

Building Mood, Building Community: Usage Patterns of an Interactive Art Installation

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ABSTRACT

To examine the processes by which appropriation happens around an interactive art installation in an organizational context, this paper presents a qualitative, longitudinal study of an interactive art installation called *mood.cloud*. While designed to collect and to visually display building occupants' collective emotion, the installation was not necessarily used or interpreted in this way. Instead, building occupants saw the sensory experience of *mood.cloud* and the ability to change the display as a way to influence their own feelings, the feelings of others, and the overall workplace ambience. We found that interaction with *mood.cloud* fostered reflection about the relationship between the *individual* and the *larger collective* that the person is a part of. This relationship, between appropriation for individual benefit and appropriation for the benefit of others, afforded participants the opportunity to become more aware of their own contribution as part of a larger community. These findings suggest an opportunity to design systems around the interplay between appropriation for the individual and appropriation for the community.

Keywords

Interactive art installation; interactive computing technology; workplace; mood.cloud; appropriation; mood; individual; community; design

1. INTRODUCTION

Prior work has investigated technology appropriation of everyday devices and artifacts around task work in organizational contexts [e.g., 16,36] as well as creative appropriation of interactive art in museum settings [e.g., 13,24,31]. Less explored is the appropriation and engagement with interactive installations or what Bødker [4] terms the “big, visible artifact” in organizational contexts. Interactive art installations have the potential to foster greater social awareness and connectedness within workplace settings.

In order to explore social awareness around interactive art installations in organizational contexts, an artist and interdisciplinary team created *mood.cloud*—a color changing LED light installation designed to display the emotion of building occupants. The designers sought to explore two dimensions of interaction around mood: 1) build community by encouraging participants to input their own mood so that it could be displayed to illuminate collective mood and 2) promote a greater sense of

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emotional awareness of others and their moods. In order to explore these goals around building community and awareness, *mood.cloud* was deployed in the atrium entry space of Gates Hall, a multi-story building housing computer science and information science at Cornell University. The atrium, where *mood.cloud* was installed, is a visible public space housing a coffee shop that is open not only to building occupants but also to the greater public.

In this paper we present a qualitative, longitudinal study of the *mood.cloud* installation. This study asks: how does engagement with *mood.cloud* build a sense of awareness of oneself and others in a community?

We examine the multifaceted ways that *mood.cloud* was used and appropriated by participants. We found that interaction with *mood.cloud* fostered reflection about the relationship between the *individual* and the *larger collective* of which that the person is a part. We examine this interplay between the individual and the collective along three dimensions: 1) interaction processes 2) awareness of and connection with others, and 3) design implications.

Mood was taken up in a variety of way in which participants reflected on their own mood and how mood was interpreted and communicated by others. Alternately, some participants felt empowered to appropriate *mood.cloud* to claim space and contribute to something larger. Finally, interaction with *mood.cloud* fostered reflection about the spatial context and design speculation about new ideas for the installation.

These findings suggest an opportunity to design systems for this interplay between the individual and larger community.

2. RELATED WORK

This study seeks to bring together appropriation literature with interactive installation literature to understand the implications of deploying interactive art installations in organizational contexts on building social awareness and community.

2.1 Appropriation & Interactive Installations

With the increase of ubiquitous technologies, physical spaces are becoming more interactive and designers are experimenting with technologically-driven interactive environments [12]. While these interactive environments span various lifestyle areas from work to leisure, to cultural experiences, *interactive art installations* are a specific type of design which focuses on “providing an experience that is outside of an everyday experience” instead of focusing on function and utility ([32], p.509).

We are interested in the unique focus on “pleasure over function,” ([32], p.509) of interactive art installations when they are situated in organizational contexts. While previous work has focused on how playful technology interventions have positively impacted workplace interaction and social cohesiveness [19], our study

focuses specifically on an interactive art installation. mood.cloud combines interactive computing technology with art to bring experiential interactivity to a workplace setting.

Appropriation is commonly understood as the process by which people adapt technologies for unintended purposes [16] or the ways that users adapt and “integrate technology into their everyday practices” [9]. Similar to Dourish’s [16] notion of thinking about appropriation as creation and communication of meaning, we take the position that appropriation is not only about using a tool for an unintended *function* but also the tool or artifact taking on *meanings* that the designer didn’t anticipate.

Given that appropriation affords users a sense of control and ownership, changes environment dynamics, and allows for situatedness, it can be beneficial to *design for appropriation* [15]. The designers of mood.cloud leveraged principles of openness such as allowing for interpretation, providing visibility, exposing intentions, and encouraging sharing and learning to make it more likely that users will appropriate the design intervention [15]. For example, the role of the designer in appropriation can be to create a “seamful design” that seeks to expose the opportunities in the design for alternate uses [10]. Similarly, *ambiguity* in the design can encourage the user to make meaning out of the design and interpret how to use it [20,39]. We are inspired by the potential new ways that technologies are taken up by users because we view these new meanings and functions as a form of *creativity* [36] which may



Figure 1. mood.cloud interactive art installation.

influence the design of new innovations or *design from appropriation* [9].

Appropriation studies have examined task-oriented technologies and artifacts in terms of phases of appropriation [9], user experience phases over time [28], and dynamic artifact ecologies [5]. While these studies provide a strong foundation for understanding appropriation of common, familiar artifacts, we draw on user engagement studies around interactive installations in order to better understand appropriation of big, visible artifacts such as

interactive art installations. Interactive art installations are a unique type of technology intervention because of both their spatiality and materiality which engages a variety of senses and provides an immersive and configurable experience for participants [26, 27]. Mathew, Rogers, & Lloyd [31] categorize user engagement with public installations in three high-level phases: *perception*, *interaction*, and *engagement*. Jacucci et al., [26] identified three phases of exploration with interactive art installation: 1) *circumspection* which describes how a new user observes and then decides how to begin interacting, 2) *testing* which describes how the user explores the installation and 3) *play* where the participant begins to creatively interact and provoke the installation after figuring out the “working principle” of the interactive piece (p. 70). The phases that Jacucci et al., [26] put forth for interacting with art installations are micro-phases of interaction within a compressed time frame of three days rather than more long-term observations. mood.cloud offers an opportunity to understand interaction and appropriation over a longer period of time— in a more longitudinal way.

