

Chapter 3

The 4P's Creativity Model and its Application in Different Fields

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3.1 Introduction

Over the past few decades, a growing recognition of the importance of creativity and innovation can be observed. In his bestseller, *The Rise of the Creative Class*, noted American economist and sociologist Richard Florida (2002, 2012) stated that we are living in the creative age, in which creativity has become a major driving force behind economic growth. According to his research, a new segment of knowledge workers, intellectuals and artists — the *Creative Class* — is growing rapidly both in the USA and in Europe. This class is characterized by three attributes — *the 3 T's* of economic development: talent, tolerance and technology. The members not only contribute to economy but also change preferences related to a lifestyle, which in their case “is driven by much thinking and the will of doing something active to switch off the brain” (Florida, 2002, p. 169). People belonging to the creative class transform big cities they live in. In a similar vein, related and partly overlapping phenomena — “creative industries” (Hesmondhalgh, 2007) and “creative economy” (Howkins, 2007) — have been recently introduced to denote businesses originating from individual’s creativity, skill and talent (including, for example, the arts, motion pictures, radio and television, and printing and publishing).

In an attempt to respond to these general expectations, scientists keep trying to deepen our understanding of creativity. The modern era in creativity research began in 1950 when Joy Paul Guilford gave his influential presidential address at the American

Psychological Association. He argued that understanding creativity is of particular importance in the context of education. Since then, the field is developing rapidly. Some authors have even proclaimed the emergence of *creatology* — a new interdisciplinary science of creativity (Aleinikov, 2013) aimed at better understanding of the phenomenon and at improvements in related practices.

The aim of this chapter is to introduce the 4P’s Model of Creativity (Rhodes, 1961) and to review its practical implications in different fields, including education, business, engineering, and others. According to this model, creativity can be viewed from four different perspectives: product, process, person and press of the environment. Thus, the main question tackled here is how creativity can be stimulated by attending to each of these components.

3.2 Psychology of Creativity: Research and Application

At the very beginning, practical expectations had a strong impact on modern psychological studies on creativity (Guilford, 1950). Nowadays, the vast majority of academic work makes both theoretical and practical contributions. Thus, studies on creativity can be seen as representing a certain continuum from most basic to most applied. However, for the purpose of this chapter, we propose to arbitrarily distinguish four levels of questions research generalizability/applicability on the basis of research questions (general questions vs. context-specific questions) and aims (understanding vs. improvement) (see Fig 3.1).

The first and most basic level includes studies related to general questions in the field. These studies are undertaken in order to build a new model or refine the existing theoretical accounts. Typical questions are: “what is creativity?” or “what are the

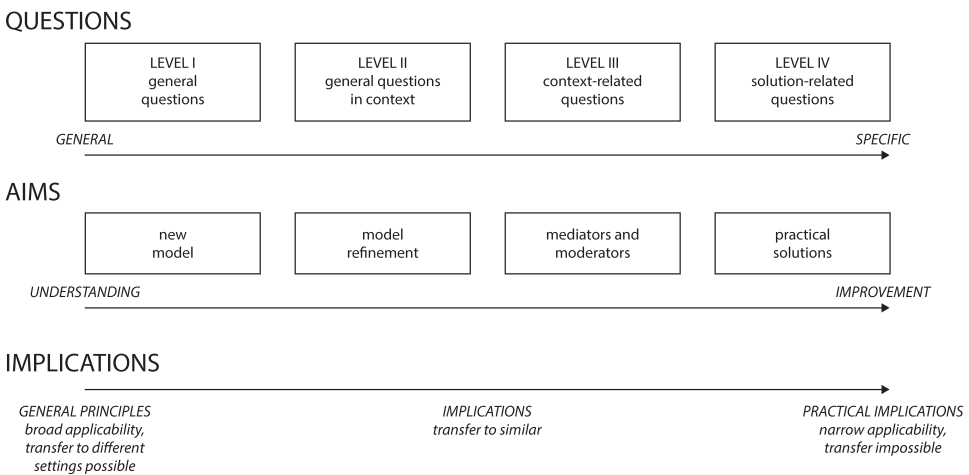


Figure 3.1. Four levels of research generalizability/applicability on the basis of the types of questions and aims.

characteristics of the creative process?”. These studies use rigorous designs and quite often examine general population.

