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Creativity or creativities: A study of domain generality and specificity

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CREATIVITY OR CREATIVITIES:

A STUDY OF DOMAIN GENERALITY AND SPECIFICITY

BY

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DEDICATION

I would like to dedicate this dissertation to my grandparents, Radojka Restovic, Mate Restovic, Vinka Ivcevic, Pjero Ivcevic, and Katy Vidovich. I remember inventing games with grandmother Radojka under the kitchen table and I remember my awe of the giant my grandfather Mate could summon from a tree. I can still smell grandmother Vinka's pasta sauce and remember reading my school essays to grandfather Pjero. Finally, I was inspired by the endless energy of my grandmother Katy. They taught me to take risks and expressed the love that makes it possible for me to take these risks.

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ABSTRACT

CREATIVITY OR CREATIVITIES:

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A series of studies investigated domain generality and specificity in creativity. Preliminary studies developed behavior report measures based on act-frequency and life-space approaches. The main studies examined two aspects of generality and specificity in creativity. A first group of studies analyzed the structure of creative behavior and the second group of studies concerned personality correlates of creativity. Dimensions of creative behavior were identified in a factor analysis of behavior reports and referred to creative life-style, arts, and intellectual achievement. Moreover, these dimensions were replicated in college students and professional adults. Groups of individuals with similar patterns of behavior were identified in a cluster analysis and described as conventional, everyday creative, artist, scholar, and renaissance people. A systems approach to personality was employed to select creativity relevant traits based on prior research and theories of creativity. Selected traits concerned global personality, emotions and motivation, cognition, social expression, and self-regulation. Creative behaviors were related to multiple areas in personality, which supported conceptions of creativity as a syndrome requiring multiple resources in the person (Amabile, 1996; Mumford & Gustafson, 1988; Sternberg & Lubart, 1995). Regression and discriminant function

analyses showed that it was possible to identify both traits general to different dimensions and patterns in creativity and traits that are specific to one dimension or pattern in creative behavior.

INTRODUCTION

Leonardo da Vinci was a creative artist, scientist, and inventor, and Stephen Hawking is "just" a creative theoretical physicist. These and numerous other examples of eminent creators show that creativity could be an attribute of behavior that transcends content domains of work and it could refer to accomplishments in a specialized area of work. To explain observed differences in creativity, researchers have asked whether creativity is general or domain specific. This research can assist theoretical formulations of the nature of creativity and it also can have implications for the study of development of creativity. Practically, a clearer picture of creativity along the continuum from generality to specificity will also inform educational programs aiming to promote or enhance creativity.

Creativity is defined as a product or behavior that is both original and appropriate (Barron, 1988; Lubart, 1994; MacKinnon, 1962). Originality allows the product to stand out and appropriateness makes it adequate in solving a problem or satisfying a need (Guilford, 1975; Torrance, 1988). Furthermore, a person's creativity can be expressed in formal domains of work, such as the arts and sciences (Amabile, 1996; Csikszentmihalyi, 1996; Sternberg, Kaufman, & Pretz, 2001), but it can also be found in everyday life (Kaufman & Baer, 2004; Richards, Kinney, Benet, & Merzel, 1988; Runco, 2004; Runco & Bahleda, 1986). This multiplicity of creative behavior makes the understanding of

generality and specificity in creativity more vital, in particular because the study of different behaviors can influence our conclusions about the psychological and social correlates of creativity. Should we study creativity as a general attribute of behavior (regardless of the behavior content), should we study it in specific domains of work (e.g., arts), areas of work within the domains (e.g., writing), or in very specific tasks (e.g., writing rhymed poems)? As many studies have employed a limited number of measures of creativity, the question of domain generality and specificity remains open (Sawyer, John-Steiner, Moran, Sternberg, Feldman, Nakamura et al., 2003).

Usually, creativity is discussed at the level of domains. If creativity is a general attribute of behavior, a person is likely to express it across multiple domains, such as when a scientist is also an artist. These individuals can be found in historically remote periods ("the renaissance person"), but are also our contemporaries. For example, Carl Sagan made significant contributions to astronomy, was a creative popularizer of science, and achieved success with his novel of fiction (Davidson, 1999). Furthermore, if creativity is a general attribute, behaviors in different domains should be described by the same psychological attributes. Openness to experience, for instance, has been theoretically and empirically defined as a general disposition for creativity (McCrae, 1987; Rogers, 1959). On the other end of the continuum, if creativity is domain specific, a person is likely to express it in one particular domain of work. Extensive educational requirements to enter some domains (for example, sciences), can make it unlikely that a person can master multiple domains and thus produces work specific to one domain. If creativity is domain specific, it should also be characterized by a set of domain specific psychological attributes. There is theoretical and empirical support for both generality

and specificity in creativity (e.g., Amabile, 1996; Baer, 1993; Plucker, 1998, 1999; Sternberg & Lubart, 1991, 1995), suggesting that the most appropriate description of creativity might be mid-way along this continuum.

The present project investigates domain generality and specificity in creativity. Domain generality would be supported by high intercorrelations among different creative behaviors and a common set of psychological descriptors for these behaviors, while domain specificity would be supported by relatively low correlations among creative behaviors, emergence of multiple dimensions of creative behavior, and a different set of psychological descriptors of these behaviors. First, a comprehensive set of scales in the domains of everyday, artistic, and intellectual creativity is developed and the structure of creative behavior examined. It is hypothesized that behaviors within broad domains constitute intercorrelated dimensions. Second, a systems model of personality (Mayer, 2001a, 2001b) is used to review and organize creativity relevant traits. Traits from all major areas of personality functioning, including global personality, emotions and motivation, cognition, social expression, and self-regulation, are used to test distinctiveness of creative behaviors.

CHAPTER I

WHAT IS CREATIVITY?

While there is consensus on a theoretical definition of creativity as the generation of original and appropriate products or behaviors, operationally it is often defined in terms of proxies for real-life creative production, such as performance on cognitive tests (e.g., listing alternate uses for a brick; McCrae, 1987) or self-reports of aesthetic preferences (e.g., preference for complex over simple geometrical figures; Eysenck, 1994). Here it is argued that the criteria for creativity should focus on the person's life. That is, criteria for creativity should refer to behaviors and groups the individual belongs to, in contrast to internal traits and abilities (Mayer, 1998; Mayer, Carlsmith, & Chabot, 1998). Criteria for creativity should also assess both activity in everyday life and in formal domains of work, such as arts and sciences.

Creativity is Observable in a Person's Life

Creativity should be observable in the products, behaviors, or solutions to life problems. This theoretical definition should be translated into assessment procedures that inquire about products generated in real-life situations. Such assessment could be achieved through self-reports of creative activity and achievement (Hocevar, 1976), and through expert judgments (Amabile, 1996; MacKinnon, 1975). Self-reports of creative activity and achievement ask about frequency of involvement in activities such as writing

poems, submitting artwork to contests, or publishing in science journals. These reports are economical, assess the generation of real-life products or behaviors, and do not have to be restricted to rare eminent creativity (Griffin & McDermott, 1998; Guastello, Bzdawka, Guastello, & Rieke, 1992; Guastello, & Shissler, 1994; Holland & Nichols, 1964; King, Walker, & Broyles, 1996; Wolfradt & Pretz, 2001).

There is still a need for new measures of behavioral creativity. Existing measures are not specific to populations of interest and are concerned primarily with rare creative behavior. For example, if a target population is college students, items such as having a patent or going public with a business venture would not offer a relevant index of creativity (Guastello et al., 1992). A more appropriate measure of creativity in a population of college students would be closer to experiences of this group and inquire about involvement in educational (e.g., making an assignment more interesting and original) and leisure activities (e.g., staying at home to work on an art project instead of going to a party).

In the last two decades, two approaches were proposed to obtain information on observable behavior relevant for a population of interest. The first approach yields act-frequency data (Buss & Craik, 1981, 1983) and the second approach yields life-space data (Brackett, 2001, 2003; Mayer, 1998; Mayer et al., 1998). In the act-frequency approach, an individual is considered to have a higher level of an attribute if he or she engages in a greater number of distinct acts characteristic of that attribute (e.g., painting, sculpting, shopping in an art store, and exhibiting artwork in public would indicate artistic creativity). Relevance of behavior for a target population is assured through the process of act nominations by a sample from the same population and subsequent

prototypicality ratings of these nominated acts. Life-space data, on the other hand, offer information both about number of different acts and frequency of these acts in a specific time period (e.g., how many times person has painted or sculpted in a previous week). Instead of lay judgments, in the life-space approach relevant behaviors are gathered through systematic sampling of domains in a person's life.

In addition to self-reports of creative activity, which assess frequency or volume of production, creativity requires originality and high quality of work. Creativity nominations, for instance, can serve as a criterion that requires both real-life behavior and offers an assessment of quality (MacKinnon, 1975). Furthermore, nominations are judgments that are socially relevant as a criterion for creativity since similar judgments are involved in decisions about awards, publications, and opportunities for presentations of products, and thus influence the inclusion of products into a domain of work (Csikszentmihalyi, 1999).

Domains and Areas of Creativity

The structure of creativity can be examined at multiple levels of behavior specificity. At the most general level, all creativity is original and appropriate, regardless of the content of behavior. Both a piece of software and a music performance can be original and appropriate or high quality and they can both be denoted as creative; at this general level, differences in the subject matter of behaviors are irrelevant. At a more specific level, it is possible to distinguish different domains of work, such as arts, sciences, and business. Domains of creativity describe broad groups of behaviors and serve as organizational units in education (e.g., Harvard Business School), culture (e.g., the arts section of the New York Times), and everyday discourse (e.g., describing a

person as a scientist). At the next level of specificity, creativity can be described in relation to areas of work. Multiple areas can be distinguished within each domain, often corresponding to academic departments within colleges (e.g., the Department of Music). Furthermore, different areas are defined by expert gatekeepers (e.g., music critics). Visual arts, writing, music, drama, and dance are commonly studied areas of artistic creativity (e.g., Barron, 1972; Jamison, 1994).

It is evident that creativity exists in all formal domains of work, like arts, sciences, and business (Csikszentmihalyi, 1996; Sternberg et al., 2001). However, creativity also exists in the domain of everyday life, outside the reach of formal education and expert judgments, such as in solutions to everyday problems and in managing interpersonal relationships. An original and appropriate product could be a painting exhibited in an art museum, but it could also be a device that helps one's disabled child with locomotion (Richards et al., 1988). This multitude of expressions presents a question of the structure of creative behavior. What dimensions of individual differences in creative behavior can be identified in the analysis of involvement in diverse activities from everyday and more formal domains? Is it possible to identify groups of people who show different degrees of generality or specificity in creative behavior? Do these dimensions differ across groups varying in age and level of achievement? These questions are central to the discussion of the structure of creativity.

Structure of Creativity

The definition of creativity along a continuum from generality to domain specificity remains elusive (e.g., Baer, 1993; Plucker, 1998; Sawyer et al., 2003; Sternberg, Grigorenko, & Singer, 2004). There are two major steps in addressing this

problem. First, creativity should be assessed in a wide variety of behaviors. This step would allow us to answer whether people who engage in one creative activity are likely to engage in other creative activities, such as whether a painter is also likely to sculpt or compose music. Another approach would explicitly investigate the assumption about different psychological descriptors for different creative behaviors.

General Creativity

The theory of generality in creativity states that creativity is an attribute of behavior in variety of settings. Therefore, we should study creative people in general, regardless of the domain in which they work. Creative people are distinguishable from non-creative, but creators in different domains have a common set of personality and work style attributes. Major theories of creativity agree on the existence of a certain number of attributes common to different creative behaviors. For example, the componential theory of creativity postulates the existence of creativity relevant skills (such as persistence; Amabile, 1996). The investment theory of creativity (Sternberg, 2000; Sternberg & Lubart, 1991, 1995) states that creativity is to a large degree a decision to take a risk with an unpopular idea and thus "defy the crowd". Empirical support for the theory of generality in creativity is offered by analyses of behavior check lists, biographical studies of eminent creators, and research on personality traits in creativity.

Pluckcer (1998, 1999) reanalyzed three data sets that used behavior check lists to assess creativity, including Holland and Nichols' (1964) study of high school seniors who were finalists in the National Merit program, Holland and Richards' (1965) study of freshmen from 24 colleges (ranging from community colleges to large state universities),

and Hocevar's (1976) study of undergraduate students in California. All studies measured creativity by multiple item scales asking participants to report on their activities and achievements (e.g., writing short stories, receiving awards for a music performance) and assessed multiple areas of expression, such as music, literature, and science. It was possible to extract three factors for the males and two factors for females in the Holland and Nichols (1964) study. Extracted factors were rather heterogeneous in content for both genders, suggesting a level of generality in creative behavior; for example, science achievement loaded on the same factor with artistic areas such as fine arts or music. Two studies yielded a single factor of creative behavior that explained 40-50% of the variance. Plucker (1999) explained the difference among the three studies in terms of dissimilarity of samples (high achieving vs. a general sample of students) and in terms of increased reliability of measurement in later studies.

Biographical studies of eminent creators offer further evidence for generality in creativity. Root-Bernstein and colleagues (Root-Bernstein, Bernstein, & Garnier, 1995; Root-Bernstein & Root-Bernstein, 2004) examined activities outside of individual's primary area of work for Nobel Prize winners in literature and chemistry, and a sample of eminent natural scientists in multiple areas of work. Each sample showed evidence of involvement in multiple domains of creativity. For example, between 31 and 35 of 98 Nobel laureates in literature were involved in at least one other artistic area (visual arts, music, drama, or dance) and 18 to 20 laureates had some involvement in science or engineering (in their education, as a temporary career, or in self-study/avocation). These numbers might have been even higher, as there was no information available on the non-writing activities of 43 individuals. Furthermore, when compared with their less eminent

peers, Nobel Prize recipients in chemistry showed significantly more involvement in arts, crafts, and writing activities. These results show that creativity can transcend areas and domains of expression and that this transcendence might even be related to greater achievement in one's primary area of work.

Support for the generality of creativity comes also from research on personality. Numerous traits and abilities have been proposed as relevant for creativity and have been shown to correlate with different creative behaviors (e.g., Barron, 1963, 1972; Domino, 1970; Eysenck, 1995; Feist, 1998, 1999; Gough, 1979; Helson, Roberts, & Agronick, 1995; MacKinnon, 1975; Sternberg & Lubart, 1995). A common conclusion from the research on creativity relevant traits is that multiple resources are needed for actualization of creativity. Traits of motivation provide the drive for creative activity (Amabile, 1996), cognitive abilities enable productivity and originality or ideas (Torrance, 1988), social nonconformity contributes to the willingness to differ from tradition (Eysenck, 1995), and traits of self-regulation enable a person to persist with an activity in the face of considerable obstacles (Csikszentmihalyi, 1996). A more detailed review of these and other attributes at the core of creativity will be given in a section on creativity and personality.

Domain Specificity in Creativity

The theory of domain specificity in creativity states that creativity is expressed in a particular domain (such as science), but does not transfer to other domains (for example, arts). In other words, the theory of domain specificity in creativity argues that there are no creative people in general, but rather, creative scientists or creative artists. Theories of creativity agree that some domain-specific attributes are necessary for

creativity. The componential theory of creativity (Amabile, 1996) includes knowledge about the domain and developed domain-specific technical skill in the group of domain-relevant skills. Similarly, knowledge is one of five person attributes in the investment theory of creativity (Sternberg & Lubart, 1991, 1995). Empirical support for the theory of domain-specificity in creativity is offered by research on performance in laboratory creativity tasks and research on the role of knowledge in creativity.

One test of domain specificity assessed performance on different kinds of tasks completed in the laboratory. Participants are asked to create a product, such as a collage, a poem, or an advertisement, and then creativity ratings on these tasks are compared. The results tend to show moderately high correlations in performance on different tasks within the same area (e.g., a series of drawings; Conti, Coon, & Amabile, 1996; Lubart & Sternberg, 1995), but only low to moderate correlations for performance on tasks in different areas and domains (e.g., story writing and problem solving; Baer, 1993; Lubart & Sternberg, 1995). Baer (1993) concluded that these findings indicate task specificity in creativity and argued that we should study creativity and develop educational programs to promote it on a task specific level.

However, several characteristics of performance-based creativity assessments suggest that this might not be the most appropriate criterion for creativity. Laboratory performance tasks require participants to produce a work in a limited amount of time (usually under one hour) and they often times designate a topic and materials to be used. These performance tests also do not offer information on whether a person will produce something creative outside of the laboratory and thus are more appropriately defined as measures of creative potential, rather than real-life creative behavior. Finally, these

measures are essentially single-item tests and as such can be unreliable. Indeed, when similar assessments are made with multiple-item tests for each task (e.g., writing equations, completing line drawings), correlations among tasks are substantially higher (Bachelor, 1986, 1989). In a reanalysis of the Hoepfner and Guilford (1965) Aptitude Research Project data, Bachelor (1986, 1989) found no support for the model of task specificity, but rather found evidence for highly correlated content factors of figural, semantic, and symbolic creative ability.

In a different line of research, Hayes (1989) analyzed the amount of time until a creator made a significant contribution to the domain. Eminent creators in music composition, painting, and poetry were selected from biographical dictionaries. Criteria for significant creative contributions were the number of available recordings of music compositions, reproductions in standard histories of painting, and inclusions in major anthologies of poetry. All groups of creators needed at least five and up to ten years from the time they entered an area of work to make the first significant contribution. Similarly, Gardner (1993) concluded from his case studies of individuals exemplifying creativity in physical science, social/clinical science, politics, visual arts, music, dance, and writing that approximately ten years of work are necessary for the first significant contribution, and also that this 10-year rule defines periods between significant contributions by the same individual. Weisberg (1999) even argued for the central role of domain knowledge and skill in creativity. Knowledge or skill is essential so that an individual becomes aware of what has been done, can build on it, and finally go beyond what is known. This skill is acquired by immersion in one's domain and hard work of deliberate practice and long working hours (Csikszentmihalyi, 1996; Gardner, 1993;

Weisberg, 1999). This immersion in a domain leads to automatization of skills that can aid consideration of novel ideas or development of heuristics (Weisberg, 1999). Collectively, there is strong empirical evidence supporting the importance of domain knowledge in creativity. However, these findings do not preclude that at least some individuals will get immersed into multiple domains and achieve creativity in multiple domains.

Have we Been Asking a Wrong Question?

This short review showed that there is support for both domain generality and specificity in creativity, suggesting that the best answer to the question of whether creativity is domain general or specific is that it is both. Indeed, the history of psychology is replete with either-or questions (e.g., nature or nurture in development, personality vs. situation) and equally replete with conclusions of these debates that integrate apparent opposites. Creativity research asked one more such either-or question in examining the nature of creativity and is approaching a point of maturity concluding that creativity should be conceptualized as including elements that are general across different areas and domains and domain-specific elements (Amabile, 1996; Lubart & Guignard, 2004). For example, the componential theory of creativity explicitly defines creativity-relevant skills (general across domains) and domain relevant skills (specific to a domain) and presents empirical support for their role in creativity (Amabile, 1996; Ruscio, Whitney, & Amabile, 1998). Examining evidence for both generality and specificity in creativity, Plucker and Beghetto (2004) concluded that the highest level of creativity emerges at a position between generality and specificity; too much generality can lead to superficiality and too much specificity can lead to functional fixedness.

In addition to defining generality and specificity in creativity in terms of domain-general and specific variables influencing behavior, it is also possible to examine generality and specificity for different groups of individuals. It is plausible that in some people, creativity might generalize across domains, while for others it is domain specific. Person-centered analyses are needed to address this hypothesis. One theoretical explanation for whether a person will demonstrate generality or specificity in behavior is offered by Gardner (1993; Connell, Sheridan, & Gardner, 2003). He argued for describing individuals in terms of multiple abilities that define a potential space for achievement. For example, a person high on mathematical, interpersonal, and verbal abilities can make creative contributions in several areas across domains, such as natural and social sciences, clinical work, and writing. A person high on verbal ability, but low on other abilities, can make creative contributions in the area of writing, but not in other areas.

Creativity and Personality

In addition to identifying the structure of creative behavior, the question of domain generality and specificity in creativity requires answering whether there is a set of psychological variables that is common across domains and a set that can distinguish among domains. Personality offers a framework for such analysis.

Since creativity is defined as requiring multiple resources within a person (Sternberg & Lubart, 1991, 1995; Mumford & Gustafson, 1988), it might be best understood by studying multiple relatively independent attributes (Cohen & Cohen, 1983). A beneficial line of research will examine predictors of creativity from all major areas of personality functioning (Mayer, 2001a, 2001b). Existing models of creativity

discuss several personality attributes as resources (e.g., Amabile, 1996; Sternberg & Lubart, 1995). These models, however, emphasize one attribute or resource over others. For example, Sternberg and Lubart's (1991, 1992, 1995) investment theory of creativity originates in the cognitive approach and as such defines several important resources that describe cognitive functions, including intellectual abilities, knowledge, and intellectual styles. Other functions are combined together into a single resource, such as personality, which combines social expression (e.g., individuality) and self-regulation (e.g., persistence).

The systems approach to personality offers a framework to organize creativity-relevant traits according to their function (Mayer, 2001a, 2001b). The systems framework defines personality as a system of interrelated parts that are organized around four major functions of personality that collectively influence behavior. These major areas of functioning include emotions and motivation, cognition, social expression, and self-regulation, and represent a relatively comprehensive and distinct categories in the description of personality. As such, the systems framework enables the translation of theoretical conceptions of creativity as a whole person syndrome into empirical formulations.

Creativity is related to global personality traits as well as attributes in specific areas of personality functioning (see Table 1). Exhaustive reviews of correlates of creativity can be found elsewhere and will not be repeated here (e.g., Amabile, 1996; Feist, 1998, 1999; Smith, Ward, & Finke, 1995; Shaw & Runco, 1994). Rather, the Big Five model of global personality traits will be reviewed in relation to creativity, and then

four areas of personality functions will be introduced, and used to organize and summarize findings from those reviews.

Global Personality Traits

Global personality traits are broad dimensions of personality that bring together a great number of smaller traits and blend multiple functions in personality. In recent decades, the Big Five has become a dominant model for describing global personality traits (Digman, 1990; Goldberg, 1992; John & Srivastava, 1999). These global dimensions include: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Extraversion concerns traits of emotionality such as positive affect, traits of social expression like gregariousness and dominance, and traits of self-regulation such as impulsivity (Costa & McCrae, 1992). Agreeableness is described by caring and warm emotional disposition and cooperative and friendly social relationships; conscientiousness includes high level of achievement motivation, intellectual efficiency, and disciplined self-regulation; and neuroticism concerns negative emotionality, irrational thinking, and difficulty in self-regulation. Finally, openness to experience refers to emotional and motivational traits such as seeking new experiences and feeling a wide range of emotions, cognitive traits of intellectuality and imaginative thinking, social expression in nonconformity and liberalism, and self-regulation traits of absorption and tolerance of ambiguity (McCrae, 1994, 1996).

Openness to experience is the global personality trait most closely related to creativity (Feist, 1998, 1999; King et al., 1996; McCrae, 1987, 1996). Other research suggests that openness to experience might be necessary, but not sufficient for creativity. Rather, creativity is best predicted by a pattern of traits. For example, the prediction of

creativity is improved when divergent thinking test scores are employed in addition to openness to experience (King et al., 1996). Furthermore, while openness to experience might be the common global trait related to creativity (Feist, 1998; McCrae, 1987), narrower traits that describe specific areas of personality functioning are also associated with creativity (e.g., persistence is a self-regulation trait related to creativity; Feist, 1998). Such findings suggest that the global trait approach to creativity might be insufficient and should be complemented by a study of functional areas of personality.

