Where are the Generators?

Min Basadur
Professor of Organizational Behavior and Innovation
McMaster University DeGroote School of Business
1280 Main Street West
Hamilton, Ontario L8S 4M4
email: basadur@mcmaster.ca
Tel. 905-690-4903

and

Tim Basadur
University of Illinois at Chicago
College of Business Administration
601 South Morgan Street MC 243
Chicago, Illinois 60607
email: tbasad2@uic.edu
Tel: 312 330 0044

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Abstract

Organizational creativity is presented as four distinctly different sequential stages of a dynamic cognitive creative problem solving process: *generation, conceptualization, optimization,* and *implementation.* The generation stage is the activity that initiates the creative process. It is disruptive, because it entails proactively and deliberately seeking and discovering brand new problems and opportunities. Often called opportunity finding, generation results from restless discontent with the status quo. This activity is different from the second stage, conceptualization, which other researchers have previously described as problem construction, identification, or formulation. Such second stage activity gives definition to a newly discovered problem freshly emerging from the first stage or to a presented or otherwise already existing problem. We provide research showing that the people who prefer the generation stage activity (generators) are under-represented in industrial and business organizations and are likely to be found in occupations normally found *outside* such organizations, for example, artists, writers, designers, teachers, and academic institutions. We argue that organizations seeking increased creativity and innovation could do so by understanding and recognizing the contributions made by people preferring the generator style, and by making generator activity more attractive for all members of the organization.

Key Words: Creativity, creativity styles, problem generating, creative problem solving, problem finding, cognitive problem solving styles

Where Are the Generators ?

Introduction

I had just finished speaking with Adriana, a young business school graduate beginning her third year of employment in a large multi-national corporation. She was seeking some career counselling from me, her former professor. We agreed to meet later in the week and the next day she sent the following email message.

"Well, I just retested myself (I believe the last time I did the test was probably three years ago) and it turns out I still belong to the generator group. This actually did not surprise me at all. And I can see how people like me don't feel like they belong in the business world, or they deliberately avoid it. For example, from my perspective, I really like thinking up new things to do. I especially like to create something out of nothing. There doesn't have to be a reason for it. I remember hearing the expression "what do you do when you have nothing to do on a rainy day?" When you were small, and there was nothing to do, you had to make up something. In the past, I have designed clothes and experimented with make-up artistry part time just because I felt like it. It doesn't matter to me if some of the new ideas I come up with at work will not necessarily amount to anything. A lot of times in the business world or in large organizations, you don't get a chance to start anything new. You are just a link, a small part somewhere in the middle of a much bigger picture. You are usually just doing routine things that you have done many times before. You never get that fulfillment of having created something new or discovered a brand new problem to solve or new idea to pursue".

This paper is about individuals similar to Adriana. They prefer to start new things, discover new problems to be solved and new opportunities to be exploited, or deliberately

seek out improvements to be made when every thing seems to going along just fine.. They seem to be continuously dissatisfied and have difficulty in explaining themselves because sometimes their ideas are still fuzzy. They become bored with work which requires applying routine procedures to increase efficiency or to execute already defined assignments. They may be perceived to be somewhat unfocussed or even disruptive, as their behavior reflects more of an orientation to introducing (*generating)* a new problem and less of an orientation to defining, understanding, constructing, or formulating (*conceptualizin*g) an existing problem, or developing *(optimizing) or implementing* solutions to an existing defined problem. They prefer non-routine work and especially enjoy participating in the first stage of our four stage model of the process of creative problem solving, which we call *generation.* Thus, they find it more difficult to fit comfortably into organizational life because organizations typically recognize and reward people who prefer working in the latter three problem solving stages which we call *conceptualization, optimization,* and *implementation.*

According to Sternberg and Lubart (1995), people who are considered "creative" are viewed as oddballs and even outcasts in many organizations, which may not perceive a positive relationship between creativity and wisdom, and may believe individuals cannot possess both attributes. We suggest that these so-called "creative" people are the ones who prefer generation work. In field research, Basadur and Hausdorf (1996) identified the negative stereotyping of individuals perceived as creative as an important organizational attitude related to why so many organizations struggle in creativity and innovation performance. They undervalue the contribution of people who prefer generation work, Such organizations do not yet understand how to manage diversity in the process of creative problem solving, especially how to incorporate problem

generation effectively. It is important to note that in this paper, we distinguish between the construct of problem generation (initiation and discovery) as distinctly different from the construct of problem conceptualization (which we equate with what has been identified as problem identification or construction).

Effective organizations: Efficiency and adaptability

Mott (1972) presented evidence that effective organizations display two characteristics simultaneously: efficiency and adaptability. The efficient organization follows well-structured, stable routines to deliver its products or services in high quantities with high quality and at low cost. In a stable world, efficient organizations may be successful. But in a changing world, organizations also need adaptability. While efficiency implies mastering routine, adaptability means mastering the *process of deliberately changing* routine. Adaptability is a proactive process: it allows the organization to deliberately and continually change and create. It entails deliberate discontent – discovering new problems to solve, finding new things to do, and adopting new technologies and methods before anyone else. Adaptability is disruptive. It requires looking outside the organization for new opportunities, problems, trends, technologies, ideas and methods that may dramatically improve or completely change routines or introduce completely new products and services. Adaptable organizations anticipate problems and opportunities, and develop timely solutions and new routines. They deliberately and continually change routines to improve quality, raise quantities, reduce costs, and stay ahead of competitors. The people in such organizations exhibit attitudes and behaviors consistent with adaptability. They accept new solutions promptly and the acceptance is prevalent across the whole organization. The most effective organizations are both efficient and adaptable. While adaptability is a *proactive* process of looking for

ways to change, efficiency includes *reacting* quickly to unexpected turns of events and maintaining routines with minimal disruption and without getting mired in organizational bureaucracy.

However in our experience, many organizations are not as effective as others because they value short-term results above all, and reward successful implementers of routines disproportionately. Simply put, organizations favor efficiency at the expense of adaptability. Starbuck (1983) describes such organizations as "action generators" who create behavior programs to repeat their successes and thus are often blind to other events that turn out to be more important. Regardless of the current popularity of creativity and innovation in the media and business publications, most organizations - when given a choice - overwhelmingly favor established routine solutions over unproven novel solutions (Ford & Sullivan, 2005; Staw, 1995). Such efficiency-oriented organizations do not yet know how to nurture and reward individuals who are capable generators of new opportunities and ideas that will translate into new products, services and procedures necessary for a sustainable competitive advantage. In other words, they have learned to design processes for efficiency, but not adaptability. In essence, adaptability is a process of continuous deliberate change-making, beginning with new problem generation. It can be considered to be virtually synonymous with organizational creativity as defined by Basadur, Graen and Green (1982) and Basadur, Graen and Wakabayashi (1990) as a continuous four stage process of generating, conceptualizing and solving important problems and implementing valuable new solutions. In our experience, most people understand problem solving and implementing, but fewer understand problem conceptualization, and even fewer, problem generation.