The second level refers to studies that are also related to general questions, but embodied into a specific context, i.e., contextualized. Research of this type also deals with general questions, but uses specific context as a means to discern the answers (e.g., searching for characteristics of creative person by studying creators from various domains (contextualization). For the researchers who advocate a domain-specific view on creative abilities (Baer, 1998, see also Plucker & Beghetto, 2004; Silvia, Kaufman, & Pretz, 2009), contextualization is the only solution. Such studies can certainly provide further refinement of the existing models, and sometimes they can inspire novel approaches.

The third level refers to the studies focusing on questions related to context specifics. Research of this sort deals with issues pertaining to a particular and domain-specific context or situation, depicting typical mediator and moderator variables. They are often focused on improving our everyday practices and discerning specific interventions that enable us to foster creativity in different settings, i.e., in education, business, advertising, engineering, and many others.

Finally, the fourth level deals with context-specific solutions. The studies are aimed at answering specific questions pertaining to the detailed problems, particular tasks or situations relevant to the entity they are running for.

Studies also differ in terms of generalizability of their results. Research from levels I and II offers very broad implications, but since these studies are heavily decontextualized, even most rigorous design, sufficient sample size, and most relevant methodological solutions may not make results applicative directly to specific practical conditions (populations, types of problems or situations). In other words, although these studies are characterized by high “internal validity” (they provide a good proof of links between variables under investigation), they may suffer from low “ecological validity” (their results can be hardly generalized to real-life settings). In turn, outcomes of research levels III and IV are of particular relevance to specific domains, research populations or even funders, local decision makers, stakeholders, etc., under certain practical conditions. Level IV provides particularly unique, highly specific, but mostly non-generalizable knowledge.

One implication of the proposed framework is that it can be used to guide readers' attention to the studies most relevant to their interests. Thus, it is used in this chapter for communicational purposes. In the next sections, when talking about basic research on the 4P's of creativity, we will be basically addressing the research levels I and II, and while talking about applications of the 4P's model, we will be mainly referring to research levels III and IV. The chapter will firstly present the typical characteristics of creative product and discuss controversies around it in different fields. Then it will describe typical characteristics of creative process and corresponding studies on creative thinking techniques. In the next part of the chapter, both dispositional traits and state characteristics of creative person will be described. Finally, the chapter will move

on to the notion of “press” (environment). The chapter will conclude by briefly presenting confluence approaches and explaining how much, in practical terms, can be gained from attending to each of the 4P’s.

3.3 How Many P’s of Creativity Do We Have?

There is something really touching when we think that the very inspirational idea of looking at creativity from four different perspectives was introduced over 50 years ago. In the paper that subsequently became one of the most popular references in the creativity literature ever, Mel Rhodes wrote: “The word creativity is a noun naming the phenomenon in which a person communicates a new concept (which is the product). Mental activity (or mental process) is implicit in the definition and of course no one could conceive of a person living or operating in a vacuum, so the term *press* is also implicit. The definition begs the questions as to how new the concept must be and to whom it must be new” (Rhodes, 1961, p. 305). Current definitions of creativity highlight one more aspect — the value of the product. Thus, the creative product must be both novel and appropriate. In other respects, our thinking about creativity remained largely unchanged.

Since Rhodes’ (1961) publication, several attempts have been made to extend his model. Simonton (1995) added *persuasion*, arguing that creative people are essentially leaders who can influence others, therefore, creativity might be seen as a form of leadership. Runco (2007) subsequently suggested reorganizing the main framework into a hierarchical structure with a distinction between *the creative potential* as opposed to *the creative performance*. The creative potential is composed by the creative process, person and press influences, while the creative product and persuasion belong to the category of performance. Due to the scope of the current chapter, we will not go deeper into the extended model of the P’s. Instead, we will follow the classic Rhode’s (1961) 4P’s model to synthesize the seminal theories of creativity.

3.3.1 *Product-related Approaches*

It seems that out of the four P’s, the creative product — an idea, process, or physical object — plays a superior role. From a common sense perspective, creativity amounts to the product; if someone were asked “*what is creativity?*”, the instinctive answer would be: “*the creative product*”. In a way, this thinking is implemented in the standard definitions of the creative process, person and environment: they are considered creative if they are associated with the creative product. Therefore, when one studies creativity, creative outcomes are usually treated as dependent variables (i.e., as measures of creativity), while characteristics of the person, process or press are usually treated as independent variables (i.e., as representing influences on the creative

products). The product approach can also be seen as the most objective approach to creativity as it deals with tangible objects available for measurement (Kozbelt, Beghetto, & Runco, 2010).

