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Proposing the Hedonic Affect Model (HAM) to Explain how Stimuli and Performance Expectations Predict Affect in Individual and Group Hedonic Systems Use

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Abstract
Hedonic systems represent a multibillion-dollar industry and play an important role in how people recreate, socialize, and even conduct business. A key goal of hedonic system design is to promote positive affectâ a variable known to influence cognitive beliefs, trust, disclosure, adoption, and purchase intentions. Yet, little research has identified or explained how stimuli from design features lead to positive affect in hedonic systems. This article introduces a new theoretical model, the Hedonic Affect Model (HAM), which is a comprehensive and generalizable model explaining the causes of positive and negative affect in a hedonic software context. HAM outlines three stages that provide an explanation of how stimuli lead to positive affect in hedonic contexts. In stage 1, HAM specifies group and individual interaction inputs that are likely to play a role in users' hedonic evaluations of a system. Stage 2 explains how the interaction inputs and intrinsic motivation influence hedonic performance perceptions. Stage 3 explains how performance expectations and perceived performance lead to a positive disconfirmation and influence users' affect.

Keywords: Affect, expectations disconfirmation, stimulus, attention, perceived affective quality, hedonic systems

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Proposing the Hedonic Affect Model (HAM) to Explain how Stimuli and Performance Expectations Predict Affect in Individual and Group Hedonic Systems Use[1]

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[1] This paper builds and greatly extends on concepts from two theory-based empirical papers on hedonic systems that the authors have under review.

ABSTRACT

Hedonic systems represent a multibillion-dollar industry and play an important role in how people recreate, socialize, and even conduct business. A key goal of hedonic system design is to promote positive affect—a variable known to influence cognitive beliefs, trust, disclosure, adoption, and purchase intentions. Yet, little research has identified or explained how stimuli from design features lead to positive affect in hedonic systems. This article introduces a new theoretical model, the Hedonic Affect Model (HAM), which is a comprehensive and generalizable model explaining the causes of positive and negative affect in a hedonic software context. HAM outlines three stages that provide an explanation of how stimuli lead to positive affect in hedonic contexts. In stage 1, HAM specifies group and individual interaction inputs that are likely to play a role in users' hedonic evaluations of a system. Stage 2 explains how the interaction inputs and intrinsic motivation influence hedonic performance perceptions. Stage 3 explains how performance expectations and perceived performance lead to a positive disconfirmation and influence users' affect. As a result, HAM is more generalizable to individual and group hedonic contexts than other models.

KEYWORDS

Affect, expectations disconfirmation, stimulus, attention, perceived affective quality, hedonic systems

INTRODUCTION

Hedonic systems are becoming increasingly important in business, socialization, and recreation, and thus an increasingly important topic in Information Systems research. Hedonic systems generate billions of dollars each year and come in the form of social networks, video games, text messaging, video and music Web sites, and virtual worlds. Worldwide revenues from the hedonic system market are forecast to reach $57 billion in 2009 (DFC Intelligence, 2008). Hedonic systems attract an enormous number of users and are increasing in popularity. For example, one popular hedonic networking site reported more than 90 million users (Facebook, 2008). Furthermore, 67% of heads of households play computer or video games, and 80% of gamers' parents play games with their children (ESA, 2007). Moreover, during the first half of 2008, the total number of social network users grew an astounding 12% (Smith, 2008)

Given the profitability and popularity of hedonic systems, an important area of study in IS research is to explain what drives hedonic system use and how hedonic systems affect human behavior. Further research can then leverage this understanding of the underlying mechanisms to not only improve hedonic systems, but also to integrate these mechanisms into more traditional systems to improve organizational processes. A key goal of hedonic system interaction design is to induce positive *affect*, which has great potential to influence user behavior (Choi & Kim, 2004; Hsu & Lu, 2004). Affect can influence cognitive judgments (Schwarz & Clore, 1983; Zhang & Li, 2004) and even judgments unrelated to the affect (Forgas, 1995). Affect has been shown to influence trust (Dunn & Schweitzer, 2005), IT evaluations and IT success (Briggs et al., 2008; Zhang & Li, 2007), technology acceptance (Zhang et al., 2006), disclosure (Vittengl, 2000; White, 2004), and so on. Therefore, an important area of hedonic system research is to identify hedonic system features that have the potential to induce positive affect and explain the process through which affect is manipulated.

Despite the importance hedonic systems play in our society and the influence of affect on human behavior, little research has attempted to explain or predict how stimuli lead to hedonic system use and promote positive *affect*. Several studies explain and predict the influence of intrinsic motivation on technology acceptance (Agarwal & Karahanna, 2000; Hsu & Lu, 2004; Hsu & Lu, 2007; Koufaris, 2002; Saade & Bahli, 2005; Wakefield & Whitten, 2006), but fail to specify the specific stimuli and expectations that fulfill intrinsic motivations and lead to positive affect. In evaluating acceptance of hedonic systems, an extra dimension must be considered: how absorbed the user is in the experience. More successful systems (in terms of amount of enjoyment created) capture more attention during usage. Some models have been proposed to explain how attention and involvement lead to enjoyment, use, and immersion (Cheng & Cairns, 2005; Csikszentmihalyi, 1990; Ermi & Mäyrä, 2005; Sweetser & Wyeth, 2005; Tellegen & Atkinson, 1974; Witmer & Singer, 1998) but they lack strong theoretical support. A few articles address how affect may influence behavior (Dunn & Schweitzer, 2005; Zhang & Li, 2004), but do not attempt to explain how hedonic systems create affect.

In this paper we propose a new theoretical model, the Hedonic Affect Model (HAM), which integrates previous theory-based and empirical papers into a comprehensive model. HAM leverages leading theories from gaming, expectation disconfirmation theory, cognitive absorption, flow, and affect to focus solely on what causes negative and positive affect in hedonic situations. HAM is designed to be more generalizable and encompassing than previous models for hedonic systems such as online games, virtual worlds, and social networking sites.

A key addition of HAM is to include not just individual hedonic experiences but also group hedonic experience. Doing so generalizes HAM to virtually any hedonic system context, whether it be individual online gaming, clans working together in virtual worlds, or socialization in a social networking system. Another addition by HAM is to look far beyond interactivity and to consider all the major interaction stimuli and inputs that can impact perceptions of hedonic

performance. This is critical because the hedonic literature shows that although interactivity is a critical part of a hedonic experience, it does not fully account for the major inputs that impact the media experience (McMahan, 2003; Sherry, 2004; van der Heijden, 2004). Finally, HAM identifies specific levels of perceived hedonic performance that influence disconfirmation of expectations that then in turn directly impacts *affect*.

THEORY

The high-level theory on which HAM is based is *expectation disconfirmation theory* (EDT). EDT posits that expectations, perceived performance, and disconfirmation influence satisfaction (Oliver, 1977; Oliver, 1980; Spreng et al., 1996). *Expectations* cover many beliefs (e.g., a system's ease of use, usefulness, pleasure, etc.). *Perceived performance* refers to a user's perception of how a system actually performed (Bhattacherjee, 2001; Briggs et al., 2008; Spreng et al., 1996). A *disconfirmation* is a cognitive process that results from comparing expectations to perceived performance. Whenever perceived performance exceeds expectations, a *positive disconfirmation* occurs and satisfaction results; *negative disconfirmation* occurs when performance is below expectations (Spreng et al., 1996). Perceived performance also directly influences satisfaction independent of the disconfirmation (Oliver, 1977; Oliver, 1980; Spreng et al., 1996). In accordance with anchoring theory (Oliver, 1980; Tversky & Kahneman, 1974) expectations also influence perceived performance. Figure 1 provides an overview of EDT.

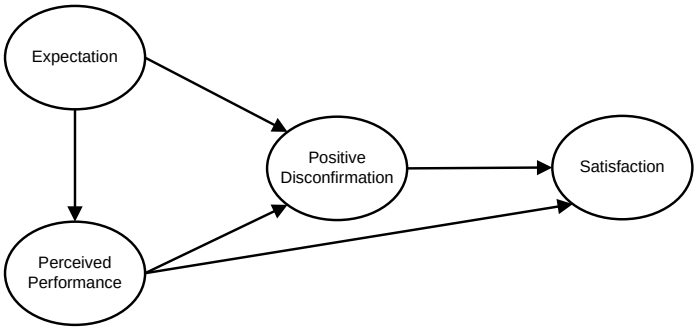

Figure 1. Overview of Expectation Disconfirmation Theory

HAM makes three valuable extensions to EDT that result in a theoretically unique and beneficial model. First, HAM identifies the interaction inputs that influence perceived performance of hedonic systems based on a user's intrinsic motivations and expectations. Second, HAM leverages the complex construct of cognitive absorption to represent perceived performance of hedonic systems. Third, HAM explains how changes in affect result from a disconfirmation of perceived performance and expectations in hedonic systems use. These three extensions are represented by three stages in HAM, and are depicted in Figure 2 (further detail on these stages will be provided in the next section). In Stage 1, a user experiences an interaction with the hedonic system, which can be described in terms of intrinsic goal congruity, hedonic stimuli, group process losses/gains, and hedonic usability. These experiences, in conjunction with his/her intrinsic motivations and expectations, drive a user's perceived performance (represented by the second-order factor of cognitive absorption) in Stage 2. In Stage 3, users perform an evaluation of their performance expectations based on their intrinsic motivations going into the experience against the actual performance they perceived. If their expectations are met or exceeded, positive affect is created; if the perceived performance is below their expectations, negative affect is created.

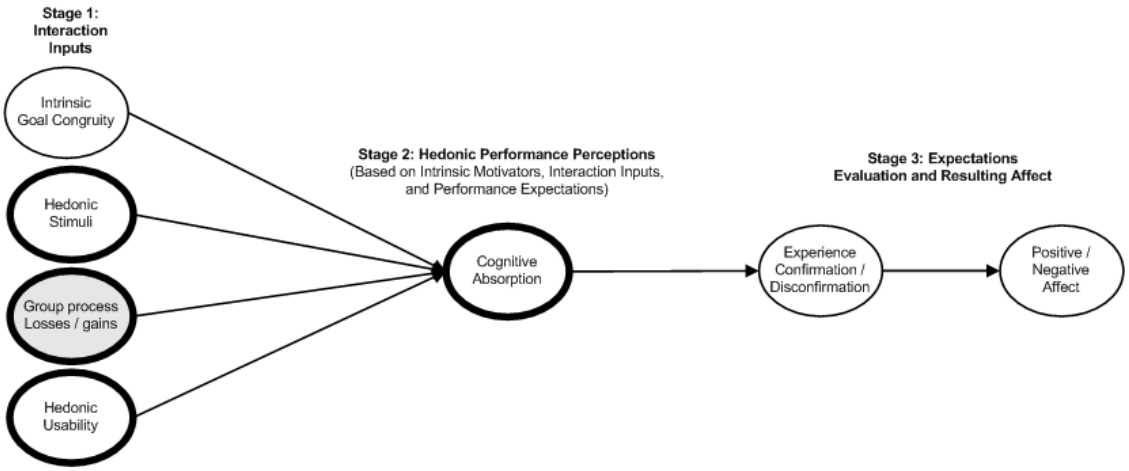

Figure 2. Overview of the Three Stages of HAM

A key difference between hedonic and utilitarian systems is the role of intrinsic motivations and extrinsic motivations. Whereas utilitarian system use is often driven by extrinsic motivations (such as productivity of job performance), hedonic systems use is driven primarily by intrinsic motivations—to have fun (Hsu & Lu, 2004; Hsu & Lu, 2007; Sweetser & Wyeth, 2005). A key assumption of HAM is that it deals with systems use where the users' motivations are primarily hedonic and intrinsic, although extrinsic motivations could still apply. Thus, it is critical to further explain intrinsic motivations and extrinsic motivations in terms of hedonic- and utilitarian-systems use, which we address in the next section.

