The role of creative problem solving style in advice network formation and subsequent creative performance

ABSTRACT

To increase understanding of the relationship between creativity and social networks in organizations, creativity is discussed as a sequential four stage cognitive *process* and an argument is made that an individual's degree of preference for each stage, that is, his or her creative process *style*, is an important antecedent to that person's formation of an advice partner network. How creative process style impacts both the number of weak ties in one's advice network and the selections of strong tie network advice partners and how both contribute to one's creative performance are modeled. Social network ties are conceptualized as providing two important resources for creative performance: *content* information and *process* expertise. Testable propositions, possible avenues for future research, and implications for leaders and managers are provided.

Key words: creativity, social networks, advice networks, creative process style, weak ties, strong ties, personal characteristics, creative process.

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INTRODUCTION

The importance of creativity to today's organizations is one of the most significant topics in the management literature and the popular press. Companies are realizing that they must differentiate their products to survive, that they can no longer rely on further cost reductions and efficiency improvements because their competitors are doing the same thing, and competitors exist that can always make it cheaper and of the same quality (Cross & Thomas, 2009). As a consequence, creativity performance has become more important in sustaining competitive advantage. Janszen (2000) observed that we are now living in the age of innovation, having progressed through the age of efficiency in the 1950s and 1960s, and quality in the 1970s and 1980s. Thus jobs in today's globalized, turbulent economy require unprecedented levels of creative skills. This puts new pressures on today's managers, who are facing the challenge of achieving results in tougher and tougher environments (Longenecker & Simonetti, 2001) and there is an active search by managers for methods that might improve the creativity performance of employees. Organizational researchers have been working hard on how to help managers meet the challenge (Puccio & Cabra, 2009).

The traditional research approach to increasing creativity has focused on the individual, for example, to determine ways to impact the cognitive abilities of employees (Puccio and Cabra, 2009; Puccio, Firestien, Coyle & Masucci, 2006). More recently, the focus has turned to examining the social aspects of creativity, in particular the impact one's network of social relationships has on creative performance (Borgatti, Mehra, Brass & Labianca, 2009; Brass, 1995a; Burt, 2004; Perry-Smith, 2008; Perry-Smith & Shalley, 2003; Zhou, Brass, Shin et al.,

2009). The traditional social network approach concentrates not on individual attributes but on the relationships between members in the social network provided by the organization's formal and informal structures (Brass, 1995b). Creativity studies examining the impact of social networks have found advantages in generating creative ideas stem from having a diverse network of weak tie relationships and occupying more central positions in the social network (Perry-Smith, 2006), from bridging structural holes that exist in social networks (Burt, 2004), and from facilitating the innovative work of network partners by connecting them to others in their network (Obstfeld, 2005), and the role Simmelian ties play in activating knowledge available in cross-boundary relationships (Tortoriello & Krackhardt, 2010). Research also suggests that certain structural characteristics of social networks, including strong ties relationships and being too central in the organizational social network, inhibit idea generation but are important for gaining the acceptance and implementation of ideas (Hansen, 1999; Perry-Smith, 2006; 2008).

Researchers have begun to turn from focusing on structure towards investigating the role that personal characteristics of individuals play in how weak and strong ties social relationships are developed (Zhou et al., 2009). Preliminary evidence indicates that the personal characteristics of network actors play a role in shaping social networks and subsequent creativity. Zhou and colleagues (2009) found evidence of higher creative performance among actors low on conformity beyond the impact of structural effects.

Additionally, creativity researchers conducting social network studies have become interested in considering creative performance as including both thinking up unique ideas and getting them implemented (Perry-Smith, 2008; Zhou et al., 2009). There is a growing recognition that organizational creativity more than thinking up ideas and implementing them, and is best understood as a more complete *process*. A creative process is defined by Kirton (2003) as a

schematic map of how an individual, ideally, performs some sequence of behavior. Puccio and Cabra (2009) suggest that understanding and modeling creativity as a process, with sequential stages or steps, emphasizes the importance of information processing activities and offers the possibility that by learning to follow such a process, individuals may increase their creative performance and systematically manage creative work more efficiently. In summary, following this approach, an ideal complete process of creativity would be modeled as a sequential set of activities (i.e. component parts), from the initial seeking and discovery of new unique information to the successful implementation of valuable change.

 This paper expands on the conceptualizations about the social nature of creativity by focusing on three areas of theoretical contribution. Firstly, I introduce creative process style as a personal characteristic which acts as an antecedent to individuals' social network formation in terms of weak and strong ties. Creative process style is defined as an individual's relative (higher or lower) degrees of preferences for participating in various different sequential stages of the creative process. Creative process styles can be considered propensities to act or behave in a consistent manner (Kirton, 1994). Styles are modifiable, meaning that individuals can adjust to better fit the demands of various situations, but in general they are heuristics that guide individuals when faced with situations that require a response (Frese, 1987; Kirton, 2003).

