Evaluating Hedonic and Eudaimonic Motives in Human-Computer Interaction

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Abstract. New measures of well-being are drawing the attention of researchers and practitioner in human factors generally and human-computer interaction (HCI) in particular. Following in the footsteps of previous scholarly endeavours in hedonic well-being (HWB), this paper argues for the adoption of eudaimonic well-being (EWB) in explorations of well-being in HCI. To this end, I report on initial findings from research in which I have evaluated the impact of hedonic and eudaimonic motives on gaming experience using a validated instrument developed by psychologists and adapted for use in HCI contexts.

Keywords: Human factors · Human-computer interaction · Interaction design · Quality of life · Well-being · Hedonia · Eudaimonia · Motivation · Theory

1 Introduction

Well-being, or quality of life, is a multifarious term that is often used loosely—without operationalization or theoretical or conceptual backing—within human-computer interaction (HCI) research. The term, however, has a rich and complex history in psychology, where it has been conceptualized, operationalized, and validated within several complementary frameworks. Taking inspiration from this domain, some scholars in HCI and the broader domain of human factors/ergonomics (HF/E) have adopted theory, conceptual frameworks, and measures from psychology to explore how design can and does impact well-being factors. As yet, the greater part of this work has focused on the hedonic, or pleasure-oriented [1], perspective. However, another perspective within the philosophical tradition of well-being as well as more recently established in psychological research needs to be considered: the eudaimonic, or personal growth and realization, perspective [2]. In the first half of this paper, I discuss the nature of this new measure, its history and conceptualization within psychology, and its relevance to HF/E and HCI. In the second half, I present and discuss the results of the use of a validated psychological instrument for evaluating hedonic and eudaimonic motives in an HCI context; these findings are an extension of those reported in [3]. The main contributions are: (a) a theoretically- and empirically-backed rationale on the importance of including a eudaimonic perspective in studies of well-being in HF/E and HCI, and (b) a demonstration of how a psychological tool that assesses hedonia and eudaimonia can be successfully adapted for use by human factors researchers in HCI contexts.

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2 Well-Being in Psychology

In psychology, hedonic and eudaimonic perspectives on well-being have been associated with several theories and measured using different instruments. I discuss the most well-known and often used here; see Huta and Waterman [4] for an in-depth review. Waterman [2] developed a scale of personal expressiveness to distinguish eudaimonia from hedonia, and was successful in this regard. Ryan et al. [5] made parallels between self-determination theory (SDT) and eudaimonia, concluding that living a eudaimonic life involves pursuing intrinsic goals, positive relationships, and competency, while being autonomous and mindful. Ryff and Singer [6] drew from the philosophical roots of eudaimonia to argue for conceptualizing Ryff's psychological well-being scale as a eudaimonic measure. Most recently, Huta and colleagues developed an activity-based, individual-level instrument for measuring hedonic and eudaimonic motives [7]; it is this instrument that I have adopted in my research, as discussed further in this paper.

In response to this diversity of approaches and measures, Huta and Waterman [4] created a framework for understanding the differences and incongruities among these and other applications of hedonic and eudaimonic well-being. In particular, they noted that well-being has been approached as orientational (including values and motives), behavioural (shown through activities), experiential (affective and cognitive states), and functional (based on evaluations and mental health status), leading to different outcomes that are hard to compare or conceptualize across studies. Additionally, different approaches have evaluated either state (in the moment or with a given activity) or trait (typical, underlying patterns) levels, which can make comparisons difficult. They conclude that consciously choosing and stating one's choice of approach using this framework will increase conceptual congruity, illuminate relationships between different measures, and more easily allow for cross-study comparisons. As researchers in HCI, it would behoove us to follow suit when adopting psychological measures of hedonic and eudaimonic well-being in our own research.

