

The Mood Street: Designing for Nuanced Positive Emotions

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ABSTRACT

This paper addresses how design activities can be supported to evoke nuanced positive emotions through a design case. The topic of nuances of positive emotions and values of differentiating positive emotions in a design process are discussed. The case follows appraisal approach, which implicates that the way people appraise an event determines the type of emotion. Design students created design interventions to specifically elicit one out of ten positive emotions in the context of an airline crew center: anticipation, confidence, energized, inspiration, joy, kindness, pride, relaxation, respect, and sympathy. Three examples are provided to show how the approach has been used to generate design concepts. Reflecting on the design process, nine lessons are outlined, all of which discusses the challenges involved in the approach and how those challenges could be overcome.

Author Keywords

Design for emotions; positive emotions; appraisal; user-centered design; design case; exploratory study.

ACM Classification Keywords

H5.2. Information interfaces and presentation:
Evaluation/methodology, theory and methods, user-centered design.

INTRODUCTION

In the field of HCI and design research, various approaches and frameworks that facilitate emotion-focused design processes have been developed such as a framework based on psychological pleasure theory [20], a framework based on neurobiological emotion theory [26], and a framework based on psychological needs [18]. Although these frameworks are helpful for designers to understand the roles

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of (positive and negative) emotions during product usage and to consider various ways in which products influence user emotions, they tend to only focus on valence: an experience can be positive, pleasurable, enjoyable or negative, unpleasant, disturbing [25]. However, there is more than the basic pleasure-displeasure distinction and products can evoke differentiated emotions. We can for example, be proud of using a laptop computer made of recyclable materials, be aflutter in anticipation of a planned trip looking at a boarding pass, or have a feeling of cathartic relief while playing a role-playing game on a mobile phone. Desmet [7] claimed that emotions experienced in response to a product or a service is more nuanced than valence, and showed that people can experience at least 25 different positive emotions while interacting with a product such as desire, kindness, confidence, and fascination. Although these emotions are all pleasurable, each is different from one another in terms of feelings, eliciting conditions and how they influence people's behavior [17]. According to the 'broaden and build' theory, proposed by Fredrickson [15], positive emotions have distinct and specific behavioral effects: joy encourages to be playful in the broadest sense of the world (e.g., physical, social and artistic play), contentment leads a person to savor the life circumstances and recent success [14], hope prompts a person to stay open to new information and motivates sustained effort in the face of a challenge [24,34]. It has been shown that in human-product interactions, positive emotions stimulate differentiated behavioral effects as well. For instance, surprise draws a person's attention to the product, leading to increased product recall and recognition [23]. A product that evokes inspiration infuses a user with new and creative thoughts, facilitating a shift in perspective [5]. A feeling of interest engages a user to actively explore the product attributes and functionalities, and prolongs the duration of use, resulting in an increased understanding about the product [36].

We propose that differentiating between positive emotions that go beyond general ideas of pleasure can be useful for designers in their design processes. Perhaps, in the conceptualization phase it may broaden the view of designers in relation to users' emotional responses and therewith stimulating design creativity, and being more precise in intended experiential effects may increase the

effectiveness of the design solution (for an overview, see [37]). Although the studies on distinct positive emotions mentioned above give insights in the underlying eliciting conditions and related behavioral effects in human-product interactions, they usually focus on one specific emotion, not taking nuances between various positive emotions into consideration, and do not provide much details in how they describe what challenges are involved in design processes, and how these challenges could be overcome. An example of such a challenge is to ensure that all design team members have the identical understanding and expectations for the quality of desired emotional experiences that the design solution is supposed to facilitate. For these reasons, the current paper aims to report the lessons we learned from a design case that was driven by multifaceted emotional intentions: (1) the gained lessons can support designers to deliberately elicit specific positive emotional experiences, and (2) the identified challenges can ensure what kinds of design supports (e.g., tools, techniques, guidelines) could be of relevance in the design process. Thus, the overall question addressed in this paper is: how can design activities be supported to elicit nuanced positive emotions? The lessons illustrated in this paper were explored within the setting of the design project ‘Mood Street’ organized in a course at Delft University of Technology.

This paper begins by introducing the topic of nuances of positive emotions and the aim of the study. The second section introduces the design project. The third section gives a brief overview of the approach we took in the project, which serves as a framework for the study. Next, we present some examples of the generated concepts. We will then report the lessons we learned ranging from issues that arose during the project to possible opportunities to resolve them. On the basis of the experience in the project, some methodological challenges involved in the process of designing for nuanced positive emotions are discussed with proposals for future research.