Studies on creative products are focused on exploration of relevant criteria, including factors affecting the process of creativity judgements, and development of diagnostic tools and methods. There is an ongoing discussion on how many criteria are necessary in order to obtain reliable assessment of the creative products. Nowadays, both researchers and practitioners widely accept the view that the creative product must be both novel and useful (Sternberg & Lubart, 1999). These two criteria constitute the bipartite definition of creativity, regarded as “golden standard” (Runco & Jaeger, 2012) in the field, that can be traced back to Stein (1953) and Barron (1955, as cited Runco & Jaeger, 2012).

Although seemingly simple, these criteria have proven to be highly problematic. Both “novelty” and “usefulness” are relative in nature, depending upon the actual personal, social, cultural, and historic contexts in which the product emerges. In different circumstances, pieces of work become creative and may lose this attribute. Therefore, researchers have been trying to discern the objective and subjective indicators of creativity (Simonton, 2012). Theoretically, the criterion of newness or uncommonness can be assessed by the objective calculation of rarity (e.g., <1% rarity as extremely original). For example, Simonton (1980) used a computerized analysis of strings of notes probabilities to operationalize melodic originality of classic musical themes relative to both the repertoire and the *Zeitgeist* at the time of composition. To define the fame of the themes, he used a citation measure. Similarly, domain-specific impact in science can be assessed with an indicator of total productivity of a scientist (e.g., Lehman, 1958), peer-rated eminence indexed by total citations in the literature (Simonton, 1997), or product’s historical impact (Simonton, 2009).

Some authors suggest the necessity to simply add more criteria to measure creativity. For example, Simonton (2012) made a very strong case for “surprise” as the third definitional criterion.

Unfortunately, purely objective approach to originality or usefulness is severely limited to experimental settings. It is relevant only when a product is assessed against ideas belonging to a fairly well-defined group or population under investigation (i.e., we compare the originality of a product to the so-called group or population norms). It is simply unfeasible in many cases of real-life products. Moreover, some seemingly objective indicators, for example, citation index in science, reveal the subjective opinions of the recipients. “Surprise” can be seen as the subjectively perceived originality of the creative product. Thus, even the “objective” measures of creative products may often rely on social acceptance.

The above-mentioned criteria of the creative product are usually discussed in a domain-general context as typical for studies of levels I and II in the proposed

framework. The issues related to creativity judgements seem even more complicated if we look at domain-specific contexts, such as assessment of the quality of art works or consumer goods, or simply a comparison of several problem solutions. In all these cases, a social aspect of a judgement seems crucially important. This work is best exemplified by the studies on commercial products (research levels III or IV). Outcomes of these studies usually emphasize different or additional criteria (Besemer & O'Quin, 1999; Cropley, Kaufman, & Cropley, 2011).

Creativity is a key factor in product development. Although novelty alone does not motivate the average consumer (Besemer, 2010), a lack of inventiveness leads to new product failures (Crawford, 1977). At the same time, development of novel commercially successful invention is very costly. According to the study by Stevens, Burley and Divine (1999), it takes about 3000 raw ideas to produce one new successful industrial product. Thus, understanding the criteria of product creativity judgements seems to be crucial in managing innovation in organizations.

However, as Cropley and colleagues (2011) note, there are surprisingly few studies pertaining to the evaluation of engineered artifacts or manufactured consumer goods. According to Vissers and Dankbaar (2002, p. 31), managers usually assume that creative and uncreative products can be distinguished easily and "little is known about the dynamics of "newness reception" in organizations".

In order to address this gap, Cropley and Cropley (2010) (see also Cropley, Kaufman, & Cropley, 2011) developed the notion of *functional creativity* that pertains to novel products aimed at serving some useful social purpose. They suggest that necessary prerequisites for a functional product or solution to be regarded creative include relevance, effectiveness and novelty. Novelty adds value to an effective solution. Once these two conditions are fulfilled, additional criteria of elegance and generalizability are applicable and further influence the overall value of a product. A similar conceptual framework that pertains to functional creativity, the Creative Product Analysis Model (CPAM) proposed by Susan P. Besemer and colleagues (Besemer & O'Quin, 1999; O'Quin & Besemer, 2006) consists of three dimensions characterising innovative products: novelty (originality, incentive, transformational effect), resolution (appropriateness or feasibility, logic, relevance, usefulness) and synthesis and elaboration (style characteristics, i.e., elaboration, complexity, organic, well-craftiness, elegance).

