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Envisioning the Concept of Emotions for Theory Development and Testing in Information Systems Research: A Study of One Positive Emotion - Enjoyment

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Abstract
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Keywords: Components of Emotion; Functions of Emotion; Utilitarian Emotions; Enjoyment; Theory Development and Testing.

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ENVISIONING THE CONCEPT OF EMOTIONS FOR THEORY DEVELOPMENT AND TESTING IN INFORMATION SYSTEMS RESEARCH: A STUDY OF ONE POSITIVE EMOTION – ENJOYMENT

ABSTRACT

There is a significant and growing trend to apply affective phenomena into information systems research for theory development and testing. Yet, the concept of emotions – a multiple-component affective phenomenon – has not been well studied in the information system realm, and thus it is not well understood for formulating the theoretical research context. To redress the gap in the literature, this study sets out to provide a review of the literature in order to lend insights into our understanding of the linkages between human emotions and information system research. This paper begins by conceptualizing emotions based on the psychology theories and laying the groundwork for examining the emotional concepts in the information systems literature. We select one positive multi-dimensional emotion, namely enjoyment, as the current research target. From our analysis, we elicit a number of aspects for considering the future information systems study, especially when researchers would like to form their theoretical models with the concept of emotions. We then conclude with the particular research challenges posed in this line of inquiry.

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1. INTRODUCTION

Prior literature has reported positive relationships between consumers' emotional states of pleasure and arousal in online shopping behavior (see Mummalaneni, 2005). In 2009, the European Union launched a 6 million Euro project, HUMAINE, to investigate emotional computing (HUMAINE, 2009). This interest has been stimulated by work such as Emotional Design (Norman, 2004) and Cyberpsychology (Norman, 2008). The study of emotions is of interest as it has significant practical implications for the service sectors. Service organizations are recommended to take websites beyond functionality and usability (Bodine at al., 2007). Emotions and the linkages to their cognitive states, such as memory and attention, are of growing interest in the information systems (IS) research realm, no matter form the aspect of positive emotions (Lin & Bhattacherjee, 2010; Van der Heijden, 2004; Wakefield & Whitten, 2006) or the aspect of negative emotions (Beaudry & Pinsonneault, 2010). These are all the indicators of the topic's importance for the IS research. However, from our observations and investigations, there are at least two imperative research questions remained:

RQ1. *What is the true nature of emotions and how to differentiate the concept of emotions from other affective phenomena for information systems research, especially for theory development and testing?* and

RQ2. *What are the theoretical functions of emotions based on the psychology literature and how to accurately apply them into a theoretical model as constructs for information systems research?*

Although the word – *emotion* – is used very frequently, psychologists still continue to ask the question: "What is an emotion?" (Scherer, 2005). While this key term

seems extremely fashionable these days, individuals and scientists rarely generate the same answer. An emotion was viewed as a short-lived psychological-physiological phenomenon (Levenson, 1994). “Psychologically, emotions alter attention, shift certain behaviors upward in response hierarchies, and activate relevant associative networks in memory. Physiologically, emotions rapidly organize the responses of different biological systems including facial expression, muscular tonus, voice, autonomic nervous system activity, and endocrine activity to produce a bodily milieu that is optimal for effective response” (Levenson, 1994, p.123). Emotions also have an interpersonal function “to inform others about the expressers’ intentions and motives, and function to motivate various actions on the part of the perceiver” (Ekman & Davison, 1994, p.139).

Based on our current observations, we have seen an increase of IS studies devoting their efforts to embed diverse emotional constructs into their research model for investigating those critical IS issues. This paper hopes to contribute a clear picture about how to well theorize an IS research model with the emotional constructs. It also indicates a number of new research directions for the IS future research. As emotions are numerous, this study only employs one positive emotion, namely *enjoyment*, as the research target.

The paper proceeds as follows. First, the concept of emotions is explored in some depth based on the psychology literature to clarify some of its definitional inconsistencies, underlying components of emotions, and the functions of emotions. This is followed by our review of the IS studies which have included one of the positive emotions, namely enjoyment, as a construct in their theoretical models. Building upon this review, the justification for relating the psychological functions of emotions to information systems research is then provided. Subsequently, the results are discussed and concluded.

2. CONCEPTUAL BACKGROUND – A RETROSPECT

A range of information systems literature has argued for the importance of studying the concepts of emotions (Ortiz de Guinea & Markus, 2009; Van der Heijen, 2004). Human emotions also have been noted that they can be used for explaining and predicting how higher level of utilitarian and non-utilitarian online outcomes arise from the cyberspace (see Norman, 2008). For precisely answering the first research question (RQ1) and the first half of the second research question (RQ2), it is necessary to review and obtain supports from the incipient discipline of this concept - *Psychology*. In the remainder of this section, we look first at general emotion concepts, then distinguishing the concepts of emotion from other affective phenomena, such as feelings, preferences, attitudes, and moods as this is a very vital step for firmly establishing the fundamental of this study; afterward, based on the psychology theories, the components and functions of emotion were expressed in some detail.

2.1. Emotion Concepts

An emotion is viewed as a mental episode that emerges when triggered by events (Wollheim, 1999). Psychologists have produced a list of basic emotions but identify them variously. The common basic emotions are fear, anger, sadness, and joy (see Ortony & Turner, 1990). All these basic emotions refer to the minus rich phenomena. Each of them has a typical facial expression and for most of them have specific types of physiological responses, such as voice or movement. Furthermore, most of them combine cognitive responses, such as focus, attention, and concentration, on a stimulus or event.

According to these basic emotions, there are numerous subordinate categories under them (see Burton et al. 2009; p.398). Psychologists found that somatic appraisals play significant functional roles in cognition and action. Complex emotions comprise diverse

multi-level somatic and cognitive appraisals. They are stimulated by tangible events or abstract features and also have individual and cultural variation (Burton et al. 2009).

Researchers in the psychology realm have provided an unshakeable basis to understand emotions. The most vital and widely accepted theoretical approaches are evolutionary theories (Cosmides & Tooby, 2000; Nesse, 1990), cognitive appraisal theories (Frijda, 1986, 1987; Schachter & Singer, 1962; Scherer, 1997), and social constructionist theories (Harre, 1986; Lutz, 1988). These psychology theories are summarized in Appendix A. As most of the emotion theories are based on the concept of multiple components (see Appendix A Figure A1 and A2) and the cognitive appraisal theories of emotion are further progressed from the evolutionary theories of emotion, this study adopts the cognitive appraisal theories for the following discussions.