NUANCES OF POSITIVE EMOTIONS

Contrary to negative emotions, positive emotions are relatively undifferentiated: joy, amusement and serenity are not easily distinguished from one another in terms of facial expressions as they all result in a smile [11]. Similarly, action-tendency, another component of emotional experiences [17], is less obvious for positive emotions than for negative ones. Due to subtle differences between positive emotions, most commonly used sets of basic emotions (e.g. [10,19,28]) include fewer positive emotions than negative emotions, and emotion research in psychology has predominantly focused on negative emotions. Likewise, distinctions between various positive emotions have been largely ignored in the design research literature [7]. In design research, although various frameworks and approaches have been proposed to support design activities that are driven by the goal of facilitating positive experience, they have not methodically considered

nuances between positive emotions. They tend to focus on general pleasure or some oversimplified sets of positive emotions, having limitations in granularity. As a consequence, practical issues such as underlying barriers or enablers involved in the process of designing for different types of positive emotions have remained largely unveiled. This limited focus is disadvantageous for designers because they mostly wish to deliberately create positive emotional experiences such as fascination, sympathy, admiration or hope. Although these positive emotions are all pleasurable, the approach to designing for each of them takes different steps because each emotion involves different eliciting conditions: designing for desire is a fundamentally different challenge than designing for relaxation, or for relief. Therefore, by making a design case and reflecting the design process, we explored when and how design activities can be supported in the process of evoking nuanced positive emotions.

DESIGN CASE – MOOD STREET PROJECT

The case that is hereafter reported was conducted in an eight-weeks master level design course ‘design for emotion and subjective well-being’, together with KLM Royal Dutch Airlines (hereafter referred to as ‘KLM’). Twenty students followed the course.

Background

The crew center of the airline locates at Schiphol airport in Amsterdam and there are approximately 9000 cabin crews employed. The airline’s management of the crew center initiated the ‘Mood Street’ design project because they noticed that it is desirable to support the cabin crews to feel prepared for international flight. Because of the large number of cabin attendants, they rarely fly with the same crews. They often meet each other for the first time only a few hours before the flight. The management had identified the preparation procedure for the flight as an opportunity to support the cabin crews and wanted design interventions to improve this experience. In this project, there was no predefined means (e.g. design a product, application, space, campaign, etc.), but the goal of positive emotional experiences for the cabin crews was set.

DESIGN APPROACH

In this project, we took the appraisal approach introduced by Desmet [8] to create design interventions that facilitate positive emotional experiences. The appraisal approach has been demonstrated to be useful for designing with the intention of both eliciting and avoiding specific emotions as it explains how different emotions are elicited by different underlying processes [22,30,31]. In this approach, the process starts with specifying emotional intentions of the design and identifying the appraisals that evoke intended emotions. Next, the concerns underlying the appraisals are identified. Based on the appraisals and related concerns, product (or service) concepts are developed (see Figure 1).

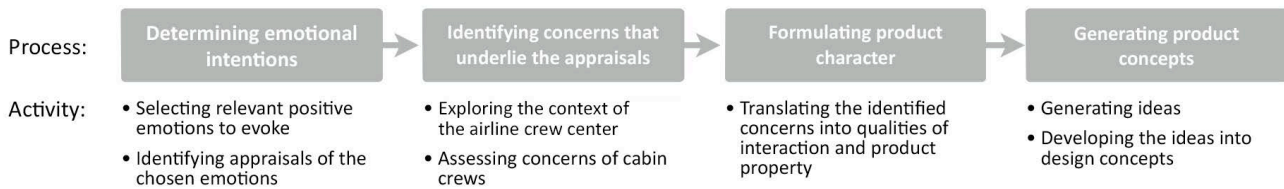


Figure 1. Appraisal based emotion-driven design approach

Step 1: Determining emotional intentions

In this step, a designer clarifies (1) the emotional intention (the emotion that should be experienced by the users) and (2) the design context in which the design will be used, if not specified previously. The emotional intention can be specific (e.g., interest [36]) or a compound experience (e.g., wow experience that combines fascination, desire, and pleasant surprise [9]), or general pleasure [6]. Once emotional intention is specified, designers determine particular appraisals that are related to elicitation of the intended emotion. For example, to evoke interest, the product must be appraised as novel, unfamiliar, and understandable [36], and to evoke desire, the product must be appraised as promising and fit for ownership [5].

In a kick-off meeting that involved the authors (second and third) and two managers of the crew center, the emotional intentions were envisioned. Typology of positive emotions developed by Desmet [7] was used as a reference for determining the positive emotions that are desirable for the given situation (Figure 2). The result was a set of ten positive emotions: anticipation, confidence, energized, inspiration, joy, kindness, pride, relaxation, respect, and sympathy. In the course, the students were split into five groups of four, and two positive emotions were assigned to each group. We allocated a pair of dissimilar positive emotions based on the typology to facilitate their awareness

