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'Feeling good' unpacked: Developing design tools to facilitate a differentiated understanding of positive emotions

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Abstract The range of positive emotions experienced in human-product interactions is diverse, and understanding the differences and similarities between these positive emotions can support emotion-driven design. Yet, there is little knowledge about what kind of tool would be effective to leverage the differentiated nature of positive emotions in a design process. The current study explores the possibilities to develop design tools that facilitate a nuanced understanding of positive emotions and the considerations for developing such tool. Four new tools were developed that were different regarding how they described distinctiveness of positive emotions, formats, and usages. This paper introduces the tools and reports a focus group study that investigated when and how the tools would be of use in design processes, and their strengths and weaknesses.

Keywords *Design for emotion, Positive emotion, Design tool, User-centered design*

Introduction

Imagine yourself as a designer having a kick-off meeting with your client. The client asks, "Please design a mobile payment service that makes people feel good." You commit to the challenge and return to your design studio. You talk with your colleagues about the project and suddenly find that they look a bit puzzled. One designer asks, "What do you mean by 'feeling good'?" He continues, "Do you mean confidence, curiosity, or amusement? These are all pleasurable feelings, yet different. Which ones do we need to address?"

This is an exemplary snapshot of when distinguishing nuances between positive emotions becomes an issue in a design process. We can experience a myriad of different pleasant emotions when interacting with products, and it has been found that being aware of differences between them can be advantageous for designers (Desmet, 2012). For example, it can be helpful in deliberately determining positive emotions to design for upfront in a design process and supporting communication about users' emotional responses to a product within design teams, with clients, and with users (for an overview of the benefits of differentiating positive emotions in design, see Yoon, Pohlmeyer, & Desmet, 2014).

Then, how can we help designers be aware of nuances of positive emotions and use this understanding for their practices? Perhaps, taxonomies of positive emotions that can be experienced in human-product interactions (e.g., Desmet, 2003; 2012) could serve as a repertoire to choose from when specifying emotional intentions of a design. Or having an overview of the different causes of a set of positive emotions (e.g., Campos, Shiota, Keltner, Gonzaga, & Goetz, 2013) could help understand the underlying conditions that evoke certain positive emotions. In design research, various types of design tools and techniques have been introduced with an intention to make theoretical knowledge assessable to designers and to inspire designers in user-centered design activities, e.g., card-set, experience prototyping (Buchenau & Suri, 2000), and design documentary (Raijmakers, Gaver, & Bishay, 2006). Although diverse, it has been unexplored what type of tool would be effective to leverage the differentiated nature of positive emotions in a design process and how such tool could be developed.

In this paper, we explore how a nuanced understanding of positive emotions can be facilitated with the aid of design tools. It was expected that the resulting insights could clarify (1) what kind of tool would be appropriate to apply for a certain design activity (e.g., understanding user emotions) and (2) what needs to be considered to develop such a tool. Thus, the research question is: how can nuances of positive emotions be conveyed to designers by means of a design tool?

This paper begins by describing the research approach and developments of four design tools. The next section reports the results of two focus groups in which design experts reviewed the developed tools and discussed when they could be useful to apply, along with their strengths and weaknesses. Based on the results, this paper ends with a discussion on limitations and recommendations for future research.

Empathy	Affection	Aspiration	Enjoyment
Sympathy, Kindness, Respect	Love, Admiration, Worship	Dreamy, Lust, Desire	Euphoria, Joy, Amusement

Optimism	Animation	Assurance	Interest	Gratification
Courage, Hope, Anticipation	Surprise, Energetic	Pride, Confidence	Inspiration, Enchantment, Fascination	Relief, Relaxation, Satisfaction

Figure 1. Typology of 25 positive emotions categorized in nine emotional types (adapted from Desmet (2012)).

Approach

Given the fact that there are few design tools available that facilitate a nuanced understanding of positive emotions that can be used as a reference, we decided to take 'research-through design' as a main approach. Research-through design refers to a research method in which building and testing prototypes take center place and becomes the key means in constructing knowledge (Stappers, 2007).

