The Facilitating Role of Task Alternation on Group Idea Generation☆

Ut Na Sio*, Kenneth Kotovsky, Jonathan Cagan

Carnegie Mellon University, USA

During group idea generation, group members often first retrieve typical ideas from common categories. The sharing of these typical ideas is likely to lead to fixation on them preventing subsequent creative idea generation. Two experiments were conducted to examine whether a task-alternation approach can reduce such fixation and facilitate idea generation. Dyads were asked to work on idea generation tasks (Experiment 1) or category–exemplar generation tasks (Experiment 2). In both experiments, dyads had to perform the tasks in either a continuous or an alternating condition. The continuous dyads worked on one task continuously before proceeding to another. The alternating dyads switched between tasks. Both experiments found a positive role of task alternation. Moreover, the performance gap between the alternating and continuous dyads increased over time. We conclude that task alternation facilitates group idea generation, most likely via overcoming fixation.

General Audience Summary
Although it is a common belief that idea generation should be best performed in groups because overhearing others' ideas should stimulate novel ideas, studies examining group idea generation often reveal that group interaction induces fixation rather than inspiration. This paper presents two experimental studies examining whether a task-alternation approach (i.e., distributing effort across different tasks through multiple, short problem sessions interlaced with other problems being solved) can reduce fixation induced by group interaction and facilitate group idea generation. Dyads were asked to generate solutions to daily problems (Experiment 1) or to list members of categories (Experiment 2). They had to perform the tasks using a task-alternation approach or perform each problem in sequence. Both experiments demonstrated a positive impact of the task-alternation approach. Moreover, the gap in performance between the two approaches increased over time. We conclude that task alternation facilitates group idea generation, most likely via overcoming fixation.

Keywords: Group performance, Idea generation, Task alternation, Creativity, Fixation

Idea generation is the early and core phase of problem solving in many domains (Osborn, 1957). For example, industrial designers usually generate a number of possible designs and then select a few for further investigation. The quality of the initial ideas often determines the success of the final problem solution (Kornish & Ulrich, 2014). It is a common belief that idea generation is best performed in groups because overhearing others' ideas should stimulate additional ideas. However, studies examining group idea generation often reported that interacting groups performed worse than nominal groups—an

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equal number of members working individually, where ideas are summed and treated as a group output (Diehl & Stroebe, 1991; Mullen, Johnson, & Salas, 1991).

A number of factors have been suggested as hindering group idea generation. First, individuals tend to lower their performance to match the group's often lower norm (Brown & Paulus, 1996), and give less effort because of diffused responsibility (Latané, Williams, & Harkins, 1979). Individuals may also withhold ideas to avoid being judged (Camacho & Paulus, 1995). Apart from these social factors, individuals' limited cognitive capacity may prevent them from concentrating on idea generation while processing others' ideas (Nagasundaram & Dennis, 1993; Nijstad, Stroebe, & Lodewijkx, 2003). Also, in face-to-face groups, individuals may forget an idea while waiting for their turn to speak ("production blocking"; Diehl & Stroebe, 1987).

One way to minimize the impacts of some of these factors is to conduct the idea generation task electronically (i.e., individuals interact via computer). Computer-mediated communication (e.g., online discussions) can reduce evaluation apprehension by providing anonymity (Cooper, Gallupe, Pollard, & Cadsby, 1998). It also allows individuals to decide when to generate ideas and when to attend to others' contributions. This should help overcome production blocking and limitations in cognitive capacities (Dennis & Valacich, 1993). However, even in a computer-mediated setting, interacting groups still do not always outperform nominal groups (Kohn & Smith, 2011).

Idea Generation and Fixation

Somewhat surprisingly, another factor that can hinder idea generation arises from the exchange of ideas between group members. Idea generation can be viewed as a search for ideas in associative memory (Nijstad & Stroebe, 2006). Individuals tend to first retrieve ideas from typical categories because these categories are highly accessible, and these initial ideas should serve as search cues and lead to the generation of ideas from the same categories. Once individuals have exhausted all the readily retrieved ideas, they then use other search strategies such as deliberately generating a new search cue for a new category, which could produce more diverse and novel ideas (Beaty & Silvia, 2012; Gilhooly, Fioratou, Anthony, & Wynn, 2007). It has been suggested that the exchange of ideas during group interaction can inhibit rather than facilitate such a strategic shift (Kohn & Smith, 2011; Nijstad & Stroebe, 2006). During group interaction, individuals often first sample and share ideas from typical categories; overhearing ideas from these typical categories should lead to a higher activation of these categories. Because retrieval probability is related to activation values (Anderson, 1983), these typical categories are likely to be retrieved again, making it less likely for groups to generate a new search cue for a new category. One may argue that confining the search to fewer categories could potentially lead to a more comprehensive within-category search, and in turn increase the likelihood of generating novel ideas in that category (Nijstad, Stroebe, & Lodewijkx, 2002). However, this may not always be the case. When performing a within-category search, typical

ideas are more likely to be retrieved first (Brown, Tumeo, Larey, & Paulus, 1998). The sharing of these typical ideas should lead to increased activation of these ideas, and the heightened activation value will then make them more likely to be retrieved again, reducing the chance of retrieving novel ideas.

Overcoming Fixation and Task Alternation

One suggested way to resolve fixation is to set the problem aside and have a break (i.e., incubation) thus allowing the overly activated concepts to dissipate (Kohn & Smith, 2011; Sio & Ormerod, 2009; Smith, 1995). However, groups often have to solve multiple problems quickly without delay. In that context, a more efficient way to combat fixation is to prevent it from the very beginning. If group idea generation on one single topic for a considerable amount of time can lead to increased fixation, one potential way to prevent the build-up of fixation might be to break apart and distribute the group's effort across different tasks through multiple short sessions interlaced with other problems. This task-alternation approach should benefit group idea generation in at least two ways. First, the initial search for ideas usually activates typical ideas, and task alternation should mitigate against prolonged sharing of typical ideas within the group, preventing the over-activation of these ideas. Second, alternating between tasks would provide time for these highly activated ideas to decay. Together, these should make groups more likely to suppress these initial responses and explore other categories when they return to the same tasks.

Task alternation, while new in the study of group problem solving, has been studied in the context of individual problem solvers. Numerous studies have shown that alternating between different tasks leads to more robust learning in individuals than blocked schedules (Kornell & Bjork, 2008; Rohrer, Dedrick, & Burgess, 2014; Taylor & Rohrer, 2010). Recent studies have also reported a positive role of task alternation on individual problem-solving, such as idea generation tasks and semantic retrieval tasks (Lu, Akinola, & Mason, 2017; Sio, Kotovsky, & Cagan, 2017; Smith, Gerkens, & Angello, 2015). However, these studies have only examined the impact of task alternation on individual performance. Group idea generation involves the exchange of ideas at the group level as well as idea generation at the individual level; both can potentially lead to fixation (Nijstad & Stroebe, 2006). This present study examined if task alternation can also effectively combat group fixation, resulting in enhanced group idea generation performance.

Two experiments were conducted to examine the effect of task alternation on group ideation. In both experiments, dyads were asked to generate ideas on two topics in either a continuous (i.e., solve the tasks sequentially) or an alternating (i.e., alternate between the tasks) condition. In Experiment 1, idea generation tasks that required generating solutions to daily problems were presented. In Experiment 2, category-exemplar generation tasks that required generating exemplars from a specific category were presented. For both tasks, successful problem solving requires expanding the search space to reach a diverse set of ideas. If alternating between tasks reduces fixation on typical initial ideas, the alternating dyads should be able to explore a wider set of ideas