# Developing Usage Guidelines for a Card-Based Design Tool: A Case of the Positive Emotional Granularity Cards

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## Abstract

**Background**   Card-based design tools have gained popularity as a means to communicate research insights and to make them usable in a design process. There are various examples of card tools and guidelines for developing a card set itself, yet there has been little research into how the usage of card tools can be systematically formulated. Although the existing literature on card tools often presents certain usages, it rarely explicates how the usage was structured, and provides few references to the underlying decisions.

**Methods**   Through a case study of the positive emotional granularity cards, this paper presents a bottom-up approach in which designers' needs and their own techniques to use the cards are reflected in formulating new card usage guidelines. Three design workshops were conducted, each of which explored how designers made use of the cards in the three design activities respectively: (1) assimilating nuances of positive emotions; (2) specifying emotional intentions; and (3) generating product ideas. In a creative session with design researchers, the workshop findings were translated into usage guidelines.

**Results**   There were individual differences in designers' ability to make use of the PEG cards. At one end of the spectrum was the designer who immediately started to play and explore the cards, creating his or her own usage rules. At the other end of the spectrum was the designer who needed instructions to get started. Most designers explored usage, but at the same time they felt insecure about getting value without having some guidance. The workshops allowed us to spot the benefits and drawbacks of the techniques the designers used, and to identify their needs in using the PEG cards. The creative session resulted in the PEG card guidelines that assist and inspire designers in the three design activities.

**Conclusions**   Provisional usage guidelines can considerably contribute to a card tool's usefulness, even if the card usage is envisioned to be open-ended and versatile. The bottom-up approach proved valuable to generate new insights into how a card set can best be used and how designers can be guided when using the card set.

**Keywords**   Design Tool, Card-based Tool, Emotional Design, Emotional Granularity

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## 1. Introduction

Card-based design tools have become a popular means to disseminate insights from design research and to make them usable in a design process. For example, Lockton (2013) developed Design with Intent, a card set that introduces a range of techniques for understanding and changing environmental and social behaviours. Lucero and Arrasvuori (2013) created PLEX cards to communicate the 22 categories of a 'playful experiences' framework to designers who want to design for playfulness. The general advantages of card-based tools are tangibility and visualised contents; designers are enabled to browse quickly through and organise the cards, gaining the knowledge inscribed on the cards (Beck, Obrist, Bernhaupt, & Tscheligi, 2008; Lafrenière, Dayton, & Muller, 1999). Recent studies on card-based tools have generated guidelines for developing effective card tools. Wölfel and Merritt (2013), for instance, analysed several widely used card-based tools and introduced a set of design dimensions, e.g., the scope of use, intended purpose and formal quality. These dimensions can serve as a reference to plan features of a new card tool carefully.

Despite the popularity of card-based tools, there has been little research into how the usage of card tools and its guideline can be deliberately formulated. Card usage means the ways in which cards are employed for certain purposes in a design process (Sanders & Stappers, 2012). Although the existing literature on card tools often presents certain usages (e.g., Lenz, Diefenbach, & Hassenzahl, 2013; Raftopoulos, 2015), it rarely explicates how the usage was generated and provides few references to the underlying decisions. Thus, creating an effective usage of cards (i.e., how to use the cards) and guidelines on the usage can still be challenging for those who want to introduce a card tool and its practical applications to designers. In our view, it is crucial to develop an understanding of how usage guidelines can be systematically generated. No amount of well-crafted cards will make them useful if designers are not well aware of how they can tap into the cards for their practice.

From our experiences, the development of usage guidelines is not less important than the card set itself. We developed the positive emotional granularity cards with a goal to support emotion-driven design processes (Yoon, Desmet, & Pohlmeyer, 2013). Positive Emotional Granularity (PEG) refers to the ability to represent the experience of positive emotions with precision and specificity (Tugade, Fredrickson, & Feldman Barrett, 2004). The PEG cards explain distinct characteristics of several positive emotions through theoretical descriptions and pictures (see Figure 1). With an expectation that the PEG cards are self-evident, the usage was made to be open-ended. After the PEG cards were implemented on many occasions, we noticed that some designers could creatively use the cards themselves, while other designers were not able to get the value of the cards. They were uncertain when and how the PEG cards could be useful.