 I propose that the creative process style preferences of individual network actors determine the extent to which they engage others in the network in their information gathering activities. Creative process style preferences are antecedents of the number of *weak* ties formed with others by focal network actors, and with whom in the social network focal actors develop *strong* tie relationships. The focal actor deliberately seeks out those interaction partners whose preferred styles are complementary to his or her own preferred style to help them increase their

creative performance. Potential network partners can be categorized as homophilous and heterophilous. Borrowing from Lin's (2001) theorizing about social capital and exchange relationships, actors select those in the network whose creative process styles make them "least effort" interaction partners. These least-effort interaction partners are those whose creative process style preferences are either the same as the focal actor's own preferences (birds of a feather flock together) or are similar. Similar creative process styles are those that are complementary to the preferred style of the focal actor. Complementary creative process styles are defined as those which include the creative process stages that sequentially precede and follow the preferred creative process stage reflected in the preferred style of the focal actor. Heterophilous advice network partners are those potential network partners whose highest preferences for creative process stages are dissimilar to that of the focal actor, which results in exchanges between the two actors to require a higher degree of effort.

The second theoretical area of contribution offered by examining creative process style as an antecedent to social network formation is that it enables researchers to study creativity-relevant skills as a form of dynamic, *process*-related exchange in addition to an information-based form of exchange between network partners. Amabile (1983; 1988) identified two fundamental components that drive individuals' creative performance: domain-relevant knowledge and creativity-relevant skills. Amabile (1988) proposes that an individual's domain-relevant knowledge serves as the "raw materials", or content, of his or her creative productivity, and creativity-relevant skills, such as creative process style, serve as the process that is applied to the "raw materials" that results in creative output. This categorization of content and process recurs throughout this paper as being the two basic forms of exchange between advice network partners related to creativity.

The prevailing view of individual creativity-related skills in social network research appears to be fundamentally that network actors' social interactions are limited to serving as content providers, and therefore that actors work alone to develop creative solutions to the problems and opportunities they face (Perry-Smith & Shalley, 2003; Perry-Smith, 2008). Network actors may get ideas and possible solution alternatives from exposure to creative role models or from being carefully placed in competition with peers (Gilson, Mathieu, Shalley & Ruddy; 2005; Harris & Evans, 1974; Shalley & Perry-Smith, 2001; Zhou, 2003), but the actual creative effort is performed by each actor individually. Essentially, the prevailing view of creativity-relevant skills in the creativity and social networks literature is that contact with others enables the focal actor to learn vicariously through observation how others produce creative outputs, and from this exposure the individual learns new creativity-relevant skills to apply to his or her own work. Shalley and Zhou (2003) consider modeling to be important for improving individuals' creative performance when the results of such learning experiences are the strengthening and encouragement of appropriate behaviors and the weakening of social inhibitors of creativity. This is basically a content, or informational, view of creativity-relevant skills, based on a social learning theory view of how the creativity-relevant skills of network partners can be utilized by focal actors as they attempt to work creatively. In this paper, however, the creativity-relevant skills of network partners are *resources* that focal actors can actively apply to their creative work in order to better execute the various activities in the creative process. While the ideas and creative process styles of the other actors in a focal actor's social network may indeed act as informational sparks of the focal actor's own creativity-relevant skills, as conceptualized in earlier creativity studies using social network theory, I argue that as

part of his or her creative efforts, a focal network actor can engage other network actors to apply their creativity-relevant skills to the focal actor's information and domain-relevant knowledge.

The third area of theoretical contribution this paper makes is to conceptualize the creative process at a more detailed level than has previously been discussed in the recent creativity social networks literature. By elaborating the creative process in greater detail, it offers the potential to expand the field of exploration around the structure of a person's ties with potential network partners and the impact on creative performance, simply because there are so many more and different aspects of creative performance available to study. The focus of this paper is on the social nature of creativity, and in particular, the role social networks play in individuals' creative performance, in particular understanding creativity as more than just thinking up new ideas and implementing them, but instead as a more complete *process* with many more variables (Ward, 2004; Osborn and Mumford, 2006; Mumford, Reiter-Palmon and Robinson, 2009). For example*,* Mumford and colleagues (eg., Mumford**,** Mobley, Uhlman, Reiter-Palmon and Doares, 1991; Reiter-Palmon and Robinson, 2009) identified eight core processes commonly used in the creative problem solving process beginning with problem identification and ending with implementation planning and solution monitoring.

Through these three areas of theoretical contribution, this paper offers an alternative perspective on what drives the formation of different social network relationships and why, by establishing the concept that individuals seek and obtain both informational content and process skills through exchanges with their advice network partners, and how both (content and process) impact actors' creative performance. Previous conceptualizations of how weak and strong ties to social network partners may influence creativity in organizations are expanded.

In the following sections of this paper, I argue that theoretical advancements are possible in our understanding of how social advice networks are formed through the identification of specific individual characteristics called *creative process styles* which are interconnected to organizational creativity portrayed as a multi-stage *process*. Individuals have measurably higher and lower degrees of preference for each of the stages of such a process compared to other individuals, and these differing degrees of preference determine an individual's creative process style. These individual process styles are antecedents to network partner formation and to the strength of potential network partner ties. The advice network relationships so formed are instrumental in the creative performance of individual actors, as they determine both the domain relevant knowledge and creativity-relevant skills which the actors can draw upon. A model is presented in which creative process style is an antecedent both to whom one is tied, and to the strength of those ties, and in which a significant moderator is an individual's appreciation of others' creative process styles. The model is shown in Figure 1.

