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Daily Importance of Creativity to Entrepreneurial Team Members: A n Empirical Investigation

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DAILY IMPORTANCE OF CREATIVITY
TO ENTREPRENEURIAL TEAM MEMBERS:
AN EMPIRICAL INVESTIGATION

A Thesis

Presented to

The Faculty of the Department of Psychology

The College of William & Mary

In Partial Fulfillment

Of the Requirements for the Degree of

Master of Arts

by

Elizabeth Layne Paddock

2001

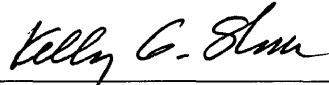
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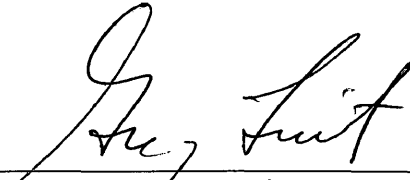
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the requirements for the degree of

Master of Arts


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ABSTRACT

The current study investigated the connection between entrepreneurship and creativity with respect to the members of a high-technology, entrepreneurial team. Twice a week for two four-week periods, nine team members completed Internet-based measures, including the components of creativity (novelty and usefulness), motivation types (intrinsic, synergistic, and extrinsic), and five daily events representing stages of the creative process (preparation, incubation, illumination, verification, and exploitation). Additionally, participants were given trait-based measures of these concepts. Multilevel random coefficient modeling analyses at the daily level suggested that both components of creativity, two types of motivation (intrinsic and synergistic), and two stages of the creative process (illumination and exploitation) predicted team members' daily perceptions of the importance of creativity in their work. Trait measures did not moderate these relationships, and the five subscales measured were shown to have medium effect sizes. The limitations and implications of the current research were discussed, as were ideas for future research.

DAILY IMPORTANCE OF CREATIVITY
TO ENTREPRENEURIAL TEAM MEMBERS:
AN EMPIRICAL INVESTIGATION

Daily Importance of Creativity to Entrepreneurial Team Members:

An Empirical Investigation

Creativity and entrepreneurship have traditionally been distinct topics of scientific investigation. Researchers recently have provided qualitative evidence that a relationship between the two exists (e.g., Amabile, 1997; Hills, Shrader, & Lumpkin, 1999; Whiting, 1987). Authors who have investigated this relationship have provided a strong step toward understanding the nature of the relationship between creativity and entrepreneurship; however, empirical evidence is still lacking. The objectives of the current study were threefold: to review the separate literatures on creativity and entrepreneurship; to examine existing literature relating the two topics; and to provide a daily empirical exploration of creativity importance in entrepreneurship.

Creativity

Historically, creativity researchers have studied creativity from three perspectives: the person, the product, and the process. Scholars concentrated initially on identifying characteristics of the creative person. Recently, scholars have argued that integrating research on the creative individual, product, and process would provide a better understanding of creativity. Empirical research pertaining to environmental factors that facilitate or inhibit individuals' ability to make a creative product also exists. Finally, researchers' efforts to define and measure the ongoing nature of the creative process have resulted in multiple theories of the creative process, which are based only on qualitative research.

The creative individual. As Feist (1998) pointed out in his recent meta-analysis of personality in scientific and artistic creativity, almost every major personality scholar in

the 20th century has written about the creative individual: Freud, Jung, Rank, Fromm, Maslow, Rogers, May, Kelly, Cattell, Eysenck, and Skinner (Woodman, 1981). More recently, trait-based investigations to identify aspects of the creative personality have been conducted, many of which stem from Guilford's (1950) Presidential Address to the American Psychological Association. The same definition has been used by nearly all researchers to define the creative individual as a person who involves him or herself in "creative thought or behavior (which) must be both novel-original and useful-adaptive" (Feist, 1998, p. 290).

As Feist noted, existing literature on the creative personality has led to multiple theories of the influence of personality on creative behavior (e.g., Eysenck, 1993; Feist, 1998; Russ, 1993). In Barron and Harrington's (1981) review of this literature, the authors concluded that a stable, core set of personality trait exist for creative individuals. Specifically, these distinguishing personality dimensions include a high valuation of esthetic qualities in experience, broad interests, attraction to complexity, high energy, independence of judgment, autonomy, intuition, self-confidence, ability to resolve antinomies or to accommodate apparently opposite or conflicting traits in one's self-concept, and a firm sense of self as "creative."

The majority of the research pertaining to creative individuals has assumed that creativity is a characteristic that is normally distributed in the population (Amabile, 1997; Nicholls, 1972). Early researchers believed that creativity was not domain specific; however, subsequent research has suggested that domain distinctions are important in the identification of such characteristics. A person who shows high creativity in one domain may exhibit very little creativity in another domain (Amabile, 1996). Feist (1998) drew

on such domain distinctions in his meta-analysis of the broad literature on creative artists and scientists, showing different patterns across the two groups.

Psychometric measures exist that reliably distinguish between these domain differences in creativity, for example, Domino's Creativity (Cr) scale (Domino, 1970, 1994). The Cr scale contains 59 items shown to differentiate creative individuals from noncreative individuals in domains such as art and science. In his more recent research on the measure, Domino (1994) showed that the Cr scale correlated with indexes of creativity such as self- and peer-ratings and course grades, as well as with other creativity adjective scales such as that proposed by Gough (1975).

Domain differences in individuals highly creative in business have also been suggested. Characteristics representative of these individuals include a) a high degree of self-discipline in matters concerning work; b) an ability to delay gratification; c) perseverance in the face of frustration; d) independence of judgment; e) a tolerance for ambiguity; f) a high degree of autonomy; g) an absence of sex-role stereotyping; h) an internal locus of control; i) a willingness to take risks; and j) a high level of self-initiated, task-oriented striving for excellence (Amabile, 1996). Additionally, characteristics that enhance a person's business creativity have been identified, including the ability to concentrate for long periods of time, abandon unproductive search strategies and/ or stubborn problems for a time, behave persistently, work hard, and maintain a high level of productivity and a high energy level (Amabile, 1997). Finally, in her research in which she used the BFI-44 (a measure that John (1988) created to measure the Big Five personality factors), Amabile showed that creative business people tend to show high

levels of extraversion, agreeableness, conscientiousness and openness, and low levels of neuroticism (Amabile, 1997).

The creative product and motivation. A creative product normally has been defined as a novel and appropriate product response to an open-ended problem in any domain (Amabile, 1996; Beattie, 1999). The term creativity is often paired with ‘innovation,’ which is the development and introduction of a new product, process, or service (Amabile, 1996; Beattie, 1999). Multiple factors have been found to affect the construction of a creative product; motivation is arguably the most important of these (Amabile, 1996).

Historically, the psychological literature on motivation distinguished between intrinsic and extrinsic motivation. The separation of these motivational types is evident in the way each was defined, as well as the different factors thought to affect each. Intrinsic motivation concerns the enjoyment or value an individual gains from the work itself. Social psychologists offered a definition of intrinsic motivation that is cognitive in nature: Individuals who are intrinsically motivated perceive task engagement as stemming from personal interest (Deci, 1975). Deci (1975) suggested that such personal interest includes underlying human needs for competence and self-determination. He and Ryan (1980) defined intrinsic motivation as “those (behaviors) that are performed in the absence of any apparent external contingency” (p. 42). Specifically, intrinsic motivation has been considered to include interest and enjoyment (Lepper & Greene, 1978), as well as feelings of autonomy, competence, task involvement, and preference for complexity and challenge (Deci & Ryan, 1985). In his personality research, Crutchfield (1962)

related this type of motivation to creativity, suggesting that it stems from the attainment of the creative solution.

In contrast, extrinsic motivation stems from outside of the task. Social psychologists suggested that extrinsically motivated individuals perceive task engagement as what must be done to achieve a related extrinsic goal (Deci, 1975). Deci and Ryan (1980) generally discussed extrinsic motivators as extrinsic rewards, external constraints, or internal communications (normally of a negative variety) on people's intrinsic motivation. According to Crutchfield (1962), extrinsic motivation may be considered an individual's wish for self-enhancement or self-defense, which involves material items such as money, job promotion, higher social status, or greater social affiliation.

Multiple authors have proposed that extrinsic motivation works in opposition to intrinsic motivation (e.g., Deci & Ryan, 1985; Lepper & Greene, 1978), such that when strong extrinsic motivators were present, an individual's intrinsic motivation for a task would decrease. In research on cognitive flexibility and complexity, McGraw (1978) applied these motivational findings, concluding that individuals used these types of cognition to a greater extent under high levels of intrinsic motivation. In contrast, McGraw found that straightforward, algorithmic tasks were fostered by extrinsic motivation, suggesting that extrinsic motivation decreases the novelty of responses.

Amabile (1983, 1996) drew on these findings, as well as Crutchfield's (1962) early work relating creativity and motivation, to develop a theory of the relationship between the two. She joined these ideas with her own research to propose her original

“Intrinsic Motivation Hypothesis of Creativity” (1983) and her revised version termed the “Intrinsic Motivation Principle of Creativity” (1996).

Amabile’s motivation research includes work on creative writers (1985). This research asserted that giving participants an intrinsically, neutrally, or extrinsically framed activity prior to the creative activity would result in significant differences in creative production in participants. Specifically, participants completed an initial writing exercise and then were randomly assigned to one of three conditions: rank a list of seven intrinsic items, rank a list of seven extrinsic items, or do nothing (control). The seven items in the intrinsic and extrinsic conditions had been previously identified in a pretest as falling into the respective categories.

Participants ranked intrinsically framed items including, a) you get a lot of pleasure out of reading something good that you have written, b) you enjoy the opportunity for self-expression, c) you achieve new insights through your writing, d) you derive satisfaction from expressing yourself clearly and eloquently, e) you feel relaxed when writing, f) you like to play with words, and g) you enjoy becoming involved with ideas, characters, events, and images in your writing.

Participants ranked extrinsically framed items including, a) you realize that, with the introduction of dozens of magazines every year, the market for freelance writing is constantly expanding, b) you want your writing teachers to be favorably impressed with your writing talent, c) you have heard of cases where one best-selling novel or collection of poems has made the author financially secure, d) you enjoy public recognition of your work, e) you know many of the best jobs available require good writing skills, f) you

know that writing ability is one of the major criteria for acceptance into graduate school, and g) your teachers and parents have encouraged you to go into writing.

Participants' rank-ordering of the items prior to completing the creative writing assignment was shown to affect final creative products. Participants in the intrinsic statement group were found to be slightly more creatively productive than participants in the control condition, who were more creatively productive than those in the extrinsic statement condition. Amabile concluded that concentrating on extrinsic reasons led to a decrease in creative production, but that concentrating on intrinsic reasons did not necessarily lead to an increase in creativity. One plausible explanation offered concerned the likelihood that high levels of intrinsic motivation to write already existed in the writers prior to the study. Amabile's summary of this work on the effect of motivational types on creativity suggested that the same extrinsic motivators that inhibit intrinsic motivation decrease individuals' creativity (Amabile, 1983). Based on these findings, she proposed the "Intrinsic Motivation Hypothesis of Creativity," which states that intrinsic motivation is conducive to creativity, but extrinsic motivation is detrimental to creativity (Amabile, 1996).

Research by Deci and Ryan (1985) and Amabile only partially supported Amabile's original motivation hypothesis of creativity, suggesting that only some extrinsic motivators inhibit intrinsic motivation and creativity. Deci and Ryan suggested that 'informational' and 'controlling' extrinsic motivators exist. Informational extrinsic motivators were thought to provide needed information, thereby enhancing intrinsic motivation. In contrast, controlling motivators constrained required resources, leading to a negative impact on creativity. Amabile made a similar distinction between these two

types of extrinsic motivation as they pertained to creativity in the business world, terming them synergistic extrinsic and extrinsic motivation. Synergistic motivators, thought to enhance levels of intrinsic motivation, included reward and recognition for creative ideas, clearly defined overall project goals, and frequent feedback for work supported creativity (Amabile, 1997). In contrast, extrinsic motivators had a negative impact on creativity; they included win-lose competition within an organization, expected negative evaluation of one's ideas, a focus on contracted-for rewards, and guidelines on how the work is to be done (Amabile, 1997). As Amabile noted, these differences showed that motivation did not work in an additive fashion. Instead, Amabile interpreted motivational types as influencing each other through a mechanism that she termed "motivational synergy." This concept was included in the revised theory of motivation to account for the positive influence of synergistic motivators on creativity. In her revised theory, Amabile (1996, p. 119) offered that "Intrinsic motivation is conducive to creativity; controlling extrinsic motivation is detrimental to creativity, but informational or enabling extrinsic motivation can be conducive, particularly if initial levels of intrinsic motivation are (at) high (levels)." Therefore, motivational synergy may be understood to occur when synergistic extrinsic motivators act in one of two ways: to support a person's interest in a task without undermining the person's self-determination, or to serve a specific function during stages of the creative process.

The creative process. As previously mentioned, measurement of the creative process has been extremely difficult because of its ongoing nature. Multiple researchers have proposed qualitative models for this process; however, many of them are based on

case studies of creative individuals. Arieti (1976) discussed eight of these models, the majority of which describe the creative process in terms of a sequence of steps.

Arieti included Wallas' (1926) model, which was one of the earliest to describe the creative process. Wallas suggested that four stages make up the creative process: preparation, incubation, illumination, and verification. Wallas maintained that during preparation the problem was investigated in all possible directions as the individual conducted a hard, systematic analysis of the problem. In the second stage of incubation, the individual did not consciously think about the problem, but instead let it sit in his mind. Wallas termed the third stage "illumination," and defined it as occurring when the idea appeared to the individual as a significant thought. The final stage, verification, like incubation, occurred in the individual's unconscious. According to Wallas, these four stages constantly overlapped and reoccurred as individuals explored various problems.

Wallas' conception of the creative process has been widely used in creativity research and has served as the basis for more recent theoretical work on the topic. For example, Barron's (1988) 'psychic creation model' paralleled Wallas' conception in the number of type of creativity stages (i.e., conception, gestation, parturition, and bringing up the baby) and in viewing creativity as a subconscious process. According to Barron, conception only occurred in a prepared mind, gestation happened when the time was right, parturition involved the emergence of the creative insight, and bringing up the baby allowed the idea to be further developed. A second example of Wallas' influence includes Amabile's (1997) generalization of the creative process; it detailed four stages similar to those outlined in Wallas' model: problem identification, preparation, response generation, and validation/communication. Like Wallas, Amabile found that it was

probable, but not necessary, for an individual to progress through these stages sequentially. In his book on organizational creativity, Kao (1989) reviewed Wallas' four stages and proposed a fifth stage, "exploitation." According to Kao, this fifth stage occurred after the results of the creative idea were verified and involved capturing the value from the creative concept.

Entrepreneurship

Initial research in the area of entrepreneurship focused on two aspects of new venture creation. First, multiple traits of the entrepreneur (e.g., achievement motivation) were investigated. Most subsequently have been shown to be unreliable ways to distinguish entrepreneurs from others. Second, a scholarly investigation of the process of new venture creation has occurred; in recent years it has focused on the concept of recognition of a business opportunity.

The entrepreneur. No distinct definition of the entrepreneur exists, as evident in Gartner's (1989) partial review of definitions in existing literature:

...a major owner and manager of a business venture not employed elsewhere
(Brockhaus, 1980)

...a man or woman who started to a business where there was none before, who had at least 8 employees and who had been established for at least 5 years
(Hornaday & Aboud, 1971)

...someone who exercises some control over the means of production and produces more than he can consume in order to see (or exchange) it for individual (or household) income...In practice such people turned out to be traders, independent artisans and firm operators (McClelland, 1961, p. 65).

...(an individual who approaches management in the) pursuit of opportunity without regard to resources currently controlled (Stevenson, Roberts, & Grousbeck, 1994, p. 5).

Yet, early entrepreneurship researchers attempted to identify traits associated with the heterogeneous group of participants defined by these parameters. Non-entrepreneurs were differentiated from entrepreneurs, who were presumed to have greater amounts of certain traits such as need for achievement (McClelland, 1987) and risk taking (reviewed by Brockhaus & Horwitz, 1986).

More recently, Miner (1996) proposed that the characteristics formerly associated with the entrepreneur be combined in four entrepreneurial types: the Personal Achiever, the Empathic Sales Person, the Real Manager, and the Expert Idea Generator. His findings were based on personality-based measures given to a group of 100 entrepreneurs over a 7-year period. According to Miner, the Personal Achiever demonstrated a personality pattern that included a need to achieve, a desire for feedback, a desire to plan and set goals, strong personal initiative, a strong personal commitment to their organization, a belief that one person can make a difference, and a belief that work should be guided by personal goals rather than the goals of others. The Empathic Supersales Person was someone who had a capacity to understand and feel with others, a belief that social processes were very important, a need to have strong positive relationships with others, and a belief that a sales force was crucial to carrying out company strategy. Real Managers included individuals who showed a desire to be a corporate leader, decisiveness, positive attitudes to authority, a desire to compete, a desire for power, and a desire to stand out from the crowd. Finally, the Expert Idea Generator

exhibited a desire to innovate, a love of ideas, a belief that new product development was very important for company strategy, good intelligence, and a desire to avoid taking risks. Follow-up interviews conducted with 84 of the original 100 entrepreneurs in the study, which provided information related to the success or failure of the entrepreneurial venture suggested that individuals who fit well into one of the four composite types were more likely to succeed than were people who did not fit well into any category.

