The Influence of Contribution Visibility on Participant Satisfaction in Electronic Brainstorming

Alex Ivanov, Simon Fraser University, Canada; E-mail: aivanov@sfu.ca
Dianne Cyr, Simon Fraser University, Canada; E-mail: cyr@sfu.ca

ABSTRACT

Electronic brainstorming (EBS) was developed to overcome limitations of face-to-face brainstorming, and can be particularly useful in distributed idea generation sessions. However, EBS adoption in organizations has been sluggish, and its benefits beyond productivity—such as participant satisfaction—are equivocal. Applying the recently advanced theory of satisfaction attainment by Briggs, Reinig, and deVreede, our research explores if EBS participant satisfaction can be increased by innovative visualization of participants' contributions. This paper outlines our research model, and reports on the pilot deployment of one of our proposed EBS user interfaces.

INTRODUCTION

Idea generation is the process of deriving new concepts that may be useful when addressing a problem or opportunity [20]. Group brainstorming—a key ideation method in organizations—is characterized by deferring judgment, including even wild ideas, striving for quantity, and building on the ideas of others [16]. *Electronic* brainstorming (EBS) was developed to overcome limitations in face-to-face brainstorming, such as delays from taking turns speaking and withholding ideas for fears of a negative reaction. EBS eliminates these limitations by allowing simultaneous and anonymous input of ideas from distributed workstations, especially relevant in today's global teams [6, 18].

Despite the potential of EBS to boost productivity, its adoption in organizations has been sluggish—not unlike other e-collaboration technologies [7, 11]. *LotusNotes*, for instance, was not well accepted in a consultancy, due to lack of incentive to share one's best ideas if they were going to be seen as common property [17]. Other group support systems have left managers emotionally unfulfilled, for lack of that affective atmosphere inherent to some face-to-face meetings [21]. At the design firm IDEO, for instance, brainstorming sessions serve as 'prestige auctions' among employees, whose status is affected by reactions within the group [23]. While such explicit evaluability is not the point of EBS, complete anonymity, on the other hand, has been known to decrease motivation and participant satisfaction [5, 9, 14]. Anonymity may refer to *process* (inability to tell who is contributing) or *content* (inability to associate comments to contributors) [19].

CONTRIBUTION VISIBILITY

A recent EBS study by Jung, Schneider and Valacich [14] took a middle-of-the-road approach to anonymity. Their user interface (UI) included a bar chart that plotted the idea generation rates of each of the five participants, identified by pre-assigned pseudonyms. This treatment increased participants' motivation, compared to the control UI with no such performance feedback. The study, however, did not measure participant satisfaction. In addition, the authors note, some participants had realized the chart was displaying the number of contributions, and so lowered the *quality* of their ideas. Our study fills these gaps by investigating whether higher satisfaction with EBS outcome and process would be reported in conditions of identifiability and contribution visibility.

Only a handful of EBS studies address the issue of information visualization in EBS [8, 12]. Despite the compelling work by Erickson and Kellogg's on social translucence and social proxies in digital systems [10], the value of visualization

Figure 1. Our research model, with an iconic representation of the EBS interface conditions on the left, instantiating three levels of contribution visibility (our independent variable). Perceived goal attainment is the causal construct, while meeting satisfaction is the consequent construct. Dependent variables are reported scores on the various items (shown with the smallest type)

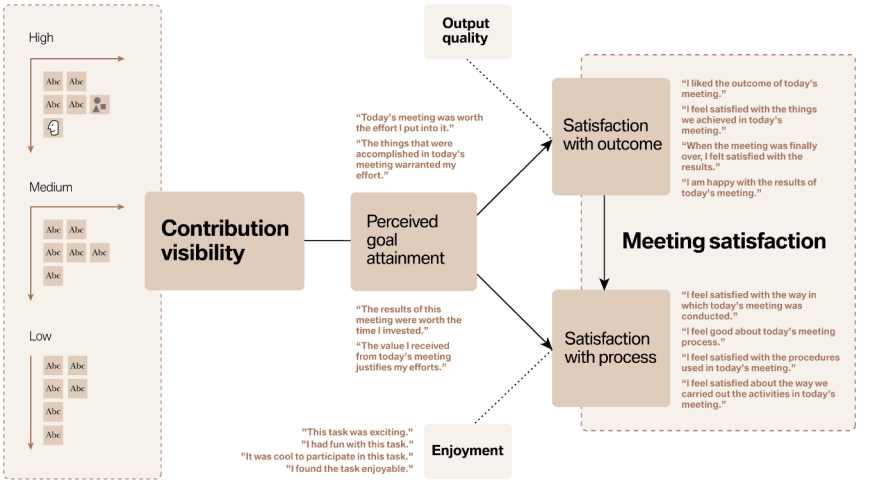

Figure 2. A screenshot taken near the end of the pilot session. Participants have submitted ideas as in a threaded discussion, except that text appears in rectangular cells. New ideas are arranged horizontally. Refinements or elaborations of already generated ideas are arranged top-down

