Art-Based User Research: Combining Art-Based Research and User Research to Inform the Design of a Technology to Improve Emotional Wellbeing

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Abstract. This paper presents research output from an experiment that combines ideas from User Research and Art-based Research. Artistic processes inspired the study, in which we asked participants to assess and then "paint" their emotions over emotion-eliciting images using an array of materials, such as watercolors and colored pencils. We used a mixed methods approach that included questionnaires, psychometric data from validated scales and informal conversations. Our primary goals were to inform the design of a mobile application meant to improve emotional wellbeing and assess whether creative self-expression can help to engage users when evaluating and exploring their affective states. We conclude by summarizing the results, which we believe to be positive.

Keywords: Art-based research · Design · Emotions
Human-Computer Interaction · Technology · User research · Wellbeing

1 Introduction

This document presents a hands-on research study mainly intended to improve the design of an upcoming mobile application for the self-monitoring of emotional states called PaintMyEmotions. Routinely monitoring our affective states, over prolonged periods of time, can help us to understand how, and why, they vary, which in turn can contribute to enhancing our emotional wellbeing. Self-monitoring is a commonly used activity in clinical settings, but it can also prove useful to those who merely wish to know more about themselves to improve.

Several applications exist to facilitate this activity. However, they frequently present problems of attrition (high drop-out rates or low adherence) [11,12,24]. The lack of user engagement ("the emotional, cognitive and behavioral connection that exists, at any point in time and possibly over time, between a user and a resource" [1]) can lead to the incorrect use of such applications, which can negatively impact its efficacy.

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Our research consists mainly of exploring how the use of artistic expression techniques, such as painting and photography, can be used to enrich interactive experiences and engage people's attention through creative enjoyment. Painting and photography have also been used in therapeutic settings to facilitate emotional expression and healing, in a field called Art Therapy - "the use of art materials for self-expression and reflection in the presence of a trained art therapist" [9]. Art therapy has been found to be an effective treatment by at least two reviews with a short body of quantifiable data [21,23].

We embraced this idea of employing artistic expression to improve users' engagement from the beginning of the design process of PaintMyEmotions, during user research, to inform the future design and lead it in the right direction. For this study, we chose to use a mixed methods approach. We merged a qualitative analysis of participants' paintings of their emotional states and their feedback regarding the activity during group discussions, with the rigor of a psychometric instrument to measure the psychological state of flow. The state of flow happens when activities are so engaging that everything else around seems to "fade away" and is associated with engagement and creativity [7].

We hypothesize that performing creative expression practices can induce a state of flow, which we consider to have the potential to increase engagement with technology and also the level of enjoyment from using it. Furthermore, we deem plausible that the playful nature of painting can make the process more engaging.

1.1 Art-Based User Research

Often seen as a dichotomy, art and science have the potential to enrich each other. As stated in the ArtScience manifesto: everything can be understood through art or science, but both understandings by themselves are incomplete. The manifesto goes on to state that ArtScience serves to attain a richer and universal understanding of phenomena by comprehending the human experience through the union of artistic and scientific modes of exploration and expression [22].

This same idea is shared by what is known as Art-based research - "the systematic use of the artistic process, the actual making of artistic expressions in all of the different forms of the arts, as a primary way of understanding and examining experience by both researchers and the people that they involve in their studies" [16]. Plus, Art-based methods can be helpful in better grasping notions of health and wellbeing [19], which can be especially relevant with complex constructs such as emotional states, since it is difficult to gather this kind of data during user studies, due to its sensitive nature. Moreover, emotions can be difficult to express. To begin with, some individuals might not be able to fully understand what they are feeling at a precise moment, due to a lack of emotional self-awareness or a lack of emotional literacy. Plus, even if they are entirely aware of their own emotions, they might not feel comfortable with sharing them with other people, including researchers. Using methods inspired by the artistic process may help participants to further engage with the study and

feel more comfortable expressing their feelings, thus helping in the extraction of phenomenological data.

