IDEAS2IDEAS: Encouraging constructive ideation in an online, mass-participation brainstorming system

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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 was evaluated against a system built to imitate existing systems’ shortcomings and designing specifically 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.

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
The study of brainstorming can be traced back to Osborn’s 1954 publication Applied Imagination when the term was first coined [3]. Osborn’s argument was that groups generate more ideas than individuals if the members contribute whatever ideas occur to them and evaluation is deferred. Taylor, Berry and Block challenged this claim [5], arguing that group participation ends up inhibiting creative thinking. Their work was then reproduced by several other groups, with similar results.

Electronic brainstorming seems like a natural alternative. Members can simultaneously contribute ideas and anonymity can be preserved. Indeed, Gallupe, Dennis, and colleagues concluded that electronic brainstorming groups of a fixed size outperformed face-to-face groups of the same size. A year later, continuing on their work, Gallupe et al also demonstrated that the performance of electronic brainstorming groups increased substantially with group size [2].

Since then brainstorming has been classified into three types: verbal brainstorming (group of people in a room), nominal brainstorming (individuals writing down ideas and then coming together to share them), and electronic brainstorming.

However, 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 — and we believe this is due to 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 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 that is 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.

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).

**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 ($\chi^2$ test of independence = 10.8776, $p < 0.001$).

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.

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**REFERENCES**

5. Taylor, DW et al. Does group participation when using brainstorming facilitate or inhibit creative thinking. *Administrative Science Quarterly* (1958)