INSERT FIGURE 1 ABOUT HERE

The following describes the way in which the variables in my model are related and provides the basic propositions which are derived from the model. Later in this section examples are provided to increase understanding of the variables and related propositions. The model in Figure 1 suggests that creative process styles are an antecedent of the number of weak ties in people's advice networks, as well as with whom they decide to develop strong tie advice relationships. These strong tie relationships are moderated by network actors' level of appreciation of styles other than their own. In terms of creative performance, the number of weak

ties in an individual's advice network affects the amount of unique informational content that actors have available which they can use to generate creative ideas. In terms of strong ties, the extent to which an actor's strong tie advice network relationships include partners who have preferences for the different creative process styles impacts the actor's ability to execute the stages of the creative process, which in turn impacts creative performance. In essence, because people tend to prefer to engage to a greater degree in some stages more than in others (their style), and since skilful effort is needed in all stages to transform initial information encountered into creative products implemented, it is important that the individual tap into his or her network resources in all four stages to help move competently through the complete creative process. The model in Figure 1 reflects the following specific propositions:

1. The number of weak ties in an individual's creativity advice network is dependent on his or her creative process style preferences.

2. With whom one develops strong creativity advice network ties is dependent on his or her creative process style preferences.

3. Individuals with higher appreciation of creative process style preferences different from their own style preferences have more strong creativity advice network ties with individuals preferring other creative process styles than do individuals with low appreciation for different process style preferences.

4. Network actors' creative performance in terms of creative idea generation is dependent on the number of weak ties in their social networks.

5. Creative performance is dependent upon the extent to which focal network actors have strong tie relationships with advice network partners who prefer creative process styles different from their own.

Connecting Creativity Social Networks and Creative Process

For the purposes of this paper, we have adopted a multi-stage process of creativity described by Basadur, Graen, and Wakabayashi (1990), with four sequential stages: the (1) generation and (2) conceptualization of new opportunities and ideas and their subsequent (3) optimization and (4) implementation, as shown in figure 2. This process is distinguished from most other creative processes in several ways which make it a suitable process model to examine the role social interactions play in creative performance. It begins *before* a problem is available to be formulated, and includes proceeding through to taking action on a solution. It also is conceptualized as a continuous process, meaning that the implementation of solutions serves to start the process anew, as the impact of implementation includes sparking new problems and opportunities to be discovered.

INSERT FIGURE 2 ABOUT HERE

Creative Process Style as a Personal Characteristic

Various researchers have identified dimensions of problem solving style as antecedents of creativity. For example, Amabile (1988) cites styles in approaching problems to be a key

aspect of creativity-relevant skills. Kirton (1976) differentiates between adaptor and innovator styles of approaching problems requiring creativity. Jabri (1991) and Scott and Bruce (1994) distinguish between intuitive and systematic problem solving styles impacting innovative behavior. Basadur and his colleagues (Basadur & Gelade, 2005; Basadur et al., 1990) have documented that each of the four stages of their creative process involves a different type of cognitive activity.

Individuals with highest preferences for the first sequential stage, generation, naturally prefer to engage in continually experiencing and scanning the environment, gathering information, problems and cues from others in their social network, and sensing possible opportunities for new or improved products, services and methods. Their highest level of engagement occurs when the activities result in the identification and articulation of new information and possibilities, usually not in a fully developed form, but rather as a starting point for new projects**.** People with highest preferences towards the second sequential stage, conceptualization, are naturally interested in activities that include giving sound structure to fledgling ideas and undeveloped opportunities. They tend to be highly engaged in creative work that involves transforming diverse facts and idea fragments from the generator stage into well-defined, insightful problems and challenges, and more clearly developed ideas and projects worth further evaluation. People with highest preferences for the third sequential stage, optimization, turn these well-defined problems and ideas and into practical, best solutions, as well as detailed, efficient plans for proceeding. Finally, people with highest preferences for the fourth sequential stage, implementation, are more naturally interested in activities that carry forward the solutions and plans, such as convincing colleagues or customers of the worth of the changes, and adapting the solutions and plans to make them fit real-life situations and conditions.

It should be mentioned that while most individuals have a clear dominant style, they also have a unique *blend* of the four styles. In some cases one or more of the other styles represent a substantial secondary or tertiary preference.

Individuals have different levels of preference for participating in the different cognitive activity of each the four sequential stages. One's degree of preference for participating in each of these four sequential process stages is called one's creative process *style.* I contend that one's highest preferred style, so defined is an important antecedent to one's formation of an advice partner network. I contend that the creative process style also impacts both the number of weak ties in one's network, who the individual actor chooses as strong tie advice network partners and how both forms of relationship ties contribute to one's creative performance are modeled. This paper contributes to the literature on the impact of personal characteristics on social networks by examining how an individual's preferences for participating in the different sequential stages of the four -stage creative process of Figure 2 are an antecedent to the formation of the individuals own unique network structure. .

