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NUANCES OF EMOTIONS IN PRODUCT DEVELOPMENT: SEVEN KEY OPPORTUNITIES IDENTIFIED BY DESIGN PROFESSIONALS

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1. Introduction

Products can evoke pleasurable emotions in several ways: they can be direct sources of pleasure (e.g., being inspired by a novel car), and indirect sources by facilitating pleasurable activities (e.g., enjoying the thrill of reading a scary story, which is facilitated by an e-book reader). The role of (positive and negative) emotions in human-product interaction and the benefits of design that evokes positive emotions have been discussed extensively in the design research literature (see, e.g. [Crilly et al. 2004]). The discussion shows a general acceptance of the idea that designers, and design processes, can benefit from emotion knowledge (for an overview, see [Demir 2008]), and, related to this, various models, tools and methods have been proposed that are intended to facilitate emotion-focused design processes. Although the development was driven by the motivation to support designers, it seems that not all resulting knowledge and tools have been widely accepted and used in practice. Desmet [2009] observed that most design professionals acknowledged the relevance of emotions, but at the same time many were skeptical about theoretical approach, believing that emotional aspects of product design is the exclusive domain of their intuition, and too elusive to predict. Moreover, Van Boeijen and Daalhuizen [2013] have pointed out that even though suggested emotion-focused design processes are seemingly understandable, using them in practice is difficult, requiring extensive time investments and practice. We propose that even though the tools and approaches have been developed with designers' needs in mind, they have not always been derived from the actual needs and expectations of these designers. For these reasons, the current study attempted to outline the needs and expectations of design professionals with respect to emotion knowledge by giving them the opportunity to express their view on this subject. The main research question was: in the perspective of design professionals, what are the benefits of having a nuanced understanding of positive emotions in product development processes? The obtained insights can help ensuring practical relevance when developing future tools, methods, and guidelines to support designers in incorporating emotion knowledge in their design processes. This paper begins by introducing the topic of nuances of positive emotions and the aim of study. The second section provides a brief overview of stages in product development processes and involved roles, which served as a framework for the study. The third section reports the study, and the final section discusses implications and proposals for future research.

2. Nuances of positive emotions

Desmet [2012] showed that there are at least 25 positive emotions that can be experienced in response to products, and formulated a typology to investigate nuances between them (Figure 1). Although these positive emotions are all pleasurable, each is different from one another in terms of feelings and

how they influence on people's thoughts and actions [Frijda 2007]. Some people are more aware of these differences and can better articulate their emotional states than others. This difference is called 'emotional granularity:' the extent to which an individual can precisely interpret and articulate one's own and other's emotional states with specificity [Lindquist and Barrett 2008]. For example, in response to a given situation, an individual with high emotional granularity may report "feeling mostly fascinated, with a hint of inspiration," whereas someone with less granularity would report "feeling good." Compared to negative emotions, differences between positive emotions tend to be more subtle. Ekman's study [2003] on emotions and their relations to facial expressions showed that positive emotions are not easily distinguished from one another as most of positive emotions result in smile. Similarly, action-tendency, another component of emotional experience is less differentiated for positive emotions than for negative emotions [Frijda 2007]. Conversely, we can readily identify the differences between negative emotions such as anger or sadness by observing behavioral manifestations. This implies that distinguishing nuances of positive emotions requires a thorough understanding of multi-faceted aspects of emotional experiences.
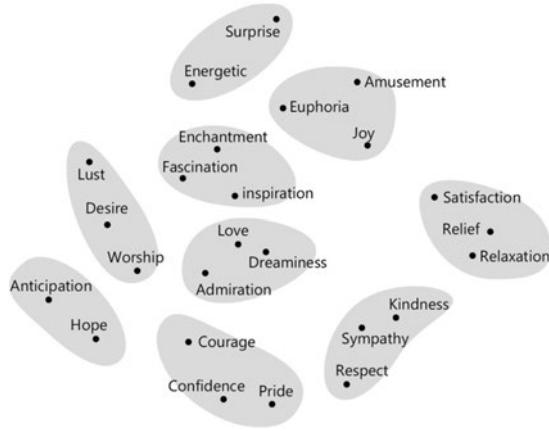
Figure 1. Visualization of similarity between the 25 positive emotions [Desmet 2012]

In this study, with the goal of exploring the relevance of understanding nuances of emotions in product development, we particularly give attention to designers' positive emotional granularity (PEG). Since designers usually intend to evoke positive emotions with their designs, it could be more effective to methodically construe the relevance by reflecting differences between varied pleasant emotions and how they can benefit from discerning them than merely discussing the relevance based on generally feeling good or bad. Therefore, it was decided to identify when and how design processes could benefit from high PEG.