2.2. The Differentiation between Emotions and Other Affective Phenomena

In the research domain of cognitive appraisal theories, we adopted a novel and widely accepted emotion theory - *Component Process Model* of human emotions (Scherer, 1987, 2001, 2005) as the basis of our study. This model regards that an emotion contains 5 sub-systems, including cognitive appraisal, physiological arousal, motoric system (including facial expression), subjective feeling, and motivational system. It is expressed in the following sections.

However, before progressing our discussion about the nature and characteristics of an emotion, it is vital to distinguish emotions from other affective phenomena such as *feelings*, *preferences*, *attitudes*, and *moods*, especially from the information systems research of view, because several confusions have been raised in our IS discipline (Ortiz de Guinea & Markus, 2009). In the Component Process Model, it reserves the use of

"feeling" for the subjective experience component of emotion and suggests that "feelings integrate the central representation of appraisal-driven response organization in emotion" (Scherer, 2004a, p.136). Based on this contention, the concept of "feeling" is viewed as a single component denoting the subjective experience process (Scherer, 2005). Comparing with the total multi-modal component process of human emotions, a "feeling" is only one of the components of an emotion.

Then, how to differentiate human emotions (including "feeling" as one of the components) from other types of affective phenomena, such as preferences, attitudes, mood, affective dispositions, and interpersonal stances? It is acknowledged that there are overlaps in the meaning of these concepts and should be distinguished properly before we proceed to any further arguments. However, "the difficulty of differentiating emotion from other types of affective phenomena is reminiscent of a similar problem in defining the specificity of language in comparison with other types of communication systems, human or animal" (Scherer, 2005, pp.699-700). Therefore, an equitable and rational differentiation mechanism is absolutely necessary.

Scherer (2005) provide the following eight features to distinguish these affective phenomena: (i) *event focus*: the organism was influenced by internal or external events that stimulates or triggers a response after having been evaluated for its significance; (ii) *intrinsic appraisal*: this feature evaluates the current human needs and goals based on their genetic or learned experiences (Scherer, 1987, 1988); (iii) *transactional appraisal*: this feature evaluates events and their consequences with respect to their conduciveness for the individual's desires or goals (Lazarus, 1968, 1991); (iv) *response synchronization*: the feature indicates that all or most of the sub-systems of the organism, such as central nervous

system (CNS), neuro-endocrine system (NES), somatic nervous system (SNS), should contribute to the event's response preparation; (v) *rapidity of change*: the feature assesses how rapid of the individual's appraisal will be changed when new information or re-evaluations occur; (vi) *behavioral impact*,: this feature evaluates how strong of the effect on the consequent behavior as different types of affective phenomena would impact individual's action tendencies and their motivational underpinnings; (vii) *intensity*: this feature assesses the intensity of the response patterns and the corresponding experience; and (viii) *duration*: this feature assess the period of each type of affective phenomenon, including the massive response mobilization and synchronization implied in the encountered event. Based on these concepts delivered, we re-organize Scherer's (2005, p.704) work in Table 1. It shows the differentiation of different types of affective phenomena.

Table 1. The Differentiation of Different Types of Affective Phenomena

	Event Focus	Intrinsic Appraisal	Transactional Appraisal	Response Synchronization	Rapidity of Change	Behavioral Impact	Intensity	Duration
Utilitarian Emotions	**VH**	**M**	**VH**	**VH**	**VH**	**VH**	**H**	**L**
Aesthetic Emotions	H	VH	L	M-H	H	L	L-M	L
Preferences	VL	VH	M	VL	VL	M	L	M
Attitudes	VL	L	L	VL	L	L	M	H
Moods	L	M	L	L	M	H	M	H
Affect Dispositions	VL	L	VL	VL	VL	L	L	VH
Interpersonal Stances	H	L	L	L	VH	H	M	M

Resource: Scherer (2005, p.704). Note: VL: very low; L: low; M: medium; H: high; VH: very high.

Scherer (2005) also distinguished emotions into two categories: *Utilitarian Emotions* and *Aesthetic Emotions*. This study only focuses on the Utilitarian Emotions. The reasons are provided in the next section.

In Table 1, a utilitarian emotion contains the following characteristics: its event focus is very high as individuals would not generally become emotional about events or people that they do not care about. The event focus is linked to appraisal, which helps the individuals to prepare appropriate behavioral reactions with potential consequences. Meanwhile, all or most of the subsystems of the organism, such as CNS, NES, and SNS, will coordinate rapidly for the response. This type of affective phenomenon - utilitarian emotions - has strong effects on behavior. However, the duration of emotions generally should be relatively short as massive response mobilization and synchronization are implied in the encountered event.

Based on the discussions above, we can specifically differentiate the emotion concepts from the other types of affective phenomena in IS research, especially when applying emotional constructs for theory development and testing.

2.3. Utilitarian Emotions V.S. Aesthetic Emotions

The question remained is: *then, what are the differences between Utilitarian Emotions and Aesthetic Emotions*? According to Scherer (2004b, 2005), when the functionality of an emotion, including to require the appraisal of goal relevance and to cope potential for an event, is absent or less obvious, it can be noted as an aesthetic emotion. Theoretically, aesthetic emotions are elicited by the intrinsic qualities of the beauty, the superiority of an art work, or an infinite achievement. Examples for aesthetic emotions are "being moved or awed, being full of wonder, admiration, bliss, ecstasy, fascination, harmony, rapture, solemnity" (Scherer, 2005, p.706). However, the absence of those functions in aesthetic emotions does not denote that they are intangible. Arts, music, and other forms of artifact or nature still influence an individual's physiological and behavioral changes (Bartlett, 1999; Scherer & Zentner, 2001). But it is very obvious

that these changes are no needed to be related to the preparation of behavioral readiness and adaptive action tendencies (Frijda, 1986).

Utilitarian emotions, on the other hand, are generally studied in the psychological research, such as anger, fear, joy, sadness, guilt (Scherer, 2005). This type of emotions is considered as "utilitarian" because they facilitate an individual's adaptation of diverse events that might cause significant consequences. Examples for this type of emotions include "the preparation of action tendencies (fight, flight), recovery and reorientation (grief, work), motivational enhancement (joy, pride), or the creation of social obligations (reparation)" (Scherer, 2005, p.706). Most of the utilitarian emotions are high-intensity emergency reactions, involving the synchronization of many organismic sub-systems as described. When reflecting the concepts described above to Table 1, it is understandable that a number of features of the utilitarian emotions, including transactional appraisal, behavioral impact, and intensity, are higher than the aesthetic emotions.