Researchers focusing on functional creativity are also concerned with tools for measuring product creativity useful for managing innovation, designing new products, improving the existing ones, enhancing advertisements or testing market preferences. For example, Cropley and colleagues (2011) devised the Creative Solution Diagnosis Scale. Besemer and O'Quin (1999) also developed the Creative Product Semantic Scale, a diagnostic tool derived from CPAM. Both scales have been proven to be reliable and valid instruments.

So far, we have discussed criterion-based measurement of creative products. Other approaches include a use of indirect measurement or global judgment. On the basis of the assumption that a product or behavior is creative simply if appropriately chosen observers agree on that, Teresa Amabile (1983) has developed the Consensual Assessment Technique (CAT; for a summary, see Amabile, 1996). The CAT involves asking a group of experts in the product-related field to rate independently the product creativity. The judges use their own subjective criteria without any need for explication or explanation. The CAT has been validated in many settings. Available data suggest that obtained judgments are usually reliable and valid (Hennessey, Amabile, & Mueller, 2011).

To summarize, resolving the issue of elusive criteria of creativity relies upon the integration of several perspectives, including its objective and subjective components. Such a multi-layered perspective on the creative product assessment was offered recently by Glăveanu (2011). According to this proposal, a product will be assessed as creative if it represents novelty and originality, but subjectively perceived as valuable or useful. However, these subjective personal judgements are embodied in the broad cultural context, in which the product emerges. Research on functional creativity advances theoretical understanding of the creative products not only by proliferating and specifying the criteria but also by revealing that different products can display different qualities of creativity (Cropley *et al.*, 2011).

3.3.2 Process-related Approaches

Research and theories focused on the creative process can be loosely divided into two approaches. The first approach is represented by levels I and II of our framework and conceptualizes the creative process and problem solving in terms of underlying cognitive processes or mechanisms. Models stemming from the first approach generally describe how things actually work (how the creative process is organized). The second approach pertains to the studies at levels III and IV of the proposed framework and focuses more on creative problem solving in the field of functional creativity. Models originating from the second approach are quite often normative or prescriptive, suggesting how thinking should be organized in order to achieve better result.

The first general approach distinguished above is strongly related to the tradition of cognitive psychology and tries to delineate the mental mechanisms that occur when a person is engaged in creative activities. Of the various cognitive models of creativity, Wallas' four-stage model (Wallas, 1926) and Finke and colleagues' Geneplore model might be the most influential (Finke, Ward, & Smith, 1992). The four stages of Wallas' (1926) model are *preparation*, *incubation*, *illumination*, and *verification*. Preparation involves a preliminary analysis of a problem, defining and setting up the problem. It involves conscious work and draws on one's education,

analytical skills, and problem-relevant knowledge. During incubation, there is usually no conscious mental work on the problem, but the mind continues to work on the problem, forming a variety of associations. The third phase is called illumination, which occurs when the promising idea breaks through to conscious awareness. Following the illumination begins a phase of conscious work called verification, which involves evaluating, refining, and developing one's idea. Wallas (1926) noted that during creative problem, solving a person could return to earlier phases in the process for another aspect of the problem.

The Genevieve model (Finke, Ward, & Smith, 1992) consists of two phases of cognitive processes: a generative phase and an exploratory phase. In the generative phase, an individual constructs different kinds of mental representations related to the problem. A variety of cognitive processes are involved in this phase, including retrieval (Perkins, 1981), associative thinking (Mednick, 1962), combination (Mobley, Doares, & Mumford, 1992), synthesis (Thompson & Klatzky, 1978), transformation (Shepard & Feng, 1972), analogical transfer (Gentner, 1989), and categorical reduction (Finke, Ward, & Smith, 1992). In the exploratory phase, an individual employs not only cognitive but also meta-cognitive processes such as evaluation to search for solutions and make practical decisions.

Another approach to the creative process and problem solving is deeply rooted in practice. It can be best exemplified by the research of the Father of Brainstorming, Advertising Executive and the Co-founder of the BBDO agency Alex F. Osborn, who published several books on creativity (Osborn, 1952). On the basis of observations of how art directors and copywriters tackled problems in his own agency, he proposed the Creative Problem Solving (CPS) model (Osborn, 1952), subsequently refined by others (Parnes (1967) and Isaksen and Treffinger (1985), see Isaksen & Treffinger, 2004 for a review). The six steps of the CPS are Objective Finding, Data Finding, Problem Finding, Idea Finding, Solution Finding and Acceptance Finding. The model is still very successful (Isaksen & Treffinger, 2004).

