
Creativity Interventions: Physical-Digital Activities for Promoting Group Creativity

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Abstract

Arizona State University's *Arts, Media, and Engineering Program* is currently addressing the need to assess the growth of group creativity in trans-disciplinary collaboration. This paper describes our initial work in developing criteria and a framework for constructing *creativity interventions*, or activities designed for building, tracking and evaluating creative group behaviors in diverse communities of IT practitioners.

Keywords

Creativity intervention, physical-digital activity, collaborative performance, play.

ACM Classification Keywords

H.5.2 Input Devices and Strategies, H.5.3 Collaborative Computing, Computer-supported Collaborative Work, K.3.1 Collaborative Learning, K.4.3 Computer-supported Collaborative Work.

Introduction

Arizona State University's *Arts, Media, and Engineering Program* (AME) is currently addressing the need for a physical-digital framework to support trans-disciplinary collaboration for transformational research in IT. AME

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has created the Reflective Living Group (RL) to respond to this need. RL's primary focus is to promote, document, and evaluate creative processes as they emerge in a diverse community of creative practitioners through the development and deployment of creativity interventions. This document will describe our current work in designing, testing, and evaluating these interventions.

Finding Ways to Evaluate Creative Processes

Understanding and promoting creativity is fundamental to the RL group. Currently, RL is exploring new ways to encourage and support creative processes in cross-disciplinary collaborative environments through the development of *creativity interventions*. A creativity intervention is assessed and adapted in relation to its effectiveness in supporting three interrelated facets for the emergence of creativity: (1) individual self-actualization within the group context, (2) group mutual awareness, and (3) complex group activity. The goal of the creativity intervention is to facilitate an increase in the sophistication of activity and the use of analogy and metaphor, where sophistication is defined within the context of each intervention and based on Csikszentmihalyi's model of creativity [3, 4].

The following section describes a creativity intervention for collaborative brainstorming in the workplace. More specifically, this intervention seeks to encourage highly creative ideas that go beyond Csikszentmihalyi's definition of domain in order to change the thinking in the broader culture and other domains [3-5].

"Creativity Interventions" in the Workplace

In this paper, we describe a prototype creativity intervention built to promote group creativity through

playfulness and novel reflection on community generated media. The end-result of the activity has no fixed "right" or "wrong" answers. Rather, it relies on a group of users to construct a metaphorical concept. Users are free to exchange interaction controllers or ask another user to deploy a particular action. In addition, the abstract nature of the activity's relation-making feature allows for broad and general discourse.

This intervention follows Csikszentmihalyi and Gertzel's creative activity assessment rubric, which is based on the correlation between observed behavioral variables and domain-expert analysis [4]. The process and product of the intervention are tightly coupled, occurring almost simultaneously. We are trying to collect evidence of emergent creativity by gathering and analyzing sensor data streams.

The activity is designed for its current location: the Reflective Living Reception Space. The RL Reception Space is a compact area with soft ambient lighting, a couch, surround speakers and a large-screen flat panel monitor—all of which add to the relaxed nature of the experience. The space belongs to a typical office environment and is subject to the noise levels and physical confines of an office meeting space. To support common rules of productivity and efficiency in a workplace environment, the length of the activity is compressed, lasting between 5 and 30 minutes.

Design Prototype: The Sensor Squid Relation Game

Goals and Motivations

Motivations for creating a playful, simple, and open-ended activity come from a performance theory understanding of *play* as "a category of creative



Figure 1. The Sensor Squid on the Reflective Living Space couch.

thought and action,” whose functions include learning, regulating, hierarchy, exploration, creativity, and communication [6]. Our design is influenced and informed by Phoebe Sengers’ heuristics on “design for enjoyment” [7] and James P. Carse’s definition of an “infinite game,” which is played for the purpose of continuous play, preventative of anyone winning so as to include as many persons as possible, and promoting playfulness to allow for most possibility [2].

Currently known as the “Sensor Squid Relation Game”, this prototype is comprised of two distinct parts: (1) an audio-visual metaphor activity that harnesses the embodied interaction framework of the Situated Multimedia Arts Learning Lab [SMALLab]¹, and (2) a large, wireless, plush squid tangible interface containing multiple sensors. This activity is motivated by a desire to encourage small and diverse groups of colleagues to discuss, generate and contribute meaningful data about how community generated media artifacts relate to one another. Through these conversations, colleagues from different disciplines and cultural backgrounds can challenge, learn from, and become more familiar with the opinions and collective wisdom situated within their own community.

Within this activity, the squid helps to facilitate playful collaboration by lowering the entry cost to participation and bringing individuals into close physical proximity. In this case, an over-sized toy amuses and engages people in ways that a plastic joystick or keyboard cannot. Multiple controllers on the squid invite

collaborative play while different controllers also facilitate the adoption of a variety of social roles.