Creativity and social networks

As described earlier in this paper, as creativity researchers have turned their attention to the social aspects of creativity, and specifically the relationship between one's social network and his or her creative performance, the outcome of interest has continued to center on the generation of unique ideas or products (Brass, 1995; Burt, 2004; Perry-Smith, 2006; Perry-Smith & Shalley, 2003). Initial conceptualizations of the relationship between creativity and social networks focused on the role network tie strength plays in the focal actor's ability to generate creative ideas. Weak ties are conceptualized to provide unique information to the focal actor that alters in his or her network do not have access, which enables the focal actor to turn the

information into more creative ideas than the network alters without such weak ties (Brass, 1995; Perry-Smith & Shalley, 2003). Strong ties, in contrast, are conceptualized as not being related to the generation of creative ideas, as individuals in strong tie relationships do not have access to information that is unique from the alters in his or her network. Subsequent studies found supporting evidence for the positive relationship between weak ties and unique ideas, and the lack of a relationship between strong ties and the generation of creative ideas.

The majority of research connecting creativity to social networks has focused on structure rather than individual characteristics. Perry-Smith, 2008) provides a review of research into creativity and social networks which examines a variety of structural aspects of social networks that are, or are not, conducive to idea generation. However, there is growing interest in examining the impact of personal characteristics on creative performance (Zhou et al., 2009). Topics of interest include movement in and out of the network center and the role of weak and strong ties in creative performance. The latter research has been limited to idea generation and idea implementation. Another topic with growing interest is examining the impact of different ties on the process of idea generation and implementation (Perry-Smith, 2008; Zhou et al., 2009).

In the published literature focused on social networks and creativity, few articles attempt to integrate the individual characteristics to performance. Perry-Smith and Shalley (2003) posit that it is through each individual's mix of domain-relevant knowledge and creativity-relevant skills that the communication of ideas and information enhances creativity. The authors define domain-relevant knowledge as being the individual's having expertise and experience in the form of "knowledge of facts, circumstances, and issues surrounding a given problem or area (Perry-Smith & Shalley, 2003, 91)." Rodan and Galunic (2004) found that, in addition to network structure, an individual's access to heterogeneous knowledge is equally important for

innovative managerial performance. It is not enough to focus on developing ties that bridge structural holes; instead, attending to the development of ties to others with specifically heterogeneous knowledge from one's own is critical in order to maximize creative performance. Zhou et al., (2009) hypothesized that one's utilization of the information found in one's weak ties is dependent on the individual's conformity values. The study's results suggest that at intermediate levels of number of weak ties, individuals with low levels of conformity perform more creatively than do individuals with high levels of conformity. The authors further argue that their findings indicate that better understanding the relationship between personal characteristics and network ties is an important area of study in order to better understand creativity in organizations (Zhou et al., 2009).

Social network researchers, however, coming from a different perspective than creativity researchers, introduced to the study of creativity the role that strong ties play in the acceptance and implementation of ideas and solutions (Hansen, 1999). This spawned a growing recognition in creativity researchers that the organizational creative process consists of more than just problem solving. The growing recognition, among creativity social network researchers, of the limitations that considering creativity as only idea generation presents, has resulted in an increasing call to study not just the generation of ideas but also their implementation (Perry-Smith, 2008; Zhou et al., 2009).

These creativity social network researchers appear to have adopted the perspective of innovation theorists, that the creative or innovation process is composed of two main phases: initiation and implementation (Axtell et al., 2000; West, 2002; Zaltman et al., 1973). As mentioned earlier in this paper, the division between the two phases is believed to be the point at which the idea is first adopted; i.e. the point at which the decision to implement the innovation is

made. The first stage ends with the production of an idea, while the second stage ends as soon as the idea is implemented (King & Anderson, 2002).

Creative Process Style and the Formation of Weak Ties

Research on the role of weak ties and access to unique information in subsequent idea generation performance of network actors supports the view that an abundance of weak ties enables actors to generate more creative ideas than those actors with fewer weak ties. This is not the focus of this paper. Instead, the focus of this paper is on the role individuals' creative process style plays in determining the extent to which individuals seek out weak tie relationships. An individual's highest preferred creative process style is their preferred way to deal with problems (Basadur et al., 1990; Kirton, 2003), and therefore, individuals with preferences for the different styles have different information needs. Anderson's (2008) research on actor agency in social networks suggests that an individual innovates to acquire the information and resources they need to achieve their goals and individuals build and maintain advice networks that provide them the resources they find valuable to their problem solving efforts. Since weak ties enhance creative performance by providing actors with unique information (Brass, 1995a; Burt, 2004; Perry-Smith, 2006), understanding what the goals are of network actors with high preferences for the different creative process styles will help clarify to what extent weak tie relationships such actors will form.

I propose that the amount of unique information considered valuable and required to successfully satisfy the goals of each sequential stage progressively decreases, due to the fact that the goals of each stage become increasingly more specific. As the goals become more specific, meaning that the more there is a clear goal to accomplish in each successive stage the diversity of information deemed relevant by actors becomes increasingly narrow, and therefore

the number of suitable advice network partners narrows as well. Unpacking this

conceptualization for each of the creative process styles clarifies how actors' creative process

style preferences influences the number of weak tie relationships they form.