This study is focusing on the utilitarian emotions. As Scherer (2005) provides 36 categories of positive and negative emotions, our study would like to specifically based on the positive emotions to reveal, assess, and connect the IS emotional constructs.

2.4. The Components of Emotions

After differentiating emotions from other affective phenomena and distinguishing the concepts of utilitarian emotions from aesthetic emotions, it is the time to thoroughly understand the concept and the composed components of "emotion".

Most of these emotion theories view an emotion as an episode, which contains a number of components, such as eliciting event, subjective state, expressive behavior, cognitive appraisals, and autonomic nervous system (ANS) activity. Different theoretical

approaches posit these components in different theoretical orders (see Niedenthal et al., 2006, p.11). Our study uses a later work by Scherer (1984, 2001, 2005) because it integrates several other theories.

Scherer (1984) clear defines five major components for an emotion episode. They are: (i) *Cognitive component (appraisal)*: for evaluating objects and events. It represents the information appraisal processes with all levels of central nervous system (CNS); (ii) *Neurophysiological component (bodily symptoms)*: for human body system regulation. It supports the response patterns generated in the neuro-endocrine system (NES), autonomic system (ANS), and somatic nervous systems (SNS); (iii) *Motivational component (action tendencies)*: for preparing and directing an individual's action. This component charges the motivational changes produced by the appraisal results, in particular for action tendencies. CNS is collaborated in this component; (iv) *Motor expression component (facial and vocal expression)*: for communicating the reactions and behavioral intentions. It indicates the patterns of facial and vocal expression as well as body movements. SNS is collaborated in this component; and (v) *Subjective feeling component (emotional experience)*: for monitoring the individual's internal state and organism-environment interaction. It supervises the state of the subjective feeling that reflects all of these component changes and CNS is cooperates with in this component. All or most of the five components will coordinate "in response to the evaluation of an external or internal stimulus event as relevant to major concerns of the organism (Scherer, 2005, p.697)".

2.5. The Functions of Emotions

Based on the components of emotions described in the previous section, the prior literature and theories (Be11, 2011; Breckler, 1984; Clark & Watson, 1994; Ekman &

Davison, 1994; Fridlund, 1991; Frijda, 1994; Gouaux, 1971; Griffitt, 1970; Hess et al., 1995; Keltner & Gross, 1999; Levenson, 1994; Scherer, 1994; Taylor, 2009; Zanna et al., 1970) propose several major functions of emotions: (1) *the influence of perception*; (2) *the influence of attitude*; (3) *the influence of intention*; (4) *the influence of behavior*; (5) *the influence of other emotions*; and (6) *the influence of communication*.

(1) The influence of perception: Emotions can be related to short-term, biologically-based patterns of perception that occur in response to specific physical and social challenges and opportunities (Keltner & Gross, 1999). The literature has indicated that emotions can converse information about an individual's perception of current situations as well as the individual's behavioral intentions (Hess et al., 1995).

(2) The influence of attitude: Prior literature has noted that attitudes include three components: a cognitive component, an affective component, and a motivational or behavioral component (Breckler, 1984). A number of researchers have studied the emotional inputs and demonstrated that emotions can serve as an affective component to influence attitudes by becoming supportive objects (Gouaux, 1971; Zanna et al., 1970).

(3) The influence of intention: Emotions serve to inform others about the individual's intentions and motives and function to motivate various actions on the part of the perceiver (Ekman & Davison, 1994). Also, emotions influence tendencies to approach and avoid various persons (Levenson, 1994). Scherer (1994, p.130) notes that "because of the action tendency component of the emotion, the momentary behavioral intention will be expressed even more clearly".

(4) The influence of behavior: Some of the emotions can directly motivate certain behaviors for dealing with the emotional events (Frijda, 1994). For instance, under some specific conditions, anger can drive the pacifist to fight; sadness can make the strong weep; and fear can cause the brave to cower (Levenson, 1994). Furthermore, it is obvious that some of the positive emotions can motivate a broad range of social behaviors (Clark & Watson, 1994).

(5) The influence of other emotions: Emotions could "be sequential in nature with the most important emotion being the final one" (Be11, 2011, p.13). These emotions are considered as "the interactions between internal factors and external objects, people, institutions, and/or cultural phenomena" (Taylor, 2009, p.46). Therefore, the one specific emotion might have its capability to influence another one.

(6) The influence of Communication: The expressive characteristics of emotion in voice, face, gesture, and posture serve an important function in communicating our emotional state to others. The value of these signals is twofold: first, by allowing others to know how we feel, and second, by influencing their behavior. This is an interpersonal function of emotion (Levenson, 1994).

3. A POSITITIVE EMOTION – *ENJOYMENT* – IN IS RESEARCH

As Section 2 is to answer the first research question (RQ1) and first half of the second research question (RQ2), this study applies the following Section 3 and 4 to answer the second part of RQ2: "*how to accurately apply them into a theoretical model as constructs for information systems research*?" There are a lot of positive emotions, such as enjoyment (Teo et al., 1999; Van der Heijden, 2004; Cyr et al., 2006; Lin & Bhattacherjee, 2010), playfulness (Hsu & Chiu, 2004; Chu & Lu 2007), flow (Huang,

2003; Wu & Chang, 2005), where enjoyment is the most interesting one in order to its application in IS research.

In this study, we choose the emotion of "Enjoyment" (and its synonym), which is one of the positive emotion indicated by Scherer (2005, p.715), as the research target. The reasons for us to do so are: First, as a research construct, this positive emotion has been studied for more than 15 years in diverse disciplines, such as business research (Bauer et al., 2006), social psychology (Davis et al., 1992), retailing (Childers et al., 2001), marketing (Fiore et al., 2005; Lin et al., 2008), and information system research (listed in Table 2). Second, enjoyment is categorized as a tertiary emotion, which is distinguished from basic emotions (Parrot, 2001). Third, some studies regarded it as a multi-dimensional emotion and have argued that it should be treated as a complex phenomenon (Lin et al., 2008). This multi-dimensional emotion will offer more insights and opportunities for us to understand the functions of emotions than those basic emotions, such as joy, anger, and fear.