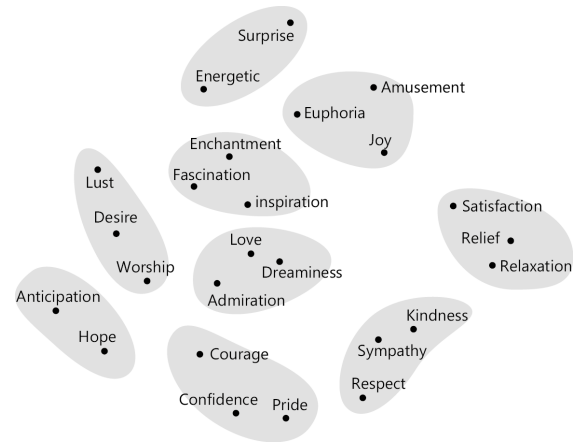


Figure 2. Visualization of similarity among the 25 positive emotions [7: p.6]

on differentiated aspects of the given positive emotions. We considered the number of the positive emotions to be appropriate for the students; challenging, but feasible in the time available. There was an exercise in which students shared their own experiences and definitions of the ten positive emotions, and discuss how the given emotions differ from each other. Next, the students were provided with the definitions and appraisals of the chosen emotions in the form of appraisal components and core-relational themes that represent a summary of the related appraisal

Group	Emotion	Definition	Core-relational theme
1	Relaxation	To enjoy a calm state of being free from mental or physical tension or concern	It arises in a pleasant situation, when it is certain that an undesirable event will not occur in any way.
	Pride	To experience an enjoyable sense of self-worth or achievement	One's praiseworthy behavior surpasses internal or external standard, and/or one recognizes that others appreciate it.
2	Energized	To enjoy a high-spirited state of being energized or vitalized	Something pleasant facilitates the enthusiasm and determination to do something.
	Sympathy	To experience an urge to identify with someone's feelings of misfortune or distress	One recognizes that someone is suffering a distress and is motivated to be helpful.
3	Joy	To be pleased about (or taking pleasure in) something or some desirable event	Something that facilitates goal accomplishment happens or provides sensory pleasure.
	Respect	To experience a tendency to regard someone as worthy, good or valuable	A praiseworthy character of someone conforms to internal or external standard.
4	Kindness	To experience a tendency to protect or contribute to the well-being of someone	One finds relatedness with someone and is motivated to be conducive to his/her goal achievement.
	Anticipation	To eagerly await an anticipated desirable event that is expected to happen	One notices that there is a high chance that a desired event will actually take place.
5	Confidence	To experience faith in oneself or one's abilities to achieve or to act right	It is certain that one is capable of overcoming a challenge in the process of realizing his/her goal.
	Inspiration	To experience a sudden and overwhelming feeling of creative impulse	One is awakened to the realization of a relational meaning of something and is enabled to do something creative.

Table 1. The determined emotional intentions, definitions and core-relational themes [7,35]

components [22]. Table 1 gives an overview of the definitions and core-relational themes of the chosen ten positive emotions.

Step 2: Identifying concerns that underlie the appraisals

This phase was to identify the cabin crews’ concerns that are related to the appraisals of the intended emotions. According to Frijda [16], personal concerns are the determinant factor of appraisal process, therewith affect emotional experiences; when we appraise something as praiseworthy to our concerns, we may experience pride, or when we appraise something as goal-conducive to our concerns, we may experience joy. Therefore, understanding the concerns of the user is the key to effectively address the appraisals of the intended emotions in design processes [8].

The identification of the concerns started with a context exploration; the students immersed themselves in the context following a tour through all surroundings in the crew center. Next, each group interviewed two cabin crewmembers to understand their concerns. Students were instructed to identify the concerns that are associated with appraisals of the intended emotions ranging from concrete (e.g. “I want to send a message”) to abstract degree (e.g. “I want to be in touch with loved ones”) based on the depth interview technique ‘laddering’ [see 29]. It was to see relatedness between the identified concerns: fulfillment of concrete concerns may lead to the attainment of the related abstract concern and similarly, realizing an abstract concern can satisfy a concrete concern [3]. This stage resulted in a set of concerns that the design solutions are supposed to address.

Stage 3. Formulating product character

In this phase, the designer envisions how the concerns can be translated into the product character that represents the appearance of or the qualities of interaction with the product [8]. The students were guided to formulate the product characters that can clearly represent the concerns in

the form of words and/or pictures such as inviting, seductive, submissive, tender or challenged. For example, when the concerns are ‘feel belonged to a community’ and ‘being able to contribute to a community’, then the product character can be expressed by ‘acceptant’ and ‘appreciative’. Each group made an inspiration board on which the collection of representation of product character, related concerns, associative quotes, pictures was attached. The board served as a source of inspiration and as a means to ensure the emotional fittingness of the design concepts. In the idea generation phase, the students were encouraged to refer back to the board.