2.2 Participation

Studies of interactive installations in museum settings have pointed to interactive group participation [24] and the ways people collectively participate in configuring space for each other through their participation [41]. More recently the focus has shifted to interaction that is both individual as well as collective [5,18] where participants created various types of unintended meaning through their participation and appropriation ranging from forms of artistic expression to social media-type posts around user-generated content.

Rather than focusing on individual or group interaction, this study seeks to understand interrelated motivations to participate and appropriate for the benefit of one’s self (individual) and for the benefit of the community. While motivation to participate for one’s own benefit (“me-regarding”) and for the benefit of others (“thee-regarding”) motivations have been discussed in relation to online communities and sharing economies [29], we apply that thinking about online communities to offline user motivations to understand appropriation in the context of interactive installations.

mood.cloud is a type of installation which invites users to contribute to the display by inputting their mood. Studies about interactive installations that rely on user-generated content give us insight into user engagement and motivation to participate. Unlike the traditional museum exhibits that consider engagement around an installation in a more finite way, interaction design in more public settings outside of the museum aims for “extended and repeated engagement” ([25] p. 135). Hornecker & Stifter [25] suggest that designing for “creative, communicative, and personal” interaction in interactive art installations will increase engagement. Others such as Morrison, Viller, and Mitchell [32] suggest the importance of designing in opportunities for “free play” in open-ended interactive art installations that give participants the opportunity to actively construct their own meaning (p. 2335). Mathew, Rogers & Lloyd [32] argue that these “social constructions of user-generated and collaborative content” are a kind of “public creativity” (p. 61). Interactive visualization interventions also play a role in fostering social awareness of others [13].

3. MOOD.CLOUD INSTALLATION

mood.cloud is an *interactive data as art installation* (Figure 1) in the atrium entry space of a multi-story college campus building housing computer science and information science. The installation

was designed as a collaboration by a media artists and information scientists to explore collective mood in public spaces. More specifically, mood.cloud was designed to explore the impact of a large interactive art display on emotional awareness and feelings of connectedness among people who work in the same physical space. In other words, the designers sought to explore two dimensions of interaction: 1) build community by encouraging participants to input mood so that it could be displayed to illuminate collective mood and 2) promote a greater sense of emotional awareness of others and their moods. How does a visual indicator of collective mood affect the sense of connectedness and emotional awareness of others in an organizational context?

The mood.cloud installation is made up of two key components: 1) *the light cloud sculpture* suspended in space 2) the *interface*-composed of iPad touchscreen mounted on a kiosk directly in front of mood.cloud (Figure 1).

The art installation itself is composed of twenty-four strands composed of 4,320 LED lights twisted in a mobius-like form, and shaped through custom laser-cut, clear acrylic guide pieces, suggesting the image of a cloud. The installation is suspended 5.5 feet off the ground via a supporting beam. The strands of LED lights are encased in clear, flexible PVC tubing wrapped with translucent mesh cable wrap for added texture. The iPad touchscreen shows a collection of images that correspond to emotions. The user selects an image that best captures his or her mood and an algorithm translates it into a color, one of sixteen possible colors, which briefly flashes over the entire sculpture. After the brief flash of color, that same color is displayed on the lowest individual LED light strand of the suspended sculpture.

Up to twenty-four people can enter an image, capturing the collective emotions across an array of 16 colors reflected in mood.cloud (Figure 2). As subsequent users select an image, the bottom LED strand refreshes with the most current color selection and moves up as more users participate, capturing and reflecting collective input from the users (Figure 4).

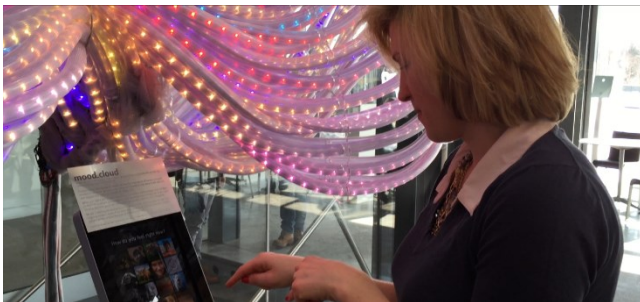


Figure 2. Participant interacting with PAM interface.

3.1 Software and Input Interface

3.1.1 Software Processing

The LED lights are controlled via Processing¹, run on a mini computer located in a clear acrylic box located directly beneath mood.cloud. When someone selects an image using PAM (described below), that selection is sent to a database, which is fed into Processing and represented as color. The output from

¹ For more information refer to <https://processing.org/>

Processing is sent to a Teensy Board, which then controls the color and animation of the lights.

3.1.2 Mood.cloud Interface: Photographic Affect Meter (PAM)

The mood.cloud leverages the Photographic Affect Meter (PAM) as the input interface. Designed for mobile devices, PAM is a tool that measures affect through users' selection of photos based on their mood [35]. The photos that are the basis of this tool are validated to represent emotions where each individual emotion is consistently represented in the same location. However, each individual emotion can be represented by three to four photos. More specifically, the photos are mapped in a 4 x 4 grid based on arousal and valence, from low arousal and negative valence in the bottom left corner, to high arousal and positive valence in the upper right corner [35]. When a person selects an image, the screen refreshes, and the photo that displays for that emotion is randomly selected. PAM has also been used in Mood Rhythm (moodrhythm.com), a smart phone app that helps bipolar patients track their daily fluctuations in mood. When people approach the mood.cloud iPad touchscreen, the PAM interfaces asks them to "touch the photo that best captures how you feel right now" and users can select from several screens of photos that range from cuddly puppy photos to a serene landscape photo or an image of a lightning storm (Figure 3).

