Brainstorming Reconsidered in Computer-Mediated Communication and
Group Support System Context

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ABSTRACT

Research presented in this paper has two major purposes. The first objective is analyzing the effects of the combination rule and merging ideas in the productivity of the groups. The objective is to analyze the effects of memory stimulation and anonymity in group performance. According to the results, significant effect of interaction were not observed. But the external memory factor (memory stimuli) revealed direct effects on quantity.

Categories and Subject Descriptors

H.5.2 [Information Interfaces and Presentation (e.g.,HCI)]: User Interfaces – Evaluation/methodology, User-centered design.

General Terms

Measurement, Performance, Design, Experimentation, Human Factors,

Keywords

Brainstorming, Electronic Brainstorming, CMC, GSS.

1.   INTRODUCTION

Generating ideas is a crucial stage of the creative process, even though, the production of ideas, by itself, is not enough to innovate or assure the organizational creativity.

The value and importance of ideas, particularly that of good, unique, useful and creative ideas, has always encouraged the

search for methods to improve, facilitate and stimulate idea generation. The suggested practical proposals were many, but we are far from the realm of techniques and methods guaranteed to be effective.

In this context, the objectives o this study are:

- To analyze the effects of the combination rule and merging ideas in the productivity of the groups

- To analyze the effects of memory stimulation and anonymity in group performance

In the following sections, the it is presented a brief literature review related to brainstorming. Then, the objectives and hypothesis of the study are presented and the empirical work described.   Finally main results are briefly presented and discussed.

2.   BRAINSTORMING

Brainstorming is the most popular technique, more involved in myths and misunderstandings throughout its history, being driven to an extensive research field full of controversies and enigmas, the product of inconsistent results and differences between researchers and practitioners.

Osborn [19] proposed brainstorming as a means to facilitate and stimulate the production of ideas, but most of the research does not evaluate directly the functioning or qualities of the intervention on groups or individuals, due to the application of brainstorming principles and rules ([21], [35]). On the contrary, much of the research conducted in brainstorming confuses the method or the practice, and the principles and rules as proposed by Osborn, with the task of idea generation on itself. In some ways, the program of brainstorming research has focused its attention on the comparison between nominal groups and interactive groups, having the majority of the studies shown a clear advantage of the nominal groups in terms of quantity of ideas.

Somehow, the comparison between nominal and interactive groups, or the focus on the task, are not very clear on its effectiveness and functioning as an intervention tool, on the production, preparation, and development of ideas, at the individual or group level.

How to make the production of ideas more efficient in quantity and quality?

When accepting brainstorming as an intervention tool [14] in organizational contexts, with individuals and groups, it is important to analyze the effect of brainstorming rules in idea generation, and then reconsider the technical programs within the context of organizational creativity.

What would be the reasons for concern with idea generation? Are ideas cheap or expensive? Are ideas an inexhaustible resource or a scarce resource?

Even though, the importance of creative ideas is recognized, research has directed its concerns and attention to other aspects of innovation. According to West [38], this pattern reflects the poor agreement on whether the task of generating ideas is easy or difficult [33], or if it is easy or difficult to get good ideas. This was the reason why research focused its attention on the final stages of the innovation processes.

Believing in the easiness to obtain or produce good ideas is contrary to many empirical results reported by research. Idea generation normally produces high ratios of bad ideas, and on the other hand, the methods of selection, and the selection and choice of ideas is often insufficient, leading to inappropriate decisions ([9], [15]; [28]).

Evidence exists that managers can act to improve idea generation ([10]; [31]; [36]); or on the contrary, their intervention may lead to negative effects in the creativity of its collaborators ([32]). It is known that success in an innovation process stage is no guarantee that the same will occur in subsequent stages. However, the domain and application of appropriate technical tools in the phase of idea generation, is certainly relevant at first to encourage organizational creativity.