Stage 4. Generating product concepts

In the last step, ideas for a new product (or service) were generated and developed into product concepts on the basis of the product character and concerns. With the term ‘idea’ we are referring to an original thought, something to further explore and experiment with, and the term ‘concept’ is a more advanced proposal that incorporates original ideas and design objectives [21]. As a starting point of idea generation, we instructed students to use a framework that distinguishes six sources of positive emotions [7]: in human-product interactions, positive emotions can be experienced in response to object (the material qualities of the product), meaning (the associated meanings of the product), interaction (the interactive qualities when using the product), activity (the activity enabled or facilitated by the product), self (the effects of using or owning products), and other (the effects of other people’s activities on us, in which the product plays some role). It was to help students explore various design opportunities for facilitating the intended emotions.

Students were asked to come up with twelve ideas per emotion (e.g. twelve ideas that generates experience of sympathy); in total, 120 ideas that aimed to evoke the ten positive emotions were generated. While generating ideas, three feedback sessions in which the groups shared their ideas together with lecturers of the course took place in order to discuss to what extent the ideas could elicit the intended positive emotions. In an interim meeting, the airline managers, lecturers, and students themselves evaluated and discussed all of the generated ideas together, and selected 20 ideas for further exploration. Following the meeting, the students developed the chosen ideas into product (or service) concepts. Next to this, they started developing rough models to explore how the intended character of the product can be translated into product properties. To demonstrate when and how the product concepts facilitate the intended positive emotions, scenarios were developed.

EXAMPLES OF THE CONCEPTS

This section shows three examples of the developed concepts, in which kindness, anticipation, confidence were aimed to evoke respectively.



Figure 3. An example of inspiration board that depicts product character and related concerns

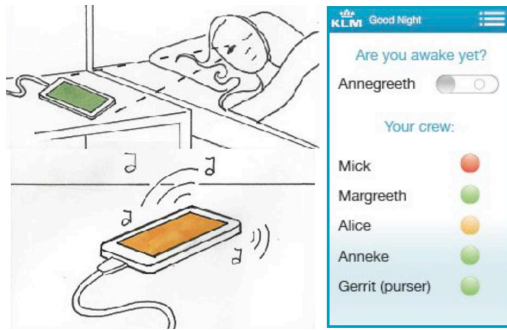


Figure 4. A smartphone application designed to evoke kindness in usage (design by Inge van der Lee, Amanda Lee Jakobsen, Suwen Shen and Maik de Rooij)

Kindness: Good night

Good night is an application for smartphones that gives a kind wake-up call for the cabin crews when they are at home and have early flights. A lot of flight attendants do not sleep well being nervous because they are afraid of oversleeping and being late for the flight. The application detects when a flight attendant is flying early. If this is the case, the day before the flight it warns him/her to set the desired time to wake up and to charge the phone by showing a red light on the screen. Once the alarm setting is done, the screen turns green and stays the same color until the set time. This assures the flight attendant even when he/she wakes up in the middle of the night by simply showing the green color. At the set time, the screen turns orange and starts alarming to wake him/her up. In this moment, he/she needs to enter the scheduled flight number to turn it off and to confirm that he/she is awake. The purser can see the statuses of crewmembers' alarm settings through color indicators. If the alarm does not go off, the flight attendant gets a call from the purser. In this way, the cabin crews kindly look after each other, and feel connected even before they actually meet.

Anticipation: The curtain

The curtain is a concept that leads the cabin crews to be expectant of the upcoming flight. Cabin crews feel the



Figure 5. An installation designed to evoke anticipation in the preparation of flights (designed by Inge van der Lee, Amanda Lee Jakobsen, Suwen Shen and Maik de Rooij)

routine in the crew center as 'preparation area' when stepping into the airport. There is a separation curtain installed between the crew center and the airport to make the cabin crews perceive these two spaces clearly separated. As the cabin crews walk altogether towards the gate of the airport, the closed curtain slowly starts opening and the lights around the curtain frame glow one by one. When all the lights are on, the curtain is completely open. This moment builds up a feeling of anticipation and signals that they are prepared to work as professionals.

Confidence: The big button

The big button is a design for a new ritual that cabin crewmembers can do before flying in order to augment a sense that the team is ready for its performance like the rituals a sport team has before entering a match. The intensity of the light on the button grows according to the number of people touching it representing the mixed energy of the entire members. When every crewmember has hands on the button, the light is at full power. The crew members push it together and a picture of their hands on the button is taken. The picture shows their hands and is sent to them at the end of the trip. This moment reinforces the feeling that they are capable of managing all tasks as a team in trusting each other.

Discussion

Although these concepts are developed to specifically evoke certain positive emotions, they would evoke different positive emotions in addition to the intended ones because products can evoke emotions in various ways [7]. For example, 'Good night' evokes kindness by enabling the cabin crews to support each other (being kind to colleagues), and may simultaneously evoke relaxation as well by ensuring that he/she will be able to be on time (relaxation attributed to the expected consequence of using the application).

Note that the given examples are meant to illustrate designing for nuanced positive emotions apart from the likelihood of implementation in practice. For example, the concept 'Big button' would not be implemented: it would be rather inadequate to be used in KLM's professional environment.