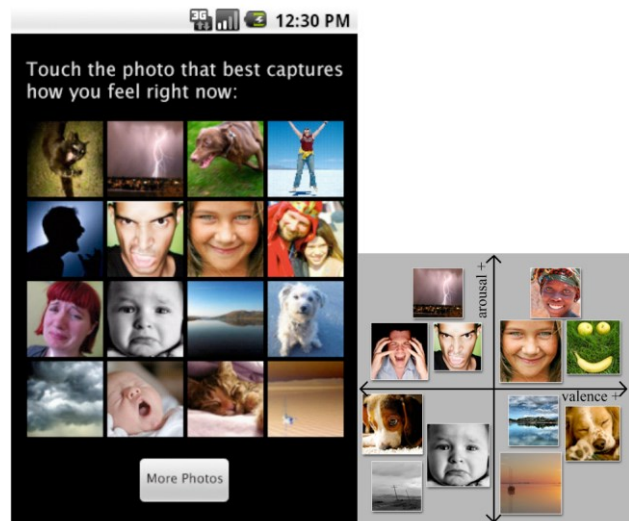


Figure 3. PAM Interface as mobile app

4. METHOD

In order to study the way people understand the mood.cloud installation, we used an interpretivist and naturalistic framework [30]. This framework allows us to gain insight into how users understand and interpret their own interaction with the mood.cloud installation. Additionally, this framework gives us the opportunity to examine more broadly users' assumptions, understandings, and spatial experiences related to their mood.cloud interaction.

4.1 Recruitment

We were concerned with understanding how people interacted with mood.cloud over time so we conducted two phases of interviews: 1) *early phase of intercept interviews* within a couple months of the

mood.cloud being installed and 2) *later phase of in-depth interviews* that took place between seven to eight months after mood.cloud was installed. The intercept interviews were conducted as people finished interacting with mood.cloud. We employed multiple recruitment strategies for the in-depth interviewees. Undergraduate and graduate students who interacted with mood.cloud were recruited from an on campus web-based recruitment system. In addition to students, we recruited the baristas who worked in the coffee shop adjacent to mood.cloud installation as well as university staff and faculty who interacted with mood.cloud through a snowball sample. While understanding how and why individuals do not interact with technology represents an important research area [37,1], the scope of this study focuses specifically on those who interacted directly with mood.cloud rather than randomly sampling from building occupants at large.

4.2 Data Collection & Analysis

After mood.cloud was installed in September of 2014, we conducted a total of 57 interviews. We conducted 32 *intercept interviews* during the fall of 2014 between October and December of 2014. The brief intercept interviews focused primarily on general impressions of the installation and having the user describe their process of interacting with the display—frequency of use, motivations for how and why they chose images, visual of the display, their interpretations of the relationship between the color they chose and the colors already present in the display, the relationship between the images and emotions, and any problem areas with their interaction.



Figure 4. Each LED strand represents an emotion entered by a participant.

Then between March and April of 2015, we conducted 25 semi-structured *in-depth interviews*. The in-depth interviews were intended to supplement the initial impressions and quick descriptions that were collected through the early intercept interviews. The participants included 4 staff members (2F, 2M—2 coffee baristas and 2 university staff members), 5 faculty members (1F, 4M) and 16 students (10F, 6M). The majority of the interviewed students are in communication and information science with the remaining sample representing computer science, design, nutrition, and interdisciplinary studies. The interviews ranged from approximately 30 to 45 minutes and were conducted in person. The interviews were audio recorded and transcribed to ensure accuracy. Participants are referred to either by pseudonym or by participant number throughout the paper. This study was granted IRB permission by the authors' institutional review board.

The interview questions for the in-depth interviews incorporated the process and motivation questions from the intercept interviews and expanded the interview guide in order to allow for the participants to reflect more deeply about not only their experiences with mood.cloud but also to think about the spatial context and representation of their interactions with the installation. Overall, we structured the questions and the overall interview as “open ended process reflection questions” ([11] p. 679) that would encourage the participants to reflect on their own usage and interaction.

The interviews focused on three areas: *impressions, expectations, and description* and included questions about their first interaction with mood.cloud, motivations for use, expectations about the interaction, description of mood.cloud to someone who was unfamiliar with it, and to speculate about how the users might name or title the installation based on their own interaction with it. *Interaction Process* questions focused on the process of interacting with mood.cloud and the users' reflection on that process (how they made decisions, their interpretations of those decisions). *Awareness of others and Connectedness with others* questions focused on the users' thoughts about how their experience with the installation related to other users. *Context, Representation, and Sense of Place* questions focused on how the users thought about the spatial context of the installation in the building, the fit with the building, and speculation about how they might think about the installation differently if it were installed in a different building or context on campus. The last part of the interview gave participants an opportunity to bring up any additional items related to their interaction with mood.cloud and experiences that may not have come up explicitly through our interview questions.

Drawing on grounded theory [22] we approached data collection and analysis as an iterative process, moving continuously back and forth between collecting data and analyzing the data using a “constant comparative method” (p.102). Our ongoing analysis of the initial interview transcripts allowed us to follow up on emerging themes in subsequent interviews, so as to continue to refine the categories and emerging themes during the data collection process. We used a visual mapping technique called “*affinity diagramming*” [3] where initial findings were put onto post-it notes as a physical tool to identify the emerging clusters and groupings of information from the interviews based on the original interview categories. The original broad affinities about participants' reported mood.cloud interaction included: how and when they interacted with the mood.cloud (context), expectations, impressions and why (motivations, intentions), spatial understandings, and their perceptions, speculations and reflections (meanings). We continued interviewing, analyzing transcripts and consulting the literature. From this process, we identified initial emerging themes including awareness of others through participation, publicness of participation, temporality and representation of data, and frequency of change and novelty.

5. FINDINGS

While mood.cloud was designed to explore *collective* mood, this study finds that interaction with mood.cloud prompted participants to reflect on the relationship between the *individual* and the *collective*. Users expressed an awareness of this interplay between self and the larger community: 1) Individual- *How did mood.cloud influence me?* and 2) Collective- *How does my use of mood.cloud influence others? How do others interpret my use of mood.cloud?* Rather than explicitly talking about collective mood, many participants expressed greater awareness of a larger community through individual participation in the interactive art installation.

We examine the multifaceted ways that mood was interpreted and deployed by a community of participants in an organizational context. We found that interaction with mood.cloud fostered reflection about of the relationship between the *individual* and the *larger collective* that the person is a part of. This interplay between the individual and the collective can be examined in three dimensions of use: 1) interaction processes 2) awareness of others & connectedness with others, and 3) design implications.

First, we present an overview of how users interacted with, interpreted, and appropriated mood.cloud. Then, we examine the ways users' interaction with mood.cloud fostered an awareness of oneself and others within the community. Finally, we illustrate the ways participants reflected on the spatial context and imagined new design ideas for mood.cloud.

5.1 Interaction Processes

Participants interacted with, interpreted, and appropriated mood.cloud in multi-faceted ways that help us to understand how people make sense of and orient themselves toward each other around an interactive installation in an organizational context.