3. Design and product development process

At each stage of a product development process, various functions are involved, and in most of the stages, design is integrated in several collaborative activities. For example, in fuzzy-front end, designers collaborate with user researchers and marketers to identify user requirements [Visser 2009], and designers cooperate with marketers and engineers in concurrent engineering [Roozenburg 1995]. Yoon et al. [2013] showed that design students were convinced that a design process could benefit from PEG in various cross-functional communications such as inquiring stakeholders' concerns. In this study, we want to learn the practitioners' perspectives regarding the entire product development process by involving design professionals (designers as well as professionals in other roles). To operationalize this, roles of individuals within a product development team are determined and a model of product development process is chosen through literature review.

3.1 Roles in product development team

Based on typical team members in a product development process as specified in literature (e.g. [Ulrich and Eppinger 1995], [ISO 2010]), five roles are identified to focus on in this study:

- Product manager is responsible for managing the project or product. Activities include the product specifications, setting priorities, planning, and coordinating efforts.
- User researcher is the person who is responsible for identifying user needs and the contexts of product use, and conveying the collected insights to designers.
- Designer creatively integrates all the requirements of the product into a design of the appearance and behavior of the product.
- Development engineer is responsible for planning, operating, and coordinating the production system in order to produce the product.
- Marketer identifies the product opportunities and the target market segments, and arranges target prices, the launch and promotion of the product and brand.

Since the focus of this study is to get an overview of potential benefits of PEG in design processes, we give less emphasis on specifying design disciplines (e.g., industrial design and human factors expert), but we integrate these into one role 'designer'. Although it is commonly suggested in the literature that designers conduct user research having contacts with users [Leonard and Rayport 1997], in practice, the person who performs the user research and the person who manages the design is usually not the same person, and the research is often sourced from a third party (e.g., an external consultancy) [Visser 2009]. For this reason and for the sake of clarity, we regard user researcher and designer as distinct roles in this study. It should be noted that the identified roles might have different names in different organizations, but their primary roles are the same.

3.2 Product development process

We use the model of product development processes that was proposed by Buijs [2012] as a framework for our study (Figure 2). The model describes the continuous process of developing a product; from the use of existing products to a change of the company's strategic product position. The model consists of five cyclic stages: product in use, strategy formulation, design brief formulation, development, and market introduction (for an overview, see Buijs [2012]).

Figure 2. Product development model used in this study (adapted from Buijs [2012])

3.3 Human-centered design process in product development

In the model of a product development process, conceptualization and embodiment take place in the development stage [Roozenburg 1995], [Buijs 2012]. We added the Human-centered design (HCD) process to 'development' in the reference model to elaborate the design activities and related benefits of PEG based on ISO [2010]. There are four main activities in HCD process: (1) understanding and specifying the context of use, (2) specifying the user requirements, (3) producing design solutions, and (4) evaluating the design.

4. Identifying opportunities to work with PEG

We took a qualitative approach to exploring the roles of PEG in product development from the perspectives of design professionals.

4.1 Method

4.1.1 Participants

Recruitment of interviewees was based on the identified five roles. For each role, five practitioners who have a minimum of three years of work experience were recruited (in total 25 participants). The participants were from a wide range of product domains such as telecommunication, consumer electronics, software, finance service, food, furniture, airline service, and design consultancy (e.g.

Philips, Pepsico, and KLM airlines). Involving people from varied backgrounds allows a variety of perspectives. Participants were recruited from the authors' professional networks and were not paid for their contribution.

4.1.2 Procedure

Semi-structured interviews were conducted individually, consisting of three phases: sensitizing, interviewing and discussing. The aim of the sensitization phase was to stimulate the participants' general awareness of nuances between positive emotions. In advance of the interview, each participant was asked to think of product examples and provided with the definitions of three emotions: pride, confidence and fascination. Desmet [2012] showed that similarity between confidence and pride is the highest among 25 positive emotions, and fascination is perceived considerably different from them (see Figure 1). Stimulating participants to think of the differentiated aspects of two similar positive emotions and one dissimilar positive emotion was intended to facilitate their awareness on the nuanced nature of positive emotions. In the beginning of the session, each participant presented three product examples with which they had experienced the given three emotions, respectively. The concept of PEG was introduced by providing the typology of positive emotions [Desmet 2012]. In addition, participants were given an A3 sized sheet with the model of Buijs [2012], and were briefed about key stages and entailed activities. Next, they were asked to come up with ideas about how and when high PEG could support the process of their own tasks and possible benefits for other roles. They were instructed to write their ideas on the given sheet. There was no time limitation. After idea generation, they were guided to present their ideas to the interviewer. All interviews lasted 1.5 hours and were audio recorded.