**Figure 1** Positive emotional granularity cards

This observation made us realise the necessity of providing usage guidelines to ensure that designers can make use of the PEG cards. Especially interesting was the observation that some designers could ingeniously appropriate the PEG cards to fit their intended purposes. The techniques used looked valuable to share with other designers. From this, we found that there is also value for us to look at how designers use the cards and learn from them to develop usage guidelines. Similarly, previous studies on design creativity have shown that designers exhibit patterns of creative behaviours when provided with a tool, and it can be of benefit to capture these patterns and instil them into a design method (Benami & Jin, 2002). It can, therefore, be advantageous to take a bottom-up approach to developing a usage guideline in which designers' needs and their own ways to use the cards are reflected in formulating a new usage. It is assumed that the resulting usage will be well accepted and more feasible to apply than if it is generated solely based on a design researchers' vision, as in a top-down approach.

This paper focuses on the development of card usage guidelines by means of the bottom-up approach. The guiding question of this research is, "how can a usage guideline of a card-based tool be developed in a structured way?" Specifically, we present a case study formulating usages of the PEG cards with a focus on applications in the three design activities: (1) assimilating nuances of positive emotions; (2) specifying emotional intentions (i.e., the emotion that should be experienced by the users); and (3) generating product ideas. The foci were selected based on the benefits of PEG in a design process (Yoon, Pohlmeyer, & Desmet, 2014, 2016 for an overview).

This paper can support design researchers as a reference when developing card set usage guidelines. The first part presents the PEG cards. Next, three design workshops are reported that investigated how designers use the PEG cards. The third part reports the development of the usage guidelines. The paper ends with a general discussion, including limitations, future research direction, and a general reflection on the development of a design tool.

## 2. The Positive Emotional Granularity Cards

Consumer products can evoke a wide range of positive emotions, such as amusement, confidence, relief and pride (Desmet, 2008). Each of these emotions represents a different experience and stimulates different user thoughts and behaviours (e.g., Campos, Shiota, Keltner, Gonzaga, & Goetz, 2013; Fredrickson, 2013). Despite the diversity of positive emotions, most frameworks and tools for emotion-driven design (e.g., Jordan, 2000; Norman, 2004) have tended only to deal with valence and arousal, being limited in leveraging designers to consider nuances between positive emotions.

For designers, having a broad repertoire of positive emotions and being aware of their different nuances can have several benefits. Firstly, it can support a precise determination of design intentions, which can increase the chances that the design outcome will have the desired emotional impact. Secondly, articulating emotional states with fine-grained emotion terms enables coherent communication throughout the design process; and thirdly, considering an array of users' positive emotional responses can stimulate divergent design directions, as each emotion involves a different elicitation condition (for a complete overview of benefits, see Yoon et al., 2014, 2016).

We developed the PEG cards with the intention to support these benefits (Yoon et al., 2013). The PEG card set consists of 25 cards, each representing one emotion from a typology of positive emotions that are often experienced in human-product interactions (Desmet, 2012). The cards contain multi-layered information: emotion labels, behavioural tendencies, definitions, visuals of behavioural expressions and eliciting conditions (see Figure 2). For each emotion, four indicative pictures were used to minimise ambiguity. In previous explorations, this number was found to balance diversity and overview. All pictures have been validated. In addition, a description of the conditions that evoke an emotion was included, drawn from cognitive emotion theory (i.e., corerelational theme; see Lazarus, 1991). A detailed description of the development process can be found in Yoon et al. (2013).

**Figure 2** Four examples of positive emotional granularity cards

## 3. Design Case: Development of the PEG Card Guidelines

This section describes the process of developing usage guidelines for the PEG cards. The process included three main stages: (1) exploring the use of the PEG cards; (2) generating ideas for usage; and (3) formulating instructions to use the PEG cards.