A growing body of research, however, questions the value of such broad characteristics of “the entrepreneurial personality” (Gartner, 1989; Shaver, 1996). For example, Miner’s presumed “types” were constructed on the basis of his own theories about entrepreneurial behavior (not on the basis of empirical clustering of the data) and Miner’s respondents were a highly selected convenience sample. Other reviews have noted that the use of “personality” in the entrepreneurship literature has not maintained distinctions between true personality traits and other personal characteristics that psychological would not consider to be traits (Shaver, 1996). For instance, gender or parental education level often have been grouped with achievement motivation; while achievement motivation fits John’s (1988) definition of a trait (stable, long-lasting, and internally caused), characteristics such as gender and parental education level, though they are stable and long-lasting, are not necessarily internally caused.

With the possible exception of research pertaining to need for achievement, many of the measures used to assess entrepreneurial traits are not reliable, suggesting that the findings are not constant over time (Shaver, 1996). Yet, as noted by Shaver (1995), the assumption that all entrepreneurs are alike is easily made because of the availability heuristic. Entrepreneurs have been categorized by the traits individuals most easily

remember rather than by actual data. Finally, many researchers have assumed that the individual entrepreneur causes entrepreneurship, ignoring environmental factors as possible causes for new venture formation (Gartner, 1989). For these reasons, entrepreneurial characteristics should be carefully measured using scales that are intended to test long-term behaviors and the act of new venture creation should be viewed with respect to all aspects of entrepreneurship (Gartner, 1989; Shaver, 1996).

Recently, Shaver, Gartner, Gatewood, and Vos (1996) introduced the Entrepreneurial Attitude Questionnaire (EAQ), as a measure to assess the individual's long-term, entrepreneurial tendencies and that is meant to be used within a framework that includes environmental factors. The 35 items that make up the EAQ cover ten constructs, each of which is composed of multiple items. The authors derived these constructs from four sources, including Kirton's (1976) Adaption-Innovation Questionnaire; Paulhus's (1983) Spheres of Control (SOC) scale; Robinson, Stimpson, Huefner, and Hunt's (1991) Entrepreneurial Attitude Orientation Scale (EAOS); and risk-based questions developed specifically for the EAQ (Shaver, Williams, & Scott). The EAQ was administered to 116 potential entrepreneurs at a public workshop required and sponsored by a small business development center (SBDC). Factor analysis showed in three creativity factors similar to Kirton's (1976) original dimensions (Efficiency, Rules, and Originality), three useable factors derived from the EAO (Achievement Behavior, Business Activities, and Innovation Behavior), and two locus of control factors (Social Control and Personal Control). In conclusion, the authors suggested the EAQ was valuable as a short measure of entrepreneurial tendencies and proposed that further work on the measure be done.

The process of new venture formation. The quest to identify the entrepreneurial personality occurred, in part, to identify individuals who were likely to recognize the need for and implement new businesses. Research focused on patterns of identification and implementation of ideas by successful entrepreneurs (e.g., Wärneryd, 1988). Scholars have identified "opportunity recognition" as an integral part of the entrepreneurial process (Hills & Shrader, 1998; Hills, Shrader, & Lumpkin, 1999). Yet existing models of this process have shown that it does not end with an entrepreneur's initial recognition of a business opportunity, but that it included multiple other stages (Bhave, 1994; Gartner, 1985). Arguably it is this entrepreneurial process that distinguishes new ventures from other forms of business (Gartner, 1989). In Bhave's (1994) model, which is one of the most recent, venture creation "begins with the idea for a business and culminates when the product or services based upon it are sold to customers in the market" (p. 224). He described three stages that are iterative, nonlinear, feedback driven, conceptual, and physical in nature: the opportunity stage, the technology set-up and organization-creation stage, and the exchange stage. The multiple elements of these stages include a commitment to a physical creation, organization creation, and product creation.

In his conceptualization of the process, Bhave touched upon two elements of entrepreneurship that should be highlighted. First, the process of new venture creation normally involved multiple individuals, including the members of the new venture team (Hills, Shrader, & Lumpkin, 1999). Whether the entrepreneurial venture was started by one individual or a group, it involved multiple groups of people. Yet, much of the entrepreneurship literature does not study aspects of entrepreneurship in relation to members of the entrepreneurial team (Cooper, 1986; Alex Stuart). The current study

contributes to the existing literature by focusing on such individuals. Second, Bhavé's focus on opportunity recognition as a continuing process suggests that opportunity recognition is, in some form, ongoing in nature. This enduring cycle has been likened to the creative process (Hills, Shrader, & Lumpkin, 1999).

Entrepreneurship as a Specific Type of Creativity

The entrepreneur as a creative individual. A few researchers have argued for a relationship between the entrepreneurial and creative personality (Fernald Jr., 1988; Whiting, 1988). Whiting (1987) presented a qualitative case for the relationship between the two on the basis that definitions of both entrepreneurs and creative individuals varied and were based on numerous, shared characteristics. He drew the conclusion that of the five most commonly cited categories of creativity characteristics and the 19 personality qualities most commonly attributed to the entrepreneur, only five entrepreneurial qualities were not shared by the creative individual. These were individuals' profit-orientation, ability to get along with people, foresight, dynamic-leader style, and responsiveness to suggestions/criticism. Notably, one characteristic Whiting cited as important for both entrepreneurs and creative individuals was motivation. As was clear from the previous discussion of motivation in each realm, this characteristic had similar effects on each type of individual.

Whiting referred to Amabile's (1996) componential theory of creativity as a possible explanation for the five characteristics that distinguished entrepreneurs from creative people. Amabile suggested that three components were necessary for creative work: domain-relevant skills, creativity-relevant skills, and task motivation. Whiting (1987) offered that domain-relevant skills presented an explanation for the five

distinguishing characteristics; the domain-specific nature of these skills may be specific to entrepreneurial creativity and not shared by highly creative individuals in other domains or the generic creative individual. In explaining the characteristic differences of entrepreneurs and creative individuals in this manner, Whiting strengthened his argument that the “entrepreneur,” as defined by traits, was really a domain-specific personality description of a creative individual.

The entrepreneurial process as a form of the creative process. As previously discussed, one of the most important elements of entrepreneurs is the ability of these to recognize business opportunities. Recent research by Hills, Shrader, and Lumpkin (1999) on opportunity recognition likened the entrepreneurial process to the creative process, calling opportunity recognition a specific form of the creative process. The authors discussed opportunity recognition in terms of the four stages of creativity originally presented by Wallas (1926) and the fifth stage introduced by Kao (1989) as a supplement: preparation, incubation, illumination, verification, and exploitation. Hills, Shrader, and Lumpkin, however, used “insight” and “evaluation” as terms for illumination and verification respectively. Hills, Shrader, and Lumpkin (1999) focused on how each of the five noted stages of the creative process related to opportunity recognition by entrepreneurs. Based on their interpretation of results from a survey that included 35 opportunity recognition items given to 165 entrepreneurs, the authors discussed the relationship from a theoretical perspective. This research and other contemporary investigations of opportunity recognition supported the idea that opportunity recognition exists as a form of the creative process.

In her definition of “entrepreneurial creativity,” Amabile (1997) discussed the entrepreneurial creative process as a individual-level phenomenon with multiple components:

The generation and implementation of novel, appropriate ideas to establish a new venture (a new business or new program to deliver products or services). The primary novel, useful ideas may have to do with: (a) the products or services themselves, (b) identifying a market for the products or services, (c) ways or producing or delivering the products or services, or (d) ways of obtaining resources to produce or deliver the products or services.

Clearly, the above definition was useful in describing the entrepreneur in the phase of idea conception. More specifically, it explained the four various aspects that the entrepreneur must consider when conceiving the idea for a new venture. Yet, Amabile’s definition of entrepreneurial creativity did not account for the entire creative process as it relates to venture creation; it related only to the first of these stages of a new venture and did not reflect the subsequent stages of the entrepreneurial process.

Ongoing opportunity recognition as a form of creativity. Previous literature has highlighted the recognition of an entrepreneurial venture as a type of innovation resulting from a creative product (Amabile, 1997). A creative product has been defined in existing creativity research as a product both novel and appropriate and given in response to an open-ended problem in any domain. Innovation, which results from and is contingent upon creativity, has been defined as the implementation of creative idea. Timmons (1990) spoke of the relationship between new venture creation and innovation, saying that entrepreneurship reflects creativity in its conception and implementation of novel

products. He maintained that the implementation of such products involved the identification of market opportunities as well as the organization and systems established to bring the product to market. Amabile's recent work on the connection between entrepreneurship and creativity is similar to Timmon's (1990) suggestion; Amabile (1997) defines this relationship as, "the successful implementation of creative ideas to produce a new business, or a new initiative within an existing business."

In conclusion, the comparisons led these authors to assert that entrepreneurship may be considered a facet of creativity. Taken as a whole, the work of these researchers laid the foundation for a new line of research relating the two bodies of research.

The Current Study

The overall purpose of the current study was to provide further evidence for the relationship between entrepreneurship and creativity by looking at entrepreneurial team members' perceived importance of creativity in daily entrepreneurial work activity. The creativity importance investigated in the current study differs from the measurement of creativity previously discussed. Specifically, the current study adds a new dimension to the study of creativity by looking at how important creativity is to entrepreneurial team members' days, which is important because if components of creativity are found to significantly predict creativity importance an additional method of fostering creativity within the organizational context will be suggested. Specifically, if novelty and usefulness positively predict creativity importance in entrepreneurial team members, increasing the novel and useful tasks given to entrepreneurial employees will increase the way in which these members perceive creativity importance. This may have a circular effect on creative employees such that greater creativity importance would then foster

more daily creative behavior in these employees, increasing the daily overall creative production of the organization substantially.

Notably, as is the case with multiple other daily activities (e.g., exercise), participants' indication of the importance of creativity does not indicate that these individuals participated in creativity on a daily basis. The measurement of creativity importance in the current study, while different from the focus on creative behavior in previous research, is an important aspect of the current study. The comparison of daily creativity importance with novelty and usefulness, the two aspects thought to define creativity, allows the current study to comment on entrepreneurial team members' perceptions of the importance of daily creativity and whether these feelings stem from participants' work tasks in the form of novel and useful tasks. Therefore, the current study is able to look at whether the entrepreneurial study of creativity is important to individuals working in the domain, as well as how participants perceive creativity on a daily basis.

The current study made use of relatively new methodology and statistical packages (i.e., multilevel modeling and Hierarchical Linear Modeling), providing the first empirical study of the relationship between the entrepreneurship and creativity. The role of creativity in the everyday activity of team members was assessed in multiple ways, including the components of creativity and the stages of the creative process. Further, the role of motivational types in participants' everyday work also was assessed on state and trait levels. Data collected from these measures allowed multiple hypotheses to be made concerning the relationships between daily measures (e.g., Do daily perceptions of the importance of creativity covary with daily scores of the importance of novelty?) and daily

and trait measures (e.g., Is the day level covariation between daily perceptions of creativity importance and novelty predicted by trait creativity?).

An understanding of the standard use of the terms “state” and “trait” in the multilevel modeling literature is imperative to understanding the use of such statistical techniques, as well as results reported in the current study. Generally, the term “state” is used to discuss a measure that is collected on an event or interaction contingent basis and on which participant’s scores are expected to vary daily. In his definition of state variables, John (1988, p. 541) suggests that they are “temporary, brief, and caused by external circumstances.” In daily events studies, participants are normally asked to log in at the end of the day to complete a set of daily (state) measures. These measures are used to assess the amount to which a person varies on a day-to-day basis on a specific variable. Whereas under John’s definition it is possible that states are more transient than a day, many researchers use the daily measurement of state variables as a measurement of the variance in these states because it is more practical in nature (e.g., Nezlek, in press, a). In contrast, existing multilevel modeling work uses the term ‘trait measures’ to refer to these characteristics or traits that are believed to vary little over an extended period of time (usually years). The current study used the trait and state terminology to discuss the multilevel models used to analyze the current data. For present purposes, state measures consist of items worded in a daily manner that should be viewed as day-to-day measurements of variables on which participant’s scores are expected to fluctuate daily. In comparison, present trait measures consist of personality trait and characteristic measures, which are expected to remain relatively stable over time.

The first hypothesis of the current study was based on the widely accepted definition of creativity as both novel and useful. Surprisingly, the acceptance of this definition rests on theoretical work (Wallas, 1926), case studies (Csikszentmihalyi, 1996), and creativity rating techniques (Amabile, 1996) rather than empirical investigations of the relationship between these components and creativity. The current study offered an empirical investigation of this relationship. Specifically, because both of these elements are required for creativity, participants were expected to perceive novelty (or usefulness) as being more important on days when creativity was also perceived as being of greater importance to the performance of their work. In contrast, on days when novelty (or usefulness) was perceived as less important, creativity was also expected to be perceived as less required for the task at hand, resulting in the following hypothesis:

Hypothesis 1: Participants' daily perceptions of creativity importance were expected to covary positively with participants' state-based novelty and usefulness scores.

The relationship between creativity importance and motivation were investigated using a hypothesis similar to that used for the components of creativity. Prior literature does not indicate that all motivational types influence creativity in a positive manner; instead it suggests that both intrinsic and synergistic motivation promote creativity, the former to a greater extent than the latter. Extrinsic motivation, however, inhibits creativity. Therefore, on days when participants believed that intrinsic and synergistic motivation were important, creativity should also have been perceived as important. In contrast, on days when extrinsic motivation was important to individual team members,

creativity should have been less important to team members. This resulted in the second hypothesis:

Hypothesis 2: Participants' daily creativity importance was expected to covary positively with daily intrinsic and synergistic motivation, but to covary negatively with daily extrinsic motivation.

Predicting the covariation between creativity importance and stages of the creative process proved more difficult for several reasons. First, as previously mentioned, multiple authors have discussed the creative process (e.g., Barron, 1988; Wallas, 1926) in a theoretical, stage-based manner. Yet, very little research has been conducted on these stages. In order to incorporate these stages into the current experiment, definitions of stages of the creative process given by Wallas (1926) and Kao (1989) were used to operationalize each stage of the creative process as a daily event. The author acknowledges that this may have narrowed or otherwise distorted these stages, however, operationalizing these definitions was one of the optimal ways to investigate the creative process at a daily level.

Authors have discussed these stages as occurring in creative individuals and resulting in creative products, which some researchers equate with ongoing aspects of the entrepreneurial venture (e.g., opportunity recognition). Even in initial stages, new business often is carried out by entrepreneurial team members. Therefore each of the stages of the creative process could occur in the individuals of an entrepreneurial team on a daily basis. Further, each event describing one of these stages represented an aspect leading to creativity, suggesting that these events should covary positively with participants' creativity importance. Specifically, on days when individuals were involved

in events representative of one or more of the stages of the creative process, individuals were expected to perceive creativity as more important and vice versa. The third hypothesis summarizes this prediction:

Hypothesis 3: Participants' daily creativity importance would covary positively with each of the five daily events representing stages of the creative process.

Finally, as is evident in literature pertaining to the creative individual and to motivation, state variation in creativity and motivation is related to inherent creativity and motivation. Therefore, the covariation of creativity importance with creativity components, motivational types, and events of the creative process should be partially explained by characteristic level measures of each variable. These relationships resulted in the final set of hypotheses:

Hypothesis 4: Participants' trait-based creativity was expected to positively covary with novelty and usefulness.

Hypothesis 5: Participants' trait-based motivation scores for intrinsic, synergistic, and extrinsic motivation would positively covary with intrinsic, synergistic, and extrinsic motivation, respectively.

Hypothesis 6: Participants' trait-based creativity would positively covary with each event used to operationalize a stage of the creative process.

Method

Participants

Participants included one high-technology, new venture team. The team consisted of nine full-time employees at a Richmond, Virginia-based, new technology venture (one female and eight males). Of the nine participants, one participant fell into the age range

25 to 29 years old, two participants in the age range 30 to 34 years old, three participants in the age range 45 to 49 years old, and three participants in the age range 50 to 54 years old. On average, participants had 3.44 years of higher education and 19.56 years of full-time work experience. All participants were Caucasian.

Materials

Three types of materials were given to all participants: demographic measures, daily measures, and Level 2 measures. A standard set of demographic questions were asked, which included variables such as age, race, gender, years of schooling, and years of work experience (see Appendix A).

With respect to daily measures, it is important to note that the same set of statements were asked at both daily sessions; specifically, participants received the same two sets of statements per day and these did not differ between the two sessions. Additionally, standard instructions for all daily measures preceded each set of daily measures. These questions, the timing of the sessions, and the two session periods were structured to assess the importance the creative process during the one of the periods of time that is most influential to new businesses. Further data were gathered during two different daily time periods to investigate expected state and event differences between afternoon and evening periods. Differences were expected because it was anticipated that entrepreneurial team members would engage in activities with others more in the afternoon (during normal business hours) than in the evening. This may have meant that team members were involved in different stages of the creative process to a greater degree during either the afternoon or evening.