Human-Computer Interaction (HCI), on the other hand, is an interdisciplinary research domain that intersects technology and computer science with psychology and the social sciences [3]. This field includes several methods aimed to conduct User Research, which focuses on better understanding users and their behaviors, needs, and motivations, to build technologies better suited for them. User Research is a staple of User-Centered Design (UCD) and highly recommended to improve the design and later adoption of the product being designed [13].

We believe that incorporating Art-based methods in User Research can help to enrich the latter, by making participants more engaged with the study and the sharing of personal data, and that is how we came up with the study design presented in this paper, described next.

2 Study Design and Procedure

We designed this study with the concepts of ArtScience, Art-based research and User Research in mind, to obtain answers to the following questions:

1. Does "painting" one's emotional state contribute to induce a state of flow?
2. How do people "paint their emotions" over a photo?

The study was carried out in two phases: a pilot session, to test and optimize the procedure, and three subsequent sessions of a hands-on experimental study, which included psychometric measures and was followed by an informal discussion with the participants.

2.1 Pilot Session

This session's goal was to ascertain whether the devised procedure would generate relevant results. We agreed that it did, and decided to use the knowledge gained from this session to improve the design of the ensuing study sessions. This session involved six participants (two males, with a mean age of 30 years old). In this session, we used three photos and set no time limit for the painting activity. In the end, we asked the participants to fill in the Flow Short Scale [10]. The main conclusions we drew from this session were that participants had a hard time understanding the phrasing of the questions of the Flow Short Scale and that some participants took a long time to paint the photos (one of them painted a single photo for more than 30 min). Because of this, we decided to look for a new flow state measure instrument and to limit the amount of time given to paint each photo. It is also relevant to note that the fact that they took a long time to paint might signify that they were having fun and engaged in the activity. Despite being all seated together at a table, and having to share the painting materials, the participants were concentrated on the painting activity, as illustrated by Fig. 1. Focused attention, to the exclusion of other things and other people, is one characteristic of user engagement [1].

Fig. 1. Participants engaging with the painting activity during sessions one, three and two, respectively.

2.2 Study Sessions

Participants. In total, 19 participants (10 female, mean age: 32 years old) volunteered to take part in the study. All participants signed an informed consent. We distributed participants between three sessions: eight in the first session, six in the second session, and five in the third one. Participants originated from Brazil, Italy, and Portugal. Their professions included: Ph.D. student, software engineer, sound engineer, designer, architect, veterinary, journalist, and teacher. Regarding their acquaintance with mood tracking: 17 participants knew what mood tracking was; 16 said that they believed that mood tracking could be useful; only one of the participants told to had practiced mood tracking (using the app Mood Meter); finally, three participants said to have tried coloring books for adults.

The Self-Assessment Manikin (SAM). SAM [2,17] is a pictorial assessment system that measures (through self-report) the valence, arousal, and dominance associated with an individual's affective reaction to a stimulus. In our study, we only used the valence and arousal dimensions. We excluded the dominance dimension because the stimuli used only provides data for the dimensions of valence and arousal.

The Flow State Scale (FSS). The FSS [15] is a self-report 36-item instrument for the measurement of the flow state. This scale represents all the nine dimensions of flow discussed by Csikszentmihalyi [4,5]: challenge-skill balance, action-awareness merging, clear goals, unambiguous feedback, concentration on the task, sense of control, loss of self-consciousness, time transformation and autotelic experience. Even though the FSS was specifically developed with sport and physical activity in mind, it has been employed before in other settings, namely the relationship between motivation and flow experience to academic procrastination [18], knowledge workers' (mostly engineers and scientists) work experiences (e.g., fixing things like hardware or computer software, assembling prototypes) [20], and also to explore the effect of web-site complexity on flow during web surfing and shopping [14].

Stimuli. We used five printed photos from the Geneva affective picture database (GAPED) [6], which is a collection of visual, emotional stimuli. Two photos had negative contents – spiders and a scene meant to induce emotions related to the violation of moral and legal norms (human rights violation). One photo had neutral content (an empty plant pot), and the other two had positive contents - animal babies and nature scenery. GAPED's photos (Table 2) are rated according to valence and arousal, which we measured in this study through the SAM instrument.