Emotion and Motivation

Emotions and motivation direct behavior into activities that offer opportunities for creation, and may additionally serve as a source of creative ideas (Amabile, 1996). Intrinsic motivation and positive or hypomanic mood are most commonly associated with creativity. Intrinsic motivation stimulates involvement in creative activity and positive emotions can broaden awareness, enabling fresh perception necessary for problem redefinition and originality (Lubart & Getz, 1997).

People who are intrinsically motivated engage in an activity because of pleasure in creating or enjoyment in an opportunity for self-expression, while extrinsically motivated people engage in an activity because of its promised rewards (Amabile, 1996). Intrinsic motivation predicts extent of involvement in creative activity as well as rated creativity of products. For example, trait intrinsic motivation predicted current involvement in creative writing, hours of work per week doing art, number of artworks produced, and instructor ratings of student commitment to art and potential as artist (Amabile, Hill, Hennessey, & Tighe, 1994). Further support for the role of intrinsic motivation in creativity comes from biographical studies of eminent creators in multiple

domains who identified enjoyment in work as a major motivator for sustained activity (Csikszentmihalyi, 1996).

Positive or hypomanic moods increase awareness and enhance breadth and flexibility of thinking. People put in a positive mood produce more original word associations (Isen, Johnson, Mertz, & Robinson, 1985), they are more successful in solving moderately difficult items on the Remote Associates Test (Estrada, Young, & Isen, 1994; Isen, Daubman, & Nowicki, 1987), and they include a higher number of items in individual categories on a sorting task (Isen, Niedenthal, & Cantor, 1992; Kahn, & Isen, 1993), than people put in negative or neutral mood states. These attributes of positive moods are central to some theories of creativity (e.g., Eysenck, 1995) and are proposed as an explanation for the relationship between mood disorders and creativity (Andreasen & Powers, 1975; Jamison, 1990; Richards, 1990). Empirical research showed that hypomania, characterized by breadth and fluency of thinking and high energy level, is correlated with both measures of creativity potential (i.e., divergent thinking, and self-perceived creativity) and observable behavior (i.e., involvement in creative activities; Eckblad & Chapman, 1986; Schuldberg, 1990, 1999).

Cognition

Although necessary, emotions and motivation are not sufficient for creativity. Cognitive abilities enable generation of creative ideas and thus actualization of the drive for creative work. Most centrally, divergent thinking abilities are directly involved in production of ideas, whereas evaluation abilities contribute to appropriateness of a generated product.

Divergent thinking abilities are defined as a "broad search for logical alternatives" that results in the production of multiple ideas to an open-ended problem (Guilford, 1975; p. 40). Divergent thinkers are able to generate a large number of responses that satisfy a certain criterion (fluency) and produce responses that depart from the ordinary and obvious (originality). Divergent thinking ability is related to real-life creative behavior in both concurrent and longitudinal studies. In concurrent validity studies divergent thinking predicts creativity ratings by knowledgeable others and self-reports of creative activity (e.g., number of artworks produced; Guastello, 1992; Guilford & Hoepfner, 1971; King et al., 1996). In longitudinal studies, divergent thinking in elementary or middle school predicts creative achievement and career aspirations even 22 years later (Torrance, 1972, 1981, 1988).

Evaluation abilities enable one to assess "correctness, suitability, adequacy, desirability of alternative responses" (Meeker, 1980; p. v). Evaluation takes place throughout the process of creation. First, it is involved in the process of choosing and defining problems. Research on problem construction and problem solving shows that creativity is facilitated by evaluation and redefinition of the initial problem formulation so that it is made more personally meaningful (Reiter-Palmon, Mumford, & Threlfall, 1998). Also, evaluation is necessary during idea generation. Only divergent thinking test responses that are both original and appropriate are significantly correlated with teachers' creativity ratings of children (Harrington, Block, & Block, 1983). Finally, evaluation abilities are important after the product has been generated and has to be assessed for quality. For example, the ability to adequately judge the originality of ideas significantly correlated with their originality (Chand & Runco, 1992; Runco & Smith, 1992). The

importance of evaluation ability in creativity is also illustrated by research on thinking processes in schizophrenic patients, accomplished artists, and 'normal' controls (Merten & Fischer, 1999). While both schizophrenic patients and artists produce unusual responses on a word-association task, creative artists give appropriate responses (i.e., non-bizarre answers) and are able to evaluate the uncommonness of their associations.

Social Expression

Self-identification with a social role directs behavior (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) and in turn is reinforced or redefined by the enacted behavior (Eccles & Barber, 2001). Identification with certain roles, such as being an artist, poet, or unconventional person, may facilitate creativity. Working from a social role that encourages nonconformity and divergence from popular opinion, a person allows him or herself to accept and express original ideas.

Enactment of certain social roles (e.g., the role of artist) has often been equated with creativity. For example, on the Occupational Creativity Scales (Helson et al., 1995) individuals in investigative and artistic occupations (e.g., professors and writers) are rated the highest on creativity and are then further differentiated depending on the level of public recognition in their professions. Similarly, self-identifications with artistic and investigative roles (e.g., roles of artist, psychologist, and reporter) are related to faculty ratings of creativity in samples of graduate students in psychology (Gough, 1992).

Social roles related to creativity are usually described as unconventional, non-conforming, individualistic, and even aloof (Barron, 1963; Domino, 1970; Helson, 1996). Unconventionality and nonconformity have been related to creativity in research employing Asch's experimental procedure (Barron, 1963; Crutchfield, 1962; Helson,

1967), self-descriptions through photography (Dollinger, Robinson, & Ross, 1999), and self-reported ratings on personality inventories (Domino, 1970; Helson & Srivastava, 2002; Rawlings, Twomey, Burns, & Morris, 1998; Schuldberg, 2000). In relation to behavioral creativity, the Q-sort descriptions "tends to be rebellious and non-conforming" and "judges in unconventional ways" made by psychologists who reviewed questionnaire measures of women at ages 21 and 43 predict their occupational creativity at age 52 (Helson et al., 1995). Similarly, successful artists and scientists score high on psychoticism, a trait dimension described by adjective markers such as nonconforming and uninhibited (Götz & Götz, 1979; Rushton, 1990).

Self-Regulation

The function of self-regulation is to oversee and balance the process of creation and sustain conscious effort in the creative activity. Process that will result in a creative idea or product has to reach a balance between originality and likelihood for social acceptance of ideas, and it has to be relatively resistant to obstacles.

One mechanism of self-regulation employed by creators is their willingness to take risks (Sternberg & Lubart, 1991, 1995). For example, artists have to make a series of decisions about topics, materials, and styles in their work. At each point of decision an individual can opt for a familiar route that is popular in the domain or has previously led to success and is thus a more commonplace and a low-risk alternative. Otherwise, an individual can choose a more unconventional route that can lead to great originality and success, but can also likely result in failure. While taking a risk will not guarantee creativity, avoiding risk will not offer an opportunity for originality that is necessary for creativity. The greatest success can be achieved at moderate levels of risk that offer an

opportunity to depart from what is common, but that will also balance the likelihood for success of an idea or product. Risk-taking is related to higher originality in tests of creative ability (Friedman & Foerster, 2001; Glover, 1977; Glover & Sautter, 1977). Supporting the importance of risk-taking in real-life creativity, Lubart and Sternberg (1995) found that willingness to take risks in making decisions was related to involvement and enjoyment in drawing and writing, creativity ratings in a laboratory drawing task, and unconventionality in writing.

While creativity entails risk-taking and exploring ideas, it also requires discipline, hard work, and persistence on the path to materialize ideas or generate products. While persistence is not significantly related to creative performance on short laboratory tasks (Lubart & Sternberg, 1995), it predicts real life creativity that requires long periods of sustained activity, often times in face of substantial obstacles and even open opposition. Wilson (1990) studied poets through interviews, observations, and psychological tests and found that they persisted in writing even in times of prolonged economic deprivation and long periods without critical acceptance for their work. In the same way, women who were described by a Q-sort item "do not give up under conditions of adversity" at ages 21 and 43 had higher occupational creativity at age 52 (Helson et al., 1995).

Introduction to Present Studies

The present studies investigate two aspects of domains generality and specificity in creativity. The first goal is to develop a large set of measures describing areas of everyday, artistic, and intellectual creativity and to examine the structure of creative behavior. The second goal is to review the literature on creativity-relevant traits in the major areas of personality functioning, including global personality traits, emotions and motivation, cognition, social expression, and self-regulation, and employ these traits to test: (1) whether creativity requires the collective action of multiple resources within the person, and (2) whether there is a set of traits general to different types of creativity. Preliminary studies include the development of measures for everyday and artistic creativity and their validation. Then, the main studies revise these measures and relate them to traits from major areas of personality functioning.

The aim of Studies 1 through 5 is to improve upon existing criteria for everyday and artistic creativity. Creativity measures based on two major types of behavior-report data are developed. First, act-frequency scales are developed for everyday and artistic creativity. These scales offer an index of behavior characteristic of everyday and artistic creativity according to lay judgments of these attributes. Also, life-space scales are developed. Life-space items are generated according to a model of college students' interactions with their surroundings that are relevant for creativity (adapted from Brackett, 2003), and content areas within domains of everyday, artistic, and intellectual creativity are identified through factor analysis.

Studies 6 and 7 test generality and specificity in creativity analyzing the structure

of creative behavior. Study 6 is a large scale survey study of college students. First, it revises and extends the life-space measure so to include intellectual creativity. Then, the structure of creative behavior is examined using two approaches: (1) a variable-centered approach identifies major dimensions of individual differences, and (2) a person-centered approach identifies groups of individuals with similar patterns of creative behavior. Study 7 tests whether the structure of creative behavior in college students adequately describes it for creative professional adults. Again, the structure of creative behavior is analyzed employing both a variable-centered and a person-centered approach.

Studies 8 and 9 examine generality and specificity in creativity in relation to traits of global personality, emotions and motivation, cognition, social expression, and self-regulation. These traits are selected based on prior research on resources for creativity (e.g., Smith et al., 1992; King et al., 1996; Shaw & Runco, 1994). Relations of personality and creativity are explored in two ways: (1) a variable-centered approach aims to predict each dimension of creative behavior from a set of personality traits, and (2) a person-centered approach examines profiles of traits in relation to patterns of creative behavior. Study 8 employs a sample of college students and Study 9 replicates and extends this research by employing a sample of professional adults. In this study, criteria for creativity combine quantity of involvement in creative activities and quality of behavior assessed by peer nominations of creativity.

CHAPTER II

PRELIMINARY STUDIES

STUDY 1

ACT NOMINATIONS

According to the act-frequency approach (Buss & Craik, 1981, 1983), if a person is described as artistically creative, this individual will engage in a greater number of artistically creative acts than someone who is not artistically creative. The act-frequency approach is unique in its item-gathering procedure. Instead of having items generated by a scale developer, act-frequency items are generated by a group of lay people. Since lay people make person judgments in everyday life, they should be able to identify acts according to which these judgments are made. As the first step in developing act-frequency scales, act nominations for everyday and artistic creativity were solicited from undergraduate students in psychology.

Methods

Participants

Students in two introductory-level courses in personality psychology completed act nominations for everyday and artistic creativity as a part of an in-class activity (N = 117; 24 males and 93 females).

Procedure

Participants received a sheet with the following instructions:

> We would like to find out what behaviors would be good signs of artistic creativity. Think of the three most artistically creative people you know. With these individuals in mind, write down five acts or behaviors they have performed that reflect their artistic creativity. That is, what exactly did this person do that made you consider him or her as an artistically creative individual? Please do not list adjectives such as that he/she is original or imaginative, but give concrete behaviors.

In order to reduce the number of non-acts, participants were given examples of the required level of specificity (suggested by Amelang, Herboth, & Oefner, 1991):

> To illustrate this, we would like to give you an example taken from the study of the personality trait of aloofness. Not specific enough: He/she is often distant and not approachable. Good answer: He/she hid in the bedroom when the others came over to visit. Now, list the creative behaviors (i.e., what they do, how they act) of the three most artistically creative people you know.

Five lines were provided for act nominations. The instruction was then repeated replacing "artistic creativity" with "everyday creativity or a creative life style".

Results

Act nominations were reviewed by an advanced graduate student in personality psychology and a senior undergraduate research assistant. The list was reduced by eliminating trait adjectives (e.g., flexible) and repeated acts. Answers stated as general tendencies were restated to indicate a single observable behavior. For example, a statement "Writes poetry" was reformulated into "Wrote a poem". As suggested by Buss and Craik (1981), 100 acts of artistic and 100 acts of everyday creativity were retained.

STUDY 2

PROTOTYPICALITY RATINGS

While there is a potentially infinite number of acts related to everyday and artistic creativity, some acts will be more indicative of these attributes than others. It is possible that some nominated acts might be idiosyncratic or only marginally related to everyday and artistic creativity and thus not equally good candidates for a criterion scale. The purpose of prototypicality ratings of nominated acts was to determine which items are better examples of everyday and artistic creativity.

Methods

Participants

Participants were students in introductory psychology courses, none of whom participated in act nominations. Following the suggestions by Buss and Craik (1981), 35 subjects (17 male and 18 female) rated the artistic creativity acts and 36 subjects (20 female and 16 male) rated everyday creativity acts. Each participant rated only one set of creativity acts (either 100 artistic or 100 everyday creativity acts) to ensure that there would be no carry over effects from one rating to another.

Procedure

Each participant received instructions suggested by Rosch and Mervis (1975) and used by Buss and Craik (1981):

> Close your eyes and imagine a true red. Now imagine an orangish red. Although you might still name the orange-red with the term *red*, it is not as good example (as clear case of what *red* refers to) as the true red. In short, some reds are redder than others. On the following pages, you will find a list of behaviors describing [artistic/everyday creativity]. Please rate how typical or representative each act is for describing [artistic/everyday creativity].
>
> Participants rated the acts on a scale from 1 (very atypical) to 5 (very typical).

Results

Reliability of the Prototypicality Ratings

Reliabilities for prototypicality ratings of everyday creativity were uniformly high ($\alpha = .93$), while those for artistic creativity were moderately high ($\alpha = .69$). Examination of item-total correlations for artistic creativity acts revealed that ratings by 7 judges negatively correlated with the total (*r*s between -.07 to -.42). The reliability of ratings in this small group of raters was moderate $\alpha = .61$, suggesting that these judges might have an alternative, but consistent criterion for judging act prototypicality. The examination of ratings by these judges showed that they used more stringent criteria than other judges. For example, they gave lower ratings to acts describing artistry in everyday life (e.g., making murals of photos and redecorating old furniture) and they gave higher ratings to acts indicating relatively rare creative achievement (e.g., publishing a collection of poetry and winning a prize in a photography contest). These 7 judges agreed with the other judges in their ratings of acts referring to generation of artistic products (e.g., writing a poem and playing music in public), as well as acts that concern everyday creativity (e.g., creating personalized stationary and making a baby quilt). These findings suggest that people have different criteria for judging artistic creativity. It seems plausible that personal involvement in the arts can help a person to develop expert criteria for judging artistic creativity (Amabile, 1996). However, personal data about the judges were not available to test this hypothesis in the present study.

The goal of this study was to develop act-frequency scales that use lay person judgments to assess prototypicality of behaviors. Therefore, the ratings of 7 raters with different criteria for judging artistic creativity were excluded from analysis. The

reliability of prototypicality ratings for artistic creativity acts in the remaining group of 28 judges was $\alpha = .86$. The correlation between ratings by these 28 judges and the whole group of 35 judges was $r = .81, p < .001$.

High and Low Prototypicality Acts of Artistic and Everyday Creativity

Tables 2 and 3 list the 8 most and least prototypical acts of everyday and artistic creativity. Scales of 25 high and 25 low-prototypicality acts were created for each domain. Highly prototypical acts created reliable scales for both everyday and artistic creativity, $\alpha = .68$ and .74, respectively. Scales of low prototypical acts had much lower reliabilities ($\alpha = .41$ for everyday creativity and $\alpha = .53$ for artistic creativity), reflecting the diversity of acts judged to be on the periphery of large domains of creativity.

Content analysis of everyday and artistic creativity acts showed both similarities and differences between the two domains. Most acts were identified as typical of only one domain. If similar acts were nominated for both everyday and artistic creativity, they were usually judged as highly prototypical of one and not prototypical of the other domain. For example, playing a music instrument was rated typical of artistic creativity, while a similar act was rated as not typical of everyday creativity. Typical everyday creativity acts concerned originality in everyday settings that does not require substantial investment and commitment to an area of work and included humor (e.g., coming up with a funny nickname for someone) and self-expression (e.g., inventing recipes). On the other hand, typical artistic acts pertained to producing works of art, commitment, and achievement in arts (e.g., playing music in public).

Most acts rated as not typical of artistic creativity were highly similar to typical everyday creativity acts (e.g., taking pictures), while most acts not typical of everyday

creativity were likely to describe highly specific behaviors of individuals involved in the process of act nominations (e.g., converting a garage into a stained glass workshop). A small number of typical artistic and everyday creative acts had similar content. These acts concerned giving out self-made objects (e.g., making a birthday gift for someone) and decorating the living environment (e.g., painting one's room). It is conceivable that a birthday gift can be a work of art (and thus typical of artistic creativity), but it can also be a photo collage from the spring-break trip (and therefore, more closely descriptive of everyday creativity). In order to evaluate the similarity of these acts, more information would be needed about the nature of the products. Finally, some acts performed by creative individuals are not typical of either type of creativity and concern social nonconformity (e.g., refusing to compromise in a discussion).

Endorsement of Everyday and Artistic Creativity Acts

To test whether there was a difference between numbers of participants reporting performing high and low prototypicality acts of everyday and artistic creativity, a one-way ANOVA was performed. Since prototypical everyday creativity does not require developed skill or commitment to an area of work, it was expected to be endorsed more frequently than prototypical artistic creativity. The difference in endorsement of four groups of acts (i.e., high and low prototypicality acts of everyday and artistic creativity) was statistically significant, $F(3, 94) = 36.73, p < .001$. The Tukey HSD test showed that the endorsement for prototypical everyday creativity acts ($M = 61.2$) was higher than endorsement of other groups of acts (prototypical artistic acts $M = 15.7$, low prototypicality artistic acts, $M = 20.8$, and low prototypicality everyday acts, $M = 5.3$). Also, low prototypicality artistic creativity acts were endorsed significantly more than

low-prototypicality everyday creativity acts. High endorsement of prototypical everyday creativity acts suggested that act endorsement can complement prototypicality ratings in differentiating everyday and artistic creativity acts. While everyday creativity acts are part of people's common experience, artistic creativity acts are rare.

STUDY 3

GATHERING LIFE-SPACE ITEMS

The purpose of Study 3 was to gather life-space items on everyday and artistic creativity. Life-space is conceptualized as a comprehensive description of the person's interactions with his or her environment (Brackett, 2003; Mayer, 1998; Mayer et al., 1998). In general, life-space data ask for reports about observable behavior and are systematically gathered according to a theoretical model defining major domains and content areas in the life-space. In this study, the life-space questionnaire was based on a model of content areas in the interactive domain that are relevant for everyday and artistic creativity. This domain describes interactions of the individual with other people (e.g., surprising a friend with a gift or a gesture), as well as interactions with settings or situations (e.g., visiting an art museum), and objects or materials (e.g., painting a piece of furniture). Content areas within the interactive domain relevant for creativity in college students included: self-presentation, everyday activities and relations, culture and media consumption, arts and crafts, and work and education activities.

Methods

Participants

Two samples were employed in the study. The first sample comprised students in personality psychology ($N = 47$, 10 males and 37 females) who received course credit for their participation. The second sample was a focus group of 6 advanced undergraduate research assistants (1 male and 5 females).

Procedure

Several methods for gathering items for the life-space questionnaire of everyday and artistic creativity were employed, including open-ended questionnaires, focus group discussions, scholarly and popular literature on creativity. First, open-ended questionnaires were administered to college students (Sample 1). The survey inquired about areas within the interactive life-space. For example, to gain items for the area of interactions with others, participants were asked about something original they did when they wanted to surprise a friend or a significant other.

Second, items were gathered through a focus group discussion (Sample 2). Participants in a focus group were told the purpose of the discussion, were presented a figure with target life-space areas, and were asked to think of college students' activities in these areas that pertain to everyday and artistic creativity. Finally, existing check-lists of creative activities (e.g., Guastello, 1991; Holland & Nichols, 1964), literature on leisure activities (e.g., Tinsley & Eldredge, 1995), and web sites devoted to arts and crafts were reviewed.

Results

Participants generated activities of everyday creativity describing self-presentation (e.g., designing one's own clothes), investment in interpersonal relationships (e.g., compiling a mixed tape or CD for a friend or significant other), and culture and media consumption (e.g., attending recitals of poetry readings). Also, they generated artistic creativity activities in visual arts, writing, music, and performing arts. These behaviors concerned both frequency of artistic activity (e.g., number of times in the previous year a person has painted or sculpted) and about artistic achievement (e.g., exhibiting artwork in public).

This item-gathering process showed that it was possible to develop a set of items specifically addressing everyday creativity and substantially expand on the existing measures of artistic creativity. For example, while the life-space questionnaire includes 26 items describing involvement in crafts, other similar scales either did not assess this area of creative activity (e.g., Holland & Nichols, 1964), or included fewer items, such as 3 items on the Artistic and Scientific Activities Survey (Guastello, 1991) and 19 items on the Creative Behavior Inventory (Hocevar, 1979).

Different procedures for obtaining creativity relevant behaviors yielding 174 items. The questionnaire was organized in groups of thematically related activities. For example, in the area of culture and media consumption, items were presented in groups labeled 'cultural activities', 'movies', 'television', 'music', 'games' and 'reading/news'. See Table 4 for the list of areas and groups of items within these areas in the life-space questionnaire.

STUDY 4

DOMAINS AND AREAS OF CREATIVITY

The purpose of Study 4 was to test whether it is possible to empirically distinguish behavior in domains of everyday and artistic creativity and whether it is possible to distinguish areas within these broad domains. Many creativity scholars have argued for the existence of everyday creativity (Maslow, 1971; Richards et al., 1988; Ripple, 1989; Runco, 2004). However, it is not clear whether everyday creativity is a discrete content domain or it is best described as involvement in leisure time behaviors and products that are a part of formal domains of creativity (e.g., leisure time painting or photography), but that are not socially recognized. Indeed, concepts similar to everyday creativity in previous research have defined it in such a way (Richards et al., 1988; Torrance, 1988). I hypothesize that it is possible to define everyday creativity through behaviors that are distinct from artistic creativity and include originality in daily activities and interactions. Study 4 will empirically test this hypothesis in an analysis of behaviors reported on a life-space questionnaire.

Methods

Participants

Participants were 122 students in personality psychology (26 males and 96 females) who participated in a lab component of the course. All subjects received course credit for their participation.

Measures

Life-space creativity questionnaire. A total of 174 items was included in the questionnaire and organized in groups of thematically related activities. For example, in the area of arts, items were presented in groups asking about visual arts, crafts, music, theatre, and writing. The number of response options varied depending upon the item content. Some items employed a dichotomous response format (e.g., whether a participant designed a personal web site), some could be answered informatively on a 3-point scale (e.g., 0, 1, 2 or more art classes outside the university), and others were best answered on a 5-point scale (e.g., times a person has expressed emotions through art in the previous month, ranging from 0 to 4 or more). The decision about response format for different questions was based on item content and judged frequency of behaviors.

Procedure

The life-space questionnaire was distributed to students as a part of the larger packet of measures on personality and behavior. All questionnaires were administered in group settings.

Results

The life-space items were factor analyzed using principal component extraction with oblique rotation. The number of extracted factors was determined on the basis of a joint scree plot and meaningfulness criteria. Factor-based scales were created using pattern matrix coefficients. An item was included on a scale if its factor loading was above $\pm$.35. Items with loadings on multiple factors were included on the factor with the higher loading. Raw data were transformed into *z*-scores and then averaged to create factor based scales.