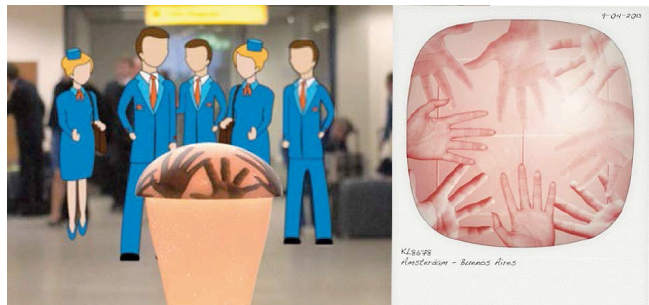


Figure 6. A camera used to evoke confidence before the flights (designed by Lorenzo Romagnoli, Mitra Malkamy, Manon Kühne and Noortje Habets)

LESSONS LEARNED

Following the completion of the project, a focus group session was conducted with five students. From each of the five groups, one student representative participated in. Based on our observations in the design process, the generated concepts and the focus group, we present lessons learned that we think are necessary to consider supporting design activities in designing for nuanced positive emotions.

Lessons in the first stage: determining emotional intentions

1. Internalizing concepts of intended emotions

“Personal reflection gives us an intuitive sense of the emotion, and these theoretic definitions also give methodical sense too. We need both” (Student B).

Although the definitions of the ten positive emotions were given to help everyone in a group have a common understanding on the conception of the intended emotions, students found them still abstract. Most of the students mentioned that the exercise in which they reflected personal experience of the given emotions was valuable to deepen their understanding; they discussed for example, when they had the feeling of joy and respect, and what happened that time and how they reacted in that situation, discovering the differences and similarities in their experiences. Combined this exercise with the provided definitions, students could clarify and establish a consensual concepts on the assigned emotions, which helped them avoid misunderstandings and miscommunications about the design intentions throughout the design process.

2. Understanding appraisals of the intended emotions

“Experience of sympathy starts with recognizing that someone is in need. For this, it is essential to make a design intervention that creates a moment of sharing intimate information. Having this idea in mind, we could sort out what to ask during the interview” (Student C).

Students used the provided appraisal patterns as a reference for understanding eliciting conditions of the given emotions and for self-questioning their ideas in idea generation phase: students related the ideas back to the appraisal patterns to check if their ideas were in line with the appraisals of the given emotions. While useful to have the patterns of how people experience the emotions, not all groups used the provided appraisal patterns and core relational themes. Students mentioned that terminologies in appraisal patterns (e.g. agency, coping ability, etc.) appeared to be tricky to interpret and it was unclear how product properties could be related to them. Furthermore, since the names of appraisal components vary somewhat across appraisal researchers [12], some students were confused when the names were different from their knowledge. This implies that providing the eliciting conditions in the textual form of appraisal patterns would be not directly applicable for a design process.

3. *Being aware of a comprehensive set of positive emotions*
“It was useful to have a full picture of positive emotions. The typology helped us see how our intended emotions are related with other emotions. For example, feeling respect involves various emotions in its episode; respect can be facilitated through being empathized from someone else” (Student E).

Although each group had two specific emotions to design for, most of the students stated that they could benefit from having a general overview of positive emotions to construe the antecedents of the intended emotions. Students used the typology of positive emotions [7] as a reference to see how the intended emotions are related with other positive emotions. Some positive emotional experiences involve other positive emotions as their antecedents. For example, relief arises when something hoped is finally realized and felt satisfactory [22]. This means that to evoke relief, it is necessary to consider the experience of hope and satisfaction in parallel. The group ‘respect’ found that a feeling of being respected could be facilitated when a person notices that other people highly regard what he/she is proud of. In line with this idea, they designed a festive event in which a member of cabin crew feels proud of reaching certain miles and, the colleagues can celebrate and express that they highly regard his/her achievement.

Lessons in the second stage: identifying concerns that underlie the appraisals

4. Focusing on particular emotions to design for

“We knew when to go deeper and to ask for more details during the interview. Having specific emotions in this phase helped us frame our questions, otherwise it is hard to see the points to dig in” (Student B).

Students found it advantageous to have specific emotions as design intention when they were identifying user concerns. During the interview, they could clearly structure their questions and focus on selecting most relevant user concerns, rather than on trying to cover everything; once the interviewee mentioned a certain thing that seemed to be closely related to the intended emotion and appraisals, the students could further probe it. Likewise, having specific emotions made the process of data analysis efficient; students arranged the collected data through the lens of their design intentions (i.e. the given two emotions), considering in what situations the given emotions become important, and what kinds of concerns could be appropriate to relate with the design solutions.

5. Specifying appropriate concerns to design for

“The idea was derived from very personal concern. Because the concern was personal, it might evoke joy for that person. However, for someone who does not have the same concern, there might be no joy” (Student A).