Painting Materials. For the painting activity, we provided the following materials to the participants: tracing paper, crayons, markers, watercolors, colored pencils, and glitter glue.

Procedure. We began the study by explaining to the participants what was going to happen during it and instructing them on how to use the SAM instrument. Then, we handed the participants the consent agreement document, followed by a questionnaire inquiring about demographic data and the participants' familiarity with the concept of mood tracking. The participants were then asked to look at the printed photos from the GAPED database for about 20 s. We distributed the photos in a random order among the participants. After that, the participants filled in the SAM measure. Then, the participants placed a sheet of tracing paper over the photo and started to paint, in whichever way they fancied—three minutes were given to the participants to paint each photo (during the pilot session we observed that this period was the most common among participants). After painting and filling in the FSS questionnaire, we talked with the participants for a while about the meaning of their paintings and the emotions they were trying to express, and also regarding the state of flow experienced (or not) while painting the photos.

3 Results

3.1 Flow State

We measured the flow state using the FSS scale. The internal consistency reliability coefficient for the FSS scale, as indexed by Cronbach alpha, was found to be excellent (alpha = .93). The average score was 125 (out of 180). Table 1 presents the individual scores of the FSS scale. Regarding the nine components of flow, the one with the highest score was "loss of self-consciousness", with a score of 307 out of 380 (19 participants $\times$ 5 (maximum score for each question) $\times$ 4 questions to access each component). This state occurs when the individual is completely focused on the activity at hands, which was also observable during the sessions. The lowest score was "unambiguous feedback" (232 out of 380), which is understandable, since there was no expected outcome for the activity of painting the photos – they were simply told to try and "paint their emotions", but there was no reference to what would constitute a good, or a bad, outcome.

These results can be seen in Fig. 2. Observable signals of the state of flow, such as focused attention, were also observed during the sessions, as is illustrated by Fig. 1.

Table 1. Individual scores of the FSS questionnaire.

Participant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Score	108	94	118	125	120	134	125	134	121	161	166	127	110	109	108	107	148	126	140

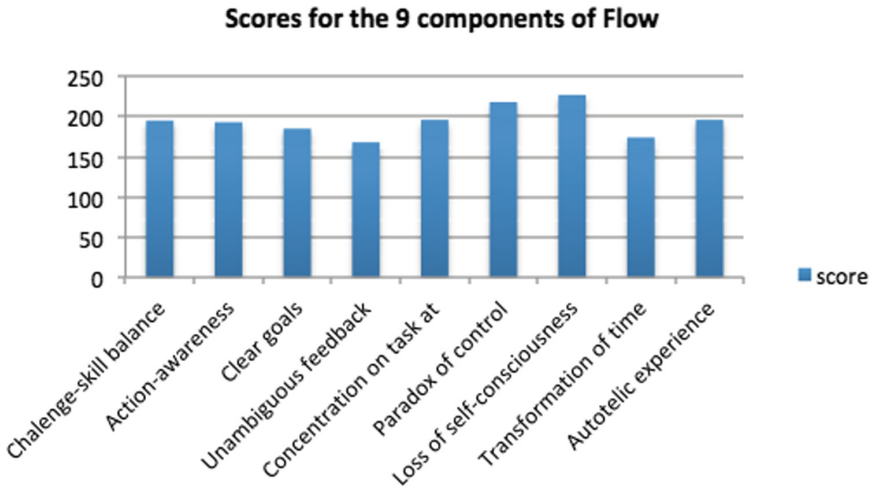

Fig. 2. Graph showing the scores for the nine components of flow obtained through the FSS questionnaire.

3.2 GAPED Vs. SAM

Table 2 compares the standard values from the GAPED images to the SAM scores given by the 19 participants. The GAPED scale goes from 0 = very negative pictures to 100 = very positive pictures, with 50 = neutral. SAM is a 9-point rating scale for each of dimension (arousal and valence). For purposes of comparison, we used the rule of three on the SAM values (e.g., $(4.222 \times 100)/9$). We calculated the Pearson's correlation coefficients between GAPED and SAM values, for the dimensions of arousal and valence. For the arousal dimension, the value of R is 0.8929. This is a strong positive correlation, which means that high X variable scores go with high Y variable scores (and vice versa). For the valence dimension, the value of R is 0.9592. This is also a strong positive correlation.