Daily measures consisted of state measures and event measures. Level 1 measures were taken of participants' perceptions of creativity, the components of creativity, and three motivation types (see Appendix B). In total, nine statements were assessed twice a day; the current study focuses on six of these statements, including one statement on state perceptions of the importance of creativity, two statements on the components of creativity (novelty and usefulness), and three questions on motivation types (intrinsic, synergistic, and extrinsic). Participants' perceptions of the importance of creativity were measured using the statement "The ability to think and work in a creative manner was important in my work." The novelty and usefulness of participants daily work were measured by the statements "The business task(s) (i.e., jobs, strategizing, decisions made) that I worked on was (were) very NOVEL.", and "The business task(s) (i.e., jobs, strategizing, decisions made) that I worked on was (were) very USEFUL," respectively. Finally, three statements pertained to motivation types, with a statement measuring intrinsic motivation ("I found my work interesting."), a statement measuring extrinsic motivation shown to foster creativity ("The reward or recognition that I received for my ideas helped me to keep working."), and a statement measuring extrinsic motivation detrimental to creativity ("I felt limited in my work because of a lack of resources or funding."). Participants responded to these statements on a seven point scale: 0 = Do not wish to respond, 1 = Disagree strongly, 4 = Neutral, 7 = Strongly agree.

In all, eight events were measured twice every day; five of these events are those discussed in the current paper. Daily events measures consisted of five events pertaining to each of the five stages of the creative process as proposed by Wallas (1926) and Kao (1989). One statement, derived from the definitions offered for each stage, was asked

during each daily session to assess the creative process. Daily event measures of preparation (“I felt sensitive to the issues related to my work.”), incubation (“I mulled over some of the issues and problems associated with my work while working on unrelated tasks.”), illumination (“I arrived at a solution to an important business problem today.”), verification (“I assessed a business idea or opportunity to see if there was a market for the resulting product or service.”). Additionally, the item “I worked out the fine details of a business idea to ensure that the resulting product or service will be produced.” was used to evaluate Kao’s exploitation stage.

Finally, five trait and characteristic-based measures were administered to all participants. Four of these measures related to the relationship between entrepreneurship and creativity, and were therefore analyzed in the current study. These include Domino’s Creativity Adjective Check list (see Appendix C), the BFI-44 (see Appendix D), Entrepreneurial Attitude Questionnaire (EAQ) (see Appendix E), and Amabile’s (1985) motivational items (see Appendix F). The current study used these measures to provide further support for the relationship between entrepreneurship and creativity by incorporating these measures in analyses with daily measures. Additionally, these measures were used to assess the relationship between inherent creativity and the Big Five personality dimensions, entrepreneurial-creative tendencies, and the motivational orientation of participants.

Cr scale. Domino’s (1970) Creativity (Cr) scale also was used to assess trait-based creativity. The scale consists of 59 items shown to differentiate creative individuals from noncreative individuals. All items were derived from Gough and Heilbrun’s (1965) Adjective Check List (ACL), which numerous studies have successfully used to study

creativity (Domino, 1970). Examples of items used in the current study include absentminded, autocratic, humorous, impulsive, outspoken, sarcastic, and sharp-witted. Directions used in the current study asked that participants indicate which of the 59 items described themselves by placing a check in the box next to the item. The adjectives identified by participants as describing themselves were given a score of 1. All adjectives denoted as describing an individual were summed to create a composite score of total inherent creativity. Domino's recent work suggests that the CR scale is not influenced by participant gender or creative domain.

BFI-44. The BFI-44 is a short version of the Big Five Inventory of personality traits, which is based on John's (1990) research involving the five basic dimensions of personality. The 44 items on this scale measure the five factors of personality (extraversion, agreeableness, conscientiousness, neuroticism, and openness) by asking participants to indicate the degree to which they agree or disagree with statements such as "I see myself as someone who tends to find fault with others." Because respondents answered BFI-44 statements on a five-point Likert scale, higher mean values (i.e., closer to 5) represent more of a given personality dimension and lower mean values (i.e., closer to 1) represent less of a particular personality dimension.

Entrepreneurial attitude questionnaire (EAQ). Shaver's Entrepreneurial Attitude Questionnaire (EAQ) was also used to assess the creative aspects of individuals' entrepreneurial tendencies. The 35 items that make up the EAQ cover ten constructs related to entrepreneurship, each of which is composed of multiple items. These constructs were derived from three sources, including Kirton's (1976) Adaption-Innovation Questionnaire, Robinson and colleagues' achievement motivation scale, and

risk-based questions developed specifically for the EAQ. Specifically, the highest loading items on each factor used, regardless of the original source, were combined to form the EAQ. A complete description of the process of scale construction is included in Shaver et al (1996). The current study focused on the relationship between entrepreneurship and creativity, so only Kirton's creativity measures included in the EAQ were assessed and discussed.

Motivational types. Participants' intrinsic, synergistic extrinsic, and extrinsic motivation were measured using a modified version of Amabile's (1985) 12 motivational items for creative writers. Items were adapted for use in the current study so that the overall meaning behind each item would fit the entrepreneurial team participating in the current experiment. As an example, an intrinsic item was altered from "You get a lot of pleasure out of reading something that you have written" (Amabile, 1985) to "You get a lot of pleasure out of presenting something you have prepared well for." An example extrinsic item alteration was "You realize that, with the introduction of dozens of magazines every year, the market for freelance writing is constantly expanding" (Amabile, 1985) to "You realize that by doing well on everyday work you have a chance of getting a raise." Participants were asked to respond to each of the twelve statements on a seven-point Likert scale.

Procedure

At the beginning of the study, a presentation was given to all members of the entrepreneurial team. During this presentation the general nature of the experiment was explained and all participants were asked to sign a Departmental and College Consent Form (see Appendix G). While participants signed the consent forms, the anonymous and

confidential nature of the data collection was discussed in detail to ensure the comfort of all participants in completing such work-related and Internet-based research. Specifically, participants were told of the strict measures taken to protect the privacy and confidentiality of the demographic, daily, and questionnaire data that were taken in the present study. Participants were identified in the database only by an arbitrary password (e.g., cubicle), which they were given in an email prior to their initial login. Additionally, only the researchers and an unrelated and named William & Mary Psychology Department faculty member had access to the database. Further, participants were told that at no point would any party release the database information to anyone and that all resulting publications would not mention the company by name.

Participants were asked to log on to an Internet website to answer a series of questions every day for two three-week sessions and to complete questionnaires at the beginning and end of the Internet portion of the study. Participants were given the Internet address, as well as the timing of the Internet sessions. The timing of the set of experimental sessions (i.e., the October Session: Monday, October 23, 1999 to Friday, November 10, 1999 and the January Session: Monday, January 8, 2001 to Friday, January 26, 2001) and the two Daily Sessions (lunch-time and end-of-the-day) per day during each session, were explained to the participants in detail. The start dates of both sessions were included in this explanation. Participants were asked to generate and agree on two start times for each of the two daily sessions, and were advised that these two times should be two time spans when all participants would be most likely to log on. The two daily sessions were scheduled to occur between 10 A.M. and 1 P.M. and between 4 P.M. and 6 P.M. Employees were informed that each daily session was estimated to last

five minutes or less, that 17 questions were asked during each session, and that the set of questions asked during both daily sessions would not vary between days. Participants were also given a few examples of possible daily events questions; the examples were not used in the actual study.

Following this explanation of the Internet site, participants were given a set of questionnaires, including the BFI-44, the EAQ, the Cr scale, and a set of standard demographic questions (e.g., age, years of work experience, etc.). Team members were asked to read the directions at the top of each measure and to complete the measure. The researcher encouraged team members to contact the experimenter with any questions that occurred during the experiment. The researcher also told participants that she would maintain regular contact with all team members during testing sessions via electronic mail and weekly office visits. After the January Session, the second group of questionnaires was given to participants, including Amabile's (1985) motivational items. A statement of appreciation was provided in the form of an email to all team members following the final questionnaire session.

Notably, the final data reported in the current paper reflect modifications made to both of the monthly sessions, as well as to the two daily session log-in times. The October and January Sessions were extended from three weeks to four weeks per participants' requests to allow participants an initial week to become acclimated to the Internet procedure and the study. Therefore, the official October Session was Monday, October 23, 1999 to Friday, November 17, 1999. The January Session lasted from Monday, January 8, 2001 to Friday, February 2, 2001. The daily session log-in times, which were originally the two windows of time previously mentioned, were modified to

account for the fact that entrepreneurial team members' daily work schedules did not adhere to a normal business day schedule (i.e., 9 A.M. to 5 P.M.). Each day, participants' initial daily log-ins were coded as afternoon and second daily log-ins were coded as evening, if, and only if, these two entries were spaced approximately two hours apart. This coding system allowed for the inclusion of all completed daily sessions.

Results

The data structure for the current study was of a multi-level nature such that observations at the smallest level of analysis (daily sessions) were nested within a middle level of analysis (days), which was nested within a final level of analysis (people). The data program HLM (Bryk, Raudenbush, & Congdon, 1998; Student Version 5.0) was used to run multilevel random coefficient models (MRCM) on the data. For further information regarding the use of MRCM methods to analyze daily events, refer to Nezlek (in press, a).

The current study focused on the analysis and discussion of the daily event and state-based measures taken during the October and January Sessions. During each of these four-week periods, there were a total of 360 potential workday morning and afternoon login times that the nine participants were asked to complete. Over the October Session participant entries totaled 230, completing a total of 64% of the total sessions as a group. In contrast, during the January Session, participant entries totaled 93, finishing the survey only 26% of the time. Table 2 provides a complete description of individual participants' login rates.

The data from the January Session were less representative of individual's daily states and events because of the low participation rate during this period. Additionally,

the relatively small amount of data made it impossible to draw comparisons between data obtained during the October and January Sessions. Without making such comparisons, it was impossible to tell whether data collected during each of these sessions was significantly different. Therefore, unfortunately, the data from the January Session were discarded from the current study. All Level 1 analyses involved only the October Session, which took place one month prior to the new venture's being in business for a year.

Analyses of the data from the October Session involved three levels of analysis and comprise what multilevel modeling scholars term a 'three-level model.' In the current study the three level model consisted of daily sessions (afternoon or evening) at Level 1 nested within days at Level 2 nested within individuals at Level 3. Recall that the study was constructed to test for possible differences between the afternoon and evening activities of entrepreneurial team members. If these activities were significantly different, including these two daily sessions as a separate level in the multilevel model would be critical for all models run. Therefore, a series of three level models were run for all major variables were run to incorporate a test the possibility that differences between the afternoon and evening sessions existed. These models provided little evidence that significant differences existed between the two daily sessions.¹

Therefore, the afternoon and evening daily sessions were collapsed and these data were used as data points analyzed on the same level of analysis (i.e., daily session) in subsequent analyses. By following this method of data analysis, each daily session (afternoon and evening) was analyzed as a separate session, which allowed the number of days analyzed per participant to be effectively double the number of days that participants were actually tested. This resulted in two level models of analysis, which

consisted of sessions daily sessions nested within individuals, effectively eliminating the middle level of analysis (i.e., days).

Whereas nine people is a rather large size for a new venture team, multilevel modeling studies are rarely run with so few people. The within person nature of the hypotheses put forth in the current study, however, means that nine participants are an adequate number of people to test the within person (daily) activity of entrepreneurial team members. In contrast, between person (trait) hypotheses were assessed, although nonsignificant findings were expected because of the large sample size. Calculations were run to assess the variance accounted for by the Level 2 variables to further assess the Level 1 and Level 2 findings. It also is important to note that the small sample size did not influence the reliability or validity of the state measures in the current study.

Descriptive Statistics, Reliability and Validity of Daily Measures

To provide descriptive statistics for each of the daily measures discussed, what multilevel modeling analysts term a ‘unconditional model’ was run on each measure. An unconditional model consists of each daily measure (state or event) run as a dependent variable (y_{ij}) without any other independent variables included in the model at either level 1 or level 2. In other words, no intercepts or slopes are included in the analysis, which results in the following level 1 and level 2 equations:

$$y_{ij} = \beta_{0j} + r_{ij}$$

$$\beta_{0j} = \gamma_{00} + u_{0j}.$$

As explained by Nezlek (in press, a), HLM estimates the reliability of the coefficients automatically and defines this reliability as the ratio of the true to the total variance of an effect. For a further explanation of these comparisons, refer to Nezlek (in

press, a, in press, b). Usually, a comparison of the error terms associated with trait and state level variables measuring the same construct provides an estimate of the validity of the daily measures. Stated in simpler terms, comparing the error terms associated with the variable at Level 1 of analysis and the error associated with the variable at Level 2 allows one to assess the convergent validity of the two levels of measures. If the Level 1 version is found to be similar to the Level 2 version, which is normally taken from founded literature, the Level 1 version of the variable is said to be valid.

An example of a model measuring validity used in the current study to measure the validity of intrinsic motivation was:

$$y_{ij} = \beta_{0j} + \beta_{1j}(\text{INTRINSIC}) + r_{ij}$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{INTRINSIC}) + u_{0j}.$$

In this model, a direct comparison is made between the error terms for Level 1 intrinsic motivation (r_{ij}) and Level 2 intrinsic motivation (u_{0j}). This type of model was used to assess the validity of synergistic and extrinsic motivation as well; however, a slightly different model was used to test the validity of the daily components of creativity and stages of the creative process. Specifically, novelty, usefulness, and each stage of the creative process were compared to trait-based creativity as measured by the Cr scale. An example of this model was:

$$y_{ij} = \beta_{0j} + \beta_{1j}(\text{NOVEL}) + r_{ij}$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{CRETOT}) + u_{0j}.$$

In the above example, the error term for Level 1 novelty (r_{ij}) was compared to the error term for Level 2 creativity (u_{0j}) to obtain the validity of the Level 1 measure of novelty. Whereas using the same trait measure to validate multiple state measures is not the

normal method used in HLM to calculate validity, the same intrinsic creativity variable was used to measure each of these factors. Creativity scholars have suggested that such daily measures of creativity are all directly related to inherent creativity (Amabile, 1996), but have not assessed the components of creativity or the creative process at the trait level. Therefore, a general measure of trait creativity, which scholars suggest is related to state items used in the current study, is used to obtain the validity of these items.

Reliability and validity coefficients for each daily variable are included in Table 1.

With-in Person Covariation between State-based Measures and Daily Events

To test the relationship between the importance of creativity and the components of the definition of creativity (novelty and usefulness), the stages of the creative process, and three types of motivation, intercept models were run. Coefficients, termed slopes in multilevel terminology, were estimated that represent day to day, with-in person relationships. Statistically, the estimation of slopes using multilevel modeling techniques was similar to running regression equations on each of these variables. The statistical package HLM, however, controls variability to a greater extent than OLS models (Nezlek, in press, a).

Recall the first set of hypotheses of the study: An individual's perception of the importance of creativity was expected to covary with the definitional components of creativity (novelty and usefulness), motivational types (intrinsic, synergistic, and extrinsic), and daily events pertaining to the creative process. The same type of day level (within person) model was used to examine the relationships between individuals' perceptions of the importance of creativity (PCREAT) and each definitional component (CNOVEL and CUSEFUL, respectively).

$$y_{ij} = \beta_{0j} + \beta_{1j}(\text{CNOVEL}) + r_{ij}.$$

In this model, y_{ij} is a state-based (or daily) measure of the perception of the importance of creativity (PCREAT) for person j on day i , β_{0j} is a random coefficient representing the intercept of y for person j (mean for PCREAT), β_{1j} is a slope representing the within person relationship between perceptions of creativity and the components of the definition of creativity (CNOVEL or CUSEFUL) for person j , and r_{ij} represents error. To eliminate the influence on parameter estimates of individual differences in novelty and usefulness these scores were group mean centered. As predicted, results indicated that both novelty and usefulness significantly predict participants' perceived importance of creativity (Refer to Table 4).

To analyze the relationship between the events representing the stages of the creative process and creativity importance five models similar to those used previously to assess the relationship between the perceived importance of creativity (PCREAT) and the components of creativity were run. Event scores were group mean centered in the following within person models:

$$y_{ij} = \beta_{0j} + \beta_{1j}(\text{CP1-EVENT}) + r_{ij}.$$

Results of these analyses suggest that the third (Illumination) and fifth (Exploitation) stages of the creative process significantly predicted participants' creativity importance, whereas the first (Preparation), second (Incubation), and fourth (Verification) stages do not predict creativity importance (Refer to Table 3).

Recall that Hypothesis 3 of the current study suggested individuals' perceptions about the importance of creativity and motivation would covary. Specifically, the state measure of PCREAT was expected to covary with three types of daily events related to

motivation: intrinsic motivation (MINTRIN), synergistic motivation (MEXERG), and extrinsic motivation (MEXTRIN). Notably, extrinsic motivation was expected to predict participants' perceptions of the importance of creativity in a negative fashion such that greater state-based extrinsic motivation would reduce the amount to which participant's perceived creativity as important. These relationships were examined using variations of the following day level model:

$$y_{ij} = \beta_{0j} + \beta_{1j} (\text{MINTRIN}) + r_{ij}.$$

These models are similar to those previously used except that β_{1j} is a slope representing the within person relationship between the perceived importance of creativity and motivation type (intrinsic, synergistic, or extrinsic, respectively) for person j . To eliminate the influence on parameter estimates of individual differences in intrinsic and extrinsic motivation, motivation scores were group mean centered.