4.2 Data analysis

All collected audio data, ideas on the sheets, and notes of the interviewer (first author) were transcribed and coded on the basis of stages, roles and activities in a product development process. This coding scheme was used to get an overview of when, for whom, and for what activities high PEG could be beneficial. For example, one participating designer said: "*In development stage, the communication between team members can be more efficient in translating the intended emotions to product characters that can embody the values.*" This response was considered to contain three meaning units and was assigned to three different codes. The first text segment 'In development stage' fitted into the code "development". The second text unit was determined to be: "the communication between team members" - this text was considered to fit into the code "product development team". The third text segment "communication between team members can be more efficient in translating the intended emotions" was considered to fit into the code "communicating the design intention in terms of emotional experience". For each suggested idea, the related activities were identified and clustered according to commonalities.

5. Results and discussion

The study resulted in 47 beneficial effects of PEG that are related to 27 activities in product development. The identified benefits were categorized into seven main groups, each consisting of various sub-groups. Table 1 gives an overview of the main findings in the order of the product development process. In this section, the main groups are reported and discussed with the examples of interviewee's quotes.
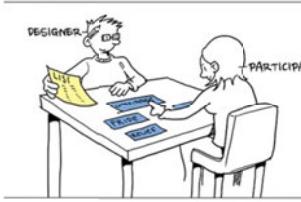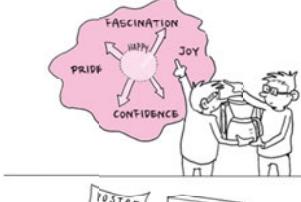
5.1 Getting in-depth understanding of user emotions

5.1.1 Interpreting end-users' affective states

"*It makes me vigilant when observing people considering if the target positive emotion can be actually experienced*" (User researcher B). User researchers and designers responded that in observational research, having developed PEG would enable them to carefully interpret end-users' affective states on the basis of expressive behaviors that end-users show in response to a given product or a situation.

The participants mentioned that the insights from precise interpretations are often required in various activities such as investigating people's responses to product concepts during development stage.

Table 1. An overview of the suggested benefits of PEG in a product development process

	Opportunities	Stages	Roles
	Getting in-depth understanding of user emotions • Interpreting end-users' affective states in responses to a product • Benchmarking competing products in terms of emotional impact • Validating the emotional impact of a product concept • Measuring end-users' responses in product use	• Product in use • Strategy formulation • 'Understand and evaluate' in development	• User researcher • Designer
	Determining emotional impact of a product • Identifying the areas to improve and add positive emotional impact of a product in its usage • Specifying emotional impact of a product in design brief • Specifying design intention in terms of interaction effects • Associating brand expression with specific positive emotions in determining emotional impact of a product	• Design brief formulation • 'Specify' in development	• Product manager • User researcher • Designer • Marketer
	Dealing with organizational support • Demonstrating the added values of emotion-driven approach by comparing products in terms of end-users' emotional responses with granularity • Guiding key-stakeholders to (re)formulate the project goal by helping them get a deep understanding of end-users' emotional states in relation to a product or a situation	• Strategy formulation • 'Understand' in development	• Product manager • User researcher • Designer
	Keeping continuity of emotional impact in communications • Building a shared understanding on the meaning of the determined positive emotions across all functions. • Helping a product development team have increased empathy towards end-users through explicit communication of user emotions	• 'Specify' in development	• Entire team
	Facilitating design creativity • Facilitating creative exploration to design problems by helping designers envision various positive emotional responses of end-users to a product • Translating the intended positive emotions to product qualities based on the specific eliciting conditions of the emotions	• 'Conceptualize' in development	• Designer
	Strengthening emotional coherency • Ensuring coherent communication to end-users through elicitation of consistent emotions in both product usage and marketing communications	• Market introduction	• Designer • Marketer
	Managing emotions within a product development team • Fostering specific positive emotions within a product development team with an intention to support each stage's main activities	• Entire stages	• Entire team

