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The "rules" of brainstorming: an impediment to creativity?

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One of the most popular techniques for enhancing the number of ideas or solutions to a problem is that of brainstorming. Developed by Osborn (1957), it is specifically designed to foster idea idea generation by the usage of four rules:
 (1) Come up with as many ideas as you can
 (2) Do not criticize one another's ideas
 (3) Free-wheel and share wild ideas
 (4) Expand and elaborate on existing ideas. (Osborn, 1957)

 Most research has shown that these rules of brainstorming tends to improve group performance relative to a control group given no specific rules (Parnes & Meadow, 1959; Paulus & Brown, 2003, but see also Dunnette, Campbell, & Jaastad, 1963). The main reasons for this improvement are believed to lie in their ability to combat, problems such as social loafing and evaluation apprehension (Karau & Williams, 1993). The rule "not to criticize", for example, is believed to lower people's concerns about how they re being evaluated.

 In contrast to such literature, there is some theoretical reasons and recent evidence to suggest that these rules and, in particular, the rule "not to criticize" may actually inhibit creativity. Rather, there is evidence of the value of debate even criticism in the stimulation of creative thought.

 A variety of studies demonstrates that exposure to a persistent minority dissenter sparks more flexible, open-minded, and multi-perspective thinking which, in turn, produces less conformist and more creative outcomes (e.g., Peterson & Nemeth, 1996; Nemeth & Chiles, 1988; Nemeth & Kwan, 1985). This line of research maintains that the benefits of dissent stem from the cognitive conflict it generates; the dissent compels those in the majority to search for possible explanations as to why the dissenter is willing to openly disagree and suffer the rejection that often accompanies such disagreement. This search for explanations then fosters thinking on all sides of the issue (Nemeth, 2003). People search for information on all sides of the issue, use multiple strategies in problem solving and detect solutions that otherwise would have gone undetected (Nemeth, 1995).

 Other research more directly examines the role that conflict plays in enhancing group performance (e.g., Jehn, 1995; Jenn & Mannix, 2001; Pelled, Eisenhardt, & Xin, 1999). This body of literature points to conflict regarding the task at hand as an impetus for improved group performance.

 One recent study examines the role of the rule "not to criticize" directly in a brainstorming setting. Conducted in both the United States and in France, Nemeth et al (2004) gave participants in the condition the typical brainstorming rules including the admonishment "not to criticize" or the latter rule was changed to one that emphasized that they should debate, even criticize, one another's ideas. While many would have hypothesized that such an instruction would have lowered the number and

quality of ideas, the results showed the reverse. Not only was the faming of instructions to "debate and even criticize" higher than the control, it was as high as the typical brainstorming instructions. While these two conditions did not statistically differ, the means actually favored the advice to debate and criticize.

Nemeth et al. (2004) theorized that the "criticize" condition outperformed the "do not criticize" and the control conditions because the instructions to criticize liberated participants to more freely generate ideas. These instructions allowed for discussion that would otherwise have been kept in check, and such discussion led to more ideas and improvements on ideas. In addition, Nemeth et al. speculated that an atmosphere where criticism and debate are allowed, even expected, may also be liberating since such behavior is usually perceived as socially inappropriate and undesirable. Thus, such instructions may parallel rule-breaking or deviance which in and of itself may be liberating, stimulating, and creativity enhancing.

One might infer from such an analysis that there is clear discord between rules and creative thinking, because rules may inhibit freedom of thought. Regarding brainstorming, one could then argue that the rules of brainstorming, being rules, may even impede group creativity.. In fact, rules for how to think creatively may be contradictory to the free and unbounded thinking that many argue are the foundations of creativity (Amabile 1988; Hill & Amabile, 1993; Kanter, 1988; Mednick, 1962; Sternberg & Lubart, 1993).