Creativity as a process

Studying and discussing creativity can be difficult and complex, because no single, agreed-upon definition of this quality exists and because researchers have taken many different approaches to its study. Under the *identification* approach, Guilford (1967), Torrance (1974), and MacKinnon (1962; 1977) developed cognitive, aptitude and personality tests to identify more or less creative people. Others have studied personal characteristics related to creativity. For example, Kirton (1976) differentiated between people with more "adaptive" styles of creativity and people with more "innovative" styles of creativity, and Myers (1962) addressed the relationship between personality and creative behavior. Others have studied *organizational or environmental factors* that are likely to inhibit or nurture creative performance (such as goals, incentives, motivation, and freedom from time pressure (Amabile and Gryskiewicz, 1989; Baker, Winkofsky, Langmeyer and Sweeney, 1976). Another approach involves *deliberate improvement*: can we train people and make them "more creative" or better able to use their innate creativity (e.g. Basadur, Runco and Vega, 2000; Parnes, Noller and Biondi, 1977; Puccio, Firestien, Coyle, and Masucci**,** 2006)? In a fourth approach, some researchers (e.g., O'Quin and Besemer, 1989) have focused on understanding and assessing the *product* of creative efforts: What makes a more or less creative product, whether it is a car or a story? For example, Jackson and Messick (1964) identified the criteria of unusualness, appropriateness, transformation, and condensation to make this assessment.

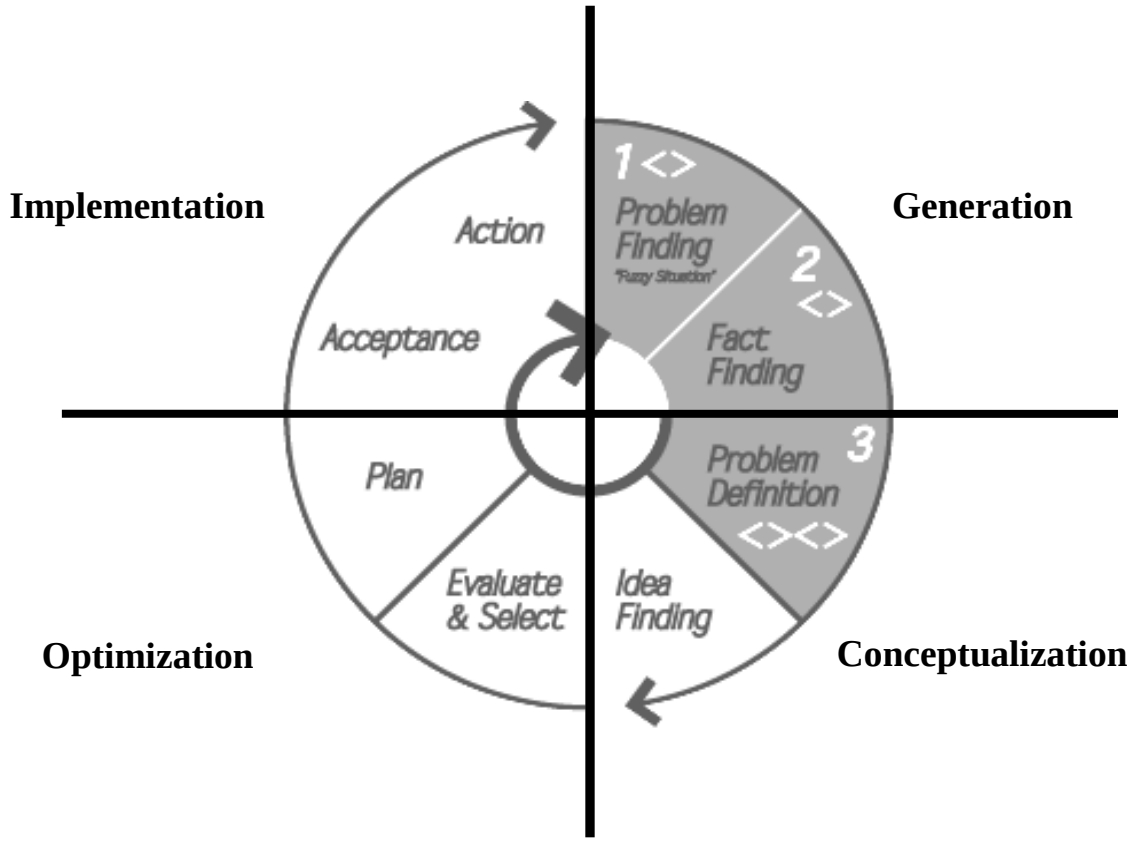
Our paper focuses on different approach, which is to understand and model creativity as a *process*, with stages or steps. This approach emphasizes the importance of information processing activities (Runco, 2003) and offers the possibility that by learning to follow such a process, individuals, teams and organizations may increase their

creative performance and systematically manage creative work more efficiently (e.g. Basadur, 1994).. The evolution of cognitive models of multi-stage creative thinking and problem solving processes began with Wallas's (1926) four main stages: preparation, incubation, illumination and verification. Osborn (1963), and Parnes, Noller and Biondi (1977) evolved a linear five step creative problem solving model: fact finding, problem defining, idea finding, solution finding and acceptance finding. Amabile (1988) identified five stages: presentation, preparation, generation, validation and assessment**.** Mumford and his colleagues (eg. Mumford**,** Mobley, Uhlman, Reiter-Palmon and Doares, 1991) identified eight core processes commonly used in creative problem solving beginning with problem identification and ending with implementation planning and solution monitoring. Finke and his colleagues (Finke, 1990; Finke, Ward and Smith, 1992; Ward, Smith and Finke, 1999) proposed that in general, creativity consists of a cycle of generation and exploration to meet specific goals or task demands. Runco and Chand (1995) provided a two tier model in which primary processes (e.g. ideation and evaluation) interact with secondary processes (e.g. motivation and knowledge) to produce novel products.

Reiter-Palmon and Robinson (2009) suggest that while these models do not completely overlap in terms of specific cognitive processes, all of them include as a first step a process in which a problem is recognized, identified, and constructed and that various terms have been used to describe this first step, including problem definition, problem identification, problem recognition, and problem construction. For clarity, they suggest using the term *problem identification and construction* to refer to this first step. This is where the problem is formulated. We suggest something different. We suggest that all of the above models tend to pre-suppose that a problem, task or goal requiring

creativity already exists or has been presented and that a creative process is subsequently applied (which may include problem construction and identification). We offer a more complete process of creative behavior which begins *before* a problem is available to be formulated (e.g. Basadur, Graen and Green, 1982; Basadur, Graen and Wakabayashi, 1990). This process begins with the deliberately seeking out (*generating*) of new problems and opportunities from scratch as an everyday activity as the first stage. This process distinguishes between this first stage and the second stage, which is *conceptualizing*, that is formulating, defining, and constructing a newly generated problem. This process is a circular four stage process of generating, conceptualizing, optimizing and implementing shown in Figure 1. The process includes the implementation of a solution, (which has emerged from the third stage), and then begins anew, as the implementation of the change sparks new opportunities to be discovered and also permits further development of the implemented solution.

Figure 1: Four Stage Eight Step Process



The messy concept of problem finding

Kabanoff and Rossiter (1994) cited *problem finding* as one of the most vital and difficult frontiers for creativity researchers – a "messy" concept that is hard to define and to use but a crucial element of creativity, especially real-world creativity in applied settings. We believe that this is at least partly due to the ambiguity of the word "problem" itself. A number of theoretical problem typologies have been proposed by creativity and innovation researchers. Getzels (1982) described 10 possible problem types. Basadur, Ellspermann, and Evans (1994) identified three different ways the word "problem" can

be defined using the concept of a gap between the present and some desired state of ffairs. A negative gap exists when there has been a drop in performance that needs to be corrected. A positive gap exists when an opportunity is sensed to create an innovative product or procedure to take a satisfactory state of affairs to a significantly raised level. An unknown gap exists when a base state of affairs has fundamentally been altered by changes beyond our control. We suggest a fourth gap, when an undiscovered opportunity lurks waiting for someone to discover or stumble upon it. This is similar to what Simon (1977) called "opportunistic surveillance." For example, Edwin Land (1972) attributed his invention of the Polaroid camera to his unexpected discovery of an intriguing problem while on the beach with his young daughter, when she queried why she needed to wait a week to see her picture which he had just snapped using a conventional camera. For Land, the key was discovering the problem, not undertaking the technical work leading to its solution.

