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Building on the ideas of others: An examination of the idea combination process

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ABSTRACT

Two experiments were conducted to explore the process of building on ideas in brainstorming. Although this is presumed to be an important role of brainstorming, this has never been explored experimentally. In one experiment individual and group brainstormers generated ideas which were subsequently presented to these same individuals and groups to combine and build on for additional ideas, either as groups or individuals. The combination process was influenced by whether the participants had previously brainstormed alone or in groups and the phase of the combination period (early vs. late). In a second study participants were presented lists of rare or common ideas to combine and build on either as individuals or groups. Although groups generated fewer combinations than nominal groups, they generated more novel and feasible combinations when combining rare ideas. These findings indicate that groups are able to benefit from the exchange process in building on each other's ideas and are interpreted in the context of past research on idea generation and evaluation in groups.

Idea generation or exchange is a critical part of the innovation process. The idea exchange process seems to be facilitated by the use of brainstorming rules suggested by Osborn (1963) (cf., Parnes & Meadow, 1959). These rules are that individuals should focus on generating a large number of ideas without concern for quality, say whatever comes to mind, should not criticize or evaluate ideas as they occur, and build on the ideas from others. There is indeed evidence that a focus on quantity can increase both the number of ideas and the number of good ideas (Paulus et al., in press) and that low evaluative contexts can enhance idea generation in groups (Diehl & Stroebe, 1987; Camacho & Paulus, 1995). However, research has not yet examined the role of building on other's ideas in the creative process (Hargadon & Bechky, 2006; Litchfield, 2008). Prior research has shown that shared ideas can stimulate other group members to think of other ideas or categories of ideas (Dugosh, Paulus, Roland, & Yang, 2000; Rietzschel, Nijstad, & Stroebe, 2007). However, studies have not explored to what extent those stimulated ideas actually lead to combinations of previously shared ideas or combinations of new ideas with those previous ideas. The act of combining the elements from two ideas is analogous to conceptual combination — the product will be a merger of the two ideas and may contain some emergent properties. Because combining ideas involves stimulation, selection, and combination, all of these factors will have to be considered in understanding the combination process. We will use the insights of previous research on group ideation and selection to provide a theoretical context for the idea combination process.

Developing ideas in groups involves a series of processes. Group members have to tap their own knowledge network to come up with relevant ideas, listen to the ideas shared by others, and then build on the ideas generated in group. To generate ideas to share in the group, group members are presumed to search their memory for relevant domains and tap them for relevant ideas. After tapping ideas in one domain the search continues for other domains or categories of ideas (Nijstad & Stroebe, 2006; Paulus & Brown, 2007). One benefit of sharing ideas in groups is that ideas shared by other group members can serve as cues for potential categories and for related ideas in these domains. Of course, in the early phases of the idea generation process, group members may have little need for such social priming because they have an adequate source for their own accessible ideas (Paulus & Brown, 2003). However, as they find it more difficult to think of new categories and ideas over time, ideas shared by others should have more interest value. At this stage, there is an opportunity to link one's ideas to those of others or combine some of the shared ideas into more complete, novel, or useful ideas. This implies a move from purely divergent ideation to a more convergent orientation. Building on ideas from others requires both divergent and convergent processes. Individuals have to select ideas for possible combination (a convergent process; Putman & Paulus, 2009; Rietzschel, Nijstad, & Stroebe, 2006) and then generate a combination with these ideas or in conjunction with a new idea (divergent process). Our theoretical predictions will rely on the insights from both the idea generation and the idea selection literatures.

The source of the ideas for combination can be either from a prior idea generation session of these same individuals/groups or can be from other individuals/groups, and the combination phase can be done either as an individual or a group. Since participants already have a pool of ideas to work with, the production losses due to production blocking in idea generation groups (Diehl & Stroebe, 1987) should be lessened, especially if groups use electronic or written means of exchanging ideas

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(Dennis & Williams, 2003; Heslin, 2009). However, even with those paradigms, small groups tend to show poorer performance than nominal groups because of the competing demands of attending to the shared ideas as well as generating one's own ideas (DeRosa, Smith, & Hantula, 2007; Paulus & Yang, 2000). The combination process should also vary over time. One would expect more novel combinations over the course of a combination session, as is the case in regular brainstorming (Basadur & Thompson, 1986; Parnes, 1961). The most easily accessible and thus more common ideas should be tapped in the early phase of the idea search process (Paulus & Brown, 2003). Group interaction should increase the extent to which more novel combinations occur over time because shared ideas in groups can stimulate or prime more unique ideas (Dugosh & Paulus, 2005). However, groups tend not to select novel ideas as the best ideas (Putman & Paulus, 2009; Rietzschel et al., 2006), showing instead a bias toward more feasible ideas. This suggests that groups may also focus more on developing combinations that are feasible or useful. This trend may be most evident in the later phases of the combination session as groups move to a more convergent orientation (Parnes, 1975). This focus on more pragmatic combinations in groups may also mean that group members may rely more on their own prior generated ideas than those generated by others over the course of the session. It may be easier to come up with useful combinations based on one's own ideas rather than the ideas of others.