As described earlier in the paper, individuals with the generator style most prefer the

activities of the first creative process stage of Figure 2. The generation stage typically begins

before a problem has been identified, so the activities those with a high preference for the

generator style naturally prefer include those related to the generation of new problems to solve,

the identification of opportunities for improvement, or to identify and propose new projects that

might be worth undertaking. These problems can be found throughout the organization, and in

the external environment (Basadur & Gelade, 2005). Network actors preferring the generator

style therefore tend to consider everyone in the organizational social network as a source of

potentially valuable information. They recognize few boundaries as to whom or what makes

another actor in the network a worthwhile partner with whom to exchange information. The

result is that individuals who more highly prefer the generator style in the creativity process

require a large number of weak ties to effectively keep tabs on the diverse world. Weak ties are

less important for individuals whose most highly preferred styles are for subsequent stages of the

process, as those stages begin with a more specific target upon which to focus information

gathering activities.

The conceptualization stage begins with a focus on a target opportunity identified in the

generation stage. While individuals with the highest preference for the conceptualizer style are

presented with a more specific target for their information gathering activities, the target is not

yet clearly defined. The lack of clarity typically found in the output of Stage One requires the

individuals with higher conceptualizer styles to gather information from a wide variety of

potential stakeholders and other network actors who might have valuable content knowledge to contribute. Based on the information gathered and the creative thinking performed, a number of potential solution ideas are finalized. Essentially, the activities in the conceptualization stage, favored by those with a higher preference for the conceptualizer style, requires sufficient information in order to clarify and define precisely what the target opportunity is, and although this information gathering effort may be quite extensive, it would be less extensive than for the generator style. Thus the number of weak ties needed would not be as great as the generator style would need, but is greater than those of actors with higher preferences for the optimizer and implementer styles.

Information gathering for those high in preference for the optimizer style is focused on collecting relevant information to determine which solution ideas developed in the conceptualization stage are to be selected for implementation. Optimization stage activities involve evaluating the desirability of solution ideas against real world constraints, and therefore, begins with an even more focused target (than in earlier stages) in the form of the small number of solution ideas resulting from the conceptualization stage. Network actors with a high preference for this creative process style require less unique information than were required in the previous stages, as the range of potential advice partners with relevant information is restricted to those who may have hidden knowledge of any relevant organizational constraints. So actors with a preferring the optimizer style may seek out key stakeholders to discover any "hidden" or unknown constraints. The value of weak ties is much less in this stage because it is unlikely many weak ties would have the content knowledge required to ensure the successful and detailed implementation of a solution. Information search activities in this stage occur largely with the actor's strong ties, partners in whom the individual places a great deal of trust.

The activities in the implementation stage require the least amount of unique information before acting in order to be performed well. Therefore, network actors with higher preferences for the implementer style form the fewest weak tie relationships because the stage activities require the least unique information in order to be performed well. The implementation stage begins with the most narrow target range for unique information, as what is to be done is clearly understood and the clear articulation of the steps to be taken to successfully implement the solution are the goals of the previous stage's activities (optimization). Whereas in the generation stage all information was potentially relevant, in the implementation stage only a tiny fraction of that information remains relevant. The target goal of those with higher preferences for the implementer style is to get the solution idea that was selected in the preceding stage implemented, using the detailed action plan developed as part of optimization. Only if the action plan fails in some way would the actor whose highest implementer style preferences need to seek out new information, and even then the source of the information would likely be a strong tie partner whom they trust to help them adjust successfully.

Proposition 1a: Individuals with higher preferences for the generator creative process style have more weak ties in their social networks than individuals with lower preferences for the generator style.

Proposition 1b: Individuals with higher preferences for the conceptualizer creative process style have fewer weak ties in their social networks than do those individuals with higher preferences for the generator style, but have more weak ties than individuals with highest preferences for the optimizer and implementer styles.

Proposition 1c: Individuals with higher preferences for the optimizer creative process style have fewer weak ties than those with higher preferences for the generator and conceptualizer styles, but have more weak ties in their social networks than individuals with higher preferences for the implementer process style.

Proposition 1d: Individuals with higher preferences for the implementer creative process style have the fewer weak ties in their social networks than individuals with higher preferences for the other three stages.

CPS Style and Strong Tie Relationships

Strong tie relationships tend to develop between network actors who share are similar on one or more dimensions, and beyond the positive effects on creativity associated with the transmission of positive affect and social support, are widely considered to have a negative impact on individuals' creative performance. This negative impact is argued to be due to the fact that since the individuals are similar to each other they are likely unable to provide each other with unique information (Burt, 2004; Perry-Smith & Shalley, 2003, Zhou et al., 2009). Furthermore, the conformist tendencies of close, homophilous relationships is also believed to constrain individuals' creativity as the actor's strong advice partners are unlikely to be receptive to different points of view.