Results suggest that both intrinsic and synergistic motivation significantly predicted team members' perceptions of the importance of creativity (Refer to Table 4). Surprisingly, extrinsic motivation was not found to be a significant predictor of participants' perception of the importance of creativity.

Further analyses were conducted to determine the extent to which daily novelty and usefulness, daily intrinsic and synergistic motivation, and the events related to incubation and exploitation shared covariance with daily creativity importance. To examine this relationship, daily scores were group mean centered and both entered into an equation similar to that previously used. For example, the resulting equation for the components of creativity was:

$$y_{ij} = \beta_{0j} + \beta_{1j}(\text{CNOVEL}) + \beta_{2j}(\text{CUSEFUL}) + r_{ij}.$$

Results of these analyses suggested that daily novelty and usefulness separately covaried with daily creativity perceptions and also covaried together.² Separate covariation of novelty was seen in the novelty slope of the new model, which, like the original model of novelty and creativity perceptions, was highly significant. The smaller slope of daily creativity perceptions and novelty in the current analyses than in the original analysis of novelty and creativity perceptions makes the joint covariation of the variables apparent. The resulting pattern for usefulness parallels that of novelty in that the significance of the useful slope in the model containing both creativity components shows the independent covariation of daily perceived creativity. Further, the joint covariation of this variable and perceived creativity was apparent because the daily perceived creativity slopes were smaller than these same slopes were in the model that did not include novelty.

Intrinsic and synergistic motivation showed a pattern that differed slightly from the previously described pattern. Specifically, results suggest that only intrinsic motivation covaried separately with daily creativity importance, whereas synergistic motivation did not covary with creativity importance. This was apparent in the slopes; the slope for intrinsic motivation was significant, but the slope for synergistic motivation was not ($p = .47$). In contrast, the equation containing both intrinsic and synergistic motivation resulted in smaller slopes for both, suggesting that these motivational types covary jointly.

Analysis of daily events associated with incubation and exploitation resulted in a pattern similar to the one between novelty and usefulness, showing that incubation and exploitation covaried separately and together with daily perceptions of creativity importance. Specifically, the high significance of both variables in the new model

showed the separate covariation of each with creativity importance. The event slopes obtained for incubation and exploitation in the new equation, which were smaller than those obtained in the original equations for each variable, portrayed the joint covariation of both with creativity importance.

Trait Level Moderators of Within Person Relationships

The authors of multilevel modeling analyses commonly describe the within person covariation by trait level moderators of these relationships (e.g., Nezlek, in press, a). For this reason, relevant trait level moderators were grand mean centered and added to the previous within person model. In HLM centering involves the location of the predictor used to estimate coefficients, which in this case is each of the trait variables. As explained by Nezlek (in press, a), when a variable is grand mean centered the intercept is the expected score for y when x equals the between participants mean. A second type of centering, group mean centering, is also commonly used in multilevel modeling analyses and will be discussed later in the paper. Regardless of the type of used, centering usually helps to reduce the correlation between intercepts and slopes, allowing models to be more easily estimated (Bryk & Raudenbush, 1992). An example of the resulting model for novelty and usefulness depicts the basic Level 1 and Level 2 equations used for all three analyses:

$$y_{ij} = \beta_{0j} + \beta_{1j}(\text{CNOVEL}) + \beta_{2j}(\text{CUSEFUL}) + r_{ij}.$$

$$\beta_{0j} = \gamma_{00}(\text{CRETOT}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}(\text{CRETOT}) + u_{1j}$$

$$\beta_{2j} = \gamma_{20}(\text{CRETOT}) + u_{2j}$$

In the above equation for novelty and usefulness, the trait creativity was not found to be a moderator of slopes depicting novelty or usefulness. Trait measures of inherent and synergistic motivation were added to the model containing these two motivational types. Results suggest that neither type of trait motivation moderated inherent or synergistic motivation slopes. Finally, results from a similar equation, which was used to assess whether trait creativity moderated events pertaining to incubation and exploitation, suggest that trait creativity did not moderate the slopes of these two stages of the creative process. For the results of these analyses refer to Table 5.

The Variance Accounted for by Trait Variables

The ability to investigate Level 2 covariance using nine participants is, for all intensive purposes, not possible. Therefore, the variance accounted for by each characteristic given in the current study was calculated to obtain the magnitude of effect for each measure. Variance accounted for, like validity, can be calculated by comparing of the Level 1 and Level 2 level variables (Nezlek, in press, a). The two variables measured to calculate the variance accounted for, however, include a measure of the dependent variable(s) (Level 1) and each trait level measure (Level 2), resulting in the following equation:

$$y_{ij} = \beta_{0j} + r_{ij}.$$

$$\beta_{0j} = \gamma_{00}(\text{CRETOT}) + u_{0j}$$

In this model the equation is viewed in terms of Level 1 and Level 2. In Level 1, y_{ij} is a state-based or daily measure of creativity importance (PCREAT) for person j on day i , β_{0j} is a random coefficient representing the intercept of y for person j (mean for PCREAT), and r_{ij} represents error. Components of the Level 2 portion of the equation include β_{0j} ,

which represents each individual's mean (as calculated at Level 1), γ_{00} , which is the random coefficient representing the intercept for person j (mean for (CRETOT), and u_{0j} , which represents error. The variance accounted for was calculated between creativity importance and all BFI-44 (Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness), EAQ-KAI items (Efficiency, Rule conformity, and Originality), and motivation type (Intrinsic, Synergistic, and Extrinsic) trait variables. The variance accounted for by all Level 2 variables were summarized in Table 6.

Discussion

Recall that the results obtained offered partial support for the first three original hypotheses. Specifically, results fully supported the hypothesis related to the components of creativity; novelty and usefulness positively covaried with creativity importance. The significant positive covariation obtained between creativity importance and components of creativity supported the first hypothesis. As was evident in the literature review, scholars from all facets of creativity study, including the study of the creative person, product, and process, define novelty and usefulness as necessary components to creativity. Yet, these definitions were based largely on theoretical research. Therefore, as was the intent, the current study offers evidence of the direct daily relationship between creativity importance and novelty and usefulness. Results of the current results suggest that on days when individuals perceive novelty and/or usefulness as being important, they were likely to also perceive creativity as being so. Further, the positive relationship between creativity importance and novelty and usefulness suggests that participants not only perceived creativity as important on a daily basis, but that these perceptions were related to participants novel and useful daily work activities. These findings may be

interpreted to mean that for the current sample, individuals' creativity importance was predicted by their novel and useful daily activities, suggesting that if one wanted to increase people's interest in creativity, the novel and useful aspects of peoples' work should be increased. This finding has large implications for previous research concerning creativity training programs, which relied on cognitive and environmental aspects of creativity enhancement rather than aspects of the task or problem.

The current results did not support the original hypothesis with respect to motivational types. Recall the second hypothesis: that the motivational types of inherent and synergistic motivation would positively covary with creativity importance, whereas extrinsic motivation would negatively covary with creativity importance. Results only supported covariation between intrinsic and synergistic motivation and creativity importance, showing that on days when participants perceived intrinsic and synergistic motivation as more important, they also perceived creativity importance as greater. This was not startling as previous literature investigating the relationship between motivation and creativity in the business domain supports this exact relationship between the two (Amabile, 1997). Surprisingly, days on which participants' extrinsic motivation was higher did not seem to correspond to days when individual team members' creativity was lower.

This finding was not consistent with previous literature, however, it may be partially explained by the entrepreneurial achievement motivation research. Specifically, this prior literature describes the importance of achievement motivation to new venture formation (McClelland, 1978), a finding that is generally accepted on a theoretical basis if not an empirical one (Shaver, 1996). Generally, high achievement motivation suggests

a high intrinsic and synergistic relationship to the work being done. Whereas this prior research normally describes the entrepreneur and not all new venture team members on an individual basis, it is possible that the entrepreneurial environment either draws individuals with such motivation as workers or that it fosters such motivation in all individuals working in this environment.

If either (or both) of these explanations correctly describe the underlying motivational orientation of entrepreneurial team members, it is possible that the levels of daily intrinsic and synergistic motivation were so high that the creativity importance of these individuals was not affected by extrinsic motivation in the customary fashion (i.e., extrinsic motivation does not inhibit creativity importance). This interpretation of the results pertaining to extrinsic motivation suggests that this motivational type was effectively neutralized in entrepreneurial team members. Additionally, an alternate explanation for extrinsic motivation findings includes the division of extrinsic motivators into the two subtypes synergistic and extrinsic motivators; a smaller number of extrinsic constraints exist overall when the influence of all of synergistic motivators on intrinsic motivation is positive. The remaining extrinsic factors may not have been of a sufficient strength to impact creativity importance.

Finally, a third explanation includes the item used to measure extrinsic motivation. Recall that because of time constraints only one daily item was used to assess extrinsic motivation. The extrinsic measure used read "I felt limited in my work because of a lack of resources or funding." Whereas previous daily events research suggests that the use of one item to measure a concept often is valid, this may not have been the case in the current study. Specifically, all entrepreneurial ventures must seek funding to initiate

new business, especially during their initial year in business. Following, a lack of resources and funding may have been viewed by entrepreneurial team members as normal or expected. If this is the case, individuals may have learned to cope with it as a constant factor, lessening the effect this extrinsic constraint on member creativity.

The speculative nature of these interpretations, however, leads the author to suggest that future research is needed to more fully understand the absence of a relationship between creativity importance and extrinsic motivation. Such research should further investigate the possibility that extrinsic motivation has less of an impact on creativity in the entrepreneurial domain, as this would suggest that theoretical relationships between the two variables as described in existing literature (e.g., Amabile, 1997) should be revised with respect to entrepreneurship.

Results only partially supported the overall hypothesis that each of event related to a stage of the creative process would positively covary with daily perceptions of creativity importance; two stages of the five stages of the creative process, when viewed as daily events, covaried positively with creativity importance. Specifically, only the stages of illumination and exploitation followed this predicted pattern. Notably, these events also covaried with each other, which supports the theoretical assumption that stages of the creative process occur simultaneously and affect each other (Arieti, 1976; Wallas, 1926).

One explanation for findings related to creative stages that did not significantly predict creativity importance is that only two stages of the creative process significantly predicted creativity importance, but that alternate stages may predict other aspects of creativity. The aspect of creativity importance is such a general measure of creativity,

however, that it is unlikely that this explanation is correct. The most likely explanation for these findings concerns the way in which the stages of the creative process were operationalized. It is possible that each event did not sufficiently capture the core idea of each stage of the creative process; however, a better explanation pertains to the operationalization of creativity stages, which are normally fluid in nature, into daily events. Therefore, it is possible that operationalizing the creative process in terms of one or multiple events is not possible. If this is the case, the significant findings pertaining to the third and fifth stages may be considered a fluke.

When viewed in terms of the first explanation the significance of these findings leads the researcher to suggest that the significant findings related to the creative process are meaningful findings. Instead, these stages of the creative process may lend themselves to a single definition to a greater degree and/or have been more easily captured in the event used. If this interpretation of the current findings is correct, two possible inferences can then be drawn. First, another, better way to operationalize the creative process may exist. Second, the ongoing nature of the creative process may be such that a simple (or even complex) way of defining the process does not exist. This interpretation leads the researcher to call for further research on how stages of the creative process may be operationalized, what daily events effectively represent these stages, and the relationship between these stages and facets of creativity such as creativity importance.

Unfortunately, the current data also fail to support the group of hypotheses concerning the covariation of trait variables associated with each of these daily measures. As was initially expected, the analysis of trait influence proved difficult in the current

study because of the small nature of the sample size. Therefore, the variance accounted for was calculated between creativity importance and the multiple trait based measures used in the study. Several trait measures accounted for a small amount of the variance in these follow-up tests, providing evidence that some of the nonsignificant findings obtained with respect to trait variables most likely occurred because of the small sample size. Of variance accounted for, the most notable finding concerns the effect sizes obtained for intrinsic and synergistic motivation. The variance accounted for in the former (.30) was slightly smaller than that obtained for the latter (.35). This pattern is contrary to that suggested by existing empirical and theoretical literature on the two in which scholars show synergistic motivation as a support to intrinsic motivation. Whereas the differences in variance between these two variables is not of great magnitude, it does lead the author to question the role of these types of motivation in the entrepreneurial domain. This question is important because it holds implications for the entire business domain, including aspects of business productivity and survival.

A more important implication of the current study includes the existence of creativity on a daily level. As previously mentioned, creativity is normally viewed in terms of the creativity individual, the creative product, and the creative process. This research stems from the completion of the creative act. Unfortunately, the complex nature of testing ongoing creativity often keeps scholars from investigating creativity as a continuing process. The current author investigated creativity as an ongoing process and found that it was an ongoing daily basis. These findings seemingly contradict examples of brilliant discoveries that some authors use to suggest that creativity occurs at a higher, spontaneous level; however, the current study did not investigate such higher order

insights. In fact, results of the current study augment results pertaining to highly creative instances because they provide evidence of creative activity on a daily rather than episodic level. Specifically, current results show that individuals participate in components of the creativity process when completing every day work tasks. This leads the author to question the relationship between daily activity and creativity “Which facets of normal, daily experience would individuals not rely on creativity?” and how daily creativity relates to episodic, highly insightful cases of creativity, “Do larger creative insights, such as opportunity recognition in entrepreneurship, occur because an individual’s daily creativity is of greater importance?”

Practical Concerns and Limitations

Internet-based difficulties. Whereas Internet-based data collection methods facilitate the data collection process to a great extent, there were potential problems with this data collection method that should be mentioned. A problem of particular relevance to the current study includes the sporadic difficulty that participants had logging on to the study site. These difficulties may have resulted because of problems associated with the company’s server. For instance, the company’s server may have failed to connect to the host server because the company’s server may have been working at full capacity due to Internet traffic to the company’s website.

It is important to note that while these difficulties did occur, they not cause a significant problem in terms of participant response rates. Additionally, these Internet-based difficulties were not unique to the current study. The use of the Internet to gather data is increasing rapidly. Many of the researchers at the forefront of this new data collection method have experienced similar Internet-based difficulties at some point in

the data collection process. Notably, the assets of using the Internet to collect data far exceed the drawbacks; however, a more complete data set would have increased the predictive power of the data, allowing for the analysis of the January Session and more complex analysis of the this session.

Experimental method problems and measurement concerns. As noted by one multilevel modeling expert (Nezlek, in press, a), research involving the day-to-day measurements may contain within person problems (e.g., fatigue). The low response rate and variability of participants' daily responses in the current study certainly could be an indication of participant fatigue. Yet, a more feasible explanation of the variability in response rate concerns the travel schedules of the entrepreneurial team members. The current study used only data collected during the October Session and prior to the company's completion of its first round of venture funding. As is normal in a new venture, during this period of time entrepreneurial team members spent a great deal of time traveling to meetings to present the company to venture capitalists, and, therefore, had a more difficult time completing the daily measures. This explanation is supported by one respondent's comment that he "was often unable to login due to out-of-town travel." Further, while in the office participants often spent time in business meetings and were, therefore, unable to login during these period. Notably, these explanations may also account for the variation in participants' login times, which rarely fell into the two time periods originally designed as login times.

Another problem associated with many studies using multilevel modeling techniques involves the noncausal nature of the results. Clearly, the findings obtained in the current study are of a correlational nature, meaning that no significant predictor can

be considered a cause of creativity importance. For instance, usefulness, which significantly predicts creativity importance, is not shown to cause individuals to perceive creativity in this manner. Notably, such causal relationships can be assessed using lag-time multilevel modeling techniques. For a further explanation of this technique, refer to Nezlek (in press, a).

Participant sample. The entrepreneurial team used in the current study, although similar demographically to the majority of high-tech, new venture teams, is only one new venture team. Therefore, the generalizability of the current data certainly is not completely representative of all high-tech, entrepreneurial teams. Whereas high technology teams have been found to be similar in nature to more general types of entrepreneurial teams, the high-technology nature of the team used also may decrease the generalizability of current findings to other types of entrepreneurial teams. Further, the use of an entrepreneurial team in the current study means that findings may not be generalizable to other types of organizational teams, which are far more prevalent than entrepreneurial teams.

Additionally, the use of only one entrepreneurial team limits the generalizability of the findings in the current study because trait level variables cannot be assessed. Such analyses would provide further evidence of the validity of state based measures by allowing comparisons between trait measures of a specific state measure to be made.

Future research

Future research using multiple teams would allow researchers to use multilevel modeling techniques that assess the relationship between trait and state measures.

Assuming that these analyses provide evidence of a significant relationship between the

two, the validity of state measures would be further supported. With respect to the relationship between entrepreneurship and creativity, such analyses would allow for a deeper investigation into the relationship between multiple independent variables (e.g., novelty and usefulness with respect to the perception of the importance of creativity). Clearly, the current data provide initial evidence supporting the relationship between entrepreneurship and creativity importance.