Given the critical role intrinsic motivation plays in hedonic contexts, HAM builds on the foundation provided by Flow Theory and Cognitive Absorption to explain how specific intrinsic motivations influence one's expectations and related performance indicators in hedonic systems use. This literature explains how hedonic performance can be represented by the degree of curiosity, enjoyment, and immersion a person experiences in a hedonic interaction. Table 1 shows the key constructs used across HAM, CA, and Flow Theory.

Table 1. Comparing Constructs in HAM, CA, and Flow Theory

HAM	Cognitive Absorption (CA)	Flow Theory
Interactivity: *Synchronicity*		
Interactivity: *Two-way Communication*		
Interactivity: *Control*	*Control* (used as a subconstruct of Absorption)	*Control* (used as a subconstruct of Flow)
Curiosity	*Curiosity* (used as a subconstruct of Absorption)	
Perceived Enjoyment (PE)	*Heightened Enjoyment* (used as a subconstruct of Absorption)	

Immersion: -Focused Immersion -Temporal Dissociation	*Absorption*: -Control -Curiosity -Heightened Enjoyment -Focused Immersion -Temporal Dissociation	*Flow*: -Control -Intense concentration -Loss of self- consciousness -Merging of action and awareness -Time distortion -Rule-bounded activity
Interaction richness		
Social media interaction		
Content		
Ease of use		
Adaptability		
Emotional appeal		

Flow Theory. Flow Theory has been used since 1974 to explain attention and involvement in contexts involving high intrinsic motivation (Csikszentmihalyi, 1990; Tellegen & Atkinson, 1974). Flow Theory was not developed with systems in mind, although it has been extensively applied to systems, including gaming (Choi & Kim, 2004; Hsu & Lu, 2004; Sweetser & Wyeth, 2005). *Flow* is generally defined as a state resulting from an absorbing experience so gratifying that people are willing to do it for its own sake, with little concern for any external reward (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2002). Noteworthy aspects of flow in gaming include a sense of control, intense concentration, loss of self-consciousness, time distortion, merging of action and awareness, and rule-bounded activity (Csikszentmihalyi, 1990, p. 71; Nakamura & Csikszentmihalyi, 2002). Flow Theory conceptualizes flow as something that happens in stages; flow is considered to be the highest state of attention, absorption, or engagement (Ermi & Mäyrä, 2005; Wild et al., 1995; Witmer & Singer, 1998).

However, little theory is attached to Flow Theory; it is highly fragmented and has many disparate constructs (and associated measures) that are sometimes defined in contradiction to each other. In addition, these constructs do not always apply well to systems use (Finneran & Zhang, 2003; Hsu & Lu, 2004; Koufaris, 2002; Sánchez-Franco & Roldan, 2005). For this reason, Flow

Theory has generally been used as a framework, metric, or description of the degree of one's involvement in an activity or with a system (Koufaris, 2002). Not surprisingly, when flow has been applied to gaming theoretically, it has often shown poor explanatory power (Choi & Kim, 2004; Hsu & Lu, 2004; Sweetser & Wyeth, 2005). When flow has been applied to a systems perspective, typically only a portion of the model is used (Agarwal & Karahanna, 2000; Finneran & Zhang, 2003; Hsu & Lu, 2004; Koufaris, 2002; Sánchez-Franco & Roldan, 2005).

Cognitive Absorption. Recognizing the drawbacks of Flow Theory and Immersion literature in a systems context, Agarwal and Karahanna (2000) built on the strongest concepts of flow (Csikszentmihalyi, 1990), absorption (Tellegen & Atkinson, 1974), and cognitive engagement (Webster & Ho, 1997) to create the construct of cognitive absorption. *Cognitive absorption* (CA) is a deep state of involvement with, and attention to, software based on intrinsic motivation. CA consists of five dimensions (Agarwal & Karahanna, 2000, p. 673): (1) *control*; (2) *curiosity*; (3) *heightened enjoyment* (4) *focused immersion*; and (5) *temporal dissociation.*

Control is "the user's perception of being in charge of the interaction" (p. 673). *Curiosity* is "the extent the experience arouses an individual's sensory and cognitive curiosity" (p. 673). *Heightened enjoyment* is "the pleasurable aspects of the interaction" (p. 673) described as being fun and enjoyable rather than boring (Saade & Bahli, 2005) and thus conceptually equivalent to enjoyment (Davis et al., 1992). *Focused immersion* is "the experience of total engagement where other attentional demands are, in essence, ignored" (p. 673). *Temporal dissociation* is "the inability to register the passage of time while engaged in interaction" (p. 673).

Given this overview of HAM, we now explain the three stages of HAM in further detail.

HAM Stage 1: Interaction Inputs

In this section, we explain the literature and theoretical background for all the stages. Based on our interdisciplinary literature review (summarized in Appendix 1), we first propose the

interaction inputs that should most strongly impact hedonic performance. We introduce and define these in four major groupings: intrinsic goal congruity, hedonic stimuli, group process losses / gains, and hedonic usability.

Interaction Input 1: Intrinsic Goal Congruity. A misconception some people have of hedonic interactions is that they have no goal or point, which is rarely true. Typically the goal of a hedonic interaction is to align one's interaction experience with one's intrinsic motivations through appropriate stimuli and interactions (Sweetser & Wyeth, 2005). To better understand how this works, we first define what we mean by intrinsic motivation, extrinsic motivation, hedonic systems, and utilitarian systems.

On a high level *intrinsic motivation* has been said to be motivation within an individual to perform a task simply for the sake of personal satisfaction and pleasure; whereas *extrinsic motivation* is motivation that is external to individuals, inciting them to perform a task even if they do not like it, because they seek an external reward (Deci, 1975; Deci & Ryan, 1985). Intrinsic motivation often comes from the joy one gets from an experience or task itself or from the sense of pleasure / satisfaction in working on a task; however, intrinsic motivation can also include other internal reasons such as moral belief that something is the right thing to do or the desire to learn. Thus, intrinsic motivation can also be cast in terms of what people will do without external inducement (Malone, 1981; Malone & Lepper, 1987). Accordingly, intrinsic motivation has been shown to be consistently more powerful and predictive of human behavior (Deci, 1975; Deci & Ryan, 1985), and thus it is important to satisfy intrinsic motivations in both hedonic and utilitarian contexts.

The weakness of extrinsic motivation is that one who is extrinsically motivated is concerned with doing something because of external rewards—such as a prize, a payment, or grades—or other external factors such as coercion or threat of punishment. Fulfilling extrinsic motivation is rarely enough to keep a person satisfied and engaged in the long term; this explains

why professionals making a lot of money (achieving external reward) can be miserable in their career path because they lack joy and satisfaction in their day-to-day work.

Given this background, another key difference between intrinsic and extrinsic motivation is the degree of control involved (Deci, 1975; Deci & Ryan, 1985): those who act intrinsically often do so out of choice and freedom, and those acting extrinsically often feel compelled, obligated, or manipulated to do so. Intrinsic motivation does not mean, however, that a person will not seek external rewards. It just means that such external rewards are not enough to keep the person motivated to persevere with a task or experience. An intrinsically motivated student, for example, may want to get a good grade on an assignment, but if the assignment does not interest that student, the possibility of a good grade is not enough to maintain his/her motivation to put any effort into the project (Malone, 1981; Malone & Lepper, 1987).

Based on these definitions, we can further describe hedonic and utilitarian systems. *Hedonic systems* are systems that are designed to primarily fulfill intrinsic motivations of their users (e.g., have fun, socialize, relax) (Choi & Kim, 2004; Hsu & Lu, 2004; Hsu & Lu, 2007; Jegers, 2007; Sweetser & Wyeth, 2005; van der Heijden, 2004) and *utilitarian systems* are designed to primarily fulfill extrinsic motivations of their users (e.g., complete a work task) (Davis, 1989; Davis et al., 1989; Davis et al., 1992). People who devote themselves to hedonic systems do so for intrinsic rewards and have little concern for any external reward they may receive. For example, the primary goal of game design is to encourage a user to have an enjoyable, immersive experience in which extrinsic motivation plays virtually no role (Choi & Kim, 2004; Hsu & Lu, 2004; Hsu & Lu, 2007; Jegers, 2007; Sweetser & Wyeth, 2005). Furthermore, the highest levels of attention (i.e., immersion) in an optimal gaming experience are inextricably linked to intrinsic motivation (Cheng & Cairns, 2005; Sherry, 2004; Sweetser & Wyeth, 2005).

Whereas gaming is primarily about intrinsic motivations, this does not mean that

extrinsic motivations never influence the goals of hedonic system use. We recognize that extrinsic and intrinsic motivations are rarely dichotomous and both can exist in hedonic system use, and likely exist along a spectrum the ultimately depends on a given user's perspective. The key to defining a system as "hedonic" as opposed to "utilitarian" is that extrinsic motivations alone (e.g., more friends in a social network, getting paid more, winning a prize) will not sustain a person's use if intrinsic motivations are not addressed adequately (e.g., fun, relaxation, enjoyment, socialization, friendship). Examples of hedonic systems that can have extrinsic motivations involved include social networking sites, text messaging, and blogging.

For example, one may use Facebook for a number of reasons, along a spectrum of intrinsic to extrinsic motivations. A minority of people use Facebook solely to make money through multi-level marketing. If that represents a user's sole objective then Facebook to that specific user would be a utilitarian system. However, the majority of people use Facebook not to make money but to socialize and socially network, which includes everything from stalking, to dating, to flaming, to commiserating, to bonding, to sharing one's life story, to debating, to sharing music, to forming clubs, to looking at photos of friends and strangers, etc. Such motivations are primarily intrinsic because a person freely chooses to do them, such tasks rarely come from external reward or inducement, and the rewards involved are internally centered, such as feeling self-worth, experiencing the emotional satisfaction of validation through friendship, feeling a human connection, having a sounding board, letting go of anger / frustration, developing social bonds, etc. Accordingly, we would generally categorize Facebook as a hedonic system. Appendix 2 further describes and classifies several major types of hedonic systems that address both intrinsic and extrinsic motivations.

