

1997

## Organizational Dynamics, Issue Importance, and Creativity in Problem-Solving

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<https://dx.doi.org/doi:10.21220/s2-nvjg-re40>

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**Organizational Dynamics, Issue Importance,  
and Creativity in Problem-Solving**

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**A Thesis**

**Presented To**

**The Faculty of the Department of Psychology  
The College of William and Mary in Virginia**

**In Partial Fulfilment**

**Of the Requirements for the Degree of  
Master of Arts**

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**by**

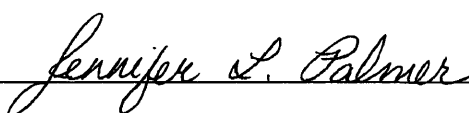
**Jennifer L. Palmer**

**1997**

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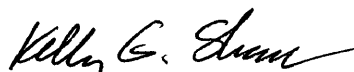
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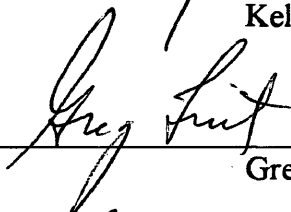


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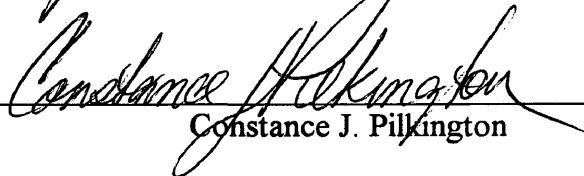
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## ACKNOWLEDGMENTS

First and foremost, I would like to thank my advisor, Kelly Shaver, for devoting countless hours of patience and timeless wisdom to my academic development. His dedication to this project has been every bit as great as my own, and his gifts of scholarly advice and supportive encouragement provided a guiding force that is largely responsible for my present accomplishments. As a mentor Kelly has earned my deepest respect and admiration, and I will always be grateful for the indelible imprints he has made on me both personally and professionally.

I would also like to recognize the remarkable efforts and contributions of my committee members, Gregory Feist and Constance Pilkington, both of whom made invaluable suggestions and were notably generous in the sharing of their time, knowledge, and insight. I am deeply grateful for the keen perspectives they offered.

Most importantly, I would like to thank my family. Their unwavering confidence in my abilities and their boundless expressions of caring inspired me to press ahead toward the realization of my goals. This project is dedicated to my mother, who encouraged me to embrace my dreams wholeheartedly, my father, who convinced me that determination could transform my dreams into realities, and Boomer, who taught me to believe in myself and to find humor in the midst of the challenges. Together they have endowed me with “foundational roots” and “wings to fly,” and these priceless, enduring gifts provide meaning and momentum to every step in my life’s journey.

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## Abstract

Recent research in employee creativity implicates the potential role of organizational dynamics on subsequent manifestation of creativity. It is believed that the prevailing organizational attitude, in addition to other factors, contributes as much to manifestations of employee creativity as does the employees' natural aptitude for creative thought processes. This study examined the ways in which organizational dynamics mediate employee creativity in problem solving tasks. Fifty-eight undergraduates read two vignettes that outlined their role in an organization and described a specific problem being faced by the organization. Additional details included the importance of finding a solution to the problem and the organization's attitude toward creative solutions. After reading each vignette participants were asked to generate ideas that could lead to a potential solution to the organizational problem. A series of 2 (Organizational Dynamics) x 2 (Relative Importance of Problem) analyses of variance (with repeated measures on the last factor) revealed significant main effects of organizational climate (the degree to which the organization encouraged or discouraged creativity) and interactions between organizational dynamics and problem importance.

Organizational Dynamics, Issue Importance,  
and Creativity in Problem-Solving

Creativity and innovation have been defined in a multitude of ways. For the present purpose, creativity will be understood to denote the generation of novel, unconventional, or imaginative ideas at the individual level that may contribute to the improved efficiency or efficacy of a system. Innovation, closely related to creativity, is conceptualized as opportunity recognition, or the ability to implement these ideas in beneficial ways at the organizational level (Amabile, 1988; Kuratko & Hodgetts, 1995; Staw, 1990). Creativity constitutes the necessary springboard for all innovation, which explains why strategies to increase innovative practices begin with efforts to cultivate and enhance creative endeavors.

A common misconception surrounding creativity is the belief that it is intrinsically related to intelligence, or that one must possess a certain level of intelligence in order to exercise creative ability. The extensive studies of Torrance (1965) debunked this pervasive myth by cogently demonstrating that every child is born with a certain amount of creative thinking potential. A significant amount of research has been devoted to the identification of personal characteristics and attributes that are predictive of creative performance (Barron & Harrington, 1981; Davis, 1989; Feist, 1993; Martindale, 1989; Woodman & Schoenfeldt, 1990). Relevant findings suggest that a stable set of core personal characteristics correlates reliably with measures of creative achievement in numerous domains. These characteristics include self-confidence, openness to divergent thinking, toleration of ambiguity, attraction to complexity, and lack of conventionality.



To the extent that these qualities can be promoted in a given atmosphere, creative performance should similarly be enhanced. The studies of Simonton (1978) suggest that creativity is significantly less prone to outside influences during adulthood in comparison with childhood, but he further acknowledges that the influences of specific environments on manifestations of adult creativity have yet to be significantly examined.

Current research supports the idea that personal and contextual factors interact to produce creativity (Amabile, 1983; Woodman, Sawyer, & Griffin, 1993). Creative people are typically self-confident, energetic, autonomous, and willing to take risks, but these characteristics are not impervious to external forces in the environment (Yong, 1994). Environmental influences appear to affect not only the frequency of creative behavior, but the level of creativity as well (Amabile, Conti, Coon, Lazenby, & Herron, 1996). The present issue is not an individual's relative capacity for creative thinking, but rather the mechanisms by which creativity operates and the conditions under which it may be optimized.

### Creativity Conceptualized

Creativity has been examined from many standpoints, yet this scrutiny has made little headway in obliterating the obscurity surrounding the concept. In order to broaden the understanding of creativity from a social psychological perspective, Amabile (1983) developed a "component" conceptualization of the phenomenon. The resulting framework identifies three major components as necessary for the production of creative responses: domain-relevant skills, creativity-relevant skills, and task motivation.

Domain-relevant skills represent one's familiarity with a given domain.

“Familiarity” in this case encompasses all germane informational background possessed by the individual, as well as technical proficiency and talent pertinent to the area. These skills establish the range of possibilities from which new ideas will be drawn. They provide the resources that are consulted during novel thought generation and determine the accessibility of cognitive paths during brainstorming. The factual knowledge inherent in domain-relevant skills essentially establishes the criteria, or bases of comparison, by which subsequent ideas and responses are evaluated. Extensive domain-relevant skills are believed to increase the likelihood that a creative response will be produced.

Creativity-relevant skills, on the other hand, include the individual’s cognitive style, knowledge of heuristics, and work style. These skills determine the way in which the individual approaches new tasks and how favorably a new response will compare with previous ones. These skills are crucial to the creative process; without them, no amount of motivation can inspire creative thought. In terms of cognitive style, highly creative individuals are those who can easily process complexity, and who can exercise the ability to “break set,” or think divergently, during a problem solving task. Similarly, creativity heuristics refer to the various strategies or thought processes a person employs in an effort to solve a problem. These strategies can rarely be stated explicitly because they operate primarily outside of the individual’s awareness. Lastly, work style encompasses personality traits that are conducive to the creative process. Certain creativity-relevant skills are believed to stem directly from one’s personality, while other creativity-relevant skills can be amplified through specific training.

Task motivation refers to the variables responsible for inspiring an individual to

confront and to persevere in a particular task. According to the component framework, task motivation is divided into two parts: the individual's general attitudinal regard for the task (the "trait") and the individual's perceived reasoning for pursuing the task in a particular situation (the "state"). An individual's initial attitudes toward the task are derived fairly instantaneously through a process of task assessment and the comparison of its requirements to preexisting preferences. Individual perceptions of motivation, however, are highly susceptible to external social and environmental influences. Perhaps the most salient of these influences is the degree to which extrinsic constraints are present in the environment. Extrinsic constraints refer to any forces that attempt to regulate or to restrict one's performance on a given task. These constraining factors are typically imposed by other individuals, but they may also be mediated by the individual's ability to shift his or her attention away from these constraints. Task motivation provides the critical link between the performance an individual is capable of executing and the performance he or she actually generates. Task motivation is believed to be responsible for both the initiation and the maintenance of the creative process.

The collective contributions of domain-relevant skills, creativity-relevant skills, and task motivation provide a theoretical understanding of how the creative process is initiated and how it proceeds. This model is regarded as multiplicative in nature, implying that the levels of these three components predict the degree of creativity that will be generated on a given task, and consequently, that no creativity will result if any one of these components is zero (Amabile, 1983).

### Intrinsic Motivation

The primary feature distinguishing the component framework of creativity from previous models is its emphasis on motivational variables. The social psychological model of creativity (Amabile, 1983) implicates task motivation as central to creative performance but also highly susceptible to outside influences. According to Crutchfield (1962), intrinsic motivation refers to goal-directed activity that is propelled by the inherent challenge of the task itself. People who are intrinsically motivated in the realm of creativity view the creative act as an end in itself. This perspective contrasts sharply with that of extrinsic motivation, in which the creative act is viewed as the means to an unrelated end, and the individual's effort is motivated by the promise of an external reward. From Crutchfield's perspective, the distinction between intrinsic and extrinsic motivation is the presence or absence of an external reward for task accomplishment.

The work of Crutchfield (1962) suggests that intrinsic motivation generally facilitates individual creativity, whereas extrinsic motivation typically inhibits creative performance. The relationship between intrinsic and extrinsic motivation deserves consideration. Although it is frequently assumed that these two phenomena are additive (e.g., Vroom, 1964), another line of reasoning (termed the hydraulic model) holds that they interact, such that high levels of extrinsic motivation actually impede intrinsic motivation from reaching significant levels (Calder & Staw, 1975). From this perspective, the imposition of extrinsic constraints on a task that would otherwise be intrinsically stimulating may lead an individual to interpret task effort as being channeled toward an extrinsic goal. Such a perception would be expected to diminish intrinsic

motivation, and thus, to hinder creativity.

To recap, the hydraulic model states that an increase in extrinsic motivation is necessarily accompanied by a decrease in intrinsic motivation, whereas the additive model holds that extrinsic motivation can increase without undermining corresponding levels of intrinsic motivation. Debate remains regarding potential positive effects of extrinsic motivators. In fact, there is evidence that high levels of extrinsic motivation may actually enhance the corresponding level of intrinsic motivation. For example, support for this idea was offered by Amabile, Hennessey, and Grossman, who found that creative output was greater when an external bonus was promised than when there was no such promise (1986). In general, though, high levels of intrinsic motivation are more commonly associated with displays of creativity.

The concepts of intrinsic and extrinsic motivation have also been described in more cognitive terms, with the emphasis centering on the individual's perceived reason for task motivation, or the individual's explanation for persevering in task-related efforts. In this case an intrinsically motivated individual is one who interprets his or her effort on a project as originating from genuine interest in the task (Lepper, Greene, & Nisbett, 1973). The same individual would be considered extrinsically motivated if the explanation for this effort revolved around the attainment of an unrelated goal, such as money, recognition, or promotion. The principle remains the same, namely that individuals who undertake a project for its own sake are intrinsically motivated, whereas those who persevere in a project for any other reason are extrinsically motivated. Recent research suggests that intrinsic and extrinsic motivational orientations toward creativity

are not task-specific, as was previously believed, but rather are stable and ubiquitous attitudes toward activities in general (Amabile, 1996).