The investigation of creativity importance in the current study would be strengthened by further research on this variable. Additionally, the comparison of creativity importance and creativity in daily work tasks measured as creativity rather than novelty and usefulness would provide stronger evidence for the use of creativity importance as variable in creativity research, and would show how this variable relates to other aspects of creativity.

Additionally, future research should examine creativity with respect to the numerous other individuals included in the entrepreneurial process. As noted by Neck, Cohen, and Corbett (1999), just as entrepreneurship is not solely the act of the entrepreneur, it is not simply the act of the entrepreneurial team members. Instead, the entrepreneurial process involves numerous other individuals who make up a vast social network. To understand the relationship between the entrepreneurial process and the creative process, it is necessary to understand how creativity relates to this entrepreneurial system in its entirety. Notably, recent research by Hills et al. (e.g., Singh, Hills, Hybels, & Lumpkin, 1999) provides an initial foray into the relationship between an entrepreneur's social network and the creative process. Further research on this topic that investigates the social networks of the entrepreneur, as well as those of the

entrepreneurial team would allow for a greater understanding of the role of the creativity in new venture formation.

In conclusion, future research, like the research streams suggested above, should attempt to facilitate and promote respondents' ongoing and reliable contribution of data during scheduled sessions. Additionally, creativity measures used in such research should be shown to be of high validity and reliability prior to their use in multilevel studies. Further, the use of multiple teams would support such measures, allowing for trait-state analyses to be run.

The current study provides an important first step towards the analysis of the relationship between entrepreneurship and creativity in several important ways. First, to the author's knowledge, it is the first study to attempt to empirically measure the creative process in an ongoing, daily fashion. Second, it is one of the first studies to apply multilevel modeling techniques to the analysis entrepreneurship. Third, the current study joins few others in providing further empirical support for the relationship between entrepreneurship and creativity. Finally, the current study offers a starting point for several mentioned and a multitude of other empirical and theoretical studies involving entrepreneurship. The current author encourages such studies, as they would facilitate the theoretical understanding of new business creation and development and would be of great practical value to fledgling entrepreneurial ventures.

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Table 1.

Entrepreneurial Team Members' Trait-based Scores Listed by Individual.

	Entrepreneurial Team Members								
	1	2	3	4	5	6	7	8	9
<u>Creativity check list total</u>	18.00	21.00	35.00	36.00	22.00	29.00	34.00	21.00	25.00
<u>BFI-44 subscale means</u>									
Extraversion	5.00	1.75	1.88	4.13	3.25	4.50	4.13	2.88	3.63
Agreeableness	4.89	3.33	3.33	4.33	2.56	3.67	4.00	2.89	4.89
Conscientiousness	4.44	4.11	3.56	4.00	4.67	4.11	4.22	3.78	3.89
Openness	4.80	5.30	5.50	5.50	4.60	4.00	4.90	4.90	4.20
Neuroticism	1.88	3.50	3.25	1.75	3.13	3.13	2.00	2.63	1.75
<u>KAI subscale means</u>									
Efficiency	6.60	5.60	6.20	4.60	5.80	5.60	4.00	5.20	3.80
Rule conformity	4.75	3.25	2.00	3.00	4.00	4.25	3.50	3.75	4.75
Originality	5.00	4.33	5.00	6.67	4.00	5.33	6.33	6.33	5.67
<u>Motivational subscale means</u>									
Intrinsic motivation	6.14	6.00	6.71	6.86	5.14	6.00	6.00	6.14	6.00
Synergistic motivation	5.25	4.50	6.50	6.50	5.50	6.00	5.75	5.50	5.00
Extrinsic motivation	4.00	4.00	6.00	5.50	5.33	4.67	4.33	3.33	6.00

Table 2.

Number of Times Individual Entrepreneurial Team Members Logged In.

	October Session			January Session		
	Afternoon	Evening	Total	Afternoon	Evening	Total
Potential entries	20	20	40	20	20	40
<u>Participant</u>						
1	9	8	17	4	2	6
2	16	16	32	11	8	19
3	21	14	35	8	5	13
4	11	6	17	6	3	9
5	10	11	21	2	1	3
6	20	16	36	10	10	20
7	18	11	29	11	5	16
8	7	24	31	2	1	3
9	3	7	10	0	3	3

Table 3.

Statistics of Daily Measures.

	Day- level Mean	Between person Variance	Within person Variance	Reliability	Validity
<u>Importance of creativity</u>	5.47	.79	1.81	.91	.34
<u>Components of creativity</u>					
Novelty	3.04	1.17	2.03	.93	.58
Usefulness	4.61	1.30	1.98	.94	.63
<u>Stages of the creative process</u>					
Preparation	2.35	.67	1.33	.92	.28
Incubation	1.77	.64	1.15	.93	.41
Illumination	1.46	.33	1.78	.81	.37
Verification	.99	.76	1.36	.93	.34
Exploitation	1.90	.72	1.59	.91	.29
<u>Motivation types</u>					
Intrinsic motivation	5.30	.80	1.51	.92	.22
Synergistic motivation	3.41	1.08	2.30	.91	.26
Extrinsic motivation	3.86	2.70	2.01	.98	.42

Table 4.

Day Level Relationships Between State and Event Measures and Creativity Importance.

HLM Analyses			
Analysis Run	Coefficient	t-ratio	p-level
<u>Components of Creativity</u>			
Novelty	.41	4.78	.001
Usefulness	.51	5.14	.000
<u>Stages of the Creative Process</u>			
Preparation	.16	1.43	ns
Incubation	.17	1.27	ns
Illumination	.54	4.21	.003
Verification	.21	1.22	ns
Exploitation	.51	4.06	.004
<u>Motivation Types</u>			
Intrinsic Motivation	.84	14.99	.000
Synergistic Motivation	.30	4.66	.001
Extrinsic Motivation	-.03	-.23	ns

Table 5.

Trait Moderators of State and Event Slopes for Creativity Importance.

<u>HLM Analyses</u>			
<u>Daily</u>			<u>State/ Event</u> <u>Slopes</u>
<u>Measure</u>	<u>Trait</u>	<u>Intercept</u>	
<u>Components of Creativity</u>			
Novelty	Creativity	.02	.01
Usefulness	Creativity	.02	.01
<u>Stages of the Creative Process</u>			
Illumination	Creativity	.02	.01
Exploitation	Creativity	.02	.01
<u>Motivation Types</u>			
Intrinsic Motivation	Intrinsic	.05	.32
	Synergistic	.26	-.29
Synergistic Motivation	Intrinsic	.05	-.11
	Synergistic	.26	.02

Table 6.

Variance of Perceived Importance of Creativity Accounted for by Trait Measures of the BFI-44, EAQ Creativity Items, and Motivational Items.

	Trait-level Mean	Trait-level SD	Variance Explained
<u>BFI-44</u>			
Extraversion	3.46	1.13	.03
Agreeableness	3.77	.83	.06
Conscientiousness	4.09	.34	.16
Neuroticism	2.56	.72	.08
Openness	4.86	.53	.03
<u>EAQ (KAI Items)</u>			
Efficiency	5.27	.96	.01
Rule conformity	3.69	.88	.12
Originality	5.41	.92	.09
<u>Motivation Types</u>			
Intrinsic Motivation	5.61	.66	.09
Synergistic Motivation	4.80	.96	.16
Extrinsic Motivation	6.11	.49	.15

1. Analyses of the three level model was conducted between creativity importance and daily measures of the components of creativity (novelty and usefulness), motivational types (intrinsic, synergistic, and extrinsic), and daily events of each stage of the creative process. Results suggest that the afternoon and evening sessions were significantly different from each other only the fifth stage of the creative process (Exploitation), with participants rating this stage as more important in the afternoon. The nonsignificant nature of all other predictor variables suggested that differences between afternoon and evening would not affect results obtained in a similar two level model (i.e., daily sessions on Level 1 and individual on Level 2). Therefore, multilevel models run in the current experiment were simplified, allowing results to be discussed in a more straightforward manner.

² Notably, the covariation apparent between novelty and usefulness is itself extremely interesting because creativity researchers do not normally discuss them as overlapping. Instead, the scholars focus on each as separate and necessary components to creativity. The current study did not focus on the relationship between these components, although the current findings call for further investigation of the daily relationship between novelty and usefulness.

Appendix A

Demographic Questions

The following email address will be used to provide you with a password used to access the current study and to remind you of the starting date/ time of each three-week session. Professor Nezlek will be given this page and will use it to provide you with a password. Ms. Paddock will use your preferred email to remind you of the date/ time of the second three-week session. It should be noted that Ms. Paddock and Professor Shaver will never view your preferred email and password together, and will only view your preferred email.

My preferred email is: _____

Please answer the following question by placing an “x” on the line next to the range that describes you the best.

Indicate your age range:

- _____ 20-24 years old
- _____ 25-29 years old
- _____ 30-34 years old
- _____ 35-39 years old
- _____ 40-44 years old
- _____ 45-49 years old
- _____ 50-54 years old
- _____ 55-59 years old
- _____ 60-64 years old

Indicate the highest level of education that you have achieved:

- _____ High school degree
- _____ Some college
- _____ Bachelors degree
- _____ Masters degree in business
- _____ Masters degree not in business
- _____ Doctoral degree

Indicate the number of years that you have worked full-time in the business community:

- _____ 10-14 years
- _____ 15-19 years
- _____ 20-24 years
- _____ 25-29 years
- _____ 30-34 years
- _____ 35-39 years
- _____ 40-44 years
- _____ 45-49 years
- _____ 50-54 years

Because there are sometimes gender differences inherent in studies of work behavior, it is important that researchers collect gender information. This information, like the previously collected age and occupation information could allow the primary researchers to distinguish between participants. Therefore, your answer to the following question will only be seen by a William & Mary Psychology Dept. faculty member who is unrelated to the company (Professor John Nezelek). He will enter this data and will use it to run initial analyses, which will determine if there are gender differences in the current study.

Please indicate your gender by marking an "X" on the appropriate line.

Female _____ Male _____

After completing these questions, please fold this form and seal it in the envelope provided. Then, place the envelope in the folder.

Appendix B

Internet-based Daily (State) Measures

1. The ability to think and work in a creative manner was important in my work.
2. The business task(s) (i.e., jobs, strategizing, decisions made) that I worked on was (were) very NOVEL.
3. The business task(s) (i.e., jobs, strategizing, decisions made) that I worked on was (were) very USEFUL.
4. I found my work interesting.
5. The reward or recognition that I received for my ideas helped me to keep working.
6. I felt limited in my work because of a lack of resources or funding.
7. I felt sensitive to the issues related to my work.
8. I mulled over some of the issues and problems associated with my work while working on unrelated tasks.
9. I arrived at a solution to an important business problem today.
10. I assessed a business idea or opportunity to see if there was a market for the resulting product or service.
11. I worked out the fine details of a business idea to ensure that the resulting product or service will be produced.

Appendix C

Domino's Creativity Adjective Check List

Absent minded	Imaginative	Unconventional
Active	Impulsive	
Adaptable	Independent	
Adventurous	Individualistic	
Alert	Industrious	
Aloof	Ingenious	
Ambitious	Insightful	
Argumentative	Intelligent	
Artistic	Interests wide	
Assertive	Intolerant	
Autocratic	Inventive	
Capable	Logical	
Careless	Moody	
Clear-thinking	Original	
Clever	Outspoken	
Complicated	Quick	
Confident	Rational	
Curious	Rebellious	
Cynical	Reflective	
Demanding	Reserved	
Disorderly	Resourceful	
Dissatisfied	Restless	
Distractible	Sarcastic	
Egotistical	Self-centered	
Energetic	Sensitive	
Enthusiastic	Serious	
Humorous	Sharp-witted	
Hurried	Spontaneous	
Idealistic	Tactless	

Appendix D

BFI-44

1. Is talkative
2. Tends to find fault with others
3. Does a thorough job
4. Is depressed, blue
5. Is original, comes up with new ideas
6. Is reserved
7. Is helpful and unselfish with others
8. Can be somewhat careless
9. Is relaxed, handles stress well
10. Is curious about many different things
11. Is full of energy
12. Starts quarrels with others
13. Is a reliable worker
14. Can be tense
15. Is ingenious, a deep thinker
16. Generates a lot of enthusiasm
17. Has a forgiving nature
18. Tends to be disorganized
19. Worries a lot
20. Has an active imagination
21. Tends to be quiet
22. Is generally trusting
23. Tends to be lazy
24. Is emotionally stable, not easily upset
25. Is inventive
26. Has an assertive personality
27. Can be cold and aloof
28. Perseveres until the task is finished

29. Can be moody
30. Values artistic, aesthetic experiences
31. Is sometimes shy, inhibited
32. Is considerate and kind to almost everyone
33. Does things efficiently
34. Remains clam in tense situations
35. Prefers work that is routine
36. Is outgoing, sociable
37. Is sometimes rude to others
38. Makes plans and follows through with them
39. Gets nervous easily
40. Likes to reflect, play with ideas
41. Has few artistic interests
42. Likes to cooperate with others
43. Is easily distracted
44. Is sophisticated in art, music, or literature

Appendix E

Entrepreneurial Attitude Questionnaire

1. I have original ideas.
2. I am thorough.
3. I fit readily into “the system.”
4. I master all details painstakingly.
5. I conform.
6. I can handle several new ideas at once.
7. I am methodical and systematic.
8. I readily agree with the team at work.
9. I would rather create than improve.
10. I enjoy detailed work.
11. I never try to bend or break the rules.
12. When I make plans I am almost certain to make them work.
13. I have no trouble making and keeping friends.
14. Bad economic conditions are caused by world events beyond our control.
15. I am stimulating.
16. When I get what I want, it’s because I worked hard for it.
17. I’m not good at guiding the conversation with several others.
18. I’ll never be too old to start my own business.
19. There is nothing consumers can do to keep the cost of living from going higher.
20. I have always wanted to go rock climbing in the mountains.
21. It is impossible to have any real influence over what big businesses do.
22. I would lend my car to a teenage boy who had previously been arrested for speeding.
23. I seldom follow instructions unless the task I’m working on is too complex.
24. I never put important matters off until a more convenient time.
25. I spend a considerable amount of time making any organization I belong to function better.
26. I do ever job as thoroughly as I can.
27. I make a conscientious effort to get the most out of my business resources.

28. I feel best about my work when I know I have followed accepted procedures.
29. Most of my time is spent working on several business ideas at the same time.
30. I usually delegate routine tasks after only a short period of time.
31. I will spend a lot of time analyzing my future business needs before I allocate any resources.
32. I make it a point to do something significant and meaningful at work every day.
33. I often approach business tasks in unique ways.
34. I always follow accepted business practices in the dealings I have with others.
35. I rarely question the value of established procedures.

Appendix F

Amabile's (1985) Motivational Items Modified

1. You get a lot of pleasure out of presenting something for which you are well prepared.
2. You enjoy the opportunity for self-expression.
3. You realize that by doing well on everyday work you have a chance of getting a higher raise.
4. You achieve new insights through working.
5. You want your boss to be favorably impressed with your work.
6. You have heard of cases where good work has "made" someone's career.
7. You enjoy recognition for work you have done.
8. You derive satisfaction from expressing yourself clearly and eloquently.
9. You know that many of the best jobs available require good people skills.
10. You feel relaxed when you are finishing a job task for which you were prepared.
11. You like to complete work activities.
12. You enjoy being involved with ideas, characters, events, and images when you are solving problems.
13. You know that the work you are doing is important to your colleagues.
14. Your boss has encouraged you to complete your work assignments.

Appendix G

THE COLLEGE OF WILLIAM & MARY
AND PSYCHOLOGY DEPARTMENT CONSENT FORM

The general nature of this study entitled “How Important are Daily Events in a New Technology Venture” conducted by E. Layne Paddock and Professor Kelly Shaver has been explained to me. I understand that I will be asked to use an interacted Internet site to answer two sets of questions daily for two three-week periods. Additionally, I will be asked to fill out several questionnaires. All questions will consist of stating my opinion using a simple scale. I further understand that my anonymity will be preserved and that my name will not be associated with any results of this study in any way. More specifically, the researcher and her advisor, Professor Kelly Shaver, will never have my name or other identifying information (e.g., years spent working in the business environment). Instead another Professor, who is in no way associated with the company and who is a member of Ms. Paddock’s defense committee, will have access to any information that could identify me. I know that I may refuse to answer any question that I find personally objectionable. I also understand that no grade, payment, or credit for participation will be affected by my responses or by my exercising my rights. I am aware that I may report dissatisfactions with any aspect of this experiment to either the Chair of the Protection of Human Subjects Committee Chair, Professor McCoy at (757) 221-2783 (rwmcco@wm.edu) or the College of William & Mary Psychology Ethics Chair, Dr. Glenn Shean (gdshea@wm.edu). I am aware that I must be at least 18 years of age to participate. My signature below signifies my voluntary participation in this study.