Our process splits what has been loosely called *problem finding* into two totally separate and different cognitive activities, problem generating and problem conceptualizing. .Basadur et al (1994) grouped problem sensing and anticipating and fact finding into an initial phase called problem generation and separated out a second phase which occurs after a problem has been generated. The second phase is called problem formulation. Here the problem is defined, conceptualized and structured. This typology fits out generation and conceptualization stages. We suggest that most of the past research on what has been called problem finding has focussed not on problem generation but on problem conceptualization. A case in point is the seminal studies by Getzels and Csikszentmihályi (1975, 1976) on art students. In this study, art students were *given the task* of creating a still life painting. They did not generate the task. As

they worked on the given task, several measures of problem identification and construction were employed, including the uniqueness of the objects selected for the final painting, how the objects were handled, and the time it took to select the objects and create the still life scene to be painted. These measures were found to be strongly related to the originality and aesthetic evaluation of the painting and also to long term success as an artist. However the activities measured were based on a presented problem. The participants were measured on their *conceptualization* of a problem that they had been given to solve, in fact a fuzzy one (create a work of art using the materials available). This is an example of problem definition because the participants were given a problem to define as well or as poorly as they wanted. Problem *generation* was not required or measured. Akoff (1979) emphasized that managers are often unskilled in defining the appropriate version of the problem to be solved before they move forward to seeking a solution. Basadur (1995) provides several examples of organizations rushing into ill-advised solutions without defining the problem thoughtfully.

The following sections describe and review the research relating to the two separate constructs of generation and conceptualization

Problem conceptualization

Since the early work by Getzels and Csikszentmihályi (1975, 1976) above, after a considerable lull, there has been a recent surge in empirical research studying how presented or given problems are constructed and identified (conceptualized). . To facilitate this study Mumford, Reiter-Palmon and Redmond (1994) provided a starting point model for understanding the factors that influence problem identification and construction. The model suggests that individuals use past experiences to develop problem representations (which include information on the goals of the problem solving

effort) or cognitive structures reflecting the problem solving effort (Holyoak, 1984) . Mumford et al. (1994) and Reiter-Palmon, Mumford, O'Connor Boes, and Runco (1997) found positive effects of active engagement in the problem identification and construction process wherein participants were asked to restate a given problem in multiple ways prior to solving it (Baer, 1988). Similarly Rostan (1994) and Voss, Wolfe, Lawrence, and Engle (1991) demonstrated differences in problem identification and construction between more creative and less creative artists and scientists and more or less expert political science participants on presented problems. Okuda, Runco, and Berger (1991), Reiter-Palmon and her colleagues (Reiter-Palmon, Mumford, O'Connor Boes, and Runco, 1997; Reiter-Palmon, Mumford, and Threlfall, 1998), and Mumford, Baughman, Threlfall, Supinski, and Costanza (1997) all found correlations between problem identification and construction ability and creative results on real world problems... Research on training of problem identification and construction skills has demonstrated positive effects for both children and adults (Ellspermann, Evans, and Basadur, 2007; Fontenot, 1993; Kay, 1991; and Scott, Leritz, and Mumford, 2004).

Problem generation

Compared to the study of problem conceptualization above, the construct of problem generation is very much under-studied in scientific research (Unsworth, 2001). Most creativity research has focused on how people *react* to presented problems ("expected creativity"), with very little research focusing on the *proactive* search for problems to solve ("proactive creativity"). Generally, innovators are not handed problems (Ward, 2004). Livingston (1971) cited opportunity finding as the most important managerial ability, even beyond defining complex problems, citing examples of managerial deficiencies in foreseeing important changes in the business environment and

in perceiving new problems long before evidence of them can be found by even the most advanced management information systems. Mackworth (1965) elevated scientists who could raise new questions, formulate new concepts, and speculate far above those who are good at solving given problems. He identified the best researchers as those whose working life is devoted to looking for the problems, not just to hit the targets, but to find them. For Mackworth, curiosity is the prime requisite, such that the unforeseen problem is a joy, not a curse. While Basadur, Graen and Green (1982), and Basadur (1992; 1994; and 1997) provided some empirical and conceptual evidence and frameworks emphasizing the importance of problem generation, most of the literature has been confined to theoretical discussions, as in the citations mentioned above, including Simon's concept of "opportunistic surveillance" (1997). There may be many reasons why problem generation is under-studied. Perhaps problem generation is simply not noted very often – that is, it may not be commonly undertaken in organizations. Or perhaps a majority of people are not even aware of the concept. For example, in these turbulent times of accelerating change, many organizations are still designed to emphasize routine efficiency work (where solving already-identified problems is key) at the expense of non-routine, creative work focused on proactively adapting to change (where finding new, valuable problems is key). The frequent result is an organization caught flat-footed by a competitor which has been able to launch a lucrative new product because they have been able to discover a new customer problem to solve (Basadur, 1995) .And perhaps it may be that problem generation is under-studied is because it is very hard to measure or capture, or even to try to study rigorously – after all, how would you even introduce such a topic to participants in an experiment?

Shortcomings in problem generation in organizations

Problem generating does not come easily to many people (Csikszentmihalyi, 1988)**.** People tend to wait for others to find problems for them to solve rather than take the initiative to seek out, or anticipate problems, changes, trends and opportunities for improvement or innovation. Leavitt (1978) suggested this tendency is, in large part, due to the fact that managers find their desks loaded with problems every day, making it easy for them to be reactive rather than proactive. Leavitt argued that the tendency to avoid proactive problem finding represented an organizational form of Gresham's Law, in which people prefer to solve the problems that find them before working on problems they find for themselves. The attitude is so prevalent that some researchers have deemed the activity of problem finding to be an extra-role behavior – one that requires individuals to go beyond the boundaries of their jobs to bring about positive change (*taking charge*, Morrison & Phelps, 1999) or an operant behavior, which Livingston (1971) suggested is developed through actual practice. In fact, people often avoid important problems that cut across organizational functions and department lines: "That's not our problem." They also tend to avoid addressing complex or "wicked" problems (Rittel and Webber, 1973), that is, messy ones that do not lend themselves to analytical problem solving techniques, have no optimal solution, and in which finding a solution is intertwined with understanding the problem. Even on less daunting but not obviously solvable problems, people often assume prematurely that "it can't be done" simply because of their unwillingness to challenge conventions or step beyond the boundaries of their current work. In a keynote address, a corporate executive urged a prestigious high school faculty to prepare their students for the uncertainty they will face in their future working lives. He emphasized that rarely does anyone in business, industry and government precisely

define a person's assignment and this can provoke frustration, particularly in younger people unfamiliar with the anxiety of navigating uncharted territory without specific and certain directions and in the face of continual, accelerating change (Basadur, 1995).

Can problem generation performance be increased through training and organizational structuring of work? Basadur (1992) reports that top companies in Japan place newly hired R&D engineers and scientists into the sales department to begin their careers so they gain awareness that innovation begins with discovering customers' problems. Later solutions to those problems become new products. Such companies also teach new employees in first day orientation training sessions that problems are "golden eggs," and provide encouragement and simple structures for employees to identify problems as opportunities for improving processes and products. In North America, the 3M Corporation sets goals for its managers that provoke problem finding. For example, one goal calls for 30% of the company's products to be new every five years. As well, 3M employees are required to spend 15% of their working time exploring new opportunities of personal interest to them.