### The Quest for Organizational Creativity

Organizations have long recognized the value of cultivating employee creativity. As early as 1955, the Harvard Business Review quoted F. D. Randall as saying that management “must learn to mine the creativity within its own ranks -- the inventiveness and imagination buried by the pursuit of specialization, systematization and control.” He further contends that executives “tend to overlook a virtually untapped asset -- the natural creativity of the average executive” (as cited in Dauw & Fredian, 1971, p. 26). In the decade following this article, hundreds of thousands of businessmen registered for courses in applied imagination. In recent years creativity training programs have sprung up nationwide, attesting to the prevalent belief that an individual’s potential to capitalize on his or her creative abilities can be enhanced through specific training. Several organizations have emerged that deal exclusively with the cultivation of creativity, the most notable example being the Center for Creative Leadership in Greensboro, North Carolina. These organizations claim to focus on the development of the latent creative potential residing within individuals.

The very idea that individual creativity may be improved through training implies that creative manifestations are susceptible to outside influences, although the search for an ideal enhancement strategy has sparked debate among organizational analysts. International research suggests that strategies to foster creativity and innovation cannot achieve universal effectiveness but instead are culture- and situation-specific (Shane,

Venkataraman, & MacMillan, 1995). These findings warrant an admonition to business leaders, namely that an effective strategy in one setting may not achieve success in another; strategies may not be widely generalizable. For this reason, customized strategy is a consideration in efforts to enhance creative tendencies. Regardless of the specific methodology employed in order to achieve greater creativity and innovation in organizations, the endeavor appears to be both feasible and increasingly popular. It seems that the creative abilities of each individual are relatively set at birth but that the manifestations of these abilities can be amplified later in life, and these manifestations may be situationally mediated.

It has been argued that the cultivation of employee creativity is mandatory in order for companies to remain competitive in today's unpredictable business arena, and that corporate innovation will become only more critical to organizational success in years to come (Amabile, 1988; Crossan, Lane, White, & Klus, 1996; Devanna & Tichy, 1990; Gundry, Kickul, & Prather, 1994; Kanter, 1983; Shalley, 1995). Parallels have been drawn between the well-functioning organization and the creative individual mind in that both are highly integrated, holistic, synergistic, and efficient (Ambrose, 1995). Organizational theorists assert that flexible, dynamic companies led by such creative, visionary thinkers represent the ideal prototype to emulate in order to survive in the context of today's turbulent economic and sociopolitical realities (Kanter, 1989). The mere acknowledgment of creativity's value to an organization cannot in itself produce creative thinking, however. Social and environmental influences are believed to mediate the otherwise natural creative processes of innovative people. The potential of the

organizational climate to either inhibit or encourage creativity has been addressed by Amabile (1983), who posits that the work environment must be examined more closely in order to understand creativity in the context of organizations.

### Organizational Dynamics

Amabile (1983) specified several possible environmental obstacles to creativity, including constraint (lack of methodological freedom in task accomplishment), organizational disinterest (lack of support for or perceived apathy toward the project), and overemphasis on the status quo (resistance to abandon traditional methods). Regrettably little is known about the factors that contribute to employee creativity, and very few studies have explored the role of organizational context in employee performance (Amabile, 1988; Shalley, 1991; Staw, 1990).

A considerable body of empirical research lends support to the idea that contextual features of the organizational environment significantly affect employees' eagerness to generate novel ideas (Amabile & Gryskiewicz, 1989; Redmond, Mumford, & Teach, 1993; Shalley, 1991). Recent research has called attention to the role of such factors as goals, deadlines, and evaluation expectancy in employee creativity (Amabile, 1979, 1982; Carson & Carson, 1993; Shalley, 1991, 1995). These studies suggest that the imposition of harsh deadlines or conspicuous supervision deters employees from engaging in creative endeavors. In addition, task complexity is considered to be an important component of creativity (Amabile, 1988; Kanter, 1988; West & Farr, 1989), such that more challenging jobs foster increased motivation and creativity (Deci, Connell, & Ryan, 1989; Hackman & Oldham, 1980; Oldham & Cummings, 1996). In short,



creativity appears to flourish in environments that provide adequate latitude for its cultivation.

With regard to interpersonally-based organizational dynamics, supervisory style has been implicated as another viable predictor of creative performance (Amabile & Gryskiewicz, 1987, 1989; Deci & Ryan, 1987). Specifically, supervision that is supportive in nature tends to facilitate creative efforts, while controlling supervision has been shown to inhibit creativity (Deci, Connell, & Ryan, 1989; Deci & Ryan, 1985, 1987; Oldham & Cummings, 1996). Equally vital is open communication between employee and supervisor (Himes, 1987), with better communication encouraging more creative pursuits. The quality of rapport between supervisor and employee has been identified as a potential determinant of creative performance, such that relationships characterized by support, trust, and autonomy are more likely to enhance creative output (Moukwa, 1995; Oldham & Cummings, 1996; Scott, 1995; Scott & Bruce, 1994), even in the absence of anticipated rewards or recognition (Eisenberger, Fasolo, & Davis-LaMastro, 1990). Lastly, increased participation in organizational decision making appears to enhance creative output (Plunkett, 1990). Clearly these environmental dynamics are deserving of attention with respect to their overall impact on creativity in organizational contexts.

### Organizational Research

There is currently a dearth of empirical research examining the relationship between the work environment and subsequent manifestations of creativity. A study by Andrews (1975) explored the way in which social-psychological factors in the workplace influence the fulfilment of creative potential. A group of 115 scientists with advanced

degrees was asked to complete comprehensive questionnaires that inquired about specific aspects of the social-psychological environment. Each person also completed the Remote Associates Task (RAT; Mednick & Mednick, 1966), which provided a measure of creative potential through the formation of unusual associations. Correlations between RAT scores and individual innovativeness were used to indicate the degree to which organizational dynamics facilitated or inhibited individual displays of creativity. Four factors appeared to be critical in fostering the exercise of creative potential: (a) taking responsibility for initiating new activities, (b) possessing the authority to hire research assistants, (c) an absence of interference from administrative superiors, and (d) high stability of employment. Taken together, these findings provide support for the role of organizational dynamics in the realization of creative potential.

A study by Amabile and Grysiewicz (1989) seeking to validate a new paper and pencil assessment instrument, the Work Environment Inventory (WEI), focused on research and development scientists in professional organizations. "Work environment" was operationalized as the social climate characteristic of an organization, including "a conglomerate of attitudes, feelings, and behaviours which characterize life in the organization" (Ekvall, 1983, p. 2). The development of the WEI was guided by the premise that individual creativity in an organization depends on three basic components: (a) the presence of a supervisor who is skillful in the management of innovation, (b) visible commitment to innovation at the organizational level, and (c) sufficient resources, including time, materials, and personnel. A variety of tests were performed to assess the reliability and validity of the WEI. Two scales were consistently identified as factors that

influence creativity: Environmental Stimulants to Creativity and Environmental Obstacles to Creativity. The former category includes the following items: freedom in method of task accomplishment, a sense of challenge in completing tasks, sufficient resources, supportive supervision, the maintenance of good communication between coworkers, recognition of admirable efforts, a cooperative atmosphere featuring a shared organizational vision, and an overall atmosphere that welcomes creativity. Obstacles to creativity included time pressure, intimidating evaluation procedures, an overemphasis on the status quo, and political problems within the confines of the organization.

The most recent attempt to assess the organizational environment for creativity is actually a revision of the Work Environment Inventory. KEYS, as the instrument is now titled, goes beyond the scope of the WEI by addressing individual perceptions of the work environment and the influence of those perceptions on the creative content of subsequent work (Amabile et al., 1996). This instrument takes into account individual variability in perception and makes it possible for the interpretation of organizational dynamics to be considered. The authors assume that the level at which an influence operates is less critical than individual perceptions of that influence. The relevant categories of organizational factors are similar to before: encouragement of creativity, freedom/autonomy, resources, pressures, and organizational impediments to creativity. Although this instrument has only recently been released, it shows great promise in terms of providing a comprehensive assessment of organizational climate.

### Creativity Measurement

Creativity is a particularly challenging concept to measure because the assessment

process is riddled with opportunities for subjectivity and bias. The development of an operational definition of creativity has proved to be no simple task. Although the majority of creativity research has focused on characteristics of the individual, definitions of creativity primarily emphasize the creative product. In particular, the novelty and the usefulness of the product are recurrent themes in attempts to operationalize creativity (Amabile, 1983; Barron, 1955; Feist, 1993; MacKinnon, 1975; Stein, 1974).

A model for evaluating creativity was introduced by Amabile (1982), namely, the consensual assessment technique. Task selection is an important element in this methodology. An appropriate task is one that (a) yields a tangible product or an observable response, (b) is open-ended enough to allow variability in responses, and (c) does not rely on the cultivation of specific skills. Requirements for the assessment team are as follows: (a) all judges should have experience with the domain of interest, (b) judges should make all evaluations independently, (c) judges should assess additional dimensions, not just creativity, (d) judges should evaluate the products in relation to each other instead of rating them in comparison to an absolute standard, and (e) judges should both view and rate the products in a randomized order. If these guidelines are followed, interjudge reliability provides an indication of construct validity. This subjective assessment technique has been tested and found reliable in evaluations of artistic creativity and verbal creativity (Amabile, Goldfarb, & Brackfield, 1990).

For the purpose of this study a creative solution will be operationalized according to Amabile's (1983) guidelines: a) the solution is both novel and appropriate with regard to the task, and b) the task itself is heuristic rather than algorithmic (meaning that no

obvious or straightforward path to the solution is apparent). It is hypothesized that an individual's inclination to apply creative and innovative thinking to an organizational problem is dually influenced by two factors: the relative importance of the problem and the organization's attitude toward novel solutions. It is expected that an individual's natural tendency to engage in creative, innovative thinking will be mediated by these two factors. More specifically, it is predicted that the creative abilities of individuals will be stimulated more by environments that encourage creativity than by climates that discourage it, and that more creativity will be exercised when the importance of the problem is high rather than low.

The present study is designed to assess whether particular organizational contexts influence the tendency to engage in creative thought processes during problem solving. The experiment consists of a 2 (Organizational Climate: Creativity Encouraged or Creativity Discouraged) x 2 (Relative Importance of the Problem: High Stakes or Low Stakes) factorial design with repeated measures on the last factor.

## Method

### Participants

Fifty-eight undergraduates (27 males and 31 females) at the College of William & Mary volunteered to participate in a single session experiment as a part of their requirements for Introductory Psychology. Each participant met the minimum age requirement of 18 years old.

### Materials

The participants read fictional vignettes about two different companies. Each

vignette outlined a specific organizational problem and solicited the participant's help in generating potential solutions to this problem. In each vignette, the participant's assumed role as a corporate executive in the organization was established, along with the organization's attitude toward creativity and innovation. In addition, the importance of finding a solution to the problem (i.e., the potential consequences that would result if a solution were not found) was made clear. The vignettes were deliberately composed in hopes of eliciting differences in creative solutions according to both the organization's attitude toward novel ideas and the problem's overall implications for the organization as a whole. Efforts were made to keep the difficulty of each problem relatively equivalent so that differential manifestations of creativity due to organizational climate could be revealed more definitively.

Each participant was given a set of two vignettes to read, each of which was followed by a response sheet. The vignettes in each set shared a single organizational attitude toward creativity, such that each packet contained either two vignettes in which the organizational dynamics encouraged creativity or two vignettes in which creativity was discouraged. Each packet included one of each level of importance. One vignette in each set featured an organizational problem of great importance and very high stakes, in which the company's survival hinged on the discovery of a solution. The other vignette featured a problem characterized by less importance and lower stakes, such that the discovery of a solution would be beneficial, but was not necessarily critical. Each organizational problem was described in a memo from the company president. The tone of this memo reinforced the organizational attitude toward creativity. In each memo

participants were asked to formulate solutions to the problem presented. (See Appendix A for specific vignettes.) The number and nature of these generated ideas provided measures of creative endeavor.

