Preliminary Thesis Report

The Effects of Problem Construction on Team Creativity

Hand-in date:
15.01.2018

Campus:
BI Oslo

Examination code and name:
GRA 19502 Master Thesis

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Programme:
Master of Science in Leadership and Organizational Psychology

Content

Introduction

The contexts in which organisations operate are becoming increasingly complex and dynamic in nature. It has been maintained that innovation greatly enables organisations to create competitive advantage in a volatile environment as it allows generating, accepting, and implementing new ideas, products or services (Bilton & Cummings, 2009; Calantone, Cavusgil, & Zhao, 2002). Extant literature on innovation well supports the idea that organisations with greater innovativeness perform better: for instance, innovative organisations can successfully respond to customer needs and competitor actions and accordingly develop new capabilities (Calantone et al., 2002).

Creativity is a closely linked yet distinctive concept from innovation. Whereas innovation pertains to the implementation of new ideas toward improving procedures, products or services, creativity refers to the stage of generating those new ideas (Anderson, Potocnik, & Zhou, 2014). In this sense, creativity can be viewed as the first stage of innovation (Hülsheger, Anderson, & Salgado, 2009). Although debates surrounding the nature and definition of creativity still exist (see e.g., Kaufman, 2003), most researchers agree that creativity encompasses two definitional components: novelty and appropriateness (Hennessey & Amabile, 2010). That is, creativity involves the generation of novel ideas or products that are different in important ways from what preceded them and are of value and useful for the situation at hand (Hennessey & Amabile, 2010; Fleenor & Taylor, 2004).

The same forces underlying the need for creativity and innovation in organisations – increasing globalisation, competition and technological sophistication – are driving organisations to shift their design of work from individual jobs to team structures (Kozlowski & Ilgen, 2006). The problems organisations face require high levels of diversity in skills and expertise and adaptability a single individual does not possess, and teams have been argued to be able to solve these problems (Kozlowski & Bell, 2008; Kozlowski, Gully, Nason, & Smith, 1999). In other words, teamwork has been speculated to be necessary to achieve creativity and innovation in organisations (Jones, 2009; Wuchty, Jones, & Uzzi, 2007). On the other hand, empirical research has found that the faith in team creativity may be misplaced. Investigations on brainstorming groups typically show that the performance of individuals in brainstorming is superior to that of groups both in terms of the quantity and the quality of the ideas generated (Diehl & Stroebe, 1987; Mullen, Johnson, & Salas, 1991; Paulus & Dzindolet, 1993; Forsyth, 2010). This pattern of results has been hypothesised to be due to several factors that give rise to process losses in groups, including evaluation apprehension, free-riding, and production blocking (Paulus & Dzindolet, 1993). However, some researchers have postulated that groups can perform better on brainstorming tasks under certain circumstances. For example, when idea sharing in groups are enabled and encouraged, brainstorming groups can be more productive than individuals (Paulus & Yang, 2000).

Even though academic research on creativity is proliferating, much of the early work on creativity focused on the individual level as the unit of analysis (Reiter-Palmon, Wigert, & de Vreede, 2011). Within this approach, the role of individual differences such as cognitive ability and personality, as well as mood states have been emphasised in explaining individuals' performances on creativity tasks (e.g., Feist, 1998; Amabile, Barsade, Mueller, & Staw, 2005). On the other hand, research investigating the direct role of teams in producing creative ideas or products is still in its early stages. This gap in research needs to be addressed, considering that the team structures occupy a core position in today's organisations, and that the very reason teams are used is because they are believed to be more creative than individuals.