Signature

Date

Printed Name

Appendix H
Raw Demographic Data

id	gender	agerange	yrsed	yrsbusex
5	2	4549	4	2024
6	2	5054	3	2529
7	2	2529	4	0
9	2	5054	5	2024
11	1	5054	2	3034
14	2	3034	3	1014
16	2	3034	3	1014
19	2	4549	3	2529
20	2	4549	4	2024

Appendix I

Raw Daily Data

Autonum	Date	dcSessO	dcSessJ	id	jdate	dayweek	intime	dcmorn	dcafter	pro1	pro2	pro3	pro4
23	10/23/00	1	0	11	297	2	11:57 AM	1	0	4	1	0	0
24	10/23/00	1	0	5	297	2	12:05 PM	1	0	4	2	1	1
25	10/23/00	1	0	7	297	2	12:35 PM	1	0	1	2	1	0
26	10/23/00	1	0	16	297	2	2:12 PM	1	0	2	4	4	0
27	10/23/00	1	0	9	297	2	3:55 PM	0	1	4	3	4	3
28	10/23/00	1	0	6	297	2	4:11 PM	1	0	3	3	4	0
29	10/23/00	1	0	5	297	2	5:24 PM	0	1	4	4	4	4
30	10/23/00	1	0	20	297	2	5:28 PM	0	1	3	2	3	3
31	10/23/00	1	0	11	297	2	5:30 PM	0	1	2	1	4	0
32	10/23/00	1	0	7	297	2	5:54 PM	0	1	1	0	2	0
33	10/23/00	1	0	6	297	2	6:15 PM	0	1	4	2	0	0
34	10/23/00	1	0	16	297	2	6:19 PM	0	1	1	2	4	0
35	10/23/00	1	0	14	297	2	6:20 PM	0	1	0	2	4	0
36	10/23/00	1	0	19	297	2	10:26 PM	0	1	4	3	3	0
37	10/24/00	1	0	9	298	3	11:13 AM	1	0	3	2	0	3
38	10/24/00	1	0	6	298	3	11:24 AM	1	0	0	0	0	0
39	10/24/00	1	0	7	298	3	12:21 PM	1	0	2	0	2	0
40	10/24/00	1	0	11	298	3	12:43 PM	1	0	0	0	0	0
41	10/24/00	1	0	5	298	3	12:51 PM	1	0	4	3	4	4
42	10/24/00	1	0	14	298	3	1:06 PM	1	0	0	0	0	0
43	10/24/00	1	0	19	298	3	1:12 PM	1	0	3	0	4	4
44	10/24/00	1	0	16	298	3	2:26 PM	1	0	2	1	2	0
45	10/24/00	1	0	20	298	3	4:04 PM	0	1	3	3	2	3
46	10/24/00	1	0	5	298	3	4:27 PM	0	1	4	3	3	3
47	10/24/00	1	0	6	298	3	4:57 PM	0	1	1	3	0	0
48	10/24/00	1	0	7	298	3	5:15 PM	0	1	0	3	1	0
49	10/24/00	1	0	14	298	3	5:41 PM	0	1	0	0	0	0
50	10/24/00	1	0	9	298	3	5:54 PM	0	1	4	2	3	1

51	10/24/00	1	0	16298	3	11:28 PM	0	1	1	1	3	2	0
52	10/24/00	1	0	19298	3	11:57 PM	0	1	4	4	0	4	4
53	10/25/00	1	0	6299	4	10:51 AM	1	0	1	3	0	0	0
54	10/25/00	1	0	9299	4	11:40 AM	1	0	2	2	0	0	3
55	10/25/00	1	0	7299	4	12:44 PM	1	0	2	2	1	1	0
56	10/25/00	1	0	14299	4	12:44 PM	1	0	0	2	3	0	0
57	10/25/00	1	0	16299	4	12:52 PM	1	0	2	0	3	0	0
58	10/25/00	1	0	11299	4	1:46 PM	1	0	0	0	0	0	0
59	10/25/00	1	0	19299	4	3:22 PM	1	0	0	0	1	0	0
60	10/25/00	1	0	6299	4	4:55 PM	0	1	1	0	0	0	3
61	10/25/00	1	0	7299	4	5:47 PM	0	1	0	2	0	0	0
62	10/25/00	1	0	14299	4	8:08 PM	0	1	0	2	4	0	0
63	10/25/00	1	0	19299	4	11:34 PM	0	1	4	3	0	1	1
64	10/25/00	1	0	16299	4	11:53 PM	0	1	2	3	3	0	0
65	10/26/00	1	0	11300	5	11:59 AM	1	0	0	0	0	0	0
66	10/26/00	1	0	7300	5	12:37 PM	1	0	1	2	1	0	0
67	10/26/00	1	0	16300	5	12:27 PM	1	0	1	1	2	0	0
68	10/26/00	1	0	14300	5	12:45 PM	1	0	0	2	0	0	0
69	10/26/00	1	0	6300	5	1:24 PM	1	0	3	4	0	0	0
70	10/26/00	1	0	9300	5	1:25 PM	1	0	3	3	0	4	4
71	10/26/00	1	0	5300	5	3:53 PM	0	1	3	3	3	4	4
72	10/26/00	1	0	11300	5	4:14 PM	0	1	0	0	0	0	0
73	10/26/00	1	0	20300	5	5:20 PM	0	1	3	3	3	2	2
74	10/26/00	1	0	19300	5	5:19 PM	1	0	4	4	4	4	4
75	10/26/00	1	0	19300	5	10:06 PM	0	1	4	4	4	4	4
76	10/27/00	1	0	16301	6	11:58 AM	1	0	0	4	4	0	0
77	10/27/00	1	0	7301	6	12:04 PM	1	0	1	2	0	1	1
78	10/27/00	1	0	11301	6	12:36 PM	1	0	0	0	0	0	0
79	10/27/00	1	0	6301	6	1:11 PM	1	0	3	0	0	0	0
80	10/27/00	1	0	14301	6	1:25 PM	1	0	0	0	0	3	0
81	10/27/00	1	0	19301	6	3:54 PM	0	1	4	4	4	4	4

82	10/27/00	1	0	0	11301	6	4:37 PM	0	1	0	0	0	4	0
83	10/30/00	1	0	0	11304	2	10:55 AM	1	0	0	0	0	0	0
84	10/30/00	1	0	0	5304	2	12:42 PM	1	0	4	3	1	2	2
85	10/30/00	1	0	0	16304	2	12:51 PM	1	0	1	1	2	0	0
86	10/30/00	1	0	0	6304	2	1:01 PM	1	0	0	0	0	0	0
87	10/30/00	1	0	0	14304	2	1:04 PM	1	0	0	2	0	0	0
88	10/30/00	1	0	0	7304	2	1:16 PM	1	0	3	0	1	0	0
89	10/30/00	1	0	0	20304	2	1:13 PM	1	0	3	3	2	3	3
90	10/30/00	1	0	0	5304	2	3:01 PM	0	1	4	3	2	3	3
91	10/30/00	1	0	0	11304	2	4:28 PM	0	1	0	0	0	0	0
92	10/30/00	1	0	0	7304	2	5:26 PM	0	1	2	1	2	0	0
93	10/30/00	1	0	0	9304	2	5:26 PM	0	1	4	3	2	0	0
94	10/30/00	1	0	0	6304	2	6:13 PM	0	1	3	2	0	0	0
95	10/31/00	1	0	0	7305	3	12:16 PM	1	0	2	3	2	0	0
96	10/31/00	1	0	0	16305	3	12:44 PM	1	0	0	0	0	0	0
97	10/31/00	1	0	0	6305	3	1:32 PM	1	0	3	0	0	0	0
98	10/31/00	1	0	0	5305.	3	1:48 PM	1	0	4	3	2	3	3
99	10/31/00	1	0	0	14305	3	2:52 PM	1	0	0	2	2	0	0
100	10/31/00	1	0	0	7305	3	5:03 PM	0	1	2	2	2	1	1
101	10/31/00	1	0	0	6305	3	5:17 PM	0	1	3	2	0	0	0
102	10/31/00	1	0	0	14305	3	8:04 PM	0	1	0	2	2	0	0
103	10/31/00	1	0	0	19305	3	9:20 PM	0	1	3	3	0	3	3
104	11/1/00	1	0	0	6306	4	11:15 AM	1	0	4	4	3	0	0
105	11/1/00	1	0	0	9306	4	11:32 AM	1	0	3	3	2	2	2
106	11/1/00	1	0	0	11306	4	12:30 PM	1	0	0	0	0	0	0
107	11/1/00	1	0	0	5306	4	12:42 PM	1	0	4	3	1	1	1
108	11/1/00	1	0	0	16306	4	1:28 PM	1	0	2	3	2	3	3
109	11/1/00	1	0	0	7306	4	2:36 PM	1	0	1	2	1	0	0
110	11/1/00	1	0	0	14306	4	3:26 PM	1	0	0	0	0	0	0
111	11/1/00	1	0	0	20306	4	3:44 PM	0	1	3	2	2	4	4
112	11/1/00	1	0	0	11306	4	4:12 PM	0	1	3	0	2	0	0

113	11/1/00	1	0	0	6306	4	6:20 PM	0	1	4	3	3	0
114	11/1/00	1	0	0	16306	4	7:06 PM	0	1	3	3	4	0
115	11/1/00	1	0	0	14306	4	7:08 PM	0	1	3	0	2	0
116	11/1/00	1	0	0	19306	4	7:37 PM	0	1	4	3	3	3
117	11/2/00	1	0	0	7307	5	12:49 PM	1	0	2	1	0	2
118	11/2/00	1	0	0	6307	5	1:08 PM	1	0	4	3	0	0
119	11/2/00	1	0	0	9307	5	2:16 PM	1	0	3	0	0	0
120	11/2/00	1	0	0	14307	5	2:33 PM	1	0	2	0	2	0
121	11/2/00	1	0	0	16307	5	2:35 PM	1	0	0	2	0	0
122	11/2/00	1	0	0	5307	5	3:50 PM	0	1	4	4	0	2
123	11/2/00	1	0	0	16307	5	5:00 PM	0	1	0	1	2	2
124	11/2/00	1	0	0	14307	5	5:12 PM	0	1	3	2	3	0
125	11/2/00	1	0	0	7307	5	5:25 PM	0	1	1	2	2	1
126	11/2/00	1	0	0	6307	5	5:43 PM	0	1	4	2	0	0
127	11/2/00	1	0	0	19307	5	10:07 PM	0	1	3	2	0	0
128	11/3/00	1	0	0	11308	6	11:10 AM	1	0	3	0	0	0
129	11/3/00	1	0	0	9308	6	12:14 PM	1	0	2	2	0	0
130	11/3/00	1	0	0	5308	6	12:57 PM	1	0	4	3	3	3
131	11/3/00	1	0	0	16308	6	12:36 PM	1	0	2	0	0	0
132	11/3/00	1	0	0	14308	6	2:03 PM	1	0	3	2	2	0
133	11/3/00	1	0	0	7308	6	2:32 PM	1	0	2	2	0	1
134	11/3/00	1	0	0	19308	6	3:02 PM	0	1	2	2	0	4
135	11/3/00	1	0	0	6308	6	3:14 PM	1	0	4	3	0	0
136	11/3/00	1	0	0	11308	6	4:24 PM	0	1	3	0	0	0
137	11/3/00	1	0	0	7308	6	4:59 PM	0	1	2	2	2	0
138	11/3/00	1	0	0	16308	6	5:34 PM	0	1	2	2	3	2
139	11/3/00	1	0	0	14308	6	5:53 PM	0	1	4	2	2	0
140	11/3/00	1	0	0	6308	6	5:57 PM	0	1	3	1	3	0
141	11/6/00	1	0	0	20311	2	11:27 AM	1	0	3	3	4	2
142	11/6/00	1	0	0	9311	2	12:37 PM	1	0	3	3	3	1
143	11/6/00	1	0	0	7311	2	12:48 PM	1	0	0	2	1	2

144	11/6/00	1	0	0	5311	2	1:02 PM	1	0	3	2	1	3
145	11/6/00	1	0	0	6311	2	1:57 PM	1	0	2	2	0	0
146	11/6/00	1	0	0	11311	2	3:52 PM	0	1	3	0	0	3
147	11/6/00	1	0	0	14311	2	4:09 PM	1	0	3	0	0	0
148	11/6/00	1	0	0	20311	2	4:42 PM	0	1	3	3	4	2
149	11/6/00	1	0	0	6311	2	5:03 PM	0	1	1	3	0	0
150	11/6/00	1	0	0	14311	2	4:09 PM	0	1	3	0	0	0
151	11/6/00	1	0	0	19311	2	10:45 PM	0	1	4	4	0	0
152	11/7/00	1	0	0	6312	3	11:05 AM	1	0	4	3	1	0
153	11/7/00	1	0	0	16312	3	12:00 PM	1	0	1	2	2	0
154	11/7/00	1	0	0	7312	3	12:25 PM	1	0	1	2	1	1
155	11/7/00	1	0	0	14312	3	12:44 PM	1	0	3	0	0	0
156	11/7/00	1	0	0	5312	3	2:01 PM	1	0	4	2	2	3
157	11/7/00	1	0	0	7312	3	5:18 PM	0	1	1	2	1	2
158	11/7/00	1	0	0	6312	3	5:25 PM	0	1	4	3	0	0
159	11/7/00	1	0	0	19312	3	9:26 PM	0	1	4	4	4	0
160	11/8/00	1	0	0	6313	4	11:05 AM	1	0	1	3	0	0
161	11/8/00	1	0	0	7313	4	1:23 PM	1	0	1	3	1	1
162	11/8/00	1	0	0	14313	4	2:14 PM	1	0	4	0	3	0
163	11/8/00	1	0	0	16313	4	2:49 PM	1	0	1	0	0	3
164	11/8/00	1	0	0	5313	4	3:05 PM	1	0	4	3	2	3
165	11/8/00	1	0	0	5313	4	5:09 PM	0	1	4	2	1	2
166	11/8/00	1	0	0	16313	4	5:59 PM	0	1	2	1	2	3
167	11/8/00	1	0	0	6313	4	6:17 PM	0	1	3	2	0	0
168	11/8/00	1	0	0	19313	4	7:49 PM	0	1	4	0	4	0
169	11/9/00	1	0	0	11314	5	11:00 AM	1	0	2	0	0	0
170	11/9/00	1	0	0	7314	5	12:04 PM	1	0	1	2	2	0
171	11/9/00	1	0	0	14314	5	12:55 PM	1	0	4	0	0	0
172	11/9/00	1	0	0	16314	5	1:19 PM	1	0	3	3	0	0
173	11/9/00	1	0	0	5314	5	2:38 PM	1	0	4	3	4	4
174	11/9/00	1	0	0	6314	5	2:40 PM	1	0	0	4	1	0

175	11/9/00	1	0	0	7314	5	5:40 PM	0	1	2	3	2	1
176	11/9/00	1	0	0	14314	5	5:46 PM	0	1	3	0	0	0
177	11/9/00	1	0	0	20314	5	5:48 PM	0	1	4	1	2	0
178	11/9/00	1	0	0	5314	5	5:37 PM	0	1	4	2	2	3
179	11/9/00	1	0	0	6314	5	5:51 PM	0	1	4	2	0	0
180	11/9/00	1	0	0	19314	5	6:46 PM	0	1	2	0	0	0
181	11/10/00	1	0	0	16315	6	11:52 AM	1	0	3	3	3	0
182	11/10/00	1	0	0	7315	6	12:07 PM	1	0	1	3	2	1
183	11/10/00	1	0	0	20315	6	12:32 PM	1	0	4	2	2	0
184	11/10/00	1	0	0	6315	6	12:52 PM	1	0	3	2	2	4
185	11/10/00	1	0	0	14315	6	1:26 PM	1	0	3	2	0	0
186	11/10/00	1	0	0	5315	6	3:03 PM	0	1	4	3	4	4
187	11/10/00	1	0	0	11315	6	3:52 PM	0	1	3	0	4	0
188	11/10/00	1	0	0	6315	6	5:16 PM	0	1	4	3	1	0
189	11/10/00	1	0	0	7315	6	5:21 PM	0	1	2	3	3	1
190	11/10/00	1	0	0	14315	6	5:38 PM	0	1	3	2	0	0
191	11/10/00	1	0	0	19315	6	7:49 PM	0	1	2	0	4	0
192	11/13/00	1	0	0	7318	2	12:15 PM	1	0	1	2	1	2
193	11/13/00	1	0	0	11318	2	12:54 PM	1	0	2	0	0	0
194	11/13/00	1	0	0	16318	2	1:35 PM	1	0	1	1	0	0
195	11/13/00	1	0	0	14318	2	1:39 PM	1	0	2	2	0	0
196	11/13/00	1	0	0	9318	2	2:03 PM	1	0	4	2	0	0
197	11/13/00	1	0	0	6318	2	4:02 PM	0	1	4	3	2	0
198	11/13/00	1	0	0	7318	2	5:39 PM	0	1	1	1	2	2
199	11/13/00	1	0	0	16318	2	5:59 PM	0	1	3	2	3	3
200	11/13/00	1	0	0	14318	2	6:00 PM	0	1	3	1	2	0
201	11/13/00	1	0	0	19318	2	11:52 PM	1	0	2	2	4	0
202	11/14/00	1	0	0	14319	3	1:15 PM	1	0	3	2	2	0
203	11/14/00	1	0	0	7319	3	3:44 PM	0	1	1	2	2	2
204	11/14/00	1	0	0	6319	3	5:00 PM	0	1	2	1	0	0
205	11/14/00	1	0	0	14319	3	6:02 PM	0	1	3	1	2	0