We decided to develop a set of design tools, all of which helps distinguish various positive emotions in a different manner, and analyze them with design experts to identify their advantages and disadvantages. Four prototypes of design tools were conceived: positive emotional granularity cards, emotionPrism, emotion raconteur, and emotion carousel. These tools were based on the typology of positive emotions (Desmet, 2012) that includes 25 positive emotions that can be experienced in human-product interactions (see Figure 1). The tools were conceptualized to be different regarding how they describe distinctiveness of positive emotions, formats, and usages. The following parts of this section describe the developed tools.

Developing design tools

Tool 1: Positive emotional granularity cards

Positive emotional granularity cards (Yoon, Desmet, & Pohlmeyer, 2013) consist of 25 cards that incorporate definitions of emotion labels, the general conditions where people experience certain emotions, and visuals of emotion expressions. Each card represents a positive emotion. In line with Wallbott (1998) who showed that behavioral manifestations are indicative of a particular emotional state, it was assumed that providing visuals of behavioral manifestations and concrete contexts could give a comprehensive understanding of the emotions in the set. The visuals used in the card-set includes, for example, a group of people being proud of winning a game and a man being relaxed listening to music. For each emotion, four different images were used. The chosen images were validated to check if they could effectively characterize the target emotions, and whether they were distinct from other similar positive emotions. A detailed description of the validation procedure can be found in Yoon et al. (2013). All emotions have unique 'core relational themes' that represent the conditions that elicit them (Lazarus, 1991). Core relational themes of the 25 positive emotions were formulated to describe the eliciting conditions from appraisal theory-based literature and printed on the cards (for an overview, see Yoon et al., 2013). For instance, core relational themes for respect and surprise are *"a praiseworthy character of someone conforms to internal or external standard"* and *"something unexpectedly happens beyond one's expectation"* respectively.

Tool 2: EmotionPrism

The tool, 'emotionPrism' consists of movie-sets, which illustrate how people interact with a product when expressing the 25 different positive emotions in these interactions (Yoon, Pohlmeyer, & Desmet, 2016). This tool was devised based on the insight that positive emotions are characterized by distinct behavioral

Figure 1. Typology of 25 positive emotions categorized in nine emotional types (adapted from Desmet (2012)).

Figure 3. Screenshots of movies (from left: joy, enchantment, and love) and the interface of the emotionPrism.

tendencies (Fredrickson, 2013). For example, joy stimulates playful interactions, and kindness makes the interactions tender and protective. We postulated that having a tool that communicates the differentiated behavioral tendencies could support designers to purposefully envision user behavior concerning particular positive emotions, and to stimulate different types of usage behavior. It was decided to use hands interacting with an artifact as a channel to discriminate between positive emotions since most human-product interactions involve hands. The movie-sets were generated through an exploratory study with professional actors manifesting positive emotions, e.g., squeezing, groping, and caressing. Instead of showing a specific product in the videos such as camera or lamp, this tool uses a neutral cube that symbolizes a product in an abstract manner to make the application of the tool not limited to the design of a particular product type. Four movie-clips were generated for each emotion, and validated through online surveys (for the details of the validation process, see Yoon, Pohlmeyer, & Desmet, 2016). Designers can use the movie-sets incorporated in the tool to discuss what kinds of usage behavior would be appropriate or desirable for a design context and a product, and to select a set of relevant positive emotions accordingly by referring to the movie-sets as a repertoire to choose from.

Tool 3: Emotion raconteur

'Emotion raconteur' is a sound library of users' anecdotes. The anecdotes were collected from actual users' experiences in which they had felt positive emotions when using products (Desmet, 2012). The anecdotes illustrate how a product plays a role as a cause of an emotion in a certain context and how users react to it. For instance, an anecdote used for the emotion 'sympathy' was *"sometimes I see an old car that has been damaged and taped with glue. The owner does not seem to have enough money to repair properly it. I imagine how difficult her life is and feel sympathy."* The idea behind this tool was that, as argued in Demir (2010), anecdotes that depict certain emotional experiences can help designers be aware of antecedents of emotion, i.e. what caused the feeling, and in a narrative, distinct emotions can be well perceived at the sentence level beyond simple valance classification (Buitinck, van Amerongen, Tan, & de Rijke, 2015). It has been proven that some specific positive emotions can be identified via vocal cues, e.g., affect bursts of admiration and laugh with amusement (Schröder, 2003). Since emotions expressed in an anecdote can be more accurately and quickly communicated when they are supplemented by paralinguistic cues such as voice tone inflection (Epley & Kruger, 2005; Pell et al., 2015; Sauter, McDonald, Gangi, & Messinger, 2014), we decided to voice-record the anecdotes with professional voice actors. Each emotion involved three to four anecdotes (86 in total), and the recorded audio files were incorporated into an audio application in which the anecdotes can be navigated based on emotion type and product type.