5.1.1 Discovering mood.cloud

The first impression for twenty-three people who interacted with mood.cloud was that it was a mix between art, humans, and technology with it being referred to as “an art piece,” “sculpture,” “someone’s art,” “weird art thing,” as well as a “brain.” Several people discussed the way that the installation combined art and intelligence because it communicated information and was not just purely aesthetic.

It is an interesting art piece. It combines two things. It's a display piece but it tells you something. It's not just there to make the space look nice. It's also there to tell you information, which is not what most art pieces do. (James, undergraduate student)

Others saw mood.cloud as an invitation to interact and explore. One participant described how the form of mood.cloud encouraged exploration.

I like the shape. It has this very lively feeling similar to when you think of a butterfly. It has that feeling. The shape makes me want to interact with it. (Terry, Female, undergraduate student)

Jacucci & Wagner [27] describe the importance of materiality to engage the senses. Similarly, the sculptural form combined with the tactile quality of the strings of color-changing lights created a dynamic feature at the entry of Gates Hall.

The mood.cloud installation was perceived as embodying, and catalyzing conversations about, the work being done in the building. A coffee barista observed how mood.cloud had become a “conversation piece” for building occupants. Similarly, one faculty member described how mood.cloud “creates lots of conversation.” We observed a number of students, faculty, and staff referring to mood cloud as a way to communicate their collective identity as part of the computer science and information science disciplines and the work being done in the building. For many, mood.cloud became a spatial representation of how to communicate their disciplinary identity to others. For example, one faculty member described how mood.cloud has become a “reflection of a value system, something we all value and who we are in the building.”

Similarly, visitors to the building or students who took an occasional class in the building (as opposed to those who regularly occupied the building) talked about mood.cloud in a way that helped them make sense out of the identity of those who regularly occupied the building—a kind of spatial shorthand for the identity of those in the building.

5.1.1.1 Use Over Time

The observations and interviews that took place over the course of eight months give us the opportunity to understand engagement with the interactive installation in a more longitudinal way. The very name of the interactive art installation, the way the piece was discussed by the Dean, and the instructions on the display all communicated explicitly to users that they should select images based on how they were feeling and that mood.cloud was designed to *display* collective mood. Based on the early intercept interviews completed within a few months of mood.cloud being installed, 20 of the 32 people interviewed reported that they selected images based on how they were feeling. Eight of those participants described initially selecting images as instructed. Informants reported that they later experimented with mood.cloud, selecting images by finding their “favorite image,” “trying something novel,” and “trying to get a change to occur.” These interactions of experimenting with mood.cloud can be understood in terms of Jacucci et al.'s [26] experimental stage wherein users strive to figure out the “working principle” (p.70) of the interactive piece. With mood.cloud, that working principle entails how the images related more specifically to color change and the way that users understood where their corresponding color selection showed up in the display.

Over time, participants began to select images based on things *other than mood or emotion*. In fact, six months later only 8 of twenty-five in-depth interviewees reported interacting with mood.cloud around their own mood. The majority of participants moved beyond the intended interaction and began creatively to play with and to provoke the installation. For example, one faculty member expressed the sentiment that when he interacted with the installation that he “just pushed buttons to see what would happen and thought it was cool.” He described how he “didn’t really think about emotions” and “didn’t associate mood cloud with emotions as much as thinking about it as an art piece.” Another participant described how achieving color change was the most compelling aspect of the installation.

I like seeing many colors so I think selecting based on how I feel would be less enjoyable than seeing a changing kaleidoscope. (Intercept Interview, Undergraduate)

While mood.cloud was originally designed to collect and visually display the collective emotions of building occupants, for many participants, their interaction with mood.cloud evolved over time with the materiality and sensory experience of the installation becoming most engaging. Several participants saw their interaction with mood.cloud as a way to influence their own mood—how they *would like* to feel. One undergraduate discussed how she interacted with mood.cloud based on how she “wants to feel” instead of how she actually feels in the moment. Another undergraduate, Sarah, expressed a similar sentiment about how she goes to mood.cloud “to cheer up, not to express the mood that I’m actually feeling.” For Sarah, it is about personal play with mood.cloud to boost her own mood. Finally, a faculty member described how “the changing colors make me feel happier.” In this way, the sensory experience of color change took precedence over the ostensible focus on mood.

The most recent interviews and observation suggest that, for participants who were in the building on a daily basis, mood.cloud increasingly began to “blend in.” When asked what he had noticed over time, a barista noted that mood.cloud has “become a little background for people.” A number of participants described how more and more they observed campus visitors and campus tour groups being the primary users of the mood.cloud. One faculty member described how “people in the building show it to guests”

and how he “started watching others using it” in lieu of using it himself.

5.1.2 *Interpreting Others’ Use*

Users perceived, and took advantage of, the openness of mood.cloud. This came through in the way that sixteen of the twenty-five interviewees felt empowered to interact with mood.cloud in ways unintended by the designers. In fact, even those who took very seriously the idea of trying to evaluate accurately and input their own mood tended to assume, through their own interaction and observation of mood.cloud, that others were *not selecting images based on mood*. For example, one barista described his observations of how people interact with mood.cloud.

I’m not sure a lot of people pick the emotion that they feel. Some people pick the picture they like (Male, Barista).

An undergraduate, James, expressed how he carefully considers his mood and “wants to do good by trying to put the right mood in.” Yet, at the same time he expressed frustration with the openness of the system.

The idea that people can just keep pushing buttons kind of defeats the purpose but you don’t want to restrict people to only once. (James, Male, Undergraduate)

James tried to follow the instructions and enter mood but ultimately didn’t understand the purpose of entering mood or how that might impact others. The sentiment that James expressed illustrates the tension between how designers intended mood.cloud to be used, how participants actually used it, how their use is interpreted by others, and how that interpretation influences future use and meaning making. Other participants expressed more explicitly the openness that they perceived was built into mood.cloud.

I think this display is exploratory. People are like “oh I wonder what this picture will do.” It isn’t regulated. I would think the person is experimenting with it. If you had to pick exactly how you feel then that would be different (Nicole, Female, Graduate Student).