3.1 The Positive Emotion – Enjoyment

Warner (1980), a seminal study of enjoyment, defines enjoyment in terms of three necessary sub-constructs: *Engagement*, *Positive Affect*, and *Fulfillment*. For people to enjoy an activity, they have to: (i) engage in the activity; (ii) be positively affected in terms of satisfaction, excitement, contentment, or similar feelings; and (iii) achieve fulfillment of needs or desires through the activity (although these needs may not be consciously realized a priori). This definition also has been used as the base for an instrument to measure online enjoyment, with 12 characteristics matched against the three dimensions of engagement, positive affect, and fulfillment (Lin et al., 2008).

Turning from the definition of enjoyment to its usage as a construct in empirical work, we find a range of studies. These prior studies can basically be categorized into three aspects: enjoyment as a prior stimulant, enjoyment as a transactional element and enjoyment as a consequence. Table 2 shows these studies in terms of the research models, the major measurements, and the findings. Further discussions are addressed below.

(1) A prior stimulant: Several studies regarded the enjoyment as a stimulant for further interaction (Yi & Hwang, 2003; Hsu & Chiu, 2004; Chu & Lu, 2007; Kim et al., 2007; Lu et al., 2010). In these cases, the stimulus is an elicitation in the surroundings that triggers a response (Burton et al., 2009) and it can be seen as a motivating element that influences performance. For example, enjoyment can directly leverage customers' perceived value (Chu & Lu, 2007; Kim et al., 2007), usage intention (Lu et al., 2010; Yi & Hwang, 2003) or online service satisfaction (Hsu & Chiu, 2004). All of these studies applied quantitative methods and focused on hypotheses testing. Most of these studies obtained positive outcomes for their propositions. The enjoyment was measured by the items of happy, pleasant, fun, exciting, or even interesting.

(2) A transactional element: A number of studies considered enjoyment as a transactional element (Teo et al., 1999; Van der Heijden, 2004; Wu & Chang, 2005; Cyr et al., 2006; Wakefield & Whitten, 2006; Webster & Ahuja, 2006; Cyr et al., 2007; Hwang & Kim, 2007; Lin & Bhattacherjee, 2010). These studies see enjoyment as patterns of motor and communicative actions designed to facilitate goal attainment (Ford 1992). In other words, the enjoyment is elicited by some actual or conceptual events and it then enhances task performance or facilitates goal achievement. For example, this emotion is

affected by diverse design concepts, such as navigation, convenience, aesthetics, interactivity, design quality, and it then facilitates and strengthens human attitudes and usage intentions (Wu & Chang, 2005; Cyr et al., 2006; Wakefield & Whitten, 2006; Hwang & Kim, 2007; Lin & Bhattacherjee, 2010;). Enjoyment can also be influenced by subjective perceptions and then assist a person's performance (Teo et al., 1999; Van der Heijden, 2004; Webster & Ahuja, 2006; Cyr et al., 2007). Most of these studies have demonstrated that enjoyment can be a positive communicative element for performance achievement. As with the first aspect of studies, enjoyment was measured by the items of attention, pleasant, enjoyable, fun, exciting, or even interesting.

(3) A consequence: At least one study has treated enjoyment as a consequence, a hedonic achievement (Huang, 2003). When a person reaches this state, their higher level human goals (e.g. transcendence, tranquility, and so on, Ford, 1992) are fulfilled. Enjoyment was measured by the items of pleasant, nice, entertaining, agreeable, and soothing notions. Huang (2003) showed that novelty and interactivity can affect a person's flow experience and positively achieve a person's hedonic (enjoyment) experience.

Another interesting phenomenon was revealed from Table 2 that consists with our descriptions in the introduction section, namely more and more IS researchers have started to apply the emotional constructs for their studies. From 1996 to 2000, only one theoretical model was proposed (Teo et al., 1999). From 2001 to 2005, five more theoretical models were developed – from Huang (2003) to Wu and Chang (2005). Finally, from 2006 to current, nine studies have applied this positive emotion as a research construct in their theoretical models. Therefore, it is very vital for us to fully understand the characteristics and the power of emotions.

Table 2. Studies on the Concepts of Enjoyment [in chronicle order]

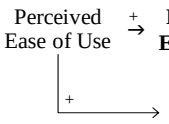
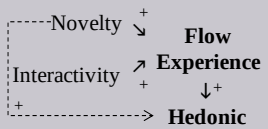
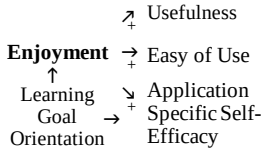
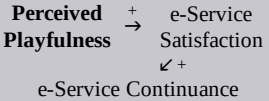
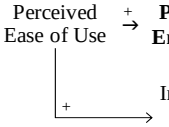
Study/ Research Context	The Functions of Enjoyment/Playfulness	Description	Key Measurement	Results
Teo et al. (1999) To examine intrinsic and extrinsic motivations in the context of the Internet instead of microcomputers.		"*Individuals may **engage** in a particular behavior if it yields **fun** and **enjoyment**. This implies that individuals may adopt technology because its use is **enjoyable**.*" (p.27)	• *Fun;* • *Pleasant;* • *Positive;* • *Pleasurable;* • *Exciting;* • *Wise; and* • *Enjoyable.*	Perceived ease of use can positively affect perceived enjoyment; and perceived enjoyment can positively affect internet usage.
Huang (2003) To design websites to generate an experiential experience and to enhance hedonic performance.		"*A website performs well in the **hedonic** aspect when users perceive the site to be enjoyable in its own right, apart from any performance consequences that may be anticipated.*" (p.430)	• *Pleasant;* • *Nice;* • *Entertaining;* • *Agreeable; and* • *Soothing.*	Flow elements (control, curiosity, and interest) can positively affect hedonic (enjoyment) experience.
Yi and Hwang (2003) To extend the TAM model by incorporating self-efficacy, enjoyment, and learning goal orientation to predict the use of web IS.		"*… **enjoyment** as a determinant of behavioral intention and as a determinant of ease of use.*" (p.435)	• *Fun*; • *Pleasure; and* • *Enjoyable.*	Enjoyment, learning goal orientation, and application-specific self-efficacy positively influence the decision to use a Web-based technology and subsequent actual use.
Hsu and Chiu (2004) To predict electronic service continuance.		"*… **positive affect (joy** and **interest**) had a significant influence on satisfaction.*" (p.365)	• *Interesting;* • *Enjoyable;* • *Exciting; and* • *Fun.*	Perceived playfulness can positively affect e-service satisfaction; and e-service satisfaction can positively affect e-service continuance intention.
Van der Heijden (2004) To understand the hedonic nature and testing an empirical model in which the TAM is applied to a hedonic system.		"*…, the definition of **perceived enjoyment** specifies the extent to which **fun** can be derived from using the system. **Perceived enjoyment** strongly influenced Web use for **entertainment** purposes.*" (p.697)	• *Enjoyable;* • *Exciting;* • *Pleasant; and* • *Interesting.*	Perceived ease of use plays a pivotal role in the user acceptance of hedonic information systems. It can positively affect enjoyment; and perceived enjoyment can positively affect intention to use.

