

Strengthening Collaborative Groups Through Art-Mediated Self-Expression

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Abstract—Self-expression and interpersonal sharing of emotion have been shown to strengthen groups. However, how to accomplish such interpersonal sharing in public settings is a challenge. In a pilot study of a prototype system, we sought to facilitate public self-expression and sharing of affective information. We followed five design principles around the concept of art-mediated self-expression and created a collective doodling installation. The pilot trial demonstrated positive results around engagement of end users. As we reflected on the results from this trial, we found implications for building trust and collaboration in teams.

Keywords—interpersonal sharing, trust, collaboration, teams, socially engaged art practice.

I. INTRODUCTION

Imagine we are working in a collaborative group. We talk to colleagues over lunch, we chat online with teammates, we share on social networks to express joyfulness or frustration. This is a simplified image of how people working in the same organization frequently communicate with each other on a day-to-day basis. However, for people who belong to the same group, there are limited ways for them to express their subtle and personal emotions; direct conversations may neither be desirable nor possible. Yet were they able to share such emotions, they could build stronger, more affective ties with people in the same group.

Self-expression and interpersonal sharing of emotions have been shown to strengthen groups. It helps promote positive emotions [1], increases the interpersonal awareness among a group [2], and facilitates group cohesion [3]. There are different ways how people express themselves and share feelings in the information era. When people exchange texts or images using multi-media, they are sharing part of who they are.

However, there still are challenges in supporting people to self-express within groups. We are interested in two specific questions: (1) how to help people express themselves in a more implicit way around affective information such as feelings or, more generally, emotions; and (2) how to help them share their affective information visually within collaborative groups, and hence to strengthen groups.

While investigating these questions, we are inspired by how art successfully helps people to express a broad spectrum of beliefs and emotions, how it engages people to perceive the embedded messages and thus facilitates sharing of affective information. As a creative and reflective practice, art facilitates a variety of communications through embodiment engagement. The different forms of art work make it a powerful way

to engage people. Viewers and participants could perceive messages through visual, aural, touch and other senses. For example, Asian Field [4] is a participatory sculpture project by Antony Gormley and hundreds of makers from rural China. At the end of the project, Antony exhibited the 210,000 created clay figures to allow more people to read, experience, and reflect through the work. It reveals how civic art engages people in expressing themselves through a specific practice, and the different ways of perceiving information, interacting with physical reality, and connecting physical artifacts with their inner space.

In this paper, we propose the concept of *art-mediated self-expression*. The goal is to engage people in implicit expressions and sharing of their affective information through social art practices. To guide design, we propose five principles and report on a specific pilot trial - Doodled “Us”. It illustrates our concept and that the principles have positive influences on engaging group members. We synthesize insights from interdisciplinary research in design in HCI, end-user development, information visualization in public spaces, and collaboration in distributed teams. We relate our research to the areas of HCI, CSCW, and VL/HCC, particularly around visual interfaces to mediate better team practices. Finally, we describe how art-mediated self-expression could specifically benefit research in globally distributed teams.

II. DESIGN PRINCIPLES

There are two goals in our concept of art-mediated self-expression. (1) Art-mediated self-expression encourages people to express themselves by supporting more implicit expressions through art practices when explicit expressions are insufficient or not desired. (2) Art-mediated self-expression empowers people to perceive information and values through public visualization within a group.

A. Enable Implicit Self-Expressions Through Diverse Interactions and Gateways

A design should be able to support individuals to express their subtle, personal, and affective information in a more intuitive way than what Facebook or Twitter has already offered. In particular, a design should: (1) provide a mechanism for multiple types of affective information; and (2) be able to translate diversified input into representations that encourage sharings and explorations within the group.

B. Design for the Catharsis Process

A design should also be able to support emotional catharsis by enabling people to spread out, get connected, and find

support. Different than joining an online support group, the catharsis does not come from explicit communication. Rather, it requires a less goal-oriented method.

C. Reveal Group Patterns Through Socially Collective Artifacts

In terms of information representations, we propose that a design should have visualizations to: (1) show all individual inputs; (2) reveal the patterns and social interactions among collective individual data; and (3) support explorations of meanings through socially collective artifacts.