Given this background, we now address the role of hedonic goal congruity in HAM. The goals of the interaction design of a hedonic system must be clear and these goals should be in alignment with the user's intrinsic motivations (Sweetser & Wyeth, 2005). We refer to this goal

clarity and goal alignment as *intrinsic goal congruity*. From a media perspective, Vorderer et al. (2004) called these goals "motives" and listed escapism, mood management (e.g., trying to achieve enjoyment, avoid boredom), and achievement / competition as common motives. Accounting for group hedonic use we also add socialization, networking, romance, and friendship as common goals.

We use Motivated Action Theory (MAT) (DeShon & Gillespie, 2005), which is based on the goal orientation literature, to explain the phenomenon of goal selection and how varying goals have "fit" with one another, and thus can explain perceived performance of a hedonic system. In MAT, goals are hierarchically structured such that higher level goals provide the purpose, or "why," while lower level goals specify actions, or "how". Topping the hierarchical structure are *self goals* (i.e., goals related to basic needs and desires to live a functional life) and the second highest are *principle goals* (i.e., values or principles that are guidelines for behaviors). These higher-level goals provide guidance for relevant behavior consisting of specific actions to achieve lower level goals.

The lower level goals are *achievement goals* and *action plan goals*. Achievement goals reflect "general action patterns" individuals implement to obtain principle goals. So, even though an individual is presented with a positive opportunity, if the achievement goals associated with that opportunity clash with a principle goal, the individual will seek to reduce the discrepancy. Action plan goals help an individual focus on the detailed actions needed to reduce discrepancies. These goals are clear, distinct, and highly flexible. While DeShon and Gillespie (2005) only provided four levels, they noted that more levels of detail likely exist but the purpose of their study was not to identify the infinite possibilities.

MAT (DeShon & Gillespie, 2005) provides a model for detecting goal discrepancies as follows: The mind uses a sensory system to compare the current state of the environment to the goal in question. The discrepancy or error discovered by this analysis causes an output function to

search for a relevant goal associated with the discrepancy. This output function begins at the top of the hierarchy and trickles down until a sufficient goal meeting the criteria is discovered. Through action and other factors the discrepancy is removed and the cycle begins anew, as depicted in Figure 3.

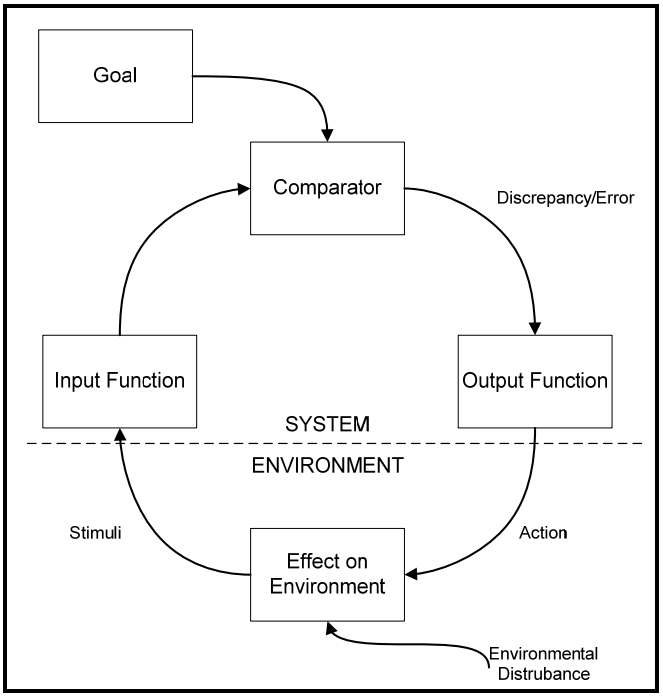

Figure 3. Discrepancy Detection, from (DeShon & Gillespie, 2005)

Environmental stimuli do not always cause an individual to perform specific actions related to the current high-level goal. The relationships between goals can be excitatory (positive) or inhibitory (negative). As DeShon and Gillespie (2005) point out, when the mind is occupied by a current process, competing responses are blocked, or inhibited, from gaining prepotence in order to protect the current process. However, stimuli can cause a non-prepotent goal to obtain focus over the prepotent goal. The mind maintains an innate ability to classify goals at varying activation levels. These activation levels can either be reduced by decreasing a discrepancy (thus causing that goal to be non-prepotent) or increased due to a discrepancy. Hence if the interaction design goal of a hedonic system is to provide socialization and one's intrinsic goal is to

experience anti-social escapism, one will experience intrinsic goal incongruity (regardless of how well designed the hedonic system is), which will result in dissatisfaction with the experience. As a result, one will no longer focus on escapism, but focus on clarifying the discrepancy; the motivation is no longer equated with the goal. This then results in poor fulfillment in hedonic performance according to one's expectations.

P1. Intrinsic goal congruity positively impacts hedonic performance perceptions.

Interaction Input 2: Hedonic Stimuli. Game designers wish to maximize attention, with immersion being the highest form of attention. Enjoyable games motivate players to give their attention and concentration through interesting stimuli (Sweetser & Wyeth, 2005).

Psychological theory on attention provides the foundation for explaining how gaming stimuli can capture attention. The basis for this attention theory is that various stimuli compete both to capture a person's attention and to be processed by his or her limited cognitive capacity (Johnston & Dark, 1986; Posner, 1980; Posner et al., 1980). For attention to be gained, a stimulus must continue to capture more notice and cognitive processing; this is enhanced by alertness caused by novelty and diminished by boredom (Posner, 1980; Posner & Boies, 1971; Posner et al., 1980). Attention is enhanced when it is selectively performed in such a way that irrelevant stimuli are filtered out, and multiple stimuli work together to reinforce a temporally occurring stimulus stream (Egeth, 1967; Johnston & Dark, 1986; Posner & Boies, 1971). When focused attention occurs, one focuses on an isolated field of stimuli somewhat like a spotlight, so that the efficiency of detecting events and signals within the spotlight is enhanced and everything outside the spotlight becomes peripheral and harder to detect (Johnston & Dark, 1986; Posner et al., 1980). Attention is captured through stimuli from an external environment such as a system (Biocca et al., 2007). In gaming, stimuli come directly from the designed features of the game (Sherry, 2004).

On this basis, we summarize the literature to propose the key stimuli in a hedonic system

context that are likely to capture and retain a user's attention on an individual level and a group level of interaction.

Individual- and Group-Level Stimuli. The literature indicates that *interaction* between the user and the system provides a critical stimulus of attention that is especially pertinent to gaming. A person must be actively engaged in order to gain his/her attention (Csikszentmihalyi, 1975; Wild et al., 1995), and active engagement cannot occur without interaction. *Control* (an element of interactivity) is a critical element in achieving flow (Webster & Ho, 1997). Moreover, every major description of gaming immersion suggests that high levels of interactivity are essential for immersion because gaming is not a passive activity (Choi & Kim, 2004; Ermi & Mäyrä, 2005; Sherry, 2004; Sweetser & Wyeth, 2005; Witmer & Singer, 1998). Therefore, "interaction is considered one of the most important aspects related to optimal experience with computer games" (Choi & Kim, 2004, p. 13). Sufficient levels of interactivity must be present within a game so that there are enough stimuli to capture and hold users' attention (Choi & Kim, 2004); otherwise, boredom, which inhibits both attention and the stimulus stream, is likely to occur (Posner & Boies, 1971).

The interaction that acts as a critical stimulus has been often described in the literature as *interactivity.* In our context, *interactivity* is a key aspect of interaction design and is defined as the degree to which an interaction involving people (one-to-many) and systems (one-to-many) exhibits control, two-way communication, and synchronicity. *Interaction control* is the ability to manage the communication experience, including the ability to interrupt, to be spontaneous and unpredictable, to adapt the interaction to one's desires, to make choices, and to be generally in charge of an interaction (Agarwal & Karahanna, 2000; Liu & Shrum, 2002; Zack, 1993). Besides its application to interactivity, interaction control is an interdisciplinary construct that has been richly applied to Flow Theory (Csikszentmihalyi, 1975; Koufaris, 2002), Cognitive Absorption (CA) (Agarwal & Karahanna, 2000), self-efficacy (Bandura, 1982), and the Theory of Planned

Behavior (Ajzen, 1991).

Two-way communication is a form of reciprocal communication where one or more senders and one or more receivers (human or system) communicate with each other (e.g., Burgoon, Bonito, Bengtsson, Cederberg et al., 2000; Burgoon, Bonito, Bengtsson, Ramirez et al., 2000; Burgoon et al., 2002; Liu, 2003).

Synchronicity has been defined as a quality of communications and interactions that have an immediate response, simultaneous exchange of information, quick response time, high speed of interaction, real time, synchronous response, no time lag, and so on (Alba et al., 1997; Liu, 2003; Liu & Shrum, 2002; Novak et al., 2000; Steuer, 1992; Zack, 1993). In sum, *synchronicity* is the degree to which a system enables a user to immediately respond to the system, and the degree to which the same system immediately responds to the user.

Beyond interactivity, the literature suggests that some of the most effective stimuli for fostering focused attention are typically sensory-oriented, such as visual and auditory stimuli (Bundesen et al., 2005; Egeth, 1967; Johnston & Dark, 1986). The use of graphics and sound are often crucial supplemental stimuli. In modern interactive gaming, graphics and sound form essential media through which a player interacts with a game. We define the degree to which visual and auditory stimuli are used in interactive media as *visual richness* and *auditory richness*, respectively. Additionally, other characteristics of the media affect how rich and effective the communication is between an individual and others (system or people). Traditionally, this is referred to as *media richness*. *Media richness* can be defined as how strongly a medium provides communication capabilities to those using the medium (Daft & Lengel, 1986; Daft et al., 1987). For example, face-to-face (FtF) communication is traditionally considered richer than e-mail-based communication. However, to avoid confusion with visual and auditory stimuli we call this *communication richness.*

Finally, haptics—where the interface to the user involves touch sensation (tactile) and

control—are also becoming increasing important in hedonic and utilitarian contexts as ways to improve the interaction between the user and system (e.g., Feintuch et al., 2006; Mukai et al., 2008; Robineau et al., 2007). Haptics include an increasing diversity of devices from joy sticks, data gloves, mice, robotic surgical devices, touch screens, to body-movement-aware devices. We call the richness of interactions using such devices *haptic richness.*

Summarizing this section and for model simplicity, we combine these four related constructs (*visual richness, auditory richness, communication richness,* and *haptic richness*) into a second-order construct that we call *interaction richness.*

Group-Level Stimuli. Finally, in terms of hedonic stimuli, we propose the stimuli that only apply in group settings. Like the previously discussed stimuli, a key distinguishing feature of these stimuli is that they require media interaction, not just group interaction. Group-related hedonic systems (such as social networks, clans working together in networked games and virtual worlds, blogs, and so forth) have experienced explosive growth. For example, during the first half of 2008, the total number of social network users grew an astounding 12% (Smith, 2008). Yet, very few studies (e.g., Hsu & Lin, 2008) have indentified the group-level stimuli that have led such growth. On the other hand, research on group work and collaboration in a utilitarian context is well-developed (e.g., Banker et al., 2006; Dabbish & Kraut, 2008; Levina & Vaast, 2008). Drawing from this literature has potential to richly add to hedonic system research.