Some research specifically shows the importance of freedom and liberty for creativity. Hill and Amabile (1993), for example, found that the most commonly cited stimulus for creativity was freedom among research and development scientists. By contrast, individuals who perceived their work environment as confining and constraining were less likely to manifest high levels of creativity (Amabile, Conti, Coon, Lazenby, & Herron, 1996. In fact, one might argue that rules are confining and constraining by definition and as such are obstacles to creativity because they promote standardization, reduced variation, and norm following (Olin & Wickenberg, 2001; Perrow, 1979.

Rules may also impair creativity at an unconscious level. As many cognitive psychologists have shown, subtle cues from the environment can prime specific goals, motivations, behaviors, and mental frameworks (for a review, see Bargh & Chartrand, 1999).   If priming affects brainstorming cognitions, there is a strong likelihood that providing rules to follow might trigger a "rule-following" schema, or more generally, a "conventionality" or "conformity" schema which would be antithetical to creativity.

From this perspective, the specific rule to criticize or not may be relevant to discourse and critical thought. However, the fact that any content is a " rule" may in and of itself prevent groups from reaching their optimal level of creativity. In the Nemeth et al 2004 study which explored the content of the instructions, the exact phrasing was framed as a suggestion rather than a rule. Specifically people were told that "prior research" suggested that the best way to generate ideas involved either no criticism or involved debate and even criticism. Given that both conditions led to more solutions to the problem than did the control and that the specific content did not statistically differentiate between conditions, it is possible that the issue is one of

framing the content in terms of a suggestion versus a rule. Thus, a major aim of the present study is to test whether rules impair creativity.

In this study, we contrasted rules with suggestions and compared the content of urging criticism vs admonishing against it. In essence, this was an attempt to investigate whether the Nemeth et al. (2004) findings were bounded by the fact that the advice was framed as a suggestion rather than a rule and, further, to investigate the role of rules, regardless of content..

HYPOTHESES

1.) Groups receiving instructions framed as suggestions will generate more creative ideas than will groups receiving instructions framed as rules.
2.) Groups receiving instructions framed as "rules" will generate fewer creative ideas than a control group given no instructions
3.) Groups receiving instructions framed as "suggestions" will generate more creative ideas than a control group.
4.) Instructions favoring criticism will lead to more creative ideas than instructions "not to criticize" .

PRESENT STUDY

Procedural Details

Design. The present study employed a 2(rules vs. suggestions) x 2(criticize vs. no criticize) design, and a control condition. Thus, there were 5 conditions.

Participants. 141 students (86 female and 55 male) from the Department of Psychology's subject pool at a west-coast university participated for course credit. Groups consisted of 4 individuals, 3 participants who would actually brainstorm and one individual who was a confederate for the experiment and was "chosen" to be the group's idea recorder. The confederate said nothing throughout the entire study and just wrote down the group's ideas. One group which was 2 standard deviations from the mean was dropped from the analyses.

Procedure. The experimenter brought the three participants and the one confederate into the lab and had them sit at a table. The experimenter then introduced the group task – brainstorm to come up with as many ideas as possible that could help reduce traffic congestion in the San Francisco Bay Area. The experimenter then mentioned that one participant needed to serve as the recorder. The recorder would simply write down all the ideas that group comes up with, but not talk or take part in the brainstorming at all. The experimenter then inconspicuously asked the confederate to serve as the recorder, at which time the confederate moved from the table to a chair somewhat behind the three participants where a clipboard, pen, and paper awaited.

Following this, depending on condition, the experimenter provided specific verbal and written instructions to the brainstorming group. For the two variables of rules vs suggestions and criticize vs do not criticize, there were 4 experimental conditions..