D. Build Empathy Through Reading and Exploring the Social Artifacts

In collaborative art, reading, analyzing, and critiquing a piece of artwork require cognitive effort. It helps people become aware of specific issues. To ensure that the explorations of socially collective artifacts could well engage people, we are proposing that people should have aesthetically attractive, enjoyable, provoking, or stimulating experience and, thus, could gain engagement and reflection.

E. Embody A Mechanism to Make Information Anonymous in Order to Protect Information Privacy

Privacy is a big concern for information visualization in public spaces. Building trust between participants and the design is a key factor in engaging people. Especially when the participants' original desire is to implicitly self-express, their privacy should not be sacrificed for exposure. In order to protect participants' identities, we are proposing the design should embody a mechanism to make personal identification abstract and anonymous.

III. DESIGN CASE: DOODLED "US"

A. Background

The distributed and complex infrastructure in a local organization separates its members [8]. The lack of connection and the absence of community is a major factor that leads to many issues and is exacerbated by limited avenues for day-to-day interactions [9]. Doodled "Us"¹ aims to help increase awareness and build empathy of each others mood among local members through collaborative doodling. It explores how technology enables users to share affective information beyond a "like" on Facebook in an intuitive and enjoyable way. It explores how interactive art could help members get to know more about the people living in the same area through a subtle but effective way.

B. Design Concept

In order to achieve the above goals, the team came up with a concept of collaborative mobile doodling. The design concept is composed of two parts: a mobile application with a visual interface for users to doodle and local public displays to present real-time collective drawings.

¹Doodled "Us" is the result of a course project for the advanced prototyping class in the HCI/d graduate program at Indiana University [7]. The first author was one of the key project team members.



Fig. 1: Participants and spectators around the public display.

Users can pick a color to stand for their moods and click the screen to doodle simulated firework animations consisted of colorful dots. Doodles are simultaneously projected onto large public displays (e.g., in a plaza). Every new doodle will overlap the previous ones, so the more doodles are, the more crowded the canvas will be. A collective drawing gets archived every 24 hours and users get a new canvas everyday. If in a local area where five thousand members participate and create six thousand doodles in one day, the daily drawing could be highly abstract with only hundreds of thousands of colorful animated dots on the canvas.

Users can express their moods by drawing any shapes. Meanwhile, the simultaneous collaborations with other participants bring them an unexpected visual result. The daily drawing is an abstract projection of mood of the local area. It enables people to "speak" out without actual verbal descriptions. It resonates people's reflections through an abstract visualization, and facilitates the emotional connections among strangers.

The team did a pilot study at Indiana University. The prototype system simulated the mobile interactions through Arduino and an iPad. The iPad screen was projected onto a 3×3 public screen wall in the School of Information and Computer Sciences (see Fig. 1). The interactive demo lasted for 2 hours, with about a total of 30 participants.

C. Design Principles in Practice: Expression, Engagement, Emotional Resonance and Awareness

1) *Enable implicit self-expression through diverse interactions and gateways:* This design allows users to spread out their emotions through doodling with many others. Focused on a visual representation of emotional information, participants no longer express how they feel by detailed descriptions in texts or images, but through a social activity that surpasses more abstract communications. Moreover, the real-time collaborative drawings show the dynamic interactions. Participants observe, read and explore the visual results alongside their participation.

2) *Design for the catharsis process:* The design team did not predefine the mapping between colors and moods. While the subjective nature of the color selection precludes the projects use as a communal emotional barometer, Doodled

“Us” aims to be reflective rather than representative. It does not matter whether blue stands for sad or peaceful, what does matter is the process that members “speak” their moods out in a public space and see how their feelings merge with the others, and how their diverse subjectivity comes together with a magical result.

3) *Reveal group patterns through socially collective artifacts*: By turning collective doodles into an augmented visual presentation, this design helps members living in the same campus get a holistic view of the mood of the area. Different than some other ways to broadcast the status of members’ mental well-being, such as through official annual report or content analysis of a social network, there is no single authority interpreting the data anymore. Participants are the content co-creators and they are also the ones who define the meanings of the final drawings. Doodled “Us” does not intend to conclude, but rather to provide a platform for members to explore, interpret, and reflect on the stories they compose together.