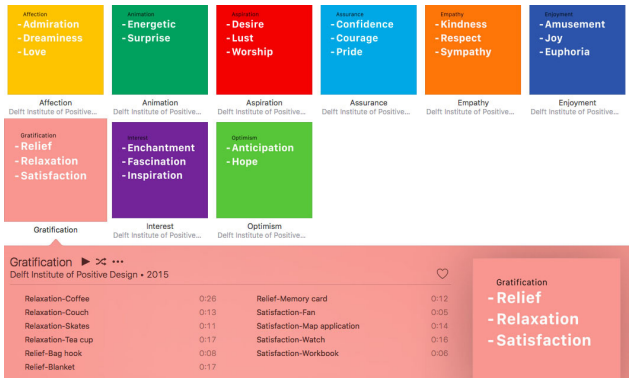

Figure 4. A screenshot of the app through which the anecdotes can be played.

Tool 4: Emotion carousel

Emotion carousel is a package of three interactive installations, 'Assurance', 'Enjoyment', and 'Interest', each of which enables designers to explore three similar positive emotions in an interactive way (nine emotions in total). We assumed that in line with Buchenau, M., & Suri, J. F. (2000), offering firsthand experiences of particular emotions in a physically staged setup could give a visceral sense of differences between the emotions.

Assurance

This tool intends to show what it is like to feel confident, courageous, and proud in interactions. The tool consists of several interactive steppingstones placed apart on which a person can step. When he/she goes up a steppingstone, it gives a pleasant sound with a light effect, confirming that it is safe to jump on, which would make him/her confident to keep stepping forward. When he/she encounters a stone, at a distance of one meter, the stone on which he/she stands gives a signal that it is doable to reach the next one through light and sound effects, which also gives an inviting signal. This would lead him/her to forge ahead with courage. After going through all

Figure 5. A participant interacting with the installation 'Assurance'.

Figure 6. Participants interacting with the installation 'Enjoyment'.

steppingstones, they start celebrating by blinking the lights and playing songs. This would give a sense of achievement, facilitating a feeling of pride.

Enjoyment

This tool intends to evoke three emotions: joy, amusement, and euphoria. The tool consists of a series of soft balls connected to each other. When a person touches a ball, a light comes to his/her hand and leaves again. The slowly breathing light would encourage him/her to follow it and gently pat the ball. While doing this, the tool explains through a speaker that sensorial pleasure could give a feeling of joy. Then, the tool invites him/her to the game 'catch me if you can' intending to evoke amusement. Lights start fast moving and jumping, challenging him/her to catch them. When a light is grabbed, it stays in the ball. As several lights are moving, it requires involving additional players to catch all moving lights, which would make the interaction more socially playful. While doing the game, the tool explains the feeling they are likely to have, which is amusement. When all lights are caught, all balls start flashing on and off to signal the successful end of the game. This accomplishment gained through the joint efforts would make the experience euphoric.

Interest

The Interest has a large sphere in which a series of lights and speakers are nestled. By changing its behavior, it shows three different conditions where people would experience enchantment, fascination, and inspiration. For enchantment, the sphere hangs out of a person's reach putting him/her in a passive position and mysteriously glows emitting slow sounds. After a while, the sphere comes down and invites him/her to get close to it; a spot starts blinking and attracts him/her to touch. When touched, another spot starts flashing, building a pattern of lights. While doing this, he/she would get fascinated and become curious about what kind of pattern he/she will end up. After this cycle, the inspiration phase starts. The sphere gives him/her the opportunity to create his/her pattern of lights and melodies by touching different spots. This would encourage playing with it and inspiring to express his/her creative ideas into a form.

Figure 7. Participants interacting with the installation 'Interest'.