Groups in the rules condition were given a form that stated in large, bold, and underlined font: "Brainstorming Rules." Groups in the suggestion condition were given a similar form that had "Brainstorming Suggestions" written on the top. Furthermore, four rules/suggestions were printed in smaller font underneath these headings. The first of these four rules/suggestions depended on condition. In the criticize condition, the first read: "Debate, even criticize, one another's ideas." In the no criticize condition, the first read: "Do not debate or criticize one another's ideas." The remaining three rules/suggestions were the same for every condition. They were: "State any idea that comes to mind no matter how wild," "Aim for a large quantity of ideas," and "Build upon the ideas of others." Overall, there were four experimental conditions: 1. Rules-No Criticize, 2. Rules-Criticize, 3. Suggestions-No Criticize, and 4. Suggestions-Criticize. In all four of these experimental conditions, the experimenter read the instructions repeatedly emphasizing that they were rules to follow or were suggestions and were not rules. In the control condition, participants were provided no specific instructions after the brainstorming task was introduced.

Once the experimenter presented the instructions he left the room for 20 minutes during which time the groups brainstormed. After the 20 minutes, the experimenter returned and collected all the ideas the recorder had written down and also collected the instructions form. The experimenter then gave participants a questionnaire designed to gauge their impressions and reactions to the brainstorming task, and to gather demographic data. Participants completed these questionnaires independently, as did the confederate to maintain the cover story. Once all participants had completed this questionnaire the experimenter fully debriefed the subjects, answered their questions and then dismissed them.

Dependent Measures

A. The various measures of creativity

Creativity has been variously defined. Most previous creativity research has measured creativity by counting the total number of ideas an individual or group produces (Kogan, 1983; Runco, 1990). However, logic would suggest that, though this measuring methodology is quick and easy, it may not be the most accurate way to measure creativity. The definition of creativity generally includes the aspect of originality rather than simple numbers. Thus, a group that is good at coming up with a large number of ideas may not be more creative than a group that comes up with a small number of ideas. Furthermore, from an applied perspective, businesses and organizations that use brainstorming to develop innovations would most likely prefer a couple of very creative ideas to numerous mundane and uninspiring ideas

In the present study, we examined creativity in several ways. Along with measuring quantity of ideas, we measure creativity using both a "top notch" technique and an "average creativity score". The top-notch technique centers on ideas rated as the most creative ideas (relative to all other ideas generated). We had independent raters code every idea that all groups generated. We then selected the 3 most highly rated ideas for each group and averaged them together (i.e., an average of their very best ideas).

We also measured top-notch ideas by defining a threshold for what rating indicated an idea was highly creative. The threshold we chose was the top 2%, which dictated that we focus only ideas that ranked in the top 2% of all ideas generated. It turned out that the threshold for the top 2% of ideas was a rating of 4 or higher (on a

scale from 1 to 5; see coding section below). Thus, for each group we counted the frequency of ideas they had that scored a 4 or higher.

We also employed an "idea creativity average" technique that involved judging a group's creativity based on their entire performance, not just their best ideas. For this technique, we summed up the ratings for each idea a group had and then divided by the total number of ideas that the group had. This yielded a measure of the average creativity for each idea a group generated. Table 1 below provides a summary of the different measuring techniques we employed.

-----------TABLE 1 ABOUT HERE-------------

1. Coding and Calculating Creativity

Two coders who were blind to condition and hypotheses to rated each idea. They did this in two separate waves based on the general definition creativity which includes both originality and feasibility or usefulness.found in the literature:(Amabile, 1996; Kasof, 1995; Mumford & Gustafson, 1998; Paulus, 2000; Sternberg & Lubart, 1995). Thus, in the first wave, they rated every idea on originality (i.e., novelty) on a scale from 1 to 5 (alpha = .76). We specifically instructed them to not take feasibility or usefulness into account. On the other occasion, we had the coders rate each idea on feasibility (i.e., usefulness) also on a scale from 1 to 5 (alpha = .70). This time, we specifically instructed them to not take originality into account, but rather focus directly on how practical, useful, and implementable each idea was.