206	11/14/00	1	0	19319	3	7:48 PM	0	1	0	2	2	0
207	11/15/00	1	0	6320	4	11:42 AM	1	0	2	2	0	0
208	11/15/00	1	0	16320	4	11:45 AM	1	0	3	0	1	4
209	11/15/00	1	0	14320	4	12:07 PM	1	0	3	0	2	2
210	11/15/00	1	0	7320	4	3:45 PM	1	0	1	2	2	2
211	11/15/00	1	0	11320	4	4:08 PM	0	1	4	0	0	0
212	11/15/00	1	0	7320	4	5:25 PM	0	1	2	2	2	2
213	11/15/00	1	0	16320	4	5:28 PM	0	1	2	3	1	4
214	11/15/00	1	0	14320	4	5:59 PM	0	1	3	2	1	3
215	11/15/00	1	0	6320	4	8:17 PM	0	1	1	1	0	0
216	11/16/00	1	0	6321	5	12:04 PM	1	0	1	1	0	0
217	11/16/00	1	0	14321	5	12:48 PM	1	0	3	0	0	0
218	11/16/00	1	0	16321	5	1:57 PM	1	0	1	0	1	0
219	11/16/00	1	0	20321	5	4:15 PM	0	1	4	3	3	1
220	11/16/00	1	0	9321	5	4:15 PM	0	1	4	2	2	3
221	11/16/00	1	0	7321	5	5:24 PM	0	1	2	3	2	2
222	11/16/00	1	0	16321	5	6:07 PM	0	1	0	1	0	0
223	11/16/00	1	0	14321	5	6:12 PM	0	1	3	0	0	2
224	11/16/00	1	0	19321	5	10:35 PM	0	1	4	4	2	0
225	11/17/00	1	0	14322	6	12:15 PM	1	0	2	2	0	0
226	11/17/00	1	0	16322	6	2:00 PM	1	0	2	2	1	0
227	11/17/00	1	0	7322	6	2:11 PM	1	0	2	2	3	2
228	11/17/00	1	0	11322	6	2:24 PM	1	0	4	0	0	2
229	11/17/00	1	0	16322	6	4:45 PM	0	1	2	3	1	0
230	11/17/00	1	0	7322	6	5:10 PM	0	1	2	3	2	2
231	11/17/00	1	0	14322	6	5:28 PM	0	1	3	2	0	0
232	11/17/00	1	0	19322	6	7:46 PM	0	1	3	0	0	3
233	11/20/00	1	0	7325	2	1:12 PM	1	0	2	3	2	2
234	11/20/00	1	0	14325	2	1:49 PM	1	0	3	0	0	0
235	11/20/00	1	0	11325	2	5:00 PM	0	1	4	0	4	0
236	11/20/00	1	0	14325	2	6:20 PM	0	1	3	0	3	0

237	11/20/00	1	0	0	19325	2	11:08 PM	0	1	4	3	0	3
238	11/21/00	1	0	0	7326	3	12:30 PM	1	0	2	2	1	0
239	11/21/00	1	0	0	19326	3	6:22 PM	0	1	2	0	0	3
240	11/22/00	1	0	0	7327	4	1:03 PM	1	0	1	1	2	1
241	11/22/00	1	0	0	9327	4	4:57 PM	0	1	3	2	3	1
242	11/22/00	1	0	0	19327	4	9:21 PM	0	1	3	0	0	0
243	11/27/00	1	0	0	9332	2	2:39 PM	1	0	2	3	0	0
244	11/27/00	1	0	0	19332	2	11:17 PM	0	1	4	3	0	0
245	11/28/00	1	0	0	19333	3	9:56 PM	0	1	4	4	4	4
246	11/29/00	1	0	0	9334	4	11:28 AM	1	0	3	3	1	3
247	11/29/00	1	0	0	11334	4	3:56 PM	0	1	4	0	2	4
248	11/29/00	1	0	0	19334	4	11:11 PM	0	1	4	4	4	0
249	11/30/00	1	0	0	9335	5	4:59 PM	0	1	3	2	0	0
250	11/30/00	1	0	0	19335	5	9:54 PM	0	1	2	4	2	2
251	12/1/00	1	0	0	9336	6	12:18 PM	1	0	2	1	0	3
252	1/9/01	0	1	1	99	3	12:07 PM	1	0	3	0	2	3
253	1/9/01	0	1	1	69	3	12:44 PM	1	0	3	3	0	0
254	1/9/01	0	1	1	149	3	1:15 PM	1	0	3	3	4	0
255	1/9/01	0	1	1	169	3	1:18 PM	1	0	2	2	2	0
256	1/9/01	0	1	1	209	3	1:20 PM	1	0	1	1	2	2
257	1/9/01	0	1	1	69	3	5:21 PM	0	1	4	3	1	0
258	1/9/01	0	1	1	169	3	5:50 PM	0	1	3	2	3	0
259	1/9/01	0	1	1	149	3	6:21 PM	0	1	3	3	2	1
260	1/10/01	0	1	1	1610	4	11:50 AM	1	0	3	2	2	0
261	1/10/01	0	1	1	1410	4	1:58 PM	1	0	3	0	3	0
262	1/10/01	0	1	1	610	4	2:37 PM	1	0	2	3	0	0
263	1/10/01	0	1	1	1410	4	6:22 PM	0	1	3	2	2	0
264	1/10/01	0	1	1	710	4	6:24 PM	0	1	3	3	2	2
265	1/10/01	0	1	1	610	4	8:02 PM	0	1	4	3	0	0
266	1/11/01	0	1	1	711	5	12:42 PM	1	0	2	2	2	3
267	1/11/01	0	1	1	1411	5	12:55 PM	1	0	3	0	0	0

268	1/11/01	0	1	1611	5	2:59 PM	1	0	3	3	2	0
269	1/11/01	0	1	611	5	3:22 PM	1	0	3	1	0	0
270	1/11/01	0	1	711	5	5:20 PM	0	1	2	3	3	3
271	1/11/01	0	1	1411	5	5:21 PM	0	1	3	0	0	0
272	1/11/01	0	1	1611	5	5:33 PM	0	1	4	3	3	0
273	1/11/01	0	1	611	5	5:46 PM	0	1	2	1	0	0
274	1/12/01	0	1	1612	6	12:11 PM	1	0	3	3	0	4
275	1/12/01	0	1	512	6	12:18 PM	1	0	4	2	1	2
276	1/12/01	0	1	1412	6	1:34 PM	1	0	3	3	2	0
277	1/12/01	0	1	912	6	1:42 PM	1	0	2	2	0	3
278	1/12/01	0	1	712	6	2:33 PM	1	0	2	2	3	3
279	1/12/01	0	1	912	6	4:56 PM	0	1	3	3	2	0
280	1/12/01	0	1	512	6	5:12 PM	0	1	3	2	2	3
281	1/12/01	0	1	612	6	5:19 PM	0	1	2	3	0	0
282	1/12/01	0	1	712	6	5:28 PM	0	1	3	3	4	4
283	1/12/01	0	1	1412	6	5:38 PM	0	1	3	2	3	0
284	1/15/01	0	1	1615	2	12:44 PM	1	0	2	3	0	0
285	1/15/01	0	1	1415	2	12:47 PM	1	0	3	3	0	0
286	1/15/01	0	1	715	2	12:47 PM	1	0	0	4	1	1
287	1/15/01	0	1	915	2	12:57 PM	1	0	4	2	3	0
288	1/15/01	0	1	515	2	1:32 PM	1	0	3	2	1	3
289	1/15/01	0	1	615	2	3:24 PM	1	0	2	4	1	0
290	1/15/01	0	1	1415	2	6:08 PM	0	1	3	3	0	0
291	1/15/01	0	1	615	2	6:33 PM	0	1	1	3	0	0
292	1/16/01	0	1	1616	3	12:29 PM	1	0	2	3	2	0
293	1/16/01	0	1	716	3	1:20 PM	1	0	1	1	1	2
294	1/16/01	0	1	1416	3	1:18 PM	1	0	3	4	0	2
295	1/16/01	0	1	916	3	1:59 PM	1	0	3	3	3	0
296	1/16/01	0	1	616	3	2:09 PM	1	0	1	1	1	4
297	1/16/01	0	1	516	3	3:34 PM	1	0	4	3	2	3
298	1/16/01	0	1	1616	3	5:01 PM	0	1	3	3	2	3

299	1/16/01	0	1		516	3	6:02 PM	0	1	4	4	3	3	3
300	1/16/01	0	1		1416	3	6:36 PM	0	1	3	3	2	2	0
301	1/17/01	0	1		617	4	12:47 PM	1	0	1	3	0	0	0
302	1/18/01	0	1		2018	5	1:10 PM	1	0	3	2	2	2	3
303	1/18/01	0	1		1118	5	1:10 PM	1	0	4	0	3	3	0
304	1/18/01	0	1		718	5	1:21 PM	1	0	1	1	1	1	1
305	1/18/01	0	1		1418	5	1:39 PM	1	0	3	0	0	0	0
306	1/18/01	0	1		618	5	1:58 PM	1	0	1	1	1	1	0
307	1/18/01	0	1		1618	5	2:55 PM	1	0	2	3	1	1	0
308	1/18/01	0	1		918	5	5:46 PM	0	1	4	1	3	2	2
309	1/18/01	0	1		618	5	5:56 PM	0	1	1	1	0	0	0
310	1/18/01	0	1		1418	5	5:54 PM	0	1	3	1	0	0	0
311	1/18/01	0	1		1618	5	8:54 PM	0	1	3	3	0	0	0
312	1/19/01	0	1		1619	6	12:57 PM	1	0	3	2	0	0	0
313	1/19/01	0	1		719	6	1:13 PM	1	0	1	1	2	2	2
314	1/19/01	0	1		1419	6	1:24 PM	1	0	3	3	2	2	0
315	1/19/01	0	1		1919	6	1:57 PM	1	0	3	0	3	0	0
316	1/19/01	0	1		519	6	2:15 PM	1	0	4	2	3	4	4
317	1/19/01	0	1		619	6	2:44 PM	1	0	1	2	0	0	0
318	1/19/01	0	1		919	6	4:14 PM	0	1	3	3	1	1	1
319	1/19/01	0	1		619	6	5:39 PM	0	1	3	1	0	0	0
320	1/19/01	0	1		1419	6	5:48 PM	0	1	3	3	2	2	2
321	1/19/01	0	1		719	6	6:30 PM	0	1	2	2	2	2	0
322	1/22/01	0	1		1622	2	11:47 AM	1	0	3	3	0	0	0
323	1/22/01	0	1		1122	2	12:46 PM	1	0	4	0	0	0	0
324	1/22/01	0	1		722	2	12:48 PM	1	0	1	2	2	2	2
325	1/22/01	0	1		1422	2	12:55 PM	1	0	3	0	0	0	0
326	1/22/01	0	1		1922	2	2:22 PM	1	0	0	0	0	0	0
327	1/22/01	0	1		622	2	3:57 PM	1	0	4	4	3	3	0
328	1/22/01	0	1		722	2	5:29 PM	0	1	1	2	2	2	2
329	1/22/01	0	1		1422	2	5:33 PM	0	1	3	0	0	0	0

330	1/22/01	0	1	622	2	6:13 PM	0	1	4	4	3	0
331	1/23/01	0	1	1623	3	12:25 PM	1	0	3	3	1	2
332	1/23/01	0	1	623	3	1:15 PM	1	0	1	1	1	3
333	1/23/01	0	1	623	3	6:00 PM	0	1	1	1	0	0
334	1/23/01	0	1	1923	3	7:15 PM	0	1	3	3	4	3
335	1/24/01	0	1	924	4	11:14 AM	1	0	2	3	2	1
336	1/24/01	0	1	2024	4	11:48 AM	1	0	3	2	1	3
337	1/24/01	0	1	1624	4	12:11 PM	1	0	3	3	3	0
338	1/24/01	0	1	724	4	12:23 PM	1	0	2	2	1	1
339	1/24/01	0	1	1424	4	1:46 PM	1	0	3	3	0	0
340	1/24/01	0	1	624	4	1:48 PM	1	0	4	3	0	3
341	1/24/01	0	1	1124	4	3:27 PM	0	1	0	0	0	0
342	1/24/01	0	1	1624	4	5:27 PM	0	1	3	3	1	2
343	1/24/01	0	1	1424	4	6:18 PM	0	1	3	4	0	0
344	1/25/01	0	1	925	5	11:35 AM	1	0	4	1	2	0

pro5	ev6	ev7	ev8	cre3	mot3	mot1	mot2	drk1	drk2	cre1	cre2	loc
0	0	4	0	7	7	4	6	6	0	0	6	3
1	0	1	1	2	2	1	0	2	2	4	2	4
3	0	2	0	5	5	4	3	1	1	3	4	4
4	0	1	4	7	7	6	2	6	0	3	7	7
1	2	4	1	7	5	6	4	4	4	5	6	5
0	2	0	4	7	7	2	7	2	0	4	5	6
3	1	2	4	6	5	1	7	5	5	5	4	2
1	1	1	2	4	4	2	4	3	3	3	4	4
0	0	0	0	7	7	4	6	7	1	1	7	5
3	1	1	0	6	5	2	1	1	1	5	4	6
0	0	4	0	7	7	1	1	1	1	1	5	7
4	0	1	2	7	7	7	5	4	4	5	6	7
3	0	0	0	7	6	6	0	4	0	6	5	5
4	4	0	4	7	7	5	4	7	5	4	7	6
2	1	2	2	5	4	3	6	5	4	3	5	4
0	0	0	4	4	2	2	1	1	1	1	2	1
2	0	1	0	5	3	6	2	0	0	3	4	6
0	0	0	0	7	7	1	2	1	1	1	7	3
4	2	1	4	7	7	5	7	7	7	4	7	6
4	0	0	0	7	7	2	1	0	0	4	5	6
4	4	4	0	7	7	0	0	5	0	6	7	5
2	0	0	0	6	6	6	4	4	3	4	6	6
2	2	2	3	4	4	5	2	4	5	2	4	5
4	1	0	3	5	4	1	7	5	5	2	5	5
2	0	0	4	6	5	1	1	1	1	1	3	4
0	2	3	0	5	4	4	1	0	0	3	4	6
4	0	1	0	6	6	4	1	0	0	4	4	5
1	3	2	0	5	5	4	5	4	4	5	5	4
4	0	2	0	7	6	6	5	4	4	5	6	6
4	0	0	4	7	7	4	4	7	1	4	7	6
0	0	0	0	7	6	1	1	1	1	7	6	6

pro5	ev6	ev7	ev8	cre3	mot3	mot1	mot2	drk1	drk2	cre1	cre2	loc
0	0	4	0	7	7	4	6	6	0	0	6	3
1	0	1	1	2	2	1	0	2	2	4	2	4
3	0	2	0	5	5	4	3	1	1	3	4	4
4	0	1	4	7	7	6	2	6	0	3	7	7
1	2	4	1	7	5	6	4	4	4	5	6	5
0	2	0	4	7	7	2	7	2	0	4	5	6
3	1	2	4	6	5	1	7	5	5	5	4	2
1	1	1	2	4	4	2	4	3	3	3	4	4
0	0	0	0	7	7	4	6	7	1	1	7	5
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3	2	1	3	0	6	5	5	3	5	5	4	5	5	6
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3	0	0	0	6	4	4	5	2	2	2	4	6
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(Additional columns in trait spreadsheet for nine participants)

bfi40	bfi41	bfi42	bfi43	bfi44	eaq1	eaq2	eaq3	eaq4	eaq5	
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5	1	4	3	5	6	7	3	6	6	5
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5	2	4	4	4	6	7	2	6	6	2
5	4	4	4	1	7	6	2	3	3	3
3	4	3	2	2	5	6	5	6	6	3

(Additional columns in trait spreadsheet for nine participants)

eaq6	eaq7	eaq8	eaq9	eaq10	eaq11	eaq12	eaq13	eaq14	eaq15	
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7	2	5	7	2	1	5	7	2	2	5
6	5	5	7	2	2	7	5	1	6	6
6	2	5	6	2	3	5	7	3	3	5
7	5	5	1	7	5	7	7	3	7	7
6	5	3	5	6	2	6	3	3	2	2
6	6	2	7	6	2	6	5	2	2	2
7	6	6	7	1	1	6	7	3	6	6
6	6	5	3	6	3	6	3	2	3	3

(Additional columns in trait spreadsheet for nine participants)

eaq16	eaq17	eaq18	eaq19	eaq20	eaq21	eaq22	eaq23	eaq24	eaq25	
6	1	3	2	6	3	3	5	3	5	
7	2	7	2	2	1	1	6	1	5	5
7	1	1	1	1	1	2	6	2	6	6
6	3	6	2	3	2	5	3	6	5	5
7	1	3	1	1	1	1	2	5	7	7
5	5	2	3	2	5	1	5	2	5	5
6	3	6	3	2	5	3	5	1	5	5
5	2	7	1	1	2	7	6	3	5	5
6	3	6	2	5	3	2	5	3	6	6