In terms of the strong ties formed by focal network actors, I argue that creative process style determines which potential network partners are considered homophilous and which are heterophilous. The similarity between strong advice network partners is not based on characteristics that are best considered aspects of domain-relevant knowledge like functional background or education, but instead on their shared creative process style preferences. Individuals from different backgrounds, functions and education work well together if their creative process style preferences are the same (Basadur & Head, 2001). In other words, even if network actors differ in terms of their content knowledge of the organization, if they share the same creative process style preferences there is likely a seamless flow when they work together stemming from how they approach situations, regardless of the content. I am arguing not that it is largely the domain-relevant content that makes them similar, but rather the similarity in their preferred ways of approaching the content. People may have different understandings of a

domain but still be able to work productively because of the similarity or complementariness of their creative process style preferences.

The easy and seemingly seamless flow experience makes actors with the same creative process style preferences "least effort" interaction partners (Lin, 2001; Perry-Smith & Shalley, 2003). These least-effort interaction partners are those whose creative process style preferences are either the same as the focal actor, as well as those actors whose creative process style preferences are of the creative process stage that follows that of the focal actor's.

It is expected that network actors will naturally form develop strong homophilous advice network relationships with other network actors who share their style preference, I argue that they will also deliberately build strong ties with a second type of similar actors whose highest preferred creative process styles are complementary to his or her own style preferences. This second type of strong tie relationship is proposed as being due to the fact that there is mutual dependency between the two partners based on their complementary styles. The focal actor deliberately enjoys engaging with other actors whose preferred styles are for the stage activities that precede or follow after the stage activities of his or her preferred style. Those actors with style preferences for the preceding stage are deliberately sought out by the focal actor because they are sources of interesting creative work to do, meaning nature of the creative activities match the focal actor's creative process style. Similarly, focal actors deliberately seek out and form strong advice partnerships with network actors whose highest creative process style preferences are for the stage activities that sequentially follow after the most preferred activities of the focal actor. I argue that these relationships enable the focal actor to better understand how and when to conclude the activities of the stage matching his or her most preferred creative process style. In other words, focal actors tend to develop strong, trusting advice partnerships

with other actors who can help them confidently conclude the activities in their highest preferred style and psychologically "move on". For example, those with higher preferences for the generator style will value and trust the input of strong tie individuals with higher preferences for the conceptualizer style because conceptualizers naturally enjoy helping generators clearly define the poorly articulated problem or opportunity that has been discovered.

Proposition 2a: *Network actors form strong advice network partnerships with others whose highest creative process style preference is the same as their own.*

Proposition 2b: *Network actors with higher preferences for the generator creative process style form more strong advice network ties with potential partners with higher preferences for the conceptualizer and implementer creative process styles than with individuals whose preferences are highest for the optimizer style.*

Proposition 2c: *Network actors with higher preferences for the conceptualizer creative process style form more strong advice network ties with potential partners with higher preferences for the generator and optimizer creative process styles than with individuals whose preferences are highest for the implementer style.*

Proposition 2d: *Network actors with higher preferences for the optimizer creative process style form more strong advice network ties with potential partners with higher preferences for the conceptualizer and implementer creative process styles than with individuals whose preferences are highest for the generator style.*

Proposition 2e: *Network actors with higher preferences for the implementer creative process style form more strong advice network ties with potential partners with higher preferences for the optimizer and generator creative process styles than with individuals whose preferences are highest for the conceptualizer style.*

Creative Process Style Appreciation and Strong Ties

With whom one chooses to form relationships, whether they are similar (homophilous) or dissimilar (heterophilous) to the focal actor has been a topic in social network research to the extent that it has been said that researchers can be categorized as similarity analysts and dissimilarity analysts (Walker, Wasserman & Wellman, 1994). According to Walker et al. (1994), similarity analysts argue that individuals tend to form strong relationships with other

actors who are similar to them in some meaningful way, and therefore their network partners

have similar characteristics. Dissimilarity analysts, in contrast, argue that individuals seek to

exchange with those different from them, thereby gaining access to resources outside their social

positions.

Research examining the interactions of individuals with different creative process style

preferences have found that creative performance improves when there is style heterogeneity, but

that satisfaction with the interaction is typically lower (Basadur & Head, 2001; Kirton, 2003).

Considering the fact that the very concept of creative process style is not fully understood, never

mind accepted (Kirton, 2003), we believe that most actors in employees' advice networks reflect

similar styles to their own. In order to value a resource that is dissimilar, one first has to

recognize the resource itself and the value it holds. In order for an employee to have strong ties

to other actors with preferences for the different creative process styles in his or her advice

network, he or she has to have experienced the different styles in action enough and to have

developed a high level of appreciation for the advantages associated with each of the different

styles, as well as being self-aware enough to recognize the value having access to them brings.

Therefore, it is anticipated that high levels of appreciation for different creative process style

preferences moderates the proposed relationship between actors' creative process styles and

whom they form strong advice network ties with, such that actors with higher levels of

appreciation form more strong tie advice partnerships with actors preferring creative process

styles different from their own than do actors who have a low appreciation for creative process

style differences.

Proposition 3: Network actors who have a high appreciation for all of the different creative
*   process styles have more strong ties with network actors who have different style*

preferences than do actors with a low appreciation for creative process styles different from their own.