### 3. 1. Stage 1: Exploring the use of the PEG cards

As a first stage, we explored how designers use the PEG cards, focusing on their own techniques and the experienced difficulties to resolve.

### 3. 1. 1. The PEG cards in use

The PEG cards were used in three design workshops, each of which focused on (1) assimilating nuances between positive emotions; (2) specifying emotions to design for; and (3) generating product ideas, respectively. A workshop as a research method has been widely used in the development of design tools because it facilitates a natural situation where participants are actively encouraged to work with the tools (e.g., Lockton, 2013; Sleeswijk Visser, van der Lugt, & Stappers, 2007). The workshops took place in industrial practice and design education. In the first two workshops, there were no provisional instructions for using the PEG cards. In the third workshop, instructions were provided. The procedure of that workshop was inspired by a usage proposed by designers in an initial exploration (Yoon et al., 2013).

The first workshop was conducted with 12 design practitioners as part of the master-class 'Design for Emotion' at Delft University of Technology. The group was split into four groups of three, and each group received the PEG cards. As a stimulus, the watering can 'Taboo' designed by Sander van der Haar was presented (Figure 3). Each group reviewed the PEG cards and discussed the emotions they had towards the stimulus by referring to the cards. Next, all groups presented the results of their explorations, including the emotions they selected and the product properties (e.g., shape, material and colour) that were related to these emotions.

The second workshop took place at an Amsterdam-based design consultancy (Sunidee) and involved ten professionals of various disciplines (five designers, two product managers, one marketer and two master design students), divided into two groups of five. The workshop assignment was to envision product-service systems for a smart home with an emphasis on safety and security. As the start, the participants reviewed the PEG cards and were guided to determine target emotions by selecting an individual or a combination of the cards.

The third workshop involved four master design students from Delft University of Technology. The task was to generate product ideas that can improve the communication between caregivers in a hospital. The design students were instructed to pick a random card individually from the card set and to generate ideas that could evoke the emotion represented by the card. They took another card and continued generating ideas again if they thought that the chosen emotion was far off or they felt the flow of ideation dropped.

All three workshops ended with a discussion in which the participants discussed how they used the PEG cards and how the cards could be improved. The first and third workshops were audio-recorded and discussions were transcribed. The second workshop was not recorded due to the non-disclosure agreement of the contents; in this case, the facilitator took notes during the workshop. The observations, recorded audio data, notes of the facilitators and generated ideas from the workshops were combined in the analysis. Participants' statements associated with card usages were mapped out based on the three design activities. Next, they were clustered based on similarity in terms of advantage and disadvantage.

**Figure 3** Participants discussing the emotions that the given stimulus evokes (left) and the stimulus used in the workshop (right)

### 3. 1. 2. Results and implications for usage guidelines

It was observed that there were individual differences in designers' ability to make use of the PEG cards. At one end of the spectrum was the designer who could immediately start to play and explore the cards, creating his or her own usage rules. At the other end of the spectrum was the designer who needed instructions to get started. Most designers appeared to be somewhere in the middle. They explored usage, but at the same time felt insecure about getting the most value out of it without having some guidance. Although the participants enjoyed the versatile quality of the PEG cards, they missed guidelines or proposed application steps.

In this section, the observed usages are reported, along with the implications for further developing the usage guidelines.

*Usage in the first workshop for assimilating nuances between positive emotions*

The PEG cards appeared useful for introducing the differences between positive emotions to the participants. By referring to the cards, the participants could spontaneously articulate three to seven types of feeling they had in response to the stimulus, such as surprise, fascination and desire. They reported that the act of spreading out the cards on the table and comparing them helped to understand the distinct qualities of emotions in the set.

At the start of the workshop, the participants had slightly different notions of the meanings of some emotions. They sometimes picked a card based on first impressions, examined the information on the card and then discarded it upon realising that the definition of the emotion was different from what they had initially understood. In addition, while they mentioned valuing the theoretical descriptions on the cards, they tended only to look at the emotion words and pictures. They mentioned that the descriptions looked 'wordy' and were uncertain how the information could help them in the given task.