5.1.2 Measuring emotions

"The emotions in our tool are a little bit random. It would be interesting to have a structured list of positive emotions, so when people see them, they can point out things and explain the meaning behind it" (User researcher A). User researchers found it helpful to develop a research tool that can be used for probing user emotions by including a comprehensive set of positive emotions. After seeing the given list of 25 positive emotions, user researchers and designers realized that the tool they had used for assessing emotions are limited in terms of granularity. User researchers and designers expected

that by measuring emotions with specificity, they could identify what types of positive emotions and to what extent end-users experience. It was mentioned that based on the results of measured emotions, user researchers would be able to lay out the changes of user emotions in a series of instances in product use. The suggested implications of measuring emotions with granularity were benchmarking emotional impact of competing products in strategy formulation stage, validating the emotional impact of a concept in development stage, and measuring end-users' responses in product use stage.

5.2 Determining emotional impact of a product

5.2.1 Identifying opportunities of a new product with respect to emotional impact

"We don't want to just satisfy our customers. We want to deliver more than that such as a sheer awe, or desire. For this, it is crucial to be able to understand and represent the details of the customers' emotional states" (Marketer-A). At strategy formulation stage, marketers and designers found that knowing the current user emotions on a detailed level would enable to identify desirable, but not yet experienced positive emotions. In particular, marketers emphasized that clarifying emotional impact of an existing product can help them pinpoint the most critical areas to improve, to preserve or alternatively, to give additional positive emotional impact.

5.2.2 Specifying emotional impact of a new product

"When making a design brief, I have written "user-friendly" or "simple to use". With this ability, I could go beyond general easy to use" (User researcher-C). Marketers, user researchers, and designers acknowledged the importance of PEG for deliberately specifying which positive emotions to evoke at design brief formulation stage. The participants responded that in formulating a design brief, this would lead to more nuanced and less generic brief that explicitly conveys the intended experiences. In addition, they noted that as a secondary function in later stages, the specified positive emotions would guide to validate that if the product got it right when evaluating a design concept or its prototypes.

5.2.3 Setting the impact of emotions on end-users' interactions as a goal

"I am more interested in nuances of behavioral impact that positive emotions could spark because that's more concrete than putting some emotion words. It already shows why we design for certain emotions. For example, when I designed a website of a museum, I aimed to make a user stay longer on webpages, thus he has more chance to get to know art-pieces of the museum. I did it by designing the interface to evoke fascination" (Designer-E). Designers, user researchers, marketers, and product managers paid attention to differentiated interaction effects of varied positive emotions for specifying the intention of design. In particular, most of the participating designers expressed the necessity to have a tool that shows how different positive emotions differently affect the ways people interact with a product (e.g. gentle behavior triggered by kindness, playful behavior triggered by amusement).

5.2.4 Associating the brand expression with specific positive emotions

"Every goal of a product and a brand is in essence some kinds of emotions. With this sensitivity, the process of defining a design goal can be made to be in line with the expression of a brand connecting to certain positive emotions" (Designer-C). Designers and marketers related the usefulness of PEG with their attempt to ensure that the emotional impact of a product aligns with the expression of a brand. Since the feeling of the user experience is closely tied with end-users' perception on a brand as stated in Buley [2013], the participating marketers and designers expected that they can deliberately select specific positive emotions that best represent a certain brand, and endow them as overarching emotional impact of a product to safeguard the fittingness of brand expression in design.

5.3 Dealing with organizational support

5.3.1 Demonstrating human-emotion as a success factor of a product

"Clients or managers usually tend to consider emotion-driven approach as peripheral to the success of a new product and care more about the result that it will financially produce, rather than the approach that generates the success" (Marketer-B). At the beginning of the development stage,

designers and user researchers seemed not to have enough organizational support from other roles to pursue emotion-driven approach, although they believed that it could play a key role in ensuring the success of a product. Participants talked about the need to demonstrate the added values of emotion-driven approach to induce other people to support it. They suggested that it might be helpful to show why a certain product is preferred over a different one by unveiling the differences in terms of the end-users' responses with fine-grained emotion terms, and if possible, its consequential business impact.