Studies on team-level creativity to date have mainly focused on team input variables such as member composition and characteristics, and social process variables including team climate, cohesion and conflict in fostering team creativity (see Hülsheger et al., 2009 for a review). Although cognitive processes associated with creative problem-solving have been widely examined at the individual level, an in-depth investigation of the effect of team cognitive factors on team-level creativity has been relatively under-studied (Santos, Uitdewilligen, & Passos, 2015). Recent development in team dynamics literature suggests that some team characteristics are emergent: they originate from individual characteristics, however, are amplified and modified as team members interact with one another (Kozlowski & Klein, 2000). This suggests that team characteristics do not merely serve as background or social context to the individual, but rather are a collective phenomenon separable from mere aggregation of individual characteristics, and hence play a crucial role in team performance. Thus, team-level creativity may be a different phenomenon from individual creativity, and findings on cognition associated with creative problem-solving at the individual level may not be directly applicable to the team level. Our aim in the present paper is to investigate the cognitive processes of creative problem solving in teams.

Literature review and research question

Creative problem-solving processes

One area in cognitive processes of team creativity that has received much attention is that of idea generation, and in particular, brainstorming. Idea generation refers to the process of producing alternative solutions to a problem, and hence is the most salient process typically associated with creativity (Reiter-Palmon, Herman, & Yammarino, 2008). However, research has suggested that creative problem-solving processes consist of several stages, and idea generation is only one of them.

The attempts to formalise general procedures in creative problem-solving have started early on. One of the first such models was proposed by Wallas (1926). Based on some documented recounts of sudden inspiration and enlightenment in creative acts, Wallas (1926) formalised the classic four-stage model of creative problem-solving. First, the problem solver consciously works to define and analyse the problem in the *preparation* stage. In the subsequent *incubation* stage, the problem solver relaxes and takes a break from the problem, however, the unconscious mind continues to work to make associations and combine ideas. The third stage, called *illumination*, occurs when the problem solver becomes aware of a meaningful and promising idea. Finally, the validity of the idea can be tested in the *verification* stage.

The four-stage model has served as the foundation of a variant of later creative process models, and there have been efforts since to extend and enhance this basic model (Lubart, 2001). For example, Sapp (1992) suggested that a phase of frustration may occur between the incubation and the illumination stage, and it is an important juncture at which problem solvers decide whether or not to start the problem-solving process over in a new direction. On the other hand, Wallas' (1926) conception of the creative process has been criticised as evidence on the co-occurrence and recursion of different stages have been found (e.g., Eindhoven & Vinacke, 1952).

More recently, creativity scholars have attempted to move beyond the superficial stage-based descriptions and to explore the nature of creative problem-solving based on cognitive processes. For example, Mumford, Mobley, Uhlman, Reiter-Palmon and Doares (1991) specified a general set of core creative processes based on information-processing demands. Problem solvers first engage in *problem construction* process in order to define the problem to be solved. Guided by the crucial elements of the problem identified, problem solvers enter into *information encoding* process by which they retrieve information from their memory system or acquire new knowledge. Once information has been obtained, it is organised into a set of categories pertinent to the problem at hand through *category search* process. In solving complex problems, often information encoding and category search efforts occur in tandem as such that a piece of information activates certain categories and these categories guide further encoding (Mumford et al., 1991). This iterative pattern of information search leads problem solvers to *category specification* process whereby they identify the set of categories that fits best to the problem. Only after a set of relevant categories has been identified can problem solvers *combine and reorganise* it to generate new problem solutions. Subsequently, problem solvers *evaluate* the utility of the potential solutions, *implement* chosen solutions, and *monitor* the conditions and success of the solutions. Mumford and colleagues' (1991) creative process model incorporates the dynamic nature of creative problem-solving efforts and allows for multiple processes to recur in cycle. Moreover, the proposed processes have been shown to explain significant variance in creative performance on marketing and managerial tasks (Mumford, Supinski, Baughman, Costanza, & Threlfall, 1997).