Creativity as a cognitive process with four distinct stages

The circular process of Figure 1 distinguishes between problem generation and problem conceptualization and adds solution development (optimization) and implementation. Each quadrant in Figure 1 corresponds to a specific stage of the creative process. The first two quadrants represent problem generation (seeking problems and information from the environment) and problem conceptualization (defining problems and finding solution ideas) as the first two stages of the creative process and the third and

fourth quadrants represent solution optimization (evaluation and selection of solution ideas and planning for action) and solution implementation (gaining acceptance for and taking action on solutions) as the final two stages of the creative process. The process is dynamic and continuous. Every implemented solution (action) results in the opportunity to discover (generate) new problems and opportunities to trigger the process to begin anew. This recognizes that, as new problems are generated, conceptualized, and solved, and the new solutions are implemented, new problems and opportunities can be discovered.. For example, the automobile's invention provided not only a new solution to an old problem (improving transportation) but created many brand-new problems (e.g., pollution, energy and accidents). This circular process, which emphasizes continuous creativity beginning with problem generation, also serves as a model for organizational adaptability. Adaptable organizations continually and intentionally scan the environment to anticipate new opportunities and problems, and to proactively find new products, services and procedures to implement, thus leapfrogging over their competitors. Each implemented solution leads to new problems to be discovered.

This multistage process approach contrasts sharply with research that confines creative thinking merely to generating ideas to presented problems using techniques such as "brainstorming." Such research has dominated the literature from the 1950s (see review by Basadur, 1994). Practitioners who employ such limited process conceptions do not reflect real world situations and thus seldom attain practical results (Sternberg, O'Hara & Lubart, 1997). More recent literature emphasizes more complete conceptions of creativity as process (Kabanoff and Rossiter, 1994; Rickards, 1994). Such complete models include not only multiple stages (beyond simply solving presented problems) but other important individual, group and organizational variables affecting

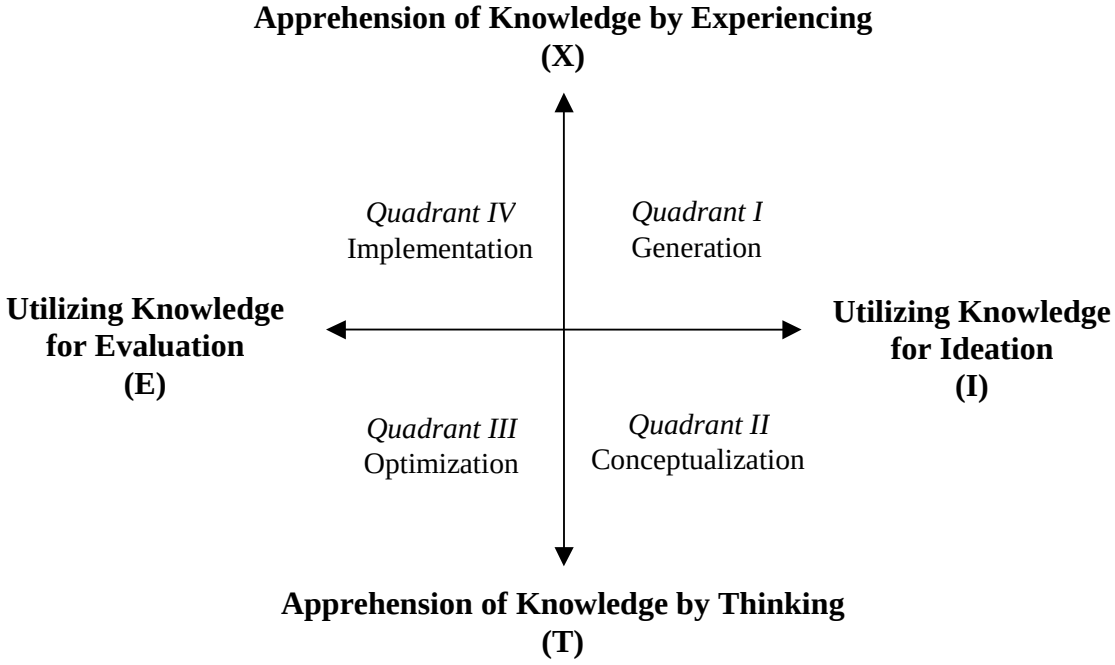
creative performance such as motivation, cohesiveness, environment, linkage to goals, and specific skills, behaviors and attitudes. After reviewing the growth of cognitive models of multi-stage creative thinking and problem solving processes, Kabanoff and Rossiter (1994) defined applied creativity as a *process* occurring in a real-world, industrial, organizational or social context; pertaining to the finding or solving of complex problems; and having an actual behavioral creative product or plan as the final result

Individuals have unique preferences for the different process stages

More specifically, our approach focuses on modelling creativity as a cognitive multi-stage problem solving process consistent with Kabanoff and Rossiter's (1994) definition. Furthermore, our approach suggests that individuals like to contribute in different ways to the process of organizational creativity because they have individual preferences for each of the four different stages of the cognitive problem solving process of Figure 1. They prefer some stages relatively more than others. We call these preferences *styles.* We tie four cognitive styles directly to the four stages of the process. Note that this approach differs from other approaches to studying cognitive style characteristics which are not related to any process, for example: Cacioppo, Petty, and Kao's (1984) need for cognition*;* Messick's (1984) educational learning styles as differentiated from intellective abilities*;* Zhang and Sternberg's (2005*)* intellectual styles; Grigorenko and Sternberg's (1995) thinking styles as the interaction of intelligence and personality; and Kirton's (1976) adaptor/innovator creativity differentiation (adaptors solve problems staying within the context of a problem as given, whereas innovators are more likely to reframe a given problem and may thus be perceived as less trustworthy).

Instead, we suggest that individuals in organizations have identifiable varying preferences for each of the specific stages in the creative process of Figure 1. These preferences, called creative problem solving process styles, are measured using the Creative Problem Solving Profile (CPSP) inventory first published by Basadur, Graen and Wakabayashi, (1990). For a complete description of this instrument see Basadur and Gelade (2005). Briefly, the CPSP measures two bipolar, orthogonal, dimensions of cognitive activity underlying the process in Figure 1. The first dimension (Experiencing vs. Thinking) measures two opposing ways of apprehending knowledge (gaining understanding). Experiencing is more open, non-rational, experiential, and divergent. Thinking is more closed, rational, theoretical, and convergent. The second dimension (Ideation vs. Evaluation) measures two opposing ways of utilizing knowledge (however apprehended). Ideation is non-judgmentally creating new information to increase the variety of options Evaluation is judgmentally reaching decisions about new information to reduce the variety of options. An individual's creative style is determined by their scores on these two dimensions. High scores on Experiencing and Ideation are characteristic of the *Generator* style. High scores on Thinking and Ideation are characteristic of the *Conceptualizer* style. *Optimizers* have high scores on Thinking and Evaluation, while *Implementers* have high scores on Experiencing and Evaluation. These relationships are depicted in Figure 2.

Figure 2. Four Styles and Four Stages of the Process



How the four process styles are connected to the four process stages

Stage I. The first stage is called *Generation* and involves Apprehension by Experience and Utilization for Ideation. Here, physical contact with, and involvement in, real world activities (X) alerts the individual to inconsistencies and difficulties. This knowledge is then used to suggest new problem areas, to identify opportunities for improvement, and to propose projects that might be worth undertaking (I). At this stage, problems and opportunities are recognized, but are not yet clearly articulated or understood.