Based on our literature review, we propose that the key group-level stimuli that fit this distinction are *group awareness*, *group memory*, and *social presence*. For modeling simplicity and to be congruous with hedonic literature (Sherry, 2004), we combined these into a formative construct we call *social media interaction* (note that interactivity can also be supportive of social interaction). *Group awareness* is the ability to know what other group members are doing at a given time without direct communication; this implicitly increases social pressure on group members to contribute more, coordinate work, contribute to a group's effort, and avoid duplicate

work (Lowry & Nunamaker, 2003). *Group memory* exists when the knowledge of a group is shared in common (Dennis et al., 2003; Wegner et al., 1991). *Social presence* can be defined as "the degree to which a medium facilitates awareness of the other person and interpersonal relationships during the interaction" (Fulk et al., 1990, p. 118). Central to social presence theory is the belief that the presence of the sender influences the recipients' understanding of the message (Miranda & Saunders, 2003).

It is important to note that people can become overstimulated. Too many stimuli have been shown to cause individuals' cognitive capacities to become overloaded (Barbalet, 1999), resulting in less enjoyment. Overstimulation is likely a result of too many irrelevant (non-hedonic) stimuli creating noise that prevents attention focus on the stimuli perceived to be hedonic. Overstimulation may also result from too many purely hedonic stimuli (from the user's perspective), but this limit has yet to be discovered empirically. It has similarly been recognized in interactivity research that too much interactivity can be distracting and thus counterproductive (Liu & Shrum, 2002).

Summarizing this section, whether the source of stimuli is on the individual- or group-level, an increase in hedonic stimuli will positively impact one's perception of hedonic performance—assuming that one has not reached a level of excessive and/or irrelevant stimulation.

P2. Assuming one is not over stimulated, an increase in perceived hedonic stimuli will positively impact hedonic performance perceptions.

Interaction Input 3: Group Process Losses and Gains. Outside the medium itself, the literature on collaboration indicates that groups (e.g., clans, online communities, teams) can have a myriad of social and process phenomena that can improve or detract from a group's experience (in our case, a hedonic experience), which are known as *process gains* or *process losses*, respectively (Diehl & Stroebe, 1987; Lamm & Trommsdorff, 1973).These process gains and losses have long been documented in the social psychology literature. For brevity, we do not list

every type of group process loss and gain but provide examples of some of the major ones that can impact hedonic group experiences. Some of the relevant group process losses that are most prevalent in the literature include *evaluation apprehension, production blocking, social loafing, cognitive inertia, conformance pressure, status effects, airtime fragmentation*, etc. *Evaluation apprehension* occurs when group members withhold ideas because they fear they may be criticized by other group members (Diehl & Stroebe, 1987; Lamm & Trommsdorff, 1973). *Production blocking* occurs when potentially good or creative ideas are suppressed or forgotten when a person is busy listening to other group members—particularly if a speaker dominates the conversation or takes too long to express his or her ideas (Diehl & Stroebe, 1987; Lamm & Trommsdorff, 1973). *Cognitive inertia* occurs when group discussions continue along one path because group members contribute only ideas related to the immediate topic (Jablin & Siebold, 1978; Lamm & Trommsdorff, 1973). *Conformance pressure* occurs when team members do not want to criticize any of a team's efforts or do not want to elicit a dissenting viewpoint because of a desire to be polite or concerns of group member retaliation or rejection (Hackman & Kaplan, 1974). *Status effects* occur when high-status group members dominate low-status members and/or marginalize their contributions (Berger, 1977; Dubrovsky et al., 1991). *Airtime fragmentation* occurs when a group's available speaking time is divided between the group members (Diehl & Stroebe, 1987; Jablin & Siebold, 1978; Lamm & Trommsdorff, 1973).

Examples of relevant group process gains include *coordination, openness, cohesion, task-discussion effectiveness, synergy, stimulation, more information, learning, more objective evaluations*, etc. *Coordination* is "managing dependencies between activities" (Malone & Crowston, 1994, p. 90). *Openness* represents the idea that one who is open to experience evaluates threats more accurately and tolerates change more graciously than someone who is more closed to experience; openness allows group members to deal with problems in a mature manner (Haney et al., 1973). *Cohesion* is "the degree to which users are attracted to the group and

to each other" (Hsu & Lu, 2007, p. 1648). *Task discussion effectiveness* reflects the degree to which discussion content is carefully developed, issues and ideas are examined effectively and critically, group members participate in the discussion, and a large amount of information is effectively exchanged (Gouran et al., 1978; Lowry et al., 2005). *Synergy* is when a member of a group uses information in a different way than the original holder, because the member has different information and skills (Nunamaker et al., 1991). *Stimulation* occurs when working as a part of a group stimulates and encourages the group members to perform better (Nunamaker et al., 1991). *More information* means that the group as a whole has more information than any one member (Nunamaker et al., 1991). *Learning* occurs when group members learn from one another (Nunamaker et al., 1991). *More objective evaluation* results when groups are able to catch more errors than individuals (Nunamaker et al., 1991).

Summarizing this section, if a hedonic experience involves group interactions then the process gains and process losses of the group will directly affect an individual's perception of the hedonic experience.

P3. Group process gains will (a) positively impact hedonic performance perceptions in a group context whereas (b) group process losses will produce a negative impact.

Interaction Input 4: Hedonic Usability. HAM assumes that hedonic stimuli are not enough to drive a positive experience through hedonic performance expectation, unless the interaction design, including how the stimuli are presented to the user, delivers them in a usable manner. We critically assume that usability is always judged from the perspective of the end user; thus, stimuli (e.g., haptic richness, two-way communication, social presence) may affect usability but their effect is largely user dependent and requires user evaluation of the effectiveness of the stimuli.

The International Standards Organization (ISO) defines usability as the "extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency,

and satisfaction in a specified context of use" (Karat, 1997, p. 34). This general definition provides a high-level look at usability. However, understanding more specific qualities of usability is helpful. Information systems researchers (e.g., Agarwal & Venkatesh, 2002; Massey et al., 2007; Venkatesh & Ramesh, 2006) have provided additional insights into describing and defining usability for Web site design. These insights are based on the Microsoft Usability Guidelines (MUG) for designing Web sites (Keeker, 2008). MUG consist of five categories and several subcategories. The main categories are *content, ease of use, promotion, adaptability*, and *emotional appeal*.

Content describes the information and transformational qualities of a system (Agarwal & Venkatesh, 2002). It includes the subconstructs of relevance, appropriate depth and breadth, timely/current information (timeliness), and attractive use of media (attractiveness). Each of these subcategories has significance for hedonic systems: *Relevance* involves how interesting the site or system is to the user. *Appropriateness* (appropriate depth and breadth) refers to systems possessing an adequate amount of variety (Palmer, 2002), breadth to be relevant to a wide audience, and depth for more interested users. *Timeliness* (timely/current information) describes whether the site or system has the latest information or substance. Finally, *attractiveness* (attractive use of media) describes having appealing graphics, pleasing audio, and emotion-evoking music. This is particularly important in hedonic systems and has often been referred to as aesthetics. *Aesthetics* refers to the study of beauty and its application to a given product (Lavie & Tractinsky, 2004). Consumers have placed increased value on the aesthetics of website or program design rather than just on the underlying information and traditional aspects of usability (Darden & Babin, 1994; Jordan, 1998). In fact, sheer sensory delight through aesthetics can be very entertaining in a hedonic experience such as gaming (Vorderer et al., 2004).

Ease of use describes the cognitive effort involved in using a site or system (Agarwal & Venkatesh, 2002). The subcategories are *goals*, *structure*, and *feedback*. *Goals* refers to having

goals that are clear, apparent steps to achieve the goals, and indicators of advancement toward the goals. *Structure* relates to the capability of the site or system to communicate the main activities, communicate the consequences of actions, and allow users to "control the pace of sequences" (Keeker, 2008). Critical to structure is how navigation and Web site organization are delivered (Palmer, 2002). *Feedback* means that the system gives users an understanding of their location, gives progress status to the user, and does not confuse or frustrate users with uncertainties. Being responsive to the user in general and avoiding unnecessary download delays are also captured in feedback (Palmer, 2002).

Promotion is described as the promotion of the content, location, and features of a site (Keeker, 2008). Agarwal and Venkatesh (2002) did not find *promotion* to be very important in Web site usability assessment, and the users that did place value on it were playing the role of investors rather than customers while analyzing Web sites. Hence, we choose not to include *promotion* in HAM because it is likely even less important to users of hedonic systems.

Adaptability[2] involves the malleability of a hedonic system to fit the needs of particular users (Agarwal & Venkatesh, 2002). The subcategories of adaptability are *community*, *personalization*, and *refinement*. *Community* refers to whether the system provides opportunities for users to perceive themselves as one of a community, have freedom of expression, experience a feeling of group identification, and achieve social goals while using the system. *Personalization* relates to how well a site or system responds individually to users, allows users to interact with the system in their own way, and provides the ability for users to customize the site or system to their individual style. *Refinement* describes the ability of the system to add new content, give users updates on timing of additions, and add information in a timely manner.

Emotional appeal (often referred to as *emotion*) relates to the affective responses engendered by using the site or system (Agarwal & Venkatesh, 2002). *Plot*, *character strength*,

[2] The literature generally calls this construct *made-for-the-medium*, but we felt that *adaptability* is much more intuitive, given the subconstructs involved.

pace, and *challenge* are the subcategories of *emotional appeal*. *Plot* refers to the way a site or system captures the user's interest through the "ordering of emotions" (Keeker, 2008). *Character strength* is the ability of the system to help users identify with the characters and recognize and distinguish the lead and secondary characters. *Pace* refers to the ability of the system to allow users control over the flow of information (Agarwal & Venkatesh, 2002). *Challenge* is critical for most games (Keeker, 2008), but it is also relevant to other hedonic systems. The elements of *challenge* are appropriate challenge for the core users, new challenges for proficient users, and both familiar and unique qualities of the site or system.

