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Motivational Affordances: Reasons for ICT Design and Use

ORGANIZATIONS HOPING TO IMPROVE EMPLOYEE productivity, increase strategic advantages, and gain or hold the competitive edge have invested heavily in information and communication technology (ICT). Similarly, ICT development firms and other stakeholders have struggled to attract potential consumers, increase consumer loyalty, and stimulate continued ICT use. Yet despite such heavy investment and keen interest, our understanding of what contributes to ICT acceptance and use is still limited. The limits are largely owing to the theoretical perspectives researchers have chosen to study the phenomenon.

One important but under-utilized theoretical perspective is motivation of human behavior. Motivation studies attempt to answer two basic questions: what causes behavior, and why does behavior vary in its intensity.[5] A motivation theory explains the processes that give behavior its energy and direction. Energy implies that behavior has strength (strong, intense, or persistent).

Direction implies that behavior has purpose (aimed or guided toward achieving some particular goal or avoiding some particular situations).

A motivational approach to ICT study can address questions such as "Why do people initiate, continue, stop, or avoid using ICT?" "Why do ICT use behaviors vary in intensity?" This approach thus can provide an understanding of ICT use behaviors and feed this understanding back into ICT design. Until now, few studies have taken a comprehensive view of human motivation to study behaviors toward ICT. Thus only a subset of questions has been addressed in the literature, leaving out other interesting and related questions such as "How much use (intensity)?" and "Why not use (direction)?"

ICT can and should have *motivational affordances*. The term affordance refers to the actionable properties between an object and an actor.[2, 3] When perceived, affordance allows actors to take actions that may satisfy certain needs. *Motivational affordances* comprise the properties of an object that determine whether and how it can support one's motivational needs. When using ICT involves our motivational needs, we feel interested (thus attend and engage). When using ICT satisfies our motivational needs, we feel enjoyment (thus want more). The ultimate goal of designing an ICT for human use is to achieve high motivational affordance so that users would be attracted to it, really want to use it, and cannot live without it. This article proposes a set of 10 design principles (high-level and context-free design goals)[6] to guide ICT design with high motivational affordances.

Motivation Sources
Motivation has two clusters of sources: internal motives (needs, cognitions, and emotions) and external events (environmental incentives). Needs are conditions within the individual that are essential and necessary for the maintenance of life and for the nurturance of growth and well-being. There are three types of needs: physiological,

psychological, and social needs. Physiological needs are inherent within the workings of biological systems. Psychological needs arise from the self's requirement and desire to seek out interactions with the environment to promote psychological vitality, well-being, and growth. A social need is an acquired psychological process that grows out of one's socialization history that activates emotional responses to a need-relevant incentive. Cognitions refer to mental events, such as beliefs and expectations. Emotions orchestrate how we react adaptively to the important events in our lives.

Most relevant to ICT use are psychological, social, cognitive, and emotional sources of motivation. Our design principles are based on these sources, although we do acknowledge the importance of studying physiological and external sources, which are outside the scope of this article. Table 1 summarizes the 10 principles and some existing design examples that show limited applications of the principles.

Afford Autonomy and the Self (P1 & P2)

Autonomy is the psychological need to experience choice in the initiation and regulation of behavior. Autonomy-supportive social contexts tend to facilitate self-determined motivation, healthy development, and optimal functioning.[1] Other positive outcomes from an autonomy-supporting style include developmental gains (greater perceived competence, higher self-esteem, and enhanced sense of self-worth), engagement gains (greater engagement, positive emotional tone, stronger perceptions of control, preference for optimal challenges, pleasure from optimal challenges), performance gains (improved performance, higher achievement), high quality learning (greater flexibility in thinking, enhanced conceptual learning, more active information processing, and greater creativity), and optimal functioning (maintenance of behavioral change, long-term retention).[5]

The province of the self is to pursue the quality of one's psychological well-being. Motivational analysis of the self has three aspects: defining or creating the self, relating the self to society, and discovering and developing personal potentials.[5] Here we focus on defining

and creating the self, specifically self identity. ICT, just as many other objects in one's environment (e.g., home, office, possessions), should support one's need for defining and representing the self. Identities function in a social context. Thus identities normally contain information about the particular individual, the immediate group, the social context, and the cultural context that the individual belongs to.

With such principles in mind, ICT should be designed to allow users to decide how they want to express themselves and how they want to do things in distinctive ways. Early examples showing limited application of these principles include desktop skins, cell phone ring tones, online avatars, and application toolbar customizations. Many other aspects can be designed to fully utilize these principles to increase the motivational affordances of ICT.

Afford Competence and Achievement (P3 & P4)

Everyone wants and strives to become competent. Competence provides an inherent source of motivation for seeking out and putting forth the effort necessary to master optimal challenges that are developmentally appropriate.[1, 5] When we engage in a task with a level of difficulty and complexity that is precisely right for our current skills, we feel the strongest interest and the greatest involvement of the need for

competence. One key condition that involves competence need is optimal challenge, and one key condition that satisfies our competence need is positive feedback.[5]

Optimal challenge, represented by a level of difficulty and complexity, is related to goals one may set or be assigned. Each person may have different levels of skills, thus would require different levels of challenges. For an ICT to support all possible targeted users, identifying and setting different challenge levels are central to design.