Table 2. Comparison of GAPED and SAM values obtained during the study.

Photo	Photo code	GAPED - arousal	SAM - arousal	GAPED - valence	SAM - valence
	P072	19.134	46.91	92.978	89.51
	P083	35.561	52.46	78.075	87.65
	Sp069	66.282	62.74	22.636	44.44
	N014	14.34	25.92	59.275	52.46
	H005	72.751	65.43	2.377	16.66

3.3 Analysis of the Paintings

To analyze the paintings, we started by looking for patterns in the paintings created by the participants. Then, we listed several relevant aspects and rated the paintings, one by one, according to those aspects, as yes (the painting reveals this aspect) and no. The results consist of the percentage of the average of the observational ratings given by the three authors. The most interesting aspects we found were: 60% of the participants used the colors present in the photos, or colors in the same hue family (Fig. 3); 84% of the participants were inspired by the form of the subject to paint (Fig. 4); and 47% of the paintings had its subject mostly covered up with ink or other painting material(s) (Fig. 5). It was also interesting to note that, from all the 38 paintings of photos with negative content (photos H005 and Sp069), 61% were painted with dark colors and/or had a negative form (Fig. 6), and 39% covered it with light colors (Fig. 7). When inquired about this matter during the informal conversations, the participants explained that they wanted to cover up the negative subject because it bothered them - the spider provoked fear, disgust and panic, and the little boy evoked emotions such as sadness, shock, and pain. The participants also stated that they wanted to cover the subject in order not to see it, and that the dark color represented their negative feelings toward the photo. The participants that used lighter colors to cover the negative subjects said that they wanted to "cure" the subject (referring to the little boy) and to make "an ugly thing beautiful".

This is consistent with evidences from a study [8] that concluded that for some people making art can serve as a means of releasing negative feelings (catharsis), whereas for others it can work as a distraction from negative rumination and reorient them in a positive direction (redirection), with a result of improved mood in both situations. In our study, when people painted with dark colors to "hide it" might correspond to catharsis, and when participants painted over it with light colors to "heal" and "make it better" it might have been redirection.

Fig. 3. Example of a painting where the participant used the colors present in the photo to paint.

Fig. 4. Example of a painting where the participant was inspired by the form of the photo's subject to paint.

Fig. 5. Example of a painting where the participant covered the photo's subject with ink.

Fig. 6. Example of paintings where participants covered up negative subjects with light colors and forms. The photo painted on the left is H005, and the one on the right is Sp069.

Fig. 7. Example of paintings where participants covered up negative subjects with dark colors and forms. The photo painted on the left is H005, and the one on the right is Sp069.

4 Conclusion

In this study, we collected qualitative (observation, informal discussion) and quantitative (FSS scale) data regarding the flow state of participants while painting "their emotions" (provoked by emotion-eliciting photos). We also analyzed the resulting paintings and discussed the context of their production with the participants.

We are inclined to conclude that painting one's emotional state does contribute to induce a state of flow and might help to engage users when assessing and exploring their emotional states. We also noticed that the form of the photos' subject to paint inspired most participants. Additionally, we observed that a large portion of the participants used the colors present in the photo to paint (or colors in the same hue family) and that some participants covered up the entire subject with ink or other painting material. Furthermore, while some participants painted over the negative subjects using dark colors, others used light colors, which, according to participants' feedback, may be a form of catharsis and redirection, respectively.

In the future, we will apply these insights to the design of PaintMyEmotions. For instance, we will allow users to paint progressively (adding layers on top of each other), so they can "cover" negative subjects, and we will offer users a color palette inspired by the photo being painted. Also, participants were able to successfully assess their emotions using the arousal and valence dimensions, after a brief explanation of the terms, and thus we will use them in the emotion assessment user interface of PaintMyEmotions. Finally, we believe that that merging Art-based methods with User Research enriched the participants' experience and

engagement with the study's activities, and provided data that might not be so easily collected otherwise.

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