example of Contextual Features that Drive Affect Infusion Strategies and Subsequent Cognitive Processing** | | | | | |
|---|---|---|---|---|---|
| **Contextual features** | | **Low-Affect Infusion (Low PEmo) Strategies:** | | **High-Affect Infusion(High PEmo) Strategies:** | |
| | | **Direct access** processing | **Motivated** processing | **Heuristic** processing | **Substantive** processing |
| Trust target features | *Familiarity* | **High** if they have an accounting background and/or QuickBooks experience | **Low** no accounting background and/or no QuickBooks experience is necessary for a motivated goal | **Low** with no accounting background and/or no QuickBooks experience | **Low** with no accounting background and/or no QuickBooks experience |
| | *Typicality* | **High** typicality with accounting background and standard accounting system models; or with QuickBooks experiences and a similar interface model is used. | n/a | **High** typicality with accounting background and standard accounting system models; or with QuickBooks experiences and a similar interface model is used. | **Low** typicality if they do not have an accounting background and accounting mental models are used; or if they do not have QuickBooks experience and similar interface and design models are used that do not match the users' mental models |
| | *Complexity* | n/a | n/a | **Low** with accounting background and/or QuickBooks experience; and/or if firm is a sole-proprietorship with single-state taxation | **High** w/o accounting background and/or QuickBooks experience); and/or if firm is a complex partnership with multi-state taxation |
| Trustor Features | *Personal relevance* | n/a | n/a | n/a | **High** because they own the company and it is their money |
| | *Motivational goals* | **Low** for day-to-day operations | **High** at end of quarter or year, and seeking capital | **Low** for day-to-day operations | **Low** for day-to-day operations |
| | *Affective state* | n/a | n/a | **High** is possible only through additional design intervention | **High** is possible only through additional design intervention |

| | | | | | |
|---|---|---|---|---|---|
| | *Cognitive capacity* | **Low** assumed for those without accounting experience | n/a | **Low** assumed for those without accounting experience | **High** assumed for those with accounting experience |
| Situation features | *Need for accuracy* | n/a | n/a | n/a | **High** need for accuracy is a given with accounting |
| | *Availability of criteria* | n/a | n/a | n/a | **High** is likely: the books are balanced or not; the transactions are reconciled or not; there are outstanding payments to be made or not… |
| | *Social desirability* | n/a | **Low** if no one they know is using the system | **Low** if no one they know is using the system | **High** possible if close friends, associates, vendors, or clients are using the system |

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