Assessing the developed tools

While all four developed tools are meant to provide a broad repertoire of positive emotions, they address different aspects of emotional experiences and use varied forms, which implies that they might have different strengths and weaknesses. We postulated that depending on the type of design activity, e.g., communication of users' emotional states or specification of emotional intentions, to some degree, the usefulness of each tool would differ. For example, the images used in the card-set would help designers grasp and imagine the situations the emotions arise while the movie-sets used in emotionPrism, which was made abstract and decontextualized would stimulate designers to conceive the effects of emotions on interactions.

Two focus groups were conducted in which the developed tools were reviewed by a panel of design experts, focusing on how the tools could contribute to helping designers discern a variety of positive emotions, when the tools would be useful to apply, and their strengths and weakness.

Method

Procedure

Three mixed groups of design experts participated in the study: four design teachers, four design professionals, and one emotion expert. The design teachers and emotion expert were recruited from the faculty of Industrial Design Engineering of Delft University of Technology. On average, the design teachers had 28.3 years of experience in education and the emotion expert had 6.5 years of experience in emotion-driven design research. The design professionals were from four design consultancies and self-identified their roles as a usability engineer, industrial designer, interaction designer and user researcher. On average, they had 4.5 years of experience in design practice. The emotion expert was in charge of guiding the participants to keep their focus on emotions during the sessions, not being distracted by other subjects such as technologies harnessed in the prototypes. The participants were recruited from the authors' professional networks and were paid for their contribution.

The focus group consisted of three phases: learning the topic of the study, reviewing the prototypes of the tools, and discussing their characteristics. In the beginning of the session, the first author explained the benefits of discerning and articulating nuances between positive emotions for designers based on the findings in Yoon et al. (2014), and the purpose of developing tools. Next, the participants watched demonstration movies that illustrated how designers used the tools. The prototypes of the tools were placed on a table, and the participants were guided to try them out. Although the prototypes of 'emotion carousel' were presented, the computational components were left inactive due to the intricacies of installation setting.

The participants then discussed each tool in comparison to others regarding the ways they account for differences between positive emotions, e.g., descriptive and experiential. The tools were reviewed in turn, and the participants described in what kind of design context the tools would be useful, along with their strengths and weaknesses. They made suggestions regarding additional issues that should not be overlooked for developing a new tool. Each session took two hours and was audio-recorded.

Data analysis

All audio recordings of two focus groups were transcribed verbatim and coded based on the context of tool application, strength, weakness, and suggestions. In the analysis of the transcripts, the emphasis was given to identifying themes concerning the relevance to how the nuances of positive emotions were explained, instead of the prevalence within the transcripts, e.g., general impression of the fidelity of the prototypes. In the process of analysis, data related to general considerations for design tool were left out, e.g., size, time and budget available, and location of use.

Results

Overall, the participants agreed that designers could benefit from being aware of differences between positive emotions in various design activities. The concepts of the developed tools were well accepted and the elements incorporated in the presented tools, e.g., pictures and videos, were seen to be carefully selected and relevant inputs that can serve as a reference or an education material. They were convinced that designers and design students could use the given tools to learn multi-faceted aspects of positive emotions. In this section, the main strengths and weaknesses perceived by the participants are reported with the examples of their quotes. Table 1 gives an overview of the main findings.

Positive emotional granularity cards

"It helps me describe how I actually feel. I would never come up with 'admiration' or 'love', and likewise, people have a lot of troubles expressing their emotions. People just say "that's good" or "I am happy with it".." (Participant 2)

Provision of a broad palette of emotion labels combined with pictures and descriptions appeared to have a potential to deepen emotion knowledge and minimize the risk of misleading interpretation. Participants pointed out that the emotion labels would ensure unambiguity and support articulation of emotional states with fine-grained terms, which would provide designers with a shared language of emotions, facilitating clear communication. The card format was particularly appreciated, as it was effective to share and arrange the contents with others. The participants found the pictures useful; (1) the pictures would give designers a quick overview of positive emotions and help them decide to further look at the detailed information, and (2) the elements illustrated in pictures, e.g., context, product, and people, could support designers to infer when and how particular emotions arise.

While useful, the descriptions of emotions were considered a bit abstract and difficult to compare. Most of the participants agreed that the textual information would not be gone through because designers tend to be more attracted to visual stimuli in their creative processes. The card format was seen to be limiting in helping designers to understand experiential aspects of emotion, e.g., a behavioral and physiological influence of an emotion. The selection of the pictures was considered critical; some cards included culture-sensitive ones, leaving room for wrong interpretations, and the diversity of examples that illustrate emotion-eliciting situations were to be ensured.