The perceived interpretive flexibility and ambiguity of mood.cloud encouraged creative use and active meaning making. However, at the same time this same ambiguity and openness led to uncertainty about how to make sense about others’ interactions and use, especially when it came to how to interpret the emotions, feelings, and well-being of others. Fourteen of the twenty-five in-depth interview participants discussed how they wanted less interpretive flexibility. Specifically, seven participants mentioned how they wanted more clarity around trends and patterns to understand how others were feeling.

I want to be able to see how many people are feeling happy. (Female, Undergraduate)

I want more of an awareness of trends. Perhaps a poll of the day to show collective mood. (Sam, Male, Graduate Student)

I would like a key or a legend—for example, yellow means happiness and a lot of people are happy because the sun is out. (Megan, Female, Undergraduate)

These comments indicate how some participants wanted more prescription and less interpretive flexibility. When asked to reflect on future interaction and re-engaging with the installation, users talked about how their individual participation could benefit others’ emotions. Three participants discussed how they would more actively contribute if they knew the installation could *improve the mood of others* or “boost people’s interaction with each other.” A graduate student described how knowing more about the installation, would make him more likely to contribute to influence the mood of others”

If I knew what a color represented, then if I were to see a blue or sad color, then I would actively contribute to make it not as sad. (Terry, Male, Graduate Student)

I would interact with it more if I knew it was helping research or helping others or if I knew that the mood.cloud could make you happier. I don’t know if that has been determined? (Rachel, Female, Graduate Student)

Similarly, one undergraduate student, Terry, described how, if she knew a certain color would make people happier, then she would try to change the color to make people feel happier.

T: Does orange mean everyone is happy? If I can tell how to change the color, then I would try to boost the collective mood. If I know that making it more orange is happier, then I would try to do it. If I were to see a sad color, then I would actively contribute to make it not as sad. (Terry)

Interviewer: Why would you want to do that?

Terry: It’s human nature. You don’t want to see everyone around you sad.

For this participant and others, knowing how their contributions could benefit others would make them more motivated to engage continuously with mood.cloud over time. While the ambiguity afforded participants the ability to construct their own meaning around their interaction and others’ interactions with mood.cloud, it left a number of participants wanting more clarity around how their interaction might influence the mood of others. Ultimately, the idea that one could potentially *influence mood* by interacting with technology was very intriguing to a number of participants. Building occupants had high expectations around mood.cloud and wanted, as Brianna stated, to be able to “boost mood.”

5.1.3 *Appropriating mood.cloud*

Within HCI/CSCW literature, appropriation is a process by which people adapt technologies for purposes that were not originally intended by the designer [9,15,16,36]. Appropriation is not only about using a tool for an unintended function but also the tool or artifact taking on a meaning that the designer did not anticipate. As such, appropriation is not a singularly defined process. Participants were simultaneously motivated to appropriate mood.cloud for their own individual benefit as well as for the benefit of others—the larger community.

For many participants, their interaction with mood.cloud evolved over time with the materiality and spatiality of the installation becoming most engaging—the ability to manipulate, experiment, and play with the color of mood.cloud in space.

The in-person effect is more significant. You are standing right there and the colors shine in on your face. The whole atmosphere is different. There is something more special about it being in front of you and you seeing the colors change. (Nicole, Female, Undergraduate)

Rather than solely using mood.cloud to input emotion, a number of users saw their interaction with the mood.cloud as an outlet to exert influence and leave one’s mark within the building. These individuals viewed the installation as an opportunity to exert control or a form of personal expression.

Some of the participants described their interaction with mood.cloud as a way to exert control on the physical environment—a type of *claiming space*. Greg, a graduate student, described how he interacted with mood.cloud in order to “*prove to myself that I still have control over things.*” Participants, such as Greg, saw contribution as a way to exert control and help construct the space through changing the color of mood.cloud. In this way, it is both about changing the way the environment looks and feels as well as interaction being a way to adapt and shape the environment.

Similarly, a faculty member described how he likes to use mood.cloud to exert influence.

I like the dynamics of the colors. I wanted to see how I could influence them. It makes me so happy when I can see the different colors flow through after interacting with mood.cloud (Male, Faculty)

For this participant, the affordance of color manipulation and feedback of seeing one's own strand turn color provides an outlet for influence and personal expression. This perception of control is key to the processes of appropriation and the way that these appropriations contribute to the shaping of space [2].

Similarly, several of the participants discussed how they liked to interact with mood.cloud in order to influence the *color of the surrounding space* by manipulating the color of mood.cloud installation, especially at night in the all glass building.

At night, the colors of the mood.cloud change the color in the floor. It becomes more powerful and has a greater presence in the space around it. (Greg, Male, Graduate Student)

For this participant, the installation became a way to creatively manipulate the physical environment through light and color on the various architectural surfaces of the interior of the building. The installation was appropriated for a kind of individual “*free play*” [32] with the building surfaces of glass, concrete, and blank walls acting as a canvas for this *public creativity* [31]

Another user mentioned the power of changing the display at the beginning of the day. The baristas who work at the adjacent coffee shop expressed a shared sense of ownership over mood.cloud and the atrium space. One barista, Molly, described her routine for interacting with the mood.cloud each morning.

Interviewer: Have you interacted with it?

Molly: Yes, we usually do every time we come in the building early in the morning. We open at 7:15 and the building is usually empty when we open. I like to push the buttons and my goal is to see it all yellow.

Interviewer: Why do you do it? How do you think about that?

Molly: It seems like a fun way to start the day when I first come into the building. Also, knowing that there is nobody else here— So, I wonder, am I the first person of the day to use it?

For Molly, there is a sense of control that comes from changing the ambience of the space. For both Molly and Greg, this sort of presence [21] through the interactive technology of mood.cloud suggests that their interaction with mood.cloud increased their awareness of others within the building. In other words, their appropriation is an interplay between their individual use and their simultaneous awareness of the larger community of participants.

Like Molly, another building occupant, Daria, expressed her motivation in interacting with mood.cloud to change the color of the entire display when no one else is around or when a specific, intended audience is around.

In each of these examples, the participants describe the personal value they get from changing the space through the mood.cloud installation for their benefit and the benefit of others. People's perception of control is key to appropriation and “tailoring culture” ([2], p.65). For these participants, mood.cloud became a way of exerting control and shaping space. The designers of mood.cloud intended the installation to bring people together around collective mood. Instead, participants had an increased awareness of the relationship between themselves as individuals and the larger community through participation in mood.cloud around meaning and usage outside of emotion.