Each vignette was followed by a series of questions designed to assess individual differences in creative and innovative tendencies, that is, how creative and innovative participants would be under normal circumstances. Questions were constructed to measure the degree to which individuals generate novel or unconventional ideas in a neutral environment, that is, an environment in which no facilitating or constraining factors intervene. Participants responded to each item on a 6-point scale. (See Appendix B for specific items.)

### Procedure

At the beginning of the session, the participants were told that they were participating in an organizational problem-solving study. (The term “creativity” was deliberately avoided to minimize demand characteristics.) The experimental procedure was explained, namely that participants would be given two vignettes to read, after which they would be asked to generate ideas regarding the problem described in the vignette. They were also told that a questionnaire would follow the two vignettes.

The vignette packets were distributed in a counterbalanced order (such that half of the individuals read the high stakes vignette first and the other half read the low stakes vignette first) and participants were asked to begin reading the first vignette. Once all participants had finished reading the passage they engaged in the problem-solving task for a period of five minutes. This procedure was repeated for the second vignette, after

which participants were directed to complete the questionnaire. Upon completion, the packets were collected and the participants were encouraged to ask any questions they had regarding the study. A post-experimental interview followed in which the purpose of the study was explained and the rationale behind the study was outlined. The participants were given the option of receiving results and in conclusion they were thanked for their assistance. The session lasted 30 minutes.

## Results

### Pretesting of Individual Difference Measures

A major concern in designing the experiment was the potential for variability in creative aptitude and in the tendency to manifest creative behavior (conformity issues). It could be the case that certain individuals simply possess less creative aptitude than others or that they possess sufficient creative aptitude but do not exhibit creative behavior. In such cases organizational dynamics may not be capable of enhancing creative output. On the other hand, the creative motivation of other individuals may be high enough to allow the generation of creative solutions regardless of the organizational context. In any case, an assessment of natural creative tendencies was warranted. In an effort to identify items that would assess these individual differences in creative tendencies, 137 male and female undergraduates were pretested on measures of creativity. A list of 23 items was presented in four randomized orders and the ratings of each item were then factor analyzed. Of these 23 items, 12 were taken from Kirton's (1976) adapter-innovator measure of creativity. The remaining 11 items were designed to measure creative potential and the tendency to conform in group settings. In order to reduce the number of items being



analyzed and to limit familywise error rate, factor analyses were first performed on the 12 Kirton items collectively, and then on the remaining items.

A principal components factor analysis with varimax rotation on the 12 pretested Kirton items produced three factors with eigenvalues exceeding one, leaving one item to be analyzed separately. With the exception of “rule-following” and “rather create than improve,” all items loaded on the three factors originally identified by Kirton (1976). Together these scales accounted for 51% of the variance. Only those items yielding a primary loading of  $> \pm .4$  and other loadings  $< \pm .4$  were retained. Two items were discarded on the basis of these criteria, leaving 10 items to be included in the actual questionnaire. Specific findings are presented in Table 1.

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Insert Table 1 about here

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A principal components factor analysis with varimax rotation on the remaining 11 creativity assessment items produced four factors with eigenvalues exceeding one. Together these scales accounted for 55.8% of the variance. Again, only those items yielding a primary loading of  $> \pm .4$  and other loadings  $< \pm .4$  were retained. Three items were discarded on the basis of these criteria, leaving eight items to be included in the actual questionnaire. Specific findings are presented in Table 2.

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Insert Table 2 about here

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In sum, five items were discarded from the pretested questionnaire. The resulting creativity assessment for the main experiment thus included 10 Kirton items and eight creativity assessment items.

### Factor Analyses

In the main experiment creativity assessments associated with each individual were analyzed independently of creative output to clarify potential influences on manifestations of creativity. More importantly, they were analyzed in this manner to reveal individual differences in creative tendencies, independent of organizational dynamics. Factor analyses proceeded in the same fashion as in the pretest: analyses were first performed on the 10 Kirton items collectively, and then on the remaining eight creativity items.

A principal components factor analysis with varimax rotation on the 10 Kirton items produced three factors with eigenvalues exceeding one. Together these scales accounted for 61.9% of the variance. Only those items yielding a primary loading of  $> \pm .4$  and other loadings  $< \pm .4$  were retained for subsequent analyses. In addition, only factors with Cronbach  $\alpha$  values of .65 or greater were included in subsequent analyses. According to these criteria, only two factors were retained. Specific findings are presented in Table 3.

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Insert Table 3 about here

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A principal components factor analysis with varimax rotation on the remaining eight creativity assessment items produced two factors with eigenvalues exceeding one, leaving one item to be analyzed separately. Together these two scales accounted for 48.1% of the variance. Three items were discarded on the basis of the outlined loading criteria, and only one factor was retained based on the .65 Cronbach  $\alpha$  requirement. One of the discarded items (Prefers predictability) loaded highly on two factors and was therefore retained for use as an independent covariate. Specific findings are presented in Table 4.

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Insert Table 4 about here

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In sum, three creative aptitude factors were retained for use as covariates in subsequent analyses: two from the Kirton adapter-innovator items (Originality and Thoroughness) and one from the creativity assessment items (Conformity). In addition, a single item (Prefers predictability) was isolated for later use as a covariate due to its significant cross-loadings. A list of the retained factors and their corresponding eigenvalues is presented in Table 5.

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Insert Table 5 about here

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Of the three factors that emerged from these analyses, the first one, Originality, reflected the individual's inclination toward novel thoughts and the entertaining of

multiple ideas. The second factor, Thoroughness, represented the individual's propensity to be precise and painstaking in his or her work. The third factor, Conformity, reflected (a) the individual's tendency to modify his or her behavior in order to meet the standards and expectations of others, and (b) the length to which the individual would go to avoid being unpopular. Table 6 displays correlations among the three factors.

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Insert Table 6 about here

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The two highly correlated factors (Originality and Conformity) were combined at the factor level (after Conformity scores were reversed), and the resulting factor (Origicon) served as an additional covariate in subsequent analyses.

#### Manifestations of Creativity in Organizational Contexts

Upon completion of the study, the solutions given by participants were compiled according to relative importance condition. All in all, 271 solutions were generated in the low stakes condition, whereas 314 solutions were offered in the high stakes condition. Each solution was subsequently rated on two characteristics: novelty (the degree of originality inherent in each idea) and usefulness (how effective the idea would be in terms of solving the problem). For each participant, an average novelty score was computed for each of the two relative importance conditions. This was done by summing each individual's novelty scores for the low stakes condition and dividing this total by the number of solutions generated by the individual in that condition. This

procedure was repeated for the high stakes condition. Average usefulness scores for each importance condition were then calculated in the same manner. To clarify, each participant was given separate novelty and usefulness scores for the high stakes vignette, and separate novelty and usefulness scores for the low stakes vignette.

Once novelty and usefulness ratings were made, a creativity score was generated for each individual. Because novelty and usefulness are dual components of creative manifestation, the creativity score for each individual was calculated by multiplying each novelty rating by each usefulness rating, summing these products, and taking their average.

In addition, each solution was evaluated on the basis of its distinctiveness in comparison with all of the other solutions in the relative importance condition. Overlapping solutions were excluded, and the remaining differentiable solutions were summed within each relative importance condition. The low stakes condition featured 159 distinct solutions, whereas only 106 distinct solutions were generated in the high stakes condition. The number of distinct solutions contributed by each individual was tabulated for each of these two conditions, and these subtotals were divided by the total number of distinct items in that condition. The resulting score provided an assessment of each individual's relative contribution to the number of distinct items. In keeping with the assignment of novelty and usefulness scores, each participant was assigned two separate distinctiveness contribution scores; one for the high stakes condition and one for the low stakes condition.

In order to assess the degree of objectivity with which these ratings were made, an alternate judge was solicited to rate a subset of the solutions on novelty, usefulness, and distinctiveness. Specifically, the alternate judge rated 102 solutions, or 17% of the total solutions. The specific instructions that were provided to the rater may be found in Appendix E. Correlations between judges were .83 for novelty and .85 for usefulness, respectively. The Spearman-Brown formula was used as an index of interjudge reliability, and this calculation yielded .91 for novelty ratings and .92 for usefulness ratings. The reliability of distinctiveness ratings was determined using the percentage of matching assessments (items that were considered to be either unique or overlapping by both judges). Of the 102 items in the subset, 91 items received identical distinctiveness assessments by the two judges, or a reliability of .89.

Analysis of Novelty. A 2 (Organizational Climate: Creativity Encouraged or Creativity Discouraged) x 2 (Relative Importance of Problem: High Stakes or Low Stakes) analysis of variance with repeated measures on the last factor was performed on the novelty of solutions. Although no significant interaction was found, a main effect of organizational context was noted, such that all solutions were judged to be more novel when creativity was encouraged than when it was discouraged,  $F(1, 56) = 8.12$ ,  $p = .006$ . The mean scores for this analysis are summarized in Table 7.

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Insert Table 7 about here

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In order to control for individual differences in natural creative aptitude, a series of 2 (Organizational Climate) x 2 (Relative Importance of Problem) repeated measures analyses of covariance (ANCOVAs) were performed on the novelty of solutions using the three creativity assessment factors (as well as Origicon, the newly combined factor) as covariates. The first series of ANCOVAs were performed using each individual factor as a covariate. Additional ANCOVAs featured every possible combination of covariate factors. Other covariates included sex, the single item Prefers predictability (due to its significant cross-loadings), and the items Riskcost and Expectation (chosen for theoretical reasons). The results of all ANCOVAs were consistent with the analysis of variance that was performed without the inclusion of these covariates.

Analysis of Usefulness. A 2 (Organizational Attitude) x 2 (Relative Importance of Problem) analysis of variance with repeated measures on the last factor was performed on the usefulness of solutions. An interaction between organizational dynamics and relative importance was revealed,  $F(1, 56) = 8.39, p = .005$ . Specifically, when creativity was discouraged, solutions to low stakes problems were judged as less useful than solutions to high stakes problems, whereas this trend reversed when creativity was encouraged. The mean scores for this condition are summarized in Table 8.

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Insert Table 8 about here

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A series of 2 (Organizational Climate) x 2 (Relative Importance of Problem) repeated measures analyses of covariance (ANCOVAs) were performed on the usefulness of solutions using sex, the three creativity assessment factors, and the independent items as covariates in the same manner as before. Again, the results completely paralleled those obtained without the inclusion of these covariates.

Analysis of Creativity. A 2 (Organizational Attitude) x 2 (Relative Importance of Problem) analysis of variance with repeated measures on the last factor was performed on the creativity of solutions. An interaction between organizational dynamics and relative importance was revealed,  $F(1, 56) = 5.35, p = .024$ . Specifically, when creativity was discouraged, solutions to low stakes problems were judged as less creative than solutions to high stakes problems, whereas this trend reversed when creativity was encouraged. The mean scores for this condition are summarized in Table 9.

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Insert Table 9 about here

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A series of 2 (Organizational Climate) x 2 (Relative Importance) repeated measures analyses of covariance (ANCOVAs) were performed on the creativity of solutions using sex, the three creativity assessment factors, and the independent items as covariates in the same manner as before. Again, the results completely paralleled those obtained without the inclusion of these covariates.

Analysis of Distinctiveness. A 2 (Organizational Attitude) x 2 (Relative



Importance of Problem) analysis of variance with repeated measures on the last factor was performed on the distinctiveness of the solutions offered. No significant interaction was found, but a main effect of organizational climate was revealed,  $F(1, 56) = 8.99, p = .004$ . When creativity was encouraged, individuals tended to generate solutions that were qualitatively different from those of other people, regardless of whether the problem involved high or low stakes. In organizational climates that discouraged creativity, however, distinct solutions to both low and high stakes problems occurred with diminished frequency. The mean scores for this condition are summarized in Table 10.