The results indicated that card usage should allow designers to take the time to explore the content on the cards, because they would miss the contained information when relying only on the first glance. Also, the usage should guide users to actively interpret the contents beyond literal comprehension.

*Usage in the second workshop for specifying target emotions*

The participants reviewed which emotions would fit the given design context by browsing through the cards and sorting them out on the table. Cards were organised based on relevance, and cards were removed if they seemed to be irrelevant. Participants reported that the pictures on the cards were useful to infer what kinds of experience would be appropriate to facilitate, because the pictures implicated the general situations that evoke particular emotions and associated emotion expressions. When satisfied with the selection, participants used it as the basis for the next step.

Other techniques that were used were shuffling the cards, making pairs of similar emotions, and sharing personal experiences in which they had experienced certain emotions. In particular, taking a moment to recall personal experiences and sharing them within a group seemed to facilitate an open atmosphere and active discussion. The designers who shared personal stories mentioned that recalling their experiences helped them to be more aware of nuances between emotions and how different the emotional experiences of users would be.

The participants were uncertain if all the emotions that they had selected were relevant for the design context. They noted that the selection was based solely on their knowledge and previous experience, without an empathetic understanding of users.

The workshop revealed the importance of supporting designers to empathise with users to choose proper emotions to design for. For this, usage actions need to help designers, considering users' goals and concerns and related contextual factors, e.g., time and activities of people in the context.

*Usage in the third workshop for generating product ideas*

Observations and participant feedback indicated that the cards and the guideline provided in the workshop were useful to create a large number of initial ideas quickly. The act of shuffling was perceived as amusing, helping them to stay engaged in the workshop. Participants reported that drawing a new card from the deck stimulated them to explore different design directions, and randomly chosen cards encouraged them to consider non-obvious emotions that they would otherwise never have tried. At the same time, however, the randomness of emotion selection was not always inspiring; some emotions (that seemed to be irrelevant for the design brief) resulted in a creative dead-end.

Some designers tried to combine more than one emotion into a target 'emotion profile'. It was observed that this helped the designers to produce more elaborate and novel ideas than when they used only a single target emotion. Some emotions were found to be difficult to design for. Participants noted that the difficulty was not primarily because of the emotion type, but the combination of the design context (i.e., a hospital) and the specific emotions. However, they did not see this as a critical issue in the context of generating product ideas. They used the different emotions as a source of inspiration in their creative processes, not a rigid target of the design.

Some participants, especially non-designers, found it difficult to translate the core relational themes into product properties, e.g., appearance and movement. Related to this, they suggested that the inclusion of concrete product examples in the cards would help to infer how design could be made to be in line with the core relational themes. In contrast, others were concerned that such examples would hinder the designers' creativity, as it could incline them towards the example solutions.

The randomness in using the PEG cards appeared to be useful to explore emotions that were not part of the designers' regular repertoire, resulting in broadened design directions. However, designers should not be forced to spend time on emotions that are irrelevant for the design brief. Having an emotion profile that consists of several target emotions was found to be useful for generating more novel and advanced ideas than working towards a single target emotion. For idea generation, card usage should guide designers to consider multiple emotions as a design intention.

*Usability of the PEG cards*

The participants noticed a lack of diversity in the choice of the pictures for some emotions. Moreover, they mentioned that the pictures of some emotions (e.g., desire and relaxation) were clichéd. This caused the participants to make rash one-to-one associations between the situations and emotion types instead of construing the underlying processes that cause the emotions.

The need for customisability was often raised. In some cases, participants could not find an emotion term they wanted to express from the cards (e.g., a feeling of trust and gratitude) and wanted the option to create their own cards. Another issue was that participants wanted to use multiple copies of a card when they were dealing with several sets of emotional intentions that consist of multiple emotions.

### 3. 2. Stage 2: Generating ideas for the PEG card guidelines

Based on the findings from the workshops, the PEG card guidelines were formulated. This section reports a creative session in which ideas for the card usage were generated, followed by the proposed guidelines.