5.2 Awareness and Connection

Rather than explicitly discussing feelings of collective emotion, many participants became more aware of their community through individual contribution to mood.cloud.

5.2.1 Awareness of Self, Awareness of Others

The intersection of *personal* interaction within a *public* space afforded by the installation fostered self-reflection and an awareness of others. Several faculty members expressed the ways in which they thought of mood.cloud as an “outlet” and “a place for expression.”

I used it like a diary. I keep a diary and this was another way to reflect on my own personal feelings. For me, it was a very private thing. (Male, Faculty)

This faculty member used the interactive art piece as a kind of *personal reflection tool* about his own thoughts and emotions and created a routine around this use. Yet at the same time, he described an awareness of the others through his interaction with mood.cloud.

I see an awareness of others or the people in the display where you add your emotions and it snakes through the lights. It is connected to the emotions of others in an interesting way (Male, Faculty)

It is very individual at first and then when you step back from it you start to see how all the colors interact and you have this appreciation of all the people who came together to create the final impression (Kate, Female, Undergraduate)

For these participants, interaction with mood.cloud was both *personal and public*. Interaction with the mood.cloud provided a powerful visual reminder of the relationship between one's own participation and the other members of the community who helped to co-create the visualization. Significantly, since color change happened frequently, the three-dimensional visualization fostered reflection about the presence of others—traces of others who had just interacted with mood.cloud.

5.2.1.1 Awareness & Publicness of Emotions

A small subset of the in-depth interview participants, who reported using mood.cloud to input their own emotions, reflected on how self-conscious they were about entering their personal emotions in a public and highly visible space.

Participant: If there was no one in the building, I would play with it more.

Interviewer: Is it more comfortable at night or with no one around for you to tinker around with it?

Participant: Yes, currently there is the coffee crowd and the main entrance path. There are so many people and so much activity around. The question is how public should it be? I want to interact with something that I know is public and I want to feel better but do I want everyone to know the change of color is reflecting *my* mood? (Greg, Male, Graduate Student)

Another graduate student, Kurt, discussed how he preferred the second iPad interface location that was temporarily placed in the coffee shop, a slight distance away from the installation because then people didn't immediately associate the input of emotion and subsequent color change with the person in front of the display.

People used to interact with it in groups. So I was scared because people were actually looking at me while I was interacting with the mood cloud. I didn't want to pick a bad mood. I was self-conscious. I liked the other interface location that was in the coffee shop. It is more personal and people don't know what I am doing or what emotion I am choosing. People aren't looking at me and judging me. (Kurt, Male, Graduate Student)

In addition to the more general “evaluation apprehension” of being judged while interacting with a public installation [34,8], these

participants have a concern about the personal nature of the specific type of content that they are revealing in their interaction. This suggests that the act of sharing emotion, perceived as personal and private in an organizational context, made some participants more aware of the relationship between their own emotions and the way they were perceived and interpreted by the larger community of which they are a part.

5.2.2 Connectedness Through Contribution

A number of the users saw the act of interacting with mood.cloud as a form of participation where their contributions made them feel like they were part of the larger community. Rachel mentioned how she felt “good to see you contributed to this campus collective mood. You feel like you are a part of it, part of Cornell.” Similarly, Roger described both the individual and collective aspects of contributing.

I really like the part where people are coming here and making a contribution. People make it a pretty thing and unique and I like that perspective. (Roger, Male, Graduate Student)

For these participants, contributing made them more *aware* of the larger community that they were a part of—whether that be their colleagues within the building or the university. Several others described how contributing made them feel a part of a larger imagined creative community.

I think it is the idea of having something that is individual and collective. All these things are their own separate entities and people can affect them separately but it is overall masterpiece that has the impact when you are looking at this weird art sculpture thing. (Kate, Female Undergraduate Student)

It is the feeling like you added to the display, not like an artist but as a participant toward the artist's work. (Megan, Female, graduate student).

These participants pointed to the way that the physical form of mood.cloud and the visualization of mood communicated this relationship of between the individual and the larger collective. Instead of seeing mood.cloud as being about the display of mood, Megan viewed her interaction with mood.cloud as a way to creatively contribute to the art piece. Megan's interaction is about seeing herself as a participant in an ongoing creative installation by an artist, similar to Mathew, Rogers & Lloyd's [31] notion of “public creativity” around user-generated content.

Several users pointed to their *connection* to others through their individual interaction with mood.cloud. When asked what the display represents, users described the connection they perceived through their interaction with the display.

I would almost call it a *mood web* or like a *mood quilt* even because I feel like it is a quilt or a web in that it is a connection of fibers that are all working together for one common purpose but have their own little independent flair. (Kate, Female, Undergraduate)

It is about connectedness. It's like a lot of little balls on a string. You impact one with color and then all of us is part of the community and each one of us contributes. A tap on the display means a change in light. That sense of community is strong in the display and how you are a part of it by little actions. It is this idea that you are in it together and that sense of community and being a team is inherent in this interaction. (Greg, Male Graduate Student)

These participants see their actions as oriented around a highly visible artifact that strengthened their perceived sense of community. For these users, the aspects of both individual participation and collective participation were communicated in the three-dimensional visual representation of the display and fostered a sense of connection with the larger imagined community.

5.3 Design Implications and Speculations

Williams, Kabisch & Dourish [41] argue that “people configure space for each other” and make certain artifacts and activities “seeable” (p.7). Through their interaction with mood.cloud users made the spatial field and building architecture more “*seeable*.” Users reflected on the role of mood.cloud within the spatial context and its impact on the mood of the space. Additionally, some users imagined and generated new ideas for mood.cloud.

5.3.1 Reflection on Spatial Context & Mood of Space

The interaction with mood.cloud resulted in the development of new meaning making about the *mood of the space*. While users didn't always think about *their own* feelings and mood related to the installation, through their interaction with mood.cloud participants began to notice *how the space feels*—the mood, atmosphere, and ambience of the physical environment in Gates Hall.

Overall participants described the building architecture as “innovative and modern” and used descriptive terms such as “technology, novel, imaginative, interactive, futuristic, high techy design, smooth, clean lines, and the most technologically advanced building on campus” to describe Gates Hall. Roger, a graduate student, noted how “Gates Hall gives you the feeling of technology and innovation.” In many ways, users perceived the form and materiality of mood.cloud as fitting with this high tech vocabulary of the building architecture.