4) *Build empathy through reading and exploring the social artifacts*: The tacit resonating when people see the collaborative fireworks is to increase members’ awareness of how many others are making their subjective states visible. When the other actions take place, their moods merge and become into something fun and aesthetic. The idea of fireworks blooming in public displays is to enhance this experience, which cannot be measured by quantitative metrics, but can support a reflection on the social intimacy.

5) *Embody a mechanism to make information anonymous in order to protect information privacy*: In this design, the concise interaction does not require any user information. The designers intended to help people engage in the process as anonymous users. Making colors as the medium to communicate one’s mood also helps people to “hide” their identities.

IV. DISCUSSIONS AND RELATED WORK

In addition to the inspirations from art, our design principles also build upon, and may contribute to, ongoing research. Specifically, our work draws upon and can contribute to four research areas: interdisciplinary research on design in HCI, end-user development, information visualization in public spaces, and collaboration in distributed teams.

A. Interdisciplinary Research on Design in HCI

Sorensen [10] discussed how the separation of art and science was problematic for institutional research and education, while computer graphics bridged the gap between art and science. As a multi-disciplinary field, HCI has been applying theories and methods from a variety of fields such as art, science, design, and psychology, among others [5], [11]. It benefits the field by providing different angles to study, analyze, design, and evaluate the relationship between technology and humans.

Among the diversified themes, meta-design promotes using intentionally unfinished designs to engage users as co-designers, or using open-ended interactive artwork to engage participants as co-creators [12], [13]. Reflective design advocates that reflections on embedded values in computing should be the principle of technology design [14], [15]. Critical

design, pushes people to reflect by provoking designs or practices [16], [17]. Socially engaged art practices care both about how technology assists art practices with a broader group of participants and how such social practices could stimulate new creativity and meanings [6], [18].

Research with the above focuses does not put emphasis on design or evaluation for efficiency, accuracy, or usability, but rather on user engagement, values, reflections, emotions, aesthetics, and experience [19]–[21]. For example, studies have shown that expressing ones internal states has positive psychological effects [1]. Some other research has also demonstrated how technology could effectively help build empathy [22], express emotions [23], increase awareness [24], persuade behavioral changes [25], and promote civic engagement [23]. Those studies are all focused on the greater research focus of social and affective impact that computing has on humans. Meanwhile, it is necessary to develop more applications, mechanism, and methods to demonstrate how well those inquiries can help solve specific problems in HCI and CSCW. The proposed concept of art-mediated self-expression and the corresponding design principles can contribute to solving the problem of self-expression and sharing of affective information within groups.

B. End-User Development

The end-user development community promotes end users as content co-creators and system co-designers. The end users are no longer passive information receivers that merely comprehend designed artifacts, but rather the ones who actively engage in creating and critiquing the designs [12], [13], [26]–[28]. Research around end-user development aims at creating supportive socio-technical environments to encourage the culture of participation and to enable users as design co-creators [29]–[31].

While engaging participants as co-creators, “privacy and trust” is crucial. Involving participants inevitably requires individual information, such as activity data, demographic information, emotions, and other personal data [32]–[34]. But not all the potential harm is transparent to participants. Even when participants understand how much personal information they are providing, their relationship with spectators in situ might also hinder their participation and decrease their trust towards the systems [21].

Our design principles intend to provide a mechanism to involve end users as co-creators by encouraging them to practice art-mediated activities. Meanwhile, we address the concerns about information privacy of: where does participants’ personal information go, how is it represented in public, and will people experience any embarrassment rather than enjoyment?

C. Information Visualization in Public Spaces

There are studies proposing using public data visualization to support social and civic purposes in public spaces. For example, researchers could show sustainable issues to get people’s attention [25]; reveal societal problems in education, poverty and health [35]; encourage civic engagement [36], etc. Those studies help increase awareness of social problems, encourage discussions among a broad population, and facilitate behavioral changes [25], [36].