Students strived to identify the concerns that were relevant for a large group of people. For instance, the group who

worked on 'joy' expressed difficulty in selection of appropriate concerns¹. They mentioned that the goal related concern that they selected was too concrete (e.g. "I want to have a good coffee before a long flight.") and it seemed to be not always relevant for the majority of cabin crews. In addition, we observed that when students solely focused on the concerns in the concrete level, there was a tendency to already provide design solutions instead of trying to identify an overarching concern. Therefore, we propose that in order to select most proper concerns, it is required to guide designers to identify concerns thoroughly covering from concrete to abstract level.

6. Shared appraisals in varied positive emotions

"Our concept would evoke joy to some degree, but not explicitly. Perhaps, you may associate users' responses with different positive emotions such as pride." (Student A).

Although all five groups followed the same design process, students perceived that some emotions were more challenging to design for. We argue that this difficulty arose because some positive emotions share the same appraisals so that it was difficult to clearly differentiate. For instance, joy, pride, and satisfaction share the appraisal of 'appreciation of present circumstance', and joy shares the appraisal of 'goal achievement' with pride [13]. This means that the eliciting condition for joy also characterizes pride. Ortony, et al. [27] suggest that to differentiate pride from joy, an event (or stimulus) should be appraised to be not easy to achieve, or the result of an event should be beyond expectation. We propose that to support designers to evoke a certain emotion with clear differentiation, designers need to be equipped with a detailed overview of nuanced eliciting conditions so that they can compare what is shared, and what is different between similar positive emotions.

Lessons in the third stage: formulating product character

7. Representing product character

"The board was very useful. Quotes, pictures, and statements embodied the qualities of interactions and product properties. Literally, it was an inspiration board" (Student C).

Using rich operational means to represent the product character (e.g. quote, photo, statement, collage) helped students get a sense of how the chosen concerns can be materialized. As to the approach to formulating character, students somewhat struggled in representing quality of a

product that embodied the concerns. In general, they used two approaches: either a metaphorical or literal way. We observed that when the product character was made in a very literal way, the character tended to actually end up in the final design. For example, the group who worked on kindness expressed the product character through a statement "Flirting is a way of showing kindness", and their final concept was an interactive mirror that gives a personal 'flirting' message to a flight attendant. While concrete, the product character made in a literal way was not evocative of creative exploration. We think that product character needs to be open-ended and inviting interpretation to some degree; the product character should not rigidly dictate the design direction.

Lessons in the fourth stage: generating product concepts

8. Staying open to other emotions for divergent thinking

"In this phase, having two specific emotions restricted our creativity. Some promising ideas seemed to evoke other positive emotions rather than the intended ones. We were too hasty in discarding them. Perhaps, we could build on those ideas and tweak them to evoke our target emotions" (Student E).

Students mentioned that sticking to the given two positive emotions somehow limited them in exploring various design opportunities. They assumed that apart from the specified emotional intention, envisioning various positive emotional responses of users could be also useful in that it could help them expand their solution space. Thus, it would be helpful to encourage designers to incorporate other positive emotions with the predefined ones so as to broaden their view.

Note that although this lesson seems to contrast the fourth lesson 'focusing on particular emotions to design for', they are clearly different in that each lesson is to serve a different design activity: the fourth lesson is about helping designers to deliberately converge from a diversity of positive emotions to the highly relevant ones in order to deepen understanding on users, and the eighth lesson is to help designers to diverge their view to explore an array of design solutions.

9. Exploring different sources of positive emotions

"We tried to challenge ourselves to come up with ideas based on each of the sources. It helped us see different opportunities and create unique ideas" (Student C).

Students used the framework of six sources of positive emotions [7] as an idea generation technique. For example, when they felt stuck while focusing on 'object', they started thinking of how other sources such as meaning or activity could play a role in facilitating the intended emotional experience. They found this framework particularly useful for an experience-driven design project because the

¹ There are two types of joy: joy as characterized by a feeling from progress towards one's goals [22], and joy experienced from sensorial pleasure, which is goal-independent [32]. The group found it difficult for the former.

framework helped them avoid being fixated to a certain stimuli type and focus on changing the experience.

GENERAL DISCUSSION

Studies in HCI and design research traditionally have focused on generalized pleasure or displeasure in user experience, giving little attention to differentiated nature of positive emotions and to how these differentiated emotional experiences can be facilitated with designs. Through a design case that followed appraisal approach, we identified the challenges that designers face in the process of designing for nuanced positive emotions and discussed how those challenges could be overcome: we investigated (1) how designers can assimilate their emotional intentions in the project; (2) how they can identify appropriate user concerns that are associated with the appraisals of the intended emotions; (3) how they can translate the concerns into concrete ideas that evoke the predefined emotions. Along with the lessons, our approach and used materials presented in this paper (e.g. typology of positive emotions) can provide designers with a frame of thought that can help them systematically structure their design processes such a way that the design outcome has the specific emotional impact.