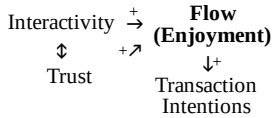
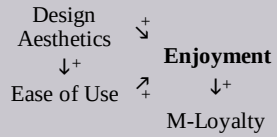
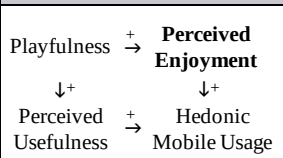
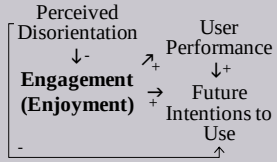
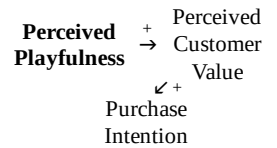
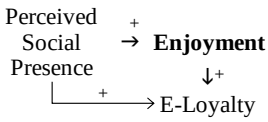
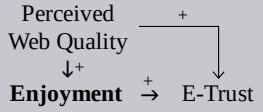
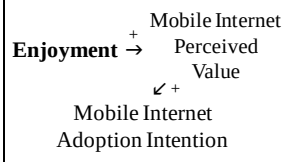
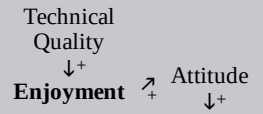
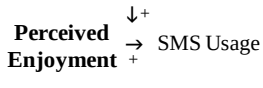
Table 2. Studies on the Concepts of Enjoyment [in chronicle order] (continued)				
Wu and Chang (2005) To explore the factors that affect the experience of flow and how flow affects the transaction intentions in the online travel communities.		"*(Flow) as an extremely **enjoyable** experience, where an individual engages in an online game activity with total involvement, **enjoyment**, control, concentration and intrinsic interest.*" (p.940)	• *Felt contented;* • *Felt enjoyable; and* • *Felt fulfilled.*	Machine interactivity, ability, and integrity can positively affect enjoyment; and enjoyment can positively affect transaction intentions.
Cyr et al. (2006) To explore antecedents of TAM related to visual design aesthetics in mobile domain.		"*Online retail shopping has been suggested to have both utilitarian and **hedonic** dimensions and that vendors can create **aesthetically rich** shopping environments that consumers **enjoy**.*" (p.952)	• *Exciting;* • *Pleasant;* • *Cool;* • *Fun; and* • *Enjoyable.*	Both design aesthetics and ease of use of the mobile interface can positively affect enjoyment; and enjoyment can positively affect m-loyalty.
Wakefield and Whitten (2006) To examine the effect of cognitive absorption and playfulness on user beliefs including perceived enjoyment and perceived usefulness on mobile devices.		"***Playfulness** is an intrinsic motivator that prompts users to **engage** technology for internal benefits, namely **enjoyment**. Consequently, highly **playful** users are likely to expect more **enjoyment** and have greater usage intentions.*" (p.294)	• *Fun;* • *Enjoyable; and* • *Enjoyment.*	Higher playfulness can positively affect perceived enjoyment and perceived usefulness; and higher perceived enjoyment and perceived usefulness can positively affect hedonic mobile usage.
Webster and Ahuja (2006) To test a model in an experimental study examining the effects of one simple and two global navigation systems.		"*…, users who **enjoy** a computer activity report higher intentions to use it in the future, those with more **positive attitudes** toward a Website are more likely to use it, and those with higher intrinsic **enjoyment** exhibit higher intentions to return to the Website.*" (p.667)	• *Absorbed;* • *Attention;* • *Excited curiosity;* • *Aroused imagination;* • *Fun;* • *Interesting; and* • *Engaging.*	Lower disorientation would relate to higher user engagement, engagement would relate positively to performance, and engagement would relate positively to intentions to use the website in the future.
Chu and Lu (2007) To identify the key factors by early adopters of online music.		"*…, this study defined **perceived playfulness** as the degree to which the consumer believes that **enjoyment** could be derived when listening to online music.*" (p.143)	• *Enjoyable;* • *Pleasant;* • *Exciting; and* • *Interesting.*	Perceived playfulness can positively affect perceived customer value.

Table 2. Studies on the Concepts of Enjoyment [in chronicle order] (continued)				
Cyr et al. (2007) To investigate varied states of social presence in e-services influence e-loyalty and its antecedents of usefulness, trust and enjoyment.		*"…, we expect that if users **enjoy** a website, they are more likely to have a **positive attitude** towards it and consequently **visit it again** or have e-Loyalty towards that site."* (p.46)	• *Interesting;* • *Entertaining;* • *Enjoyable; and* • *Pleasant.*	The perceived social presence does not only influence e-loyalty directly, but also has an indirect impact by positively influencing perceived usefulness, trust and enjoyment.
Hwang and Kim (2007) To test the perceived web quality, system anxiety, and perceived enjoyment as the antecedents of multi-dimensional e-trust.		*"**Perceived enjoyment** is the extent to which the activity of using a computer system is perceived to be personally **enjoyable** in its own right aside from the instrumental value of the technology."* (p.750)	• *Enjoyable;* • *Pleasant; and* • *Fun*	There are partial mediating effects (enjoyment and anxiety) of affect in the relationship between perceived web quality with service contents and e-trust.
Kim et al. (2007) To investigate mobile Internet adoption as a new ICT from the general consumer perspective.		*"**Enjoyment** refers to the extent to which the activity of using a product is perceived to be **enjoyable** in its own right, …. **Enjoyment** thus represents an affective and intrinsic benefit."* (p.116)	• *Fun;* • *Enjoyable; and* • *Boring (reversed).*	Value perception is a major determinant of the mobile internet adoption on the relationship between a customer's benefit (usefulness and enjoyment) and sacrifice (technically and perceived fee).
Lin and Bhattacherjee (2010) To understand perceived enjoyment and social image as the core cognitive drivers of technology usage.		*"**Perceived enjoyment** can be defined as the **excitement** and **happiness** derived from IT use."*; *"**Perceived enjoyment** should have a stronger effect on user attitudes towards **hedonic** systems…."* (p.167)	• *Obtaining a strong sense of vigor;* • *Feeling powerful; and* • *Feeling excited*	Enjoyment and social image can be influenced through a system's technical and interaction quality. Attitude does fully mediate the effects of enjoyment and social image on usage intention.
Lu et al. (2010) To examine the factors influencing the adoption of SMS for personal communication.		*"… perceived **enjoyment** was stronger for experiential services such as SMS, contact services, payment and gaming services. … age as a possible moderator on the impact perceived **enjoyment** has over actual usage."* (p.189)	• *Pleasure;* • *Interesting;* • *Fun;* • *Happy;* • *Relaxed; and* • *Exciting.*	Perceived usefulness, perceived enjoyment and service cost affect SMS use. Mobile network operators should advertise the benefits, fun and low costs associated with using SMS when marketing their services.

