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1.0 Introduction

Group idea generation, especially when it is directed towards planning organizational strategies, is a much-valued group support system (GSS) application (Dennis and Valacich, 1993). There is considerable evidence that the use of a GSS results in an increase in both the quantity and quality of ideas generated (Valacich, et. al., 1994). A much less investigated issue is whether idea generation processes can be used to influence the type of ideas generated or to produce any systematic paradigmatic shifts in thinking as represented in the ideas generated (Gryskiewicz, 1987; Nagasundaram and Bostrom, 1995). Ideas that reflect paradigmatic shifts in thought are those that break away from the standard way of perceiving the problem at hand. There is much interest in specific industries, especially those in danger of being superseded, for fostering of effecting paradigmatic shifts in their business strategies and the ideas that drive the business.

A key component of the GSS-based idea generation process is the *group memory* (Nunamaker, et. al., 1991) which is the repository of ideas created in a GSS by idea generation participants. The group memory allows participants to review each others' ideas during the idea generation process, the viewed ideas may stimulate the production of more ideas. Given the critical role of group memory in the idea generation process an important research question unaddressed thus far is: *In what manner do the contents of the group memory influence the* ***type*** *of ideas generated by individuals in the group?*

We report the results of a laboratory experiment that investigated whether the contents of a GSS group memory systematically influenced the extent of *paradigm shift* represented in the ideas generated by participants. A GSS simulator specifically designed for this study was used to allow for the manipulation of the group memory contents.

2.0 Research Framework

The general creativity model consists of four principal components: *Person*, *Product*, *Process*, and *Press* (or environment)ói.e., ìthe Four Písî. The attributes of each component impacts all other components (Fellers and Bostrom, 1993). For instance, individuals have preferred creativity styles (*adaptor* or *innovator*óKirton, 1976) which causes them to generate ideas (product) that preserve paradigms (adaptors) or modify or break away from paradigms (innovators).

Structures. Creativity techniques for idea generation with or without GSS support provide structures (DeSanctis and Poole, 1994) that enable, promote, or constrain certain kinds of individual and group behavior, which potentially influences the nature of the outcomes produced. Some structures could be **paradigm-preserving (PP)**, in that they tend to promote the generation of ideas that preserve the paradigm of the stated problem, while other structures may be **paradigm-modifying (PM)** in that they tend to produce results that alter or change the paradigm (Nagasundaram and Bostrom, 1995).

Ideas may be placed along a continuum in relationship to their paradigm relatedness. Ideas that do not seek to redefine the basic problem presented to the participant are considered the most paradigm preserving. Whereas those that are more tangential to the initial problem and redefine the problem to arrive at possible solutions are the most paradigm modifying ideas. For instance, Gryskiewicz (1987) studied the types of ideas different participants generated when faced with the problem: A tea-bag manufacturing company has excess capacity - how can the company utilize this capacity? A paradigm preserving idea may be to manufacture tea bags with instant coffee in them while a paradigm modifying idea could be to use the equipment to manufacture sheets of material for gauze bandages.

Group Memory. The availability of the group's ideas in the group memory is expected to stimulate further idea generation by participants. The ideas stored in group memory can be new ideas, feedback on other peopleís ideas or other forms of thought that an individual within the group has added to the group memory. Comparison of electronic nominal and electronic interacting groups has shown that the interacting groups (where the group memory is accessible to participants) produce a larger number of ideas (Valacich, et. al., 1994). The tone of feedback has been found to impact the number of ideas an individual produced and their satisfaction level (Connolly, et. al., 1990) while the use of cognitive feedback has been found to improve the control over the decision-making process as groups members decision strategies converged (Sengupta and Teíeni, 1993). The effects of the contents of group memory on the paradigm-relatedness of participant ideas is unknown.

One way to manipulate the paradigm-relatedness of ideas in group memory is to control what members of the group enter into the memory. This can be accomplished by using a group composed of one test participant, with the rest being confederates working from a script. This method has been used to understand the impact of positive and negative evaluative feedback on idea generation (Connolly, et al., 1990). While effective, this method is very costly. A less expensive method is to create the illusion of a group for the lone test participant through the use of virtual participants simulated by a custom GSS. The GSS simulator displays previously entered ideas on the subjectsí screens as if they were being entered into group memory by other participants. This approach controls for human inconsistency. Such a system was developed and used in this study to present participants with either PP or PM ideas.

Hypotheses. Drawing on Nagasundaram and Bostrom (1995) we developed the following hypotheses relating the paradigm-relatedness of simulated ideas in group memory to the paradigm relatedness of ideas generated by participants.

H1: *Individuals who are exposed to PM ideas via group memory will generate a higher percentage of PM ideas than PP ideas.*

H2: *Individuals who are exposed to PP ideas via group memory will generate a higher percentage of PP ideas than PM ideas.*

3.0 Methodology

The impact of group memory on idea generation was explored through a laboratory experiment. The independent variable was the type of stimulation the individual was exposed to (either paradigm preserving or paradigm modifying ideas). The dependent variable was the paradigm relatedness of ideas generated.

Participants. Participants included 185 undergraduate business students, 90 female and 95 male. Participants self selected their session, and were randomly assigned to one of two treatment conditions. There were, on average, 10 participants, each working alone (in a simulated group) at a workstation during each session.