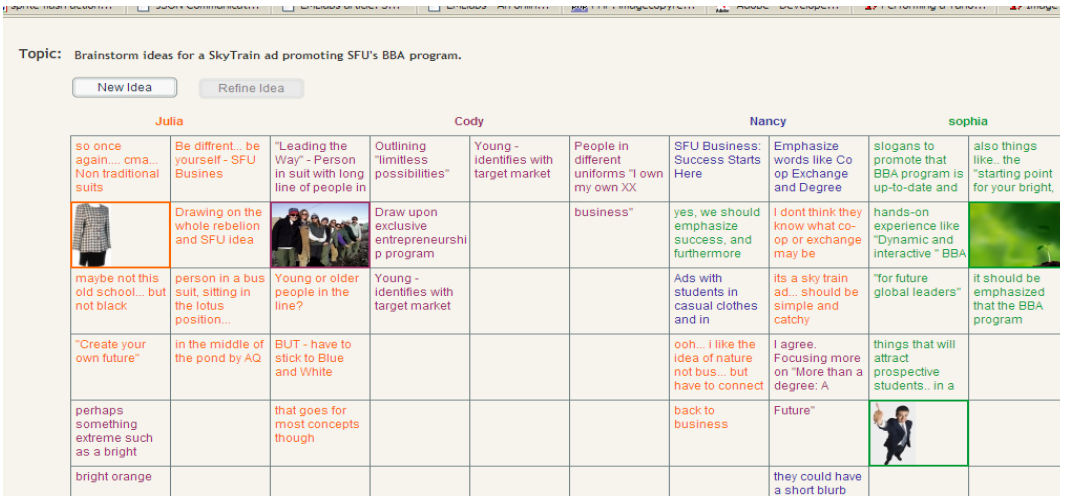

Table 1. Mean responses for each construct from the five participants in the pilot test.

	1 Strongly Disagree	**2** Dis-agree	**3** Some-what Disagree	**4** Neutral	**5** Some-what Agree	**6** Agree	**7** Strongly Agree
Perceived goal attainment					**5.3**		
Satisfaction with outcome					**5**		
Satisfaction with process				**4.85**			
Enjoyment				**4.75**			

for interfaces of collaboration technology has yet to be realized. The most popular system on the market and in the labs, GroupSystems.com, is mostly based on text and tables, and relies on trained facilitators to wield its rich computational functionality. But the scope of our research does not include facilitated meetings. For political and economic reasons, reliance on facilitators in companies has become impractical [3]. Instead, our experimental manipulation is varying the design of our web-based EBS interface.

MEETING SATISFACTION

There is a dearth of research on what causes satisfaction in technology-supported meetings. Yet insufficient satisfaction can undermine the adoption of otherwise productive systems [2, 22]. Briggs and his colleagues observed many instances of users abandoning systems they *judged* to be useful and easy to use, but with which they nonetheless *felt* dissatisfied [2, 21]. These researchers have since then defined meeting satisfaction as an affective arousal with a positive valence on the part of a participant with respect to the outcomes or procedures and tools used in a meeting [2, p. 588]. We apply the validated instrument that stems from this definition, but in addition include items for *enjoyment*, which has influenced technology acceptance in more general IT contexts [24]. Its inclusion will help us better understand the link between extrinsic and intrinsic motivation in EBS.

Effort towards a goal is generally determined by our subjective assessment of its *value* and the *likelihood* of its attainment [2]. Yet this effort is reduced when individuals work collectively and combine their inputs, according to the collective effort model [15]. This reduction is strong when individuals feel unlikely to get credit for their contributions, or when these are not instrumental towards attainment of the group goal. In one study of an online community, for instance, members were reminded of their unique position to rate a specific movie that only they had seen. This intervention increased their participation [1], and similar increases in EBS have been achieved based on social comparison [14, 21]. Indeed most of us compare ourselves to others due to some degree of uncertainly about our abilities, which we seek to resolve through positive confirmations [19, 23]. Uncertainty occurs in EBS given the flurry of incoming ideas, as some participants even confuse their own ideas with those of others [9].

While all hypotheses have yet to be derived, our main expectation is that EBS participants who brainstorm in conditions of high contribution visibility (CV) will report higher meeting satisfaction than participants who brainstorm in the conditions of low CV. Further, since the condition of highest CV supports uploading of image thumbnails alongside text, we expect participants, who do take advantage of this feature, to report the highest levels of satisfaction. This is because—simply put—pictorial representations are more impressive than text [4, 13]. Pictures can also be used as avatars instead of usernames, but this feature was not enabled in our pilot.

METHODOLOGY AND PILOT TEST RESULTS

Consistent with the EBS literature, our methodology is the lab experiment with students. In a between-subjects design, 240 students from a second-year business course will brainstorm on how to advertise the University's undergraduate Business program in the local mass transit. Each participant will receive course credit, and teams with the best ideas will further receive $100 ('best' being determined by independent coding from domain professionals). All 5-person teams will brainstorm for 15 minutes in distributed settings, using one of the three web-based EBS interfaces. The post-experimental questionnaire, with items on a 7-point Likert scale (shown in Figure 1) will be administered at the end online.

A pilot test was already conducted with five participants using the high contribution visibility condition. The quality of participation (Figure 2) and survey responses (Table 1) were promising. Some usability problems that emerged will be fixed for the upcoming main data collection. For instance, participants needed more and wider cells, so an algorithm will rescale and optimize the canvas aspect ratio. The outcome also alleviated our concern whether participants would take the trouble to find and upload pictures with relevant content. All five participants submitted a picture. The elaboration structures were not so clear, unfortunately, but on the plus side, participants reported they found the color-coding meaningful. The next step is conducting a second pilot test for instrument validation and finalizing all three EBS interfaces.

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