The purpose of this research is to investigate how effectively participants can create combinations in an idea generation setting, which ideas participants will use to generate their combinations and how the type of ideas affect combinations. In the first experiment individuals generated ideas either as individuals or as groups of three and subsequently had the opportunity to combine the brainstormed ideas into new ideas either as individuals or as groups of three. In the second experiment the participants were presented with common or novel ideas and were asked to combine these into new ideas either as individuals or as groups of three.

Experiment 1

In the first experiment, the idea generation and combination sessions were done via computers in groups of three. On the basis of past research with electronic brainstorming groups of size three (Gallupe, Bastianutti, & Cooper, 1991) one might predict that there will be a slight productivity loss for interactive groups of this size. However, it is possible that the outcome of the combination phase will be different from that of the brainstorming phase. Simply generating ideas is essentially an additive process in which the ideas generated by each individual are "summed" to make a group product. The combination process is more involved. It requires careful attention to the shared ideas, connecting the concepts contained within two or more of these ideas, and monitoring the combinations suggested by others. With this increasing complexity of the task, group interaction may be more beneficial. Consistent with this prediction, computer support systems for group interaction appear to be more beneficial with complex tasks than simple ones (Fjermestad & Hiltz, 1998). Furthermore, asking participants to combine ideas increases the necessity for them to attend to the ideas of others. Such attention may not occur in electronic brainstorming unless participants are motivated to do so by specific instructions (Dugosh & Paulus, 2005; Dugosh et al., 2000). The degree to which participants attend to the shared ideas is a critical factor in determining whether these shared ideas have a cognitive impact on other group members (Paulus & Brown, 2007). Thus it is possible that the task of combining ideas will enhance the extent to which the shared ideas are processed cognitively and their potential impact on the creative ideas of the participants. Such positive effects of group exchange on the combination process are likely to be most evident after some period of interaction. Such associative carry-over effects have been observed in several studies in which the impact of shared ideation was measured in a subsequent session (Dugosh et al., 2000; Paulus & Yang, 2000).

One particularly interesting aspect of the idea combination process is to determine the extent to which individuals use ideas from others to generate additional combinations or whether they will rely primarily on their own previously generated ideas. Ideas that one has generated previously may be better connected to one's semantic network than ideas generated by others (Paulus & Brown, 2007), and one may also better understand the basis for those ideas. So it may be easier to build on one's own ideas than ideas generated by others. There may also be an egocentric bias or preference for ideas that are self vs. other generated (Ross & Sicoly, 1979). The extent to which one uses ideas generated by others to form combinations may also depend on whether these ideas were generated as a group or individually, as discussed below.

In Experiment 1, participants first brainstormed ideas and then were asked to use these ideas to generate combinations from these ideas. Each of these two phases of the experiment was done either in an individual (nominal) or an interactive group setting. Regardless of the condition, all participants received the combined list of brainstormed ideas during the combination phase. At the beginning of the combination process, nominal group members saw the brainstormed ideas from others for the first time, while the interactive group members may have already seen them during the brainstorming phase (depending on the extent to which they attended carefully to the shared ideas). Therefore, if group members are presented with the group brainstormed ideas, their prior familiarity with the ideas may enable them to use them more effectively for combination ideas than members of nominal brainstorming groups who are subsequently exposed to the combined list of ideas. A contrary perspective is that the stimulation or interest value of the list of ideas generated by the three group members will be greater for those who brainstormed alone than for those who brainstormed as a group. Nominal group members will be seeing the ideas from others for the first time, while the interactive group members will have had the opportunity to see them during the exchange process. This interest value hypothesis has some support from research on idea selection after brainstorming. Putman and Paulus (2009) found those who brainstormed as individuals (nominal groups of 3) were better at subsequently selecting the best ideas from list of ideas generated by the "group" than did those who brainstormed as an interactive group and then selected ideas as a group. In this study the idea evaluation process was done as a group for both the nominal and interactive brainstorming conditions. In a similar study Rietzschel et al. (2006) had individuals brainstorm as individuals and groups and then select ideas under the same individual or group conditions. In that study there was no advantage in the idea selection process for individual idea generators. This pattern of findings suggests that the contrast between the individual idea generation phase and the group selection phase may be a critical factor. This may increase the interest in carefully evaluating ideas that were not encountered before. The rate of combination production was also expected to decrease with time, matching the temporal findings in normal brainstorming (e.g., Kohn & Smith, in press).

In sum, Experiment 1 allowed us to determine the effect of group interaction on the combination process and the impact of having generated the ideas for the combination phase either alone or in groups. Our theoretical discussion suggests the following hypotheses:

Hypothesis 1. The number of combinations generated by groups and individuals will be similar since the electronic exchange paradigm minimizes production blocking and the combination task is of higher complexity than merely generating ideas.

Hypothesis 2. Combinations will be more novel later in the session since more common/easily accessible ones should be generated first.

Hypothesis 3. Combinations generated by groups will be more novel and useful than those by individuals, especially toward the later part of the session based on mutual stimulation in groups.