Much of the conceptual work and research on the creative process is focused specifically upon problem-solving and creative thinking techniques. Defined as "a plausibly effective prescription" (Smith, 1998, p. 109), the techniques have been repeatedly shown as promoting creative solutions in many settings (Scott, Leritz, & Mumford, 2004a, 2004b; Tsai, 2013) although not unequivocally (Laakso & Liikkanen, 2012). Creative thinking techniques are based on heuristics. Therefore, in opposition to algorithms, they do not guarantee a success (creative, satisfactory outcomes), but are applicable to broader classes of problems. In order to be effective, a technique must affect user's thinking. It does so through active ingredients (Smith, 1998), i.e., devices producing a desired mental shift (e.g., they employ certain strategies for habit-breaking, analysis or search for additional information, etc.).

There are numerous techniques described in the literature. Out of 170 methods reviewed, Smith (1998) considered about 70 as particularly powerful. However, according to this author, most of the techniques are in fact based on a limited range of “tricks” or “active ingredients”: strategies, tactics, and enablers. Strategies — the most numerous and significant tools are active means for generating ideas, which usually refer to specific mental operations (e.g., analytical strategy, search strategy or imagination-based strategy). Tactics work within a strategy providing stimulatory tools that support strategies (e.g., elaboration tactic that requires a problem solver to mentally enrich the problem situation). Finally, enablers are passive means of promoting idea generation (e.g., motivational enablers, anti-inhibition enablers). Rather than directly inspiring creative output, they set conditions that facilitate thinking and problem solving (i.e., working in friendly atmosphere).

Organizations and educational institutions invest substantial resources in creativity and problem-solving training. Meta-analytic studies run by Scott and colleagues (Scott *et al.*, 2004a, 2004b) provide compelling evidence that interventions aiming at problem solving and creative thinking are powerful tools for fostering creativity and innovation. More successful programs are focused on the development of cognitive skills and heuristics involved in skill application and use realistic exercises appropriate to the domain at hand.

3.3.3 Personality-related Approaches

For the past decades, numerous studies have been carried out to depict the personality traits related to creativity. Several strands of research can be identified here. First of all, these studies are focused either on the *creative personality* or on the *personality of eminent creators* (Nęcka, 2001). Research focused on creative personality represents the first level of our framework. Here, studies usually examine general population (i.e., people who have not reached the levels of recognition that characterize highly creative individuals) in order to unravel correlations between creativity and normative traits or characteristics (e.g., extraversion, neuroticisms, intelligence). Studies on personality of eminent creators are naturally focused on high-achieving individuals from various fields, i.e., they represent the second level of the framework. Finally, a separate research is devoted to characteristics of professionals (i.e., managers) for whom creativity remains an important tool for dealing with their everyday tasks. These studies can be seen as representing the third level of the proposed framework. Although very dissimilar in terms of their research aims and methodologies, all these studies seem to converge in their findings.

Several traits are identified as important attributes of creativity such as intrinsic motivation, broad interests, independence of judgement, creative self-concept, etc. (Barron, 1969; Barron & Harrington, 1981). Among the widely used Big Five

personality traits, except the somewhat consistent result of the positive correlation between openness and creativity (e.g., Feist, 1998; Karwowski & Lebuda, 2016; Werner *et al.*, 2014), the relationships between other big five personality traits and creativity are mixed (see Guastello, 2009 for a review). In most cases, any given trait is conducive or inhibitive to creativity depending on the domain-specific context. For example, successful and possibly creative managers and leaders tend to be emotionally stable (Barrick & Mount, 1991), whereas neuroticism is usually paced higher in artistic populations (Feist, 1998). Conscientiousness seems to contribute to scientific excellence but not so much to artistic performance (Feist, 1998). From the developmental psychological perspective, a 44-year longitudinal study of about 80 male graduates found tolerance and psychological mindedness resulted in a significant increase in variance that explained 20% over and above potential and intellect (Feist & Barron, 2003).