Although many other cognitive process models of creative problem-solving have been proposed, and they differ in terms of the number and the precise nature of the processes (see Lubart, 2001 for a review), several core processes cut across these models: problem construction, information encoding, idea generation, idea evaluation and selection, and implementation and monitoring (Reiter-Palmon et al., 2008). As stated, whereas idea generation processes have received much attention at the team level, research on other processes of creative problem-solving lagged (Reiter-Palmon et al., 2011). In the present paper, we aim to study creative problem-solving efforts in teams, with a particular focus on one of the neglected area of research: problem construction.

Problem construction and creativity

Not all problems require creative solutions: problems that require creativity differ from more routine problems in some important ways. Creative problem-solving is more likely occur in response to ill-defined or poorly structured problems or situations (Mumford, Baughman, Threlfall, Supinski, & Costanza, 1996). Ill-defined problems are characterised by multiple possible goals, multiple possible information and resources that can be used, and multiple possible solutions (Dillion, 1982; Mumford et al., 1991). Thus, problem solvers must begin creative problem-solving processes by imposing structure on the problem – by defining the nature of the problem and identifying the resources and rules to be used to solve the problem (Mumford et al., 1991). Problem construction refers to this process of defining the goals and parameters of the problem-solving effort (Mumford, Reiter-Palmon, & Redmond, 1994; Reiter-Palmon et al., 2008).

Problem construction processes have been postulated to play a crucial role in the success of creative problem solving efforts, because the effective application of the subsequent processes is contingent upon the context and direction provided by problem construction activities. Understandings of the problem by itself is not sufficient to solve the problem, however, it prescribes the kinds of knowledge and information needed to solve the problem (Mumford et al., 1991).

Mumford and colleagues (1994) have proposed a theoretical model of problem construction specifying the factors that influence the process. Problem solvers attempting to construct and define an ill-defined problem engages in a recursive memory search in order to generate hypotheses on how to structure and organise the available stimuli (Mumford et al., 1994). It has been suggested that prior problem-solving experience serves as an important mental model problem solvers rely on in abstracting key features of ill-defined problems (Gick & Holyoak, 1980; 1983). Based on past experience, problem solvers generate *problem representations*, or ad hoc cognitive structures that capture the central features of problem-solving efforts (Holyoak, 1984). According to Holyoak (1984), problem representations often contain four types of information that are necessary to solve problems effectively: (a) the *goals* of the problem-solving effort; (b) the key pieces of *information* needed; (c) the key *procedures* to be employed; and (d) any *restrictions or constraints* placed on the problem solution.

When faced with a novel problem, problem solvers may not be able to select a problem representation that is directly analogous to the problem at hand. Instead, either a problem representation can be applied in a flexible manner or multiple problem representations can be activated and combined to generate a new applicable problem representation (Mumford et al., 1994).

Empirical work on the problem construction process strongly supports the link between the process and creativity. For example, art students who engaged in problem construction, as measured by both the time they took to select the scene and objects to paint, and the uniqueness of the objects selected, produced more original and aesthetically valuable paintings (Getzels & Csikszentmihalyi, 1975; 1976). Okuda, Runco, and Berger (1991) using a sample of children also found that problem construction processes were the best predictor of creative accomplishments. Reiter-Palmon, Mumford, O'Conner Boes, and Runco (1997) demonstrated that participants who were asked to actively engage in problem construction by restating and redefining the problem in multiple ways produced more creative solutions to a series of real-life problems compared with those who were not instructed to do so.

Research question

Even though we have some understanding of how individual problem solvers construct ill-defined problems, research on creative problem-solving in teams in general, and problem construction process in particular, is much more limited (Reiter-Palmon & Robinson, 2009). Generally, a team is defined as two or more individuals who are interdependent on each other in striving to achieve some common outcomes (Kozlowski & Ilgen, 2006). In group dynamics literature, teams often are distinguished from groups, however, in many cases the two terms are interchangeably used (Paulus, Nakui, Putman, & Brown, 2006). A team is a unified system with emergent characteristics that cannot be fully understood by only examining the individuals who compose the team (Lewin, 1951). When individuals interact in a team, something different from what individuals produce is created, and this new product itself needs to be the object of team research (Forsyth, 2010). Thus, team-level creativity may be a different phenomenon from individual creativity, and findings on cognition associated with creative problem-solving at the individual level may not be directly applicable to the team level.