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Insert Table 10 about here

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The standard series of 2 (Organizational Climate) x 2 (Relative Importance of Problem) repeated measures analyses of covariance were performed on the distinctiveness of solutions using the same covariates as before. The results of all ANCOVAs were consistent with the initial analysis of variance.

Summary of results. As hypothesized, manifestations of creativity were mediated by organizational climate, although the relative importance of the organizational problem did not demonstrate the expected effect consistently. In high and low stakes conditions alike, the solutions generated by participants were more novel, more useful, and more creative when creativity was explicitly encouraged by the organization than when it was

discouraged. Similarly, the proportional contribution of distinctive solutions was significantly higher in organizational climates that welcomed creativity.

### Discussion

Recall that the predictions were twofold: namely, that the inclination to apply creative thinking to an organizational problem would be mediated both by the relative importance of the problem and by the organization's attitude toward novel solutions. Specifically, it was predicted that environments that supported creativity would stimulate the creative ability regardless of the importance of the organizational problem. With regard to the relative importance of the problem, individuals were expected to exercise creativity more when the stakes were high rather than low.

Review of the results offers cogent support for the first hypothesis: manifestations of creativity do appear to be mediated by the organizational context in which they occur. In fact, the main effect for organizational climate constituted a consistently recurring theme in every analysis. When the organization expressed an openness to creative ideas, resulting solutions were more novel, more useful, and more distinctive than solutions generated in creativity-discouraging contexts. The relative importance of the organizational problem, however, does not appear to play a consistent role in the individual's propensity to generate novel, appropriate, and distinctive ideas.

The present study's findings that the solutions devised in the creativity encouraged condition were judged as significantly more novel than those generated in the creativity discouraged condition is in complete concurrence with the first hypothesis. The organizational scenarios for the creativity encouraged condition featured a company

president who explicitly expressed openness to new ideas. Similarly, the employee noted that the radical ideas of coworkers had met with acceptance and implementation. In addition, the rapport between the president and the employee was characterized by appreciation and respect, in which the president specifically acknowledged the employee's past efforts and accomplishments. The president also offered unlimited resources to the employee in devising a solution. All of these components of the organizational atmosphere would be expected to optimize the employee's sense of freedom in task accomplishment, and would additionally be expected to elevate the employee's level of intrinsic motivation. The creativity discouraged condition featured these components in their reversed form (i.e, strong emphasis on tradition, discouragement of radical ideas, president fails to acknowledge or appreciate the employee's past achievements, and limited resources for task accomplishment). Such dynamics impose restrictions on the employee's method of task accomplishment and are associated with diminished intrinsic motivation. Because high levels of intrinsic motivation are typically associated with greater manifestations of creativity, the triumph of novelty in an organizational context that welcomes such thought processes and the downfall of novelty in contexts that discourage creative endeavors completely parallels theoretical predictions.

In contradiction to the second hypothesis, relative importance of the problem did not play a significant role in the generation of novel solutions. Solutions for high and low stakes problems were judged as equally novel when creativity was encouraged. It is interesting to note, however, that when the organizational climate discouraged creativity,

solutions to high stakes problems were judged as more novel than solutions to low stakes problems. Although the trend is not significant, it does proceed in the predicted direction. Theoretical explanations for this are scarce, but it seems plausible that more serious situations would motivate employees to branch out further in generating solutions to the problem. Perhaps the idea that “desperate times call for desperate measures” is operating here. Or it could be that organizational atmospheres that inhibit creativity promote such dissatisfaction that employees feel they have nothing to lose by presenting their radical ideas, and problem severity may amplify this likelihood.

Analysis of both the usefulness and the creativity of solutions brings all of these organizational considerations back into focus. Again, the organizational attitude toward creativity set the tone for consequent solutions; the solutions for both high and low stakes conditions received higher usefulness ratings and higher creativity ratings when creativity was encouraged than when it was discouraged. The low stakes condition demonstrated a dramatic leap in solution usefulness and solution creativity between organizational contexts, whereas the usefulness and creativity scores of high stakes solutions increased only moderately. It makes sense that the employee would experience a greater responsibility to solve the problem when the rapport with superiors was positive, and alternatively would have less of an incentive to solve the problem in an environment that was unsupportive. Also, solutions would be expected to be more useful and more creative when the range of possibilities for constructing them was unlimited, whereas the imposition of restrictions on solution formation could easily limit their effectiveness and originality. In organizations that frowned on creativity, high stakes solutions were both

more useful and more creative than low stakes solutions, but interestingly, this trend reversed itself in organizations that welcomed creativity. This is a somewhat puzzling progression to explain, as differential influences of stakes were unanticipated. It is highly possible that individual perceptions of both the organizational climate and the seriousness of the problem played a role in these findings.

The consideration of each individual's relative contribution to the "distinctive" pool of solutions reiterates the potent influence of organizational attitude. Again, environments that openly welcomed creativity were met with higher percentages of "distinct" solutions than environments that shunned creativity. Interestingly, the proportion of "distinct" solutions provided by each person nearly doubled when creativity was encouraged. It is not surprising that the same condition that evidenced greater novelty of solutions would similarly demonstrate less overlap among these solutions. It could be argued that more overlap occurred among solutions in the creativity discouraged condition because employees were hesitant to elicit disapproval from their superiors and therefore came up with more obvious (and therefore more mainstream) solutions. The rigid organizational climate in this condition would be expected to strongly discourage employees from drawing attention to themselves, and the overlap in solutions may reflect an effort to "blend in" and to avoid arousing the disfavor of the company president.

In general it appears that novel and useful solutions abound when and where they are given sufficient latitude to be formed. The main issue appears to be freedom in task accomplishment, although interpersonal factors are implicated as well.

The subjectivity of ratings is a major issue in creativity research. For future

studies it would be desirable to enlist the help of a team of raters in accordance with the specifications outlined in Amabile's (1982) consensual assessment technique. As was exercised in this study, a calculation of interjudge reliability is always warranted. In particular, the Spearman-Brown prediction formula provides an appropriate measure of interjudge reliability.

An additional concern in this study is time limitation. Due to restricted availability of research pool hours and the desire for a respectable sample size, this study was limited to 30 minutes. The shortened session length necessarily limited the number of items that could be included in the questionnaire, and restricted the amount of information that was collected in this study. Additionally, the five-minute time limit for solution generation may have hindered manifestations of creativity. Future research should seek to allow more time for both assessments and solution generation.

Another obvious problem with this study is the questionable relevance of tasks to participants. A better design would include master's students in business, or more ideally, executives in actual organizations. The novelty and usefulness of the participants' solutions may actually have been muted as a consequence of their limited organizational background and experience. Additionally, it cannot be assumed that undergraduates can internalize the organizational scenarios as vividly or as effectively as would participants who have a significant investment in the field of business. A greater degree of internalization would be expected to lead to improved conscientiousness in solution generation, and results stemming from such a group would be more enlightening and perhaps more definitive. It is encouraging, however, that such strong support for the

influence of organizational context was obtained with such a random group of participants. Future research should target a population for whom these issues are more familiar and more relevant, or at the very least, include several manipulation checks to assess the degree of internalization, both of the organizational problem and of the interpersonal dynamics characterizing the employee-superior relationship.

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Table 1

Factor Analysis of Kirton's Adapter-Innovator Creativity Measures (Pretest)

	Factor 1	Factor 2	Factor 3	Factor 4
% variance	20.60	18.40	12.00	8.40
Eigenvalue	2.47	2.21	1.44	1.01
Cronbach's alpha	.72	.62	.52	---
Detailed	<b>.78</b>	-.04	-.07	-.03
Thorough	<b>.76</b>	-.09	-.17	.06
Painstaking	<b>.75</b>	-.04	.10	.03
Methodical	<b>.56</b>	.09	.10	<b>.52</b>
Attitude toward "the system"	-.01	<b>.75</b>	-.12	.32
Conforming	.03	<b>.73</b>	.11	.11
"Team" mentality	-.12	<b>.71</b>	.06	-.18
Stimulating	.06	.05	<b>.80</b>	-.07
Multiple ideas	-.16	-.20	<b>.64</b>	.17
Original	-.05	.35	<b>.59</b>	.31
Rule-following	<b>.40</b>	.26	<b>.40</b>	-.01
Rather create than improve	.01	.08	.13	<b>.89</b>

Table 2

**Factor Analysis of Creativity Assessment Items (Pretest)**

	Factor 1	Factor 2	Factor 3	Factor 4
% variance	23.00	11.60	11.10	10.10
Eigenvalue	2.53	1.28	1.22	1.12
Cronbach's alpha	.60	.52	.32	.24
Values the approval of superiors	<b>.81</b>	.06	.04	.04
Unwillingness to be unpopular	<b>.80</b>	.04	.06	- .07
Readily expresses ideas	.66	- .09	.40	- .02
Preference for predictability	<b>.43</b>	.28	.04	- .01
Easily deterred	.32	.27	- .06	.17
Concern over risks and costs	.08	<b>.79</b>	- .05	- .08
Avoids mistakes at any cost	.05	.71	.41	.10
Welcomes divergent ideas	.02	.01	<b>.73</b>	- .05
Views risks as necessary	.17	.10	<b>.69</b>	.06
Solves problems quickly	.13	.25	- .12	<b>.78</b>
Meets expectations	.16	.34	- .18	- <b>.70</b>

Table 3

Factor Analysis of Kirton's Adapter-Innovator Creativity Measures

	Factor 1	Factor 2	Factor 3
% variance	28.10	21.40	12.40
Eigenvalue	2.80	2.14	2.14
Cronbach's alpha	.77	.72	.38
Original	.79	.04	-.16
Stimulating	.77	.16	-.37
Multiple Ideas	.71	.16	.13
Conforming	-.71	.28	.32
Painstaking	.22	.86	.12
Detailed	-.32	.81	-.23
Thorough	.20	.68	.34
Attitude toward "the system"	-.05	.09	.74
Desire to create	.12	.05	-.70
"Team" mentality	-.25	.15	.39



Table 4

Factor Analysis of Creativity Assessment Items

	Factor 1	Factor 2	Factor 3
<b>% variance</b>	<b>32.90</b>	<b>15.20</b>	<b>13.00</b>
<b>Eigenvalue</b>	<b>2.63</b>	<b>1.21</b>	<b>1.04</b>
<b>Cronbach's alpha</b>	<b>.72</b>	<b>---</b>	<b>---</b>
<b>Values the approval of superiors</b>	<b>.82</b>	<b>-.15</b>	<b>-.16</b>
<b>Unwillingness to be unpopular</b>	<b>.80</b>	<b>-.00</b>	<b>.06</b>
<b>Views risk as necessary</b>	<b>-.62</b>	<b>-.16</b>	<b>.02</b>
<b>Welcomes divergent ideas</b>	<b>-.61</b>	<b>-.34</b>	<b>.01</b>
<b>Concern over risks and costs</b>	<b>-.10</b>	<b>.89</b>	<b>-.16</b>
<b>Prefers predictability</b>	<b>.49</b>	<b>.54</b>	<b>-.39</b>
<b>Meets expectations</b>	<b>.23</b>	<b>.38</b>	<b>.29</b>
<b>Makes decisions quickly</b>	<b>-.09</b>	<b>-.01</b>	<b>.92</b>

Table 5  
Summary of Factors Used as Covariates

	Factor 1	Factor 2	Factor 3
% variance	28.10	21.40	32.90
Eigenvalue	2.80	2.14	2.63
Cronbach's alpha	.77	.72	.72
<b>1. Originality</b>			
Original	.79	.04	-.16
Stimulating	.77	.16	-.37
Multiple Ideas	.71	.16	.13
Conforming	-.71	.28	.32
<b>2. Thoroughness</b>			
Painstaking	.22	.86	.12
Detailed	-.32	.81	-.23
Thorough	.20	.68	.34
<b>3. Conformity</b>			
Values the approval of superiors	-.16	-.15	.82
Unwillingness to be unpopular	.06	-.00	.80
Views risk as necessary	.02	-.16	-.62
Welcomes divergent ideas	.01	-.34	-.61

Table 6

Correlations Among Natural Creativity Assessment Factors

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	Thoroughness	Conformity
Originality	.00	-.56**
Thoroughness	.	.82

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\*\* Denotes correlation that is significant at  $p < .01$

Table 7

Mean Novelty Scores

Organizational Context	Creativity Discouraged		Creativity Encouraged	
	Low	High	Low	High
Relative Importance of Organizational Problem				
n:	29	29	29	29
M	4.14	4.63	4.91	4.91
SD	.92	.84	1.12	.74

Note. The higher the score is, the greater the rating of novelty. All ratings were made on 7-point scales.