The findings illustrated in this paper provides a first step to purposely generate positive experiences, but we should be aware that emotions are subjective thereby a resulting experience could deviate from the prediction [8]; the way people appraise a stimuli can differ from each other. For example, a person may appraise a product as novel whereas someone may appraise the same product as stereotyped due to his/her different background. Likewise, the concept 'Good morning' would probably not evoke a feeling of kindness if the service is used by a flight attendant who is less afraid of waking up early and is confident of being on time. Therefore when designing for emotion, user-centered approach and in-depth understanding on the context and users' concerns (e.g. goals, values, and aspirations) are crucial in that this enables the designer to envision how users will appraise the design solution. Reflecting our experience, it is suggested that the implementations of each step should be based on the insights that are shared and checked with the actual users in order to make sure that the final design is developed to have the intended emotional impact. The premise for this is that the design process supports users to express their emotional responses in a fine-grained way. Discussing emotional responses to products with users is challenging; emotional states are difficult to articulate, especially the types felt at low intensity, and users often experience multiple emotions simultaneously, with each different product aspect (e.g. appearance, functionalities, comfortability) [8]. Given the complexity in emotions experienced in human-product interactions, tools that measure distinct emotions such as PrEmo [4] and Geneva emotion wheel [33] could be applied to understand user emotions.

We focused on positive emotions in this study, but this does not mean that positive emotions are only worthwhile designing for and a panacea for all situations. Note that there are some situations where pursuing behavioral effects of positive emotions are not appropriate, e.g. people in dangerous situation should remain focused or ready to escape and for this, moderate degree of negative emotions such as fear or anxiety would be required. Therefore, designers should make sure that they have a solid understanding on the context and users, and should question about what kinds of emotional impact are most relevant for the context, and when is suitable to experience certain emotions.

The current study comes with some limitations. Since the illustrated lessons are mainly derived from the design activities in early stages of a design process, they would be not fully comprehensive; there might be different design challenges involved in the rest stages such as product (or service) realization and validation of emotional impact on users, which are not covered in this study. With the help of more case studies that encompasses entire scope of a design process, some details in the approach could be further developed and additional lessons could be gained. As outlined in Cross [2], there are differences between inexperienced designers and expert designers in performing various design activities such as gathering information, scoping and framing a design problem, searching for solutions. This implies that the differences in expertise could influence on how a certain design approach is carried out. Regarding the expertise of the participating design students, we are aware that a student cohort is not representative for all designers. The same study, if conducted with design professionals, may have resulted in different patterns. Another issue is that the setup of the design case was somewhat unnatural; dividing designers into several groups and allocating particular emotions to them would not be the case in real design practice. Rather, the reality of design is much more sophisticated and holistic than is shown in the design case. Note that through this controlled setup, we intended to outline the issues to consider in designing for nuanced positive emotions because this allowed us to observe differentiated design challenges involved in evoking ten different positive emotions under the same condition.

All the lessons we learned taken together, we think that a key factor is to support designers to have developed 'emotion knowledge' in their design processes. Emotion knowledge is the knowledge that people use to understand and reason about emotions in terms of causes and consequences of the emotions experienced by themselves or by others. This knowledge is also related to the ability to express and talk about emotional experiences (in both past and present) [1]; as the lessons in our experience showed, designers and design processes can benefit from differentiating various positive emotions, articulating the desired emotional states to facilitate, discerning

distinctiveness in terms of eliciting conditions, and reasoning underlying user concerns that are associated with the particular positive emotions. Hence, we postulate that to deliberately design for positive emotions, it is of importance to structure a design process that leverages designers to work with developed emotion knowledge. It is especially relevant because as found in Desmet [7], not all designers have a structured overview of positive emotion types and are good at communicating emotional experiences with specificity. This implies that some designers might have a difficult time in specifying what kinds of positive emotional responses they need to design for. As next steps of this research, we aim to explore how a nuanced understanding on positive emotions can be facilitated, and to develop tools and techniques that can be used in the design process based on the lessons we gained in this study. We expect that the findings illustrated in this paper can serve as a guide for further researches and design projects that aim to create positive experience, and hope that more attention will be given to the values of bringing the concept of nuances of positive emotions into a design process in HCI community.