EmotionPrism

"This tool can be used for an interaction design course. It helps students understand… how I can translate an interaction quality into a movement of or with an object. Then, the emotion words don't matter that much." (Participant 6)

The participants responded that the tool well demonstrated differentiated usage expressions in relation to emotions and, it could be used as a repertoire of various interactions qualities. They mentioned that the several videos could support designers to identify and explain specific feelings that the interaction with a product should bring for the user. The participants particularly favored the abstract representation for this purpose. Also it could guide translation of the intended positive emotions to interaction qualities and physical form of a product because the videos could give a hint of what product properties could be effective to afford an interaction that expresses certain emotion.

The weaknesses of the emotionPrism were that some positive emotions were inappropriate to express with only hands. The participants suggested that some emotions, e.g., euphoria and excitement, might be better expressed by showing a full-body of a person. To reenact some emotions, e.g., hope and dreaminess, narratives seemed indispensable. Since the videos only demonstrate how emotions influence behavior, when and how those emotions arise remained unclear, which appeared to be problematic, as the tool gives partial information about an emotional experience.

Emotion raconteur

"From the story, I discovered different types of love – not only love between two people but love with an ugly object from a grandfather. It shows you can also design for that kind of experience." (Participant 6)

The participants regarded the voice recordings as one of the strengths of the tool; the voices in the narrations clearly conveyed a user's emotional states and seemed to facilitate empathy with him/her. All participants agreed that the professional voice actors'

Table 1. An overview of the suggested design activities, strengths, and weaknesses.

Tool	Design activity	Strength	Weakness
Positive emotional granularity cards	— To deepen designers' emotion knowledge — To use a shared language of emotions within a design team	— Minimize the risk of misleading interpretation — Help articulation of emotional states with fine-grained terms — Effective to share and arrange the contents with others — A quick overview through pictures — Help infer when and how particular emotions arise	— Abstract descriptions of emotions — Difficult to compare the descriptions — Not useful to understand experiential aspects of emotions
EmotionPrism	— To understand the relationship between emotion and behavior — To specify interaction effects to address — To translate the intended positive emotions into interaction qualities	— Provide a repertoire of various interactions qualities — Demonstrate what product properties could be effective to afford an interaction that expresses certain emotion	— Unclear expressions of some emotions — Do not explain the causes of emotions
Emotion raconteur	— To facilitate empathy with users — To help stakeholders understand the intended emotions to design for	— Vivid expression of emotions — Stimulate to imagine actively what the user and situation would look like	— Take a long time to go through all anecdotes — Emotions are not comparable — Do not give an overview of emotions
Emotion carousel	— To provide an education material for students — To inspire designers (as a collection of examples that show how design evokes particular emotion)	— Give a visceral sense of differences between emotions	— Do not give an overview of emotions — Difficult to remember the emotions experienced while using the tool — Difficult to communicate the nuances of the feelings — Less applicable in a professional context

recordings made the anecdotes credible and lively, stimulating them to imagine what the user and situation would look like. The concrete product examples were particularly appreciated in that they helped easily understand how a product could play a role in eliciting particular emotions. Given these advantages, the participants mentioned that this tool would be effective in helping stakeholders of a design project, e.g., client, understand the intended emotional experience the design needs to facilitate, and empathize with their target users.

Since it takes a long time to go through all anecdotes and they are incomparable, the participants responded that this tool would not be supportive when a designer wants to have a quick overview of the positive emotions; the tool is more useful when a few positive emotions are already determined to focus on. The participants noted that an extra care should be paid to the generations of the recordings. Some recordings sounded too polished and stereotyped, which made less authentic and inspirational.

Emotion carousel

"Sometimes we realize something when we actually do. How I feel through my body - I can't get it from reading a book. Reading '30 degrees of temperature' is different from actually being in a warm room" (Participant 5)

The strength of the emotion carousel reported by the participants was that first-hand experiences of particular positive emotions through interactions with artifacts could give an intuitive sense of differences between them. The direct experience would enable designers to reflect the feelings they had, the qualities of the interactions, and the conditions where the interactions were enabled. This tool was seen to be a major advantage for those who study emotion-driven design. One participant mentioned that the experiential quality of the tool would enable design students to learn and open up their mind that various emotions can be experienced in the interactions with a product. Moreover, the tool itself could serve as a collection of examples that shows how product properties (i.e., shape, size, behavior, and color) can be manipulated to evoke a particular emotion.

