

Psychological Needs as Predictors of Affect in Business Management Software

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ABSTRACT

Studies have found a strong relation between intensity of psychological need fulfillment and positive user experience. In addition, recent studies show that the hedonic qualities have a stronger impact on attractiveness of a product and psychological need fulfillment than pragmatic qualities. This study investigates if these results can also be applied to work-related software, namely business management software. We found that need fulfillment and positive affect are related to perceptions of hedonic quality, rather than to pragmatic quality, also in a context of business management software.

Author Keywords

Hedonic qualities; pragmatic qualities; psychological needs; UX; User Experience; business management software.

INTRODUCTION

Both users, as well our corporate partner for this study, Exact, perceive business management software mainly as a tool, which helps them to manage their daily work. Thus, there's a strong hypothesis that the user interface is well adapted to the work context of the user, if its focus is on pragmatic functions such as effectiveness, efficiency, and learnability instead of hedonic qualities such as stimulation and identification.¹ For instance, Molich and Nielsen,² and Nielsen³ formulated 10 criteria for conducting such a heuristic evaluation, which is a well-known example for this focus.

This hypothesis dates all the way back to the early decades of Human-Computer Interaction (HCI), to the 60s and 70s, when the first interactions with computers were pre-dominantly work related. Therefore, the early HCI strove to enable people to perform work-related tasks in an efficient and error-free way. As a consequence, during the 1980s, usability engineering emerged from this understanding of HCI.⁴

A lot has changed ever since. People use IT products beyond accomplishing tasks at work.

The users' expectations have changed due to the merge of the computer with other media, and functional features, benefits, and product quality are merely taken as a given. Consequently, the HCI community seems to embrace the notion that functionality and usability is just not enough, and design has become increasingly interested in the question whether it can design for happiness, pleasure and meaningfulness.⁴

Despite this development, usability related aspects have had a stronger focus in the design for work contexts, than aspects such as joy of use,⁵ aesthetics,⁶ or emotions.⁷ Only recently, there is a new tone of voice appearing in work related interfaces – a relaxed, friendly and joyful attitude towards users, which target making the experience much more personal, engaging and fun.

Some work-related interfaces advocating such attitude are e.g. Slack.com, Atlassian.com and Mailchimp.com. However, little research is done on the relationship between affect and hedonic aspects in work context. One research investigates the influence of hedonic quality on the attractiveness of user interfaces of business management software.¹ The results show that pragmatic and hedonic qualities have an impact on attractiveness, also when moderated through a context of business management software.

To describe psychological needs as sources of the UX, and its relation to product qualities, it was found that need fulfillment and positive affect are related to perceptions of hedonic quality, stronger than to pragmatic quality.⁸ In this study, we investigate whether this framework applies also to a productivity tool, namely business management software.

DEFINITIONS

To explain the User Experience, Hassenzahl and his colleagues⁸ considered experience-related affect to be an indication of either a positive or negative experience. This was necessary for him to identify the fulfilment of psychological needs as sources of the UX, and its relation to product qualities, conceptualized as hedonic and

pragmatic qualities. This way he set experience-related measures - affect and psychological needs - against product-oriented measures.

Affect is mainly considered to be divided into two dimensions: positive and negative affect. These dimensions are relatively independent of each other,¹⁰ and relate to the emotional state of the person. Counterintuitively, it means one can experience e.g. high positive and high negative affect. Positive affect “reflects the extent to which a person feels enthusiastic, active, and alert”.¹⁰ To the contrary, negative affect reflects “aversive mood states, including anger, contempt, disgust, guilt, fear, and nervousness”¹⁰.

Psychological needs refer to a feeling of needing a variety of things. Most widely accepted theory on these needs is the Self-Determination Theory (SDT), which poses autonomy (feeling that actions are self-chosen), competence (feeling effective in your actions), and relatedness (feeling close to others), as basic, universal needs.¹¹ In day-to-day life, fulfilment of these needs is seen as an important predictor of well-being. Failure to fulfil them can cause severe psychological problems.¹¹

Pragmatic and hedonic quality refer to perceived product qualities. Pragmatic qualities relate to instrumental aspects. They are the result of fulfilling “do-goals”. These are strongly related to usability.¹² Hedonic qualities, however, are more “non-instrumental, self-referential”, aspects.¹² These are the result of fulfilling supposed “be-goals”. An example of this is “to be inviting”.¹²

These hedonic and pragmatic qualities can be measured with the Attrakdiff.¹² This questionnaire consists of 28 word pairs, which can be used to rate a product. An example of such a word pair is: pleasant – unpleasant. On a 7-point scale, the participant has to rate which one of the words applies most to their own interaction with the relevant product.

THE CONCEPTUAL FRAMEWORK

Hassenzahl¹² showed that psychological needs, experience-related affect, and hedonic quality relate to each other. A relationship between psychological needs and hedonic quality was found, partially mediated by positive affect. See figure 1 for a schematic overview.

They also identified hedonic qualities as the most important predictor of positive affect, with a positive relationship. In contrary, pragmatic qualities were found to be the most important predictor of negative affect, with a negative relationship. Thus, hedonic qualities can be seen as a motivator, whilst pragmatic qualities can be seen as a hygiene factor.

METHOD

To evaluate if Hassenzahl’s model applies to the usage context of business tools, we executed a research in cooperation with Exact, a Dutch supplier of business software. We asked, in an online survey, customers to rate their typical day using Exact’s product. First, they were shown five questions about the product, to activate their memories on their usage. Then they gave their ratings on their usage on a typical day using three questionnaires designed to measure experience-related affect, the fulfilment of psychological needs, and hedonic and pragmatic qualities. These questionnaires were, respectively, the Positive Affect Negative Affect Schedule (PANAS),⁹ a psychological needs questionnaire adapted from other research,¹³ and the Attrakdiff. After that, we asked for the amount of experience with the product, as well as the age of the user. For both these variables, we expected there to be a moderation on the relationship between psychological needs and hedonic quality.