Stage II. This stage is called *Conceptualization* and involves Apprehension by Thinking and Utilization for Ideation. Here, a proposal, problem, or opportunity identified in the previous stage is systematically thought through (T) to create a sound conceptualization or model of the problem domain. Understanding of the problem area is gained not by

direct experience but by abstract analysis. This conceptual knowledge is then used as the basis for ideation whereby one or more plausible solutions are developed (I).

Stage III. This stage is called *Optimization*, and involves Apprehension by Thinking and Utilization for Evaluation. In this stage the conceptualizations of stage II are critiqued (T) against real world constraints in order to identify practical difficulties. Alternatives are systematically examined to select (E) an optimal plan for implementing the solution that can be executed with existing resources.

Stage IV. The fourth stage, *Implementation,* completes the creative process, and involves Apprehension by Experiencing and Utilization for Evaluation. Creative activity in this stage consists of experimenting with the new solution (X), evaluating the outcomes (E), and making adjustments if necessary to successfully implement them.

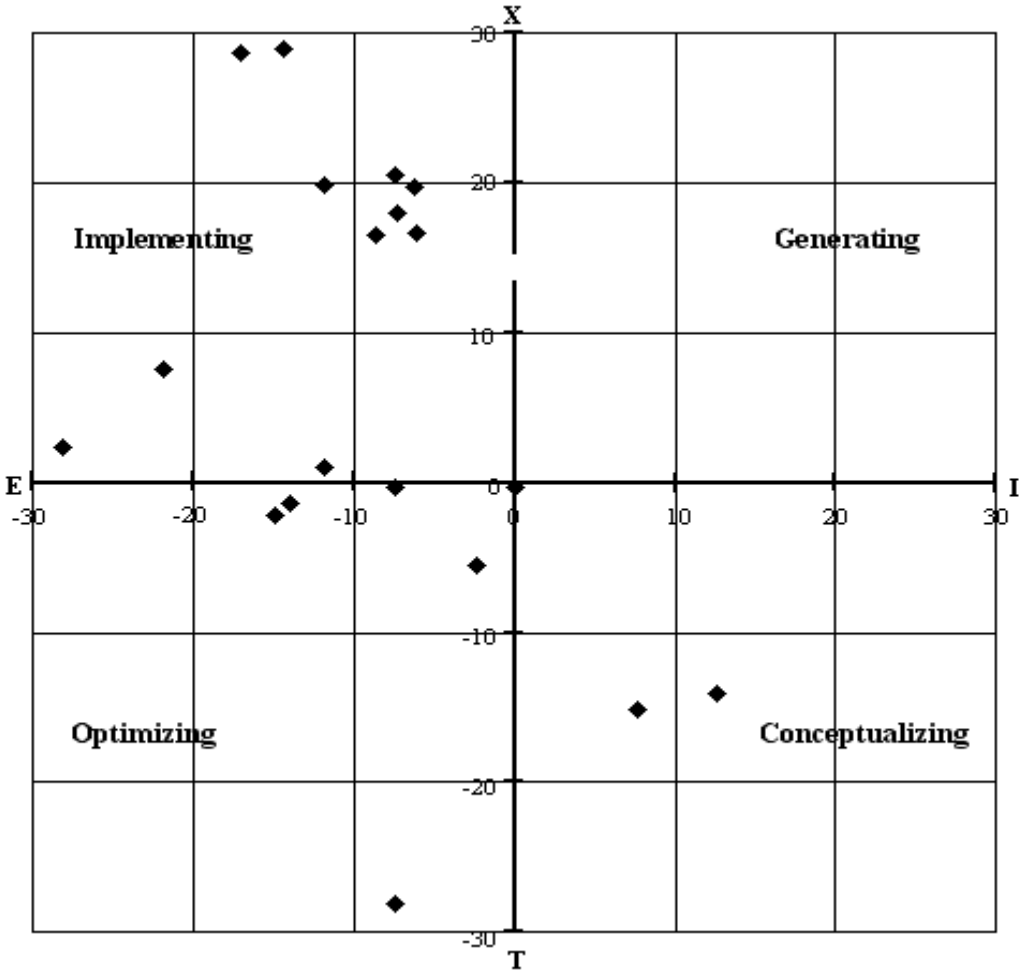
Individuals preferring the generating stage enjoy continually experiencing and scanning the environment, picking up information, problems, and cues from customers, suppliers, and others, and sensing possible opportunities for new or improved products, services, and methods. They raise new information and possibilities—usually not in a fully developed form, but rather as a starting point for new projects**.** People inclined toward conceptualizing usually lead in giving sound structure to fledgling ideas and undeveloped opportunities. They transform 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 inclined toward optimization usually lead in turning these well-defined problems and ideas and into practical, best solutions, as well as detailing efficient plans for proceeding. Finally, implementers lead in carrying forward the solutions and plans, 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 will have a clear dominant style, it is also the case that all individuals will have a unique *blend* of the four styles. In some cases one or more of the other styles will represent a substantial secondary or tertiary preference.

Organizations as problem solvers

It can be argued that organizations are, or ought to be, problem solvers. They provide goods or services which solve customers' problems. If their customers cease to have problems, organizations either go out of business or must find new customers with new problems to solve**.** Nickerson and Zenger (2004) propose that organizations exist for their problem solving abilities and that a manager's fundamental objective is to continually discover new solutions. In addition, Starbuck (1983) proposes that such problem solving activity begins with the perception of a problem, which he differentiates from decision making. He argues that problem solving is defined by its origin – the perception that a problem exists – whereas decision making is defined by its end – a decision. However, it is more typical that business and industrial organizations employ managers who are strongly oriented toward action rather than toward generating new opportunities. The scatter diagram in Figure 3 displays the problem solving preferences of a typical group of managers in a large engineering manufacturing company servicing the aircraft, airline and aerospace industries world wide. There is a clear and obvious bias toward implementation and away from generation.

Figure 3: Not Enough Generators



A typical group of managers from a large aerospace company serving the aircraft, airline, and aerospace industries and having trouble expanding into new products and new markets.

Note:

Each ◆ represents an individual's pair of coordinates derived from their score on the vertical apprehension axis (XT) coupled with their corresponding score on the horizontal utilization axis (IE).

This company has established high growth targets for new products and markets but is failing to achieve them. The failures are consistent with the results of Figure 3,

which demonstrate a shortage of generators, the individuals who are more inclined toward discovering opportunities for new products and markets. Conversely, there is an abundance of implementers, who are more inclined to solving short-term problems and who reflect the prevalent culture of the organization. To improve its balance, the company must find ways to increase generation activity. They could consider training strategies to strengthen appreciation of generator activity and provide cognitive tools to facilitate such activity. They may also consider hiring, promoting and rewarding individuals more inclined toward the generator style. They could also create organizational structures and incentives that specifically reward the generation of ideas for new products and markets to encourage individuals of the other three styles to participate more in generation activity even though it is not their favorite stage.

Empirical results: Generators in short supply

The imbalance in problem solving process styles demonstrated in the previous example illustrates a broad trend that can be seen across a large number of industrial and business organizations. Using the Creative Problem Solving Profile (CPSP) inventory, we measured creative problem solving process styles for a sample of 3,942 adults (39% female, 61% male). Respondents worked in 38 different occupations, and a wide variety of organizations including large and small corporations, banks, schools, universities and hospitals. In this sample, 36% were in non-management or supervisory roles, 27% in managerial roles, and 25% in professional or technical roles; the remainder were in other roles or did not specify their role. High percentages of generators were found in fields such as teaching (56%), academia (38%), and art (34%) and low percentages in fields such as IT systems development (9.5%), manufacturing engineering (9%) and

engineering (7.5%). Overall, the results suggested that few business and industrial occupations had a high proportion of generators (see Figure 4).