3 A Brief History of Well-Being in HF/E and HCI

Researchers in HF/E drew on the philosophical roots and namesake of hedonia in the creation of a new domain of study and model of human factors called "hedonomics." Since then, hedonomics has followed a somewhat tumultuous path: initially broadly conceptualized as affective human factors [8, 9], it was then constrained to maximizing pleasurable experiences through design [10], but subsequently broadened again into an affective design framework [11], and presumably eclipsed by other efforts in affective design over the last decade, perhaps due to conceptual imprecision. Recently, my colleagues and I have proposed a return to adopting psychological measures of well-being in HF/E by revisiting the hedonomics model: revising the model for conceptual congruency with the psychological literature on hedonia, and expanding the model to account for a newly advanced, complementary perspective—eudaimonia—for a robust model of well-being [12]. Eudaimonia, first proposed by Waterman over two decades ago [2], addresses the personal growth side of well-being: personal expressiveness, self-actualization, and realizing one's full potential [1]. However, it has not

received the same amount of attention in psychology as hedonia, and the view that both (if not other) perspectives should be considered jointly in studies of well-being is relatively recent, appearing shortly after the creation of hedonomics [1, 4]. As such, eudaimonia is a new measure in HF/E with great potential to enliven and strengthen research on well-being within our domain.

4 Evaluating Eudaimonia and Hedonia in HCI: A Case Study

For my research, I have adopted the Hedonic and Eudaimonic Motives for Activities (HEMA) scale [7] as a tool to measure the impact of well-being motives on various factors in an HCI context. Here, I discuss how the instrument was adapted, the nature of the particular context of use, and initial statistical results.

4.1 The HEMA Scale

The HEMA scale assesses the subjective effect of hedonic and eudaimonic motives following a particular activity, event, or experience. The scale uses the most common conceptualizations of hedonia and eudaimonia in psychology; see Table 1.

Table 1. A comparison of hedonia and eudaimonia in the HEMA scale

Subscale	Hedonia	Eudaimonia
Operationalizations	Pleasure	Authenticity
	Absence of pain (seeking rather than avoiding)	Excellence
		Growth

The HEMA scale takes an orientation approach to assessing well-being: it assesses the impact of well-being motivation rather than well-being as an outcome. Additionally, unlike other instruments, it presents hedonia and eudaimonia as parallel concepts in the form of subscales that are distinct and can be compared. The revised version of the scale (HEMA-R) allows for state-level (current, activity-based) and trait-level (typical, overarching) evaluations [13]. It has been successfully deployed in several studies, e.g., [14, 15], but as it has not, beyond the case study discussed in this paper, been used in HCI research. Even so, the scale is ideal because the delivery of the scale is flexible, with instructions and items being easily adapted for use in evaluations that involve an HCI context. For instance, we can take "During the [activity], how much were you seeking enjoyment?" and adapt it to read "During the game, how much were you seeking enjoyment?" without losing the original meaning of the item. The recommended response scale is the Likert scale, which is well-known among HCI researchers and well-used in HCI research, thus allowing comparisons among disparate constructs. The full instrument is available for download on Dr. Huta's website.

4.2 Context of Use: Cooperative Puzzle Game

For my research, I am developing a mixed reality gaming platform designed to improve the well-being of older adults who use powered chairs, such as mobility scooters and electric wheelchairs. The platform requires power mobility and the participation of someone who does not use a powered mobility aid. This setup allows me to address the well-being of the older adult group in two ways: internally, through performance mastery, and externally, through empathy training of a non-powered chair user who is a friend, family member, or stranger. In the present paper, I focus on the game prototype stage, which features networked web-based gameplay in the traditional interaction paradigm of desktop computing.

The game is a cooperative puzzle game with a space setting (Fig. 1). The goal of the game is to create a constellation by drawing lines between paired stars. The challenge is that each player can only see their own stars, and thus only has access to paired star information for their own stars. Thus, the gameplay strongly encourages cooperation between players so that they can achieve the common goal of constellation formation by sharing information about their stars.