We then took the average originality score (across coders) and the average feasibility score (across coders) for each item, added them together and divided by two to generate an average creativity score for each item. We chose to incorporate an average of both originality and feasibility to form a creativity score because it was inline with the generally recognized and accepted definition of creativity consisting of both novelty and usefulness.

RESULTS

Manipulation Check

We first examined whether our manipulation – emphasizing either that the provided instructions were rules to be followed or suggestions that did not have to be followed – had their intended effects. To check this, we asked participants how free they felt to violate any of the instructions provided. Participants in the rules condition were significantly less likely to feel they were free to violate the provided instructions (Means = 2.22 versus 2.77; $F(1, 109) = 9.78$, p = .002). Thus, our manipulation appears to have been successful.

Group Level

We first ran a series of 2 x 2 analyses of variance (ANOVA) for rules/suggestions and criticize/do not criticize. For the "number of ideas generated", the 2x2 ANOVA yielded no significant main effect for rules/suggestions $F(2, 33) < 1$, NS, no significant main effect for criticize/no criticize $F(2, 33) = 2.15$, NS, and no significant interaction $F(2, 33) < 1$, NS. Means are shown in Table 2.

----------TABLE 2 ABOUT HERE ----------

For the "Top 3 Ideas Average", the 2x2 ANOVA revealed a significant main effect for rules/suggestions, such that the "top" ideas of groups in the suggestion condition were rated significantly more creative than groups in the rules condition ($F(2, 33) = 4.80$, p = .04). This analysis, however, did not yield either a significant main effect for criticize/no criticize $F(2, 33) < 1$, NS, or a significant interaction $F(2, 33) < 1$, NS.

To examine whether our manipulations affected frequency of ideas that were within the top 2% of all ideas, we ran chi-square analyses.. First off we ran a chi-square that compared the "Frequency of Top 2% of Ideas" between the rules conditions and the suggestions conditions. This chi-square yielded a marginally significant difference between the two groups' frequencies, such that the suggestions condition had more top 2% ideas ($\chi^2 = 2.74$, p < .10). We then ran a chi-square that examined the frequency differences between the criticize condition and the no-criticize condition (see table 3). This analysis did not reveal a significant difference between the criticize and no-criticize conditions ($\chi^2 = .14$, NS).

------------TABLE 3 ABOUT HERE ----------

We also ran a 2 x 2 ANOVA for "Idea Creativity Average". This analysis produced a significant main effect for rules/suggestions, such that the suggestions groups were rated as more creative than the rules groups ($F(2, 33) = 4.013$, p = .05). The analysis did not reveal a main effect for the criticize/no criticize conditions ($F(2, 33) < 1$, NS), and did not yield a significant interaction ($F(2, 33) < 1$, NS).

To specifically examine whether rules were impairing creativity or suggestions were fostering creativity, or possibly both, we compared each of these conditions with the Control. We ran a one-way ANOVA for "Top 3 Ideas Average" with 3 levels (Rules, Suggestions, Control). This analysis revealed a significant pairwise difference between suggestions and rules ($F(1,35) = 4.89$, p=.034). Pairwise comparisons, however, revealed no significant difference between the suggestions condition and the control ($F(1, 25) < 1$, NS) or between the rules conditions and the control ($F(1,26) < 1$, NS; see table 2 for means). However, as the means reveal, the results were trending such that the control conditions performed right in the middle of the rules and the suggestions conditions – implying that instructions framed clearly as rules impaired group creativity, whereas instructions framed clearly as suggestions fostered group creativity (see table 5 for means).

We then conducted a one-way ANOVA for "Idea Creativity Average" with 3 levels (Rules, Suggestions, Control). This analysis yielded a significant pairwise difference between the rules and suggestions conditions ($F(1, 35) = 4.067$, p = .05). However, like before, there were no significant differences found when comparing the suggestions condition with the control ($F(1,25) < 1$, NS) and when comparing the rules condition with the control ($F(1,26) = 1.38$, NS). Yet, also like before, the means suggest that since the control condition falls directly between the suggestions and rules condition, suggestions may foster while rules may impair creativity.