3.   BRAINSTORMING AS STRATEGIC ORIENTATION FOR OBJECTIVES.

The purpose of brainstorming instructions is to bring structuring and modeling to group activity, in order to increase productivity and stimulate creativity.

The individuals are asked to make an effort to follow four rules, which can be viewed and interpreted as a set of objectives. The orientation for the objective perspectives aims to simultaneously create multiple objectives from the brainstorming rules. Others may also be triggered, given the differences in perception and interpretation of the instructions and objectives of the task.

First rule – generating the maximum of ideas possible targets an obvious objective of quantity, at the same time may stimulate the effect of productivity adjustment with the other colleagues ([2], [6]; [25]).

Second rule - avoiding criticism suggests excluding the evaluation of alternatives, but it may also trigger the objective of avoiding conflict, disagreement or different thinking.

Third rule – combining and merging ideas may be interpreted as an instruction to take notice of ideas and contributions from others, to integrate ideas within the same category, or to compete with other members to suggest better ideas [34].

Finally, free-wheeling, is associated with creativity, but could also be associated to other objectives, such as acquisition of status through humor by presenting more creative or fun ideas [34], through cheerfulness.

It is widely accepted that the brainstorming rules are better than any others to generate many ideas. But few studies have compared the rules of brainstorming with other rules [24]. For example, Parnes & Meadow [22] compared the rules of brainstorming and the instruction comments only on good ideas, but only good ideas were assessed. The studies of Parnes concluded that the rules of brainstorming were preferable for the instruction: do your best. The problem is that the rules of brainstorming were not compared with a clear instruction of quantity, and without any reference control to quality, as it can be restricted from the other brainstorming rules. Eventually the only study that attempted to deal with this hurdle failed to find reliable differences [8].

The big issue, subsequently discussed in brainstorming over the years, was the comparison between nominal groups versus interactive groups, initiated by Taylor and colleagues [35]. The advantage is clearly from the nominal groups. Although, some intervention over the interactive groups could reduce or even cancel this trend. Offner and colleagues[18] demonstrated that the presence of a trained facilitator increased the number of ideas generated by FaF groups, canceling the advantage of nominal groups [18].

Early studies on brainstorming assumed that ruling out criticism was a crucial rule ([13],[21]). The verbal ideation context displays empirical evidence of advantage in the absence of criticism of ideas generated by participants ([8];[20];[22];[27]; [37]). By comparison, other literature showed advantages when challenging various opinions and encouraging discussion of ideas ([4]; [16]; [17]), i.e., appraising conflict, disagreement, and criticism, as inducers of creativity and enhancement in decision-making groups. The emphasis in agreement and non-criticism, very present in brainstorming instructions, has received strong recognition in the context of verbal ideation, because it reduces fears and prior judgments by individuals, by preventing inhibitions in the expression of ideas and input ([11]).

Other studies have extended the discussion by adding more rules to the original instructions ([24]; [7]; [22], [21], [23]) with beneficial results of increased productivity. Thereby, it demonstrates the importance of testing and evaluating the application of rules that are appropriate to the context, in order to make the generation process more efficient.

But Connolly and colleagues [39] suggested that the non-criticism rule would not be favorable for all conditions and environments, or ought to be accepted without being systematically evaluated in different contexts of interaction and studies, because in many cases could stimulate the appearance of early traditional tendencies, or facilitate passivity in the participants.

The CMC shows significant differences in the communication context of FaF, namely in the possibility of anonymity of content and process, in parallel communication, in the organization simultaneously in individual and group tasks, in the gap between the presentation and reading of ideas, in the presentation of various stimuli during the sessions, in the lack of social cues and clues, in the lack of communication in all methods, etc. Because of all these facts, it has been suggested, but not tested, by some authors the possibility of classical brainstorming instructions not being fully suitable to the contexts of CMC, and in particular of GSS [5].