Session. Sessions ran for an average of an hour. Each session began with a warm up task to allow participants to become familiar with the technology and technique. The individuals were then asked to generate responses to the question: *How to improve the parking situation on campus?* Both the parking task and the warm up task lasted 15 minutes. A script was used during the lab sessions to reduce experiment administrator bias. Participants filled out a questionnaire at the end of the experiment.

Group Simulator GSS. Participants were told that they were part of a *simulated group* of 5 participants, only one of whomói.e., themselvesówas a real person. We could have deceived them by telling them they were part of a real group working together. We felt, however, it was possible that the participants would realize that this was not the actual situation if any one entered ideas into the system they thought would provoke a reaction from other group members (either verbal laughter or electronic responses). It is possible that their knowledge of their participation in a simulated group may have impacted the responses, but the researchers felt that deceiving the participants could lead to more confounding reactions.

The GSS simulator implemented the Electronic Brainwriting Technique where participants entered ideas into a simulated "sheet of paper" on the screen that were drawn at random from 6 (number of ìparticipantsî +1) electronic "sheets". Each time a sheet was displayed to the participant, it included new ideas entered by the virtual participants. The new ideas were actually read in from a database of ideas assembled and entered from an earlier experiment involving real participants who had worked on the same problem. The ideas in the database had been coded as paradigm-preserving (PP) or paradigm-modifying (PM). Depending on the treatment administered, the ideas presented to a participant were either all PM or all PP ideas. Ideas entered by participants were added to the group memory just as in a real group.

The ideas entered by participants as well as those by virtual participants were captured in electronic session logs which also recorded information about the use of scroll bars, the entering of null ideas, and the identification of the origin of each idea (the idea database or participant). Participants ideas were later coded as either PP ideas or PM ideas and the total number of ideas generated by each participant was computed.

Two coders were trained in identifying paradigm relatedness in ideas. The coders used a categorization scheme to classify the ideas. This classification scheme was developed during a previous study (Nagasundaram, 1995). If the ideas revolved around increasing the parking space or managing the existing space differently they were considered paradigm preserving ideas. If the ideas focused on managing the use of automobiles, finding alternative modes of transportation, providing different forms of education, or other higher level goals the ideas were classified as paradigm modifying. The first coder coded all of the participants ideas as PM or PP, the second coder coded one third of the session to determine inter-rater reliability. Inter-rater reliability was found to be adequate at 91%, at the participant level of analysis.

4.0 Results and Discussion

There was a significant and large effect for the impact on the paradigm relatedness of ideas presented to participants from group memory (PP or PM) on the paradigm-relatedness of ideas generated by the participants ($F=52.77$, $p=.000$, $R2= .22$). Both hypotheses were supported. The paradigm-relatedness of ideas presented did not affect the total number of ideas per participant ($F=0.05$, $p=0.825$), or satisfaction levels reported by the participants.

The group memory used in this study simulated a creative climate that a participant is exposed to, and the creative behavior that it begets. Participants working with a group memory containing only paradigm preserving ideas tended to generate paradigm preserving ideas, while those exposed to paradigm modifying ideas tended to generate paradigm modifying ideas. Since the study used randomized groups, both individuals with adaptive and innovative creativity styles tended to be influenced by the paradigm-relatedness of ideas in the group memory significantly more than their own preferred styles. Most GSS idea generation studies have assessed the value of group memory principally in terms of the quantity of ideas that a group can generate. While all treatments resulted in the same *quantity of ideas*, they differed in the *paradigm relatedness of ideas.* By focusing on the quantity of ideas an interesting and different phenomenon might have been obscured. This study , therefore, has introduced a new perspective on effects of group memory and how its use could *actively* influence a group idea generation process.

References

Connolly, T., Jessup, L.M and. Valacich, J.S (1990). Effects of Anonymity and Evaluative Tone on Idea Generation in Computer-Mediated Groups. Management Science, 36 (6), 689-703.

Dennis, A.R. and Valacich, J.S. (1993). Computer brainstorms: More heads are better than one. Journal of Applied Psychology, 78, 531-537.

DeSanctis G. and Poole, M.S. (1994). Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. Organization Science, 5(2), 121-147.

Fellers, J.W. and Bostrom, R.P. (1993). Application of group support systems to promote creativity in information systems organizations. Proceedings of the Twenty-seventh Hawaii International Conference on Systems Sciences, Kauai, HI.

Gryskiewicz, S.S. (1987). Predictable creativity. In Isaksen, S. G., (ed.), Frontiers of Creativity Research: Beyond the Basics, Buffalo, NY: Bearly Ltd., 305-313.

Kirton, M. (1976). Adaptors and innovators: A description and measure. Journal of Applied Psychology, 61(5), 622-629.

Nagasundaram, M. (1995). The Structuring of Creative Processes with Group Support Systems. Unpublished dissertation, University of Georgia.

Nagasundaram, M. and Bostrom, R.P. (1995). The Structuring of Creative Processes using GSS: A Framework for Research. Journal of Management Information Systems, 11(3), 89-116.

Nunamaker, J.F., Dennis, A.R., Valacich, J.S., Vogel, D.R., and George, J.F. (1991). Electronic Meeting Systems to Support Group Work. Communications of the ACM, 34(7), 40-61.

Sengupta, K. and Teíeni, D. (1993). Cognitive Feedback in GDSS: Improving Control and Convergence. Management Information Systems Quarterly 17(1), 87-113.

Valacich, J.S.; Dennis, A.R.; and Connolly, T.. (1994) Group versus individual brainstorming: A new ending to an old story. Organizational Behavior and Human Decision Processes, 57, 448-467.