However, the modern and high tech statement of the building architecture was experienced very differently on the scale of the everyday user of the interior spaces. Some users described a spatial contrast that they saw between the spaces of the building and the installation.

Gates Hall is futuristic and the outside is razory so the warmer colors like yellow and orange of the display make it warm. The design of the display is more circular instead of sharp. I like that contrast of the display with the building (Nicole, Female, Undergraduate Student).

A small number of the undergraduate and graduate student participants described the feeling of the workspace as “not that comfortable”, “for work only,” “nothing that is warm or inviting,” “empty,” “kind of scary,” and “stressful.” One participant noted that “there could be more excitement within the building” and that it “doesn't have much color—all white with glass doors” and that the “furniture is really rough edged.” Overall, a majority of the participants saw mood.cloud as making a spatial contribution by adding color, warmth, visual contrast, and liveliness. One faculty member noted how mood.cloud “changed the dynamics of the space and the building.” Nicole explained the perceived impact of mood.cloud on the building atmosphere.

Gates Hall looks so futuristic and modern and not that comfortable. The warmer colors of the display give the building a more appealing feel because the building is grey and all the furniture is really rough edged. It is kind of scary because I am used to buildings like Olin, which is from so long ago. The display made Gates Hall more appealing to me (Nicole, Female, Undergraduate Student)

For this user, the contrast of mood.cloud's form and color enhances the experience of the building architecture. Similarly, another user described her attachment to mood.cloud as an integrated part of what she considers the space.

Rachel: I don't want mood.cloud to ever leave Gates Hall. I think there could be more excitement within the building and I think the mood.cloud provides some of this aesthetic.

I: Could you describe a little more about what you mean by “this aesthetic?”

Rachel: I'm talking about the set up. There isn't enough space in there for people to do work and chat. The lab gets so overwhelming and annoying because everyone is always in there. There aren't enough social spaces. (Rachel, Female, Graduate Student)

Similarly, another undergraduate student expressed how the installation contributed to making the building "more socially relaxing." The presence and collective interaction with mood.cloud installation contributed to *making space* more social in contrast to the predominantly *experienced place for work*. In many ways interaction with the installation and its spatial presence brought aspects of the feeling of the space and architecture to the forefront for some of the users.

5.3.2 Imagining Design Ideas

Several participants engaged in imagining the spatial potential of the installation to interact both with the building architecture and with the building occupants. Interaction with the installation spurred on creative idea generation about the installation. These ideas had to do with further integrating the mood.cloud experience with the building architecture and creatively expanding the scope of the installation for amplifying the spatial ambience, developing connectedness between users and their spaces, and signaling or projecting visually outward.

For example, Kate described a way to creatively expand the scope of the installation to amplify the spatial ambience through the imaginative idea of a ceiling design element that works with the existing mood.cloud installation.

K: I was thinking it would be cool if the ceiling could change different hues above it based on the installation. The idea is that when colors flood into mood.cloud that they then leave and go up to the ceiling and then the ceiling takes on a color that is representative of mood.cloud that day. So the display is changing but the ceiling is this more constant, opaque idea.

I: Cool. How do you see ceiling space versus the current mood.cloud display?

K: Ceilings are really interesting. Heat rises and so this idea of generating this heat which is from moving, thinking, interacting bodies through this display that then rises up to create an atmosphere that is then accumulated at the top in this representative color of the thoughts and idea and everything over time.

Kate's new design idea is speculative in how it re-imagines the ways that individual changing interactions could be collected and create a more continuous "atmosphere" that reflects not only mood but interactions, movements, and feeling of space—a display of spatial ambience that is larger than just the display and is more integrated to the building interior by taking over the ceiling space.

Similarly, Kurt, graduate student, expressed how he wanted to expand the scope of collecting mood and awareness of mood by being able to understand how people are feeling in relation to their specific areas of the building—to "locally set mood" to increase the connectedness among building occupants and their workspaces.

A third participant imagined how the activity and interaction on the interior of the building could be projected outward to others outside of the building.

The building is a living entity and there are people inside which really make it a living entity. The building can speak out. So you could have the display on the inside and also subtle ways of reflecting elements of this on the exterior of the building. (Greg, Male, Graduate student)

Each of these participants' ideas is about connecting the building architecture (ceiling, individual spaces, and exterior) with the experiences of the people working within the building such that the architecture on a larger scale begins to communicate more about the shifting feelings, perspectives, and energy of the workplace. In this way, the interactions with mood.cloud were generative in the

sense that they encouraged some users to speculate and imagine ways in which the design could contribute more to space-making. The interactive technology combined with the materiality of mood.cloud made the elements of the space—ceiling, façade, interior architecture—more legible as part of the canvas for making space and a way to expand the scope of their collective influence from the atrium space to greater building.

6. DISCUSSION

While designers deployed mood.cloud in order to explore building community and awareness through interaction around mood, our findings show that participants engaged with, interpreted, and appropriated mood.cloud in unanticipated ways.

While the visual indicator or representation of collective emotion in mood.cloud didn't necessarily influence the mood of others, building occupants saw the sensory experience of mood.cloud and the ability to change the color of the display as way to influence their own feelings, to potentially impact the feelings of others and the overall ambience of the workplace.

We found that interaction with mood.cloud fostered reflection about the relationship between the *individual* and the *larger collective* that the person is a part of.

The juxtaposition of the personal, individual interaction with a highly visible and attention garnering response in a public workplace setting fostered a great amount of awareness of oneself and others. This resulted in building various dimensions of social awareness within a workplace setting: fostering a sense of connectedness through contribution, empowering participants to appropriate mood.cloud to influence the feeling of the physical environment, and encouraging reflection about other's use, feelings, and motivations.

Sengers et al., [38] argue that "*affect* can be formally '*designed in*' to a system" or we can "*design for*" experiences where users are likely to reflect about or encounter affect in new ways (p.357). This study finds that *designing in* and *designing for* affect are not mutually exclusive. So while affect was 'designed in' or formally built into the design of mood.cloud's representation, technology, and even communication, affect was also *designed for* through mood.cloud's easily manipulated sensory materials of light and color, combined with a certain degree of open-endedness and ambiguity. By "designing in" and "designing for" affect, participants felt empowered to appropriate the technology of mood.cloud in ways that fostered reflection on and new experiences of the emotions of others and of the larger building.