*Creative session: generating ideas*

A two-hour creative session was organised in which the authors and three additional design researchers (Ph.D. candidates in emotion-driven design research) generated the PEG card guidelines. The foci of the card applications were the same as in the workshops: understanding nuances of positive emotions, determining the emotional impact of a product, and diverging design directions when generating product ideas. The creative session consisted of three parts: (1) the findings from the workshops were shared; (2) participants discussed the processes within the three design activities; and (3) they created guidelines for using the PEG cards for the three activities.

The proposed ideas were subsequently reviewed by the authors with a focus on their supportiveness in the three given design activities. The proposed ideas involved various exercises that adopt techniques from emotion research and collective decision making, e.g., the contemplation technique (Schorr, 2001; Wallbott, 1998) and the repertory grid technique (Castellani, 2011). These exercises aimed to provide a structured procedure to explore and reason the relationships between emotions. One idea, for example, was to guide designers to develop a narrative together by referring to multiple cards. In addition, many ideas utilised additional materials to leverage the usage effectively, e.g., a sketchpad and a timeline on a board.

### 3. 3. Stage 3: Formulating usage guidelines of the PEG cards

The authors consolidated the suggested ideas into a set of PEG card guidelines by considering the findings from the workshops as design requirements (see section 3.1.2). The guidelines were formulated for a group setting. The following section presents the usage guidelines of the PEG cards for the three design activities.

### 3. 3. 1. Resulting instructions

*Understanding nuances between positive emotions*

The guideline intends to provide designers with a quick overview of the emotions in the set and explore the contents of the PEG cards. The repertory grid technique (Castellani, 2011) was incorporated into the guideline to stimulate designers to discern the characteristics of the emotions carefully.

The PEG cards can provide designers with a wide repertoire of positive emotions. The cards enable the designers to browse through and compare the emotions in the set, and to explore and understand their different characteristics.

*Split into groups of three (or four) members. Go through all cards in the deck and randomly take three cards (three per participant). Read the contents on the cards and reflect on how the texts and pictures on the cards are related to one another. Compare the three emotions, thinking about how the emotions are similar to and different from one another. Discard the emotion that seems dissimilar to the other two emotions. Explain to the group members how you compared them and why you discarded one. Have all members explain. Next, reflect on moments in which you experienced the two remaining emotions in relation to products. Share your stories, answering the following questions: What happened to cause the emotion? What was going through your mind and body? How did you express your emotion? Did the experience change you in any way? Repeat this procedure to review all cards in the set.*

*Determining target emotions*

The guideline focused on supporting designers to consider dynamics in users' experiences with an empathic understanding of users. The ContinUX framework (Pohlmeyer, 2011) was adopted in the guideline to encourage reflection on users' goals and possible activities in different time phases in the user experience (e.g., pre-use, in use and post-use).

The PEG cards can help designers determine target emotions. This target can be a single emotion or a profile that combines several emotions (e.g., a wow experience that combines fascination, desire and pleasant surprise (Desmet, Porcelijn, & Van Dijk, 2007).

*Divide into groups of three or four members. Specify a design context and make a list of users' activities that may take place in the context as well as a list of users' goals, along the three stages of product usage: before, during and after using a product, respectively. Discuss what users would want to achieve and what procedure they would go through for this. Write the discussed ideas on a sheet of paper. Review the generated list and select key activities that are relevant to support through designs. Next, discuss what kind of positive emotions it would be desirable to evoke and how they can support users' activities by referring to the cards. Try to answer the question "What emotions do people expect to have while taking this action?" For each activity, draw cards that seem to fit the given activity, and sort them out on the basis of relevance for that activity. Write down the activities and the selected target emotions.*

*Facilitating creativity in design conceptualisation*

The guideline is intended to assist designers to generate a large number of ideas and to further elaborate the initial ideas by means of comparing and combining multiple emotions. Randomness in the card usage was kept to widen the space of exploration and encourage novel ideas.

Differentiating a wide diversity of positive emotions enables designers to envision unusual product-emotion combinations that can stimulate new design directions and usage situations. The PEG cards can be used to mediate this creative process.