More recently, Santanen [29] defended its rejection, since according to the author, they have no effectiveness in the context of electronic communication. Previously Dennis and Vallacich. [5] and Santanen and colleagues [30] used simple instructions like "Read others' ideas and write your own ideas." However, no other alternatives were compared, the reason why it is not possible to discuss the effectiveness of this alternative in view of the classical brainstorming instructions. But Paulus and colleagues [23] verified, in a verbal ideation context, that the performance of groups improved considerably with the use of more rules. These rules instructed the participants not to say foolish things, tell jokes or explain in detail their ideas.

4. STUDY OBJECTIVES AND HYPOTHESIS

The objectives of this study are:

1. To analyze the effects of the combination rule and merging ideas in the productivity of the groups

2. To analyze the effects of memory stimulation and anonymity in group performance.

In order to reach those objectives and according to the literature, the fallowing hypothesis are analyzed:

H:1 – The groups that performed the task by following the rules of classical brainstorming, will be more productive than the groups to which the incentive rule of combination and merging ideas was omitted.

H:2 – The groups in contact with external memory will show better performances

H.3 – The anonymity of authorship has positive effects on group performance.

5. EMPIRICAL WORK

5.1 Method

Design - 2x2x2 factorial plan, the objective being to analyze the effect of the rule of combinatorial ideas (in the absence of the rule of combinatory and merging ideas vs. classical rules of brainstorming), of the stimulus of external memory (in the absence of any memory stimulus vs. permanent presence of external memory) and the anonymity of authorship (anonymity versus identification of authors) in the performance of groups.

Participants - 168 student volunteers participated (111 women and 57 men, average age = 21.2 years) forming 56 groups of three members, randomly distributed throughout the experimental situations.

5.2 Procedure

Follow the oral and written instructions of the classical brainstorming rules, versus incentive of criticism. Procedures are similar to those described by [1] [13].

The task that we propose is to generate and propose slogans to promote ISCTE in order to attract and increase the number of domestic and foreign students to choose courses by ISCTE.

The participants generated ideas during 15 minutes. The after-experimental questionnaire was applied at the end of the session, to evaluate the satisfaction of the participants and other dynamic dimensions of the group.

The group production was assessed by three judges double-blinded to the experience.

5.3 Independent Variables

Rule of combinatorial and merging - classic brainstorming instructions and omission of the rule of combination;

External memory:

The groups perform the session without any stimuli other than that generated by the members' ideas.

The groups perform the whole session having projected on a public screen the ideas generated during eight pre-study sessions, and randomly selected from the universe of 187.

Anonymity:

The groups performed the tasks under an environment of either unknown or identified authors.

Control of anonymity - we asked participants in the post-experimental questionnaire, whether they could identify the authors of the ideas on a scale of 1 to 5 (Always (1) Never (5)). The individual responses were compiled by groups. We observed that the groups performing their session on the condition of anonymity showed M = 3.82, SD = .73, and in the condition of identification of authorship (M = 1.9, SD = .63 (F (1, 51) = 58,012, p <.001).

6.   RESULTS

Anonymity, rules and external memory show a direct effect on the group performance.

Figure 1 shows the effect of anonymity on quantity, originality and diversity of ideas. The MANOVA showed main effects of anonymity: F (1,4)= 3,13, p<.020, Wilks' λ =.74.
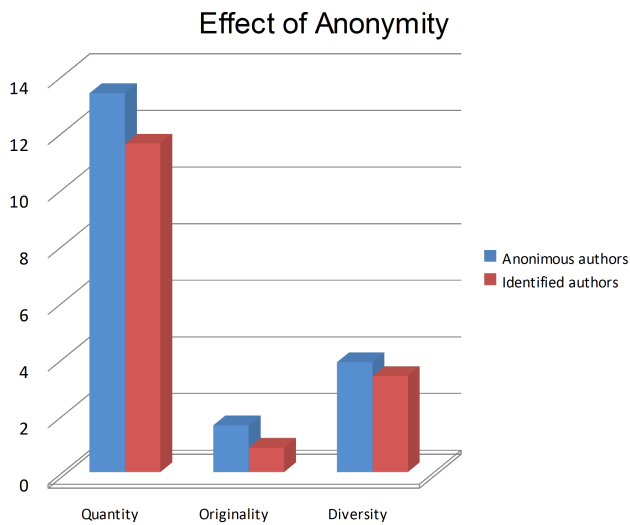