Also relatively well-researched field of creativity study is motivation. Due to its strong impact, intrinsic motivation has been identified as one major component of many creativity theories. For example, “intrinsic motivation” is one of the components of Amabile’s (1983) componential model of creativity. In the interactionist model of creative behavior proposed by Woodman and Schoenfeldt (1990), intrinsic motivation is also acknowledged as a component that is conducive to an individual’s creative accomplishment. In the interactive approach, which focuses on the development of an individual’s creativity within society, Csikszentmihalyi (1990/2008) and Gardner (1993) both included intrinsic motivation as a personal characteristic that contributes to creativity. A growing body of empirical studies about motivation and creativity came to the same conclusion that intrinsic motivation is conducive to creativity. Studies of personalities of highly creative people have described them as being totally absorbed in and devoted to their work (Barron, 1963; Mackinnon, 1962). In a set of longitudinal studies following people from elementary school through adulthood, Torrance (1981; 1987) found that people who were doing what they loved were more creative in their pursuits. A study of talented youth in math and science reported that these creative teens displayed higher levels of intrinsic motivation than their peers (Heinzen, Mills, & Cameron, 1993). Utilizing a case-study approach, Gruber (1986) also observed that highly creative people possess an intense commitment to their work, manifested as a fascination with a set of problems that sustains their work over a period of years. Research has also found that creative people are energized by challenging tasks, a sign of high intrinsic motivation (Perkins, 1988). In his well-known research, about 91 exceptional individuals of the USA, including 14 Nobel Prize winners and celebrities in various fields such as writers, artists, musicians, philosophers, physicians, chemists, biologists, economists, etc., Csikszentmihalyi (1997) described the highly creative persons as highly intrinsically motivated people who even reached a state of “flow” wherein there are heightened feelings of enjoyment and a centering of concentration, such that even the passage of time may seem to

slow. Earlier, Csikszentmihalyi (1990) argued that people involved in creative pursuits actively seek flow experiences and that creativity is more likely to result from such states.

While intrinsic motivation seems undoubtedly favorable for creativity, the opposite — extrinsic motivation undermines creativity — seems to be not always true. While some studies show that extrinsic motivators such as expected performance evaluation, competing for prizes or contracting for a reward lead to lower levels of creativity, a number of studies find the opposite: positive effects of reward on various aspects of creative performance. It was found that the benefits of reward were most apparent on the behaviors that could be easily modified using an algorithmic, or step-by-step approach (Amabile, 1996). When reward was found to enhance originality, subjects had been explicitly instructed to try to generate unusual responses. The controversial role which extrinsic motivators play in creative behavior raised Amabile's attention and has led her to a revised view of extrinsic motivation and creativity (Amabile, 1993, 1996). She differentiated two types of extrinsic motivators: synergistic extrinsic motivators, which provide information or enable the person to better complete the task and which can act in concert with intrinsic motives, and non-synergistic extrinsic motivators, which lead the person to feel controlled and are incompatible with intrinsic motives. Due to its informative nature, the synergistic extrinsic motivators can be beneficial for creativity. These conclusions can be illustrated by a study of Tokarz (1996) who showed that motives such as hubristic motivation (to enhance self-importance or self-value) facilitated young researchers performance in science (see also Koziol, 1987).

Other person-related studies on creativity focus on the relationship between creativity and individual differences, variables of cognitive nature, including intelligence, knowledge, thinking styles, etc. Due to the scope of the current chapter, we just focused on the mostly studied fields of creativity, personality and motivation, highlighting the most consistent findings.

3.3.4 Press-related Approaches

Press refers to “the relationship of human beings and their environment” (Rhodes, 1961, p. 308). These influences — either supportive or constraining in nature — do not shape the creative outcome directly, but either mediate or moderate it by affecting variables related to the creative process or person. Research on the press factors focuses on the physical and social conditions, under which creativity is likely to unfold. As tackling problems related to characteristics of a context of creativity, they are most likely to represent levels II or III of the proposed framework.

Runco and Pagnani (2011) pointed out that so far researchers identified at least six levels of socialization acting as press factors: physical surroundings, family

upbringing, schooling experiences, workplace environments, cultural traditions, and the historical milieu in which we happen to have been born. According to these authors, places, settings and environment constitute the so-called *immediate* sources of influence, while evolution, culture and Zeitgeist the *distal* forces (as exemplified by Csikszentmihalyi, 2014; Simonton, 1980).