The level of necessary challenge for a hedonic experience is highly specific to a person and hedonic context, as it takes into account the level of difficulty of a hedonic experience and the person's skill set. Sherry (2004) theorized this level from a flow perspective to be a careful balance between the difficulty of the medium and skill in medium use, which was elaborated in (Sweetser & Wyeth, 2005). For example, a single player playing a video game or an online adventure will need enough challenge to keep their interest, or the experience could become boring, but if they have too much challenge they can become frustrated or anxious. Yet, challenge is not very important when dealing with a more social hedonic context such as instant messaging. Liu et al. (2007) proposed and validated a model that concurs with Sherry (2004) but also adds that one's performance goal orientation acts as a moderator, essentially because some people care more about performance than others.

Hence, building on these studies, we define *appropriate challenge* as the right mix of hedonic challenge for a person's skill set such that the person will avoid boredom or frustration, taking into account his/her performance goal orientation. The challenge for hedonic system designers is that this appropriate mix shifts throughout one's experience with a hedonic system (Liu et al., 2007; Sweetser & Wyeth, 2005). In studies involving MUG as criteria of usability, researchers have found that the categories and subcategories are not equally important

nor are they given the same weight in different contexts (Agarwal & Venkatesh, 2002; Massey et al., 2007; Venkatesh & Ramesh, 2006). In utilitarian contexts, *content* was considered to be the most important criterion for usability while *emotional appeal* was not generally considered to be very important (Agarwal & Venkatesh, 2002; Massey et al., 2007; Venkatesh & Ramesh, 2006). One explanation for the lack of value placed on the emotional appeal component of usability is that the sites tested were business-oriented in nature. Thus, the sites lacked the "entertainment or fun-oriented nature" (Venkatesh & Ramesh, 2006, p. 187). Additionally, emotional appeal was found to be more important in purchases that included more involvement (Venkatesh & Ramesh, 2006). Because hedonic systems are fun-oriented and have high involvement, users of hedonic systems will likely place greater importance on the emotional appeal dimension of usability.

We consider *hedonic usability* to include the categories of *content, ease of use, adaptability,* and *emotional appeal*. Generally, we expect that *content* and *ease of use* will continue to be important usability criteria to users of hedonic systems. We also anticipate that *emotional appeal* will be regarded as important to hedonic systems users. We assume that different hedonic systems will have different usability requirements, and users will weigh the categories differently in different contexts. Additionally, it is necessary to recognize that *hedonic usability* requirements will also vary depending on users' characteristics (Massey et al., 2007). Summarizing this section, the extent to which one perceives the software involved in a hedonic experience to be usable will have a direct impact on one's perception of the hedonic experience.

P4. Hedonic usability positively impacts hedonic performance perceptions.

To finalize this section, it is important to emphasize a couple of assumption about interaction inputs. First, HAM focuses on hedonic interaction inputs from the perspective of the user. For example, an objective third-party evaluation of interactivity would likely yield different results than the same evaluation from the perspective of the user. For example, a third party might judge all simpler games as less interactive than more complex games, but the user may find the

inputs in the simpler game to be more stimulating than the inputs in the complex game. In other words, what is effective for one person is not always effective for another, since each person has different types of affective desires and expectations. A hedonic system (game) only creates positive affect to the extent that the inputs match the expectations of the given user at a given time.

Second, one's perception of a hedonic experience evolves over time. The interaction inputs discussed in this section— intrinsic goal congruency, hedonic stimuli, group process gains and losses, and hedonic usability—may be independent from each other but combine to determine the overall level of perceived performance. These inputs are not one-time events; rather, they continue throughout the hedonic experience. To retain an individual's attention, interesting stimuli must continue to flow. The stimuli are interpreted differently over time because the utility of the experience evolves (Lehmann, 2001). Utility evolution may be cause by learning and acculturation (Carpenter & Nakamoto, 1989), context and situation (Simonson & Tversky, 1992), and satiation (McAlister, 1982). To understand why this evolution takes place, it is important to understand that a person's expectations change during an experience (Winer, 1986). Once a user has an initial interaction with a hedonic system, the user experiences a disconfirmation by comparing perceived performance to expectations. After this evaluation, the user forms a new set of expectations based on the previous experience (Oliver, 1980). Due to the continued stream of inputs and one's evolving utility, one's perception of an experience changes over time. Figure 4 graphically depicts the process described above.

HAM Stage 2: Hedonic Performance

In this section, we further elaborate on how the perception of hedonic performance is determined and what it is most likely to influence. Because one's motivations to use hedonic systems are purely intrinsic, the perception of hedonic performance is going to be

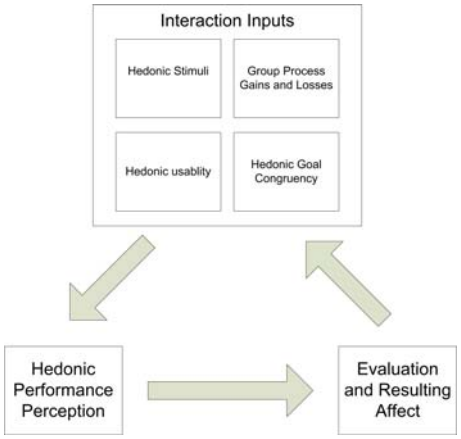

Figure 4. Evolution of User Perceptions

judged against one's intrinsic motivations and expectations. HAM posits that hedonic stimuli, group process gains/losses, intrinsic goal congruence, and hedonic usability are the interaction inputs that capture attention and drive hedonic performance perceptions. As suggested by the physiological theory of attention (Posner, 1980; Posner & Boies, 1971; Posner et al., 1980), if hedonic system performance satisfies or exceeds one's intrinsic motivations, one will devote attention to the system's stimuli. If not, the user will give attention to other competing stimuli. CA (composed of curiosity, control, joy, temporal dissociation, and focused immersion) can be effectively used as a representation of one's perceived hedonic performance, because CA is an effective representation of the level of attention one is willing to give to a hedonic experience—the more attention is given, the better is the perceived hedonic performance.

The stimuli that capture attention must be appealing enough to arouse curiosity in the user, and the individual must be intrinsically motivated to experience the stimuli. Hedonic usability is an important supporting factor to capture a user's attention because a game can be highly interactive in technical terms, but still provide distracting stimuli (e.g., annoying sounds, distracting colors, or inappropriate interaction) that break focused attention. Likewise, lack of social media interaction and group process losses are both important supporting factors because both can detract from otherwise appealing stimuli in a group hedonic context. Conversely, a game

can be appropriately interactive, but a user simply may not be in the right mood or state of intrinsic motivation for curiosity arousal, which is why intrinsic goal congruity is an important factor.

An assumption we make in our depiction of hedonic performance evaluation is that the subconstructs of CA appear simultaneously and are self-reinforcing. However, we recognize that reality may be more complex as the conceptualization of immersion in gaming has long been considered to occur in stages (Cheng & Cairns, 2005; Sherry, 2004; Sweetser & Wyeth, 2005), similarly to how attention builds in degrees. For example, one can be curious about a hedonic experience but not enjoy it. One can also enjoy a hedonic experience but not consider it to be immersive. For simplicity's sake, we consider these constructs to be self-reinforcing and appear together and that for these to increase in degree over time the stimuli and interaction inputs need to be novel and positive.

Attention to stimuli is enhanced when they are perceived as novel and not boring (Posner & Boies, 1971). Novelty requires a continuous stream of stimuli and positive interaction inputs that vary and/or progress in conjunction with one's intrinsic motivations (Posner, 1980; Posner & Boies, 1971; Posner et al., 1980). Likewise, it is likely that the CA constructs reinforce each other in a system of feedback loops that can build attention and perceived performance over the course of a hedonic interaction. For example, an increased sense of PE would likely heighten one's sense of curiosity, which would help to make an experience more immersive and cause a user to provide more attention to the experience. This interaction of feedback loops of CA and sustained attention is depicted in Figure 5. Thus, immersion will end if the hedonic stimuli end.

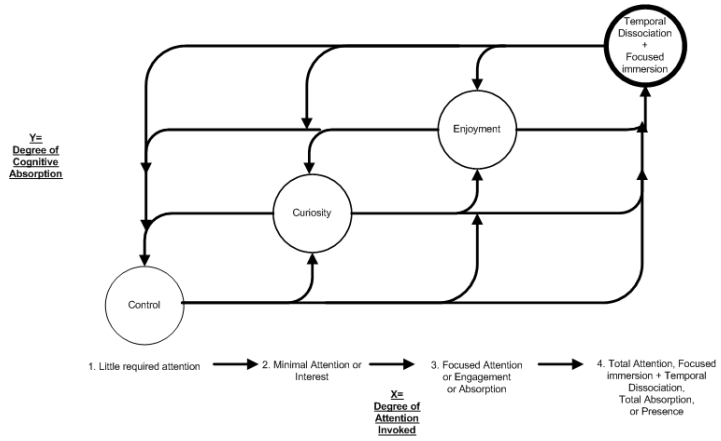

Figure 5. Depiction of Feedback Loops in Increased CA and Attention

We now describe how the five subconstructs of CA are self-reinforcing. We begin by elaborating on curiosity. Curiosity is an increase in interest or "a heightened arousal of sensory and cognitive curiosity" (Agarwal & Karahanna, 2000, p. 668) representing heightened attention or "increased perception of stimuli" (Berlyne, 1954, p. 180). "Curiosity suggests that the act of interacting with the software invokes excitement about available possibilities" (Agarwal & Karahanna, 2000, p. 675; Webster et al., 1993). If positive attention is captured from the hedonic stimuli and supporting group process gains, intrinsic goal congruity, and hedonic usability, then we posit that sufficient conditions are met to create *curiosity*; conversely, negative stimuli and/or distraction from group process losses, intrinsic goal incongruity, or lack of hedonic usability would detract from curiosity. Curiosity is a key motivational state that increases exploratory behavior and additional engagement (Berlyne, 1954). Hence, curiosity should reinforce the desire to interact in a manner that will reinforce the other elements of CA, whereas lack of curiosity would be negatively reinforcing.

Meanwhile, perceived enjoyment (PE*)* is the degree to which using a system is perceived to be enjoyable (the basis for the intrinsic motivation to use the system), regardless of the perceived performance outcomes of system use (the basis for extrinsic motivation to use the system) (Hsu & Lu, 2007; van der Heijden, 2004; Venkatesh, 2000). PE occurs when increased

attention and involvement in the interaction provide the expected satisfaction (Choi & Kim, 2004; Hsu & Lu, 2004). For example, because the primary purpose of playing a game is to have fun, if a game is not enjoyable a user will not play it (Choi & Kim, 2004; Hsu & Lu, 2004; Hsu & Lu, 2007) and his or her attention will not hold. Consequently, if PE is not created in gaming, a user will not fully achieve the deepest levels of attention represented by focused immersion and temporal dissociation[3].