Figure 4: Some Occupations by Dominant Style Mix

More Implementers	**More Generators**
IT Operations Customer Relations Secretarial/Administrative Project Manager Sales	School Teacher Academic Artistic Non-Profit/University Administration Training and Development
Engineering Manufacturing Engineering Finance IT Systems Developer IT Programmer/Analyst	Organizational Development Strategic Planning Market Research Design R&D
More Optimizers	**More Conceptualizers**

Overall, the distribution of respondents by preferred problem solving process stage was implementer, 32.0%, conceptualizer, 26.2%, optimizer, 21.7%, generator,

20.1%. Table 1 shows the mean scale scores for individuals in various occupations, and the percentages of individuals in each CPSP quadrant.

Table 1. CPSP Mix of CPSP Styles by Occupation

	n	Percentage of Generators	Conceptualizers	Optimizers	Implementers
Occupation					
School Teacher	27	55.6	22.2	11.1	11.1
Academic	58	37.9	39.7	10.3	12.1
Artistic	32	34.4	46.9	12.5	6.3
Non-Profit/University Admin.	89	32.6	28.1	13.5	25.8
Training	240	32.5	32.5	17.9	17.1
Marketing	172	30.2	33.7	19.8	16.3
Design	73	30.1	47.9	12.3	9.6
Health Mgmt. Exec.	37	29.7	21.6	21.6	27.0
Advertising Mgr.	68	26.5	30.9	17.6	25.0
Tech. Customer Support	46	23.9	10.9	28.3	37.0
Sales	379	23.7	14.0	15.6	46.7
Logistics	94	22.3	12.8	22.3	42.6
Product Dev.	45	22.2	44.4	8.9	24.4
Personnel/HR	144	21.5	28.5	20.1	29.9
Business Consultant	63	20.6	28.6	20.6	30.2
Mfg Prodn.	386	20.2	18.4	17.1	44.3
Fund Raising/PR	37	18.9	32.4	18.9	29.7
R&D	95	17.9	47.4	18.9	15.8
Organization Dev.	81	17.3	60.5	12.3	9.9
Qual. Assurance	87	17.2	21.8	24.1	36.8
Mfg. Maintenance	54	16.7	24.1	22.2	37.0
Project Mgr.	78	16.7	12.8	21.8	48.7
Operations	45	15.6	20.0	22.2	42.2
Gen. Mgmt-Small Co./Div.	84	15.5	21.4	21.4	41.7
IT Prog/Analyst	194	15.5	17.5	31.4	35.6
Secretarial/Admin	159	14.5	13.2	22.0	50.3
Accounting	105	13.3	22.9	30.5	33.3
Market Research	23	13.0	52.2	17.4	17.4
Purchasing	69	13.0	15.9	24.6	46.4
Customer Relations	65	12.3	15.4	21.5	50.8
Social/Health Services	131	12.2	24.4	28.2	35.1
IT Operations	117	12.0	6.8	17.1	64.1
IT Sr. Consultant	85	10.6	40.0	27.1	22.4
Finance	110	10.0	26.4	36.4	27.3
IT Systems Developer	199	9.5	31.2	36.2	23.1
Mfg Engineering	32	9.4	34.4	37.5	18.8
Strategic Planning	46	8.7	56.5	28.3	6.5
Engineering	93	7.5	21.5	43.0	28.0

Table 2 ranks occupations by CPSP style.

Table 2. Occupations Ranked by Occurrence of CPSP Style

Rank	Generators	Conceptualizers	Optimizers	Implementers
1	School Teacher	Organization Dev.	Engineering/Eng. Design	IT Operations
2	Academic	Strategic Planning	Mfg Engineering	Customer Relations
3	Artistic	Market Research	Finance	Secretarial/Admin
4	Non-Profit/University Admin.	Design	IT Systems Developer	Project Mgr.
5	Training	R&D	IT Prog/Analyst	Sales
6	Marketing	Artistic	Accounting	Purchasing
7	Design	Product Dev.	Strategic Planning	Mfg Prodn.
8	Health Mgmt. Exec.	IT Sr. Consultant	Tech. Customer Support	Logistics
9	Advertising Mgr.	Academic	Social/Health Services	Operations
10	Tech. Customer Support	Mfg Engineering	IT Sr. Consultant	Gen. Mgmt-Small Co./Div.
11	Sales	Marketing	Purchasing	Tech. Customer Support
12	Logistics	Training	Qual. Assurance	Mfg. Maintenance
13	Product Dev.	Fund Raising/PR	Logistics	Qual. Assurance
14	Personnel/HR	IT Systems Developer	Mfg. Maintenance	IT Prog/Analyst
15	Business Consultant	Advertising Mgr.	Operations	Social/Health Services
16	Mfg Prodn.	Business Consultant	Secretarial/Admin	Accounting
17	Fund Raising/PR	Personnel/HR	Project Mgr.	Business Consultant
18	R&D	Non-Profit/University Admin.	Health Mgmt. Exec.	Personnel/HR
19	Organization Dev.	Finance	Customer Relations	Fund Raising/PR
20	Qual. Assurance	Social/Health Services	Gen. Mgmt-Small Co./Div.	Engineering/Eng. Design
21	Mfg. Maintenance	Mfg. Maintenance	Business Consultant	Finance
22	Project Mgr.	Accounting	Personnel/HR	Health Mgmt. Exec.
23	Operations	School Teacher	Marketing	Non-Profit/University Admin.
24	Gen. Mgmt-Small Co./Div.	Qual. Assurance	R&D	Advertising Mgr.
25	IT Prog/Analyst	Health Mgmt. Exec.	Fund Raising/PR	Product Dev.
26	Secretarial/Admin	Engineering/Eng. Design	Training	IT Systems Developer
27	Accounting	Gen. Mgmt-Small Co./Div.	Advertising Mgr.	IT Sr. Consultant
28	Market Research	Operations	Market Research	Mfg Engineering
29	Purchasing	Mfg Prodn.	Mfg Prodn.	Market Research
30	Customer Relations	IT Prog/Analyst	IT Operations	Training
31	Social/Health Services	Purchasing	Sales	Marketing
32	IT Operations	Customer Relations	Non-Profit/University Admin.	R&D
33	IT Sr. Consultant	Sales	Artistic	Academic
34	Finance	Secretarial/Admin	Organization Dev.	School Teacher
35	IT Systems Developer	Logistics	Design	Organization Dev.
36	Mfg Engineering	Project Mgr.	School Teacher	Design
37	Strategic Planning	Tech. Customer Support	Academic	Strategic Planning
38	Engineering	IT Operations	Product Dev.	Artistic

Note: Occupations ranked 1 contain the highest percentages of the relevant style.

In the first column of Table 2, occupations are ranked (in descending order) by the percentage of generators in each. Thus the occupation with the highest proportion of generators is School Teacher, and the occupation with the next highest proportion is Academic. In the second column, occupations are ranked by the percentage of conceptualizers. Here we see that Academics (ranked 9th) are more likely to be conceptualizers than are School Teachers (ranked 23rd); the occupations that contain the highest proportion of conceptualizers are Organization Development, Strategic Planning and Market Research. In the last two columns occupations are ranked by the percentages of optimizers and implementers respectively. Inspection of these two columns shows that few School Teachers and Academics are either optimizers or implementers; the occupations that contain the most optimizers are Engineering and Finance, and the occupations that contain the most implementers are IT Operations, Customer Relations and Secretarial/Administrative support.