6.1.1 Designing for Modes of Appropriation

The materiality of mood.cloud—the way the light and color engaged the user became very experiential. This sensory material experience combined with a certain open-ended design and ambiguity [15,32] was perceived by participants as being "exploratory" and "unregulated," encouraging experimentation and appropriation in ways that were less about mood and more about leaving one's mark and personal expression.

This study identifies two different types of motivation to understand the process of appropriation. We find that it is this interplay between appropriation for individual benefit and appropriation for the benefit of others that affords the opportunity to have participants become more aware of their own contribution as part of a larger community. This suggests that designing for the interplay between different modes of appropriation could be a means for encouraging a community of users to become more aware of others' and their emotions and foster a sense of

connectedness between people. While collaborative task based systems have examined presencing or awareness of others, interactive art installations provide an opportunity to foster an awareness of others and their emotions in a more ludic way that could be particularly useful within an organizational context.

In addition to designing common social spaces as part of workplace and academic buildings to encourage interaction, this study points to the potential for interactive art installations to act as “social signifiers” [33] that signal a certain type of atmosphere or ambience apart from the “serious” workplace- a cue that social connectedness is valued, that there are moments that offer respite from the office or the lab, and that playfulness and creativity are encouraged. In this way, interactive art installations can serve to “loosen up” [17] or prompt reflection on [23] the dominant norms of the building. In this study we found that the sense of place for Gates Hall was firmly defined for student participants in the lived experience of the building as a place for *doing work* for computer science and information science students, faculty, and staff. In other words, the types of activities that happen in the building were *perceived and experienced* as predominantly work-based activities of research, coursework, labs, etc. The introduction of the interactive installation, mood.cloud served to disrupt this sense of place for many of the building occupants and visitors. mood.cloud acted as a small signifier of sociality and informality within a workplace. Our study points to the potential of interactive art installations to contribute to spatial well-being within the workplace in the way that they can both *signal* a space for sociality as well as *offer* building occupants opportunities to feel as though they are creatively contributing to a larger community. While mood.cloud was a single stand along installation, there is the potential to incorporate multiple interactive art installations within a building in order to create a series of experiential moments throughout the workspaces as way to potentially impact spatial well-being [cf. 7]

In addition to the ways that interactive installations can introduce play and serve to “lighten up the workplace” [19], this study finds that interactive art installations, through their spatiality and sensory engagement, give building occupants an opportunity to engage with shaping space. Sihvonen and Cnossen [40] point to the importance of continual “re-imagining of space while working in it” (p.050) as part of fostering creative work. Although unintended, interaction with mood.cloud fostered reflection, speculation, and imagination about the spatiality of Gates Hall. This suggests that interactive art installations in the workplace could be designed to *invite appropriation of space*, giving building occupants ways to actively and engage with and shape the feeling of their work environment.

6.1.2 Designing for Continued Engagement

Both the spatiality and materiality of mood.cloud invited building occupants to explore and appropriate mood.cloud. In the short term, the abstract notion of contributing to a larger community motivated engagement with mood.cloud. Importantly, our data offer a series of snapshots at specific points in time. Further work would be required to understand in more detail how use and appropriation evolved over time. Regardless, a sense emerged that, when it came to the idea of influencing mood, participants felt that they needed to know what they were contributing towards in a more concrete way in order to sustain and continue to engage with mood.cloud.

Although a number of participants discussed how they felt they were making a contribution to something larger by engaging with mood.cloud, others wanted less ambiguity around what their contribution meant and more importantly how their contribution could benefit the larger community. In other words, participants were motivated to continue participating if they knew how their

contributions could help others—influencing the way others felt or influencing the way the space felt. While mood.cloud was compelling as a dynamic and colorful light sculpture, participants wanted more “information” about what the data meant and to be able to see trends and patterns over time as a means of sense-making.

Even though ambiguity can foster creativity in how an artifact or installation is appropriated, in this case participants described wanting less ambiguity in how their interactions with mood.cloud could potentially help others. They wanted to know for example which colors could boost the mood of others and even suggested that getting a notification reminder about contributing to mood.cloud to help change the mood of the space or help others would be helpful. It is unclear whether a more prescriptive design would have appeased or exacerbated participants’ desire to boost the building’s collective mood. With more prescriptive design and feedback, would a desirable result be sought more ardently? An interactive installation like mood.cloud in an organizational context blurs boundaries between art and task-based ubicomp systems, between prescription and interpretation. This positioning can lead to higher expectations for the installation to communicate intended purpose, i.e., to provide potentially less interpretive flexibility, to participants than an interactive art installation located in a gallery setting, but meeting those expectations may also reduce the degree or types of appropriation in which users engage.

7. CONCLUSION

We investigated the way a new technological artifact mediated the interactivity of the surrounding space. The in-the wild deployment of mood.cloud in an organizational context of a university empowered participants to move beyond the mood tracking input function of the installation.

This study makes several important contributions to CSCW and HCI studies. First, by exploring how participants engage with an interactive art installation over a significant time period, we introduce two intertwined modes of appropriation that reveal different types of motivation for participating. In doing so, we show that in addition to looking at phases of appropriation, researchers can also examine the processual aspects of appropriation related to interactive installations. In this study, participants saw the technology of mood.cloud as a means to contribute to something larger, fostering feelings of connectedness. These findings suggest that an opportunity to design systems for this interplay between appropriation for the individual and appropriation for the imagined community.

Our study reveals that interacting through a big, visible artifact such as mood.cloud mediates the interactivity in the surrounding space. mood.cloud encouraged participants to orient toward each other around use, interpretation, and appropriation. While this study offers a particular snapshot in time of user engagement and perceptions of use by participants at that time, it points to the potential of longitudinally studying interactive art installations in organizational contexts to better understand phases of engagement. Future research should continue to explore how a series of linked interactive art installations throughout a building can impact spatial well-being and impact the atmosphere and feeling of the workplace. Future research might examine the spatiality of interactive technologies in enabling building occupants to develop a sense of authorship and ownership of their workplace.

Introduced as a new technological artifact, mood.cloud was appropriated in ways that revealed new spatialities between the installation and building architecture, heightened awareness of the

mood of space and the mood of the larger community, and inspired new meaning making.

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