Table 8

Mean Usefulness Scores

Organizational Context	Creativity Discouraged		Creativity Encouraged	
	Low	High	Low	High
<b>n:</b>	29	29	29	29
<b>M</b>	5.01	5.42	5.99	5.70
<b>SD</b>	.90	.79	.62	.86

**Note.** The higher the score is, the greater the rating of usefulness. All ratings were made on 7-point scales.

Table 9

**Mean Creativity Scores**

Organizational Context	Creativity Discouraged		Creativity Encouraged	
	Low	High	Low	High
<b>n:</b>	29	29	29	29
<b>M</b>	7.87	10.14	15.10	12.74
<b>SD</b>	4.92	5.26	9.42	6.29

**Table 10**  
**Mean Distinctiveness Scores**

Organizational Context	Creativity Discouraged		Creativity Encouraged	
	Low	High	Low	High
<b>n:</b>	29	29	29	29
<b><u>M</u></b>	.01	.01	.02	.02
<b><u>SD</u></b>	.01	.01	.02	.02

## **Appendix A Stimulus Materials**

### **Creativity Encouraged/High Stakes Condition**

You have been happily employed as a corporate executive with ArcticMeals for many years. You are proud of the contributions you have made within the company, and your supervisor has rewarded you with compliments and public commendation for your high quality work. You were recently informed that the company is experiencing a major crisis. You have ideas for a possible solution that could salvage the company, but they involve strategies that are somewhat radical. Your boss is receptive to new ideas and possible change, and you have observed that original ideas presented by your co-workers have met with both approval and implementation. You believe that your ideas could be valuable to the company, and you also realize that finding a solution quickly is critical. You receive a memo from the president of the company, reading as follows:

To: Corporate Executive  
From: Jamie Towers, President  
Date: March 24, 1997  
Subject: Company Crisis

As I am sure you are aware, ArcticMeals is in the midst of a major crisis. For many years we have maintained a reputable standing in the frozen foods industry, in fact, our products are internationally recognized. As most of you know, all of our products are specially manufactured using a premium preservative called calcium propionate. We chose this preservative because it offers optimum freshness to all of our products. The FDA recently released a study showing that calcium propionate is a potential carcinogen, and that any products containing it may cause cancer. As you can imagine, the bad publicity we have received as a result of this report has been disastrous to our sales, not to mention our reputation in the food industry. The media have presented the information in the most injurious way possible by trying to persuade the public that we knew the potential hazards of calcium propionate all along. To make matters worse, our competitors do not use this preservative in their products, so their sales have skyrocketed.

The financial damage this fiasco has produced is too great for us to develop an alternative preservative at this time, however, it is imperative that we implement major damage control to mend our reputation with consumers and to win back sales. If we do not find a way to improve our image substantially, the company will be forced to fold.

This is a particularly critical point in time, and only the combined efforts of our most capable employees can restore the company to its competitive status. I have



observed your efforts in the past and your performance has been nothing short of outstanding. In light of this, I am confident that your contributions can make a significant difference in salvaging the reputation of ArcticMeals. I am committed to finding a solution and I welcome any ideas you have, no matter how radical they may seem to you. I am open to trying new strategies in attempts to salvage the company. I will see that you are provided with the necessary funding and resources to develop and implement your ideas. Thank you in advance for your efforts in this matter.

After reading this memo, you think to yourself:

*Wow. I knew the situation was serious, but I didn't realize that ArcticMeals' entire future is at stake. Regardless, Jamie expressed confidence in my abilities and seems to genuinely appreciate my contributions. In addition, I have been given complete freedom in formulating a solution. I have made valuable contributions in the past, but now I have the opportunity to make a notable difference in the company's future. Jamie made it clear that new ideas are welcomed by upper management, and in addition I will be supplied with any resources I need to apply these ideas. I feel very confident that new ideas are encouraged or recognized in this organization.*

**--- STOP READING AND LOOK UP ---**

Your goal is to generate as many different ideas as possible that could lead to a solution to this problem. In each case there are no right or wrong answers; instead, it is the thought process that counts. Jot down as many ideas as you can in the time allotted.

**Creativity Encouraged/Low Stakes Condition**

You have been happily employed as a corporate executive with ToddlerPlay for many years. You are proud of the contributions you have made within the company, and your supervisor has rewarded you with compliments and public commendation for your high quality work. You were recently informed that the sales of ToddlerPlay toys have plummeted to an all-time low. You have ideas for a possible solution that could improve overall sales, but they involve strategies that are somewhat radical. Your boss is receptive to new ideas and possible change, and you have observed that original ideas presented by your co-workers have met with both approval and implementation. You believe that your ideas could be valuable to the company, and you feel that your input could make a difference in the company's success. You receive a memo from the president of the company, reading as follows:

To: Corporate Executive  
From: Taylor Vancourt, President  
Date: March 24, 1997  
Subject: New Focus for Toy Development

For ten years ToddlerPlay has enjoyed great success as a market leader in the manufacturing of recreational toys for young children. Over the last three years, however, our sales have declined sharply. In a recent marketing survey parents expressed an overwhelming preference for purchasing educational toys. In fact, they claim to avoid purchasing toys that are purely recreational. Buying trends over the last three years confirm the survey results. As you know, our focus at ToddlerPlay has centered on the production of exclusively recreational toys. In the past our toys have been rated as very entertaining, but they have consistently fallen short in the area of educational value. It is clear that we must develop a new line of educational toys in order to remain competitive in today's market.

I am pleased to announce that ToddlerPlay has successfully recruited some of the best and brightest toycrafters in the industry to assist us in this endeavor. I truly believe that by joining forces with these specialists we can create a series of instructive toys that will establish ToddlerPlay as the leading manufacturer of educational products for children.

Our immediate problem is that the experts we have recruited have devoted their careers to inventing recreational toys. Although they will certainly honor our request for an instructional focus, it will take a significant amount of effort for them to change their thinking processes and to accommodate an educational toy focus. In addition, it may be frustrating for them to enter an environment in which the "masterpieces" they have spent years striving to create are exactly what we are trying to avoid. As they have far more experience in toy development than we do,

we need to be diplomatic in the way we confront this issue. I would like to launch an incentive program to encourage everyone here, current employees and new recruits alike, to adopt an educational focus in toy manufacturing. I realize that the reprogramming of our efforts will take significant time and effort, and I wish to make the incentive program as effective as possible.

Although this issue does not present a major problem at the present, it is a situation that can and should be resolved as soon as possible. I am confident that we can successfully redirect our development efforts if each of us spends some time brainstorming. Your past accomplishments here at ToddlerPlay have been impressive, and I have heard only the most complimentary remarks from your superiors regarding your work. It is for these reasons that I am soliciting your ideas about the incentive program. I feel strongly that your contributions can make a difference, and I will be receptive to any and all ideas you have. We are willing to try new strategies in order to develop the new product line. You will be provided with any funding and/or resources you need to put your ideas into action. Thank you in advance for your efforts in this matter.

After reading this memo, you think to yourself:

*It sounds like Taylor is serious about redirecting our efforts in favor of educational toys. Still, I have to admit that solving this problem will not have a significant impact on the overall future of the company. Educational toys may sell well for a few years, but eventually the focus will shift back to recreational toys and we will have to redirect our efforts once again. I suppose it was important enough for Taylor to ask for my help, but I fail to see how the implementation of an incentive program will make a notable difference in years to come. Regardless, Taylor expressed confidence in my abilities and seems to genuinely appreciate my contributions. I have complete flexibility in coming up with my solutions, and again, resources will not be a problem. It is clear that novel solutions are welcomed, and that my ideas will be given serious consideration. I feel very confident that new ideas are encouraged or recognized in this organization.*

**--- STOP READING AND LOOK UP ---**

Your goal is to generate as many different ideas as possible that could lead to a solution to this problem. In each case there are no right or wrong answers; instead, it is the thought process that counts. Jot down as many ideas as you can in the time allotted.

**Creativity Discouraged/Low Stakes Condition**

You have been employed as a corporate executive at ArcticMeals for many years. During this time you have made many contributions to the company, although your efforts have never been officially acknowledged by your superiors. You were recently informed that sales of ArcticMeals have plummeted to an all-time low. You have ideas for a possible solution that could improve overall sales, but they involve strategies that are somewhat radical. You know that your boss frowns on any ideas that deviate from tradition, and your co-workers have been harshly criticized for their efforts to implement change. You realize that your ideas will not be popular, but you also believe that these ideas could make a difference in the company's success. You receive a memo from the president of the company, reading as follows:

To: Corporate Executive  
From: Jamie Towers, President  
Date: March 24, 1997  
Subject: New Focus for Frozen Food Development

For ten years ArcticMeals has enjoyed great success as a market leader in the production of frozen foods. Over the last three years, however, our sales have declined sharply. In a recent marketing survey consumers expressed an overwhelming preference for purchasing low-fat, nutritional frozen meals. In fact, they claim to avoid purchasing meals that contain more than 8% fat. Buying trends over the last three years confirm the survey results. As you know, our focus at ArcticMeals has centered on the production of great-tasting, gourmet meals. In the past our meals have been rated as extremely delicious, but they have consistently fallen short in the area of nutritional value. It is clear that we must develop a new line of frozen meals in order to remain competitive in today's market.

I am pleased to announce that ArcticMeals has successfully recruited some of the most experienced food specialists in the industry to assist us in this endeavor. I truly believe that by joining forces with these specialists we can create a series of low-fat meals that will establish ArcticMeals as the leading manufacturer of frozen food.

The immediate problem is that the experts we have recruited have devoted their careers to developing rich, savory, but relatively high-fat meals. Although they will certainly honor our request for an low-fat focus, it will take a significant amount of effort for them to change their thinking processes and to accommodate a nutritional focus. In addition, it may be frustrating for them to enter an environment in which the "masterpieces" they have spent years striving to create are exactly what we are trying to avoid. As they have far more experience in frozen food development than we do, we need to be diplomatic in the way we

confront this issue. I will soon launch an incentive program to encourage everyone here, current employees and new recruits alike, to adopt an nutritional focus in food production. I realize that the reprogramming of our efforts will take significant time and effort, and this incentive program must be effective.

Although this issue does not present a major problem at the present, it is a situation that can and should be resolved immediately. As experienced executives, I expect you to put forth your best efforts in redirecting the development efforts at ArcticMeals. I am convinced that we can find a traditional way of remedying the situation. At this point any radical ideas are too risky, and we cannot afford further damage to our reputation. Please keep in mind that funding is limited, and that resources must be divided between all employees. Thank you in advance for your efforts in this matter.

After reading this memo, you think to yourself:

*It sounds like President Towers is serious about redirecting our efforts in favor of nutritional meals. Still, I have to admit that solving this problem will not have a significant impact on the overall future of the company. Low-fat meals may sell well for a few years, but eventually the focus will shift back to better tasting food and we will have to redirect our efforts once again. I suppose it was important enough for President Towers to ask for my help, but I fail to see how the implementation of an incentive program will make a notable difference in years to come. President Towers has never expressed confidence in my abilities before, and my previous contributions do not appear to be valued. If anything, I feel that my accomplishments have been taken for granted. In addition, I do not have much flexibility in formulating a solution. The President also made it clear that resources are limited, and there is no guarantee that any of my ideas will actually be implemented. I do not feel confident that new ideas are encouraged or recognized in this organization.*

**--- STOP READING AND LOOK UP ---**

Your goal is to generate as many different ideas as possible that could lead to a solution to this problem. In each case there are no right or wrong answers; instead, it is the thought process that counts. Jot down as many ideas as you can in the time allotted.