Many of the respondents (n= 3,783) could also be classified into one of five organizational levels. The first four organizational levels (non-manager, supervisor/team leader, middle manager, upper manager) represented increasing levels of organizational responsibility. The fifth category comprised specialist technical and professional jobs. The CPSP styles associated with different organizational levels are shown in Table3.

Table 3. CPSP Mix of Styles by Organizational Level

	N	Percentage of			
		Generators	Conceptualizers	Optimizers	Implementers
Organizational Level					
Non-manager	449	19.4	16.9	22.3	41.4
Supervisor/Team Leader	1073	19.9	17.3	21.8	40.9
Middle Manager	843	19.5	24.4	22.3	33.8
Upper Manager	357	17.9	35.9	17.4	28.9
Technical/Professional	1061	22.8	30.2	23.3	23.8

In Table 3, generators are the least common process style in every level, ranging from 17.9% at the upper manager level to 19.9% at the supervisor/team leader level. Even in the technical/professional group, they are the least common at 22.8%. Meanwhile, implementers are the most common style in every level except upper manager and technical/professional, in which they rank second. Implementers range from 41% to 33.8% at the three lower levels, and score second highest (28.9% and 23.8%) in the upper manager and technical/professional groups. Conceptualizers are most common in these two groups, at 35.9% and 30.2% respectively.

Discussion of results

In a nutshell, the empirical research above indicates that in business and industrial organizations:

1. There are proportionately fewer generators overall than the three other styles and proportionately more implementers.

2. Only a few occupations are dominated by generators. Many occupations are dominated by implementers.

3. Generators are less well-represented at all organizational levels than any of the other three styles.

4. The occupations which have the highest proportion of generators are normally found outside of business and industrial organizations, including artists, writers, designers, and teachers.

Following are our thoughts about these findings at the organizational, individual and team levels.

Thoughts at the organizational level

From the standpoint of managing organizational change and innovation, the overall distribution of respondents by preferred creative process stage is worth examining. It is especially interesting to note that individuals preferring the generator style were predominantly found in non-industrial occupations; few business and industrial occupations had a high proportion of generators. Furthermore, generators were no more likely to be found amongst senior managers than at other levels of the organizational hierarchy. These findings are perhaps the most provocative for business and industry organizations, whose most perplexing challenge today is how to be more innovative in the face of accelerating change, uncertainty, globalization, increased competition, and pressure for revenue growth. While many corporations recognize the need to innovate, they also find it difficult to do. Indeed, many leading management consultants exhort corporations to "begin their revolutions" – to expand their thinking and do things differently. Rather than simply improve existing methods and procedures, they advocate deliberate change. They advise corporations not to defend old markets, but to explore new ones. Many corporations find this an appealing strategy but one that is

difficult to implement. Perhaps one reason for this is a lack of employees with a preference for the generator style of thinking; generator activity is the first stage of the innovative thinking process, and the essential trigger for subsequent change.

If organizational success depends so critically on innovative change, why are employees with generator characteristics apparently under-represented in business organizations? Perhaps many companies have yet to learn how to retain and motivate individuals who prefer the generator style. Generators are the farthest away from work that is visibly measurable. In contrast to people in sales and manufacturing, for example, generators do not produce tangible and measurable results such as sales completed or goods produced. Rather, they initiate work that others carry forward and complete. As well, generators may be seen as somewhat disruptive because of their tendency to find new problems and opportunities in work still underway or only just completed. Another potential explanation for the dearth of generators in organizations could be that the same relative scarcity and overall style distribution exist in the general population as seen within corporate organizations. On the other hand, perhaps there are some scientific theories which might help explain the lack of generators at the individual level. We will examine three such theories in a later section: the ASA model, the theory of vocational personality, and the theory of work adjustment.

However, one could argue that it may be overly simplistic to speculate that the difficulty with innovating in organizations is the lack of employees who prefer the generator style of thinking. For example, a single generator might initiate enough work for ten "implementers". A more productive approach might be to raise broader questions and hypotheses about the appropriate mixes or ratios of the four quadrant preferences

within various organizational departments and functions, or within an organization as a whole.

From an *intra*-organizational perspective, different ratios of the four quadrants might be appropriate within, say, manufacturing or service organizations, or within the particular departments of a given organization, such as R&D, sales, IT or finance. The optimal mix for a top management team might differ from that for a lower-level team. Our previous research (Basadur, 1994) has suggested that a business unit's optimal ratio may depend on the typical proportion of work oriented toward problem generation.

The research reported here supports this point of view. Organizational creativity has been portrayed as a multi-stage process, and moreover, a process with an "applied" focus. We suggest that organizational leaders must recognize, nurture, reward and synchronize the different styles creativity associated with the various stages of the creative process, particularly as different parts of organizations tend to prefer different stages and thus, contribute differently to the creative process. Gone are the days when a company could assign "creative work" to a select group of people, say, in the marketing or R&D department. Today, much more complex challenges posed by globalization of competition and technological advancement make it imperative for organizations to engage the creativity of all members, across multiple disciplines. No longer can the creative process be seen as a "relay race," with one department handing off pieces of a project to the next. Rather than wait for others to "do their job first," each department must be involved throughout the various stages of the creative process. By blending different kinds of knowledge and different kinds of cognitive problem solving styles, the entire organization can more quickly and successfully implement new solutions to newly discovered, well-defined problems and opportunities.

Thoughts at the team level

We believe that the research we have described has additional implications for organizations especially with respect to interdisciplinary team performance and human resource management. Interdisciplinary teamwork is an important topic in the management literature especially that concerning innovation, continuous improvement, employee engagement, and complex problem solving (e.g. Hauschildt, 2001). Often teamwork is frustrating and even dysfunctional. First, if teams are not created with an appropriate mix of styles, their performance may suffer (Basadur and Head, 2001). Second, heterogeneity is often an inherent characteristic of cross-functional teams, as people in various occupations favor different problem solving process styles. We suggest that lack of awareness and understanding of the different styles among team members may be a significant source of difficulty. If team members understand their own creative problem solving styles and thus their personal preferences for different stages of a multi-stage process of creative problem solving, this can increase their sensitivity to, patience with, and appreciation of the value of their teammates' different styles and improve the quality of their interactions and their team problem solving performance (see e.g., Basadur, 1995; Basadur and Gelade, 2005). Then, rather than endure frustration in working with team members' different and even opposing cognitive styles, they can build skills in synchronizing these different preferences for the stages of the problem solving process and more efficiently and collaboratively work their way through the complete process through to successful implementation of change. If the four-stage process of creativity outlined above adequately represents the creative process, it would be expected that teams with a heterogeneous mix of preferred creative process styles would significantly outperform teams with a homogeneous mix of creative process styles in

innovative work. In the former case, all stages of the process are readily available within the team. One could also predict that members of homogeneous teams would experience more satisfaction working with like-minded teammates.

These predictions were confirmed by a study by Basadur and Head (2001) that assessed groups of MBA students on a creative problem-solving task. Groups including individuals with different styles (heterogeneous groups) outperformed homogeneous groups whose members all had the same style. Asked about their teamwork experience, individuals in the heterogeneous groups expressed less satisfaction than those in the homogeneous groups.

Thoughts at the individual level: Theoretical explanations for the paucity of generators in organizations

Person-Environment fit (P-E fit) is a well-established approach to understanding job satisfaction and turnover at work (Schneider, 2007). There are a number of P-E fit theories that we can apply to attempt to explain the paucity of generators found in organizations, for example, Schneider's attraction-selection-attrition (ASA) model of organizational behavior, Holland's theory of vocational personality, and Dawis and Lofquist's theory of work adjustment. We discuss each in this section.