Analyzing the literature on social influences on creativity, Ford (1996) offered a very useful term “social domains”. According to this author, four primary levels of explorations of social influences on creativity can be traced in the literature: (a) groups/subunits, (b) organizations, (c) institutional environments, and (d) markets. The four levels simultaneously influence individual creativity, interacting with each other — both across different levels (e.g., organizational resources and market opportunities) and across domains (e.g., between different groups, organizations, disciplines, and markets). A “social domain” is emerging as an interaction between an individual’s actions and the content of specific domains as mediated by the selection processes personified by members of their respective fields. Some domains are heavily based on creativity (e.g., creative industries mentioned at the beginning of this chapter) and these will facilitate people’s creative actions. In contrast, domains that do not rely on creativity will constrain an individual’s creative activity and encourage conformity.

Many factors influence individual creative contributions at the group level. Reviewing the literature on group creativity, Zhou and Luo (2012) identified three main areas of psychological studies: (1) group creativity in context; (2) group-level creative synergy, and (3) strategies for developing group creativity. According to Paulus (2000), team or group creativity can be enhanced by the use of challenging goals, structured group interactions, a certain degree of group autonomy, and supportive environments. Sometimes, however, groups fail to reveal their potential due to tendency to loaf, to evaluate ideas prematurely, to dominate a group process or to distract from main goals. These problems can be overcome by using techniques that structure group activity and interactions (see Section 3.3.2). On the basis of a study of 141 cross-functional product development teams, Sethi, Smith, and Park (2001) revealed that innovativeness is positively related to the strength of identity of the team members, encouragement to take risk, customers’ expectations, and active monitoring of the progress by senior management. A negative effect on innovativeness exerts social cohesion among team members.

The second level of social domains refers to organizations in which creativity emerges. Organizational mechanisms refer to the formal approaches and tools present within the company, which provide resources to encourage novel and creative behaviors of the members (as opposed to conformity). In their study including nearly 650 organizations (banking, telecommunications, manufacturing, media, consumer packaged goods, and healthcare), Bharadwaj and Menon (2000) have shown that in

organizations, the highest level of performance is related to the interactive presence of both individual and organizational mechanisms of creativity.

A lot of work has been done on environmental factors conducive to creativity, which pertains to the third level of social domain — institutional environments (Ford, 1996). Amabile (1988) and Amabile *et al.* (1996) have identified eight aspects of the work environment that stimulate creativity: freedom, challenging work, appropriate resources, a supportive supervisor, diverse and communicative co-workers, recognition, a sense of cooperation and an organization that supports creativity. Leader support is especially important to creativity among subordinates in the workplace. A good supervisor can inspire creativity by consulting with her works, recognizing positive performance, and showing social and emotional support. Amabile *et al.* (1996) have also pinpointed four environmental characteristics that constrain creativity at workplace: time pressure, high importance of evaluation, an emphasis on the *status quo*, and high involvement in organizational politics. The authors have also developed and validated an instrument called KEYS aimed at assessing the work environment for creativity.

Similar conclusions can be drawn from Göran Ekvall's work on the notion of "creative climate" seen as an objective attribute of an organization that pertains to conglomerate of attitudes, feelings and behaviors characterizing life in the organization (Ekvall, 1996). The author identified 10 dimensions of the climate, which can be grouped into three main areas of Resources (time for developing ideas, resource supply and emotional involvement or commitment of employees to work called challenge), Motivation (trust and openness, playfulness and humor, absence of interpersonal conflicts) and Exploration (risk-taking, debates about the issues, freedom). Ekvall developed a 50-item questionnaire named the Creative Climate Questionnaire (CCQ) which looked at these dimensions. The instrument has been validated in various organizational settings (Ekvall, 1996; Ekvall & Ryhammar, 1999).

Finally, a lot of work has been done on the school environments conducive to students' creativity. Davies *et al.* (2013) reported a systematic review of 210 educational research, policy and professional literature focusing on creative school environment published between 2005 and 2011. They found evidence to support the importance of the following factors as facilitative for creative skill development: flexibility in use of space and time resources, availability of appropriate materials, activities outside the classroom/school, use of "play" or "games" allowing learners a degree of autonomy, respect between teachers and students, peer collaboration, partnerships with outside agencies, teachers' responsiveness to students' needs, and non-prescriptive planning (see also Beghetto, 2010; Beghetto & Kaufman, 2014).

In sum, many authors recognize factors related to organizational climate or culture as fostering or impeding creativity and innovation in organizations. It should be

noted, however, that some data suggest that the role of climate as a mediator to innovative behavior may be overstated in the literature (McLean, 2005).