**Creativity Discouraged/High Stakes Condition**

You have been employed as a corporate executive at ToddlerPlay for many years. During this time you have made many contributions to the company, although your efforts have never been officially acknowledged by your superiors. You were recently informed that the company is experiencing a major crisis. You have ideas for a possible solution that could salvage the company, but it involves a strategy that is somewhat radical. You know that your boss frowns on any ideas that deviate from tradition, and your co-workers have been harshly criticized for their efforts to implement change. You realize that your ideas will not be popular, but you also realize that finding a solution quickly is critical. You receive a memo from the president of the company, reading as follows:

To: Corporate Executive  
From: Taylor Vancourt, President  
Date: March 24, 1997  
Subject: Company Crisis

As I am sure you are aware, ToddlerPlay is in the midst of a major crisis. For many years we have maintained a reputable standing in the toy manufacturing industry, in fact, our products are internationally recognized. As most of you know, all of our products are manufactured through a special heating process using a chemical agent called drixomeryl. A national study recently revealed that drixomeryl is potentially toxic, having the potential to release hazardous airborne molecules. Furthermore, this report implies that products containing drixomeryl can cause serious illnesses in humans, and especially in young children, who are more susceptible to disease. As you can imagine, the bad publicity we have received as a result of this report has been disastrous to our sales, not to mention our reputation in the toy industry. The media have presented the information in the most injurious way possible by trying to persuade the public that we knew the potential hazards of drixomeryl all along. To make matters worse, our competitors do not use this chemical in their products, so their sales have skyrocketed. The financial damage this fiasco has produced is too great for us to develop an alternative chemical at this time, however, it is imperative that we implement major damage control to mend our reputation with consumers and to win back sales. If we do not find a way to improve our image substantially, the company will be forced to fold.

This is a particularly critical point in time, and as experienced executives, I expect you to put forth your best efforts in salvaging the reputation of ToddlerPlay. We must find a traditional way to improve our image. As you know, I do not advocate radical ideas as they are risky in nature, and we cannot afford to incur any further damage to our reputation. Please keep in mind that funding is limited, and that resources must be divided between all employees. Thank you in advance for your efforts in this matter.

After reading this memo, you think to yourself:

*Wow. I knew the situation was serious, but I didn't realize that ToddlerPlay's entire future is at stake. The President has never expressed confidence in my abilities before, and my previous contributions do not appear to be valued. If anything, I feel that my accomplishments have been taken for granted. In addition, he is not giving me much flexibility in formulating a solution. Still, I have the opportunity to make a difference in the company's future. President Vancourt made it clear that resources are limited, and there is no guarantee that any of my ideas will actually be implemented. Still, I do not feel confident that new ideas are encouraged or recognized in this organization.*

**— STOP READING AND LOOK UP —**

Your goal is to generate as many different ideas as possible that could lead to a solution to this problem. In each case there are no right or wrong answers; instead, it is the thought process that counts. Jot down as many ideas as you can in the time allotted.

**Appendix B**

**Assessment of Natural Creative and Innovative Tendencies**

Please indicate your gender:     Female    Male

**INSTRUCTIONS:** Please read the following questions and answer them carefully, keeping in mind your general habits and preferences. The accuracy of your responses is important, so take your time and *think carefully* before answering.

**1. I eagerly embrace ideas that differ greatly from those of the majority.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**2. I would rather express my ideas than have the approval of my co-workers.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**3. I find that my actions are fairly consistent with the expectations others hold for me.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**4. It is more important to me to have the approval of my superiors than to voice my opinion.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**5. Risk-taking is sometimes necessary in order to solve a problem.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree



**6. If I realize that my ideas could be unpopular, I prefer to keep them to myself.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**7. When faced with a problem, my first inclination is to make a decision as quickly as possible.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**8. I see mistakes as something to be avoided at all costs.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**9. When faced with a problem, the first things I notice are its possible risks and costs.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**10. I prefer situations that are predictable, characterized by certainty and structure.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**11. I have original ideas.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**12. I am thorough.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**13. I fit readily into “the system.”**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**14. I am stimulating.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**15. I master all details painstakingly.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**16. I conform.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**17. I can handle several new ideas at once.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**18. I am methodological and systematic.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**19. I readily agree with the team at work.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**20. I would rather create than improve.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**21. I enjoy detailed work.**

Strongly disagree : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : Strongly agree

**Appendix C**

**COLLEGE OF WILLIAM & MARY**

**PSYCHOLOGY DEPARTMENT CONSENT FORM**

The general nature of this study of problem solving conducted by Jennifer Palmer has been explained to me. I understand that I will be asked to read a few vignettes and to attempt to solve the problems presented to me. I will also be asked to answer a set of questions following these vignettes. I further understand that my anonymity will be preserved and that my name will not be associated with my responses or with any of the results of this study. I know that I may refuse to answer any questions that I find personally objectionable and that I may discontinue participation at any time. I also understand that any grade, payment, or credit for participation will not be affected by my responses or by my exercising any of my rights. I am also aware that I may report dissatisfactions with any aspect of this experiment to the Psychology Department Chair, Dr. Robert Johnston (221-3875). I am aware that I must be at least 18 years of age in order to participate. My signature below signifies my voluntary participation in this experiment.

**Please print:**

\_\_\_\_\_  
Name

\_\_\_\_\_  
201/202 Professor

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## Appendix D

### Verbatim Instructions

Hi, my name is Jennifer Palmer, and I want to thank each of you for participating in my study. This study is the basis of my master's thesis, and its focus is characteristics of problem solving in organizations. Your participation involves reading two short vignettes in which you will be faced with specific organizational problems. You will then be asked to generate ideas that could lead to a solution to the problem. At the end of the problem solving session, you will be asked to answer a series of questions pertaining to your problem solving style. The session will last approximately 30 minutes.

As I pass out the consent forms let me remind you that you do not have to answer any questions that you find personally objectionable. I also want to briefly explain anonymous testing. Your name will in no way be associated with your responses. To ensure anonymity I will collect the consent forms first, keeping them separate from the response sheets. This way you can feel comfortable knowing your performance will in no way reflect on you personally. So don't be intimidated about the answers you write down. Everything is fair game. The important thing is that you take your time and construct your solutions carefully.

Here is how the experiment will work. Each of you will receive a packet. Each packet contains two organizational scenarios, each of which is followed by a response sheet. After reading the scenario you will be asked to come up with as many solutions as possible to the problem presented. In each vignette, you are taking the role of a corporate executive. The president of the company has written a short memo to you to update you

on the company's problem and to solicit your help. After you finish reading about the problem I want you to look up at me. Once everyone has finished reading I will signal you to begin writing down your ideas. You are to try your best to come up with as many viable solutions as possible. You will be allowed a set amount of time to work on the problem, and I will signal you when the time is up. Then you will read another memo regarding a different company. The format is identical, and again I will signal you when to start and stop writing down your solutions. After the second vignette you will answer a short series of questions, after which I will collect your responses and briefly tell you the rationale for the study.

Did everyone receive a packet? Okay, that's great. Are there any questions? You may begin reading the first vignette.

Is everyone finished reading the first vignette? Okay, you may begin writing down your solutions.

You may finish writing down your current idea; then go on to the second vignette.

Is everyone finished reading the second vignette? Okay, you may begin writing down your solutions.

You may finish writing down your current idea; then go on to the questionnaire. When you finish the questionnaire look up at me.

Now that everyone is finished I will collect the packets and explain the rationale behind what you just read. As I alluded to earlier, the study's focus is on factors that mediate employee creativity in organizational problem solving. In my opinion, creativity and innovation are valuable commodities that are presently underutilized in major

corporations. Attempts to identify factors that stifle otherwise creative, innovative individuals could lead to the enhancement of creative potential in the future. Research in this area is currently scarce, but one researcher in particular, Teresa Amabile, has found that particular features of organizational environments have the potential to either facilitate or inhibit the creativity of its employees. She has identified several possible obstacles to creativity, including such organizational characteristics as inappropriate reward systems, excessive red tape, a rigid corporate climate, and excessive regard for the status quo. In conducting this study I hope to clarify the nature of organizational factors with respect to the generation of creative or innovative solutions to company problems. Are there any questions? If you are interested in knowing the results of this study, I would be happy to share them with you. I have labels at the front, and those who are interested may fill out the address where the results may be sent. Again, thank you very much for participating.

**APPENDIX E****Instructions Provided to Alternate Rater*****Instructions for the Distinctiveness Evaluation Task:***

You have been given a group of 100 solutions (on separate slips of paper) that were generated by students during the course of the experiment. Students read each of two vignettes and were asked to write down as many solutions as possible in a set amount of time. Fifty of the solutions you have been given pertain to the first vignette, whereas the other 50 relate to the second vignette.

Your first task is to read both of the vignettes. After reading them, you are to sort the 100 solutions into piles based on their similarity. In reading each solution, ask yourself, "Is this idea the same as another one that I have seen?" This task will be much easier if you glance through the solutions and familiarize yourself with them before beginning to form your piles. Because the solutions pertain to two different industries (one that manufactures toys and another that produces frozen meals), you will need to *look beyond* the identity of the product in your assessments of similarity. For instance, if one solution reads, "Make toys that are both recreational and educational," whereas another reads "Make food that is both delicious and nutritious," in the context of the vignettes, these two solutions are equivalent -- both are simply advocating that the new product should meet the wishes of both target populations.

To reiterate, the solutions within each pile should be solutions you judge as equivalent in meaning. Therefore, each of your final groupings (piles) will consist of solutions that are identical or highly similar. When you encounter solutions that seem



qualitatively distinct, that is, solutions that differ from others that you have read, make a separate pile for each of them. It is natural for you to rearrange the piles as you read, because as you read each solution, the criteria you use to constitute a “distinct” solution will change slightly.

Once you have evaluated all one hundred solutions in this manner, count how many “distinct” solutions you found. Paper-clip each pile together (one paper clip per “similar” group), and place the “distinct” solutions in the envelope that I have provided.

***Instructions for the Ratings Task:***

This task will involve (a) the piles you have created, and (b) the computer disk I have provided. Your job will be to assign each of the 100 solutions two separate ratings: novelty (how original you consider each idea to be) and usefulness (how effective the idea would be as a means of solving the problem). You will rate each solution’s novelty and usefulness on a 7-point scale (1 = least, 7 = most). The computer disk contains an Excel File (“interrat”), in which each of the solutions is listed. Next to each solution is a column for the novelty rating, and another column for the usefulness rating. The ratings you assign should not reflect your personal liking or disliking of a given idea, but simply how “original” and how “effective” you judge it to be. These ratings are independent and therefore have no bearing on each other; for example, an idea may receive very high ratings of both novelty and usefulness, or a high rating on one and a low rating on the other.

Here’s the catch: for each pile that you created, the rating should be consistent. That is, two solutions that you judged to be similar should receive roughly equivalent novelty

ratings, and roughly equivalent usefulness ratings. If the solutions are conceptually equivalent, but one solution adds more detail or a new “twist” to the solution, it may receive a higher rating. The idea is to standardize the novelty ratings and the usefulness ratings as much as possible.

I realize that these tasks require considerable time and concentration, and I greatly appreciate your help with this project. Please feel free to call me (564-9746) if you have questions along the way, and again, thank you for your assistance!

Appendix F

Sample ANOVA

\*\*\*\*\* Analysis of Variance \*\*\*\*\*  
 58 cases accepted.  
 0 cases rejected because of out-of-range factor values.  
 0 cases rejected because of missing data.  
 2 non-empty cells.  
 1 design will be processed.