Recently, Reiter-Palmon and colleagues (2008) proposed a multi-level model for problem construction processes in teams. Considering that problem construction phase is contingent upon problem solvers' past experience, the activation of multiple different problem representations may be more pronounced in teams, since individual team members are likely to possess different experience as well as knowledge, skills, personality and values. Moreover, these differences in problem representations may be more prominent when the team consists of diverse members. Individual team members often are not aware that other members frame the problem in a different way (Cronin & Weingart, 2007), and this can lead to disagreements about the best solution to the given problem (Reiter-Palmon & Robinson, 2009). In this sense, the degree of convergence among individual team members' problem representations may have an impact on the resulting team creativity. However, teams can address the presence of multiple perspectives and problem representations, and the level of convergence in individual problem representations may have different effects on team creativity if the team can somehow discuss and address it. Moreover, there may be a number of ways in which teams can address different individual problem representations. In other words, the effect of addressing different individual problem representations on team creativity may hinge on how the difference in individual problem representations are integrated at the team level. To sum up, the degree of overlaps in individual members' problem representations, and how the members address and aggregate their problem representations at the team level can have significant impact on team creativity. Hence, our research question is: "How does the degree of overlaps in individual problem representations and the team-level problem construction process influence the team's creativity?"

Research model and hypotheses

Hypothesis construction

As stated, we first hypothesise that how similar individual team members' problem representations are to each other can influence how creative the team is. More specifically, we expect that the less convergent, hence the more divergent, individual team members' problem representations are, the more likely that the team will produce creative problem solutions. Cognitive studies of individual creativity have emphasised the importance of several cognitive processes that are relevant to generating creative problem solutions. When no set conclusion or answer is attached to the given problem, the novelty and originality of creative productions requires individuals to engage in divergent thinking (exploring and generating many possible solutions that can be combined in an unexpected fashion; Guilford, 1956; McCrae, 1987) and remote association (identifying connections between seemingly different concepts; Perry-Smith, 2006). In other words, the ability to generate diverse categories of problem solutions to a single problem is crucial in creative problem-solving. Since each individual members can draw problem representations from their unique experiences, teams are likely to possess a broader pool of potential problem solutions, which may in turn make team solution creativity more likely. Furthermore, a team may be able to produce more creative problem solutions when the individual problem representations are highly idiosyncratic.

Research on job-relevant diversity, or the heterogeneity of team members regarding task-related attributes including functional roles, educational background as well as skills and expertise, has repeatedly documented that more functionally diverse teams are more creative (Hülsheger et al., 2009). One of the largest and most significant studies of team creativity and innovation conducted on a total of 1,222 research teams discovered that functional diversity accounted for 10 per cent of the variance in team creativity innovation (Andrews, 1979; Payne, 1990; West, 2002). Cognitive explanations on how diversity in team composition can be conducive to team creativity are that members' exposure to a variety of divergent perspectives can stimulate them to engage in informational conflict, integrate new ideas, and pursue previously unexplored directions (Perry-Smith, 2006; Milliken & Martins, 1996; Simons, Pelled & Smith, 1999). Moreover, the presence of diverse perspectives on how to manage the problem may prevent team members from prematurely reaching consensus on the problem that needs careful consideration (van Knippenberg, De Dreu, & Homan, 2004). Even though ample research has theorised that member diversity in task-relevant characteristics boost the team's creativity by allowing its members to access diverse perspectives on the problem, to our knowledge, no empirical research yet has directly tested the hypothesis that diversity in member problem representations can lead to team creativity, and one of potential contributions of our research lies here.