3.2. Linking IS Studies with the Functions of Emotions

Based on the thorough review in Section 3.1, we connect these IS studies, which employed one of the positive emotions – *enjoyment (and its synonyms)* – into their theoretical models, with the psychological functions of emotions listed in Section 2.5. Table 3 shows the operational matrix of these two disciplines in chronicle order.

Table 3. The Functions of Enjoyment in IS Studies [in chronicle order]

	(*) The Stimulus/i	(1) Influencing Emotion	(2) Influencing Perception	(3) Influencing Attitude	(4) Influencing Intention	(5) Influencing Behavior	(6) Influencing Communication
Teo et al. (1999)	O					✓	
Huang (2003)	O	✓					
Yi and Hwang (2003)	O		✓		✓		
Hsu and Chiu (2004)		✓					
Van der Heijden (2004)	O	✓			✓		
Wu and Chang (2005)	O				✓		
Cyr et al. (2006)	O			✓			
Wakefield and Whitten (2006)	O	✓				✓	
Webster and Ahuja (2006)	O				✓	✓	
Chu and Lu (2007)			✓				
Cyr et al. (2007)	O			✓		✓	
Hwang and Kim (2007)	O			✓			
Kim et al. (2007)			✓				
Lin and Bhattacherjee (2010)	O			✓			
Lu et al. (2010)						✓	

According to Table 3, we, therefore, reorganize these studies by the psychological functionality orders (see Table 4). From Table 4, several issues should be noted and will be debated in the Discussion section. First, most of the studies theorized their emotional constructs by having an eliciting event. Only few studies modeled their emotional constructs without any of the eliciting event.

Table 4. The Functions of Enjoyment in IS Studies [in the functionality order]

	(*) The Stimulus/i	(1) Influencing Emotion	(2) Influencing Perception	(3) Influencing Attitude	(4) Influencing Intention	(5) Influencing Behavior	(6) Influencing Communication
Van der Heijden (2004)	O	✓			✓		
Wakefield and Whitten (2006)	O	✓				✓	
Huang (2003)	O	✓					
Yi and Hwang (2003)	O		✓		✓		
Cyr et al. (2007)	O			✓		✓	
Cyr et al. (2006)	O			✓			
Hwang and Kim (2007)	O			✓			
Lin and Bhattacherjee (2010)	O			✓			
Webster and Ahuja (2006)	O				✓	✓	
Wu and Chang (2005)	O				✓		
Teo et al. (1999)	O					✓	
Hsu and Chiu (2004)		✓					
Chu and Lu (2007)			✓				
Kim et al. (2007)			✓				
Lu et al. (2010)						✓	

Second, for extending the first point further, most of the studies disregard that an emotion is a component-process-based affective phenomenon (Scherer, 1984, 2001, 2005). Third, the interpersonal communication function of emotions was not applied in these prior studies yet. The whole column 6 is still remained blank. All of these points are discussed in the following section.

4. DISCUSSION

First of all, according to those vital and widely accepted psychology theories of emotions, such as evolutionary theories (Cosmides & Tooby, 2000; Nesse, 1990), cognitive appraisal theories (Frijda, 1986, 1987; Schachter & Singer, 1962; Scherer, 1997), and social constructionist theories (Harre, 1986; Lutz, 1988), emotions should be triggered by an eliciting event. Most of the IS studies developed their theoretical models with enjoyment in the accurate way. They set up one eliciting construct (e.g., Teo et al., 1999; Van der Heijden, 2004; Cyr et al., 2007; Lin & Bhattacherjee, 2010) or even multiple eliciting constructs (e.g., Huang, 2003; Wu & Chang 2005) to elicit the positive emotion – enjoyment. This is a very good sight for the IS literature.

Second, psychologists have investigated the relationships between belief, attitude, intention, and behavior for a long period (Fishbein & Ajzen, 1975). According to the *Theory of Planned Behavior* proposed by Ajzen (1991), an individual's behavioral intention is influenced by two factors: the attitude and the individual's believe (Ajzen, 1991; Ajzen & Madden, 1986; Fishbein & Ajzen, 1975). Furthermore, human behavior can be determined by an individual's intention to perform that specific behavior. Based on this theory, Kok and Siero (1985, p.160) proposed an integrated behavior model that clearly demonstrates the steps of an individual's planned behavior. These steps, as a

sequence, from top to button are: Awareness → Comprehension → Attitude → Intention → Behavior → Behavior Maintenance. The awareness and comprehension could be regarded as a single step, namely perception. Following this theory, we set up this sequential mechanism in Table 4 (also in Table 3). However, none of the IS studies in Table 4 formed their theoretical model by following this behavior mechanism (Kok & Siero, 1985). Most of the enjoyment constructs were theorized in a non sequential way. Through the analysis here, we would like to suggest the future IS studies to seriously consider the relationships from emotional constructs to the influences of human behavior motivation mechanism.

