

IDEAS2IDEAS: Encouraging Constructive Ideation in an Online, Mass-participation Brainstorming System

Michel Krieger
Stanford University
mkrieger@hci.stanford.edu

YanYan Wang
Stanford University
yanyan@cs.stanford.edu

ABSTRACT

Brainstorming has moved from the individual, to the meeting room, to digital tools, and recently, to online collaborative systems with masses of participants in a “crowdsourced” brainstorm. This paper presents IDEAS2IDEAS, our design of a mass-participation online brainstorming system built to encourage a particular behavior in brainstorm participants: constructive, collaborative ideation. This system (Figure 1) was evaluated against a system built to imitate existing industry practice with a between-subjects study with 60 participants, and found that the I2I system was significantly better at encouraging constructive behavior.

Keywords: Brainstorming, Crowdsourcing

INTRODUCTION

The study of brainstorm has often focused on small-group brainstorming, or interaction techniques to minimize process loss. In the last few years, however, the rising popularity of “crowdsourcing”—the outsourcing of work to a “crowd” of online participants by companies and individuals—has moved brainstorming online. Companies such as Dell, with Dell IdeaStorm, and Starbucks’ MyStarbucksIdea have attempted to bring brainstorming into a mass participation context – with mixed success. Particularly, in these systems participants are far more likely to add their own ideas versus building off existing ideas – and further, even when they do comment on existing ideas, the comments are as likely to be negative or disparaging as constructive. This goes against the brainstorming precepts of “Defer Judgment” and “Build off other ideas” suggested by IDEO and other design experts. We believe that this notion of “building off other ideas”, which we have termed “constructive ideation”, is a necessary one for the success of an early-stage brainstorm. We hypothesized that, by learning from existing systems’ shortcomings and designing specifically for the target behavior we wanted to encourage – constructive ideation – we could design a system that outperforms current ones on this metric.

RELATED WORK

Brainstorming—a term first coined by Osborn in 1954 [3]—has been focus of a wealth of academic studies. As early as 1958, Taylor, Berry, and Block challenged the notion that brainstorms generate more and better ideas [5], arguing that process loss in groups inhibits creative think-

ing, and ‘nominal brainstorming’—with each participant writing out their ideas on their own—is more effective.

Electronic brainstorming showed early promise in improving brainstorming. Members can simultaneously contribute ideas and anonymity can be preserved. Gallupe, Dennis, and colleagues concluded that electronic brainstorming groups of a fixed size outperformed face-to-face groups of the same size. However, they still did not outperform nominal brainstorming groups [2].

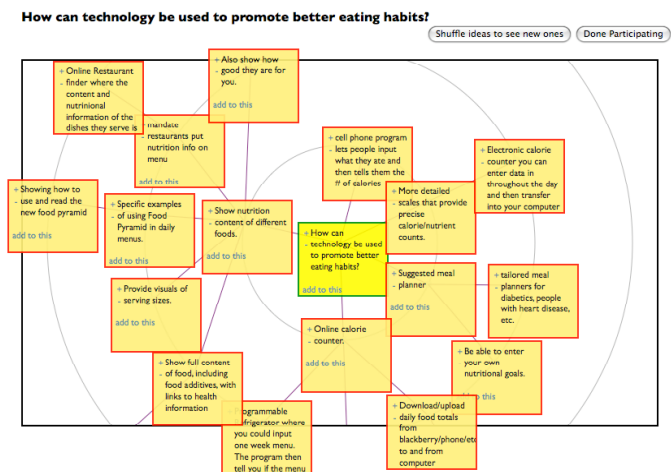


Figure 1: Ideas1Ideas Prototype

Recent work suggests a hybrid approach, that we believe is applicable and extremely promising for online brainstorming—interactive groups of “brainwriters”. Paulus and Yang [4] examined the effectiveness of a technique whereby a person wrote down their ideas on a piece of paper and passed them to the next person, who then built on these and passed it on, and so forth. This was, according to Brown and Paulus, perhaps the first laboratory study where face-to-face brainstormers outperformed nominal brainstorming – which strongly highlights the potential for constructive ideation.

DESIGNING IDEAS2IDEAS

Based on prior work, our observations, and a critique of existing online brainstorm systems, we settled on a set of design characteristics that a successful mass participation brainstorming system should have if it is to encourage constructive ideation. They are as follows:

- Visualize the entire sequence of ideas, from the initial prompt to the current idea – this will show future par-

Participants that the existing ideas did not come out of thin air, but of collaboration.