Relationship Between the Number of Weak Ties and Creative Performance

In order to be considered highly creative, an individual has to be able to demonstrate the ability to generate creative ideas (Amabile, 1983; Zhou & Shalley, 2003). This line of thinking represents a content approach to creativity, as the focus is on *what* individuals develops based on the information available to them, not *how* they cognitively worked through the creative process to arrive at the result. Research exploring the relationship of social networks with creativity has thus far taken a structuralist approach, and emphasized the importance for creativity of diverse, unique knowledge accessible through social networks (Brass, 1995a; Burt, 2004; Perry-Smith & Shalley, 2003; Perry-Smith, 2006). Network actors with more weak ties have been found to generate more creative ideas than those actors with fewer weak ties (Burt, 2004; Perry-Smith, 2006). In other words, 'good' ideas result from individuals having a variety of non-redundant, heterogeneous contacts that enable a person to generate ideas by combining diverse information the weak ties provide. There has been considerable evidence in support of the positive relationship between weak ties and the generation of creative ideas so I expect that, based on the proposed relationship between actors' creative process style preferences and the number of weak tie relationships they form, that network actors with the highest preferences for the generator, and then conceptualizer, styles are considered to be higher creative performers whereas actors with preferences for the optimizer and implementer styles are considered to be lower creative performers.

Proposition 4: Network actors' creative performance in terms of creative idea generation is positively related to *the number of weak ties in their social networks.*

Strong Advice Network Ties and Creative Performance

Individuals' creative process style preferences means that they will tend to experience some level of discomfort in the stages preferred by the other creative process styles. If they are unable to access the creativity-relevant skills in their strong advice partner relationships to network actors whose creative process styles favor the activities in the other process stages they are likely to find difficulty performing creatively. The creativity literature has many examples where application of a full creative process leads to superior creative performance (Basadur et al., 1982; Dailey & Mumford, 2006; Mumford et al., 1991; Osborn & Mumford, 2006; Reiter-Palmon et al., 1997). At the same time the literature is rife with research reports of inadequate application of the full creative process leading to poor creative performance. These inadequate applications include not recognizing or seeking new opportunities; defining problems incorrectly; selecting suboptimal solutions; and never implementing good solutions, or not implementing them in a timely manner (Basadur, 1994). All of these deficiencies are more likely to occur when the activities in each of the stages are not performed thoughtfully. High creative performers are able to get help from others with process style preferences that enable them to execute each of the process stages creatively.

Proposition 5: Creative performance is positively related to the extent to which focal network actors have strong tie relationships with advice network partners who prefer creative process styles different from their own.

RESEARCH AND MANAGERIAL IMPLICATIONS

Future research opportunities

For a long time researchers have accepted the premise that the only way to judge a creative process is by the creativity of the final output (Amabile, 1983; Brown, 1989). The model in Figure 1 of this paper now offers the opportunity to use social network analysis to examine the creative process thinking of network actors by their own creative process style preferences and the style preferences of their advice network partners. For example, if an individual does not have strong heterophilous creative process style ties to advice network partners with different styles, and their creative performance is indeed less than those with strong heterophilous creative process style ties, then conclusions can be drawn as to whether or not they executed the full creative problem solving process. The lack of partners with different styles in their advice networks can be considered to be an indication that they do not consider individuals with different styles as offering meaningful value.

A second avenue for future research to examine is the role creative process styles play in organizational social networks in terms of centrality. The concept of centrality was avoided in this paper but research examining the creative process styles of central actors in organizational social networks would reveal interesting information about the creative process in organizations. What are the outcomes for creative performance the central characters share a common creative process style? Or, it would appear that a longitudinal study of the social networks of organizations with highly efficient creative process performance would reveal individuals with the different creative process styles rotating in and out of central network positions as the creative work cycled through the different process stages.

A third area for future research concerns the relative paucity of generators in organizations (Basadur & Basadur, 2010). From a process perspective of creativity, it would seem that the small number of generators in organizations, combined with the importance of the

generation stage (Csikszentmihalyi, 1992), indicate that organizations' creativity efforts should be struggling. However, as Brass (1995a) suggested, an individual's creativity can be augmented by the social ties he or she has to others. Perhaps organizational social networks compensate in some way for the lack of individuals actively involved in seeking out diverse information. Or, on the other hand, perhaps an outcome of such research would be to highlight a relatively new personal characteristic that organizations should consider vital to add to their ranks of employees.

Lastly, researchers could revisit some of the more established social network topics like homophily (birds of a feather flock together) versus the perspective that opposites attract, in understanding the strength of network ties. Using CPS styles as a variable could shed new light on this puzzle. Perhaps certain personal characteristics could explain the flocking side of a relationship and creative process style the "opposites attract," idea. This might help to remove the mystery regarding why these two adages appear to be opposite. It may well be that the commonality is found in creative problem solving styles.

Managerial Implications

Managers interested in the functioning of the advice networks in their organizations and creative performance may find it beneficial to examine the style differences of the members in the organizational social network. The ASA model (Schneider, 1987) suggests members in organizations become more homogeneous over time, with the danger that innovation and creative ability will suffer. Examining the advice networks of high and low creative performers may reveal differences in terms of style heterogeneity in each group's network relationships.

Managers should model and otherwise encourage employees to appreciate others with different CPS styles with the aism of increasing the diversity within the different organizational networks.