Working Hypothesis 1: Groups with diverse problem representations at the individual level (heterogeneous group condition) will produce more creative solutions than groups with less diverse problem representations at the individual level (homogeneous group condition).

Creativity has long been equated with divergent thinking, however, in more recent years, there has been increasing recognition that producing multiple novel ideas via divergent thinking alone is not sufficient to generate creative productions that are appropriate or useful to the situation at hand (Cropley, 2006). Literature on team member diversity also has suggested that members' diverse perspectives on potential problem solutions may not always contribute to team functioning. Rather, diversity may jeopardise teams' task execution. This line of research has used the social categorisation theory as an explanation. In order to simplify the complex social context, individuals automatically categorise others into in-groups and out-groups based on how similar the others are to self (Forsyth, 2010). Once a team member classifies some other team members as an out-group, the member may be less willing to trust and cooperate with those who belong to the out-group (Brewer, 1979; Tajfel & Turner, 1986). When team members perceive their interests and values to be dissimilar to those of other team members, intra-group conflict may arise as well, which interferes with smooth functioning of the team (van Knippenberg & Schippers, 2007; Jehn & Mannix, 2001; DeChurch, Mesmer-Magnus & Doty, 2013).

Several researchers have argued that the contribution functional and informational diversity makes on team creativity is dependent on the quality of group processes (West, 2002). In recent years, researchers have recognised that team reflexivity is one of the most important factors that determine the quality of group processes (Schippers, Den Hartog, Koopman, & Wienk, 2003). Team reflexivity refers to "the extent to which group members overtly reflect upon, and communicate about the group's objectives, strategies, and processes, and adapt them to current or anticipated circumstances" (West, Garrod, & Carletta, 1997, p. 296). Research shows that team creativity as well as overall performance is facilitated when members discuss and reflect upon team goals and procedures to achieve them, especially when the team works on complex and non-routine tasks (West, 1996; De Dreu, 2002).

A critical distinction between individual problem construction and team problem construction could be that in teams, problem representations may exist on multiple levels. In other words, individual members' problem representations and team-level problem representations can occur as separate phenomena. Team members may not be aware that other members conceptualise the goals, key procedures and information, and restrictions placed on the given problem differently, and hence may not address this as a team (Cronin & Weingart, 2007; Reiter-Palmon et al., 2008). If differences in individual problem representations are not discussed, group processes as a whole can be negatively impacted (Pieterse, van Knippenberg, & van Ginkel, 2011). On the other hand, teams that address these differences and discuss how they, as a team, will define the key procedures and goals of the problem at hand (i.e., teams that engage in reflexivity processes), will be able to surface and clarify the differences in problem representations between team members, and will be able to reach a more shared understanding of the problem at hand (van Ginkel, Tindale, & van Knippenberg, 2009).

Literature on team mental models shed light on how members' shared understanding on tasks can contribute to team performance. Mental models are in essence the cognitive representations of knowledge regarding the pattern of interaction with the environment (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Resick, Dickson, Mitchelson, Allison, & Clark, 2010). A team's mental model (TMM) refers to an organised understanding and a mental representation of the knowledge team members share concerning relevant task and team aspects and the environment in which they operate (Klimoski & Mohammed, 1994). Members of those teams high on TMM are "on the same page" with regards to what to expect from other members and what the team needs, and this allows the members to coordinate actions and adapt behaviours to changing task demands (Cannon-Bowers, Salas, & Converse, 1993; Mohammed, Ferzandi, & Hamilton, 2010). Hence, several researchers have achieved a common theoretical assumption that high level of TMM is a precursor to effective team processes and performance (Klimoski & Mohammed, 1994; Kraiger & Wenzel, 1997; Rentsch & Hall, 1994). However, TMM is not a unitary construct, and can be specified in terms of its property and content domain (Mohammed et al., 2010). With regards to the content, TMM can be collapsed into teamwork and taskwork domains. Of the two, taskwork mental models capture team members' knowledge on work goals, procedures, strategies, and performance requirements that include problem interpretation issues (Mohammed et al., 2010). The degree to which team members possess shared knowledge on task-relevant requirements (i.e., taskwork mental model similarity) has been shown to facilitate coordination in teams, and to contribute to overall team performance (Mohammed et al., 2010). This is because team members possessing a shared understanding of task goals, procedures and strategies can anticipate and identify what other members require to accomplish their task (Santos et al., 2015).