- Allow for quick shuffling of ideas for additional inspiration, so that participants do not see the same ideas every time they join the system merely due to recency or popularity.
- Present the ideas in a visual manner that evokes traditional brainstorming situations—PostIt notes and whiteboards—instead of a forum-based system more likely to evoke Internet chatter on a particular issue.

To make these design characteristics concrete, we built a prototype, which we call IDEAS2IDEAS (I2I). This web-based prototype uses a Radial Graph visualization to display idea hierarchies and illustrate the ideas that sparked the most collaboration. Ideas are shown as PostIt notes on a virtual whiteboard, with a direct manipulation interface for adding to existing ideas.

EVALUATION

Our study focused on the central question of whether our IDEAS2IDEAS prototype encouraged creative ideation more than the industry-standard message board-based system. To this end, beyond implementing IDEAS2IDEAS, we also implemented a message board system, using the open-source Pligg system, meant to mimic Dell’s IdeaStorm system (an unmodified Pligg system is shown in Figure 2; our system replaced any mentions of “news story” for “ideas”).

Participants were recruited online using Amazon’s Mechanical Turk service[1]. Mechanical Turk is a US-based crowdsourcing service that allows participants over 18 to perform “Human Intelligence Tasks” requested by a variety of individuals and companies (participation on both ends is open to anyone). Since our target audience of brainstormers is that of an online crowd, this service provided a good source of participants. Further, having access to a massive, readily available subject pool allowed us to pilot and tweak our study design multiple times before running our study.

We used a between-subjects design, and assigned 30 participants to either of two conditions: using IDEAS2IDEAS, or using our facsimile of existing systems. Since we wanted to measure how many ideas were extensions to current ideas, we asked each participant to contribute at least two ideas to a brainstorm on “How can technology be used to promote healthy eating?” This prompt was chosen due to its balance of open-endedness and specificity. Participants were told to either add to existing ideas or add their own ideas. Instructions were identical for both conditions.

In both systems, participants were presented with an initial set of ideas. To see other ideas, participants could then either shuffle (in the IDEAS2IDEAS condition) or browse (in the message board) condition.



Figure 2: Pligg submission system

RESULTS AND DISCUSSION

Participants contributed a total of 154 ideas between both conditions—in the IDEAS2IDEAS condition, 78 ideas were contributed (an average of 2.6 ideas per participant), while in the message board condition, 76 ideas were added (an average of 2.53 ideas). This difference was not significant, which is to be expected since participants were likely to follow the prompt and add the minimum (2) ideas, with a few participants adding more ideas.

More important is the variable we were designing for—were participants more likely to build off other ideas in the IDEAS2IDEAS system? In the I2I condition, 35 new ideas were added, and 43 ideas built off other ideas. In the message board condition, 52 new ideas were added, and 25 ideas built off other ideas. This difference is significant (χ^2 test of independence = 10.8776, $p < 0.001$).

Since the interface design was the primary difference between the two conditions, we believe the increased visibility of “idea chains” was instrumental in encouraging constructive ideation. Particularly, we believe there is a self-reinforcing effect whereby participants who see that previous brainstormers have built a ‘web’ of constructive ideas are more likely to build off a previous idea.

As evidenced by our results, our system encouraged the constructive ideation behavior that we were looking to design for. We believe our system is a strong step forward in online brainstorming for masses of users.

FUTURE WORK

While our system has shown a significant improvement over current mass brainstorming systems, the improvement is not as nuanced as it might be. In our future work, we plan to perform a more fine-grained comparison of how interaction design decisions affect target behaviors in brainstorming, including the notion of idea authorship, and the make up of the initial set of ideas that a user is presented with. Further, we are interested in seeing how the ideas contributed in both conditions would be rated and evaluated through either an expert evaluation or another crowdsourced study focusing on evaluation.

ACKNOWLEDGMENTS

The authors thank Scott Klemmer and Joel Brandt.

REFERENCES

1. Amazon Mechanical Turk. <http://www.mturk.com>
2. Gallupe, R. Brent et al. Electronic Brainstorming and Group Size. In *The Academy of Management Journal* (Vol. 35, No. 2 (Jun., 1992), pp. 350-369)
3. Osborn, AF. *Applied Imagination: Principles and Procedures of Creative Thinking*. Scribner (1954)
4. Paulus, PB, HC Yang. Idea Generation in Groups: A Basis for Creativity in Organizations. *Organizational Behavior and Human Decision Processes* (2000)
5. Taylor, DW et al. Does group participation when using brainstorming facilitate or inhibit creative thinking. *Administrative Science Quarterly* (1958)