5.3.2 Involving key-stakeholders in (re) formulating the project goal

"In strategy stage, we organize a workshop with important stakeholders, and let them experience the reality and find that there is more than what they had thought in terms of emotional experiences. This helps get rid of their doubts on our approach" (User researcher-B). The current problem often referred to by product managers, designers, and user researchers is that from a client or a company manager, they often requested to increase Net Promoter Scores that reflect the likelihood of a product purchase, which is thought to be too abstract to regard it as a goal of a new project. They perceived that companies do not support or trust emotion-driven approach because the client or the manager usually does not have a deep understanding on how end-users feel about a certain product or situation. They said that it is of importance to engage and guide them to find out what specific positive emotions are relevant to evoke, and reframe the goal of the project themselves. One premise for this process was that there should be a way to increase their understanding on nuances between positive emotions. The participants assumed that with this approach, other involved people also could empathize with end-users and realize how important it is to consider emotions in product development.

5.4 Keeping continuity of emotional impact in communications

5.4.1 Communication of the emotional impact

"An external agency prepares a creative work for us such as a packaging design, but when we test it, consumers' answers are often far from our expectation. But, the agency always says, 'We did it as you asked'" (Marketer-D). When the development process evolves from design brief formulation to development, the determined target emotions, which are described in a design brief need to keep their salience, not losing the granularity until it is conveyed to designers or engineers. However, in practice, it was found that information on (intended) user emotions goes through several interpretations from person to person before it reaches to them. Besides, people often have a different understanding of the same emotions, so that interpretation on the design goal and approaches considerably differ from each other, sometimes resulting in rejection of the delivered information. Marketers and user researchers mentioned that they use metaphors referring to existing products in their communications to supplement their lack of vocabularies to represent emotional experiences, but this also often led to misunderstanding as found in Eckert and Stacy [2000]; the success of communication of experience by a reference relies on how much the conversation partners share the same interpretation of the reference source and when there is lack of common interpretation, the communication becomes discrepant. In particular, this problem was more serious when a company works with an external party (e.g. a design consultancy). All of the five roles agreed that having developed PEG would help the entire team gain a shared understanding on the meaning of various positive emotions that they refer to in communications. They expected that the ability to articulate the target emotions would ensure that the team has the identical understanding and expectations for the quality of emotional experiences.

5.4.2 Stimulating product development team to empathize with users

"I often see development engineers ignore the design suggestions and go totally different direction. ... Perhaps, it's because the current design brief is not effective ... they don't get what it feels like to be in the shoes of our users" (User researcher-E). As confirmed by Visser [2009], participating designers and development engineers usually did not have a direct contact to end-users and tended to receive information from other parties such as marketing department or an external consultancy. Situated in this circumstance, all participating roles related PEG with increased empathy towards end-users: sharing information of the specific preferred emotional states and end-users' concerns could help the

entire team understand why end-users wish to experience the particular emotions. It was also considered important to share the rationale of the predetermined emotional impact of a product with explicit emotion expressions to facilitate a deep understanding of users and increased empathy.

5.5 Facilitating design creativity

5.5.1 Expanding creative space

"If you design a chair, kindness, sympathy, respect… these could be starting points. You take one of these as a design theme, and later you can try other emotions too" (Designer D). Designers valued to develop PEG for stimulating divergent thinking especially for the conceptualization phase. They suggested that having a high level of PEG would facilitate creative exploration in relation to design problems they are dealing with: they could envision various positive emotional responses of end-users and think of how a product could lead them to experience the intended positive emotions. They were particularly acknowledging the given typology of positive emotions as a source of inspiration, assuming that application of the typology would guide them to a wide range of design directions.

5.5.2 Generating product qualities

"Each emotion requires a different design approach and because of this difference, the sooner you realize what is right strategy, the better you can translate the emotion into the design" (Designer B). Designers paid attention to the ability to distinguish nuances of positive emotions in terms of eliciting conditions that define when and how people experience certain emotion types. Since each emotion involves different eliciting condition [Frijda 2007], they pointed out that knowing a set of unique patterns of eliciting conditions could be useful for formulating design strategies that guide translation of the intended positive emotions to design elements such as qualities of interaction, and physical form of a product. They suggested that based on the understanding, the design strategy could be properly made in line with the target emotions. Some designers noted that it might be helpful to have an overview of appraisals as a theoretical reference to design for the intended positive emotions.