Considering that the importance of a problem construction process hinges on its ability to specify the kinds of knowledge and information that needs to be retrieved or acquired to solve the problem at hand (Mumford et al., 1991), team members' shared understanding of other members problem representations can facilitate information search and sharing at the team level. In other words, when members agree upon how to interpret and define the problem, they can attend to key information needed to solve the defined problem and can communicate about the problem in a similar manner (Mohammed & Ringseis, 2001; Reiter-Palmon et al., 2008). This cognitive consensus on problem representation can be achieved when group members make an effort to attend to others' diverging perspectives by engaging in reflexive group processes. Thus, we hypothesise that when members can know about, understand, and accept the problem representations of other group members, a shared group level problem representation can arise and this will facilitate the creativity of their team.

Working Hypothesis 2: When groups with diverse problem representations at the individual level (heterogeneous group condition) address the diversity of individual problem representations, they will produce more creative solutions than the heterogeneous groups that do not address the issue.

Working Hypothesis 3: When groups with less diverse problem representations at the individual level (homogeneous group condition) address the diversity of individual problem representations, they will produce more creative solutions than the homogeneous groups that do not address the issue.

It is possible that how teams address and integrate members' diverse problem representations can influence the team-level creativity. Harvey (2012) has proposed several approaches that can facilitate the integration of members' diverse views, including *collective attention* and *building on similarities from* *within different perspectives*. Each of these processes operate by enabling the teams' cognitive processing of ideas, as well as their social interactions, and their affective environment. Collective attention is a process by which team members can agree upon a prevailing paradigm and consider emerging ideas in terms of the shared understanding of that paradigm. Importantly, having a shared understanding of the paradigm does not necessitate that individual team members have to agree with the understanding of the paradigm, as team members can disagree with specific actions and ideas (Heracleous & Barrett, 2001). By collectively paying attention, or attending to the dominant view of the team, team members would be better equipped at diverging together from these dominant assumptions, values and rules (Harvey, 2012). This type of integration approach is argued to facilitate creativity by allowing team members to make meaningful connections between different and new ideas by rooting them back to the agreed-upon dominant view (Vera & Crossan, 2005). Moreover, collective attention to ideas in light of the teams' shared understanding of the dominant paradigm will provide individual members with meaning to new ideas (Csikszentmihalyi, 1999), as individuals tend to pay attention to ideas that fit their own understanding of a situation (Bartunek, 1984). Thus, this enables team members to be more deeply engaged with ideas that receive the team's collective attention.

The integration process of building on similarities can also be conducive to creativity, as it allows individuals to see similarities in perspectives divergent from their own (Koestler, 1964). As such, although divergent perspectives are what allows for creativity to occur, the persistence of differences can inhibit creativity (Heracleous & Barrett, 2001; Murnigham & Conlon, 1991). Identifying and building on similarities may facilitate team creativity through allowing team members to broaden their ideas by identifying new ways it can be applied (Langer & Moldoveanu, 2000). Considering an idea from multiple diverging perspectives helps members of a team to develop a more complex and creative understanding of the idea (Bartunek, Gordon & Weathersby, 1983; Grant & Berry, 2011). Furthermore, by identifying the similarities between different individual problem representations, members can compare otherwise disconnected ideas by drawing on existing knowledge to explain and predict solutions to new problems (Dunbar, 1997; Gentner, 1989). In this way, members can shape new ways of understanding problems (Hargadon, 2002).