General Description of the Activity

The basic goal of the game is to give users an opportunity to explore and discuss community media as a form of enjoyment and entertainment. The activity also provides a way for people to get to know each other better. Participants use the Sensor Squid (see Figure 1 and 2) to audition sounds, pictures, and videos, and to create meaningful relationships between two of the three objects on screen.

Description of the Sensor Squid Interface

The squid is a 5-foot long soft plush toy held by multiple people at once. It is wireless and exposes no electronic components apart from sensors located at the end of each tentacle. A user controls a different aspect of the activity by using one of these sensors. Each sensor functions as follows (see Figure 3):

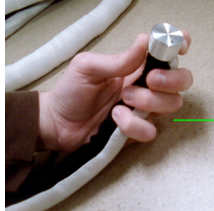
- (1) To audition a media artifact, adjust the *knob* to select the media, which will highlight it in red.
- (2) To change the relationship on the screen, scroll through the set of relationships by pointing the light sensor to a bright light.
- (3) To change the current set of media artifacts, touch the Velcro conductive fabric pads together.
- (4) To discard the media artifact that ‘does not fit’ or ‘fits least’ with the relationship, first select the media artifact with the knob and then bend the tentacle containing the bend sensor. Once the tentacle is bent, the selected media artifact disappears, the remaining two media are enlarged, and a message confirming that ‘you have made a relationship’ is displayed.



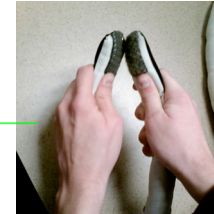
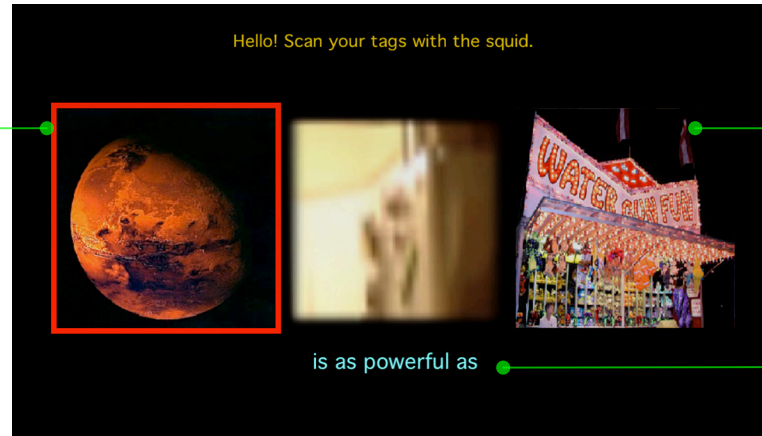
Figure 2a, b. AME students using the squid interface to play the relation game.

¹ SMALLab is a mixed-reality, experiential media system developed by a team of creative practitioners, scientists, and media researchers at AME.

Knob sensor selects and plays media audio. A red box around the media indicates it is selected.



Bend sensor removes the selected media and creates a relationship between the remaining media.



Velcro sensors are touched together to display a new set of media.



Light sensor will change the relationship when placed near a bright light.

Figure 3. The Sensor Squid Relation Game's main screen. When users determine which media artifact to discard, they must first select it with the knob and then bend the bend sensor to remove it. The two remaining media are then enlarged on the screen along with the relationship and text indicating the "is as powerful as" relationship.

Connecting the Game to the Group Creative Process: Awareness, Consensus, and Emerging Metaphors in Negotiation

The game sustains two modes of negotiation: (1) distributing and sharing control, and (2) establishing a group consensus before creating a relationship.

The negotiation of control occurs because each sensor works independently from the others. As a user becomes skilled in controlling his or her sensor, he or she must also gain awareness of other users' control elements. Tension and uncertainty may arise over how and when to act. For example, someone might change the set of media without first consulting the other participants. Another could be that a few participants continue discussing a relationship while the participant who can change the relationship desires to alter it but hesitates to use his/her control. Just as each user must be sensitive to the adjustments of his or her controller, he or she must also be sensitive to the group's current state of activity and dialogue.

Part of this negotiation involves coming to agreement on a relationship metaphor. The screen activity is based on making relationships between two items that are not often connected or compared in a particular way. Participants might examine an image of a circuit board, a video of a cat, and the sound of a gushing stream while trying to decide which one "is as enlightening as" another. Potential exists for agreement, disagreement, mental stasis and spontaneous solution. For each screen, participants can choose to share their personal experience and creative insights as they work towards a meaningful metaphor.