Curiosity amplifies excitement in software (Agarwal & Karahanna, 2000; Lim et al., 2005; Sweetser & Wyeth, 2005; Webster & Ho, 1997), which helps to increase PE. Conversely, it is difficult to enjoy an interactive game that does not arouse interest or excitement resulting in attention. Curiosity is especially important for sustaining PE in the context of interactive gaming where novelty and interest are at a premium and must continue throughout a gaming experience to prevent player boredom, apathy, and disinterest (Sweetser & Wyeth, 2005). This is supported by early attention research that shows that novelty, including anything that is unique and sensory in nature (Egeth, 1967; Johnston & Dark, 1986), which can increase curiosity, also increases attention; conversely, boredom undermines attention (Posner & Boies, 1971). An enjoyable game must elicit exploratory behavior and give players reasons to provide their attention (Sweetser & Wyeth, 2005). To further increase PE, players need to experience further increases in curiosity along with sustained interactivity. Webster et al. (1993) studied the relationship between curiosity and intrinsic interest (i.e., PE); they found the relationships between the two "to be highly interdependent in interactions with computers…This is not the intrinsic interest that arises from a game of chance, for example, but rather the intrinsic interest that accompanies cognitive arousal and use of the imagination" (p. 420).

As interactivity continues and curiosity and PE increase, immersion also increases. We define immersion as the highest level of attention and fulfillment of intrinsic motivation. In terms

[3] For similar reasons, in a hedonic mobile computing study Wakefield et al. (2006) pulled PE out of the original CA conception and retained its relationship with MAT for nomological validity.

of CA, we consider immersion to be equivalent to the combination of focused immersion and temporal dissociation, since the literature shows that these typically occur together and are virtually the same as immersion or flow. For example, flow / immersion has been described as:

> "Concentration on the navigation experience is so intense that there is little attention left to consider anything else, and consequently, other events occurring in the consumer's surrounding physical environment lose significance. Self-consciousness disappears, the consumer's sense of time becomes distorted" (Novak et al., 2000).

Meanwhile, temporal dissociation and focused immersion of cognitive absorption have been described as virtually the same: "This is characterized by the individual being engulfed with a sense of intense concentration, a feeling of being in total control of what he/she is doing, a loss of consciousness and an experience of time loss" (Saade & Bahli, 2005, p. 318).

Immersion, a concept that is prevalent in gaming literature, is often used synonymously with flow and builds on Flow Theory though typically in an atheoretical and inconsistent manner (Cheng & Cairns, 2005; Ermi & Mäyrä, 2005; Sweetser & Wyeth, 2005; Witmer & Singer, 1998). *Immersion* is the highest level of involvement reached when a player focuses complete attention on a stream of stimuli and is thereby enveloped by the experience. Immersion has been equated with *flow* (Ermi & Mäyrä, 2005; Wild et al., 1995; Witmer & Singer, 1998), *presence* (Ermi & Mäyrä, 2005), and *total absorption* (Saade & Bahli, 2005). Consistent with flow theory, immersion is accomplished after successive stages of attention or engagement. Immersion, as the highest level of attention, is used in gaming research to describe the optimal gaming experience (Cheng & Cairns, 2005; Sherry, 2004; Sweetser & Wyeth, 2005). Like flow, immersion requires complete attention from the gamer. When this is achieved, the player reaches a psychologically detached state in which stimuli outside the gaming experience are completely ignored, and the player and the system create an affect-based attachment to a virtual world that seems increasingly real (Chen, 2007; Sherry, 2004; Sweetser & Wyeth, 2005). For these reasons the games literature

explains that the CA concepts of focused immersion and temporal dissociation occur simultaneously.

Flow Theory insists that a person must enjoy his or her experience and be intrinsically motivated to achieve immersion or flow (Webster et al., 1993). In non-hedonic contexts, PE would not necessarily be required to create immersion. For example, immersion could occur in an extrinsically motivated job-performance task. However, in an intrinsically motivated task, such as gaming, PE must be present for immersion to occur. As Sweetser et al. (2005) aptly put it, "if players do not enjoy the game, they will not play the game" (p. 1). Thus, PE must always be present in immersive gaming.

HAM Stage 3: Expectations Confirmation / Disconfirmation Check

In stage 3, HAM explains the process through which hedonic performance perceptions—resulting from one's hedonic intrinsic motivations and expressed in terms of curiosity, control, PE, focused immersion, and temporal dissociation—influence users' affect. *Affect*, also referred to as *core affect*, is a nonreflective, noncognitive feeling that exists inside a person and is measured on a scale of hedonism (pleasure-displeasure) and arousal (sleepy-activated) (Russell, 2003). Affect is object-free and is the most primitive component of all emotions (Russell, 2003). Once again, the literature shows that positive affect has great potential to influence user behavior. The goal of hedonic system design is to induce positive affect. In turn, affect can influence the user's behavior (Forgas, 1995)—disclosure (White, 2004), purchase intentions (Fiore et al., 2005; Oliver, 1977; Oliver, 1981; Spreng et al., 1996), IT evaluation (Zhang & Li, 2004; Zhang & Li, 2007), adoption (Zhang et al., 2006), continued use (Hsu et al., 2004), and trust (Dunn & Schweitzer, 2005).

HAM utilizes the Expectation Disconfirmation Theory (EDT) to explain and predict how affect is manipulated during an interaction with a hedonic system. In recap, EDT posits that

whenever perceived performance exceeds expectations during a experiment, a *positive disconfirmation* occurs and satisfaction results; *negative disconfirmation* occurs when performance is below expectations (Spreng et al., 1996).

Because EDT is based on an affective outcome—satisfaction—it is easily adaptable to affect, which we later explain in further detail. EDT is an appropriate model for studying changes in affect in hedonic systems because affective judgments regarding hedonic systems are generally process-oriented rather than outcome-oriented. Process-oriented affective judgments refer to a change in a person's affect experienced while using a system (Liao et al., 2007; McKinney et al., 2002). Outcome-oriented affective judgments refer to a change in a person's affect resulting from achieving a goal through a system (Briggs et al., 2006). Research suggests that affective evaluations in hedonic systems are based on the process rather than utilitarian outcomes (van der Heijden, 2004)(Authors, 2008). Since research supports the validity of EDT in process-oriented settings (Liao et al., 2007; McKinney et al., 2002), EDT is appropriate to use in our study's hedonic contexts.

Substantial empirical support has validated EDT in IS research (Au et al., 2008; Liao et al., 2007; McKinney et al., 2002; Staples et al., 2002). Many IS studies have extended EDT to include new constructs, such as perceived ease of use, equity theory, needs theory, and perceived playfulness (Au et al., 2008; Bhattacherjee, 2001; Lin et al., 2005; McKinney et al., 2002). We acknowledge that these may be valid antecedents of satisfaction, but for parsimony we focus on how the fundamental constructs of EDT relate to affect. In addition, many of these constructs, such as desires, have been simplified as expectations in other IS studies (Liao et al., 2007; McKinney et al., 2002).

Other studies have questioned the applicability of EDT in utilitarian IS contexts. Brown et al. (2008) found that disconfirmation alone does not have a significant effect on satisfaction, but rather that experience (or perceived performance) alone accounts for changes in satisfaction.

This finding does not lessen the validity of EDT in a hedonic context because EDT accounts for both the disconfirmation and experience-only perspectives of satisfaction formation; EDT posits that in addition to the disconfirmation effect, perceived performance has a direct and independent influence on satisfaction (Spreng & Chiou, 2002). Furthermore, the disconfirmation effect will likely have a larger effect in hedonic systems, which are process-oriented and governed by intrinsic motivation. Briggs et al. (2008) explained that the disconfirmation model does not provide a comprehensive explanation of how satisfaction is created and proposed a new model—the Yield Shift Theory (YST). While YST does provide a more comprehensive model of satisfaction formation in a utilitarian context, EDT is more appropriate in a hedonic context because hedonic judgments are governed more by affect and less by goal utility, goal likelihood, and goal composition.

Therefore, HAM adapts EDT by substituting affect for satisfaction. Satisfaction is one of many possible emotions that result from an alteration in core affect (Russell, 2003). Thus, it is reasonable to believe that a change in core affect mediates the relationship between disconfirmation and satisfaction. Previous research demonstrates that in EDT, affect can be used in place of satisfaction: Battacherjee (2001) described expectations and disconfirmation as affective in nature, Oliver (1977) posited that expectations and disconfirmation change overall affect, and Spreng and Chiou (2002) proposed that satisfaction is a key form of affect.

We reference Russell's (2003) prototypical process of an emotional episode as further evidence that affect can be substituted for satisfaction in EDT. Russell's prototypical process of an emotional episode explains the process through which emotions develop. The emotional episode process consists of 10 steps, starting with an antecedent event and ending with emotion regulation. According to the process, core affect, combined with behavioral planning and information processing, account for all emotional episodes such as satisfaction (Russell, 2003). In step 3 of the emotional episode process, core affect is altered as a result of the antecedent event.

Satisfaction occurs in step 9 when the individual experiences an emotion. Therefore, Russell's prototypical process provides support that affect is an antecedent of satisfaction; if satisfaction was formed, affect was altered (Zhang & Li, 2004). In the context of EDT, if satisfaction results from a process, it was the result of an alteration of core affect.

Our substitution of affect for satisfaction in EDT means that a positive disconfirmation should result in greater positive affect. Conversely, a negative disconfirmation should lead to less positive affect. HAM posits that if hedonic performance perceptions—in terms of curiosity, enjoyment, and immersion—exceed a user's expectations of the system experience, a positive disconfirmation will occur and positive affect will result.

P5. Hedonic performance positively impacts positive experience disconfirmation (a) and negatively impacts negative experience disconfirmation (b).
P6. Hedonic performance positively impacts positive affect (a) and negatively impacts negative affect (b).
P7. Positive experience disconfirmation positively impacts positive affect (a) and negatively impacts negative affect (b).

Based on our propositions, Figure 6 depicts the final proposed hedonic affect model (HAM).