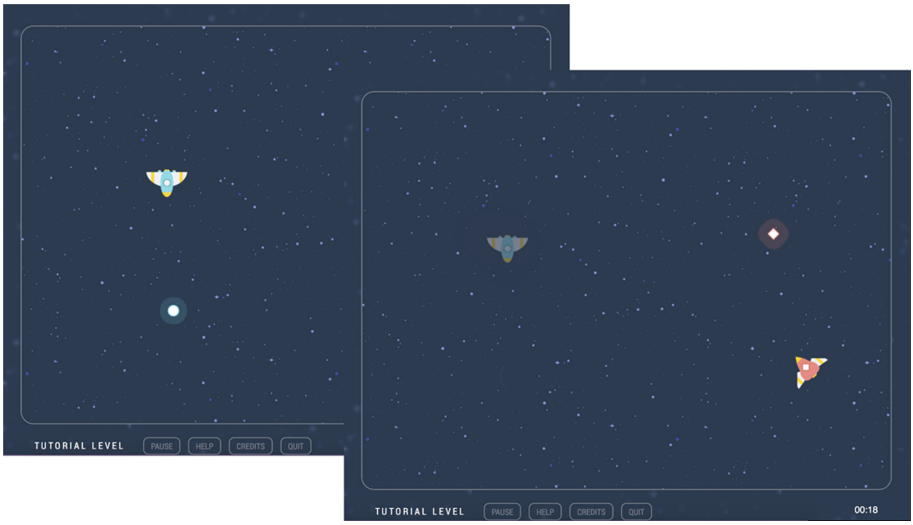

Fig. 1. Shared game board visible to both players in the tutorial level. Players can see the other's position through a ghostly image on their own screens, but cannot see each other's stars. Notice the absence of the blue player's star (right) on the red player's screen (left). (Color figure online)

In the web-based game prototype, two laptop computers are networked through a Node.js- and Socket.io-powered server that passes along information about the game and players in realtime. The game was developed using an HTML5 game engine powered by jQuery, a JavaScript library. In this version, players use the arrow and enter keys on their respective keyboards to control their spaceship avatars. The mixed reality version will feature a shared game board projected in physical space on the floor, over

which players will move in their powered chairs; display of private star information and selection of stars will be facilitated by a tablet attached to each chair.

4.3 Case Study

Methods. As part of the larger usability study on the efficacy of the game prototype, well-being motives were gathered using the HEMA scale and compared to usability items (ease of use, ease of learning, and satisfaction); see [3] for initial results gathered by the halfway point with about half of the participants. The present data set includes nineteen participants in ten pairs comprised of older powered chair users and a friend, family member, or stranger; one participant did not have a partner and instead participated with one of the principal investigators, hence one missing data point. The procedure involved participants completing a pre-questionnaire, playing the game together, and filling out a post-questionnaire, in which the HEMA scale was included.

Results. A summary of the results for the HEMA scale are presented graphically in Fig. 2. Descriptive statistics are presented in Table 2.