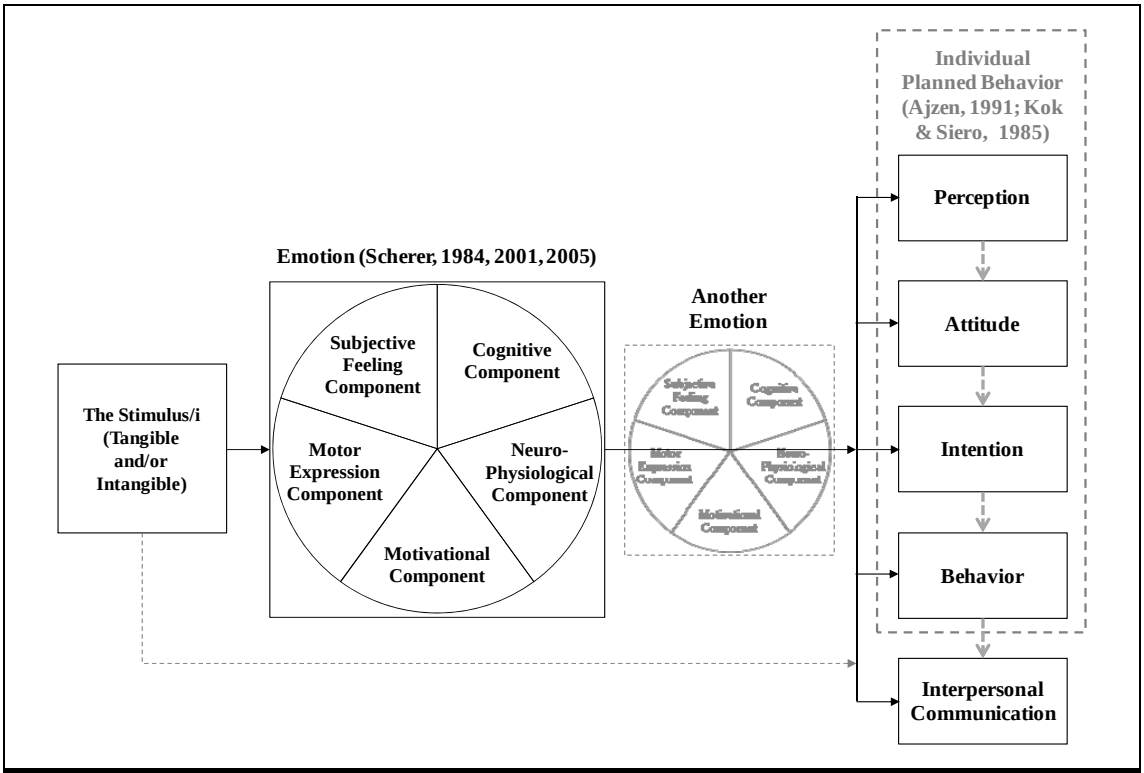


Figure 1. The Nomological Functions of an Emotion

Based on the cognitive appraisal theories (Frijda, 1986, 1987; Schachter & Singer, 1962; Scherer, 1997) and the Component Process Model (Scherer, 1984, 2001, 2005) described

in Section 2 and our investigations of the positive emotion - enjoyment - in the IS research (see Table 2 and Table 4), we propose a nomological diagram to show the conceptual functions of emotions. Figure 1 shows that an emotion can be stimulated by some events, which could be tangible (e.g., online interactivities, design functions) or intangible (e.g., perceptions, goals, quality of the systems). A secondary emotion might also be triggered by an initial emotion. Furthermore, a person's perception, attitude, intention, behavior, and also the interpersonal communication can be influenced by the functions of an emotion.

Third, a number of IS studies have engaged the online social communities as their research targets (Sykes et al., 2009; Wattal et al., 2010). The concepts of an online forum and Web 2.0 social networks were suggested as desirable for IS research (reference withheld during review). As many online social communities enable users to share and discuss their learning experiences with each other, and allow users to upload learning materials designed by themselves, we believed that to research the virtual forums or communities is beneficial as such facility allows online users to learn from and share knowledge with other people having similar interests. This argument is also supported by prior work: "Individuals are experiencing a greater sense of social presence while managing their identities, forming meaningful and romantic relationships online, extending spheres of influences, and generating a sense of belonging and meaningfulness" (Norman, 2008, p.301). But it is still absent in those IS studies in Table 4. When future studies would like to theorize their research with the emotional construct, they have thorough supports from the psychological view of the communication function of emotions.

Furthermore, we would like to mention one of the greatest challenges in IS-emotion research. This is, how to precisely measure this invisible and intrinsic human brain reaction? A novel IS research area, namely *NeuroIS*, has drawn researchers' attention. It proffers a new perspective by looking into the human's physical responses and emotions, such as brain's functionality, while encounter IS phenomena. A number of IS studies have investigated the connections between neural mechanisms and technology adoption (Dimoka & Davis, 2008), the concept of online trust (Dimoka, 2010; Riedl et al., 2010). This is an advanced challenge, but also can be another ultimate opportunity for IS emotion-relevant research.

5. CONCLUSION

This paper set forth to review the literature on IS and psychology. We encountered two diverse streams of research, one at the human intrinsic level and one at the human and machine interaction level. In analyzing these prior IS and psychology studies, it is clear that we still have enormous opportunities to progress the IS research one level up when combining the psychology's thinking of emotions.

In this paper, Table 1 helps us to differentiate the concept of emotions from other affective phenomena. It provides values to play a common role for IS researchers in determining the patterns of event focus, intrinsic and transactional appraisal, response synchronization, behavioral impact, and intensity between these psychological affective phenomena. Furthermore, when integrating the analysis results of Table 2 and Table4, IS research should consider the possibility of applying both the components and functions of emotions when forming their theoretical research models. It seems the empirical IS literature which applied emotional constructs in the research model has been largely

biased by ignoring the component-process-based concept of emotions and the theory of planned behavior. We also indicate opportunities and challenges to study the role of emotions in the IS research.

As with any study, a number of limitations should be acknowledged when interpreting the whole literature review process. First, there are 36 categories of emotions, including positive and negative emotions, listed by Scherer (2005). In this study we only selected one particular type of positive emotions – enjoyment. It is necessary to proceed with a large scale of study with all categories of the emotions. Second, there are different emotion theories. In this study we mostly based on the component process theory. It might cause some biases for analyzing the IS literature. Thus, further studies are needed to extend the generalisability of this study to different psychological theories.

This study has contributed to bridging a substantial research gap in psychological human emotions and IS research for theory development and testing. The study has used a positive emotion – enjoyment – and rigorous analysis to connect the two diverse research disciplines. We hope this article can contribute IS research with more novel insights and perspectives when encountering the cyber era.