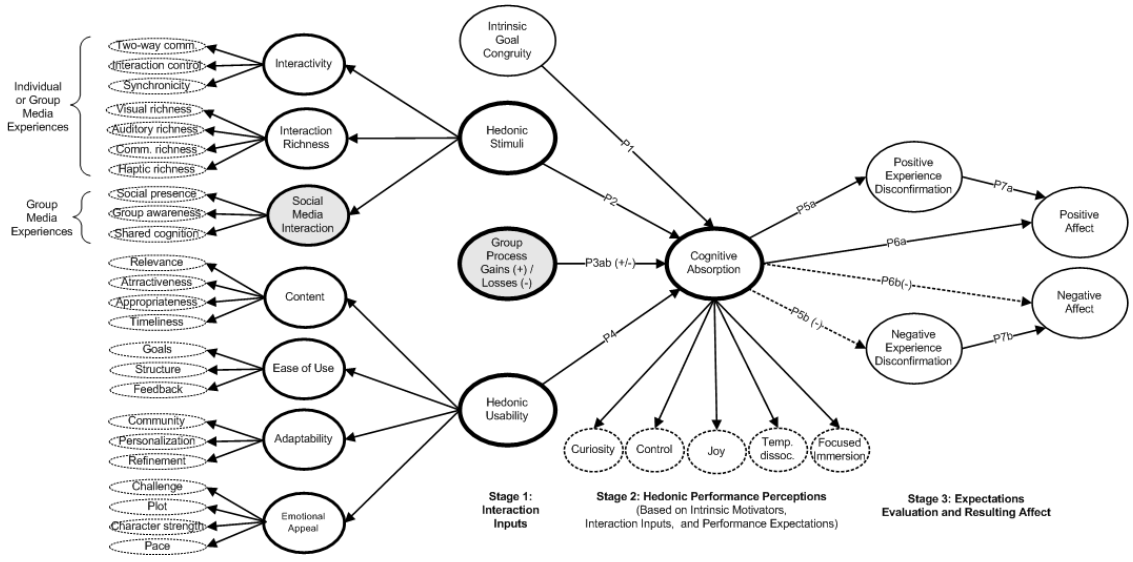

Figure 6. Proposed Hedonic Affect Model (HAM)

DISCUSSION

This paper proposes a new theoretical model, the Hedonic Affect Model (HAM), which leverages leading theories from gaming, expectation disconfirmation theory, cognitive absorption, flow, and affect to focus solely on what causes negative and positive affect in hedonic situations. HAM is designed to be more generalizable and encompassing than previous models for hedonic systems such as online games, virtual worlds, and social networking sites. HAM includes individual and group hedonic experiences, which allows it to generalize to all hedonic system contexts, whether they be individual online gaming, clans working together in virtual worlds, or socialization in a social networking system.

Contributions to Practice

Past IS and marketing research concerning EDT have posited that perceived performance influences affect or satisfaction. HAM builds on the EDT literature by extending CA to measure perceived performance, based on one's intrinsic motivations, in a hedonic system context. Thus, practitioners may measure CA to design systems that create a positive disconfirmation and promote positive affect. This measure of perceived performance is generalizable across all hedonic system contexts because CA is not attribute-specific; CA measures the composite effect of all system attributes on perceived performance. Likewise, expectations for specific hedonic system interactions would likely be user- and context-specific, and could be defined and measured in terms of the interaction inputs in HAM.

To capture and hold a user's attention, a constant stream of interesting stimuli must flow to the user (Witmer & Singer, 1998). An increase in relevant hedonic stimuli will positively impact one's perception of a hedonic experience. HAM is beneficial to practitioners because it provides a comprehensive list of individual and group interaction inputs that are likely to attract a user's attention and impact a user's perception of the hedonic system performance. System designers can consider these interaction inputs (intrinsic goal congruity, hedonic stimuli, group

process gains and losses, and hedonic usability) to capture a user's attention and create an immersive experience.

HAM also has practical implications for improving group hedonic-system design. HAM suggests that both social media interaction and group process gains/losses influence a user's perception of hedonic system performance. Furthermore, HAM decomposes social media interaction into three useful constructs that can be manipulated through software design—social presence, group awareness, and shared cognition. We believe that the success of hedonic systems like Skype, Nintendo Wii, and Facebook can be partially explained in terms of HAM—specifically the group-related constructs. Skype provides advanced group awareness through video chat. The Wii provides advanced social presence due to constant movement of players. Facebook provides shared cognition by providing regular updates and virtually endless links between friends. System designers should carefully consider these factors when designing group hedonic systems to create an immersive experience.

HAM suggests that by manipulating factors of interaction in hedonic systems, practitioners may positively disconfirm a user's expectations and promote a positive affective response. Positive affect, in turn, has been shown to influence human behavior (e.g., build trust, promote technology adoption, strengthen loyalty, increase purchase intentions, etc.). Therefore, if hedonic systems are properly designed and positive affect results, companies may take advantage of the increase in positive affect to create a commercial advantage. Conversely, HAM may also help practitioners account for and understand negative affect that may hinder retention and decrease enjoyment. HAM suggests interaction inputs that can be incorporated into system design to promote CA, which can also create a competitive advantage. In a systems-commodity market, users will use the system that catches their attention, arouses their curiosity, satisfies their intrinsic motives, and immerses them in the experience. Applying the principles discussed in this paper to systems design will help distinguish between competing systems.

Contributions to Theory

HAM is the first theoretical model to extend EDT to identify and theoretically explain perceived performance and positive affect in hedonic system usage. Whereas previous studies have concentrated on attribute-specific performance such as visual appeal (Cyr et al., 2006), HAM takes a broader view by identifying the high-level characteristics of hedonic system attributes that lead to positive affect. This high-level view considers both individual- and group-level variables, making HAM the most generalizable and comprehensive model of hedonic system adoption to date.

HAM is the first theoretical model to extend well-developed concepts from collaboration research—social presence, group awareness, shared cognition, and group process gains and losses—to hedonic system usage. This extension is particularly valuable in understanding the success of networked games and other group-related hedonic systems (e.g., social networks, virtual worlds, and blogs) that rely on positive group experiences.

HAM also provides theoretical support that EDT may be used to predict changes in affect in addition to satisfaction. Extending EDT to predict affect provides a theoretical connection between the EDT constructs of perceived performance and disconfirmation and important outcomes not directly related to the experience such as trust, disclosure, loyalty, and purchase intentions. In this way the EDT paradigm can be used to predict more than adoption alone.

Furthermore, HAM contributes to EDT-based IT adoption research by proposing predictors of perceived performance in intrinsically motivated, hedonic contexts. These predictors are most applicable to systems where positive affect is the main purpose for use, but some also have strong potential for a more extrinsically motivated context.

HAM clarifies and consolidates theories of Flow, Immersion, and Cognitive Absorption which have often been used interchangeably, but have disparate meanings. HAM shows how attention is the underlying construct of interest in each of these theories. HAM also clarifies the

role of intrinsic and extrinsic motivation in capturing attention, fulfilling expectations, and providing perceived performance in hedonic systems.

Limitations and Future Research

Future research should be conducted to empirically validate HAM. The entire model could be tested at once incorporating all interaction inputs; or several experiments could be performed, each testing a subset of interaction inputs. For example, if four experiments were performed, Study 1 could test the influence of hedonic stimuli on perceived performance (in terms of immersion, enjoyment, and curiosity) while holding the other interaction inputs constant across treatment groups; Study 2 could test the effect of group process gains and losses on perceived performance (in terms of immersion, enjoyment, and curiosity) while holding the other three interaction inputs constant; and so forth. One limitation of testing HAM in this way is the difficulty of testing whether interactions exist between the interaction input elements. Conversely, it may not be feasible to test the whole model at once due to the number of treatments and the required number of participants for the treatments.

Future research can also determine what individual and contextual characteristics moderate the relationships in HAM. For instance, recent research has shown that individual characteristics such as playfulness (Ahn et al., 2007), social computing expertise (Fun & Wagner, 2008), and hedonic beliefs (Premkumar et al., 2008) influence system evaluations. Other areas of interest include how computer anxiety or prior affective state moderate the input effects of HAM, or exploration as to whether some group characteristics are more amenable to intrinsic goal congruity.

HAM is based on EDT to explain how positive affect is promoted during an interaction with a hedonic system and provides justification for the use of EDT in a hedonic context. However, HAM does not posit that EDT accounts for all satisfaction evaluations or all changes in

core affect. Future research should consider whether other satisfaction-related theories may be applied to a hedonic system context. For example, a valuable area of future research would be to test if the Yield Shift Theory (Briggs et al., 2008) could be applied to a hedonic system context to explain and predict affective evaluations. Such research would add to the knowledge base of hedonic system evaluations and provide additional tools to hedonic system designers.

Over time HAM could be extended to utilitarian systems. Hedonic mechanisms are often better able to capture more focused attention than utilitarian mechanisms, and intrinsic motivations tend to be stronger than extrinsic motivations. Future research could examine whether hedonic mechanisms can be leveraged effectively in contexts traditionally considered to be non-hedonic. For example, could an increased fulfillment of underlying intrinsic motivation result in increased attention and positive affect that would improve productivity, quality of interpersonal relationships, or outcome quality in a traditional utilitarian system? It would be interesting to see how systems currently primarily motivated by extrinsic factors could be redesigned in such a way as to appeal to intrinsic desires. If affect were to become a focus of utilitarian system design, a whole new area of research would open up. Such research would have the potential to change what we generally think of as traditional “office work.”

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APPENDIX 1: SUMMARY OF KEY HEDONIC LITERATURE

Literature summary of interaction inputs that should most strongly impact hedonic performance:

Article	Summary	Application to HAM
(Ahn et al., 2007)	Finds that **playfulness** influences use of online retailing Web sites. The article also finds that Web site quality, information, and service quality have a significant impact on perceived ease of use, playfulness, and usefulness.	HAM does not incorporate playfulness into the model because playfulness is a characteristic of a user and not a property of an experience. Characteristics and beliefs of users are difficult to manipulate and therefore have limited practical significance. The scope of HAM is to identify the interaction inputs that influence the user's experience. Thus, HAM does account for web quality, information, and service quality through the hedonic usability input.
(Agarwal & Karahanna, 2000)	Introduces a multi-dimensional construct labeled **cognitive absorption**. The article finds that cognitive absorption influences PEOU and PU in TAM.	HAM applies the concept of cognitive absorption to explain levels of perceived performance in hedonic systems use. Adding to cognitive absorption theory, HAM explains how cognitive absorption may lead to changes in affect, and HAM indentifies interaction inputs that are likely to promote cognitive absorption.
(Chen & Yen, 2004)	Suggests that **interactivity** is a valuable way of improving the **communication quality** of business Web sites.	Although Chen et al.'s study concerns interactivity and communication quality in utilitarian websites, HAM also includes interactivity and group interaction inputs as important predictors of hedonic system performance perceptions. In addition, HAM extends theory on cognitive absorption, flow, and EDT to explain how interactivity inputs influence performance perceptions and resulting changes in affect.
(Dickinger et al., 2008)	Explains the role **of perceived enjoyment** and **social norms** in the adoption of technology with network entities.	HAM builds on theories of cognitive absorption and flow to include perceived enjoyment as a performance level of hedonic system experiences. HAM also builds on IS collaboration literature to add social and group interaction inputs as predictors of perceived performance. To build on this research, HAM explains how perceived performance leads to higher levels of attention and results in affective changes.
(Fetscherin & Lattemann, 2008)	Extends TAM to predict virtual world acceptance. The results suggest that **communication**, **collaboration**, and **cooperation** play a pivotal role in means of influencing user intention to use and acceptance of Virtual Worlds. The article suggests that 'community' factors play a role in virtual acceptance studies. Lastly, the article suggests that PEOU	HAM builds upon this literature by explaining and predicting how characteristics of systems lead to performance evaluations and eventually a change in affect. HAM incorporates the idea of PEOU though the hedonic usability construct. In addition, HAM captures the community, collaboration, and cooperation ideas through the important addition of social media interaction and group process gains / losses. HAM does not include social norms, personal attitude toward experience, or anxiety in the model because these