The first goal was to test whether it was possible to empirically distinguish between everyday and artistic creativity. All life-space variables were entered in one principal components analysis. Using the above described criteria, two factors were retained and interpreted as Artistic Creativity and Everyday Creativity (see Table 5 for an overview). The highest loading items on the Everyday Creativity factor referred to originality in self-expression (e.g., making scrapbooks of memories for a friend or significant other, collecting quotes or poetry in journal, making bulletin boards), and the highest loading items on the Artistic Creativity factor referred to involvement in visual arts, music, and active cultural life (e.g., painting, composing music, visiting art web site). In order to identify areas within everyday and artistic creativity, items that loaded on each factor were entered in a separate principal components analysis. It was hypothesized that it would be possible to empirically distinguish music, visual arts, theatre, and writing areas for artistic creativity and self-expressive and interpersonal creativity for everyday creativity. Table 6 presents an overview of identified areas of everyday and artistic creativity.

Two factors were extracted from the 36 items of Everyday Creativity and labeled Interpersonal Creativity and Self-Expressive Creativity. Interpersonal Creativity described involvement and originality in interpersonal relationships (e.g., making a card for someone, putting together a scrapbook of memories for a friend); and Self-Expressive Creativity referred to self-reflection and originality in self-presentation (e.g., writing personal journal, collecting quotes and poetry).

Four factors were extracted from 49 items of Artistic Creativity. The factors were labeled Emotionally Expressive Art, Committed Artistic Creativity, Music, and Artistic

Sensibility. Extracted factors differentiated generation of artistic products from interest in the arts. Factor labeled Emotionally Expressive Art describes creative activity in writing and concern for personal growth (e.g., writing poetry and short stories, working on improving a skill); Committed Artistic Creativity concerned achievement and ambition in arts (e.g., taking art lessons outside of university, exhibiting art in public); and Music referred to music creation and performance (e.g., writing songs and lyrics, playing and singing in a band). The fourth factor, Artistic Sensibility, described interest in art that does not necessarily include actual production of new artworks (e.g., visiting art museums, having conversations about art).

STUDY 5

CONVERGENT AND DISCRIMINANT VALIDITY OF EVERYDAY AND ARTISTIC CREATIVITY

The purpose of Study 5 was to examine the convergent and discriminant validity of everyday and artistic creativity by comparing behavior reports on different measures of creativity and by relating different behaviors to global personality traits. Validation is particularly necessary with respect to everyday creativity. Although arguments for the existence and importance of everyday creativity have been made by creativity scholars (Maslow, 1971; Richards et al., 1988; Runco, 2004), there have been virtually no attempts to measure it empirically and establish its validity.

Behavior describing everyday and artistic creativity will be measured employing act-frequency and life-space data. Convergent validity would be supported by significant

correlations between different measures of the same behavior domains, such as act-frequency and life-space measures of everyday creativity. Furthermore, different creative behaviors would show convergent validity by significant correlations with openness to experience, which is a personality trait dimension proposed as a general disposition towards creativity (McCrae, 1987, 1996). On the other hand, discriminant validity would be supported by greater within-domain than between-domain correlations. Also, everyday and artistic creativity should show somewhat different patterns of correlations with personality traits; in particular, content analysis of behavior and lay theories of creativity suggest that extraversion is related to everyday, but not artistic creativity (Runco & Bahleda, 1986).

Methods

Participants

Three samples were employed in this study. First, undergraduate students in personality psychology ($N = 122$; 26 males and 96 females) completed measures of everyday and artistic creativity and Big Five personality traits. Subjects received course credit for their participation. Participants in the other two samples gave informant-reports on personality traits of students who provided self-reports. The second sample included $N = 87$ parents, and the third sample consisted of $N = 78$ friends of students in the self-report sample.

Measures

Personality trait measures

NEO PI-R (Costa & McCrae, 1992). Self-reported Big Five personality traits were assessed with the 240-item NEO-PI-R. This inventory provides scores for five

global personality traits: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to experience, and 30 facet scores (6 facets for each global trait). Participants rated themselves on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree).

Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). Informant reports of Big Five personality traits were assessed with the 44-item BFI. The instructions were adapted to ask for reports on the personality of the respondent's child or friend. Participants indicated their judgments on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). Scores for five global personality traits were obtained.

Everyday and artistic creativity measures

Act-frequency scales. Act-frequency scales comprised 25 high prototypicality and 25 low prototypicality items of everyday and artistic creativity. Each participant received a list labeled 'Act Report' that contained 100 acts (50 everyday and 50 artistic creativity acts). Half of the participants first answered everyday and half of the participants first answered artistic creativity acts. Participants indicated whether or not they performed each of the acts in the previous 6 months. Four act-frequency scores were computed: high prototypicality artistic creativity, low prototypicality artistic creativity, high prototypicality everyday creativity, and low prototypicality everyday creativity.

Life-space everyday and artistic creativity scales. Life-space scales were based on the factor analyses of 174 item life-space questionnaire. An item was included on a scale if its loadings exceeded $\pm.35$. To obtain scale scores, raw scores were *z*-scored and averaged. Scores were obtained for two domain scales: everyday and artistic creativity, and 6 area scales. Subscales of artistic creativity were labeled Emotionally Expressive

Art, Committed Artistic Creativity, Music, and Artistic Sensibility, and areas of everyday creativity were labeled Interpersonal Creativity and Self-Expressive Creativity.

Procedure

In the beginning of the semester, students were administered the NEO-PI-R as one of the measures in the lab component of the course in personality psychology. Act-frequency reports and life-space questionnaire were administered at the end of the semester as a part of an in-class activity. Participants signed an informed consent and were assigned a code that would make possible to match response sheets, while also ensuring anonymity. Students received feedback on their Big Five traits as a part of the educational experience in a class discussion on global personality traits.

In order to obtain informant-reports of Big Five personality traits, students provided mailing addresses of their parents and the questionnaires were mailed directly to the parents, along with a letter explaining the purpose of the study and a return stamped envelope. Eighty seven questionnaires that could be matched to students who provided self-report data were returned (74% response rate). To obtain friend-reports, students were asked to give questionnaires to their best friend. With the questionnaire, students' friends also received a letter explaining the purpose of the study and were asked to return the completed questionnaire through the campus mail system. Seventy-eight friend questionnaires were returned (67% response rate).

Results and Discussion

Convergent and discriminant validity of everyday and artistic creativity were examined employing two approaches. First, behavior reports on act-frequency and life-space scales were compared. It was hypothesized that correlations between different

measures of the same creativity domain will be higher than correlations between domains of creativity. Second, behavior reports of everyday and artistic creativity were related to Big Five personality traits. Openness to experience was expected to correlate with both everyday and artistic creativity, while extraversion was predicted to correlate with everyday creativity and not artistic creativity.

Analysis of Behavior

Total scores for everyday and artistic creativity were obtained through both act-frequency and life-space approaches. Both approaches ask for reports of specific behavioral acts, but they differ in the item generation procedure (lay conceptions vs. systematic sampling of relevant behavioral categories) and response format (dichotomous vs. 5-point scales). In spite of different approaches to measurement, act-frequency and life-space scales for everyday and artistic creativity were highly correlated, *r*s = .61 and .70, thus supporting their convergent validity (see Table 7).

However, moderate to high correlations were also obtained when comparing involvement in behaviors across domains of everyday and artistic creativity. Act-frequency data showed high correlation between prototypical everyday and artistic creativity acts, $r(115) = .53, p < .001$. Similarly, life-space scales of everyday and artistic creativity were highly correlated, $r(120) = .58, p < .001$. Correlation between scales for total everyday and artistic creativity behaviors across act-frequency and life-space measures was somewhat lower, $r(109) = .45, p < .001$. Although moderate to high in size, correlations between everyday and artistic creativity suggest that they are empirically distinguishable.

Behavior and Personality

In addition to the analysis of correlations among creative behaviors, convergent and discriminant validity are evaluated in relation to important psychological variables. In the last two decades a significant agreement has been reached that the Big Five model offers a good description of global personality traits and thus can be employed as a framework for validating scales of everyday and artistic creativity. Table 8 shows correlations between creative behaviors and personality traits.

Openness to experience was previously defined as a global personality disposition for creativity (McCrae, 1987) and it also predicted different creative behaviors in past research (King et al., 1996; Wolfradt & Pretz, 2001). Therefore, convergent validity for different kinds of creativity should be demonstrated in relation to openness to experience. As hypothesized, self-reported Openness to experience was significantly correlated with act-frequency reports of everyday and artistic creativity (*r*s = .29 to .41). Parent and friend-reported openness to experience was also correlated with high prototypicality artistic and low prototypicality everyday creativity (*r*s = .25 and .35). Similar correlations were obtained for life-space measures of everyday and artistic creativity (*r*s = .24 to .46). Parent and friend-reported openness to experience was also moderately correlated with several scales of everyday and artistic creativity referring to self-expressiveness (*r*s between .22 to .37).

On the other hand, discriminant validity concerns differences in personality traits between everyday and artistic creativity. Extraversion was expected to significantly correlate with everyday creativity, and especially areas related to involvement in interpersonal relationships and social spontaneity, and it was predicted to be non-

significantly related to artistic creativity. Supporting these hypotheses, self-reported and parent-reported Extraversion was correlated with high prototypicality everyday creativity acts and low prototypicality artistic acts, and life-space measures of total everyday creativity and Interpersonal Creativity (*r*s = .23 and .37). Another personality trait dimension related to creativity was neuroticism. Parent-reports of neuroticism correlated with high prototypicality artistic creativity acts, and life-space measures of total everyday creativity, Self-Expressive Creativity, and Emotionally Expressive Art, *r*s = .22 to .29 (all indicating involvement in the crafts, personal expression, and writing). Although individuals involved in these activities do not perceive themselves as emotional, they are perceived by their parents as emotionally sensitive. Collectively, these results support discriminant validity for everyday and artistic creativity. For college students, everyday creativity is related to openness to experience and extraversion, while artistic creativity is unequivocally related only to openness to experience.

CHAPTER III

STRUCTURE OF CREATIVE BEHAVIOR

STUDY 6

CREATIVE BEHAVIOR IN COLLEGE STUDENTS

Study 6 investigates the structure of creative behavior and tests the hypothesis of domain generality in creativity using variable centered and person centered approaches. The first goal is to extend measurement of creative behavior in domains of everyday, artistic, and intellectual activity. Next, the structure of creative behavior is investigated using a variable-centered approach. The goal of this approach is to test whether broad dimensions of individual differences in creative behavior can be identified in a hierarchical factor analysis. It is expected that creative behavior will show a certain level of generality within broad domains (e.g., artistic creativity), but also that there will be multiple dimensions of individual differences. Also, the structure of creative behavior is examined using a person-centered approach. Employing a hierarchical cluster analysis, this approach has as its goal to identify groups of individuals with similar patterns of creative behavior.

Methods

Participants

Participants were 488 students in lower level psychology courses at the University of New Hampshire who received course credit as compensation. After handling incomplete and invalid data, the final sample consisted of 416 subjects (115 males and 300 females; 1 participant did not indicate gender). The sample was largely of traditional college age (97.8% between 17 and 22 years) and at the beginning of their college studies (87% in the first or second year in college). Most students were Caucasian (95%) and from middle to upper class families, with 71.6% reporting household incomes above $60,000. A high percentage of participants were from well educated families; 47.5% of the mothers and 52% of the fathers held bachelors degree or higher.

Measures

Life-space questionnaire for everyday, artistic, and intellectual creativity. The life-space questionnaire developed in Study 4 included 174 items concerning everyday and artistic creativity. Six factor-based scales were obtained from factor analyses of these items. Developed scales had satisfactory reliability and were meaningful descriptions of everyday and artistic creativity. However, there was a need to improve interpretability of some scales and to further differentiate among specific content areas in the domain of artistic creativity. Therefore, the life-space questionnaire was expanded to include items in underrepresented areas and items addressing higher levels of achievement or quality of behavior. Furthermore, to strengthen the test of domain generality in creativity, intellectual creativity was added to everyday and artistic creativity.

Several approaches were used to develop new items for the revised life-space questionnaire. First, some items were obtained by reviewing existing inventories of creative behavior (Guastello, 1991; Hocevar, 1979; Runco, 1986) and behavioral criteria for creativity used in previous research (Amabile et al., 1994; Griffin & McDermott, 1998). Next, in order to obtain items that adequately represent the everyday experience of college students, open-ended questionnaires were administered to 6 advanced undergraduate students enrolled in an independent study in the psychology of creativity. Each of these students was personally involved in a creative activity, including dance, music, and visual arts. The survey asked about behaviors related to domains of everyday, artistic, and intellectual creativity. For example, among the questions in the domain of artistic creativity, students were asked about activities in performing arts; in the domain of everyday creativity, they were asked about original solutions to challenges of college life and maintaining successful relationships; and in the domain of intellectual creativity, they were asked about original expressions in their academic assignments and activities in pursuit of academic interests. After obtaining open-ended responses, students were presented the original life-space questionnaire and each content group was discussed.

In addition to creative activities, membership in groups that promote creativity was assessed. A list of college student organizations was obtained from the university catalog and participants were asked about their involvement in academic clubs or organizations (e.g., science and engineering clubs) and art groups (e.g., dance teams and literary organizations). Since most participants were in their first year in college, it was expected that they might not have joined student organizations at college. Therefore, membership in both high school and college organizations was measured.

The final life-space questionnaire consisted of 222 items assessing creative behaviors and 22 items assessing membership in groups promoting creativity (244 items total). The questionnaire was organized into conceptually distinct areas. For instance, a section of artistic activities included subcategories pertaining to visual arts, writing, and performing arts, and a section on cultural activities included subcategories of art and music consumption, movies, television, reading and news.

Procedure

Data were collected in two 90-minute testing sessions in groups of 20-40 participants. Each session included measures of creative behavior and personality traits. In the first session, participants were informed about the general purpose of the study and then were presented two informed consent forms; one form asked for consent to participate in the study and the second form asked for permission to contact the University registrar to obtain official information on students' academic status and achievement. Debriefing forms were presented upon completion of the study. To ensure anonymity, all subjects received a number code that was used to match responses from two assessment sessions; no identifying information was recorded with the test materials.

Results and Discussion

Statistical analyses had three major goals: (1) To identify areas of creativity in the conceptual domains of everyday, artistic, and intellectual activity; (2) To identify broad dimensions of individual differences in a hierarchical factor analysis of behavior in different areas of creativity, and (3) To examine intraindividual patterns of creative behavior using a hierarchical cluster analysis.

Handling of Missing and Invalid Data

It was likely that some participants would not complete the surveys carefully, resulting in invalid data. First, 26 participants who failed to complete both assessment sessions were not included in the final sample. Additional 46 participants were removed from the sample due to invalid data. A participant was considered to have unreliable data if he or she gave more than three invalid responses (i.e., if response options were restricted to 1 or 2 and the participant responded 3 or 4). The final sample consisted of 416 participants.

Endorsement frequencies were checked for all items on the life-space questionnaire. Two items were excluded from the analyses because they were endorsed by less than 1% of the sample; these items included receiving a grant for summer research and publishing a paper in a professional journal (both endorsed by 3 participants, or .7% of the sample). Although these items have clear conceptual significance for creativity, a decision was made to exclude them from the analyses because they were likely to have a disproportionately large influence on scale structure (Tabachnick & Fidell, 2001). In addition, items that were highly correlated with gender were excluded from the analyses; only two such items were found, including wearing make-up and a number of different hairstyles a person wears (r with gender .60 and .72, respectively).

Identifying Areas of Creativity

The first step in analyzing the structure of creative behavior is to identify areas of creative behavior within broad theoretical domains. Life-space items were conceptually divided into domains of everyday, artistic, and intellectual creativity. Items in each domain were analyzed in a separate principal components analysis with oblique rotations.

The number of factors extracted was decided on the basis of scree and meaningfulness criteria. Areas of creativity within three domains were described by factor-based scales based on the pattern matrix coefficients. Tabachnick and Fidell (2001) recommend use of the pattern matrix coefficients because this matrix presents factor loadings that do not include the overlapping variance with other factors and thus have clearer interpretations. An item was included on a scale if its loading was greater than $\pm$.30. Items with loadings on more than one factor were placed on a factor with the largest loading. Finally, scales were created by averaging z-scored raw responses.

Everyday Creativity

Factor analysis on 121 items of everyday creativity yielded 5 factors, which accounted for 23.7% of the variance (see Table 9). The first factor, Crafts, described everyday and practical artistry (e.g., making photo collages and ornaments). Two factors described sophistication in culture consumption: Cultural Sophistication referred to reading and pursuit of experiences in arts and music (e.g., reading novels and nonfiction, visiting museums) and Refined Media Consumption referred to an active use of media resources related to one's interests (e.g., reading music reviews, using the internet to research a topic of interest). Two other factors described behaviors that make statements about one's identity; Self-Expressive Creativity referred to behaviors of self-presentation (e.g., painting clothes, wearing self-made jewelry) and Interpersonal Creativity referred to original expression in social interaction (e.g., surprising a friend with gift or gesture, animating a party).

Factor-based scales describing areas of everyday creativity had between 11 and 20 items and reliability coefficients between α = .68 and .88. Scores for everyday

creativity scales were approximately normally distributed, supporting the validity of these scales as indexes of behaviors that are to some extent present in everybody.

Artistic Creativity

Factor analysis was performed on 91 items in the domain of artistic creativity and 5 factors were extracted, explaining 32.3% of the variance (Table 9). Five factors differentiated involvement in different areas of arts: Visual Arts (e.g., number of paintings completed, exhibiting artwork in public); Music (e.g., playing music in public, composing music); Dance (e.g., dancing in a ballet production, choreographing a dance); Theatre (e.g., acting on stage, practicing lines for a play); and Writing (e.g., entering writing in a contest, publishing a story).

Scales of artistic creativity had between 10 and 21 items and were highly reliable, $\alpha = .79$ to .89. Examination of the score distributions for scales of artistic creativity reveals that there is a substantial restriction in range and that scores are significantly positively skewed. Positively skewed distributions support a general finding that artistic creativity is relatively rare. However, the distribution in scale scores that substantially departs from normality limits the magnitude of correlation coefficients with other variables, suggesting that only modest correlations should be expected (Tabachnick & Fidell, 2001).

Intellectual Creativity

Factor analysis was performed on 30 items of intellectual creativity and 3 factors were retained, jointly accounting for 35.6% of the variance (Table 9). The first factor was labeled Science and it describes involvement and success in science (e.g., designing an experiment, winning an award in science). The second extracted factor, Academic

Orientation, involved an active pursuit of advanced educational opportunities that offer a chance for exploration of intellectual interests (e.g., independent study project, study abroad). Finally, the third factor, Technology, described behaviors related to mathematics and engineering (e.g., entering mathematics competition, completing a robotics project).

Factor-based scales of intellectual creativity had between 5 and 9 items and reliability between $\alpha = .60$ to .72. Although somewhat lower than standard, these reliabilities are still acceptable for scales based on behavior reports (Brackett, 2003; Guastello & Shissler, 1994). Lower reliability coefficients are attributable to two major factors (Cohen & Cohen, 1975). First, the domain of intellectual creativity had a smaller item pool than the domains of everyday and artistic creativity and consequently scales with fewer items. Second, items had low endorsements which restricted the range of scores.

Dimensions of Individual Differences in Creative Behavior

To test whether it is possible to move from areas of creative behavior towards more general dimensions of individual differences, correlations among behavior in different areas of creativity are examined and factor-based scale scores for areas of creativity are entered as items in a hierarchical factor analysis. It is often found that creative achievements in one area, such as visual arts, do not very highly correlate with achievements in other areas, such as science (Hocevar, 1976; Holland & Nichols, 1964), suggesting that there is no one general factor underlying all of creativity. However, a certain level of generality is also often found so that both lay people and creativity scholars recognize broad domains of everyday, artistic, and intellectual creativity as

meaningful categories (Feist, 1998, 1999; Runco & Bahleda, 1986) and so that achievement in areas such as visual arts and literature combine in a dimension of artistic creativity (Guastello & Shissler, 1994). Thus, it is expected that higher order factors of creativity can be identified in behavior reports, supporting the hypothesis that creativity is best defined at a midpoint from generality to task specificity.

Scores on the 13 scales describing areas of creative behavior are weakly to moderately correlated (see Table 10). Creativity among the areas within one conceptual domain was higher than correlations among areas across domains of creativity. The highest correlations are found among areas of everyday creativity (mean $r = .37$), followed by artistic and intellectual creativity (mean rs = .27 and .31, respectively). Across domains of creativity, highest correlations were observed between everyday and artistic creativity (mean $r = .26$). Notably, intellectual creativity was largely independent of artistic creativity (mean $r = .06$) and had low correlations with everyday creativity (mean $r = .14$). Similar correlations are observed in earlier work with similar scales of creative behavior (Guastello & Shissler, 1994; Hocevar, 1976).

In order to identify major dimensions in creative behavior, a hierarchical factor analysis was performed with scores on the 13 areas of creativity entered in one principal components analysis with oblique rotation. Three broad dimensions of creative behavior were identified, collectively accounting for 51.7% of the variance (see Table 11). The three dimensions were labeled: Creative Life-Style, Intellectual Achievement, and Performing Arts.

The first dimension, Creative Life-Style, contained 7 area scales and was highly reliable, $\alpha = .81$. Creative Life-Style is described by areas of everyday creativity as well

as visual arts and writing areas of artistic creativity. An individual high on this dimension behaves in original ways in a wide variety of daily activities, relationships, and in self-presentation, and is involved in visual arts and writing, as two artistic areas that might be most readily associated with creativity by lay people. Scores on Creative Life-Style were approximately normally distributed, suggesting that this dimension identifies a general behavioral style found to some extent in the population.

The next two dimensions described behavior in more formal domains of creative work. The dimension labeled Intellectual Achievement contained 3 areas of intellectual creativity and was moderately reliable, $\alpha = .60$. This dimension described an active pursuit of academic knowledge acquisition. The final dimension described Performing Arts, including music, dance, and theatre, $\alpha = .51$. Scores on Intellectual Achievement and Performing Arts were positively skewed, indicating uncommonness of these behaviors in college students, especially in the early stages of their academic careers.

Patterns in Creative Behavior

The analysis of patterns of creative behavior uses broad dimensions of creativity to identify groups of individuals with similar behavior on all three dimensions. In other words, this analysis asks whether people engage in creative activity and whether they engage in one specific kind of activity or a combination of different kinds of creative behavior. Hierarchical cluster analysis with Ward's method and squared Euclidean distances is used to identify groups of individuals with minimal within-cluster variance in patterns of creative behavior. Ward's method was chosen as a clustering procedure that minimizes the variance within the clusters and is one of the most accurate in validation studies with known cluster membership (Aldenderfer & Blashfield, 1984; Blashfield,

1976). The number of retained clusters was determined based on the criteria of change in fusion coefficients and meaningfulness. To test replicability of the identified clusters, the total sample was divided using random split procedure in SPSS and cluster solutions are compared in two halves of the sample (criterion proposed by Asendorpf, Borkenau, Ostendorf, & van Aken, 2001; Caspi & Silva, 1995). Creative behaviors are statistically rare; thus, it is predicted that the largest cluster would be low on all dimensions of creativity. Additional clusters are expected to include individuals with peak scores on one dimension of creative behavior. Finally, the smallest cluster was hypothesized to include individuals with above average scores on several dimensions of creative behavior. This cluster structure would support the findings of statistical infrequency of creative behavior, domain specificity in creative behavior for most individuals, and generality in creative behavior for a small portion of people.