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Appendix A. Theories of Emotion

Three major theoretical approaches to the psychology of emotion, namely *evolutionary theories*, *cognitive appraisal theories*, and *social constructionist theories*, are reviewed in this appendix. Details can be found in Niedenthal, et al. (2006). These theories of emotion contain the following characteristics: "testable statements about the causes of an emotion, the processes by which the states are differentiated into definable experience, the order in which the components of the emotion occur, and how the different components of emotion interact" (Niedenthal, et al., 2006, p.10).

A1. Evolutionary Theories

The evolutionary theories of emotion are based on Charles Darwin' thought. This category of theories assumes that "emotions are biologically based and provided adaptive advantages for the organism" (Niedenthal, et al., 2006, p.11). The evolutionary approach has been much more progressed by science. According to progressive evolutionary thinking, the developed architecture of the human mind and neural architecture of the human brain will evolve to solve adaptive problems (see Cosmides & Tooby, 1987). Events or objects that are evolutionarily recognizable will trigger human emotions which coordinate some of the human body's functions, including "motor systems, perception, conceptual frameworks, energy level, effort allocation, and physiological reactions, in the service of solving the problem" (Niedenthal, et al., 2006, p.12).

As events and objects in the living surroundings are causally occurred in every area of human life, the evolutionary theories of emotion are mapped to the dynamic environmental changes. Figure A1 shows the theoretical orderings of the components of emotion according to the Evolutionary Theory of Emotion.

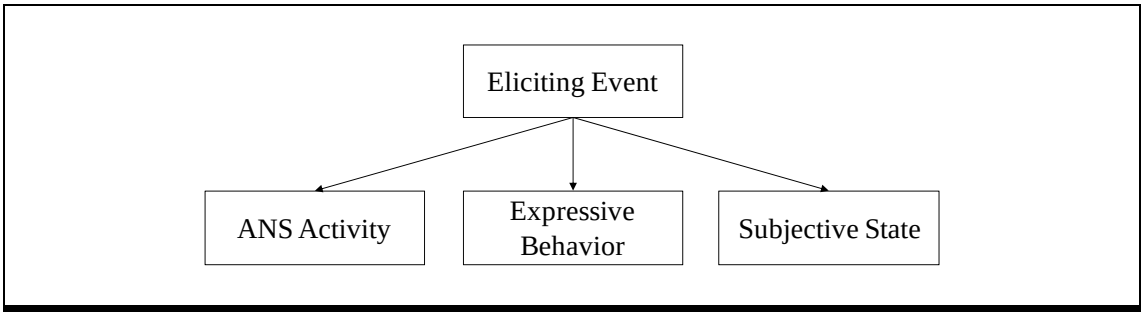

Figure A1. Evolutionary Theory - Theoretical Orderings of the Components of Emotion (Niedenthal, et al., 2006, p.11)

A2. Cognitive Appraisal Theories

The cognitive appraisal theories assume that even in the same events or stimuli, individuals might experience different emotions. Prior literature indicated that human cognition could differentiate emotions (Schachter & Singer, 1962). An emotion can be evoked depending on the appraisal patterns of evaluating the event results. Scherer (2001) summarized the patterns of appraisals and proposed the widely accepted cognitive-appraisal emotion model - *The Component Process Model*. Figure A.2 shows the theoretical orderings of the components of emotion according to the Cognitive Appraisal Theory of Emotion.

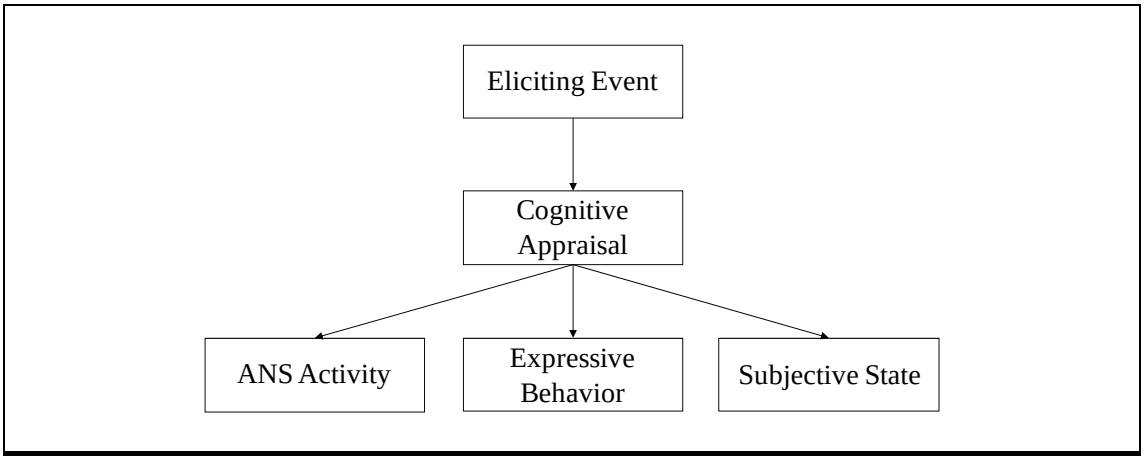

Figure A2. Cognitive Appraisal Theory - Theoretical Orderings of the Components of Emotion (Niedenthal, et al., 2006, p.11)

The general cognitive appraisal theories argue that "emotions do not unfold in a hardwired way in response to certain situations or objects, but that the emotional significance of the events and objects depends on the goals and the perceived coping capacities of each individual, in a given situation" (Niedenthal, et al., 2006, p.17). The cognitive appraisal theories also note that emotions can be associated with different physiological processes and facial expressions.

A3. Social Constructionist Theories

The social constructionist theories suggest that most human states, artifacts, and conditions are societal constructions and most of them serve multiple human goals of the society (Harre, 1986; Lutz, 1988). Emotions from this viewpoint are similar like products that are generated by the culture and for the culture. Emotions in this research domain are viewed as "a transitory social role (a socially constituted syndrome)" (Averill, 1980). Emotions are considered as a passion rather than an action although they still combined a person's appraisal of the situation, especially in a society.

The social constructionist theories argue that emotions are resulted from a cognitive appraisal process for the current events or situations. However, the category of emotion theories discards the thought of that there is necessary to have biologically relevant antecedents. This category of theories debates that "the nature of the moral values of the culture that provide the specific content to the appraisal and meaning to the situation" (Niedenthal, et al., 2006, p.21). The major idea of the theories attempts to challenges those nativist approaches, namely evolutionary theory, which indicates the important aspect of biological experiences in human emotions.

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