This approach differs slightly from the one used by Hassenzahl.¹² In his research, he asked participants to come up with a positive experience they had with a product people use in their personal, leisure time. The participants then had to rate this experience on the three questionnaires.

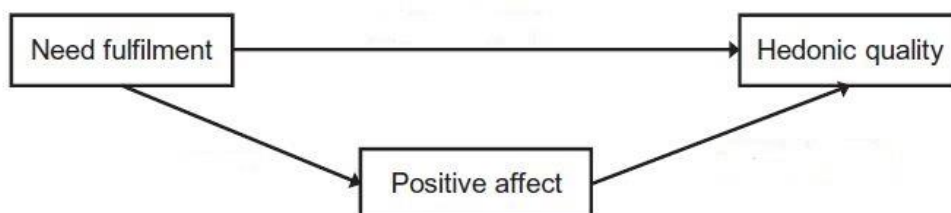


Figure 1: Schematic overview of the framework⁸

However, we expected that business management software would not, yet, elicit as strong, salient experiences as most products used for leisure purposes. This makes it hard for customers of Exact's tool to come up with an experience. Therefore, we asked participants to rate their typical day, as we predicted this general evaluation would be easier for them. In this setup, we deemed it to be important to first ask five questions relating to specific, but varied, tasks in the software. This to ensure the participants would really have the product in mind, and decrease error from other variables that occur during a typical day of work. In total, 249 participants completely filled in the survey.

To evaluate whether the framework as proposed by Hassenzahl is usable in the context of business management software, relationships between the fulfilment of psychological needs, positive affect, and hedonic qualities will be tested. In addition to that, to check if the Attrakdiff is a reliable tool in this context, reliability measures will be performed on the subscales.

FINDINGS

The conceptualized framework was validated in our research. Mediation analysis showed the fulfilment of psychological needs to be an important predictor of hedonic quality ($r = .49, p < .001$), and this was partially mediated by positive affect ($r = .32, p < .001$). Fulfilment of psychological needs was also an important predictor for positive affect ($r = .529, p < .001$). In a stepwise regression analysis, autonomy ($r = .549, p < .001$) and competence ($r = .560, p = .044$) were found to be the strongest predictors of hedonic quality. Next to that, hedonic quality and PQ appeared to both contribute significantly to positive affect. However, hedonic quality explained more variance with 35.1%, than PQ does with 17.3%.

Age and experience with the product were found to be significant moderators. Moderator analysis

showed the relative importance of the psychological needs for positive affect was influenced by different age groups ($r = .09, p = .004$). Also, age had a moderating effect on the relationship between hedonic qualities and positive affect ($r = .425, p = .038$). See table 1 for an overview of these results. Furthermore, the amount of experience moderated the relationship between the need for competence and hedonic quality ($r = .425, p < .001$).

The Attrakdiff questionnaire appeared to have good reliability. The pragmatic quality scale scored sufficient (7 items; $\alpha = .880$), as well as the hedonic quality scale (14 items; $\alpha = .945$). For the pragmatic scale deleting the first item ("technical – human") would increase the reliability (6 items; $\alpha = .888$). However, the completeness of the scale is preferred over this small increase.

DISCUSSION

These findings show important implications for the design of business software. Unlike what has been hypothesized before, we can conclude that hedonic quality and the fulfilment of psychological needs are also important aspects of business software. In order to bring about a positive user-experience, it is therefore important to also design for these aspects in the context of this software. As user's expectations of software have increased with technological advancements, this is an important conclusion for the industry that supplies business software.

In addition to this, it is important to know the different needs and hedonic qualities for different user groups. This study showed strong differences for users of different age and with different levels of experience. When designing for specific groups, this could thus be important information to address these users' needs even better.

Overall, it is apparent that the fulfilment of psychological needs, as well as hedonic qualities, are important aspects when designing for emotion.

Most important predictor	Age groups			
	25-35	36-45	46-55	56-65
Needs	Autonomy $R^2 = .270$	*	Competence $R^2 = .589$	Relatedness & Competence $R^2 = .224$
HQ	*	Novel $R^2 = .510$	Inviting $R^2 = .294$	Likeable $R^2 = .385$

Table 1: Overview of the best predictors per age group (*=no significant predictors)

There is now a strong body of literature having tested Hassenzahl's framework, with consistent results. This research replicated the same results in a new context, further adding to the validity of the model in overall.

CONCLUSION

In this study a framework defining the user experience was explained, and tested in a new context of software use. This framework incorporates the fulfilment of psychological needs, affect, and hedonic and pragmatic qualities, in one model to explain the user experience. By doing this, it integrates experience-related measures with product-related measures.

Previously, this framework has not been fully tested in the context of business management software. However, this research validated the framework in this context. Thus, it adds to the validity of this model as comprising the user experience.

This study also tested the reliability of the Attrakdiff questionnaire to evaluate hedonic and pragmatic qualities of business management software. As this is a practical, structured way to assess these qualities, Hassenzahl's framework provides a practical approach for the evaluation of design. Furthermore, it can provide a source of inspiration for designers. The hedonic qualities can provide a conceptual foundation and guidance for a new design.

Further, it has shown important implications for the design of business management software. Unlike what has been hypothesized before, hedonic quality and the fulfilment of psychological needs are also important aspects of business tools. Therefore, designers of business software should in the future also consider these aspects.

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