The Attraction-Selection-Attrition (ASA) theory of person-environment fit suggests people are attracted to, selected by, and retained by organizations with which they fit, leading to organizations becoming relatively homogenous over time, as employees who fit less naturally into the corporate culture voluntarily leave. Various authors provide explanations as to some individuals may fit less comfortably than others into an organization. (Schneider, Goldstein and Smith, 1995). For example, Schaubroeck, Ganster and Jones (1998), and Ployhart, Weekley and Baughman (2006) both found that

shared personality characteristics were important factors. We suggest a new potential explanation could be that generators do not fit many organizations cognitively, in terms of their problem solving process styles. Our view, consistent with the problem solving theory of the firm of Nickerson & Zenger (2004), is that the type of problems that specific occupations are tasked with may contribute to the similarity in styles among individuals in specific occupations. Accountants, for example, are tasked with solving very different kinds of problems than people working in marketing or product development. If the level of problem solving process style fit is low, it may be perceived as job dissatisfaction by the individual and possibly as poor performance by management. In either case, the most likely result will be the departure of the individual from the organization. Therefore, based on the ASA model of person-environment fit, generators are the most likely to be mismatched with their occupation or organization because the organizations are efficiency-oriented rather than creativity-oriented. If we accept the argument put forward by Staw (1995) that no one in organizations really wants creativity, then the dearth of generators in organizations is hardly surprising. This is also consistent with Holland's (1992) theory of vocational personality congruence. It may be that individuals will develop high levels of congruence where their problem solving process styles match the kinds of problems solved in the workplace. In the case of generators, their styles may be most likely to be incongruent with those of efficiency-oriented workplaces.

Lastly, the theory of work adjustment (TWA) suggests adaptation to the work environment as an alternative explanation for the lack of generators in organizations. TWA considers person-environment fit to be dynamic, developing over time as individuals interact with their work environments (Dawis & Lofquist, 1984; Lofquist &

Dawis, 1991). C*orrespondence* is defined as the degree of fit between the characteristics and abilities of the individual and those required by the work environment. The theory suggests that if a correspondent relationship does not exist initially, the individual seeks to establish one and build on it, or else exits (Lofquist & Dawis, 1991). We suggest generators may initially fail to establish a strong level of correspondence with efficiency-oriented workplaces, but may build correspondence by focusing on elements of their work that appeal to one of their secondary style preferences (for example, implementation). Through ongoing work use, this secondary style preference will continue to develop and may eventually supplant generation as a dominant style.

From the standpoint of human resource management, perhaps knowledge of one's own cognitive creative problem solving style can help individuals adapt to their organizations and increase self-efficacy and self-esteem. For example, individuals can better assess their cognitive fit with the prevailing culture of the organization as a whole or with their particular department or function and with the cognitive demands of their job, better manage their personal development and career progression, and develop skills in working with others. For example, if the prevailing culture favors and rewards implementation proficiency, a person whose style preference is different from implementation then can adapt accordingly, by learning to cope, finding ways to increase their value by complementing the work of others in their department, seeking a reassignment to another department whose work or culture may be more congruent with their style, or even leaving the organization. This may be particularly significant for generators. Perhaps hiring practices should incorporate identification of individual problem solving styles to ensure good decisions are made with respect to cognitive fit with the job or department under consideration. Human Resources professionals may

better aid individuals in managing their careers by helping them understand their problem solving styles to seek better job fits, develop necessary cognitive skills for upward mobility and make better decisions whether to accept promotions or transfers.

Future research

We believe that there are several opportunities for further research**.** For example, the question could be asked to what extent an individual's creative problem solving style is a disposition or a changeable state. We believe this probably varies with the individual and definitely merits exploration. Kohn & Schooler (1982) and Schooler (1984) found that individuals' intellectual functioning changes over time due to the demands of their work environments. This suggests that individuals' cognitive problem solving styles may naturally change over time due to the continued exposure to their work's dominant problem solving style. For example, if individuals are placed in work demanding generator problem solving skills, we might expect over time for them to develop increased generator problem solving styles. ("Try it, you might like it!") This possibility is reminiscent of Bem's (1967, 1970) theory that contrary to the belief that changes in attitude lead to changes in behavior, it is equally probable that changes in behavior lead to changes in attitude. And thus, for some people, changes in behavior (work demands) might lead to changes in preferred style. This line of exploration would extend to questions about the effects on style of major changes in occupation. For example, if a school teacher with a prevalent generator style changed careers and became an insurance agent for a big corporation, would he/she be likely to undergo a shift in style? What factors might mediate this kind of a shift? Would personality be a moderator? Is their a correlation of CPSP style with personality, say with any of the Big Five personality traits? For example, one might speculate that the trait of openness could be expected to

correlate with the generator style. Furthermore, another valuable area of research relating problem solving styles to careers would be to explore the application of style identification to help students to make better informed choices about future jobs and fields of higher education to pursue. By knowing which styles are represented the most in various job categories, students may be more confident in their career decision-making.

Another research direction would be to investigate if there may be optimal mixes of styles for teams at different organizational levels, or by different types of problems, or by type of industry or internal department, or by environmental factors such as volatility of markets or technologies. Such mixing represents the concept of diversity in cognitive problem solving process style. We suggest that such diversity may be an important consideration in increasing the effectiveness of organizations, departments or teams, along with other, more traditional forms of diversity. How important such cognitive diversity may be compared to more traditional forms of diversity (e.g. gender, race, experience, background, etc) in impacting performance and how the two kinds of diversity may interact or synergize would seem to be a rich area of research interest.

Earlier in this paper reference was made to Basadur's research (1992) which found that top Japanese manufacturing corporations make a concerted and highly successful effort to encourage their employees to engage in problem generation (stage 1) work and use their creativity as part of their jobs. This suggests another valuable question to research: To what extent can problem generation performance be increased through training or organizational structuring of work? And does this vary by organizational environments and by cultures? When these Japanese corporations were asked to specify the primary objective of this deliberate encouragement of employees to generate

problems and use their creativity, *none* of the corporations cited new products or new methods or lower costs or higher profits. *All* of them cited *motivated people*. Motivating people by providing the opportunity for creative activity is consistent with the motivation literature in industrial and organizational psychology including the higher level need theories of Berlyne (1967), White (1959), and Maslow (1954), as well as the intrinsic motivation theories of Herzberg, Mausner and Snyderman (job enrichment, 1959), Deci and Ryan (self determination, 1985), and Locke and Latham (goals and intentions, 1990), all of which predict that intrinsic motivation is the *result* of the opportunity to do creative work. Employees so motivated then apply themselves with high commitment to all aspects of their work. This Japanese model sharply contrasts with the approach taken by Western organizations, which is still largely based on Taylor's (1911/1967) scientific management approach of offering money in the hopes of sufficiently motivating some employees to drop ideas into a suggestion box. So, the question would be, to what extent could Western organizations increase employee engagement and motivation by making the effort to adopt the Japanese approach to employee suggestion systems which features deliberate training and structuring to encourage the generator style?

The creative problem solving process style approach might also provide an important opportunity for additional creativity research by providing an objective, research-based classification of the various occupations within an environment, based on ideal problem solving styles. This would expand the work of Chan (1996) who determined that two different types of engineering occupations were related to different Kirton Adapatation-Innovation styles Kirton (1976). The expanded classification would include problem solving style and additional occupations and departments.

In summary, we are suggesting above many new avenues of research based upon expanding the understanding and practical applications of (1) creativity as a four stage cognitive process and the relatively unexplored potential of the generation stage and (2) the concept of appreciating and synergizing different cognitive preferences among individuals for the different stages of the process. No doubt there are many additional avenues for enterprising researchers to *generate.*

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