Five clusters were identified and interpreted as: the Everyday Creative Person, the Conventional Person, the Artist, the Scholar, and the Renaissance Person (see Figure 1). The cluster labeled Everyday Creative Person was the largest ($N = 160$) and it was described by above-average scores on Creative Life-Style and below-average scores on the other two dimensions of creative behavior. The size of this cluster supports theoretical claims that creativity as a unique expression of the self is common in the general population. The cluster labeled Conventional Person was the second largest ($N = 139$), and included individuals with below average scores on all dimensions of creative behavior. This cluster supports the findings that large groups of people are not willing to behave in nonconforming ways, but rather resort to the familiar and typical (Barron, 1963; Sternberg & Lubart, 1995).

The next two clusters were characterized by peak scores on one dimension of creative behavior. The third cluster described the Artist; it had the highest scores on the dimension of Performing Arts, above-average scores on Creative Life-Style, and was below average on Intellectual Achievement ($N = 52$). The fourth cluster described the Scholar; this group had highest scores on Intellectual Achievement, average scores on Creative Life-Style, and below average scores on Performing Arts ($N = 59$). The final cluster, labeled Renaissance Person, was the smallest ($N = 6$); as hypothesized, only a small number of individuals showed above average scores on all dimensions of creative behavior, with highest scores on Intellectual Achievement.

After initial cluster identification, replicability of identified clusters was tested using randomly divided halves of the sample for cross-validation. The first four clusters were closely replicated in two validation samples (see Figure 2). The fifth cluster had only two individuals in each validation sample. In both samples the highest score in the fifth cluster was for Intellectual Achievement, while there was a pronounced difference on the two other dimensions of creative behavior. However, the small number of individuals makes any differences likely to be due to sample idiosyncrasies.

STUDY 7

CREATIVE BEHAVIOR IN PROFESSIONAL ADULTS

The goal of Study 7 is to extend research on the structure of creative behavior from college students to adult professionals. Research with college student samples has been criticized as inadequate for understanding behavior and psychological attributes of

adults (Carlson, 1971, 1984; Sears, 1986). In particular, research on creativity in college students might be criticized because significant creative achievement requires long experience in a domain of work (Gardner, 1993). Furthermore, criteria for creativity should include assessment of both originality and quantity of behavior. To address these criticisms, the present study will investigate the structure of creative behavior in a sample of adult professionals nominated for creativity by their peers. Moreover, this approach will enable a comparison of the structure of creative behavior in college students and professional adults.

Methods

Participants

Participants were 295 professional adults (101 males and 187 females; 7 participants did not report their gender) recruited using a snowball effect in an internet based study. The mean age of the sample was 36.06 years, with a range from 20 to 72 years. Most participants were Caucasian (93.2%). The sample was highly educated, with 36.2% of participants holding four-year college degrees and 53.5% of participants holding graduate degrees. Most participants were professionals working in science and engineering (41.4%), health, human services, and education (23.8%), arts and humanities (14.9%), business and administration (11.9%). Also, 4.1% participants reported working in multiple areas.

Measures

Creativity life-space questionnaire. A 59-item life-space questionnaire asked about behaviors in 3 domains and 13 areas: everyday creativity (including areas of crafts, self-expression, interpersonal creativity, sophisticated media use, and cultural

refinement), artistic creativity (areas of visual arts, music, dance, theatre, and writing), and intellectual creativity (areas of science, technology/engineering, and education). Questionnaire items addressed three criteria for creativity: 1. typical behavior in a certain area (e.g., painting and sculpting in the area of visual arts), 2. time investment in an area (e.g., time spent on visual arts projects), and 3. socially recognized achievement in an area (e.g., exhibiting art, receiving awards; criterion not used for the domain of everyday life that largely lies outside the confines defined by expert judgments).

Procedure

The measures were administered in an internet-based survey. Initially, a group of professionals working in science (including physical and social sciences), engineering, arts, and crafts was contacted by e-mail. Potential participants were sent a letter inviting them to take part in a study on professional and leisure activities. The study was described as involving "people who are creative in any area of life, from professionals in arts, sciences, or technology, to people who are creative in their everyday lives". The invitation letter contained a link to the web site administering the survey and it asked potential participants to send the link to individuals they consider creative.

The survey started with an informed consent explaining the task and it ended with a debriefing form explaining the purpose of the study and research on domain generality and specificity in creativity.

Results and Discussion

The goal of statistical analyses was: (1) to identify dimensions of individual differences in creative behaviors, and (2) to examine intraindividual patterns of creative behavior.

Preliminary Analyses

Distributions of behavior in the areas within everyday, artistic, and intellectual creativity closely replicated those observed in college students. Scores for areas of everyday creativity were approximately normally distributed, while areas of artistic and intellectual creativity were positively skewed. A related question concerns the distribution of creative behavior most relevant for people's profession. The group of scientists was large enough to allow such analysis ($N = 92$). The most professionally relevant behaviors for this group concerned conducting research, publishing research reports, and obtaining grants for research. In the group of scientists, these behaviors were normally distributed. Thus, it appears that everyday creative behavior is present to some extent in everyone and creativity in formal domains is rare in the general population, but normally distributed in individuals considered creative in their domains.

Dimensions of Individual Differences in Creative Behavior

The hypothesis of domain generality in creativity was first tested by analyzing intercorrelations among areas of creativity (Table 12). Replicating findings with college students, scores on 13 areas of creative behavior were weakly to moderately correlated, with mean correlations among areas within one domain from .21 for artistic creativity, .26 for intellectual creativity, to .28 for everyday creativity (ranging from .00 to .45 within one domain). The highest correlations between domains are observed for everyday are artistic creativity (mean $r = .19$, rs ranging from .00 to .60) and the lowest correlation was observed between intellectual achievement and artistic creativity (mean r = .06, rs from .01 to .16). Two areas of intellectual creativity, science and technology, had significant negative correlations with self-expressive creativity, $r = -.12$ and -.14.

The dimensions of individual differences in creative behavior are identified in a factor analysis of behavior reports in 13 areas describing everyday, artistic, and intellectual creativity. Dimensions were defined as factors in a principal components analysis with oblique rotation. The number of dimensions was decided on the basis of the scree plot and of meaningfulness criteria and factor-based scales were created using the pattern matrix coefficients. An item was included on a scale if its loading was greater than $\pm$.30 and each item was included on only one dimension. Factor-based scales were created by averaging z-scores of raw responses for items on each extracted dimension.

Three dimensions of creative behavior were identified, accounting for 47.2% of the variance in the areas of creativity (see Table 13). The three dimensions largely replicated those identified in the study of college students and were labeled: Creative Life-Style, Intellectual Achievement, and Arts.

The first dimension, Creative Life-Style, contained 6 areas of creativity and was moderately reliable, $\alpha = .69$. Creative Life-Style is described by areas of everyday creativity and also the area of writing from the domain of artistic creativity. The second dimension, Intellectual Achievement, contained 3 areas of intellectual creativity and was moderately reliable, $\alpha = .52$, and the third dimension, Arts, included areas of music, dance, theatre, and visual arts, $\alpha = .51$.

Patterns in Creative Behavior

The second goal was to identify individuals with similar configurations of dimensions of creative behavior. Hierarchical cluster analysis with Ward's classification method will identify groups of individuals with minimal within-cluster variance in

patterns of creative behavior. Classification into creativity clusters in the professional sample will be compared to clusters identified in the college student sample.

Five clusters of individuals with similar patterns of creative behavior were identified and they closely replicated clusters in a sample of college students (see Figure 3). The clusters were labeled: Everyday Creative Person, Conventional Person, Artist, Scholar, and Renaissance Person. Everyday Creative Person was the largest ($N = 126$) and it was described by above-average scores on Creative Life-Style and below-average scores on Arts and Intellectual Achievement. The next two clusters had peak scores on one dimension of creative behavior; the Scholar cluster ($N = 63$) had above-average scores on Intellectual Achievement, average scores on Creative Life-Style, and below average scores on Arts, while the Artist cluster ($N = 54$) had above average scores on Arts and Creative Life-Style and below average scores on Intellectual Achievement. One cluster, Conventional Person ($N = 49$), consisted of individuals with below-average scores on all three dimensions of creative behavior. Finally, a cluster labeled Renaissance Person was the smallest ($N = 3$) and it included individuals high on all dimensions of creative behavior. As in the study of college students, results indicated that for most people creativity in formal domains is specific, but also that everyday creativity co-exists with creativity in these formal domains.

General Discussion

Studies 6 and 7 were concerned with the structure of creative behavior across domains of everyday, artistic, and intellectual creativity in college students and professional adults. First, creative behavior was operationalized employing the life-space approach. Next, structure of creative behavior was examined by identifying areas of

creativity, broad dimensions of individual differences, and intraindividual patterns in these dimensions.

Advantages of Life-Space Measures of Creativity

The present studies filled the gap between the theoretical definition of creativity as real-life original and high quality ideas or products and operational definitions of creativity as performance on paper and pencil tests (e.g., Isen, Johnson, Mertz, & Robinson, 1985; McCrae, 1987; McCrae, Arenberg & Costa, 1987; Torrance & Presbury, 1984). Life-space data are unique in satisfying formal and content requirements in measuring creativity. Formal requirements are that criteria for creativity to be manifest in observable real-life behavior, and that they aggregate multiple instances of behavior (Plucker, 1998b; Plucker & Beghetto, 2004). Content requirements ask that creativity be assessed in everyday life, as well as in formal domains of work, and that creative behaviors are appropriate for the population under investigation (Richards et al., 1988; Runco, 2004).

Formally, life-space items are designed to assess behavior, rather than preferences or behavioral tendencies. Life-space items require minimal interpretation or subjectivity and are potentially verifiable. For instance, a life-space item asks how many hours in the previous week a person has painted, while an item on a typical self-report inventory would ask whether a person enjoys self-expression through art. Finally, life-space data have the advantage that they measure multiple instances of behavior performed during extended periods of time. This is particularly important in the study of creativity, as creative achievement requires commitment to an activity and is often achieved over long periods of work (Gardner, 1993). By contrast, performance measures of creativity, such

as collages or poems produced in a laboratory (Amabile, 1996; Lubart & Sternberg, 1995) do not allow for free selection of content and material of work, limit the time available for completion of the task, and do not allow for revisions of the final product, making these measures removed from real-life creative activity.

The content of life-space items is established through a systematic examination of everyday, artistic, and intellectual creativity. Previous research has employed a limited number of criteria and thus provided an incomplete picture of a person's creativity. For example, the domain of everyday creativity is rarely included in inventories of creative behavior and when everyday creativity is assessed, it is usually represented only through involvement in crafts activities (e.g., Hocevar, 1979). By contrast, in this study at least three areas were measured for each domain of creativity, which enables a more adequate analysis of the structure of creative behavior. Measures developed in this study demonstrate that it is possible to assess creativity manifest in real-life behavior by reliable and content valid scales. Since life-space items measure the frequency of involvement in creative activity, it will be important to compare these scales with assessments of quality of products (e.g., portfolio examination) and in reputation (e.g., teacher or peer nominations). However, quantity of work is the best predictor of its quality (Simonton, 1997, 1999), which supports the validity of life-space measures.

Areas of Everyday, Artistic, and Intellectual Creativity

A large number of behaviors in the domains of everyday, artistic, and intellectual creativity were assessed, based on the behavioral criteria previously used in creativity research, literature on leisure time activity, open-ended questionnaires and focus group discussions with college students. Factor analyses of these behavior-reports identified

between three and five areas in the domains of everyday, artistic, and intellectual creativity. The same areas were assessed in professional adults and they showed good internal consistency and similar score distributions, supporting generalizability of identified areas.

Most interesting are results in the domain of everyday creativity. Although many researchers have argued for existence of creativity in everyday life (Maslow, 1971; Nicholls, 1972; Richards et al., 1988; Ripple, 1989), no empirical investigation to date has explored it systematically. Five areas of everyday creativity described self-expression in leisure and interpersonal relationships (Crafts, Self-Expressive Creativity, and Interpersonal Creativity), and appreciation of art and culture (Cultural Sophistication and Refined Media Consumption). Validity of developed scales is supported by their close similarity with Artistic Interest, Self-Expressive Creativity, and Interpersonal Creativity scales identified in Study 4, which employed an earlier version of the life-space questionnaire.

Everyday creativity areas identified in this analysis are similar to some concepts previously employed in creativity research, in particular Creative Style of Living Achievements (Torrance, 1988) and Avocational Creativity (Richards et al., 1988); all these concepts include behaviors such as designing one's living environment or organizing a cultural event. Further support for the validity of identified areas of everyday creativity comes from the literature on leisure. In addition to being conceptually descriptive of everyday creativity, these behaviors are psychologically relevant for creativity. For example, activities like cooking and photography satisfy

needs for creativity, and activities such as visiting art shows and reading satisfy needs for cognitive stimulation (Tinsley & Eldredge, 1995).

However, there are several notable differences between areas of everyday creativity identified here and other related concepts. Previously, everyday creativity was defined to include behaviors that are: (1) not performed as professional or work activities, or (2) products and ideas that have not achieved social recognition (Richards et al., 1988; Torrance, 1988). The present study defined everyday creativity as behaviors that are personally expressive (e.g., scrapbooking) or that are likely to co-occur with creativity in formal domains of work, but are distinct from them (e.g., visiting an art exhibition). Behaviors in formal domains of creative activity, such as painting, are considered to describe artistic, rather than everyday creativity, even if they are not socially recognized. In this way the content overlap between everyday and formal domains of creativity is minimized.

Areas in the domains of artistic and intellectual creativity corresponded to those commonly reported in the literature. For example, in the domain of artistic creativity, existing inventories of creative behavior usually include conceptually defined scales pertaining to visual arts, music, and writing (Guastello, 1991; Hocevar, 1979). Similarly, in the domain of intellectual creativity the present studies extended previous research that combined achievement in science and technology or engineering (Guastello, 1991; Hocevar, 1979). In contrast, areas defined in these studies were able to distinguish between science and technology related achievement. Furthermore, a separate area of academic orientation referred to behaviors related to high level of academic interest and

pursuit of unique academic achievements in college students and teaching and developing educational activities in professional adults.

Dimensions of Individual Differences in Creative Behavior

Identified dimensions of individual differences in creative behavior differentiate one rather content general dimension of creative life-style from smaller and more specialized dimensions of arts and intellectual achievement. Creative life-style does not require formal training, the importance of technical skill and knowledge is minimized, and it is manifest in behaviors that do not have substantial common content. Behaviors that constitute a creative life-style permeate everyday life in areas of self-expression, interpersonal behavior, and media use, and include creative leisure activities such as writing and visual arts. Writing and visual arts are conceptually defined as pertaining to artistic creativity, but in the context of creative life-style could be describing everyday interest in the arts and sporadic involvement in the areas that are most readily associated with creativity. Indeed, behaviors describing visual arts and writing could include rather private involvement in these activities and not require a high level of commitment to an activity or high level of technical skill (e.g., painting a picture or writing a poem). On the other hand, dimensions describing arts and intellectual achievement are more content specific and defined by behaviors with rather low frequency, required domain specific learning, and implied a certain level of recognized accomplishment (e.g., acting on stage or dancing in a production).

Identified dimensions of individual differences suggest a definition of creativity at midpoint from generality to specificity. The apparent inconsistency in the results of these studies and those by proponents of either generality or specificity in creativity can be

attributed to the nature of criteria for creativity employed in different studies. Major supporters of domain-specificity primarily rely on performance criteria. Baer (1993) found that creativity on tasks in the same area (e.g., writing poems and short stories) does not highly correlate, arguing for task specificity. However, such performance assessments are one-time single item ability measures, while behavior inventories like the one employed in this study aggregate instances of behavior produced over longer periods of time.

On the other side of the debate, Plucker (1999) reanalyzed multiple data sets employing inventories of creative behavior and concluded that creativity can be described by a single dimension. However, data sets he analyzed assessed mostly artistic creativity, contained only one scale representing intellectual accomplishment (i.e., science), and had only one scales measuring creativity in areas that do not require formal training (i.e., crafts). While these studies made an important first step in multivariate investigation of domain generality or specificity, Plucker (1999) concluded that a more comprehensive assessment was necessary to adequately assess structure of creativity. The studies reported here measured at least three areas in the domains of everyday, artistic, and intellectual creativity, thus enabling emergence of distinct dimensions of creative behavior.

Patterns of Creative Behavior

The analysis of the 3 dimensions of creative behavior showed that it was possible to identify five clusters of individuals with similar behavior profiles and that the meaning of these profiles closely corresponded in college students and professional adults. Differences between two samples concerned the size of identified clusters. The modal

behavior profile in both samples showed above average creative life-style behavior and below average behavior on arts and intellectual achievement dimensions (i.e., Everyday Creative Person cluster, including 38.5% of college students and 42.7% of professionals nominated as creative). Two samples differed in relation to the cluster with below average creative behavior on all three dimensions of creativity (i.e., Conventional Person). In college students this cluster was the second largest dimension (33.4% of the total sample), while it was substantially smaller in professional adults (16.6% of the total sample). This difference reflects the nature of the two samples; college students were not selected for their personality attributes or behaviors, while the professional adults were nominated as creative by their peers and thus had higher frequency of creative behaviors.

Across samples of college students and professionals, when people get involved in domain-specific creative activity, they are most likely to primarily pursue activity in one domain, while also engaging in creative life-style related behavior; these are the Artists and Scholars. Finally, a small number of people have behavior profiles of modern day Renaissance People; these individuals are involved in multiple domains of creative activity.

The definition of distinct types of people with similar behavioral patterning brings the person back into the focus of research (Carlson, 1971, 1984) and can suggest common psychological and developmental mechanisms behind observed behavior patterns (Bergman, 2000; Gangestad & Snyder, 1985). What could be the underlying mechanisms in describing creative behavior? To examine this question, it might be informative to use an analogy with the structure and development of intelligence. Catell's (1971) investment theory of intelligence (also, Ackerman, 1996; Rolfhus &

Ackerman, 1999) describes the relationship between relatively content-free fluid abilities and content-specific crystallized abilities. Applying this theory to creativity, content non-specific propensities in behavior, such as those describing creative life-style could be channeled or invested into formal domains of creativity, such as arts or intellectual achievement. Creative life-style appears to be the most elementary form of creative behavior; it can be observed as the sole expression of creativity in the Everyday Creative Person, and it is also observed in the Artist, Scholar, and the Renaissance Person. The investment theory would further postulate that the level of achievement in formal domains will depend on the relatively content non-specific tendencies in behavior, but also on educational experiences, availability of mentors and rewards, cultural value ascribed to different areas of creative expression, personality preferences, and developed interests (Cattell, 1971; Csikszentmihalyi, 1999). Support for this interpretation of the relationship between creative life-style and more specialized expressions of creativity can be found in research showing that childhood imaginative activities similar to creative life-style behaviors (e.g., writing poems and reading) are antecedents of adult occupational creativity (Helson et al., 1995).

Domain Generality, Specificity, or Both?

The best answer to the 'either-or' debates in psychology (e.g., nature vs. nurture, person vs. situation) lies between the two extremes or in their combination. It will thus not be surprising that the question of generality vs. domain specificity in creativity will have the same answer. Creativity is best defined as in part general attribute of behavior in a wide variety of everyday situations and in part as a result of specialization within a specific domain of activity. Arguing for domain specificity, Kaufman and Baer (2004)

asked whether Madonna would be able to change careers and become a creative mathematician. The present study suggests that she might be likely to redirect her career into acting and dance, writing, and present herself in unique ways. Indeed, Madonna has achieved acclaim as an actress (received the Golden Globe award in 1996), has reinvented her music and public image multiple times, and recently published a series of children's books (Madonna, 2003a, 2003b, 2004a, 2004b, 2005). She is less likely to pursue science or technology. However, this study also shows that renaissance people still live among us and we should not be surprised by examples of musicians who are also mathematicians (Root-Bernstein & Root-Bernstein, 2004).

The more interesting question becomes how the observed levels of generality and specificity could be explained. To address this question we should turn to the psychological correlates of creative behavior. Creativity is related to a number of traits that are both content-general and content-specific. For example, intrinsic motivation predicts creativity in areas so diverse as visual arts, writing, science, and business (Amabile, 1996; Csikszentmihalyi, 1996). People could be intrinsically motivated for specific activities, such as painting or solving logic problems (Ruscio et al., 1998), but they could also display a general tendency to engage in intrinsically motivating activities (Amabile et al., 1994). Other major psychological resources for creativity, such as intellectual abilities (Carroll, 1993) and risk-taking (Lubart & Sternberg, 1995) are also best described as both content-general and specific. Studies 8 and 9 will investigate correlates of creativity employing a set of personality traits relevant for creativity.

CHAPTER IV

CREATIVITY AND PERSONALITY

STUDY 8

CREATIVITY AND PERSONALITY IN COLLEGE STUDENTS

Study 8 tests generality and specificity in relation to personality traits relevant to creativity. Creativity can be considered general if the same set of traits describes different creative behaviors and it can be considered domain specific if different traits describe different creative behaviors. Personality traits are selected based on their relevance for creativity in general and are sampled from areas of global personality, emotions and motivation, cognition, social expression, and self-regulation (e.g., Smith et al., 1992; King et al., 1996; Shaw & Runco, 1994). This study will be able to assess similarities among creative behavior and thus address whether differences in achievement in different domains of creativity might be a result of the need to invest most of one's time into one domain of work, rather than fundamental differences in psychological attributes related to creativity. Creativity and personality are examined using variable-centered and person-centered approaches; variable-centered approach analyzes which personality traits are related to individual dimensions of creative behavior, and person-centered approach examines profiles of personality traits describing different patterns of creative behavior.

Methods

Participants

Participants were the same 416 male and female college students described in Study 6.

Measures

Selecting Personality Predictors

Personality traits were selected to represent global personality and specific areas of personality functioning, including emotions and motivation, cognition, social expression, and self-regulation. Global personality traits were operationalized in terms of the Big Five model and traits in four areas of personality were selected based on several criteria. First, predictors were sampled to equally represent each of the four areas of personality functioning (two personality attributes per area). Second, all predictors have been previously reported as correlates of creativity. The goal was to sample the most central predictors from each area. This proved to be an easier task in areas of emotions and motivation and cognition, than for the areas of social expression and particularly for self-regulation. For example, in the area of emotions and motivation, intrinsic motivation has received ample theoretical and empirical support for its role in creativity (e.g., Amabile, 1996) and in the area of cognition divergent thinking abilities have even been equated to creative ability and extensively validated as predictors of real-life creative behavior (e.g., Torrance, 1988).

The most important predictors in areas of social expression and self-regulation were selected based on theoretical reasons. For instance, social-psychological research on the relationship between role identification and role relevant behavior suggest that

certain roles can support and promote creative behavior. Similarly, in the area of self-regulation, a theoretical argument has been made for the importance of conscious risk-taking in creativity (Sternberg & Lubart, 1995).

Global Personality

Big Five personality traits. The Big Five personality traits were assessed with the 44-item Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). Participants responded using a 5-point scale, from 1 (strongly disagree) to 5 (strongly agree). Scores were obtained for Extraversion (e.g., "full of energy"), Agreeableness (e.g., "is helpful and unselfish with others"), Conscientiousness (e.g., "does a thorough job"), Neuroticism (e.g., "can be moody"), and Openness to experience (e.g., "ingenious, a deep thinker"). Based on research on the Big Five traits and creativity showing that openness to experience is a general predisposition for creativity (King et al., 1996; McCrae, 1987; Wolfradt & Pretz, 2001), only openness was included in analyses.

Emotion and Motivation

Intrinsic motivation. Trait motivational orientation was assessed by a 30-item self-report Work Preference Inventory (WPI; Amabile et al., 1994). Participants rated themselves on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). The questionnaire provided scores on two primary scales: extrinsic motivation and intrinsic motivation, and two subscales for each motivational orientation. Subscales of intrinsic motivation included enjoyment (e.g., "What matters most to me is to enjoy what I do") and challenge (e.g., "I want my work to provide me with opportunities for increasing my knowledge and skills"). Subscales of extrinsic motivation included recognition (e.g., "To me, success means doing better than other people") and compensation (e.g., "I am

strongly motivated by the grades/money I can earn"). Based on the intrinsic motivation principle of creativity (Amabile, 1996), trait intrinsic motivation was considered a core predictor of creativity and a total score for intrinsic motivation was used in prediction of creativity.