*Divide into groups of three or four members. Clarify a product type or a context to design for. Randomly draw a card from the deck (one per participant). Have a look at the information and pictures and think about what it is that causes the emotion referring to the eliciting condition described on the card. Write down the kind of conditions that need to be addressed to evoke the emotion. Next, start generating ideas that could evoke the positive emotion by trying to fulfil the conditions. Record all ideas by sketching or writing them down on paper. Explain your ideas and learn what other members came up with. Among the emotions that the other members have chosen, select one that seems to be suitable to evoke together with the emotion on your card. Then, start working on the newly chosen emotion. Elaborate the initial ideas or come up with new ideas building on the initial ones. Explain how you further developed the ideas to the others. Repeat the same procedure until all 25 emotions have been explored.*

### 3. 3. 2. Discussion

A creative session was carried out to come up with concrete usage guidelines that can assist and inspire designers when they use the PEG cards. The involvement of researchers appeared to be useful: they generated a variety of usage strategies that could effectively address the findings from the workshops.

In the session, participants' prior-knowledge on the research behind the card set seemed crucial. The recruited researchers had expertise in both design methods and emotion-driven design so that they could readily grasp the value of the card set and speculate the card usage. If they were not specialised in the research topic, we would have had to include an additional step in the creative session to inform them about emotional granularity and why the cards were designed this way.

The proposed guidelines are intended to be usage tips, and designers can use the PEG cards as they like. The PEG cards can be used in different settings and can be adapted to other design methods. There are also other design activities in which a nuanced understanding of positive emotions plays a supportive role, e.g., developing empathy for user emotions (for an overview, see Yoon et al., 2014, 2016). These different advantages could be achieved with an alternative usage or might require the development of a new tool.

## 4. General Discussion

Card-based tools have been widely used as a means to share research insights (see Wölfel & Merritt, 2013). However, how to develop good card usage has rarely been addressed in the literature on card-based design tools.

The main contribution of the paper is that the approach used in the case can help design researchers better understand how the usage of a card tool can be structured, and to develop the usage of existing and new card tools. Through a design case, the current paper presents how a usage of a card tool can be systematically created. Firstly, we conducted three design workshops that made use of the PEG cards and analysed the usage from the participating designers' views; secondly, we conducted a creative session with design researchers to formulate the PEG card guidelines.

Although the PEG cards can be used in many different ways, without guidance, not all designers were able to make full use of them. This shows that usage guidelines can considerably contribute to the card set's usefulness. From observing designers who could creatively use the cards on their own, we were able to learn the benefits (and the drawbacks) of their techniques in particular design activities. We believe the proposed usage guidelines can also be valuable for those who could freely use the cards, because the guidelines complement several observed usage strategies. In a future iteration, we plan to test and further iterate the guidelines.

Novice and experienced designers differ in how they approach design tasks. A designer's creative space increases with increased experiences (Christiaans, 1992); experienced designers tend to have a broad repertoire of design strategies and can flexibly combine multiple ones, whereas novice designers are less aware of the strategies (Ahmed, Wallace, & Blessing, 2003). This implies that the differences in expertise could influence which techniques designers use. Likewise, in the results of the current study, it was clear that expert designers tried more diverse approaches to using the PEG cards than design students. Concerning the intention to use a workshop as a platform to learn from designers, it is recommended to involve selectively both experienced and novice designers. This would increase the opportunity to observe diverse ways to use and appropriate the cards, and to comprehensibly identify designers' experienced difficulties and their expectations in applying them.

Design researchers put substantial effort into developing card sets that are attractive and inspiring. For us, it proved valuable to invest time and effort to conduct workshops with designers, because these generated new insights into how the PEG cards can best be used and how designers can be guided when using the card set. At the same time, it was also useful to do the creative session with experts, because they were able to translate insights from the workshops into clear usage guidelines. We can recommend this combination of activities to formulate usage guidelines, even if the card set usage is envisioned to be open-ended and versatile. Based on our current findings, we believe that a set of provisional usage guidelines can help tap the potential of the card set. We hope that our current findings can serve as a guide for further research on the development of usage guidelines for card-based tools.

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