Cell Means and Standard Deviations

Variable .. HSNOV

FACTOR	CODE	Mean	Std. Dev.	N
CREATIV	discour	4.625	.837	29
CREATIV	encour	4.914	.739	29
For entire sample		4.769	.796	58

Variable .. LSNOV

FACTOR	CODE	Mean	Std. Dev.	N
CREATIV	discour	4.142	.916	29
CREATIV	encour	4.908	1.118	29
For entire sample		4.525	1.084	58

Tests of Between-Subjects Effects.

Tests of Significance for T1 using UNIQUE sums of squares

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	55.65	56	.99		
CREATIV	8.07	1	8.07	8.12	.006

Tests involving 'STAKES' Within-Subject Effect.

Tests of Significance for T2 using UNIQUE sums of squares

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	37.70	56	.67		
STAKES	1.73	1	1.73	2.57	.115
CREATIV BY STAKES	1.65	1	1.65	2.45	.123

Appendix G

Creativity Assessment Data

io#	sex	climate	differ	express	expctatn	superior	risknec	unpop	quick	mistake	riskcost	predict	original	thorough	system
1	1	0	4	5	4	2	6	4	4	2	3	4	5	2	4
2	1	0	4	4	5	4	6	4	1	4	5	5	3	6	5
3	1	0	5	5	4	2	6	1	4	2	3	3	6	6	3
4	1	0	4	5	4	4	5	1	2	2	3	4	4	5	4
5	1	0	3	5	4	2	4	1	2	4	6	5	6	6	5
6	1	0	5	5	4	2	6	2	1	4	5	2	5	5	2
7	2	0	4	4	3	2	6	5	2	2	5	6	5	5	3
8	2	0	3	3	4	5	5	4	4	5	4	5	5	5	5
9	2	0	3	4	1	3	6	2	6	3	5	1	4	3	3
10	2	0	3	4	3	4	6	2	2	4	2	3	4	4	3
11	2	0	5	4	4	5	6	3	3	5	5	6	4	6	4
12	1	0	4	4	5	1	5	1	2	1	6	6	5	4	2
13	2	0	5	4	4	3	5	4	3	3	4	2	6	3	3
14	1	0	3	4	2	3	6	5	2	4	6	5	2	6	2
15	1	0	6	1	5	5	4	5	1	3	5	6	4	5	6
16	1	0	5	3	4	3	5	2	2	2	3	3	4	5	4
17	1	0	4	4	5	4	4	3	2	4	1	2	6	5	4
18	1	0	5	4	3	4	6	3	1	2	1	1	3	3	3
19	1	0	4	4	5	3	5	3	3	6	4	2	4	4	3
20	1	0	5	6	4	1	6	1	4	3	5	3	6	6	6
21	1	0	3	3	2	3	5	2	2	3	4	4	4	5	2
22	1	0	4	3	5	3	6	3	4	2	2	3	4	4	4
23	1	0	4	6	5	1	4	4	5	3	4	2	6	5	5
24	1	1	5	4	3	2	4	3	2	2	3	3	5	4	3
25	1	1	5	5	4	1	6	2	3	2	4	2	6	6	4
26	1	1	5	4	3	2	6	2	1	3	4	3	5	6	3
27	2	1	3	4	5	3	5	4	2	2	3	4	5	5	4
28	2	1	4	5	5	3	6	4	2	3	4	4	4	6	5
29	2	1	5	6	5	1	6	2	5	2	4	2	5	4	3

Appendix G

Creativity Assessment Data (continued)

id#	sex	climate	differ	express	expctatn	superior	risknec	unpop	quick	mistake	riskcost	predict	original	thorough	system
30	2	1	3	4	5	3	6	4	2	4	3	2	5	5	4
31	2	1	3	3	5	5	3	4	2	4	5	5	3	3	4
32	2	1	4	5	6	3	5	3	1	6	5	3	4	6	6
33	2	1	5	4	5	2	6	2	5	2	4	2	4	4	2
34	2	1	.	.	.	.	.	.	.	.	.	.	3	3	4
35	2	1	4	5	4	3	5	3	2	4	4	5	5	5	5
36	2	1	5	4	2	3	6	2	1	1	6	3	6	3	5
37	1	1	2	2	5	4	4	5	1	3	4	6	2	6	4
38	1	1	5	5	5	2	6	2	6	3	5	3	5	4	3
39	1	1	4	3	4	2	5	5	3	2	5	2	5	5	4
40	1	1	2	3	5	5	5	5	4	5	5	6	3	4	5
41	1	1	5	4	4	6	3	5	4	2	3	5	4	4	2
42	1	1	1	3	6	4	3	5	2	4	5	6	5	6	5
43	1	1	2	1	4	4	6	4	2	5	4	5	2	4	4
44	1	1	5	4	5	4	5	3	1	5	5	4	5	5	4
45	1	1	4	5	5	2	6	2	3	2	6	4	5	5	5
46	1	1	4	2	5	5	6	4	3	2	5	5	4	6	5
47	1	1	3	4	3	4	4	3	5	5	5	3	4	3	4
48	2	0	6	6	5	2	6	2	4	5	4	2	5	5	5
49	2	0	4	4	5	5	6	3	2	6	3	4	4	3	3
50	2	1	6	5	4	2	6	2	4	3	3	4	6	5	3
51	2	1	5	5	4	2	5	2	2	5	5	2	5	4	1
52	2	0	4	3	5	4	6	4	3	4	2	4	4	3	3
53	2	1	5	5	6	1	6	1	3	2	5	2	6	6	1
54	2	0	6	6	5	1	6	1	1	1	3	4	5	5	2
55	2	1	4	4	4	3	6	2	3	3	5	6	6	5	4
56	2	0	6	5	1	2	6	3	2	2	2	1	6	6	1
57	2	1	2	2	5	3	5	4	2	1	6	3	5	5	3
58	2	0	5	3	5	4	6	5	5	4	5	2	6	3	3

Appendix G

Creativity Assessment Data (continued)

id#	stimulate	painstak	conform	sevidea	method	team	create	detailed	fcrtorig	fcrtdeit	fcrtconf	rfctrconf	origicon
1	4	1	2	5	3	5	2	2	0.3456	-2.7530	0.0530	-0.0500	0.2900
2	3	5	4	4	6	4	3	5	-1.1831	1.1694	0.3736	-0.3700	-1.5600
3	5	4	1	5	3	4	4	4	1.2617	0.3927	-1.0964	1.1000	2.3600
4	6	5	3	5	4	4	3	4	0.6185	0.7195	-0.0325	0.0300	0.6500
5	5	5	2	6	6	4	3	4	1.6965	0.7978	-0.4810	0.4800	2.1800
6	4	3	1	5	3	1	5	2	0.9178	-1.2119	-1.2931	1.2900	2.2100
7	5	5	3	5	5	3	3	5	0.3952	1.0080	0.0332	-0.0300	0.3600
8	4	4	5	5	5	4	2	4	-0.0710	0.2870	1.3680	-1.3700	-1.4400
9	4	4	3	4	3	3	5	4	-0.7687	-0.2980	-0.6555	0.6600	-0.1100
10	4	3	4	3	4	3	4	3	-1.0863	-0.8062	0.1658	-0.1700	-1.2500
11	4	4	4	5	3	5	3	3	-0.0286	0.1841	0.2599	-0.2600	-0.2900
12	6	4	2	5	5	3	4	6	0.4136	0.8444	-1.1261	1.1300	1.5400
13	4	3	3	4	3	3	6	5	-0.5041	-0.1862	0.1121	-0.1100	-0.6200
14	3	4	3	4	6	5	2	5	-1.5557	0.7142	0.2479	-0.2500	-1.8000
15	4	4	3	6	6	3	4	3	0.6838	-0.2351	1.2056	-1.2100	-0.5200
16	4	4	4	4	4	3	4	5	-0.8475	0.6693	-0.3103	0.3100	-0.5400
17	5	5	3	5	3	3	5	5	0.6545	1.1427	1.0609	-1.0600	-0.4100
18	4	2	2	5	1	3	6	1	-0.0678	-2.2766	0.0045	0.0000	-0.0700
19	5	4	3	5	4	3	6	5	-0.2433	0.5899	0.1013	-0.1000	-0.3400
20	6	6	1	5	4	3	3	4	2.0491	1.0453	-1.6724	1.6700	3.7200
21	4	4	3	5	5	5	3	4	-0.2597	0.2479	-0.1276	0.1300	-0.1300
22	4	3	3	4	3	5	4	2	-0.3174	-1.2194	0.2056	-0.2100	-0.5200
23	4	4	3	5	5	4	4	4	0.5640	0.2118	0.1843	-0.1800	0.3800
24	4	2	2	3	3	5	4	3	-0.5182	-1.3168	-0.1016	0.1000	-0.4200
25	6	5	2	6	5	3	4	4	1.9127	0.9452	-1.3567	1.3600	3.2700
26	4	3	2	4	4	5	5	4	-0.1156	0.1259	-1.1618	1.1600	1.0500
27	4	3	3	5	4	4	3	4	0.1777	-0.2220	0.8284	-0.8300	-0.6500
28	4	4	5	5	5	4	4	5	-0.5700	1.1199	0.1940	-0.1900	-0.7600
29	6	2	1	5	3	4	5	3	1.0554	-1.1425	-1.1856	1.1900	2.2400

Appendix G

Creativity Assessment Data (continued)

id#	stimulate	painstak	conform	sevidea	method	team	create	detailed	fctrorig	factrdetl	fctrconf	rfctrconf	origicon
30	3	4	3	4	4	4	3	4	-0.4260	0.0242	0.3992	-0.4000	-0.8300
31	4	3	3	5	3	5	4	5	-0.9259	-0.2386	1.7938	-1.7900	-2.7200
32	4	5	4	5	6	5	3	4	0.0043	0.9212	0.0146	-0.0100	-0.0100
33	5	6	3	4	5	4	6	6	-0.8102	1.7864	-0.8888	0.8900	0.0800
34	2	2	3	3	4	4	1	3	-1.7263	-1.9726	0.5694	0.3287	-0.8752
35	4	5	2	5	5	4	4	3	0.7638	0.0635	0.1845	-0.1800	0.5800
36	5	2	1	6	1	3	5	2	1.7343	-1.9737	-1.2215	1.2200	2.9600
37	2	3	5	3	5	5	3	5	-2.6529	0.4710	1.8640	-1.8600	-4.5200
38	5	2	2	5	4	3	4	2	0.8387	-1.6540	-0.9123	0.9100	1.7500
39	4	4	4	3	3	5	5	4	-0.9022	0.4042	0.1717	-0.1700	-1.0700
40	4	4	5	4	5	4	4	4	-1.2530	0.1299	1.8710	-1.8700	-3.1200
41	4	4	4	5	5	5	5	5	-0.9009	0.6542	2.2704	-2.2700	-3.1700
42	4	6	5	5	6	4	3	5	-0.0792	1.7981	2.3435	-2.3400	-2.4200
43	4	3	4	4	4	5	3	4	-1.4671	-0.3719	0.8905	-0.8900	-2.3600
44	4	4	3	5	4	4	5	5	-0.0616	0.7174	0.0993	-0.1000	-0.1600
45	4	4	4	5	6	5	4	4	-0.0125	0.3748	-0.9194	0.9200	0.9100
46	4	5	5	5	5	4	3	4	-0.2472	1.0124	0.7642	-0.7600	-1.0100
47	4	4	3	5	5	4	3	5	-0.4500	0.0140	0.7614	-0.7600	-1.2100
48	4	2	5	2	5	2	5	5	-1.5974	-0.0316	-1.1395	1.1400	-0.4600
49	4	4	3	4	5	3	3	3	-0.4592	-0.8604	0.6352	-0.6400	-1.0900
50	6	3	2	4	3	2	3	2	1.3391	-1.0697	-0.9391	0.9400	2.2800
51	6	4	2	5	5	3	4	5	0.5300	0.4611	-0.9554	0.9600	1.4900
52	4	2	5	5	4	2	2	3	-0.5656	-1.4719	0.8169	-0.8200	-1.3800
53	6	5	1	6	6	5	3	4	1.8486	0.9177	-1.6336	1.6300	3.4800
54	5	4	2	4	5	3	5	4	0.1786	0.2510	-1.5912	1.5900	1.7700
55	5	4	3	4	4	5	4	3	0.5455	-0.0639	-0.4221	0.4200	0.9700
56	5	4	1	6	2	3	5	4	1.4782	0.5044	-1.0407	1.0400	2.5200
57	4	4	2	3	5	3	2	3	-0.0496	-0.5433	0.5444	-0.5400	-0.5900
58	5	4	3	5	4	5	6	2	0.7167	-0.8010	0.4418	-0.4400	0.2700