Trait hypomania. Trait hypomania was assessed by the 48-item Hypomanic Personality Scale (Eckblad & Chapman, 1986). Participants answered questions using a true-false format. Items assessed euphoric affect and energy level (e.g., "I am frequently so "hyper" that my friends kiddingly ask me what drug I'm taking"), mood swings (e.g., "I seem to be a person whose mood goes up and down easily"), speed and fluency of thought (e.g., "Sometimes ideas and insights come to me so fast that I cannot express them all"), and high ambition and self-esteem (e.g., "I expect that someday I will succeed in several different professions"). This scale provided a total index of hypomanic personality.

Cognition

Divergent thinking. Divergent thinking ability was assessed by the Instances subtest from the Wallach and Kogan (1965) divergent thinking battery. This test asked for generation of as many and as original items participants can think of in four categories (i.e., round things, square things, things that make noise, and things that move on wheels). Divergent thinking was scored for frequency (i.e., total number of responses).

Evaluation ability. Ability to evaluate ideas for originality and appropriateness was assessed by the multiple choice version of the Symbol Equivalence Test (Barron, 1967). The test assessed the ability to use analogical thinking in recognizing appropriate

and original metaphors equivalent to a presented stimulus image. Ten symbolic images were presented, each followed by four pairs of alternative responses. A respondent was asked to judge which of the suggested images is a better – original and appropriate – symbolic equivalent for a given stimulus. For example, a stimulus image "a train going into a tunnel" was followed by two suggested symbolic equivalents "a needle being threaded" and "rabbit in hole". Participants should discriminate between the "commonplace" and "original" alternative. Responses were scored for recognition of originality.

Social Expression

Social nonconformity. Social nonconformity was assessed by the 51-item Impulsive Nonconformity Scale (Chapman et al., 1984). Participants answered questions using a true-false format. Items assessed disregard for social convention (e.g., "I break rules just for the hell of it"), impulsivity and lack of self control (e.g., "I prefer being spontaneous rather than planning ahead"), and mild antisocial behavior (e.g., "During one period when I was a youngster, I engaged in petty thievery"). The suggested scoring computes a total for impulsive nonconformity. However, impulsivity was not considered to be a core predictor of creativity. Responses on the Inventory were factor analyzed and only items pertaining to social nonconformity and mild antisocial behavior were included in the scoring.

Role identification. Participants received short depictions of 7 roles of college students – scholar, social activist, artist, hedonist, leader, status striver, and undecided – and asked to rate how much each role described them across four different settings: in school, when they want to relax/in leisure time, with friends, and with family. Ratings

were done on a 5-point scale from 1 (not at all descriptive) to 5 (very descriptive). A total score was computed for each of the social roles by averaging ratings across four situations. The list of social roles was based on a typology developed from an analysis of college students' values, beliefs, self-perceptions, and behavior (Astin, 1993). Although this classification of roles was specifically developed to describe college students, it has substantial overlap with Holland's (1985) classification of occupational roles that have been frequently used in creativity research with adult samples. Identification with social roles of artist and scholar can facilitate creativity by encouraging behavior congruent with these roles. Thus, a score for creative role was computed as a maximum rating for either roles of artist or scholar.

Self-Regulation

Persistence. Persistence was assessed by the 35-item Persistence Scale (Lufi & Cohen, 1987) and the 10-item Cognitive Persistence Scale (Tanaka, Panter, & Winborne, 1988). Both scales were answered using a 5-point rating scale. The Persistence Scale measured persistence in a variety of situations relevant for student populations (e.g., "Even if I fail to solve a problem, I try again and again and hope that I will find the solution"). Cognitive Persistence is a subscale of the Need for Cognition Scale and specifically assessed a preference and perseverance in complex tasks (e.g., "Prefer intellectual task to one that doesn't require much thought"). Two persistence scales were factor analyzed to create a unidimensional scale of persistence in problem solving tasks.

Risk-taking. Propensity towards risk-taking was assessed by a 60-item version of the self-report Risk-Taking Personality Inventory (Jackson, Hourany, & Vidmar, 1971). The inventory provided scores for four dimensions of risk taking: monetary, physical,

social, and ethical risk-taking. Monetary risk-taking referred to the willingness to compromise security in profession in order to obtain potential greater gains (e.g., "I would enjoy the challenge of a project that could mean either a promotion or loss of a job"). Physical risk-taking referred to thrill seeking and disregard of physical danger (e.g., "I would drive through a bad storm to get home, rather than stay in a motel"). Social risk-taking implied lack of concern about other people's judgment and willingness to risk potential embarrassment (e.g., "I try not to be too obvious in my behavior when it might affect my popularity"). Finally, ethical risk-taking concerned willingness to compromise personal or social standards in order to achieve some goal (e.g., "Despite the possibility of getting caught, I would use unemployment insurance benefits to help me get through school"). Monetary risk is the aspect of risk-taking theoretically proposed as a major resource for creativity and thus it was selected as a predictor of creativity.

Procedure

Measures were administered in two 90-minute sessions in groups of 20-40 participants (see Study 6). Both sessions included measure of creative behavior and personality traits. At the beginning of the first session participants signed a consent form and were debrief upon completion of the second session.

Results and Discussion

Three goals were addressed by statistical analyses: (1) Preliminary analyses identified traits theoretically relevant for creativity from multidimensional inventories; (2) Variable-centered analysis compared personality correlates across three dimensions of creative behavior (i.e., creative life-style, performing arts, and intellectual achievement);

and (3) Person-centered analysis identified groups of traits that can distinguish among the clusters of individuals with different patterns of creative behavior.

Preliminary Analyses

Personality predictors were selected to represent core resources for creativity in four major areas of personality functioning. Several of the employed measures were multidimensional in nature, while previous research suggested that only some of the assessed aspects of a broader construct should be relevant for creativity. In order to create scales for narrower target traits, these multidimensional inventories were factor analyzed using the principal components extraction with Varimax rotation. The number of factors was decided from a scree plot and interpretability criteria and an item was included on a scale if its loadings were above $\pm$.35.

Area of Social Expression: Impulsive Nonconformity Scale

Three factors were retained in the analysis of the Impulsive Nonconformity Scale (INS) (see Table 14): Mild Antisocial Attitude (e.g., "I would probably purchase stolen merchandise if I knew it was safe"), Volatility (e.g., "I let go and yell a lot when I'm mad"), and Social Nonconformity (e.g., "I do many things that seem strange to others but don't seem strange to me"). Research on social traits related to creativity shows that social nonconformity (e.g., norm doubting, independence) and mild antisocial attitude (e.g., hostility, aloofness) represent common attributes of creative individuals in different domains (Barron, 1972; Eysenck, 1995; Feist, 1998, 1999). On the other hand, volatility (e.g., impulsivity, emotional sensitivity) might be related only to artistic creativity (e.g., Barron, 1972; Feist, 1998, 1999; Götz & Götz, 1979). Therefore, a score for

nonconformity was computed by averaging ratings on items loading on Social Nonconformity and Mild Antisocial Attitude.

Area of Self-Regulation: Persistence Scale and Cognitive Persistence Scale

Two factors were extracted from the analysis of the Persistence Scale and Cognitive Persistence Scale (see Table 15): Intellectual Curiosity (e.g., "Even if I fail to solve a problem, I try again and again and hope that I will find the solution"), and Behavioral Perseverance (e.g., "When I watch television, I like to see the programs from the beginning to the end"). Behavioral Perseverance describes dedication to everyday activities and as such is not conceptually related to creativity. Intellectual Curiosity, on the other hand, describes commitment to a challenging task even in the face of substantial obstacles and as such is deemed as a resource for creativity. Only Intellectual Creativity is used in prediction of creativity.

Intercorrelations Among Personality Variables

Table 16 shows descriptive statistics and correlations among 9 creativity-relevant personality traits. Scores for all personality traits are normally distributed and have appropriate reliability coefficients. Furthermore, correlations among personality traits are low to moderate in size ($r < .40$ for 31 of 36 correlations). Openness to experience was significantly correlated all creativity relevant traits (*r*s between .11 to .46), supporting its definition as a global personality trait at the core of creativity. On the other hand, divergent thinking and evaluation were largely uncorrelated with other traits (10 of 15 correlations non-significant). These traits were measured by performance tests, which are usually only weakly correlated with traits of self-perception.

Dimensions of Creativity and Personality

The selected predictors of creativity represented five major areas of personality functioning and have been theoretically and empirically implicated in creativity. It was predicted that traits from all areas of personality functioning would be related to creativity. Table 17 shows correlations between dimensions of creative behavior and traits in the five areas of personality functioning. Two of three dimensions of creativity, Creative Life-Style and Performing Arts, were correlated with at least one trait from each area of personality. Intellectual Achievement was predicted by traits from four of five areas of personality. These correlations support conceptions of creativity as a syndrome that depends on multiple psychological attributes (Mumford & Gustafson, 1988; Sternberg & Lubart, 1995). Interestingly, Intellectual Achievement did not correlate with the assessed cognitive abilities, which imply that these abilities are not general to all creativity, but rather favor imaginative and artistic domains.

Dimension of Creative Life-Style had 7 of 9 significant correlations with personality traits (*r*s between .12 and .38). For the dimension of Performing Arts, 5 of 9 correlations were significant (*r*s between .11 and .23) and 6 of 9 correlations were significant for the Intellectual Achievement dimension (*r*s between .12 and .24). All domains were predicted by the global personality trait of Openness to experience, and also trait hypomania (personality area of emotional functioning), and intellectual curiosity (personality area of self-regulation). Correlations were larger in size for Creative Life-Style than for Performing Arts and Intellectual Achievement. In the present sample it is not possible to answer whether this is due to lesser role of personality traits in formal domains of creativity or it is due to the restricted range in scores for these

dimensions of creativity. To address this question, further research should assess personality traits in professional samples with higher frequency of creative behaviors.

Regression analyses tested whether three dimensions of creativity are uniquely predicted by the same pattern of personality traits. A standard linear regression was employed to predict each dimension of creative behavior from a set of core creativity-relevant personality traits. Summary of multiple regression results is presented in Table 18.

Multiple *R*s were statistically different from zero for all three dimensions of creativity, ranging from $R = .51$, $F(9, 404) = 16.23$, $p < .001$ for Creative Life-Style, to $R = .34$, $F(9, 404) = 5.98$, $p < .001$ for Intellectual Achievement, and $R = .32$, $F(9, 404) = 5.08$, $p < .001$ for Performing Arts. Again, prediction was more successful for the domain of Creative Life-Style, than formal domains of Performing Arts and Intellectual Achievement. Creative Life-Style was independently predicted by one variable from each area of personality, with βs between .13 for Openness to experience and intellectual curiosity, and .24 for the creative role. Performing Arts was independently predicted by one variable from three areas of personality functioning (global personality, emotions and motivation, and social expression), with βs between .14 for the creative role and .16 for trait hypomania. Creative Life-Style and Performing Arts were predicted by three common traits, including Openness to experience, trait hypomania, and creative role. However, Intellectual Achievement was predicted by a different set of traits. Variables from three areas of personality functioning significantly contributed to prediction (emotions and motivation, social expression, and self-regulation), with βs between .10 for risk-taking and .22 for intrinsic motivation. Interestingly, creative role showed a

suppression effect. Zero-order correlation of creative role and Intellectual Achievement was non-significant and the β weight in the regression analysis was negative and statistically significant (negative classical suppression; Krus & Wilkinson, 1986). These results indicate that creative role has unique negative prediction for Intellectual Achievement, which is not apparent in the zero-order correlation.

Patterns of Creative Behavior and Personality

A discriminant function analysis was performed to test whether it is possible to identify groups of personality variables that differentiate clusters of individuals with similar patterns of creative behavior. Creativity relevant personality traits were used to predict membership in groups identified in the cluster analysis of creative behaviors. Behavior clusters were labeled Conventional Person ($N = 139$), Everyday Creative Person ($N = 159$), Artist ($N = 52$), Scholar ($N = 59$), and Renaissance Person ($N = 6$). The group identified as the Renaissance Person, consisting of individuals with above-average behavior on all three domains of creativity, was dropped from analysis because of its small size and the discriminant analysis was performed on remaining four groups.

Two significant discriminant functions were identified, with a combined $\chi^2(27) = 114.92, p < .001$. Discriminant function two alone also was statistically significant, $\chi^2(16) = 42.21, p < .001$. Canonical correlation were .41 and .29 for discriminant functions one and two respectively. Two functions pooled together explained 25% of the variance in the differences between clusters (Wilks' $\lambda = .75$), and the second discriminant function alone explained 10% of the variance (Wilks' $\lambda = .90$).

Table 19 shows correlations between personality predictors and standardized canonical functions (loadings). Applying the criterion of .30 for the loadings in

interpreting discriminant functions, the first function can be described by creative social role, openness to experience, intellectual curiosity, and trait hypomania. As seen in Figure 4, this group of traits primarily distinguishes the Conventional Person cluster from the Artist cluster, with Everyday Creative Person and Scholar clusters falling in between them. The second discriminant function can be described by high intrinsic motivation, risk-taking, and divergent thinking, and it separates the Scholar cluster from the other three clusters (see Figure 4).

Information about the success of discriminant functions in distinguishing among creativity clusters is offered by the examination of classification results. Table 20 shows that 41.2% of the original cases were correctly classified based on the two discriminant functions. The least successful prediction was achieved for the cluster of Everyday Creativity. Individuals with this behavior pattern were rather evenly classified into one of the four cluster groups; 23.3% of cases were correctly classified and between 21.4% and 28.3% of cases were classified incorrectly into one of the other three clusters. Classification was more successful for other three clusters, with 46.6% of cases correctly classified for the Scholar cluster, 48.1% for the Artist cluster, and 56.8% for the Conventional Person cluster. Thus, it appears that creativity relevant traits most effectively predict the distinction between creative and non-creative individuals.

To test which pairs of clusters were statistically significantly distinguished by the two discriminant functions, a series of post-hoc Tukey HSD tests was performed (see Table 21 for pair-wise comparisons). Discriminant function one significantly distinguished the Conventional Person cluster from other three clusters, showing that traits defining this function differentiate non-creativity and various kinds of creativity and

thus can be considered general to creativity. Discriminant function one also significantly distinguished the Artist cluster from other behavior clusters. This finding might reflect the variety of behaviors in these individuals (above average on both creative life-style and performing arts dimensions). Discriminant function two significantly distinguished the Scholar cluster from other three clusters.

STUDY 9

CREATIVITY AND PERSONALITY: STUDY OF PROFESSIONALS

Study 9 tested generality and domain specificity in relation to personality traits relevant to creativity. In the study of college students, there was support for both a set of general predictors of creativity and domain specific personality traits. However, some trait measures might have been biased in toward one dimension of creativity (e.g., intrinsic motivation specifically asked about enjoyment and challenge in academic activities). Therefore, Study 9 employed a set of measures that addressed these concerns and that enabled a more stringent test of generality of personality resources for creativity. Target personality traits were same as in the study of college students and represent global personality, emotions and motivation, cognition, social expression, and self-regulation. Relationship between creativity and personality was studied employing variable-centered and person-centered approaches; variable-centered approach identified personality traits related to separate dimensions of creative behavior, and person-centered approach analyzed personality profiles in different patterns of creative behavior.

Methods

Participants

Participants were the same 295 professional adults described in Study 7.

Measures

Selecting Personality Predictors

The goal was to assess all traits employed in Study 8, including global personality traits and traits in four areas of personality functioning. Because of the constraints on the length of the questionnaire, trait measures had to be very short. Therefore, Big Five traits were assessed by the Ten Item Personality Inventory (Gosling, Rethfrow, & Swann, 2003) and traits in the four areas of personality functioning were assessed by 3-item questionnaires based on previous research. Items assessing each trait were selected based on two criteria: (1) For traits measured by comprehensive personality inventories, selected items had highest loadings on the first extracted component identified in research with college students, and (2) For traits measured by performance tests, theoretical formulations of trait relevance for creativity was used as a model for generation of questionnaire items. Reliability of 3-item scales based on previously used inventories in a student sample ranged from .42 to .69, and are comparable or higher than some frequently used scales of the same length (e.g., Ryff & Keyes, 1995). For all traits, participants provided self-ratings on a 6-point scale from 1 (strongly disagree) to 5 (strongly agree).

Global Personality

Big Five personality traits. The Big Five personality traits were assessed with the Ten Item Personality Inventory (TIPI; Gosling et al., 2003). Scores were obtained for Extraversion (e.g., extraverted, enthusiastic), Agreeableness (e.g., sympathetic, warm), Conscientiousness (e.g., dependable, self-disciplined), Neuroticism (e.g., anxious, easily upset), and Openness to experience (e.g., open to new experiences, complex). Although very short, this questionnaire showed convergent validity in relation to commonly used Big Five measures and predictive validity in relation to diverse set of external criteria (Gosling et al., 2003).

Emotion and Motivation

Intrinsic motivation. Intrinsic motivation was assessed by 3 items from the Work Preference Inventory (WPI; Amabile et al., 1994) that had highest loadings in the factor analysis of items pertaining to intrinsic motivation. Two items concerned experiences of enjoyment in work (e.g., "What matters most to me is enjoying what I do") and one item addressed preference for challenge in work (e.g., "I want to find out how good I really can be at my work").

Trait hypomania. Assessment of trait hypomania included items from the Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986). Three highest loading items on the factor assessing high energy and elevated mood were included in the survey (e.g., "I am frequently so 'hyper' that my friends kiddingly ask me what drug I'm taking").

Cognition

Divergent thinking. Divergent thinking ability was assessed by 3 items based on the theoretical role of these abilities in creativity. Participants were asked to report on the quantity of ideas (e.g., "I generate many ideas when working on a problem") and their originality (e.g., "Other people think that I have original ideas").

Evaluation. Evaluation ability was assessed by 3 items based on the theoretical description of its role in creativity. Participants were asked about evaluation of their own work process at different points in the creative process, from the choice of problem or task (e.g., "I choose realistic ideas or problems to work on ") to willingness to accept critical feedback in response to their work (e.g., "When working on a project, I ask others for opinion or feedback and consider their advice").

Social Expression

Creative role. Participants were asked about their identification with creative professional role. The definition of the role (such as scientist or artist) was left to the respondent and they were asked about the level to which they define their professional role in terms of originality of expression (e.g., "I have chosen a line of work that involves originality").

Nonconformity. Social nonconformity was assessed by items from the Impulsive Nonconformity Scale (INS; Chapman et al., 1984). The questionnaire included 3 items with highest loadings on the factor identified as Social Nonconformity and they addressed unconventionality in behavior and reputation (e.g., "I do many things that seem strange to others but don't seem strange to me").

Self-Regulation

Persistence. Persistence was assessed with items from the Cognitive Persistence Scale (CPS; Tanaka et al., 1988). The selected items were the highest loading descriptors of a factor interpreted as Intellectual Curiosity and concerned interest in complex activities and persistence in these tasks (e.g., "I prefer intellectual task to one that doesn't require much though").

Risk-taking. Propensity towards risk-taking was assessed by items from the Risk-Taking Inventory (RTI; Jackson et al., 1971). Selected items were the highest loading descriptors of the first factor of monetary risk-taking and refer to willingness to take risks in order to buy low and sell high (e.g., "I would hesitate to put my money into any venture with an uncertain outcome, even though the benefits could be lucrative").

Procedure

Measures were administered in a web-based survey (see Study 7). Participants first completed measures of creative behavior, followed by the personality measures, and demographics. The survey started with an informed consent and ended with a debriefing and invitation for participants to ask for additional information about the study results.

Results and Discussion

The analyses focused on three goals: (1) Descriptive statistics for personality traits in the sample tested whether selection of participants for their creativity skewed this group's personality trait scores; (2) Variable-centered analysis evaluated personality traits related to each dimension of creative behavior (i.e., creative life-style, arts, and intellectual achievement); and (3) Person-centered analysis isolated groups of traits able to distinguish clusters of people with distinct patterns of creative behavior.

Intercorrelations Among Personality Variables

Participants were recruited based on peer nominations for creativity. To the extent that assessed personality traits are related to creativity, the sample could be skewed on these variables. Indeed, as can be seen in Table 22, means for 6 of 9 personality traits are high; on a 6-point scales mean scores ranged from 4.85 for evaluation to 5.18 for creative role. The sample can be described in terms of traits with high mean scores as open to experiences (on a level of global personality functioning), thinking divergently and engaging in multiple evaluations of their work (cognitive functioning), intrinsically motivated (emotional and motivational functioning), deliberately choosing a creative role (social expression), and intellectually curious (self-regulation). These high scores show that this set of traits is descriptive of individuals selected for creativity and working in different areas. However, scores on these trait measures are significantly skewed, which limits the size of correlations with criteria for creativity.

Another limit for size of correlations between measured personality variables and criteria will be imposed by rather low reliability coefficients. Alphas for personality measures ranged from .14 for intellectual curiosity to .76 for creative role, with 4 of 9 scales with alphas below .60 and additional 2 below .70. It has to be noted that these measures are very short (consist of only 2 or 3 items), and that longer scales with similar items would achieve higher reliabilities. Scales with comparable reliability coefficients were previously used in research and despite low reliabilities predicted important criteria (e.g., Megaree, 1972; Ryff & Keyes, 1995).

Table 22 shows correlations among personality variables. Most correlations are low to moderate (only 4 of 36 correlations were between .40 and .55). Moderately high

correlations concerned the relationship of creative role and openness to experience, divergent thinking, and intrinsic motivation. Furthermore, evaluation and nonconformity had significant negative correlation, $r(292) = -.14$, $p < .05$, possibly reflecting opposing requirements for originality and appropriateness in creativity.

Dimensions of Creativity and Personality

It was a priori predicted that traits from all areas of personality functioning would be related to each dimension of creative behavior. However, examination of reliability coefficients for personality scales and descriptive statistics for personality traits indicated that correlations between personality predictors and creativity criteria would be reduced because of these measurement problems. To estimate correlations after taking into account the unreliability of measurement, observed correlations were corrected for attenuation due to unreliability to measurement and both observed and corrected correlations are presented in Table 23. Observed correlations showed that Creative Life-Style dimension is correlated with at least one trait from all five areas of personality, while dimensions of Arts and Intellectual Achievement correlated with traits from 2 and 3 areas of personality functioning respectively. Correlations corrected for attenuation due to unreliability of measurement cannot be formally evaluated for their statistical significance. However, using a cut-off value of .15 to evaluate the size of corrected correlations, all three dimensions of creativity have at least one trait in each personality area related to creativity.

Analysis of correlations corrected for attenuation due to unreliability show that dimension of Creative Life-Style had 8 of 9 correlations with personality traits that exceeded .15 (*r*s between -.15 for evaluation and .66 for openness to experience). The

cut-off of .15 was exceeded for 6 of 9 correlations for dimensions of Arts (*r*s between .17 for trait hypomania and .54 for openness to experience) and Intellectual Achievement (*r*s between .15 for openness to experience and .73 for intellectual curiosity). Similar to findings in the study of college students, all dimensions were related to openness to experience and trait hypomania (personality area of emotional functioning). Of note, evaluation was negatively related to Creative Life-Style and Arts, while it was positively related to Intellectual Achievement. This difference suggests the belief in less importance of evaluation and appropriateness of products in everyday and artistic creativity, than in the intellectual domain.

Similarities and differences among three dimensions of creativity were also evaluated in regression analyses. Each dimension of creativity was predicted in separate standard linear regression employing 9 traits from all five areas of personality. Summary of multiple regression results is presented in Table 24.