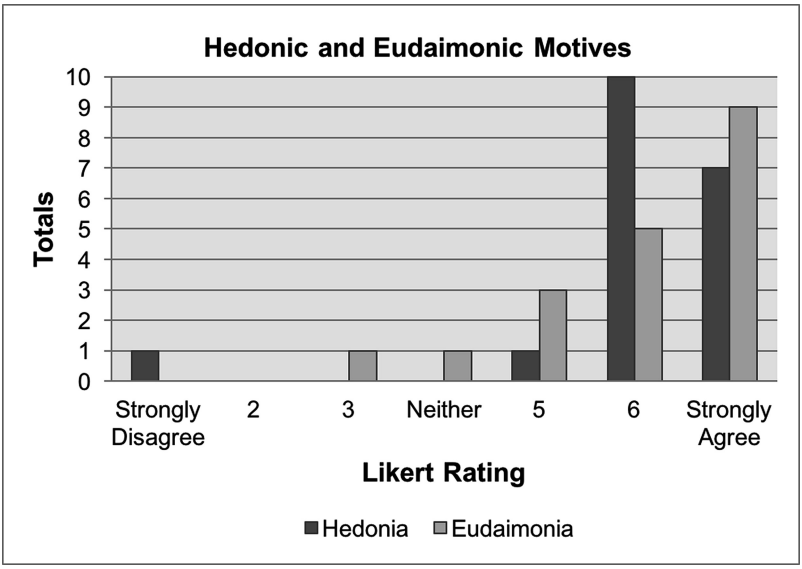

Fig. 2. Bar graph showing hedonic and eudaimonic motives per participant

Table 2. Descriptive statistics for hedonic and eudaimonic motives

Variable	Median	Range	Min	Max	Kurtosis	Skew
Hedonia	6	6	1	7	12	−3.2
Eudaimonia	6.5	4	3	7	1.5	−1.3

Kolmogorov-Smirnov tests of normality indicated that hedonic ($KS(19) = .36$, $p > .001$) and eudaimonic motives ($KS(19) = .26$, $p = .001$) were not normally distributed. A related-samples Wilcoxon Signed Rank test indicated that hedonic and eudaimonic motive scores were not significantly different.

A Kendall's tau test showed that hedonic and eudaimonic motives are significantly correlated, $r_\tau = .64$, $p = .002$. In comparing to usability items, Kendall's tau tests found significant correlations between hedonic motives and ease of use, $r_\tau = .72$, $p < .001$, eudaimonic motives and ease of use, $r_\tau = .69$, $p < .001$, hedonic motives and ease of learning, $r_\tau = .42$, $p = .006$, eudaimonic motives and ease of learning, $r_\tau = .59$, $p = .009$, and hedonic motives and satisfaction, $r_\tau = .69$, $p = .003$.

Discussion. These results suggest that most participants were strongly motivated by hedonic and eudaimonic factors. This makes sense in the context of an entertainment platform that involves a shared performance-based task, i.e. solving a puzzle cooperatively. Individual participants tended to be motivated by hedonic and eudaimonic well-being in the same way; additionally, a strong, statistically significant relationship was found between hedonic and eudaimonic motives. These results are congruous with the psychological literature, which expects a correlation between these constructs and for individuals to score each in the same way [7].

Well-being motives correlated to two of the measures of usability assessed in this study: ease of use and ease of learning. Given that hedonic and eudaimonic motives are expected to have some overlapping effects [7], this outcome is not unexpected. However, only hedonic motives correlated with satisfaction, the third usability measure. One way this result might be understood is by interpreting satisfaction as a measure of affect; this way, this result matches previous findings in psychology that found similar correlations between well-being motives and positive affect [7]. However, we cannot be sure of this interpretation of satisfaction. Additionally, the psychological outcome of life satisfaction, which refers to a general sense or longitudinal satisfaction with one's life, may be translated into an HCI context as satisfaction in general with the technology or experience under study. If this is valid, then we would expect hedonic and eudaimonic motives to correlate with satisfaction; however, in this study, they did not. More research is needed to explicate the notion of satisfaction as a usability outcome before we can draw conclusions on the nature of these correlations compared to potentially parallel constructs evaluated in the psychological literature.

5 Conclusions

While they may be new concepts to many HCI researchers and practioners, the hedonia and eudaimonia have a solid history in the domain psychology. Further, initial efforts to incorporate hedonia into HF/E models and frameworks have set the stage for a wider view of well-being in research on human-technology interactions. In particular, there is room and precedent for extending existing models to include eudaimonia, hedonia's conceptual pair in philosophical tradition and modern empirical work. As demonstrated through the case study of a cooperative puzzle game, existing instruments developed by psychologists can be easily adopted for use in studies of HCI. Future work will explore the efficacy of these tools in assessing the role of well-being and the impact on

well-being in other HF/E and HCI contexts, as well as clarify the relationships, if any, between HF/E and HCI variables (e.g., usability) and well-being motives/outcomes.

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