However, the participants pointed out that some people might be unaware of or not clearly remember the emotions they experienced while using the tool, and would find it difficult to communicate the nuances of the feelings. Besides, people's emotional responses may largely differ due to different meaning attribution or current mood. The participants criticized that the concept of the tool seemed less applicable in a professional design context.

Additional findings

The participants reported that the given tools would play their roles as a resource, but there would be an added value in using a tool as a mediator that motivates active learning about positive emotions. They suggested two approaches: (1) making 'making' as a part of a tool and (2) contemplating. The participants noted that the iterative process of designing for particular positive emotions in person may lead designers to ponder upon the conditions that evoke them, how users perceive it, and how product properties could be manipulated to facilitate those conditions. Besides, the participants suggested that designers could grasp subtle differences between positive emotions by discussing their retrospective real-life memories.

The four tools were perceived to be limiting in providing a comparative overview of positive emotions. The participants found this issue critical; they postulated that depending on a criterion, the similarity between positive emotions can be differently arranged, and ensuring multiple entry points for exploring and comparing the emotions could be advantageous. Some examples given by the participants were classifications based on interpersonal versus non-interpersonal emotions, eliciting conditions, effects on behavior, and how long the emotions last, i.e., durations.

Discussion and conclusion

This paper sheds light on the topic of designing for nuanced positive emotions with a focus on how a differentiated understanding of positive emotions can be facilitated by using design tools. The focus group study with design experts examined when and how the four types of design tools would be of use in design processes, and their strengths and weaknesses were discussed. In general, the purpose of developing tools was well accepted, and the participants could relate the practical benefits of applying the tools with various design activities such as communicating emotional intentions, envisioning effects of emotions on behavior, and increasing an empathic understanding on particular emotional experiences.

All four developed tools were considered useful to understand differences between positive emotions in a fine-grained manner, yet they were regarded different in terms of the application possibilities, strengths, and weakness. There was no single tool considered effective for all of the suggested design activities. Each tool appeared to have varied strengths and weaknesses, and their usefulness differed depending on the type of design activity. From this observation, we believe that the comparative overview of the four tools emerged from the study (see Table 1) could give an insight into what kind of tool would be appropriate to apply in design processes; a designer could choose a proper one by referring to specific design activities and strengths that each tool is associated with. In addition, the identified advantageous (and disadvantageous) aspects of the four tools could serve as design considerations for developing a future tool. A new tool could be conceived to avoid certain disadvantageous aspects of the four tools or to integrate several advantageous aspects that may corroborate the other in supporting a particular design activity.

The focus group study comes with some limitations. The study aimed to clarify when and why to use the developed tools, but the scope of the discussed design

activities was somewhat narrow. Although designers can benefit from a nuanced understanding of positive emotions across all stages of a product development process (Yoon et al., 2014), most of the referred ones during the study were mainly focused on the activities in the early stage. This might be due to the setup of the study; if the participants were provided with a model of a design process, e.g., human-centered design process (ISO, 2010) and was guided to use it as a reference during the discussion, the results would have been more thorough and specific. Although the 'emotion carousel' is an experiential tool, meant to evoke certain positive emotions through physical interactions, it was reviewed only based on a demonstration movie. One participant mentioned that it was hard to conceive how designers could benefit from using it without a direct experience.

We expect that actual applications of the developed tools in various design projects will allow us to better understand how designers perceive and experience the tools, which will help us further improve the tools and the findings reported in this paper. In particular, within the suggested tool applications, there were some activities that involve non-designers such as a client and an end-user. Although the participating design experts suggested that the tools could be effectively used in collaborative activities, it is uncertain whether other stakeholders of a design project would equally value the tools and be willing to use them. Therefore, it is required to delve into other stakeholders' views on tool applications and involve them in devising new tools and techniques.

While exploratory, this study provides the first insights into how designers can be supported to work with a differentiated understanding of positive emotions with the help of design tools. We will refine the current tools based on the collected suggestions and continue to explore ways to support designers in their efforts to deliberately create positive experiences.

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