Multiple *R*s were statistically significant for all three dimensions of creativity, ranging from $R = .39$, $F(9, 280) = 5.56$, $p < .001$ for Creative Life-Style, to $R = .33$, $F(9, 280) = 3.78$, $p < .001$ for Intellectual Achievement, and $R = .31$, $F(9, 280) = 3.35$, $p < .001$ for Arts. Creative Life-Style and Arts were predicted by traits from two areas of personality functioning and Intellectual Achievement was predicted by three areas of personality. Significant predictors of Creative Life-Style included a global trait of openness to experience ($\beta = .20$) and hypomanic personality trait ($\beta = .16$). Dimension of Arts was predicted by openness to experience ($\beta = .22$) and a self-regulation trait of intellectual curiosity ($\beta = -.15$). Intellectual Achievement was significantly predicted by intrinsic motivation ($\beta = -.18$), creative social role ($\beta = .21$), and intellectual curiosity (β

= .17). A suppression effect was observed for intrinsic motivation; zero-order correlation of intrinsic motivation and Intellectual Achievement was not different from zero, while the β coefficient in the regression analysis was negative and statistically significant.

Patterns of Creative Behavior and Personality

A discriminant function analysis was performed to identify personality traits that differentiate behavior clusters. Creativity relevant personality traits were used to predict membership in clusters labeled Conventional Person ($N = 49$), Everyday Creative Person ($N = 126$), Artist ($N = 54$), and Scholar ($N = 63$). Renaissance Person cluster was not included in the analysis because of its small size ($N = 3$). Personality variables were included in interpreting discriminant functions if their loadings were greater than $\pm .30$.

One significant discriminant function was identified, $\chi^2(27) = 59.19, p < .001$. The canonical correlation was .37 and explained 19% of the variance in the differences between clusters (Wilks' $\lambda = .81$). Table 25 shows correlations between personality variables included in the discriminant analysis and standardized canonical discriminant functions. Five personality variables had loadings above $\pm .30$: divergent thinking, creative role, openness to experience, trait hypomania, and nonconformity. Group centroids for discriminant function one show that it most prominently distinguishes the Conventional Person cluster from the Artist cluster, and that Everyday Creative Person and Scholar clusters fall in between them.

Classification results also provide information about the success of the discriminant function in distinguishing creativity clusters. Table 26 shows that the identified discriminant function correctly classified 39% of the cases originally grouped into four clusters. The least successful prediction was achieved for the cluster of

Everyday Creativity (26.4% of cases correctly classified) and the most successful classification was achieved for the Conventional Person cluster (54.2% of cases correctly classified). Individuals in the Artist and Scholar clusters were successfully classified in 43.4% and 49.2% of cases. Most misclassified cases were confounded between these two clusters; 24% of Artists were classified as Scholars and 30.2% of Scholars were classified as Artists. Also, individuals in the Artist cluster were commonly misclassified into the Everyday Creative Person cluster. Correct classifications show that the identified discriminant function is moderately successful at distinguishing the clusters, and misclassifications suggest that there is also substantial similarity among creative behaviors.

A series of post-hoc Tukey HSD tests were performed to test which pairs of clusters were significantly discriminated by scores on the discriminant function one (see Table 27 for pairwise contrasts). Significant differences were found between Conventional Person and other three clusters, suggesting that the discriminant function one includes traits general to all patterns of creativity. Discriminant function one also significantly distinguished the Artist cluster from the Everyday Creative Person clusters.

General Discussion

Applying a systems model of personality to select a set of relevant traits showed that different creative behaviors are related to all major areas of functioning in personality, in turn supporting the need for a systems approach in research on creativity and personality. Furthermore, these results support the conceptualizations of creativity as a syndrome requiring multiple resources in the person (Amabile, 1996; Mumford & Gustafson, 1988; Sternberg & Lubart, 1991, 1995). Different pieces of the creativity

puzzle can be assembled using variable-centered and person-centered analyses. A variable-centered analysis isolates different dimensions of creative behavior and independently examines their relationships with creativity relevant traits. A person-centered analysis, on the other hand, studies behavior patterns and their relationships with patterns of traits as they exist in the personality organization of different people. This analysis addresses the hypothesis that different patterns of traits can be related to patterns of behavior in different groups of people.

Two studies offer an opportunity to examine personality traits from different perspectives. In a study of professional adults nominated for creativity by their peers most creativity relevant personality traits had high mean scores, indicating that creative individuals in diverse domains can be described by these personality traits. However, substantial problems in measurement of personality traits in this group (skewness and low scale reliabilities) suggest that interpretation of obtained results should be only tentative. On the other hand, study of college students did not select participants for their creativity and had appropriate psychometric properties for measured personality traits, thus enabling a more reliable analysis of creativity and personality. Therefore, discussion of obtained results will be based on the study with college students.

Dimensions of Creativity and Personality

Variable-centered analysis showed three important findings. First, personality traits most successfully predict creative life-style. Second, largely parallel personality traits predict creative life-style and performing arts dimensions. And third, a different group of personality traits predicts intellectual achievement.

Personality traits theoretically defined as general across domains of creativity were best able to predict creative life-style, suggesting that this dimension of creativity can be most closely described as a behavioral expression of personality. The framework of Brunswik Symmetry (Ackerman & Kanfer, 2004; Wittmann & Suβ, 1999) offers a hypothesis for interpretation of these results. According to this framework, prediction is maximized when predictors and criteria are matched on breadth; broader, more general predictors, such as personality traits studied here, will be best able to predict broad criteria, and narrower predictors will be best able to predict narrower, more domain specific criteria. Creative life-style behaviors include activities in diverse areas of self-presentation, culture and media use, part-time work, and personal relationships and they do not require abilities and skills developed through specialized training. On the other hand, creativity in more formal domains, such as performing arts, depends both on general traits of personality, but also narrower or more specific abilities, skills, and traits. To the extent that there is selection for involvement in an activity (e.g., auditions for acting or singing groups are based on specific skills), prediction of such behaviors will be reduced when using a model of broad traits.

Comparisons of traits that significantly contribute to prediction of three dimensions in creative behavior show both similarities and differences among them. A largely similar set of personality traits predicts creative life-style and performing arts, including openness to experience, trait hypomania, and creative role. In contrast, intellectual achievement is predicted by a different set of traits, including risk-taking and intrinsic motivation. Differences in personality traits predicting different dimensions of creativity show that they are not distinguished only by content of behaviors in these

dimensions, but are also psychologically distinguishable. In particular, there is support for the distinction between life-style and creativity in performing arts on one hand and intellectual achievement on the other. Caution can be recommended, however, in interpreting these results as an indication that intrinsic motivation and risk-taking predict intellectual achievement, but not life-style or performing arts. Analysis of item content for measures of these traits shows that they might have been rather domain specific to intellectual achievement. For example, when used with college students, trait measure of intrinsic motivation, the Work Preference Inventory (Amabile et al., 1994), asks about experiences of enjoyment and challenge in school activities. For use in adult samples, the questionnaire refers to work and thus can encompass multiple domains, while school and grades apply somewhat more narrowly to education and thus the measure maps most closely to the dimension of intellectual achievement.

Patterns of Creative Behavior and Personality

Person-centered analysis indicated two main findings. Fist, one set of traits is able to distinguish clusters of noncreative individuals from clusters of individuals with different patterns of creative behavior. And second, another set of traits distinguishes cluster of college student scholars from other clusters.

The first set of traits that describes differences among clusters of people with patterns of creative behavior includes creative role, openness to experience, intellectual curiosity, and trait hypomania. This set of traits discriminates the cluster of conventional individuals from creative clusters, and can thus be interpreted as including creativity general traits. These traits can be a tentative operationalization of the theoretical construct of creativity relevant traits (Amabile, 1996). The core description of a creative

person thus includes imagination, complexity, and innovativeness (traits of openness to experience), a great amount of energy, belief in self-uniqueness, and wide interests (hypomanic traits), the person's self-definition as creative (social role identification), and inquisitiveness and interest in complex material (intellectual curiosity). This description of a creative person is in agreement with previously reported correlates of creativity (Barron & Harrington, 1981; Gough, 1992; Helson et al., 1995). The notable difference between these and previous results is in the assessment of creativity that compares multiple domains in the same individuals and investigates patterns in creative behavior.

The second set of traits that accounts for differences among clusters of individuals with different patterns of behavior includes intrinsic motivation, risk-taking, and divergent thinking. This set of traits primarily discriminates scholars among college students from other groups of creative individuals, showing that scholars are likely to find enjoyment and challenge in work (intrinsic motivation), able to generate multiple ideas when presented with a problem (divergent thinking), and are willing to take chances in the professional and financial areas (risk-taking). The predictive validity of these traits is lesser than for the first set of traits, indicating that broad personality traits are most successful in predicting a fundamental decision to engage in creative behavior (Sternberg, 2000; Sternberg & Lubart, 1991, 1995).

Collectively, patterns of traits identified in the person-centered analysis support the distinction between creativity-relevant traits and domain-relevant traits, in this case traits most descriptive of scholars among college students. Person-centered analysis offers a complementary view to common descriptions of creative behavior obtained from variable-centered analyses. Traditionally employed variable-centered analysis is not able

to take into account the organization of creative behavior in the individual; thus, it only provides a picture of traits related to isolated behaviors, and not behaviors as they coexist in a person. Recall that clusters of individuals were characterized by peak involvement in one domain of creativity, but also that involvement in one formal domain was accompanied by creative life-style behaviors. Person-centered analysis showed that in college students divergent thinking is related to creativity that is a combination of high intellectual achievement and average creative life-style, but it does not significantly predict intellectual achievement alone. Our prediction of behavior might therefore be more successful when predicting patterns, than if we relate a set of traits to isolated dimension of behavior.

CHAPTER V

CONCLUSIONS

A series of studies examined the question of generality and specificity in creativity. Generality and specificity have been variously defined as a correlation of behaviors in different domains, similarity of psychological attributes descriptive of different creative behaviors, and it has been at times discussed in relation to cross-fertilization of ideas between domains (Baer, 1993; Moran, 2003; Plucker, 1998; Root-Bernstein & Root-Bernstein, 2004). This paper analyzed the first two aspects of the definition of generality and specificity; it analyzed reports of naturally occurring behavior in domains of everyday, artistic, and intellectual creativity and also examined personality traits proposed as relevant for creativity across domains.

Studies with college students and professional adults nominated by their peers for creativity converged in defining the structure of creative behavior. Different areas of creative behavior formed three dimensions of individual differences (i.e., creative life-style, arts, and intellectual achievement). Interestingly, creative life-style included some artistic creativity behaviors. Person-centered analyses identified five clusters of individuals with similar patterns of creative behavior (i.e., conventional person, everyday creative person, artist, scholar, and renaissance person). In defining clusters of individuals creative life-style behaviors the co-occurred with behaviors in formal artistic

and intellectual domains. Also, it was possible to identify traits general across different contents of creative behavior and traits related only to specific creative behaviors in college students.

Research presented in this paper supported conceptions of creativity as containing both general and domain specific aspects. This structure could be best described in a hierarchy from individual acts to content areas and to broad dimensions and could be studied at each of these levels. If a goal is to study creative behavior, a map of levels in creative behavior can be a useful guide in choosing a criterion behavior. An alternative goal might be to study creative people. While most often creative individuals achieve greatest acclaim in one domain, they often times engage in everyday creative behavior, and a small number of people achieve success in multiple domains of creativity. A person-centered approach enables a researcher to take into account this patterning of creative behavior and identify traits related to behavior patterns.

Why is it important to learn about domain generality and domain specificity in creativity? Many scholars have argued for the theoretical importance of this question and some have suggested possible practical implications. Discussion of domain generality and specificity in creativity is important for refinement of appropriate criteria for creativity and can have implications for theories of creativity development. This theoretical knowledge can then have practical implications for education and selection. If creativity is domain general, the study of any creative group could be generalized to other creative group, but if creativity is domain specific, such generalizations are not justified and every creative group should be studied separately. Theories of creativity development can also benefit from the clarification of domain generality and domain

specificity. For example, co-occurrence of everyday creativity with creativity in formal domains of work suggests that everyday creativity might be a precursor of achievement in domains that require specialized training and experience. Such hypothesis is supported by research on childhood activities of women's occupational creativity (Helson et al., 1995).

Creativity scholars have been most prominently interested in applications of their research for development of educational programs aiming at promoting creativity (Baer, 1998; Plucker & Beghetto, 2004). Baer (1998) argued that general skills do not equally apply to different creative behaviors and instead proposed that creativity training programs target skills, traits, and attitudes related to success in a specific domain. On the other hand, Plucker and Beghetto (2004) noted that transfer is hindered by both a too general and a too specific focus; too much generality can lead to neglect of specific knowledge and skills and thus superficiality, while too much specificity in training can result in excess comfort with the existing knowledge and inability to generate original ideas or transfer skills between different areas or domains of work. An alternative approach acknowledges both general and specific nature of creativity by teaching creativity skills in a variety of contexts and encouraging application of these skills to all aspects of students' lives (Barab & Plucker, 2002; Renzulli, 1994). Research on generality and specificity in creativity can inform such programs in providing a list of skills that can be successfully applied to different domains and skills that can be most beneficial in the context of a specific domain. Similarly, research on generality and specificity in creativity can be applied to educational and professional selection. For example, when assessing a pool of candidates for a job that includes diverse tasks and a

possibility for advancement, it might be beneficial to select best candidates based on a combination of general skills and specific qualifications, so to maximize their likelihood for creativity in a wide range of tasks.

Of note, the generality of creativity could be underestimated in this research. There exist domains at the intersection of those assessed in this paper. MacKinnon (1975) described creativity in architecture as a combination of artistic and scientific creativity. Other hybrid domains have emerged more recently, such as digital art that blends advances in technology and art (Paul, 2003). These new domains might be similar to more traditional ones in that individuals commit to that particular line of work. In this regard, creativity in blended domains could be considered domain specific. However, creativity in blended domains might be also general. Future research will have to address whether behavior in hybrid domains is likely to be correlated with behaviors in both of the blended domains (e.g., digital art can be correlated to both art and technology) and whether psychological attributes related to these behaviors include domain specific traits characteristic of both blended domains.

The aspect of generality and specificity in creativity that has received the least attention from creativity scholars is the question of cross-fertilization between different domains. In this case ideas from one domain, such as science, are used as inspiration for work produced in another domain, such as arts. Root-Bernstein and Root-Bernstein (2004) found that approximately one fifth of Nobel Prize winners in literature found inspiration in the study of natural history and evolution. Similarly, numerous scientists and inventors used their experiences in the arts as inspiration (Hindle, 1981; Root-Bernstein, 2003). Examples of cross-fertilization indicate an ability to use analogies in

thinking that cross domain boundaries. Such ability is related to insight (Sternberg & Davidson, 1995) and might suggest that greater generality in creativity can be characteristic of particular kinds of creative contributions. One such framework for analysis of creative products makes a major distinction between types of contributions that accept the current paradigm and those that change the current paradigm in a domain (Sternberg, 1999; Sternberg et al., 2001). I would hypothesize that paradigm accepting contributions are largely based on domain specific skills. These contributions require knowledge of a domain and its methods and use this knowledge to replicate, redefine, or move the domain forward in a predictable fashion. On the other hand, contributions that reject a current paradigm require recreation of a domain so that it is redirected, reconstructed, or reinitiated. In order to redirect a domain, often times a method or a theory from a different domain is used as an aid or inspiration. For instance, Salvador Dalì used the psychoanalytic theory as an inspiration for his art that created the surrealist style and taken art in a completely new direction (Swinglehurst, 1996). From this discussion a new question crystallizes. Instead of asking whether creativity is general or domain specific, we should move to a more complex level of analysis by asking when is creativity general and when it is domain specific, for which people, and for which kinds of contributions.

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Table 1
Overview of predictors of creativity in four areas of personality functioning

Trait	References
Emotions and Motivation Initiates involvement in creative activity, may inspire problem identification and idea generation	
Intrinsic motivation	Amabile, Hill, Hennessey, & Tighe (1994); Csikszentmihalyi (1996); Kaufman (2002); Koestner, Ryan, Bernieri, & Holt (1984); Tierney, Farmer, & Graen (1999)
Positive emotions/manic states	Feist (1999); Isen, Daubman, & Nowicki (1987); Jamison (1989; 1990); Richards (1994); Schuldberg (1990; 1999)
Need for achievement	Crawford & Nirmal (1976); Dudek & Hall (1991); Guilford (1975); Helson (1996); Stein (1968)
Negative emotionality/depression	Cross, Cattell, & Butcher (1967); Helson (1999); Ludwig (1995); Post (1996); Walker, Koestner, & Hum (1995)
Affective sensitivity/empathy	Carlozzi, Bull, Eells, & Hurlburt (1995); Csikszentmihalyi (1996); Gough (1992); Helson (1999); Jamison (1993)
Cognition Allows identification of relevant problems, generation of original and valuable ideas, and evaluation and communication of products	
Divergent thinking abilities	Guastello, Bzdawka, & Guastello (1992); King, Walker, & Broyles (1996); Kogan & Pankove (1974); Runco (1986); Torrance (1972; 1981; 1988)
Evaluation ability	Charles & Runco (2001); Feist (1991); Merten & Fischer (1999); Runco & Charles (1993); Runco & Smith (1992)
General intelligence	Barron (1963); Barron & Harrington (1981); Cropley (1972); Hocevar (1980); Sternberg & Lubart (1995)
Problem finding	Csikszentmihalyi & Getzels (1971); Okuda, Runco, & Berger (1991); Runco & Nemiro (1994); Runco & Okuda (1988); Wakefield (1985)
Intuition	Jackon & Messick (1965); Policastro (1995); Raidl & Lubart (2001); Simonton (1975); Sternberg & Davidson (1995)

Social Expression Facilitates behavior characteristic of a creative social role and allows a person to display socially nonconforming behaviors or express unconventional ideas	
Artistic and investigative social roles	Barron (1972); Gough (1992); Feist (1999); Helson, Roberts, & Agronick (1995); Holland (1985)
Unconventionality/nonconformity	Cross, Cattell, & Butcher (1967); Crutchfield (1962); Csikszentmihalyi (1996); Gough (1992); Helson, Roberts, & Agronick (1995)
Schizotypy/psychoticism	Cox & Leon (1999); Götz & Götz (1979); Rawlings, Twomey, Burns, Morris (1998); Rushton (1990); Schuldberg (1990; 2000)
Independence of judgment/ self-sufficiency	Barron (1963; 1969); Cross, Cattell, & Butcher (1967); Helson & Crutchfiled (1970); Rushton, Murray, & Paunonen (1987); Whitney, Sagrestano, & Maslach (1994)
Aloofness and hostility	Dudek, Bernche, Berube, & Royer (1991); Hammond & Edelmann (1991); Helson & Crutchfiled (1970); Schaefer (1973); Wilson (1984)
Self-Regulation Oversees the creative process; assists generation of original ideas, while also maintaining a sense of reality; sustains effort in face of obstacles.	
Risk-taking	Eisenman (1969; 1987); Friedman & Foerster (2001); Glover & Sautter (1977); Joesting & Joesting (1973); Lubart & Sternberg (1995)
Persistence	Barron (1969); Csikszentmihalyi (1996); Guilford (1975); Helson, Roberts, & Agronick (1995); Stein (1968)
Tolerance of ambiguity	Helson & Pals (2000); Jackson & Messick (1965); Lubart & Sternberg (1995); Stein (1968); Tegano (1990)
Controlled primary process thinking	Dudek & Verrault (1989); Holt (2002); Martindale & Dailey (1996); Russ (2001); Sladeczek & Domino (1985)
Lack of defensiveness/ mature ego defenses	Albert (1996); Domino, Short, Evans, & Romano (2002); Dudek & Hall (1984); Smith & Carlsson (1983); Vaillant & Vaillant (1990)

Table 2
Most prototypical acts of everyday and artistic creativity (Study 2)

Prototypicality	% endorsed	Acts
		Everyday creativity
4.51	85.5	Drifted off in a daydream.
4.31	86.3	Told a joke and made people laugh.
4.01	65.8	Came up with a funny nickname for someone.
3.92	66.7	Took photographs just for fun.
3.87	75.2	Talked passionately about personal goals.
3.83	62.4	Went to a concert.
3.80	67.5	Listened to a great variety of music styles.
3.79	59.0	Made a card for someone.
		Artistic creativity
4.36	10.2	Sat down and drew/painted/sculpted from imagination.
4.29	37.6	Gave drawings or other self-made items as presents for birthdays or holidays.
4.21	.08	Submitted artwork to a well known contest and won a prize.
4.19	13.7	Wrote a song.
4.14	1.7	Carried a sketch pad all day long.
4.11	16.2	Made a mural out of photos, dried flowers, and anything else at hand.
4.11	5.1	Looked at own face on a screen or mirror and drew a self-portrait.
4.11	18.8	Kept a journal of thoughts and then turned it into poems.

Note. Prototypicality – mean prototypicality rating; % endorsed – percent of participants reporting performing an act

Table 3
Least prototypical acts of everyday and artistic creativity (Study 2)

Prototypicality	% endorsed	Acts
		Everyday creativity
1.53	.08	Went to school with paint all over the body and/or clothes.
1.66	1.7	Made own clothes.
1.79	0	Converted a garage into a stained glass workshop.
1.88	5.1	Tried to live like a favorite singer.
1.91	1.7	Learned belly dancing.
1.96	2.6	Backpacked around Europe.
1.98	.08	Followed a favorite band across country.
2.02	2.6	Used paper clips to hang a curtain.
		Artistic creativity
2.15	21.4	Drank coffee when everyone else drank beer.
2.32	82.0	Was the first person to ask if something was wrong with a friend.
2.43	59.8	Refused to compromise in a discussion when felt strongly about own ideas.
2.46	21.4	Bought clothes at the Salvation Army.
2.46	65.0	Took pictures and framed them.
2.50	53.0	Told a joke with double meaning and made everybody laugh.
2.61	33.3	Was the first one at a party to get up to dance or to speak when everyone else was quiet.
2.86	12.8	Played an imaginative role playing game.