Creative process style researchers have found evidence that conflict between employees often stems from a lack of awareness of differences in creative process style (Basadur & Head, 2001; Kirton, 2003). Sometimes members frustrate each other only because their thinking styles are quite different or even opposite. Evidence also shows that once the concept of style differences has been introduced to the parties in conflict, many negative emotions dissipate and the parties manage their interactions much more fruitfully, without the necessity of training. Managers with individuals engaged in regular conflict might consider examining whether the root of the conflict is due to style differences. Doing so might reduce employees' adversary networks and increase their advice networks, both of which would likely lead to an increase in creative performance.

SUMMARY

A new approach to increasing creativity by focusing on the network of relationships among employees has been emerging. Preliminary evidence indicates that the personal characteristics of network actors play an important role in shaping their own social networks and subsequently their creative performance. There is growing recognition that organizational creativity entails much more that generating ideas and is best explained as a multi-stage process and model of creativity. The process cycles through four stages: the generation and conceptualization of new opportunities and ideas and their subsequent optimization and implementation. Each of the stages involves a different type of cognitive activity, and individuals' creative process style is a personal characteristic that represents the particular activities of the creative process they most prefer to engage.

The literature on social network creativity and the literature on organizational creativity (especially as a process) are reviewed resulting in a modeled demonstrating how an individual's unique preference for particular stages of the process, that is, their creative process *style*, is an important antecedent to one's formation of an effective advice partner network. How creative process style serves as an antecedent to both the number of weak ties in one's advice network and the selections of strong tie network advice partners and how both contribute to one's creative performance are explained using agency and social exchange theories. Individuals' development of weak tie relationships is conceptualized as a being a function of the perceived requirement of unique information to adequately act according to their creative process styles. I propose in this paper that the perceived need for unique information decreases as each successive stage of the creative process is concluded, a concept that can best be described as a funnel that is broadest at the top and narrowest at the bottom. The generation stage (the top of the funnel), which starts before a problem has even been identified, is argued to require the most unique information if it is to be performed well. The second process stage, conceptualization, begins with a focus on the unclear but discussable problem or opportunity resulting from the generation stage. The breadth of diverse and unique information required is therefore less than is required in the generation stage, but in order to properly define exactly what the problem or opportunity represents, and to generate creative ideas that solve them, the unique information from a variety of different perspectives is valuable. The third stage of the process, optimization, begins with a narrower-still focus than did the conceptualization stage. Optimization is focused on accurately evaluating the few "best bet" creative ideas emerging from the conceptualization stage. The implementation stage has the most narrow focus of all, to take action to ensure an already selected solution

emerging from the optimization stage will be successfully implemented and an actual change made. These two latter stages require the fewest weak ties if all.

A strong tie network partner who prefers a different creative process style can help pull an individual through the activities in a stage that he or she does not prefer. Social network ties are conceptualized as providing two important resources for creative performance: *content* information and *process* expertise. This means not only that network partners can contribute new and useful knowledge, but they also can help a network partner ensure that all of the creative process styles are applied to his or her creative work when appropriate. Doing so would help ensure that network actors more fully engage in the multistage creative process, thus increasing their creative performance. Based on this logic, individuals with a high appreciation of styles different from their own are likely to be the best creative performers as they are the most likely actors in their organizations to have developed strong advice relationships with others in the network who most prefer creative process styles different from their own. Implications for managers and future research in this new field are provided with several testable propositions.

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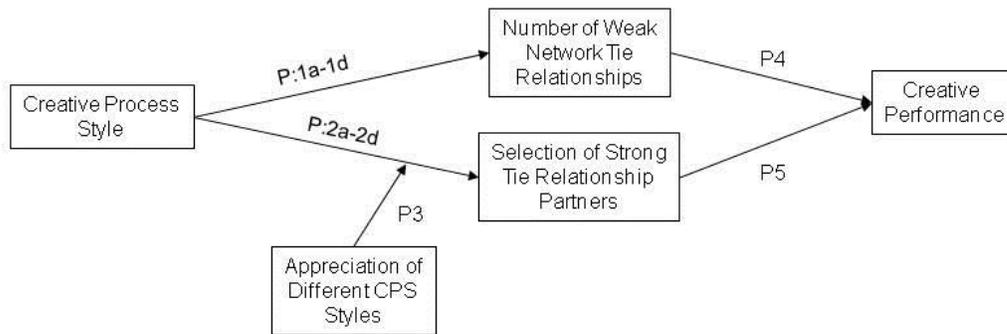
Figures

Figure 1

Figure 1: Proposed Model

Figure 2

The Four Stages of the Creative Process.

Stage IV
IMPLEMENTING

Creating options in the form of actions that get results and gain acceptance for implementing a change or a new idea

Stage I
GENERATING

Creating options in the form of new possibilities – new problems that might be solved and new opportunities that might be capitalized upon.

Stage III
OPTIMIZING

Creating options in the form of ways to get an idea to work in practice and uncovering all the factors that go into a successful plan for implementation.

Stage II
CONCEPTUALIZING

Creating options in the form of alternate ways to understand and define a problem or opportunity and good ideas that help solve it.