Figure 1 – Effect of Anonymity

Figure 2 shows the effect of external memory on ideas' quantity, originality and diversity. The MANOVA showed main effects of memory: F(1,4)= 3,86, p<. 010, Wilks' λ =.711.
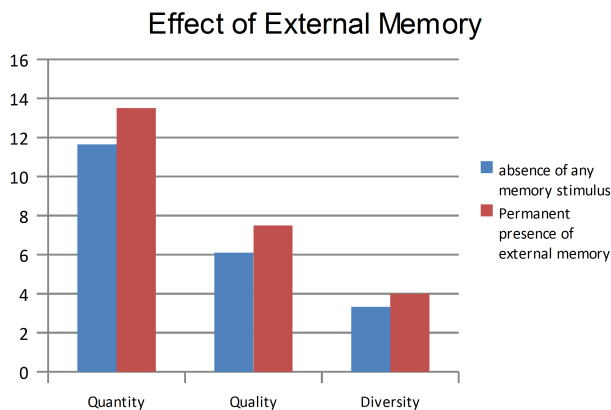

Figure 2 – Effect of external memory

Figure 3 shows the effect rules on diversity of ideas. The MANOVA showed the effect of the rules was observed only for the diversity of the ideas: F (1,7) = 8,59, p <.006.
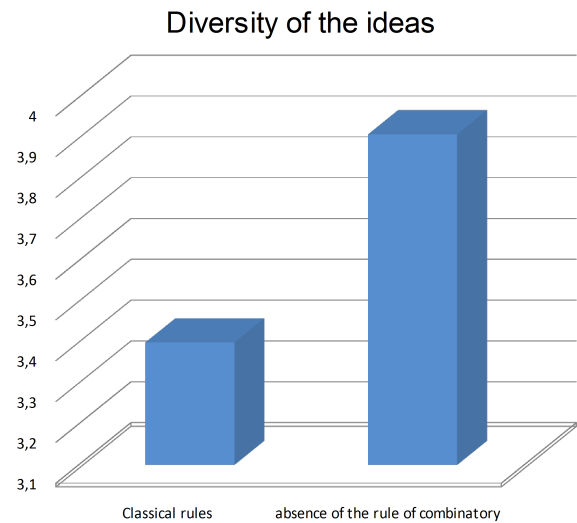

Figure 3 – Effect of rules on diversity of ideas

Summarizing, the MANOVA showed main effects of anonymity, rules and memory. Significant effects of interaction were not observed

The idea of Sutton and Hargadon [34] suggesting that the rule of combining and merging ideas could be an invitation for participants to integrate their ideas, within the categories provided by the other members, deserve to be considered. Paulus and colleagues [26] observed that individuals rarely combine ideas.

The external memory factor (memory stimuli) revealed direct effects on quantity (F(1,7)=7,87, p<.008; quality F(1,7)=5,27, p<.027; diversity F(1,7)=13,94, p<.001.

7.   CONCLUSIONS

In this paper it was presented an empirical study with three hypothesis.

H1 – The groups that performed the task by following the rules of classical brainstorming, will be more productive than the groups to which the incentive rule of combination and merging ideas was omitted.

H2 – The groups in contact with external memory will show better performances

H3 – The anonymity of authorship has positive effects on group performance.

According to the results, significant effect of interaction were not observed. But anonymity, rules and external memory show a direct effect on the group performance.

8. ACKNOWLEDGMENTS

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