Note. Prototypicality – mean prototypicality rating; % endorsed – percent of participants reporting performing an act

Table 4
Overview of the areas of the life-space (Study 3)

Life-space area	Groups of items on the life-space questionnaire
Self-presentation	Personal care and grooming
Arts and Crafts Activities	Arts
	Writing
	Performing Arts
Education and Work Activities	Work
	Academic Lifestyle
Culture and Media Consumption	Cultural Activities
	Movies
	Television
	Music
	Reading/news
	Games
Everyday Relations and Activities	Everyday Activities
	Relationships

Table 5
Principal components analysis of the life-space creativity questionnaire: Highest loading items in the domains of artistic and everyday creativity (Study 4)

	Artistic Creativity	Everyday Creativity
Cartooning	.75	
Song writing	.73	
Composing music	.72	
Writing lyrics	.70	
Working on art instead of going to party	.67	
Visiting art web site	.66	
Practicing music instrument	.65	
Singing in choir/band	.65	
Painting	.60	
Teaching self to play instrument	.60	
Making collages		.67
Making scrapbook of memories for friend		.63
Collecting quotes/poetry in journal		.61
Making bulletin boards		.58
Scrapbooking		.56
Wearing different hairstyles		.55
Making picture frames		.53
Taking photographs		.53
Making cards		.50
Publishing in literary magazine		.49

Table 6
Overview of areas of creativity identified in principal components analyses of everyday and artistic creativity (Study 4)

Area	Items
	Everyday Creativity
Interpersonal creativity	Made card *(.76)*, collages *(.65)*, picture frames *(.64)*, posters *(.64)*, bulletin boards *(.63)*, made scrapbook of memories for friend/significant other *(.63)*, scrapbooked *(.59)*, wore different hair styles *(.59)*, did photography *(.57)*, made ornaments *(.56)*, wore makeup *(.55)*, surprised friend/ significant other with gift or gesture *(.54)*, went on spontaneous trip *(.48)*, made stationery *(.46)*, gave fashion advice to friend *(.45)*, saw dance production *(.44)*, made picture frame as gift *(.39)*, designed hairdo *(.38)*, sent 'blank inside' card *(.38)*, wrote love letter *(.37)*, rearranged furniture *(.37)*, worked on assignment to make it original *(.36)*, made up dances *(.34)*
Self-expressive creativity	Published in school paper *(.81)*, kept personal journal *(.73)*, collected quotes/poetry in journal *(.70)*, published in literary magazine *(.62)*, learned new words and used them in conversation *(.51)*, painted designs on nails *(.46)*, made self center of attention *(.44)*, gave poem to friend *(.43)*, read extra for class *(.40)*, altered clothes *(.40)*, put quote of the day on door *(.40)*, watched foreign language program *(.36)*
	Artistic Creativity
Emotionally expressive art	Wrote poetry *(.90)*, art magazines read *(.87)*, wrote short story *(.65)*, researched internet on interest/hobby *(.58)*, worked on improving skill *(.54)*, wrote poem/drew on napkin on party *(.53)*, went to relax alone *(.43)*, drew cartoon *(.39)*, drew *(.38)*, shopped in art store *(.36)*, expressed emotions in art *(.33)*, drew during class *(.31)*
Committed artistic creativity	Published music *(.93)*, art lessons outside university *(.87)*, submitted artwork to contest *(.86)*, published photographs *(.66)*, composed music *(.66)*, stenciled *(.61)*, exhibited art in public *(.51)*, read photography magazine *(.35)*, cut friend's hair *(.33)*
Music creativity	Worked as DJ *(.74)*, wrote song *(.70)*, practiced musical instrument *(.65)*, taught self to play instrument *(.64)*, played in band *(.63)*, sang in choir/ band *(.63)*, wrote lyrics *(.63)*, published song *(.58)*, designed clothes *(.48)*

Artistic sensibility	Visited special exhibition in museum *(.82)*, visited art museum *(70)*, helped friend with art project *(.64)*, watched foreign movie *(.56)*, went to theatre *(.55)*, used unusual materials in artwork *(.49)*, visited art web site *(.47)*, designed video game *(.45)*, painted *(.45)*, had conversation about art *(.44)*, did art instead of going to party *(.44)*, sculpted *(.43)*, organized cultural event *(.36)*, went to local band concert *(.32)*

Note. Factor loadings are shown in parentheses.

Table 7
Correlations between act-frequency and life-space scales of everyday and artistic creativity (Study 5)

	Act-frequency				Life-space							
	Everyday creativity		Artistic creativity		Creativity domains		Everyday creativity areas		Artistic creativity areas			
	1	2	3	4	5	6	7	8	9	10	11	12
Act-frequency												
Everyday												
1. Prototypical high	.68											
2. Prototypical low	.46***	.42										
Artistic												
3. Prototypical high	.53***	.43***	.74									
4. Prototypical low	.52***	.39***	.46***	.53								
Life-space												
Domains												
5. Everyday	.61***	.33***	.51***	.52***	.89							
6. Artistic	.45***	.41***	.70***	.37***	.58***	.92						
Areas												
Everyday												
7. Interpersonal	.56***	.23*	.43***	.48***	.94***	.45***	.88					
8. Self-expressive	.48***	.40***	.48***	.38***	.70***	.58***	.45***	.73				
Artistic												
9. Emotionally expressive	.49***	.41***	.67***	.36***	.51***	.77***	.35***	.58***	.80			
10. Committed artistic	.23*	.23*	.43***	.10	.46***	.62***	.31***	.39***	.46***	.77		
11. Music	.27**	.22*	.38***	.12	.10	.59	.05	.12	.35***	.31***	.82	
12. Artistic interest	.36***	.39***	.58***	.28**	.43***	.76***	.42***	.32***	.44***	.41***	.38***	.81

Note. Values in the diagonal are alpha reliability coefficients.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 8
Correlations between scales of everyday and artistic creativity and Big Five personality traits (Study 5)

	Act-frequency						Life-space					
	Everyday creativity		Artistic creativity		Creativity domains		Everyday creativity areas		Artistic creativity areas			
	1	2	3	4	5	6	7	8	9	10	11	12
Extraversion												
Self-report	.23*	.04	-.04	.32***	.32***	-.06	.37***	.14	-.05	-.06	-.11	-.14
Friend	-.01	-.07	-.02	.21	.10	-.12	.10	.04	.00	-.11	-.20	-.14
Parent	.33**	.21	.13	.33**	.34***	.08	.32**	.22*	.02	.04	-.13	.15
Agreeableness												
Self-report	.00	-.07	.00	-.05	.09	.08	.15	-.07	-.01	.09	.04	.30***
Friend	.04	.26*	.09	.17	.15	.13	.14	.10	.08	.10	-.24*	.18
Parent	-.17	.10	-.07	-.02	-.10	-.09	-.11	-.12	-.05	-.07	-.07	.08
Conscientiousness												
Self-report	.23*	.10	.17	.20*	.06	-.05	.12	.04	.07	.00	-.01	-.07
Friend	.06	.03	.00	.13	.05	-.12	.05	.02	.02	-.05	-.25*	-.14
Parent	.06	-.06	-.04	.07	.00	-.13	.04	-.13	-.04	.04	-.05	-.04
Neuroticism												
Self-report	.00	.14	.03	-.07	.12	.12	.06	.14	.06	.02	-.04	.12
Friend	.21	.10	.14	-.10	.15	.17	.15	.18	.15	.12	.17	.05
Parent	.17	.13	.27*	.13	.23*	.20	.17	.29**	.26*	.03	.09	.05
Openness to experience												
Self-report	.33***	.29***	.40***	.30***	.30***	.46***	.24**	.34***	.38***	.32***	.30***	.37***
Friend	.09	.30**	.35**	.25*	.25*	.36***	.21	.26*	.37***	.11	.21	.31**
Parent	.08	.29**	.35***	.11	.17	.30**	.11	.18	.22*	.16	-.01	.42***

Note. $*p < .05$, $**p < .01$, $***p < .001$.

Table 9
Factor based scales in the domains of artistic, everyday, and intellectual creativity

Areas	Scale items
	Everyday Creativity
Crafts	Made collages *(.68)*, made photo collages *(.68)*, made picture frames *(.66)*, made scrapbook *(.64)*, made posters *(.58)*, made ornaments *(.56)*, made scrapbook for someone *(.55)*, made decorative boxes *(.54)*, took photographs *(.49)*, made picture frame for someone *(.48)*, made card *(.44)*, made stationary*(.40)*, gave fashion advice *(.39)*, stenciled *(.39)*, rearranged furniture *(.39)*, watched interior decorating show on TV *(.38)*, sent black inside card *(.36)*, sewed *(.35)*, watched award show on TV *(.32)*, seen dance production *(.32)*
Cultural refinement	Total books read *(.66)*, novels read *(.64)*, visited art museum *(.63)*, nonfiction books read *(.54)*, visited museum (other than art) *(.52)*, watched foreign film *(.49)*, went to local band concert *(.48)*, saw theatre play *(.46)*, visited special exhibition *(.46)*, went to a recital *(.45)*, had conversation about art *(.43)*, had conversation about politics *(.42)*, visited art web site *(.42)*, went to a lecture (not required for class) *(.42)*, had conversation about philosophy *(.39)*, saw opera or ballet *(.35)*, went to rock concert *(.35)*, days read for pleasure *(.32)*
Self-expressive creativity	Painted clothes *(.48)*, invented recipe *(.48)*, watched art program on TV *(.41)*, watched foreign language program on TV *(.40)*, died hair unusual color *(.38)*, asked teacher for an alternative assignment *(.37)*, helped friend with art project *(.37)*, designed tattoo for friend *(.34)*, kept personal journal *(.33)*, collected poetry in journal *(.32)*, wore self-made jewelry *(.30)*, wore self-designed clothing *(.30)*, wrote poem on napkin at party *(.30)*
Interpersonal creativity	Made self center of attention *(.59)*, told joke *(.51)*, laughed loud *(.50)*, went on spontaneous trip with friend *(.49)*, animated party *(.49)*, sang alone *(.44)*, surprised friend with gift/gesture *(.43)*, surprised significant other with gift *(.41)*, made up dances with friends *(.41)*, worked in summer camp *(.40)*, made mixed CD for someone *(.38)*, put picture of the day on door *(.37)*, designed hairdo for friend *(.35)*, wrote love letter *(.34)*, wore colorful clothes *(.34)*, had conversation with stranger *(.33)*, organized surprise party for someone *(.33)*, relaxed alone *(.33)*, gave poem to friend/significant other *(.30)*
Sophisticated media consumption	Read national newspaper *(.57)*, read local newspaper *(.45)*, read music magazines *(.44)*, researched internet on topic of interest *(.44)*, read music reviews *(.43)*, read entertainment magazines *(.41)*, read news online *(.40)*, watched educational TV *(.39)*, did extra reading in class *(.34)*, watched movies in theatre *(.34)*, cooked meal *(.30)*

Visual arts	Number of painting completed *(.74)*, number of drawings completed *(.73)*, time painting *(.69)*, time sculpting *(.66)*, time drawing *(.64)*, exhibited artwork *(.62)*, number of sculptures *(.62)*, hours spent on art *(.56)*, shopped in art store *(.56)*, time doing ceramics *(.55)*, artwork completed (other than painting and sculpting) *(.53)*, submitted artwork to contest *(.53)*, did art to relax *(.52)*, time cartooning *(.49)*, worked on murals *(.44)*, used unusual materials in art *(.42)*, expressed emotions in art *(.41)*, designed jewelry *(.40)*, designed clothes *(.34)*, stayed home to work on art *(.34)*, member of art club in high school *(.33)*
Music creativity	Practiced instrument *(.68)*, played music in public *(.66)*, received money for music performance *(.63)*, play\ed in band *(.62)*, member of music groups in college *(.62)*, played in orchestra *(.60)*, submitted music to contest *(.60)*, sang in choir/band *(.56)*, composed music *(.54)*, award for music performance *(.54)*, made demo CD *(.52)*, sight read music *(.50)*, taught self to play instrument *(.50)*, played in high school band *(.50)*, wrote song *(.47)*, played in high school orchestra *(.45)*, member of singing groups in college *(.41)*, wrote lyrics *(.39)*, worked on improving music skill *(.31)*
Dance	Danced ballet in production *(.80)*, choreographed dance *(.75)*, modern dance in production *(.75)*, entered dance competition *(.74)*, member of dance team in high school *(.70)*, received award for dancing *(.59)*, received money for dancing *(.55)*, member of dance team in college *(.50)*, published music *(.42)*, received money for song *(.42)*, worked as DJ *(.40)*, published song *(.38)*, performed stand up comedy *(.33)*
Theatre	Acted on stage *(.72)*, practiced lines for play *(.66)*, member of acting club in high school *(.61)*, staged play *(.55)*, member of choir in high school *(.52)*, member of acting group in college *(.48)*, award for acting *(.47)*, wrote screen play *(.39)*, member of film club in high school *(.35)*, put play on stage *(.30)*
Writing	Published in art magazine *(.64)*, entered writing in contest *(.64)*, published short story/poem *(.63)*, published in newspaper/ magazine *(.55)*, award for writing in previous year *(.53)*, read own piece in recital *(.51)*, received money for writing *(.51)*, received award for music composition *(.48)*, award for writing (ever) *(.45)*, published illustrations *(.39)*, wrote online journal *(.37)*, published in literary magazine *(.37)*, published in school paper *(.35)*, art magazines read *(.33)*, started/wrote novel *(.33)*, received money for acting *(.32)*, wrote poetry *(.30)*, published photographs *(.30)*, wrote short story *(.30)*

	Intellectual Achievement
Science achievement	Entered science competition *(.71)*, participated in science fair *(.70)*, presented at scientific conference *(.58)*, constructed scientific apparatus *(.58)*, designed experiment *(.56)*, award in science/mathematics *(.50)*, did library research for science project *(.47)*, work study in science laboratory *(.38)*, member of science clubs in college *(.31)*
Academic orientation	Participated in International Research Opportunity Program *(.79)*, independent study in social sciences *(.68)*, study abroad *(.59)*, published paper in undergraduate journal *(.34)*, independent study in natural sciences *(.33)*
Technology	Constructed radio device *(.74)*, entered math competition *(.61)*, robotics project *(.58)*, wrote software *(.58)*, designed video game *(.50)*, member of high school robotics club *(.36)*

Note. Factor loadings are shown in parentheses.

Table 10
Correlations among areas of everyday, artistic, and intellectual creativity in college students (Study 6)

	Everyday creativity					Artistic creativity					Intellectual creativity		
	1	2	3	4	5	6	7	8	9	10	11	12	13
Everyday													
1. Crafts	.88												
2. Cultural refinement	.39***	.83											
3. Self-expressive	.41***	.35***	.68										
4. Interpersonal	.55***	.40***	.46***	.81									
5. Sophisticated media use	.21***	.41***	.27***	.22***	.69								
Artistic													
6. Visual art	.60***	.46***	.48***	.34***	.19***	.89							
7. Music	.08	.26***	.15**	.18***	.01	.16***	.87						
8. Dance	.33***	.13**	.30***	.24***	.12*	.21***	.20***	.85					
9. Drama	.19***	.25***	.15**	.21***	.07	.19***	.32***	.26***	.78				
10. Writing	.37***	.38***	.46***	.32***	.20***	.51***	.27***	.33***	.27***	.84			
Intellectual													
11. Science	.09	.16***	.24***	.21***	.22***	.11*	.06	.00	.05	.08	72		
12. Academic	.00	.04	.24***	.14**	.14**	.02	.01	.18***	.04	.07	.20***	.60	
13. Technology	-.05	.08	.23***	.12*	.14**	.02	.01	.07	-.01	.13**	.37***	.35***	.67

Note. Values in the diagonal are alpha reliability coefficients.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 11
Principal components analysis: Dimensions of creative behavior in college students (Study 6)

	I	II	III
	Creative Life-Style	Intellectual Achievement	Performing Arts
Crafts	.83		
Visual arts	.80		
Cultural refinement	.67		
Interpersonal creativity	.64		
Self-expressive creativity	.61		
Writing	.52		.37
Sophisticated media use	.50		
Technology		.80	
Academic orientation		.71	
Science achievement		.63	
Music			.74
Theatre			.71
Dance			.55

Note. Only loadings greater than $\pm$.30 are shown.

Table 12
Correlations among areas of everyday, artistic, and intellectual creativity in professional adults (Study 7)

	Everyday creativity					Artistic creativity					Intellectual creativity		
	1	2	3	4	5	6	7	8	9	10	11	12	13
Everyday													
1. Crafts	.63												
2. Cultural refinement	.22***	.48											
3. Self-expressive	.30***	.25***	.35										
4. Interpersonal	.31***	.34***	.44***	.57									
5. Sophisticated media use	.16**	.39***	.24***	.20***	.58								
Artistic													
6. Visual art	.60***	.31***	.24***	.26***	.05	.72							
7. Music	.18**	.12*	.18**	.11	.08	.13*	.74						
8. Dance	.14*	.05	.24***	.19***	.02	.16**	.27***	.79					
9. Drama	.20***	.15**	.14*	.19***	.00	.27***	.17**	.36***	.76				
10. Writing	.17**	.30***	.18**	.28***	.28***	.24***	.20***	.08	.20***	.69			
Intellectual													
11. Science	-.08	-.01	-.12*	.08	.12*	-.11	-.04	.09	-.08	.09	.80		
12. Teaching	.13*	.11	.06	.21***	.15**	.06	-.03	.02	-.05	.16**	.45***	.83	
13. Technology	-.05	-.13*	-.14*	-.11	-.02	-.04	-.02	.09	.01	-.04	.26***	.08	.69

Note. Values in the diagonal are alpha reliability coefficients.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 13
Principal components analysis: Dimensions of creative behavior in professional adults (Study 7)

	I	II	III
	Creative Life-Style	Intellectual Achievement	Arts
Cultural refinement	.71		
Sophisticated media use	.67		
Interpersonal creativity	.62		
Writing	.55		
Self-expressive creativity	.51		
Crafts	.43		.40
Science achievement		.85	
Teaching	.40	.65	
Technology		.57	
Dance			.75
Theatre			.69
Music			.50
Visual arts	.38		.44

Note. Only loadings greater than $\pm$.30 are shown.

Table 14
Principal components analysis: Impulsive Nonconformity Scale (Study 8)

	I	II	III
	Mild Antisocial Attitude	Volatility	Social Nonconformity
careful drivers annoying	.52	.31	
invented excuses	.52		
danger for thrill	.49		
petty theft	.47		
break rules for fun	.44		.31
do things on impulse	.44		
act first	.43		.34
never in trouble with law	-.42		
purchase stolen merchandise	.42		
rarely act on impulse	-.42		
laugh loudly at clumsy people	.42		
embarrassed if in jail	-.38		
stop at red lights	-.37		
do what makes me happy	.36		
no plan for evening	.36		
reckless	.34		.31
skipped school	.33		
thinking destroys fun	.31		
like to annoyed teachers			
no care about cost			
parents objected to friends			
burping embarrassment			
save money			
avoid trouble			
consider viewpoints			
no worry about bills			
people say please too much			
yell when mad		.61	
lose track of what say when mad		.58	
not composed in argument		.53	
control feelings		-.51	
hit to relieve anger		.50	
controlled		-.45	
not understood		.44	
never too angry		-.38	
delays unbearable		.35	
obscene to shock people			
overeat			
open even if it hurts people			
actions strange to others			.56

misunderstood actions		.32	.52
people safeguard too much			.45
spontaneous	.38		.44
no sympathy for the gullible			.42
live for today	.36		.42
unusual to be different			.36
would worry about debt			-.34
mourners pretend			.32
worry about work mistakes			-.32
do not finish what start			
send cards			

Note. Only loadings greater than $\pm$.30 are shown.

Table 15
Principal components analysis: Persistence Scale and Cognitive Persistence Scale (Study 8)

	I	II
	Intellectual Curiosity	Behavioral Perseverance
work with little thought	.59	
ask teacher	-.58	
no need for understanding	.56	
not excited by new thinking	.54	
ask for explanation	-.45	
like to think	-.44	
avoid deep thinking	.43	.36
try again solving problems	-.41	-.39
try task again	-.40	
like intellectual tasks	-.40	
study only for class	.36	
stop work on time	.34	
answer all questions in class	-.32	
do not work after time	.30	
no care how job gets done		
study for tests		
carefully check		
no breaks while reading		
continue work on hobby		
dislike deliberating		
take breaks in work		
stay at party		
do not persist		.57
see whole TV show		-.52
not watch TV until end	-.31	.50
stop game		.49
persist		-.49
give up when fail	.40	.48
give up on problems	.42	.44
continue difficult work	-.30	-.40
no skipping pages		-.40
continue on math problem		-.39
stay at movies		.39
get help, do not try alone		.36
need encouragement		.34
do not complete activities		.31
skip school when feel bad		
stick to diet		
continue fishing		

do not clean at once	
breaks jogging	
let things happen	
persist in arguments	
demand explanation	
think hard	

Note. Only loadings greater than $\pm$.30 are shown.

Table 16
Descriptive statistics and correlations among traits from five areas of personality functioning (Study 8)

	M	*SD*	1	2	3	4	5	6	7	8	9
Global personality											
1. Openness	3.40	.57	.79								
Emotions and motivation											
2. Intrinsic motivation	3.29	.42	.46***	.76							
3. Trait hypomania	1.40	.16	.39***	.18***	.84						
Cognition											
4. Divergent thinking	15.08	4.19	.28***	.15**	.16***	.78					
5. Evaluation	14.01	5.53	.19***	.08	-.02	.00	.77				
Social expression											
6. Creative role	3.67	.73	.37***	.31***	.18***	.16***	.01				
7. Nonconformity	1.35	.19	.11*	-.03	.56***	.00	-.05	-.05	.80		
Self-regulation											
8. Intellectual curiosity	3.40	.48	.42***	.58***	.15**	.09	.06	.32***	-.22***	.73	
9. Monetary risk	2.64	.45	.12*	.10*	.22***	.06	-.03	-.01	.38***	.03	.75

Note. Values in the diagonal are alpha reliability coefficients.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 17
Correlations between dimensions of creative behavior and personality traits (Study 8)

	Global personality	Emotion and motivation		Cognition		Social expression		Self-regulation	
	Openness	Intrinsic motivation	Trait hypomania	Divergent thinking	Evaluation	Creative role	Non-conformity	Intellectual curiosity	Monetary risk
Creative life-style	.38***	.25***	.32***	.26***	.06	.37***	.12*	.27***	.05
Performing arts	.23***	.09	.18**	.15**	-.01	.22***	.00	.11*	-.02
Intellectual achievement	.12*	.24***	.18***	.05	.05	-.04	.13**	.16***	.16***

Note. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 18
Regression analyses: Personality trait prediction of dimensions of creative behavior (Study 8)

	B	*β*	*R*
Artistic Life-Style			.52***
Openness to experience	.04	.13*	
Intrinsic motivation	.00	.00	
Trait hypomania	.05	.14*	
Divergent thinking	.07	.15***	
Evaluation	.01	.04	
Creative role	.08	.24***	
Nonconformity	.03	.08	
Intellectual curiosity	.04	.13*	
Monetary risk	-.01	-.04	
Performing Arts			.32***
Openness to experience	.06	.15*	
Intrinsic motivation	-.02	-.05	
Trait hypomania	.07	.16*	
Divergent thinking	.04	.08	
Evaluation	-.02	-.04	
Creative role	.06	.14**	
Nonconformity	-.04	-.09	
Intellectual curiosity	-.01	-.02	
Monetary risk	-.02	-.04	
Intellectual Achievement			.34***
Openness to experience	-.02	-.05	
Intrinsic motivation	.10	.22***	
Trait hypomania	.05	.12	
Divergent thinking	.01	.02	
Evaluation	.02	.05	
Creative role	-.06	-.14**	
Nonconformity	.02	.04	
Intellectual curiosity	.04	.09	
Monetary risk	.04	.10*	

Note. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 19
Discriminant function analysis: Structure matrix for two significant functions (Study 8)

	I	II
Creative role	.72	
Openness to experience	.70	
Intellectual curiosity	.52	
Trait hypomania	.48	
Intrinsic motivation	.43	
Monetary risk		.68
Divergent thinking		.52
Nonconformity		.32
Evaluation		

Note. Only loadings greater than ±.30 are shown.