Finally, in terms of the fourth level of social domains — the market — the most important question concerns consumer preferences (Ford, 1996). Studies in this field are aimed at identifying qualities that are crucial for a competitive advantage of a product or service. This area of study can be exemplified by the work of Besemer (O’Quin & Besemer, 2006) and Cropley and colleagues (2010, 2011) described in Section 3.3.1.

3.3.5 Confluence Approaches

In order to apply the knowledge on the 4P’s of creativity in any practical settings, we have to understand their mutual relations first: in what way the creative product, person, process and press are related to each other. Since 1980s, more and more creativity researchers agree that multiple components must converge for creativity to occur (Amabile, 1983; Csikszentmihalyi, 1988; Gardner, 1993; Gruber, 1988; Heller, 1993; Perkins, 1981; Sternberg, 1988, 1996; Simonton, 1988; Weisberg, 1993). The common consensus is that an excessively individualistic perspective is insufficient to reveal the complex nature of creativity (Hennessey & Amabile, 2010). Creativity of a person involves an interaction of multiple factors in and outside the person and can, therefore, be optimally examined only if both the *individual* and the *environmental* variables are taken into account. This new approach, which we prefer calling the way Csikszentmihalyi (1988) called it as “systems approach”, has become the new trend in creativity study. This approach is best represented by the following models: the *Componential Theory of Creativity* (Amabile, 1983, 1996), the *Systems Theory of Creativity* (Csikszentmihalyi, 1988, 2014), the *Investment Theory of Creativity* (Sternberg & Lubart, 1991, 1999), and the *Social-Cultural Paradigm of Creativity* (Glăveanu, 2010). However, due to the scope of the current chapter, we refer the reader to the original sources.

3.4 Conclusion

A natural question that arises is how much can we gain in practice by following the implications of the studies on the creative product, person, process and press, as described above. Ma (2009) run a meta-analysis of the effect sizes of variables associated with the 4P’s of creativity. More specifically, treating creative product “as a dependent variable”, he tried to compare the relative mean effect sizes of variables associated with creative person, process and press. The analysis included over 100 studies that reported over 2,000 effects. Effect size is simply a statistical index which informs how powerful an experimental intervention or manipulation was (how

strongly it influenced the dependent variable, i.e., the creative outcome in this case). It is expressed in terms of a standardized metric. As a result, the power of experimental manipulation in a given study can be understood regardless of the particular way of measuring a dependent variable. Thus, effect sizes allow researchers to communicate the practical importance of their findings for everyday settings (Lakens, 2013).

The mean of the 2,013 effect sizes from 112 studies included into the meta-analysis was 0.73. More specifically, Ma (2009) distinguished four categories of measures of creativity: verbal creativity, non-verbal creativity, emotional creativity and problem solving. When analyzed the mean effect sizes of respective personal and environmental factors, he discovered that the biggest effect sizes were related to problem solving ($M = 0.86$) and verbal creativity ($M = 0.79$), and they were significantly larger than those related to emotional creativity and non-verbal creativity.

How can these results be interpreted? According to Cohen's (1988) conventional criteria, an effect size d below or equal to 0.2 is small, d ranging from 0.2 to 0.5 are considered medium, and those equal to 0.8 or more are considered large. If $d = 1$, the two groups' means differ by one standard deviation (SD); if $d = 0.5$, the two groups' means differ by half a SD, and so on. Altogether, it means that conducive configuration of variables associated with the creative personality or press can shift the creative performance by almost 1 SD.

To put it into a perspective, we can look at career potential of people who differ in terms of their intelligence (IQ) by 1 SD (Gottfredson, 2008). IQ is known to predict important life outcomes, including school and academic performance, income or even death to some extent. In terms of career, potential people with an average IQ are most likely to belong to one of the following professional groups: clerical workers, sales workers, skilled workers, craftsmen, and foremen. People having higher level of intelligence by 1 SD are more likely to become professionals. But those at the range of 1 SD below the mean are most likely to become unskilled workers.

In sum, it seems that although we are still far from the thorough understanding of the notion of creativity, its facets and preconditions, the results of creativity research bring not only the satisfaction that stems from the gain in knowledge but also possible pragmatic consequences. The 4P's model of creativity can be effectively used to guide researcher's attention to learn more about how to foster creativity in different settings, e.g., to improve teaching for creativity, to facilitate problem solving in any domain, to enhance economic development, and so on.

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