5.6 Strengthening emotional coherency

"The story of user experience should stay consistent in terms of feelings. … I guess that design brief can be already used by both designers and marketers, not spending extra time for making a marketing plan from scratch" (Marketer E). Marketers and designers suggested that it is important to coherently communicate to end-users through elicitation of consistent emotions in both product usage and marketing communications such as advertisement, and to do that distinguishing nuances of positive emotions are essential. They mentioned that developed PEG would help them explicitly share the idea of the intended emotions across the functions, thus in market introduction stage, marketers can stress the identical emotional experience while producing marketing materials, avoiding that the emotions facilitated by marketing communications deviate from the emotions facilitated by actual product use.

5.7 Managing emotions within a product development team

"In later stages, people usually do not feel inspiration and curiosity. They just pay attention to fulfilling pre-defined requirements. They still can be creative and the process has to facilitate this. They should feel pride because of their creative contribution. If I don't know the differences between these positive emotions, I don't know what to facilitate" (Product manager A). Besides the benefits that directly influence activities in product development, participants also mentioned some implications that PEG could bring in. Product managers found it useful to be aware of nuances of positive emotions to foster appropriate positive emotions within a product development team. They assumed that to support the team to better perform, it might be useful to facilitate certain positive emotions reflecting each stage's main activities. Product managers emphasized that in line with Ulrich and Eppinger [1995], it is important to create a sense of team pride, and for this it is essential to understand emotional states of the team and facilitate appropriate positive emotions because team pride helps motivate and unify everyone associated with the project.

6. Conclusion and general discussion

This interview study with 25 design professionals explored how and when people involved in product development can benefit from a detailed understanding of nuances in emotions, i.e., from PEG. Results revealed seven main opportunities, in which beneficial effects of PEG in relation to specific activities and roles can be expected. Having a structured overview of positive emotion types and discerning nuances in terms of meanings, eliciting conditions, and influences on behaviors appears to have a supportive function across all stages of a product development process. Interestingly, during the interviews, product managers and development engineers rarely reported the advantages of PEG in relation to their work processes. Although these two roles generated some ideas, most of them were associated with other functions' activities or with benefits for an entire team. Nonetheless, we cannot forejudge whether PEG is less relevant for them or not. Goffin and Micheli's study [2010] showed that in the context of communication on design, managers tend to perceive differences in vocabulary as irreverent and hardly use the term 'emotion', while designers consider them essential in conveying the significance of a design frequently referring to emotion words. Perhaps, because managers do not often use emotion words in daily practice and relatively not familiar with emotion-driven approach compared to other roles, they could not spontaneously make direct association between PEG and their roles during the interviews. To access the benefits for product managers, it seems necessary to use an alternative research method or more sophisticated sensitization process to lead them to familiarize with this research topic. For development engineers, as observed in this study there might be little practical benefit because, in general, they are mainly responsible for realization and optimization of a product production. One software engineer responded, *"I mainly think about how to write code that is effective and reliable. My job is often explicitly defined. I just get informed or receive advice from marketing department"* (Development engineer A).

Limitations of this study should not be left unmentioned. The sample size was relatively small. Involving only five participants for each role might not be enough to fully unveil the relevance of understanding nuances of emotions in product development. However, in the analysis process, we noticed that after coding the data collected from half of the participants, the findings were already saturated. In other words, no additional opportunities were identified when coding the second half of the data set. From this, we assume that interviewing more people would not result in noticeably more insights.

While the study is exploratory, we believe it offers insights into how emotional granularity can be of relevance in product development. In particular, the novelty of this study is reflected in the fact that opportunities were identified by design practitioners and not theoretically derived by researchers. Proceeding from the results, we found it reasonable to postulate that it is valuable to have an explicit understanding of nuances in emotional experiences because it could support a variety of activities in the development process that can, in the end, possibly provide end-users with better, i.e., more fitting, positive experiences. During the interviews, most of the participants mentioned that they were surprised at how useful it is to have an understanding of emotions in their pursuit of creating positive user experience and wanted to have tools that could support them (e.g. a tool that facilitates design creativity for a designer and an emotion measurement tool for a user researcher). The seven identified opportunities could serve as a starting point for developing such design supports. Since the opportunities are drawn from the ideas of design professionals, we expect that the resultant design supports could be well received by designers and feasible to apply in their practices.