	predicts virtual world acceptance.	constructs are not interaction inputs that can be manipulated by software design.
(Fun & Wagner, 2008)	Examines the use of weblogs as a social networking device. The article identifies technology features of weblogs and needs of web bloggers. The findings support that **social computing expertise** and **acceptance** can capture the **attention** of customers.	HAM agrees that social and group computing factors influence the hedonic experience. Therefore, HAM added social media interaction and group process gains / losses to the model. HAM does not incorporate specific software attributes (e.g., emotes, font color options, etc.) because HAM is designed to be generalizable across all hedonic experiences. Although, HAM does include properties of software (e.g., social presence, shared cognition, etc.) that can be manipulated through software features. HAM further explains how these properties lead to performance expectations and changes in the users' affect.
(Hassanein & Head, 2006)	Posits that **social presence** influences an individual's attitude to purchase.	HAM agrees that social presence may influence performance perceptions and therefore adds social presence as an important interaction input that influences performance perceptions of hedonic systems. HAM adds other interaction inputs to create a more comprehensive model as well as explains how these influence performance perceptions and the user's affective state.
(Holsapple & Wu, 2007)	Posits that imaginable response (role projection, fantasy, escapism) and emotional responses (**involvement**, **arousal**, and **enjoyment**) predict acceptance of virtual worlds.	HAM expands on Holsapple et al.'s study to create a more generalizable and comprehensive model with a stronger theory base. HAM builds on concepts of this article by using involvement, arousal (curiosity), and enjoyment as responses to hedonic systems. In addition, HAM adds immersion as a response to hedonic systems in line with cognitive absorption. HAM does not include imaginable response because not all hedonic system experiences require an imaginable response (social networks) and we believe this construct can be capture in immersion if applicable to the situation. In addition HAM adds interaction inputs to the model that are likely to influence perceived performance.
(Huang, 2005)	Creates a web performance scale in terms of **hedonic performance** (Pleasant–unpleasant, Enjoyable–unenjoyable, Interesting–boring, Fun–frustrating, Entertaining–weary, Nice, Agreeable–disagreeable, Soothing–aggravating) and utilitarian performance.	HAM integrates most of the concepts discussed in this paper through the affect outcome portion of the model (pleasant, enjoyable, fun, soothing, and agreeable). In addition, the performance levels of HAM account for the remaining factors and some of the affective factors (entertaining, fun, interesting, and enjoyable) HAM extends this line of research by adding interaction inputs that influence performance perceptions.
(Palmer, 2002)	Reports on a series of studies that develop and validate Web site usability, design and performance metrics, which include the following concepts: **download delay, navigability, site content,**	HAM includes navigability, content, responsiveness, interactivity, and download delay (renamed as "system efficiency") as key interaction inputs to hedonic system performance perceptions. HAM further explains the levels of performance in hedonic systems and how these

	interactivity, and responsiveness.	levels lead to changes in affect.
(Premkumar et al., 2008)	Found the following five significant variables that influence IM use: **utilitarian beliefs, hedonic beliefs, subjective norms, critical mass, and ease of use**.	HAM extends this study to all hedonic contexts. HAM builds on cognitive absorption and flow theory to explain how interaction inputs of this study lead to performance perceptions and changes in affect. HAM does not include the personal attributes (beliefs) as a component of the model because these attributes are difficult to manipulate and therefore have limited applicability to hedonic systems design.
(Saade & Bahli, 2005)	Provides support that **cognitive absorption** is an appropriate predictor of online learning system use and that cognitive absorption influences TAM variables.	HAM applies cognitive absorption to a purely hedonic context.
(Shang et al., 2005)	Posits that **intrinsic motivation** plays an important role in online shopping behavior. The article suggests cognitive absorption as an important motivation to shop online.	HAM builds on this research and extends the concepts of flow and cognitive absorption to all hedonic system contexts. In addition, HAM indentifies the interaction inputs that promote cognitive absorption and explains how cognitive absorption leads to a change in affect and influences behavior.
(van der Heijden, 2004)	States that **hedonic system use** is intrinsically motivated; and thus, PEOU and perceived enjoyment play a more important role in hedonic system acceptance than PU.	HAM expands on the idea that hedonic system use is intrinsically motivated. HAM explains how attributes of PEOU (represented as hedonic usability inputs) influence performance. As represented by HAM, perceived enjoyment is both a goal and outcome of hedonic systems. HAM is more comprehensive than this study and is more generalizable to all hedonic contexts (group and individual). Lastly, HAM adds EDT to explain how affect is manipulated.
(Wakefield & Whitten, 2006)	Finds that **cognitive absorption** and user **playfulness** significantly impact beliefs and that the hedonic or utilitarian orientation of the technology has implications for maximizing use.	HAM expands on cognitive absorption by indentifying inputs that promote cognitive absorption and explaining how cognitive absorption leads to changes in affect. HAM does not include playfulness in the model, as playfulness is a user characteristic that is difficult to manipulate.

APPENDIX 2. OVERVIEW OF MAJOR HEDONIC SYSTEMS

System	Examples	Possible Intrinsic Motivations	Possible Extrinsic Motivations
Stand-alone gaming	• Single player games for Xbox, PlayStation, Wii, etc. • Online games (miniclip.com)	• Challenge (Vorderer et al., 2003) • Achievement/Satisfaction (Yee, 2006) • Discovery (Yee, 2006) • Escapism/Relaxation (Yee, 2006) • Enjoyment (Hsu & Lu, 2004) • Flow (Hsu & Lu, 2004)	• Gaming competitions with reward
Group gaming	• Group games for Xbox, PlayStation, Wii, etc. (e.g. Mario Cart, Halo, Guitar Hero etc.) • Online networked games (e.g., World of Warcraft) • Massive multi-player online games (MMOG) • Massive Multiplayer Online Role-Playing Game (MMRPG)	• All Stand-alone gaming intrinsic motivations • Social competition (Vorderer et al., 2003) • Socialization (Yee, 2006) • Relationship/Friendship (Yee, 2006) • Teamwork (Yee, 2006)	• Gaming competitions with reward • Sell virtual products (e.g., clothes, characters) • Advertising
Texting	• Cell phones	• Social connectedness (Ran & Lo, 2006) • Socialization/friendship (Oksman & Turtiainen, 2004; Ran & Lo, 2006) • Gratification (Ran & Lo, 2006) • Strengthen relationships (Oksman & Turtiainen, 2004; Ran & Lo, 2006) • Self-expression (Oksman & Turtiainen, 2004) • Enjoyment • Romance (Lin & Tong, 2007)	• Business correspondence • Reminders • Advertisements
Virtual worlds	• Kaneva • Second Life • The Sims Online	• Enjoyment (Wu et al., 2008) • Accomplishment (through creating objects in the virtual world and exploration) (Barnes, 2007) • Self-Expression (Barnes, 2007) • Friendship (Barnes, 2007; Overby, 2008) • Socialization (Barnes, 2007; Tutt, 2008) • Romance (Barnes, 2007)	• Advertising (Barnes, 2007) • Business collaboration (Rutkowski et al., 2002) • Increase group work productiveness (Brown et al., 2006) • Formal learning / instruction • Formal therapy (Gorini & Riva, 2008)

		• Escapism • Relaxation (Gorini & Riva, 2008)	• E-commerce (Wu et al., 2008) • Sell virtual products (e.g., clothes, characters) • Tourism
Dating sites	• eHarmony.com • match.com	• Friendship • Socialization • Romance	
Music sites	• iTunes store • rhapsody.com • napster.com	• Relaxation (Molteni & Ordanini, 2003) • Enjoyment (Chu & Lu, 2007) • Escapism	• Motivated music search for utilitarian purposes (presentations, disk jockey, etc.)
Video sites	• Youtube.com • video.aol.com	• Enjoyment (Kim et al., 2007) • Curiosity (Kim et al., 2007) • Interest (Kim et al., 2007) • Entertainment (Trammell et al., 2006) • Achievement/Creative self-expression	• Build Reputation / Branding • Getting support materials for presentations
Fantasy sports applications/ Sports sites	• cbssports.com • espn.com	• Competition • Information motivation (Joines et al., 2003) • Friendship • Relaxation • Enjoyment • Gambling for “fun”	• Professional gambling
Instant Messaging	• Google chat • MSN messenger • Skype	• Socialization/Friendship (Premkumar et al., 2008) • Enjoyment/recreation (Li et al., 2005; Premkumar et al., 2008)	• Professional communication
Social networking / blogging	• Facebook.com • MySpace.com • BlogSpot.com • Twitter.com	• Enjoyment (Wasko & Faraj, 2000) • Socialization/friendship (Butler et al., 2002; Ridings & Gefen, 2004) • Desire for Information (Butler et al., 2002) • Attention/Visibility (Butler et al., 2002) • Passing Time (Trammell et al., 2006) • Satisfaction (Wang & Fesenmaier, 2003) • Achievement/Creative self-expression • Documentation of life / virtual journal (Nardi et al., 2004)	• Monetary compensation • Seeking/Providing advice • Professional Advancement • Networking for marketing • Multi-level marketing

Political blogging	• politicalticker.blogs.cnn.com/	• Self Expression/Express own opinion and comments (Nardi et al., 2004) • Need to express deeply felt emotions (Nardi et al., 2004) • Develop sense of community/belonging	• Campaigning / politicking • Professional lobbying
Voice communication sites	• Skype	• Enjoyment (Lin et al., 2008) • Friendship • Socialization (Lin et al., 2008)	• Business communication
Learning/Informational sites	• www.nasa.gov • Wikipedia.com • beauty/fashion • www.disney.com • genealogy research sites • news sites • news feeds	• Desire to get information (Joines et al., 2003) • Social escapism motivation (Joines et al., 2003) • Relaxation	• Intentional disinformation against competitors • Research • Promotion of one's research • Promotion of one's company
Exploration applications	• Google Earth • Google Maps/Street	• Enjoyment • Escapism • Information motivation	• Destination finding

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