Thus, it is plausible to assume that these differing integration methods may facilitate team creativity in different ways, presuming the level of differences amongst individuals' problem representations, as the different approaches could tap into different cognitive factors that are conducive to team creativity. However, neither how teams address the differences in individual problem representations, nor the differing effect of the approaches on team creativity has yet to be extensively researched. Hence our tentative hypothesis is as following:

Working Hypothesis 4: Groups in both homogeneous and heterogeneous conditions will differ in team solution creativity, depending on the approaches they employ in order to address the differences in individual problem representations.

Research design and method

Problem construction processes at the individual level have been extensively studied in a laboratory setting, as it is easier to control the setting and the causal relationships among variables can be established. In the present study, we also aim to investigate the research problem using an experimental design, using teams consisting of 2 to 3 members.

For this experiment, the independent variable will be the degree of overlaps in individual problem representations which will be manipulated across two levels: homogenous and heterogenous problem representations. In manipulating the independent variable, there might be, as of now, two ways of doing so. First, we may provide participants with instructions of a role they will have, and a problem which they will solve from the perspective of that role in as many ways as possible. Using this approach is thought to mimic the nature of real teams which are functionally diverse. Another possible way is to provide participants with a problem and pertinent solution(s). As problem solvers' problem representations are thought to be elicited from their memory or experience, this method can more directly manipulate participants' problem representations by influencing their recent memory. Support for this approach can be found in prior research: Holyoak and Gick's (1983) discovered that when participants first worked on generating tactics on attacking a fort, they tended to use elements of the solutions to this problem when they were given a different, subsequent problem to solve.

The moderating variable will be both whether or not and how teams address the differences in member problem representations. As of now, we are considering providing participants with instructions on whether or not to, and how to address the issue.

The dependent variable will be the level of creativity in team solution to the experimental task. Participants, in teams, will be instructed to solve a complex and ill-defined task such as how to go about marketing a novel product (e.g., the 3-D hologram TV), how to deal with protesters as a manager of a company (Redmond, Mumford & Teach, 1993), or something akin to Wooley, Chabris, Pentland, Hashmi, and Malone's (2010) collective intelligence tasks. The exact nature of the experimental tasks is yet to be decided. Team tasks differ in terms of how much member interdependence is needed in order to achieve the tasks (Forsyth, 2010). For example, some tasks (e.g., additive) require high levels of coordinated activity, and the tasks can only be completed when each member of a group provides his or her part; however, some tasks (e.g., disjunctive) do not require much coordination, such that parts of the team can exert little effort, but the most able member determines the quality of the team's product (Steiner, 1972). Hence, the nature of the experimental task may significantly impact the effect of the independent and moderating variables, and employing multiple types of tasks in the experiment is under our consideration.

Data on variables that should be controlled for will be collected, and manipulation check included in the experiment. Depending on the experimental condition, the experimenter will either instruct teams to engage in team problem construction or provide no instructions at all, thus leaving these teams to engage in idea generation immediately. One of the issues that requires further elaboration is the amount of time that should be allocated to each team. For one example, the teams engaging in team problem construction can be given additional time, however, confounding effects such as participant fatigue or boredom might occur, and this could affect the creativity of the team solution. Another way is to provide the teams not engaging in team problem construction with a filler task. Since team problem construction processes may facilitate nascent team social processes, giving the opportunities for similar effects to occur to the teams not engaging in team problem construction can help delineating the effect of team problem construction on team creativity. However, a weakness of this approach would be that when participants engage in a filler task without any direct links to the forthcoming task, they might forget their individual problem representations, and hence the effect of manipulation can be attenuated. On the other hand, if the filler task is relevant to the forthcoming task, individuals' problem representations may be influenced.

Tentative plan for completion of thesis

- By the end of January and the beginning of February, we will exact the nature of the experiment.
- From early February, we will start the data collection. Since it may be difficult to recruit a large number of participants for the experiment, the precise duration of the data collection process is to be determined.

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