Preliminary User Study

11 participants were divided into three groups of 3 or 4 participants. During each videotaped session, one group played the game for 10 minutes before engaging in an audio-recorded group interview. On-screen activity was captured using screen-capture software tracking both the screen and any verbal comments

produced by participants during the interaction. Each group had its own set of unique experiences:

- Group A had two “expert” users who had used the interface and system before. These users seemed to dominate the conversation during the game, delegating or requesting actions from the other users—both of whom were new to the activity. Three of the four users tended to joke in continuous conversation, with the fourth user being less talkative but still involved in the final decision (this user possessed the bend sensor).
- Group B spent more time listening to the audio samples, even if they looped continuously. One user suggested that because the activity seemed to lack a real point or clear purpose, they create the most “absurd” relationships, to which they all agreed. Following this decision, they began laughing louder and more often, appearing to be more comfortable with one another and having more fun. We did not observe that they felt making these kinds of relationships would influence the system in any obvious or negative way. Finally, each user seemed to contribute evenly to the conversation, and they spent a noticeably longer time discussing each set of media.
- Group C users rarely changed the media set during one iteration of relationship making. Once the group had seen all available relationships (for this study, there were 20), they were quick to identify and agree on relationships that made sense before they could get the actual relationship to display.

Each group shared four general characteristics. First, they all enjoyed the experience, evidenced by their frequent laughter and verbally expressed in their interviews. Secondly, users worked as a group to make

decisions, meaning that a user did not use his or her controller without some general group dialogue or consensus. A third characteristic shared by B and C and slightly less with A, is that they spent more time looking for the best relationship for a given media set rather than searching for a media set to fit the given relationship. Finally, they all expressed frustrations due to the fixed semantic order of the relationship (left-to-right), annoyance due to the endless looping of short sounds, and difficulty at using the light sensor to find a particular relationship.

Overall, users found the activity to be a good exercise in promoting group collaboration. Most users liked that they were manipulating a fun, soft object together, with some feeling an affinity to the squid as a character. Everyone had fun and found the activity useful for brainstorming or freeing one’s mind from everyday paradigms. During the post-session interview, when prompted, users came up with a variety of potential uses for the activity, including using it to share or browse personal media, narrow in on ideas, learn about colleagues’ thought processes, train a machine, achieve some kind of reward or contribute to other community applications, analysis, or artistic products.

Future Work

To assess any significant or long-term impact this activity has on collaborative group creativity, we will need to consider user suggestions, improve the flexibility and robustness of the system, and continue with further user studies. Our goals include:

Improvements to Squid Interface

- Increase the robustness of the sensors

- Integrate tactile feedback through the squid
Improvements to Software Activity
- Interaction – Increase system flexibility to support: reordering of media, returning to previously seen relationships, changing single pieces of media, permit creation/use of relationship themes or categories
- Input – Allow for personalization of media content
- Feedback – Improve audio feedback quality and modality (i.e., options in audio playback)
Addition of an Activity Summarization
- History/summary created from time-stamped sensor data and database archive using Java, Max/MSP and SMALLab's SCREM architecture [1]

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Citations

- [1] Birchfield, D., T. Ciufo, G. Minyard, G. Qian, W. Savenye, H. Sundaram, H. Thornburg, and C. Todd. *SMALLab: A Mediated Platform for Education*, Proceedings of ACM SIGGRAPH, Boston, Mass. (2006).
- [2] Carse, James P. *Finite and Infinite Games* (1986): 3, 9, 19, 67. Rpt. in *Performance Studies: An Introduction*, 2nd ed., Ed. Richard Schechner, New York: Routledge (2006), 97.

- Asynchronous access and annotation of summary

In the future, we will expand our study to include varying playing times. We will also look at how built-in system elements (e.g., randomness of media, thematic relationship sets, ease and character of interface) have a direct effect on social performance at the levels of the group and the individual in relation to the group. By examining how creativity interventions affect the performance of diverse groups, we believe that we can contribute new knowledge to the field of HCI design for enhancing and evaluating group creativity.

[3] Csikszentmihalyi, M. *Creativity: Flow and the Psychology of Discovery and Invention*, Harper Perennial (1997).

[4] Csikszentmihalyi, M. and J.W. Getzels. *Discovery-Oriented Behavior and the Originality of Creative Produces: A Study with Artists*. Journal of Personality and Social Psychology (1971), 19(1), 47-52.

[5] Kuhn, T.S. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press (1970).

[6] Schechner, Richard. *Performance Studies: An Introduction*, 2nd ed., New York: Routledge (2006), 89-122.

[7] Sengers, Phoebe. The Engineering of Experience. *Funology: From Usability to Enjoyment*, Ed. Mark A. Blythe, Kees Overbeeke, Andrew F. Monk, Peter C. Wright, Norwell, Massachusetts: Kluwer Academic Publishers (2004), 19-29.