Achievement is one's desire to do well relative to a standard of excellence that encompasses competitions with a task, competitions with the self, and competitions against others. Standards of excellence offer people two-edged swords: sometimes they excite us and we react with approach emotions and behaviors; other times, they create anxiety and we react with avoidance emotions and behaviors.[5] Individuals need to perceive or evaluate their performance toward goals. Feedback provides support for this evaluation. "Timely" responses are essential so that the "flow" of cognition and action does not break. "Positive" means to focus on the informational aspect of feedback (how far it is from achieving the goal) rather than on criticism of behaviors. The combination of goals/challenge and feedback produces an emotionally meaningful mixture: goal attainment engenders

Table 1. Summary of design principles for motivational affordance		
Motivational Sources and Needs	**Design Principles**	**Some Existing Design Examples**
Psychological: Autonomy and the Self	Principle 1. Support autonomy. Principle 2. Promote creation and representation of self-identity.	Desktop skins, cell phone ring tones, online avatars, application toolbar customization.
Cognitive: Competence and Achievement	Principle 3. Design for optimal challenge. Principle 4. Provide timely and positive feedback.	Games and learning systems with various challenge levels and immediate performance feedback.
Social & Psychological: Relatedness	Principle 5. Facilitate human-human interaction. Principle 6. Represent human social bond.	Group based games (e.g. online Bridge) with a chat section, visualizations of email exchanges over a period of time to show both tasks and social related messages.
Social & Psychological: Leadership and Followership	Principle 7. Facilitate one's desire to influence others. Principle 8. Facilitate one's desire to be influenced by others.	Blogs (satisfy one's desire to influence by authoring, and to be influenced by reading), virtual communities where leaders sometimes emerge.
Emotional: Affect and Emotion	Principle 9. Induce intended emotions via initial exposure to ICT. Principle 10. Induce intended emotions via intensive interaction with ICT.	Slick/attractive look of iPod or cell phones, engaging games, ICT that induce optimal flow experience.

emotional satisfaction, while failure to reach one's goals breeds emotional dissatisfaction.

Afford Relatedness (P5 & P6)

Relatedness is a psychological need indicating the innate desire to belong. Interaction with others is the primary condition that involves relatedness; perception of a social bond then satisfies the relatedness need.[5] Providing human-human interaction mechanisms via ICT (computer mediated human-human interaction) thus provides a condition for people to feel they are related; and providing ways of displaying the social bond (for example, the extent, the intensity, and the nature of the bond) is to show interaction results, thus confirming one's feeling of being related and satisfying this need.

Afford Leadership and Followership (P7 & P8)

Power is a learned social need. Its essence is a desire to make the physical and social world conform to one's personal image or plan for it. A person's need for power can be determined by personality ("born with it") and social situations ("social role or identity"). People high in the need for power desire to have impact, control or influence over another person, group or the world at large. High-need-for-power individuals seek to become (and stay) leaders. Leadership thus is a condition that involves and satisfies the need for power. Very often, even those who have a strong need for power experience the desire to follow. We seek, admire, and respect those who lead us by providing us certain emotional feelings. ICT design should realize both leadership and followership needs to achieve high motivational affordance.

Afford Affect and Emotion (P9 & P10)

Affect is a general word for mood, emotion, and feeling. Emotions are induced affective states that typically arise as reactions to important stimuli in one's environment. Emotion relates to motivation in two ways. First, emotions are one type of motives that energize and direct behaviors. Second, emotions serve as an ongoing "readout" system to indicate how well or poorly personal adaptation is going. [5]

Modern affect theories propose that human beings have two synchronous systems that activate and regulate emotions. The primitive biological system has the evolution root of human beings and is an innate, spontaneous, physiological system that reacts involuntarily to emotional stimuli. The contemporary cognitive system is an experience-based system that reacts interpretatively and socially. The two systems influence each other and combined they provide a highly adaptive emotion mechanism.[4] The key for applying emotional studies to ICT design is thus two-fold: induce intended emotions via the biological system that is invoked by initial exposure to ICT, and induce intended emotions via the cognitive system that is based on intensive cognitive activities.

Recent studies validate the importance of affect and emotion in ICT design and use.[4, 7] Sometimes, negative emotions may be desirable. For example, anxiety (negative) can be motivational in achieving certain goals (e.g. learning), and thus can be an intented emotion in ICT design.

Conclusion

The overarching goal of these design principles is to ensure that ICT can support people's motivational needs. Yet ICT designs are dependent on users, tasks, and use contexts.[6] Furthermore, certain design principles can support conflicting goals.[6] This means that the same design principles may not serve all ICT design goals the same way, and not all principles are of equal interest in designing a particular ICT.

A motivational perspective to ICT design and use can be very promising in providing theoretical guidance to ICT design.[8] A motivational perspective may function as a framework to unite various ICT design approaches (such as cognitive or usability centric approaches, or affective and emotional designs) to represent a holistic picture of issues in ICT design and use. C

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