(Additional columns in trait spreadsheet for nine participants)

eaq26	eaq27	eaq28	eaq29	eaq30	eaq31	eaq32	eaq33	eaq34	absent	
6	6	3	7	5	5	6	6	2	1	
6	6	2	7	7	2	6	3	2	1	
7	3	5	3	1	7	7	3	2	1	
6	6	3	6	3	5	6	5	3	0	
7	7	5	7	3	6	7	5	5	0	
6	2	2	2	1	2	3	3	2	0	
6	2	2	3	2	6	6	2	2	1	
6	7	1	7	5	5	6	7	1	0	
6	6	3	6	3	3	5	5	2	0	

(Additional columns in trait spreadsheet for nine participants)

unconv	active	tactless	adapt	spontan	advent	sharpwit	alert	serious	aloof	
0	1	0	1	1	1	1	1	1	0	0
1	1	0	1	1	1	1	1	0	0	0
0	0	0	0	0	0	0	0	0	1	1
0	1	0	1	0	1	0	1	1	1	0
0	1	0	1	0	0	0	0	1	0	0
0	0	0	1	0	0	0	1	0	0	1
0	0	1	1	0	0	1	1	0	1	1
1	1	0	1	1	1	1	1	1	1	0
0	1	0	1	0	0	0	0	0	1	1

(Additional columns in trait spreadsheet for nine participants)

sensit	ambiti	selfcent	argum	sarcast	artistic	restless	assert	resourc	autocrat	
1	0	0	0	0	1	1	0	1	1	0
0	1	0	0	0	0	1	1	1	1	1
1	0	0	0	0	0	1	1	0	0	0
1	0	0	0	0	0	1	0	0	1	0
1	0	0	0	0	0	0	0	1	0	0
1	0	0	0	1	0	0	0	0	1	0
1	0	1	0	1	1	1	1	0	1	0
1	0	0	0	1	0	1	1	0	1	0
0	0	1	1	1	1	0	0	1	0	0

(Additional columns in trait spreadsheet for nine participants)

reserve	capable	reflect	careless	rebells	clerthnk	rational	clever	quick	complic	
0	1	0	0	0	0	1	1	1	1	0
0	1	0	0	0	0	1	0	1	0	0
1	1	1	0	0	0	0	1	0	0	0
0	1	1	0	0	0	0	1	0	0	0
0	1	1	0	0	0	0	0	0	0	0
1	1	0	0	0	0	1	1	0	0	0
1	1	1	0	0	0	1	1	1	0	0
0	1	1	0	0	0	1	1	1	0	1
0	1	0	0	0	0	0	1	0	0	1

(Additional columns in trait spreadsheet for nine participants)

outspok	confidnt	origin	curious	moody	cynical	logical	demand	invent	disorder	
1	1	0	0	0	0	0	1	0	1	0
0	1	1	1	1	0	0	0	1	1	0
0	0	1	0	1	1	1	1	0	0	0
1	1	1	1	1	1	0	0	0	0	0
0	1	1	1	1	0	0	0	0	1	0
0	0	1	1	1	0	1	1	0	0	0
0	0	1	1	1	1	1	1	0	1	0
1	1	1	1	1	0	1	1	0	1	0
0	1	0	0	0	1	0	1	1	0	0

(Additional columns in trait spreadsheet for nine participants)

intoler	dissatis	widinter	distract	intell	egotis	insight	energetc	ingenus	enthus	
0	0	1	0	0	0	0	1	1	0	1
0	0	1	0	0	1	0	1	1	1	1
0	1	1	0	0	1	0	0	0	0	0
0	0	1	0	0	1	0	1	0	0	1
0	0	1	0	0	0	0	0	1	0	1
0	0	1	0	0	1	0	1	0	0	0
0	1	0	1	1	1	0	1	0	0	0
0	0	1	0	0	1	0	1	1	1	1
0	1	0	0	0	1	0	0	1	0	0

(Additional columns in trait spreadsheet for nine participants)

indust	humors	individl	huried	indept	idelistc	impuls	imaginev	cretot	mot1int	
1	1	0	0	1	0	0	0	1	29	7
1	1	1	0	1	1	1	1	1	34	7
1	0	1	0	0	0	1	0	1	21	5
1	1	1	0	1	0	0	0	1	25	6
0	1	1	0	1	0	0	0	1	18	7
0	0	1	0	1	1	1	0	1	21	4
0	1	1	1	1	1	1	1	1	35	7
1	1	0	0	1	1	1	0	1	36	7
1	0	1	0	1	0	0	1	0	22	6

(Additional columns in trait spreadsheet for nine participants)

mot2int	mot3ext	mot4int	mot5ext	mot6ext	mot7ext	mot8int	mot9ext	mot10int	mot11int
7	2	6	6	5	7	6	6	6	6
7	4	6	5	7	5	6	5	4	5
7	2	3	5	5	7	7	7	7	7
6	5	6	7	4	6	5	4	6	7
4	6	7	5	7	2	4	5	7	7
7	2	6	6	5	7	7	4	5	7
7	5	7	6	6	7	7	6	6	6
7		7	7	7	5	7	7	7	6
4	5	5	6	6	5	4	6	6	6

(Additional columns in trait spreadsheet for nine participants)

mot12int	mot13ext	mot14ext	locus1	locus2	locus3	locus4
4	6	6	6	6	6	6
7	6	4	7	7	3	3
7	3	3	6	7	6	7
6	6	6	6	6	7	6
7	7	1	7	4	2	5
6	2	4	6	7	5	6
7	7	7	5	7	5	6
7	7	4	7	7	6	7
5	5	5	7	6	5	6

Appendix K

Statistics from Two Level HLM Model

LEVEL-1 DESCRIPTIVE STATISTICS

VARIABLE NAME	N	MEAN	SD	MINIMUM	MAXIMUM
JDATE	229	310.14	9.65	297.00	336.00
MORN	229	0.50	0.50	0.00	1.00
EVEN	229	0.50	0.50	0.00	1.00
CREATP1	229	2.35	1.37	0.00	4.00
CREATP2	229	1.77	1.28	0.00	4.00
CREATP3	229	1.46	1.42	0.00	4.00
CREATP4	229	0.99	1.39	0.00	4.00
CREATP5	229	1.90	1.50	0.00	4.00
COGOALS	229	0.76	1.20	0.00	4.00
PERGOALS	229	0.83	1.14	0.00	4.00
SOCNET	229	0.58	1.20	0.00	4.00
CREIMP	229	5.46	1.60	0.00	7.00
INTMOT	229	5.30	1.49	0.00	7.00
EXTGMOT	229	3.41	1.83	0.00	7.00
EXTBMOT	229	3.86	2.17	0.00	7.00
SOCNWELL	229	2.52	2.19	0.00	7.00
SOCNNWEL	229	1.96	2.06	0.00	7.00
CRENOVEL	229	3.04	1.76	0.00	7.00
CREUSEFL	229	4.61	1.82	0.00	7.00
LOCCONTL	229	4.66	1.73	0.00	7.00

LEVEL-2 DESCRIPTIVE STATISTICS

VARIABLE NAME	N	MEAN	SD	MINIMUM	MAXIMUM
EXTRA	9	3.46	1.13	1.75	5.00
AGREE	9	3.77	0.83	2.56	4.89
CONSC	9	4.09	0.34	3.56	4.67
NEURO	9	2.56	0.72	1.75	3.50
OPEN	9	4.86	0.53	4.00	5.50
EAQKAI1	9	5.27	0.96	3.80	6.60
EAQKAI2	9	3.69	0.88	2.00	4.75
EAQKAI3	9	5.41	0.92	4.00	6.67
EAQKAIT	9	4.79	0.35	4.39	5.45
EAQCAR1	9	2.36	0.92	1.00	4.00
EAQCAR2	9	5.89	0.71	4.67	7.00
EAQCAR3	9	3.30	1.40	1.33	5.00
EAQCART	9	3.85	0.51	2.89	4.39
EAQEAO1	9	4.89	0.94	3.50	6.50
EAQEAO2	9	5.17	1.41	2.50	7.00
EAQEAO3	9	3.19	0.91	2.00	5.00
EAQEAO4	9	4.48	1.37	2.67	6.67

EAQEAOT	9	4.43	0.79	2.81	5.50
EAQT	9	4.36	0.40	3.55	4.78
CRETOT	9	26.78	6.89	18.00	36.00
EXPOSMOT	9	5.61	0.66	4.50	6.50
EXNEGMOT	9	4.80	0.96	3.33	6.00
INMOT	9	6.11	0.49	5.14	6.86
SOCCHOD	9	6.33	0.71	5.00	7.00
NSOCHOD	9	6.33	1.00	4.00	7.00
SOOUTCM	9	5.00	1.58	2.00	7.00
NSOOUTCM	9	5.78	1.20	3.00	7.00

Appendix L

Sample 2-Level HLM Model with Two Predictor Variables

Program: HLM 5 Hierarchical Linear and Nonlinear Modeling
 Authors: Stephen Raudenbush, Tony Bryk, & Richard Congdon
 Publisher: Scientific Software International, Inc. (c) 2000
 techsupport@ssicentral.com
 www.ssicentral.com

 Module: HLM2S.EXE (5.00.2045.1)
 Date: 12 April 2001, Thursday
 Time: 21:10:32

SPECIFICATIONS FOR THIS HLM2 RUN

Problem Title: NO TITLE

The data source for this run = D:\HLM5S\THESIS\stryone.ssm
 The command file for this run = D:\HLM5S\More models for thesis\creatimp and cp3 and cp5.hlm
 Output file name = D:\HLM5S\hlm2.out
 The maximum number of level-2 units = 9
 The maximum number of iterations = 50
 Method of estimation: restricted maximum likelihood

Weighting Specification

	Weight	Variable	
	Weighting?	Name	Normalized?
Level 1	no		no
Level 2	no		no

The outcome variable is CREIMP

The model specified for the fixed effects was:

Level-1	Level-2
Coefficients	Predictors

INTRCPT1, B0	INTRCPT2, G00
* CREATP3 slope, B1	INTRCPT2, G10
* CREATP5 slope, B2	INTRCPT2, G20

'**' - This level-1 predictor has been centered around its group mean.

The model specified for the covariance components was:

Sigma squared (constant across level-2 units)

Tau dimensions

INTRCPT1

CREATP3 slope

CREATP5 slope

Summary of the model specified (in equation format)

Level-1 Model

$$Y = B0 + B1*(CREATP3) + B2*(CREATP5) + R$$

Level-2 Model

$$B0 = G00 + U0$$

$$B1 = G10 + U1$$

$$B2 = G20 + U2$$

Level-1 OLS regressions

Level-2 Unit INTRCPT1 CREATP3 slope CREATP5 slope

11	7.00000	0.00000	0.00000
14	5.66667	0.18356	0.33142
16	5.62069	0.16600	0.97991
19	6.14286	0.19981	0.23706
20	5.60000	0.19209	0.74011
50	4.88889	1.33469	-0.09493
60	5.96970	0.40242	0.28185
70	3.88889	0.47195	0.31455
90	4.52941	0.49507	0.32575

The average OLS level-1 coefficient for INTRCPT1 = 5.47857

The average OLS level-1 coefficient for CREATP3 = 0.38284

The average OLS level-1 coefficient for CREATP5 = 0.34619

Least Squares Estimates

sigma_squared = 2.05475

The outcome variable is CREIMP

Least-squares estimates of fixed effects

Fixed Effect	Standard		T-ratio	d.f.	P-value
	Coefficient	Error			

For INTRCPT1, B0					
INTRCPT2, G00	5.462882	0.094724	57.671	226	0.000
For CREATP3 slope, B1					
INTRCPT2, G10	0.330633	0.074496	4.438	226	0.000
For CREATP5 slope, B2					
INTRCPT2, G20	0.398806	0.078598	5.074	226	0.000

The outcome variable is CREIMP

Least-squares estimates of fixed effects

(with robust standard errors)

Fixed Effect	Standard		T-ratio	d.f.	P-value
	Coefficient	Error			

For INTRCPT1, B0					
INTRCPT2, G00	5.462882	0.321837	16.974	226	0.000
For CREATP3 slope, B1					
INTRCPT2, G10	0.330633	0.077262	4.279	226	0.000
For CREATP5 slope, B2					
INTRCPT2, G20	0.398806	0.101285	3.937	226	0.000

The robust standard errors are appropriate for datasets having a moderate to large number of level 2 units. These data do not meet this criterion.

The least-squares likelihood value = -410.661360

Deviance = 821.32272

Number of estimated parameters = 1

STARTING VALUES

sigma(0)_squared = 1.12960

Tau(0)

INTRCPT1,B0	0.80349	-0.19850	-0.02166
CREATP3,B1	-0.19850	0.09889	-0.04649
CREATP5,B2	-0.02166	-0.04649	0.05861

The outcome variable is CREIMP

Estimation of fixed effects

(Based on starting values of covariance components)

Fixed Effect	Coefficient	Standard Error	Approx. T-ratio	d.f.	P-value

For INTRCPT1, B0					
INTRCPT2, G00	5.473351	0.308166	17.761	8	0.000
For CREATP3 slope, B1					
INTRCPT2, G10	0.377296	0.123144	3.064	8	0.016
For CREATP5 slope, B2					
INTRCPT2, G20	0.395599	0.105168	3.762	8	0.007

The value of the likelihood function at iteration 1 = -3.620653E+002

The value of the likelihood function at iteration 2 = -3.617790E+002

The value of the likelihood function at iteration 3 = -3.615738E+002

The value of the likelihood function at iteration 4 = -3.613967E+002

The value of the likelihood function at iteration 5 = -3.612355E+002

The value of the likelihood function at iteration 46 = -3.593419E+002

The value of the likelihood function at iteration 47 = -3.593414E+002

The value of the likelihood function at iteration 48 = -3.593408E+002

The value of the likelihood function at iteration 49 = -3.593403E+002

***** ITERATION 50 *****

Sigma_squared = 1.13902

Tau

INTRCPT1,B0	0.82696	-0.18161	-0.06287
CREATP3,B1	-0.18161	0.04107	0.01691
CREATP5,B2	-0.06287	0.01691	0.05015

Tau (as correlations)

INTRCPT1,B0 1.000 -0.985 -0.309
 CREATP3,B1 -0.985 1.000 0.373
 CREATP5,B2 -0.309 0.373 1.000

 Random level-1 coefficient Reliability estimate

INTRCPT1, B0 0.941
 CREATP3, B1 0.508
 CREATP5, B2 0.519

The value of the likelihood function at iteration 50 = -3.593399E+002

The outcome variable is CREIMP

Final estimation of fixed effects:

Fixed Effect	Standard Coefficient	Standard Error	Approx. T-ratio	d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	5.472495	0.312443	17.515	8	0.000
For CREATP3 slope, B1					
INTRCPT2, G10	0.360354	0.089043	4.047	8	0.004
For CREATP5 slope, B2					
INTRCPT2, G20	0.390988	0.099849	3.916	8	0.005

The outcome variable is CREIMP

Final estimation of fixed effects

(with robust standard errors)

Fixed Effect	Standard Coefficient	Standard Error	Approx. T-ratio	d.f.	P-value
For INTRCPT1, B0					
INTRCPT2, G00	5.472495	0.294746	18.567	8	0.000
For CREATP3 slope, B1					
INTRCPT2, G10	0.360354	0.078447	4.594	8	0.002
For CREATP5 slope, B2					
INTRCPT2, G20	0.390988	0.092339	4.234	8	0.003

The robust standard errors are appropriate for datasets having a moderate to large number of level 2 units. These data do not meet this criterion.

Final estimation of variance components:

Random Effect		Standard	Variance	df	Chi-square	P-value
		Deviation	Component			
INTRCPT1,	U0	0.90937	0.82696	8	163.08834	0.000
CREATP3 slope,	U1	0.20266	0.04107	8	21.79414	0.006
CREATP5 slope,	U2	0.22394	0.05015	8	20.47114	0.009
level-1,	R	1.06725	1.13902			

Statistics for current covariance components model

Deviance = 718.67972

Number of estimated parameters = 7

VITA

Elizabeth Layne Paddock

Elizabeth Layne Paddock completed her early academic education in Northern Virginia, graduating from Centreville High School in the spring of 1995. Following her graduation, she matriculated to the College of William & Mary in the fall of that year.

During her undergraduate years at the College of William & Mary, Layne received a B.S. in Psychology and English. While at the College of William & Mary, Layne participated in the Honors Program under the direction of Professor Kelly G. Shaver. This research experience fostered a strong love of research, as well as a great interest in business psychology in Layne.

After matriculating from the College of William & Mary, she entered the Masters Program at the College of William & Mary, continuing to work closely with Professors Kelly G. Shaver and Gregory J. Feist. During her time as a Masters student, Layne continued to refine her interests in business psychology as is apparent in the current thesis on entrepreneurship and creativity.

Layne will enter the Management and Policy doctoral program in Business Administration at the University of Arizona in August 2001.