Researchers have applied a variety of visual technologies to collect individual data and then present data socially in order to get individual issues to be considered collectively. The intuitive nature of visual technologies and stimulating visual results also attract more participants. Despite the progress researchers have made, questions that need deeper exploration include how to visualize data in public and how the visualizations could motivate participation and increase awareness. Together with the concern of information privacy we discussed above, we proposed a way to visualize affective information by making personal identification anonymous through abstract and artistic visual metaphors.

D. Collaboration in Distributed Teams

We have also been motivated by previous research into building trust and improving collaboration in distributed teams in general [37], [38] and in global software engineering in particular [39]–[43]. Teams that build trust initially and swiftly are more likely to overcome inevitable crisis points as a project moves towards completion [44]. Making small talk or other types of informal conversations (e.g., [42], [45]) and having available personal information about collaborators [46] make for greater trust. We hypothesize that self-expression and sharing via artistic, collective visualizations can have a similar effect in engendering trust and strengthening the team. Art-mediated self-expressions positive influences go beyond the development of trust. It also has the potential to improve collaboration in globally distributed teams in various ways. Identifying these ways would help researchers working on globally distributed teams, including us, to better leverage art-mediated self-expression in developing theoretical, empirical, and design work to support practitioners. In the next section, we propose three potential directions to apply art-mediated self-expression to improve team practices.

V. ROADMAP FOR FUTURE RESEARCH

A. Promoting Positive Personal Emotions to Reduce Conflicts

Researchers in positive psychology have a long history using art therapy to promote positive personal emotions, to create a favorable social environment, and to reduce interpersonal conflicts [3]. Recently, researchers started to use art to help with facets of organization/team practices, such as leadership [47], innovation [48], organizational learning [49], etc. Art benefits these practices by enabling self-expression [50]. Self-expression through art helps employees learn about themselves and their colleagues and be more passionate about their jobs, their company, and even their lives in general [51].

Eventually, these positive emotions would contribute to the reduction of conflicts that are caused by the lack of understanding and compassion among team members. It brings special benefits to globally distributed teams where conflicts are prevalent and have been a problem that is hard to solve [52]. Moreover, sharing art-mediated self-expressions creates shared identity, shared context, and spontaneous communication across multiple locations. All these interventions can help mitigate the conflicts that occur in distributed teams [53].

B. Improving Interpersonal Relationships and Trust

According to social penetration theory [54], relationships develop further when the level of social penetration increases. When an individual expresses and shares about herself, she actually enhances the “depth” of her social penetration. The deep self-expression would help the other team members to develop a unique perception of intimacy by sharing feelings rather than information. Research has demonstrated that intimacy has a much larger effect than simply sharing information in organizations [55]. Therefore, we argue that art-mediated self-expression is potentially able to help relationship development and improvement among team members.

In our prior work [40], we show that developing predictable expectations is crucial to build interpersonal trust. Sheldon [56] concludes that people tend to assume an individual who proactively expresses herself is more predictable and, therefore, more trustworthy. Thus art-mediated self-expression would be able to help collaborators build trust towards each other. As we mentioned in section V.A, the reduction of social conflicts would also bring opportunities to enhance the interpersonal trust [55]. Moreover, art-mediated self-expression may be quite suitable for trust development in online collaborations for globally distributed teams where people feel more restricted on expressing themselves for the unprecedented diversity in the global team. Art, as often featured with indirectness and ambiguity, offers a resource for design that can be used to encourage self-expression within the team environment [57]. Hence, it provides an opportunity for team members of diverse background to develop close relationships and trust.

C. Encouraging Cross-Cultural Interaction

A prominent characteristic of globally distributed teams is that the team members’ diverse cultural backgrounds. Cross-cultural interaction presents particular challenges, and sometimes may even lead to unexpected cultural surprises [39]. Art-mediated self-expression provides a mechanism, rather than rules of social interactions, so it creates a non-destructive way for people from different cultures to express themselves without consenting on norms. On the other hand, self-expression is culturally sensitive. Even for U.S. culture that usually encourages self-expression, people often hide their real feelings in verbal self-expression [1]. And in East Asian culture, people are more conservative about self-expression. For individuals from these cultures, verbally disclosing oneself in a distributed team would be quite challenging. By providing a mechanism to avoid identifications, art-mediated self-expression provides a venue for people from these cultures to express themselves freely.

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