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REFERENCES

- Barrett, L.F., Gross, J., Christensen, T.C., and Benvenuto, M. Knowing what you're feeling and knowing what to do about it: Mapping the relation between emotion differentiation and emotion regulation. *Cognition & Emotion* 15, 6 (2001), 713–724.
- Cross, N. Expertise in design: an overview. *Design Studies* 25, 5 (2004), 427–441.
- Demir, E., Desmet, P.M.A., and Hekkert, P. Appraisal Patterns of Emotions in Human-Product Interaction. *International Journal of Design* 3, 2 (2009), 41–51.
- Desmet, P.M.A. Measuring Emotion. In *Funology*. 2003, 111–123.
- Desmet, P.M.A. Inspire & Desire. In *Design & Emotion Moves*. Cambridge Scholars Publishing, 2008, 108–124.
- Desmet, P.M.A. Three levels of product emotion. *Proceedings of the International Conference on Kansei Engineering and Emotion Research*, (2010), 236–246.
- Desmet, P.M.A. Faces of product pleasure: 25 positive emotions in human-product interactions. *International Journal of Design* 6, 2 (2012), 1–29.
- Desmet, P.M.A. and Schifferstein, H. Emotion research as input for product design. In *Product Innovation Toolbox*. John Wiley & Sons, 2012, 149–175.
- Desmet, P.M.A., Porcelijn, R., and Van Dijk, M.B. Emotional Design; Application of a research-based design approach. *Knowledge, Technology & Policy* 20, 3 (2007), 141–155.
- Ekman, P. Basic Emotions. In *Handbook of Cognition and Emotion*. Sussex, U.K., 1999.
- Ekman, P. Sixteen enjoyable emotions. *Emotion Researcher* 18, 2 (2003), 6–7.
- Ellsworth, P.C. and Scherer, K.R. Appraisal Processes in Emotion. In *Handbook of the Affective Sciences*. Oxford University Press, New York, Oxford, 2003, 572–595.
- Ellsworth, P.C. and Smith, C.A. Shades of Joy: Patterns of Appraisal Differentiating Pleasant Emotions. *Cognition & Emotion* 2, 4 (1988), 301–331.
- Fredrickson, B.L. What Good Are Positive Emotions? *Review of General Psychology* 2, 3 (1998), 300–319.
- Fredrickson, B.L. and Cohn, M.A. Positive emotions. In *Handbook of emotions*. Guilford Press, New York, 2008, 777–798.
- Frijda, N.H. *The emotions*. Cambridge University Press, 1986.
- Frijda, N.H. *The Laws of Emotion*. Lawrence Erlbaum Associates Publishers, London, 2007.
- Hassenzahl, M. Hedonic, emotional, and experiential perspectives on product quality. In *Encyclopedia of Human Computer Interaction*. IGI Global, 2006, 266–272.
- Izard, C.E. *Human emotions*. Plenum, New York, 1977.
- Jordan, P.W. Pleasure with Products. In *Human factors in product design*. 1999, 206–217.
- Koen, P.A., Ajamian, G.M., Boyce, S., et al. Fuzzy Front End. In *PDMA Toolbook for New Product Development*. 2002, 5–35.
- Lazarus, R.S. *Emotion and Adaptation*. Oxford University Press, Oxford, 1991.
- Ludden, G.D.S., Hekkert, P., and Schifferstein, H.N.J. Surprise as a Design Strategy. *Design Issues* 24, 2 (2008), 28–38.
- Lyubomirsky, S., King, L., and Diener, E. The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin* 131, (2005), 803–855.
- Mano, H. Emotion and Consumption: Perspectives and Issues. *Motivation and Emotion* 28, 1 (2004), 107–120.
- Norman, D.A. *Emotional Design: Why We Love (or Hate) Everyday Things*. Basic Books, New York, 2004.
- Ortony, A., Clore, G.L., and Collins, A. *The Cognitive Structure of Emotions*. Cambridge University press, Cambridge, 1988.
- Plutchik, R. *Emotion: a Psychoevolutionary Synthesis*. Harper & Row, New York, 1980.
- Reynolds, T.J. and Gutman, J. Laddering theory, Method, Analysis, and Interpretation. *Journal of Advertising Research* 28, (1988), 11–31.
- Roseman, I.J. A model of appraisal in the emotion

- system. In *Integrating theory, research, and applications*. Oxford University Press, 2001, 68–91.
31. Scherer, K.R. Appraisals Considered as a Process of Multilevel Sequential Checking. In *Appraisal processes in emotion: Theory, methods, research*. Oxford University Press, New York, 2001, 92–120.
 32. Scherer, K.R. The nature and study of appraisal. In *Appraisal processes in emotion: Theory, methods, research*. Oxford University Press, 2001, 369–391.
 33. Scherer, K.R. What are emotions? And how can they be measured? *Social Science Information* 44, 4 (2005), 693–727.
 34. Snyder, C.R. Hope Theory: Rainbows in the Mind. *Psychological inquiry* 13, 4 (2002), 249–275.
 35. Yoon, J., Desmet, P.M.A., and Pohlmeier, A.E. Embodied Typology of Positive Emotions: The Development of a Tool to Facilitate Emotional Granularity in Design. (2013), 1195–1206.
 36. Yoon, J., Desmet, P.M.A., and van der Helm, A. Design for interest: exploratory study on a distinct positive emotion in human-product interaction. *International Journal of Design*, (2012).
 37. Yoon, J., Pohlmeier, A.E., and Desmet, P.M.A. Nuances of Emotions in Product Development: Seven Key Opportunities Identified by Design Professionals. (2014), 643-652.