Table 20
Percent predicted cluster membership based on two discriminant functions of personality traits in college students (Study 8)

		Predicted cluster membership			
		1	2	3	4
Original cluster membership	1. Conventional	56.8	16.5	14.4	12.2
	2. Everyday creative	27	23.3	28.3	21.4
	3. Artist	7.7	25	48.1	19.2
	4. Scholar	27.6	10.3	15.5	46.6

Table 21
Absolute values of all pair-wise contrasts among cluster means on two discriminant functions of personality traits (Study 8)

	1	2	3	4
Discriminant function one				
1. Conventional person M = -.57	-			
2. Everyday creative person M = .24	.81***	-		
3. Artist M = .70	1.27***	.46*	-	
4. Scholar M = .07	.64***	.17	.63**	-
Discriminant function two				
1. Conventional person M = -.08	-			
2. Everyday creative person M = -.16	.08	-		
3. Artist M = -.09	.01	.07	-	
4. Scholar M = .73	.82***	.90***	.82***	-

Table 22
Descriptive statistics and correlations among traits from five areas of personality functioning (Study 9)

	M	*SD*	1	2	3	4	5	6	7	8	9
Global personality											
1. Openness	5.04	.84	.27								
Emotions and motivation											
2. Intrinsic motivation	5.14	.78	.25***	.62							
3. Trait hypomania	3.57	1.21	.17**	.31***	.72						
Cognition											
4. Divergent thinking	5.02	.75	.42***	.29***	.24***	.74					
5. Evaluation	4.85	.64	.08	.22***	.03	.31***	.32				
Social expression											
6. Creative role	5.18	.81	.41***	.51***	.18**	.54***	.20***	.76			
7. Nonconformity	3.69	.96	.18**	.21***	.27***	.16**	-.14*	.21***	.48		
Self-regulation											
8. Intellectual curiosity	5.02	.78	.25***	.28***	.08	.29***	.11	.30***	-.03	.14	
9. Monetary risk	2.99	1.12	.10	-.01	.15*	-.07	-.11	-.09	.05	-.04	.60

Notes. Values in the diagonal are alpha reliability coefficients.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 23
Correlations between dimensions of creative behavior and personality traits (Study 9)

	Global personality	Emotion and motivation		Cognition		Social expression		Self-regulation	
	Openness	Intrinsic motivation	Trait hypomania	Divergent thinking	Evaluation	Creative role	Non-conformity	Intellectual curiosity	Monetary risk
Creative life-style	.29*** (.66)	.16** (.24)	.25*** (.35)	.19*** (.27)	-.07 (-.15)	.18** (.25)	.16** (.28)	.04 (.13)	.12* (.18)
Arts	.21*** (.54)	.07 (.12)	.11 (.17)	.01 (.02)	-.07 (-.18)	.08 (.13)	.16** (.32)	-.10 (-.37)	.10 (.18)
Intellectual achievement	.06 (.15)	.03 (.05)	.09 (.15)	.21*** (.33)	.15* (.36)	.21*** (.33)	.02 (.04)	.20*** (.73)	.00 (.00)

Note. Correlations corrected for attenuation due to unreliability of measurement are in parentheses.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 24
Regression analyses: Personality trait prediction of dimensions of creative behavior (Study 9)

	B	*β*	*R*
Artistic Life-Style			.39***
Openness to experience	.11	.20*	
Intrinsic motivation	.02	.04	
Trait hypomania	.06	.16**	
Divergent thinking	.05	.08	
Evaluation	-.08	-.12	
Creative role	.03	.06	
Nonconformity	.02	.04	
Intellectual curiosity	-.03	-.06	
Monetary risk	.03	.07	
Performing Arts			.32***
Openness to experience	.12	.22***	
Intrinsic motivation	.01	.02	
Trait hypomania	.02	.05	
Divergent thinking	-.05	-.08	
Evaluation	-.04	-.05	
Creative role	.03	.06	
Nonconformity	.04	.09	
Intellectual curiosity	-.09	-.15*	
Monetary risk	.03	.06	
Intellectual Achievement			.33***
Openness to experience	-.06	-.09	
Intrinsic motivation	-.12	-.18*	
Trait hypomania	.03	.08	
Divergent thinking	.06	.08	
Evaluation	.09	.11	
Creative role	.14	.21**	
Nonconformity	.01	.01	
Intellectual curiosity	.02	.04	
Monetary risk	.12	.17**	

Note. $*p < .05$, $**p < .01$, $***p < .001$.

Table 25
Discriminant function analysis: Structure matrix for two significant functions (Study 9)

	I
Divergent thinking	.74
Creative role	.69
Openness to experience	.62
Trait hypomania	.50
Nonconformity	.35
Intellectual curiosity	
Evaluation	
Intrinsic motivation	
Monetary risk	

Note. Only loadings greater than ±.30 are shown.

Table 26
Percent predicted cluster membership based on two discriminant functions of personality traits in college students (Study 8)

		Predicted cluster membership			
		1	2	3	4
Original cluster membership	1. Conventional	54.2	18.8	6.3	20.8
	2. Everyday creative	27.2	26.4	24	22.4
	3. Artist	13.2	13.2	43.4	30.2
	4. Scholar	14.8	13.1	23	49.2

Table 27
Absolute values of all pairwise contrasts among cluster means on discriminant function of personality traits (Study 9)

	1	2	3	4
Discriminant function one				
1. Conventional person *M* = -.57	-			
2. Everyday creative person *M* = .24	.68***	-		
3. Artist *M* = .70	1.19***	.51**	-	
4. Scholar *M* = .07	1.07***	.39	.12	-

Note. *$p < .05$, **$p < .01$, ***$p < .001$.

Figure 1
Mean scores on three dimensions of behavior for five clusters of creativity (Study 6)

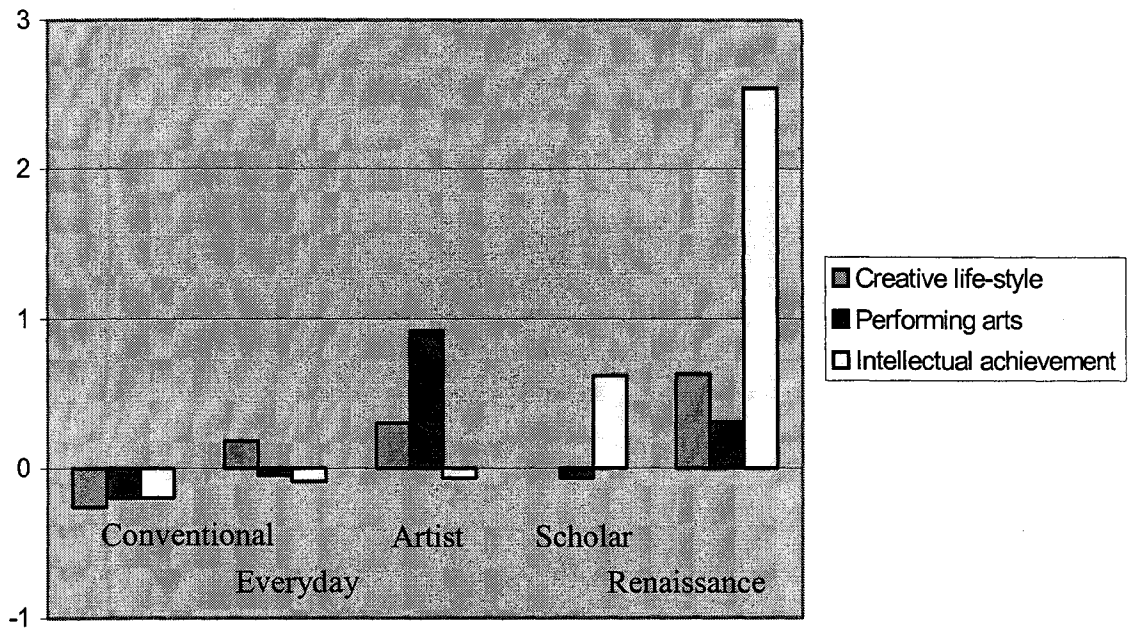


Figure 2
Replicability of a five-cluster solution for dimensions of creative behavior (Study 6)

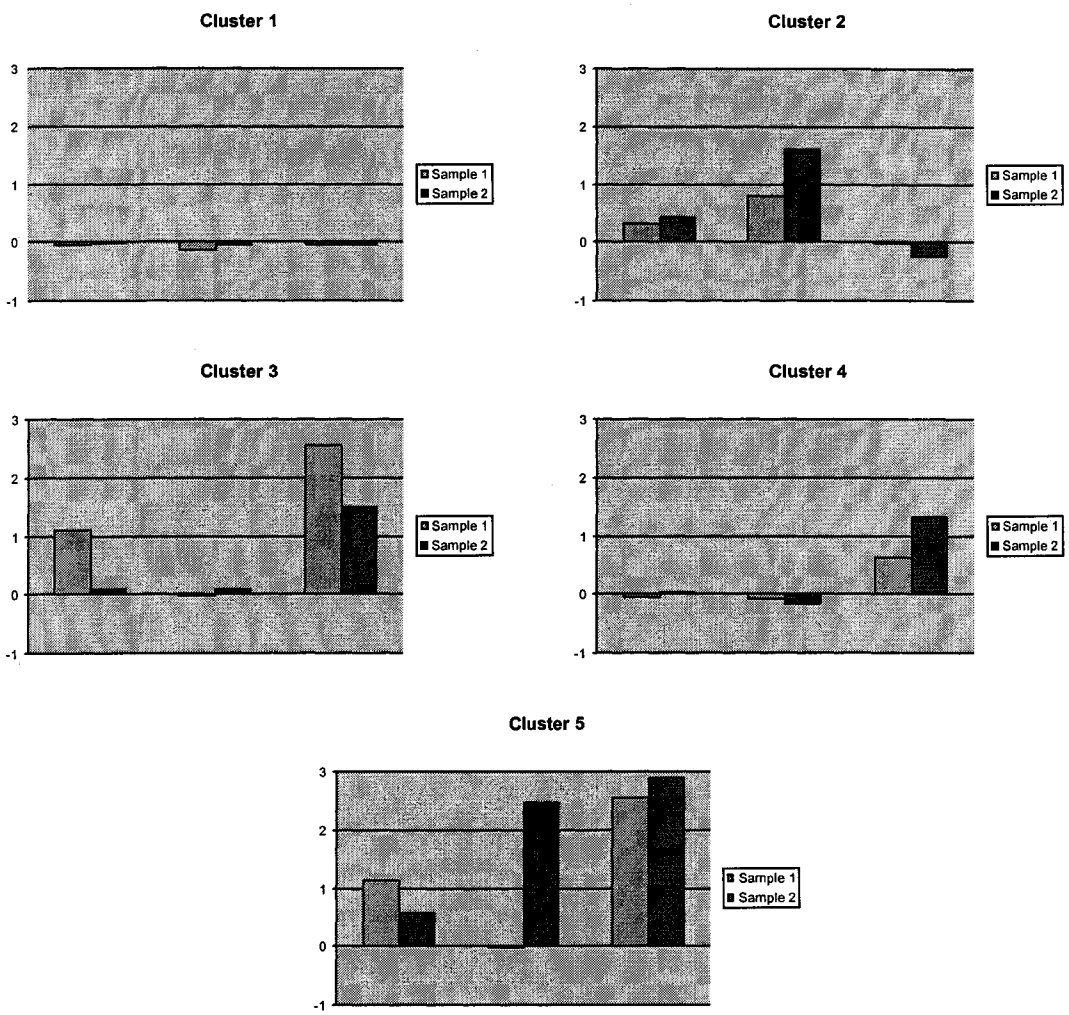


Figure 3
Mean scores on three dimensions of behavior for five clusters of creativity (Study 7)

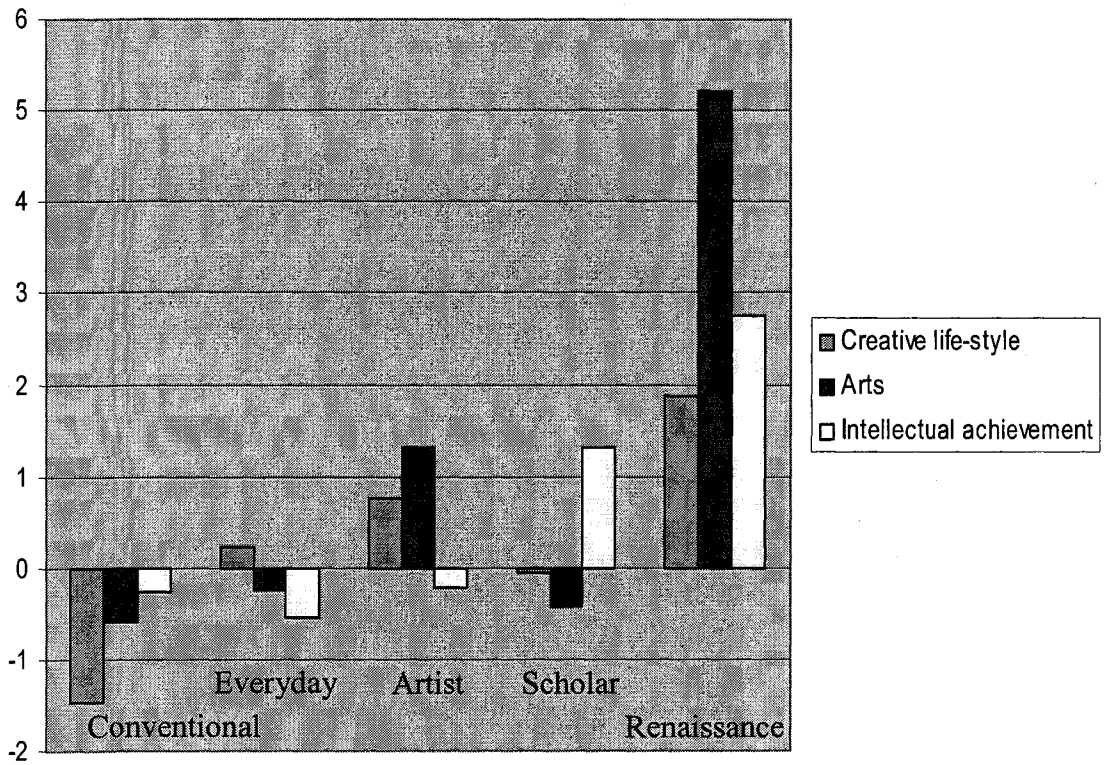
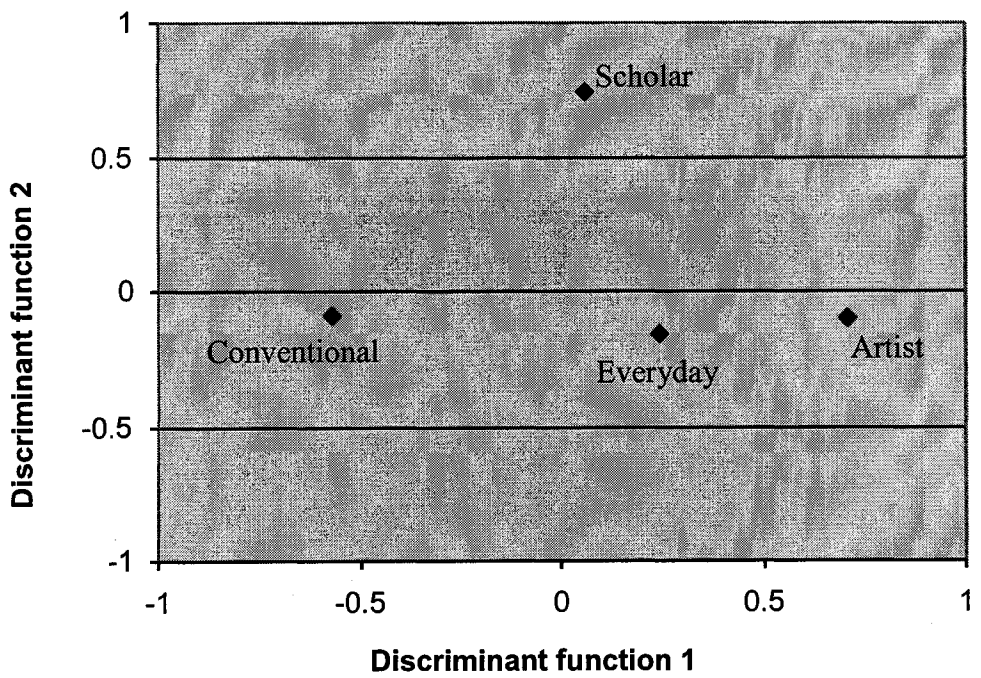


Figure 4
Group centroids on two discriminant functions based on creativity relevant personality traits (Study 8)



APPENDIX

University of New Hampshire
Institutional Review Board for the Protection of Human Subjects in Research
Departmental Review Committee Exemption Classification Sheet

Project Director ZORANA IVCEVIC **IRB #** 13

Department PSYCHOLOGY **Reviewer** _____

Project Title PREDICTING CREATIVITY : IN SEARCH OF THE CREATIVE PERSONALITY

Reviewer: Please write comments or contingencies of approval, if any, on a separate sheet of paper, and attach to this form. Place the completed form on file with the application for review, in the Departmental Review Committee files. Protocol applications and review forms will be forwarded to the Office of Sponsored Research each semester for reporting purposes.

☑ **Protocol qualifies as EXEMPT under the following subsection (check one) - see reverse for detailed category description:**

- ✓ 46.101(b)(1) Research conducted in established educational setting using normal educational procedures
- ____ 46.101(b)(2) Educational tests, surveys, interviews, observation of public behavior/no risk
- ____ 46.101(b)(3) Educational tests, surveys, interviews, observation of public behavior not exempt under Subsection 2, above, if public official or if confidentiality mandated by federal statutes
- ____ 46.101(b)(4) Study of existing data
- ____ 46.101(b)(5) Study of public benefits or service programs
- ____ 46.101(b)(6) Taste and food studies

☐ **Refer protocol to the regular IRB for EXPEDITED review under the following subsection (check one):**

- ____ 46.110(b)(1) Clinical studies of drugs/medical devices not requiring investigational new drug/device applications.
- ____ 46.110(b)(2) Collection of blood samples by finger, heel or ear stick, or venipuncture in healthy adults >110 lbs., or others and children, considering age, weight, health, collection procedure, frequency and amount of collection.
- ____ 46.110(b)(3) Prospective collection of biological specimens for research purposes by noninvasive means, and in a non-disfiguring manner: hair and nail clippings, teeth, sweat, saliva, placenta (after delivery), amniotic fluid (at membrane rupture/labor), dental plaque/calculus, mucosal/skin cells, sputum (after saline nebulization)
- ____ 46.110(b)(4) Collection of data through noninvasive means routinely employed in clinical practice (excluding x-rays and microwaves, and devices not approved for marketing): physical sensors applied to the skin, weighing, tests of visual acuity, MRI, EKG, EEG, ultrasound, etc., and moderate exercise by healthy volunteers.
- ____ 46.110(b)(5) Non-exempt research involving data, documents, records or specimens that have been/will be collected solely for nonresearch purposes (e.g., medical treatment or diagnosis).
- ____ 46.110(b)(6) Collection of data from voice, video, digital, or image recordings made for research purposes.
- ____ 46.110(b)(7) Non-exempt research on individual or group behavior or characteristics of individuals, such as studies of perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior, or research employing surveys, interviews, oral histories, focus groups, program evaluation, human factors evaluation, or quality assurance methodologies.
- ____ 46.110(b)(8) Continuing review of research such as studies permanently closed to enrollment of new subjects, or for which research-related interventions are completed, or for which only long-term follow-up of subjects remains, or for which no subjects have been enrolled and no additional risks have been identified, or for which data analysis is the only remaining research activity.
- ____ 46.110(b)(9) Continuing review of research (not conducted under investigational drug/device applications or exemption) where categories 2 through 8, above, do not apply, and for which the IRB has determined that the research involves no greater than minimal risk, and no additional risks have been identified.

☐ **Refer protocol to the regular IRB for FULL BOARD action (cite reason on separate sheet)**

☐ **Protocol cannot be approved as presented (cite reason on separate sheet)**

IRB Reviewer: _____ Date: 9/30/03

University of New Hampshire

Institutional Review Board for the Protection of Human Subjects in Research
Departmental Review Committee Exemption Classification Sheet

Project Director ZORANA IVCEVIC IRB # 23

Department PSYCHOLOGY Reviewer

Project Title PREDICTING CREATIVITY IN DIFFERENT DOMAINS: IN SEARCH OF THE CREATIVE PERSONALITY

Reviewer: Please write comments or contingencies of approval, if any, on a separate sheet of paper, and attach to this form. Place the completed form on file with the application for review, in the Departmental Review Committee files. Protocol applications and review forms will be forwarded to the Office of Sponsored Research each semester for reporting purposes.

☒ **Protocol qualifies as EXEMPT under the following subsection (check one) - see reverse for detailed category description:**

✓ 46.101(b)(1) Research conducted in established educational setting using normal educational procedures

— 46.101(b)(2) Educational tests, surveys, interviews, observation of public behavior/no risk

— 46.101(b)(3) Educational tests, surveys, interviews, observation of public behavior not exempt under Subsection 2, above, if public official or if confidentiality mandated by federal statutes

— 46.101(b)(4) Study of existing data

— 46.101(b)(5) Study of public benefits or service programs

— 46.101(b)(6) Taste and food studies

☐ **Refer protocol to the regular IRB for EXPEDITED review under the following subsection (check one):**

— 46.110(b)(1) Clinical studies of drugs/medical devices not requiring investigational new drug/device applications.

— 46.110(b)(2) Collection of blood samples by finger, heel or ear stick, or venipuncture in healthy adults >110 lbs., or others and children, considering age, weight, health, collection procedure, frequency and amount of collection.

— 46.110(b)(3) Prospective collection of biological specimens for research purposes by noninvasive means, and in a non-disfiguring manner: hair and nail clippings, teeth, sweat, saliva, placenta (after delivery), amniotic fluid (at membrane rupture/labor), dental plaque/calculus, mucosal/skin cells, sputum (after saline nebulization)

— 46.110(b)(4) Collection of data through noninvasive means routinely employed in clinical practice (excluding x-rays and microwaves, and devices not approved for marketing): physical sensors applied to the skin, weighing, tests of visual acuity, MRI, EKG, EEG, ultrasound, etc., and moderate exercise by healthy volunteers.

— 46.110(b)(5) Non-exempt research involving data, documents, records or specimens that have been/will be collected solely for nonresearch purposes (e.g., medical treatment or diagnosis).

— 46.110(b)(6) Collection of data from voice, video, digital, or image recordings made for research purposes.

— 46.110(b)(7) Non-exempt research on individual or group behavior or characteristics of individuals, such as studies of perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior, or research employing surveys, interviews, oral histories, focus groups, program evaluation, human factors evaluation, or quality assurance methodologies.

— 46.110(b)(8) Continuing review of research such as studies permanently closed to enrollment of new subjects, or for which research-related interventions are completed, or for which only long-term follow-up of subjects remains, or for which no subjects have been enrolled and no additional risks have been identified, or for which data analysis is the only remaining research activity.

— 46.110(b)(9) Continuing review of research (not conducted under investigational drug/device applications or exemption) where categories 2 through 8, above, do not apply, and for which the IRB has determined that the research involves no greater than minimal risk, and no additional risks have been identified.

☐ **Refer protocol to the regular IRB for FULL BOARD action (cite reason on separate sheet)**

☐ **Protocol cannot be approved as presented (cite reason on separate sheet)**

IRB Reviewer: John Lindon Date: 12/01/03

University of New Hampshire
Institutional Review Board for the Protection of Human Subjects in Research
Departmental Review Committee Exemption Classification Sheet

Name: ZORANA IVCEVIC **IRB #:** 15

Dept: PSYCHOLOGY **Reviewer:** _____

Study: DOMAIN SPECIFICITY AND GENERALITY IN CREATIVITY

Exempt Review

46.101(b)(1) _____ Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as:
(i) research on regular or special educational instructional strategies, or
(ii) research on the effectiveness of or comparison among instructional techniques, curricula, or classroom management methods.

46.101(b)(2) ✓ Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior unless:
(i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and
(ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to subjects' financial standing, employability, or reputation.

46.101(b)(3) _____ Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior that is not exempt under category (b)(2) if:
(i) the human subjects are elected or appointed public officials or candidates for public office; or
(ii) federal statute(s) require(s) without exception that confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

46.101(b)(4) _____ Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

46.101(b)(5) _____ Research and demonstration projects which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.

46.101(b)(6) _____ Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) or if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration, or approved by the Environmental Protection Agency, or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

_____ **Protocol is approved as presented in the category checked**
_____ **Protocol is approved with the following contingencies/comments (attach sheets if necessary)**
_____ **Protocol is referred to the IRB for Expedited or Full Board review**
_____ **Protocol cannot be approved as presented (cite reasons on separate sheet)**

DRC Reviewer: _____ **Date:** 2/3/05