-------------TABLE 4 ABOUT HERE-------------

DISCUSSION

This research scrutinized the effects of imposing rules on the creative process of brainstorming, and also specifically examined one of these brainstorming rules – do not debate or criticize one another's ideas. We contended that the nature of rules is, in and of itself, one othat may confine and costrain. Therefore framing brainstorming instructions as "the rules of brainstorming," as is commonplace, might well hinder group creativity relative to groups where the brainstorming instructions were clearly framed as general suggestions. We found that in head-to-head comparisons, using multiple methods of measuring creativity, the suggestions conditions outperformed the rules conditions. Moreover, there seems to be evidence that relative to a control condition, rules impede creativity, whereas suggestions foster it.

We did not directly test why or how rules may be impeding creativity, but there is reason to believe that providing rules impacts cognition in at least 3 ways. First, imposing rules may establish a mental framework not conducive to freedom and divergent thought processes. Presumably from a young age, individuals internalize rules as associated with obedience and conventional behavior. Yet, it is the opposite of such behavior – disobedience and eccentric behavior – that associate more closely with creative thinking. If people's minds do associate rules with convention and conformity, then simply saying the word "rules" may activate schema or goals in line with these associations. Thus, the rules of brainstorming may actually prime uncreative thinking.

Imposing rules may also deplete cognitive resources that could otherwise be utilized in creative thinking. Being aware of and obeying rules requires attention and monitoring. This should especially be the case for brainstorming sessions, where the four rules are not already ingrained into one's memory and unconscious, but are new and highly salient. Though we have no way of knowing the amount of one's cognitive resources that may get devoted to focusing on and following the rules of brainstorming. However, whatever amount this is, reduces the resources that could be directed toward developing novel and useful ideas.

Our finding that rules may impair creativity seems consistent with the argument that creativity stems from a culture or atmosphere of freedom and liberation (Nemeth, 1997). In fact, a workplace where rules are not made salient merges well with an environment where one feels free to express ideas or dissent against norms. Thus, organizations aiming for a culture of innovation might find it useful to suppress the imposition of rules.

Footnote:

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TABLE 1.

Measuring Technique	Procedure
Quantity of Ideas	Count the number of ideas a group generated
Top-Notch Ideas	Independent coders rate every idea that every group generated.
Top 3 Ideas Average	The top 3 ideas that each group generated are averaged together to create a "top-notch" score for each group.
Frequency of Top 2%	A threshold is determined based on what rating an idea

	needs in order to be in the top 2% of all ideas generated by all groups. Then the frequency of ideas that a group has that rank above this threshold is counted. This frequency becomes the "top-notch" score for each group.
Idea Creativity Average	Independent coders rate every idea that every group generated. Then, the rating of every idea that a group generated is summed up and divided by the total number of ideas that that group generated.

TABLE 2

Dependent Variable	Rules No Criticize	Rules Criticize	Suggestions No Criticize	Suggestions Criticize	Rules Overall	Suggestions Overall	Criticize Overall	No Criticize Overall
Number of ideas	46.30	39.44	45.33	42.67	43.05	44.00	41.06	45.82
Top Notch Average (top 3 ideas)	3.63	3.56	3.78	3.75	3.60	3.76	3.65	3.70
Idea Creativity Average	2.76	2.75	2.84	2.79	2.75	2.82	2.77	2.80

TABLE 3

	Rules	Suggestions	No Criticize	Criticize
Observed Frequency (frequency of top 2%)	10 ideas	18 ideas	13 ideas	15 ideas
Expected Frequency	14.38	13.62	14.38	13.62

TABLE 4

Dependent Variable	Rules Overall	Control	Suggestions Overall
Top Notch Average (top 3 ideas)	3.60	3.68	3.76
Idea Creativity Average	2.75	2.80	2.82