In this paper, we mainly gave attention to nuances between positive emotions considering that people involved in product development usually intend to evoke positive emotions with a new product and distinguishing positive emotions require thorough understanding of emotional experiences. During the interviews, designers and user researchers stressed that distinguishing nuances between negative emotions is also important to get insights into users' demands and desires. In addition, as some negative emotions are known to have beneficial behavioral impact in certain contexts, it is also valuable for designers to distinguish nuances of negative emotions and design for them. For instance, a feeling of rejection could stimulate artistic creativity [Akinola and Mendes 2008], and sadness makes people less judgmental to other people's behaviour [Schnall et al. 2008]. Thus, negative emotional granularity might also prove valuable in designing. This should be addressed in future studies. Our

research focus is to assist designers to deliberately create positive experiences that go beyond general pleasure. Given the fact that there are multi-faceted positive emotions that can be experienced in human-product interactions, we believe that the first step to design for such nuanced experiences is to understand these nuances. This paper presented opportunities to work with a nuanced understanding of positive emotions. The next steps are to explore strategies to facilitate PEG and to develop tools that can be used in the design process. We will test the tools if they can effectively facilitate PEG, and will validate if the design process can benefit from PEG based on the suggested benefits in this study.

Acknowledgement

References

Akinola, M., Mendes, W. B., "The Dark Side of Creativity: Biological Vulnerability and Negative Emotions Lead to Greater Artistic Creativity", Personality and Social Psychology Bulletin, Vol. 34, No. 12., 2008, pp. 1677–1686.

Buijs, J., "The Delft Innovation Method: a Design Thinker's Guide to Innovation", Eleven International Publishing, Amsterdam, the Netherlands, 2012.

Buley, L., "The UX Team of One", Rosenfeld, 2013.

Crilly, N., Moultrie, J., Clarkson, P. J., "Seeing Things: Consumer Response to the Visual Domain in Product Design", Design Studies, Vol 25, 2004, pp. 547–577.

Desmet, P. M. A., "Faces of Product Pleasure: 25 Positive Emotions in Human-Product Interactions", International Journal of Design, Vol. 6, No. 2., 2012, pp. 1–29.

Desmet, P. M. A., Hekkert, P., "Special Issue Editorial: Design & Emotion", International Journal of Design, Vol.3, No.2., 2009, pp. 1–6.

Eckert, C., Stacey., M., "Sources of Inspiration: a Language of Design", Design Studies, Vol. 21, No. 5., 2000, pp. 523–538.

Ekman, P., "Sixteen Enjoyable Emotions", Emotion Researcher, Vol. 18, No. 2., 2003, pp. 6–7.

Erdem., D., "The Field of Design and Emotion: Concepts, Arguments, Tools, and Current Issues", METU Journal of the Faculty of Architecture, Vol. 25, No. 1., 2008, pp. 135–152.

Frijda, N. H., "The Laws of Emotion", Lawrence Erlbaum Associates, Publishers, London, 2007.

Goffin, K., Micheli, P., "Maximizing the Value of Industrial Design in New Product Development", Research-Technology Management, Vol. 53, No. 5., 2010, pp. 29–37.

ISO, "Human-Centred Design for Interactive Systems", 9241-210- Ergonomics of Human-System Interaction - Part 210, International Organization for Standardization, Geneva, Switzerland, 2010.

Leonard, D., Rayport, J. F., "Spark Innovation Through Empathic Design", Harvard Business Review, Vol. 75, 1997, pp. 102–115.

Lindquist, K. A., Barrett., L. F., "Emotional Complexity", Handbook of emotions, Michael Lewis, Jeannette M. Haviland-Jones ,Lisa Feldman Barrett (ed.), The Guilford Press, 2008, pp. 513–530.

Roozenburg, N., "Prescriptive Models of the Design Process", Product Design: Fundamentals and Methods, N. Roozenburg & J. Eekels (ed.), Wiley, 1995, pp. 94–114.

Schnall, S., et al., "Disgust as Embodied Moral Judgment", Personality and Social Psychology Bulletin, Vol. 34, No. 8., 2008, pp. 1096–1109.

Ulrich, K. T., Eppinger, S. D., "Product Design and Development", McGraw-Hill, New York, 1995.

Visser, S. F., "Bringing the Everyday Life of People Into Design", Delft University of Technology, 2009.

Yoon, J., Desmet, P. M. A., Pohlmeyer, A. E., "Embodied Typology of Positive Emotions: the Development of a Tool to Facilitate Emotional Granularity in Design", Proceedings of the 5th International Congress of International Association of Sciences of Design Research, Tokyo, Japan, 2013, pp. 1195–1206.

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