Appendix H

Raw Data

Id#	Isnov1	Isuse1	Isnov2	Isuse2	Isnov3	Isuse3	Isnov4	Isuse4	Isnov5	Isuse5	Isnov6	Isuse6
1	1	6	4	5	4	5	4	5	1	6	6	5
2	2	6	4	6	6	6	3	6	7	5		
3	4	6	4	5	4	5	3	5	3	5	4	5
4	4	6	6	6	4	5						
5	4	5	2	2	6	5	6	6	3	6	4	5
6	7	6	7	5	5	3	5	3	3	7		
7	7	6	3	3								
8	4	5										
9	4	3	5	5	4	2	5	4	7	4	2	3
10	4	6										
11	2	3	3	2	3	7	7	7				
12	4	4	2	5	3	7	5	6				
13	4	4	4	5								
14	1	4	6	5								
15	4	4	2	2	3	4	4	6				
16	5	6	4	5								
17	2	6	7	5	7	5						
18	7	5	5	6	4	5	7	6	2	2	7	4
19	3	4	7	6								
20	4	6	4	4	2	2	3	6	5	5	4	5
21	5	6										
22	3	4	1	1	3	5	3	7	4	7	3	6
23	4	6	6	6								
24	4	6	5	7	6	7	3	6	7	7	3	7
25	7	5	6	7	4	4	6	6	7	6	7	7
26	7	7	7	7	7	7	7	7				
27	7	7	6	7	6	6	6	6	6	6	7	7
28	4	6	6	7	5	6						
29	6	6	6	6	7	6	4	6	6	1	7	2
30	5	7	5	6	5	6						
31	4	6	5	6	5	6						
32	4	6	4	5	7	7	5	6	6	6	5	6



Appendix H

Raw Data (continued)

id#	Isnov1	Isuse1	Isnov2	Isuse2	Isnov3	Isuse3	Isnov4	Isuse4	Isnov5	Isuse5	Isnov6	Isuse6
33	2	6	5	6	4	6	2	2	5	7		
34	2	5	1	1	4	6	4	5	3	7		
35	3	4	6	6	4	5	4	4				
36	3	2	5	5	3	7	7	7				
37	6	6	4	6								
38	6	6	4	6	5	6	6	6	7	6	5	7
39	3	7	4	5	4	5	2	6				
40	7	7	6	7	6	7	6	7	6	7	6	7
41	3	7	3	7	4	4	2	4	5	6		
42	5	7	4	6	2	6	5	6	4	6	7	7
43	3	6	4	6	6	6	6	6	4	7	7	7
44	7	7	7	7	7	7	6	7	7	6	5	6
45	7	7	4	7	2	5						
46	3	6	4	7								
47	5	5	3	7	6	6	4	6	7	7	4	6
48	3	6	4	5	4	5						
49	6	5	6	5	6	6						
50	5	6	5	6	4	6	4	6				
51	6	6	6	6	6	6	7	7	7	7		
52	1	3	1	1	1	1	4	5	6	6	3	7
53	4	7	3	7	2	2	5	6				
54	1	1	4	3								
55	3	4	4	7	5	7	7	7	7	7	7	6
56	2	6	3	7								
57	5	6	7	7	4	7	4	5	4	5	2	3
58	3	5	5	6	4	5	6	7	3	5	7	5





Appendix H

Raw Data (continued)

id#	hsnov1	hsuse1	hsnov2	hsuse2	hsnov3	hsuse3	hsnov4	hsuse4	hsnov5	hsuse5	hsnov6	hsuse6
1	5	5	4	6	4	5	6	5	6	2	4	5
2	2	3	5	7	7	6	1	1	7	7		
3	5	5	6	5	5	5	7	7	4	6	4	7
4	4	6	6	7	4	7						
5	4	6	6	7	7	6	7	7	7	7	4	5
6	7	5	4	5	7	7						
7	6	7	5	5	5	7	6	2				
8	5	5	5	7	7	6						
9	3	2	5	5	6	2	4	6	6	2	7	1
10	5	5	6	7	5	5	4	6	3	4		
11	1	5	6	7	3	2	2	3	1	1	7	6
12	6	7	4	7	7	4						
13	3	4	7	7								
14	7	6	7	5	2	5						
15	4	7	6	7	2	3	6	5	1	1	4	4
16	3	1	7	5	5	6						
17	5	5	4	6	7	7	7	6	6	5		
18	1	1	4	5	5	5	7	7	4	6	3	6
19	5	7	4	6	3	6	5	6				
20	2	7	4	5	4	7	4	7				
21	2	5	4	7	4	5	5	5				
22	3	3	4	7	6	6	2	3				
23	4	6	5	6	4	6	7	6	4	7		
24	4	7	6	7	6	7	5	4	7	7		
25	5	7										
26	4	6	5	7	7	7	6	7	.6	5	4	7
27	4	6	7	6	4	7	4	7	3	6		
28	5	5	5	6	3	4	4	6	4	7		
29	7	1	7	7	2	3	2	3	7	1	7	2
30	7	7	2	3	4	6	7	1				
31	2	5	7	7	4	7	4	5	4	7	3	6
32	5	5	3	6	4	7	5	7	7	7	7	7

Appendix H

Raw Data (continued)

id#	hsnov1	hsuse1	hsnov2	hsuse2	hsnov3	hsuse3	hsnov4	hsuse4	hsnov5	hsuse5	hsnov6	hsuse6
33	1	4	5	5	5	4	4	3	7	7	2	3
34	4	7	7	7	5	5	4	5	3	4	7	6
35	3	4	3	4	7	7	4	7	5	5		
36	6	7	2	3	3	6	2	3	7	7	7	2
37	7	6	7	7	4	7						
38	1	1	4	7								
39	4	6	4	6	7	7	4	6				
40	6	5	7	7	4	6	5	5	6	5	6	7
41	5	5	4	7	5	5	3	6				
42	4	7	5	5	7	6	5	5				
43	4	6	7	6	5	6	5	7	6	7	6	6
44	5	7	7	6	3	4	7	7	5	7	7	7
45	6	7	5	7	5	7	6	7	5	7	6	7
46	4	6	7	5								
47	6	7	6	7	6	7	2	3	2	3	6	7
48	5	6	6	7	4	6						
49	4	6	3	2	2	3	4	7	6	7		
50	5	5	4	6	5	7	4	7	5	7	6	6
51	3	6	5	5	5	5	5	5	7	5	5	5
52	1	1	3	4	2	5	3	6	5	7		
53	7	4	4	7								
54	4	7	4	7	2	4	4	6	4	5	4	6
55	7	5	6	5	4	6	4	7	2	3	7	7
56	4	7	4	6	5	7	7	7	4	5	3	3
57	4	7	4	7	5	5	5	5	3	6	4	6
58	2	2	5	5	7	7	4	7	4	4		





Appendix H

Raw Data (continued)

id#	hsnov13	hsuse13	#diffhs	%diffhs	lsnovavg	hsnovavg	lsuseavg	hsuseavg	lscreativ	hscreativ
1			2	1.89%	3.625	4.875	5.375	4.750	13.636	13.923
2			1	0.94%	4.400	4.400	5.800	4.800	11.364	10.231
3	5	5	2	1.89%	3.500	4.923	5.125	6.154	13.091	30.308
4			0	0.00%	4.667	4.667	5.667	6.667	7.273	7.231
5			3	2.83%	4.143	5.857	4.857	6.429	13.455	20.615
6			1	0.94%	5.400	6.000	4.800	5.667	11.636	8.000
7			2	1.89%	5.000	5.500	4.500	5.250	4.636	8.769
8			0	0.00%	4.000	5.667	5.000	6.000	1.818	7.846
9			5	4.72%	4.143	5.222	3.143	3.889	9.182	13.385
10			1	0.94%	4.000	4.600	6.000	5.400	2.182	9.846
11			2	1.89%	3.750	3.333	4.750	4.000	7.455	7.846
12			0	0.00%	3.500	5.667	5.500	6.000	7.000	7.538
13			0	0.00%	4.000	5.000	4.500	5.500	3.273	4.692
14			3	2.83%	3.500	5.333	4.500	5.333	3.091	6.692
15			0	0.00%	3.250	3.833	4.000	4.500	5.091	9.462
16			2	1.89%	4.500	5.000	5.500	4.000	4.545	5.231
17			0	0.00%	5.333	5.800	5.333	5.800	7.455	13.077
18			2	1.89%	5.375	4.222	4.875	5.222	19.545	16.692
19			0	0.00%	5.000	4.250	5.000	6.250	4.909	8.231
20			1	0.94%	4.250	3.500	5.250	6.500	17.364	6.923
21			0	0.00%	5.000	3.750	6.000	5.500	2.727	6.385
22			3	2.83%	2.833	3.750	5.000	4.750	8.636	6.077
23			0	0.00%	5.000	4.800	6.000	6.200	5.455	11.385
24			1	0.94%	4.667	4.000	6.667	6.167	17.182	13.923
25			0	0.00%	6.444	5.429	6.222	6.571	33.364	2.692
26			2	1.89%	7.000	4.000	7.000	4.333	17.818	20.154
27			1	0.94%	6.333	4.625	6.500	5.250	22.545	10.769
28			0	0.00%	5.000	4.400	6.333	5.400	8.727	9.154
29			7	6.60%	5.714	4.500	4.571	4.667	16.182	14.308
30			2	1.89%	5.000	6.000	6.333	6.667	8.636	6.615
31			2	1.89%	4.500	2.500	6.000	4.000	4.909	11.769
32			3	2.83%	5.167	4.750	6.000	6.250	17.182	19.462



## Appendix H

## Raw Data (continued)

Id#	hsnov13	hsuse13	#diffhs	%diffhs	lsnovavg	hsnovavg	lsuseavg	hsuseavg	lscreatv	hscreatv
33			2	1.89%	3.600	5.571	5.400	5.714	9.545	8.923
34			3	2.83%	2.800	4.250	4.800	5.750	6.909	15.923
35			3	2.83%	4.250	5.250	4.750	5.750	7.636	9.692
36			2	1.89%	4.500	5.714	5.250	6.286	9.182	10.385
37			2	1.89%	5.000	6.000	6.000	6.375	5.455	9.154
38			0	0.00%	5.714	5.500	6.000	7.000	21.636	2.231
39			1	0.94%	3.250	5.500	5.750	5.500	6.636	9.308
40			4	3.77%	6.273	5.000	7.000	5.429	43.909	17.308
41			0	0.00%	3.400	5.000	5.600	6.333	8.727	7.385
42			1	0.94%	4.500	3.800	6.333	5.000	15.818	9.231
43			5	4.72%	5.444	4.833	6.000	6.333	26.636	19.308
44			3	2.83%	6.500	5.286	6.667	5.429	23.727	24.077
45			2	1.89%	4.333	2.800	6.333	4.600	7.909	17.769
46			3	2.83%	3.500	5.500	6.500	5.500	4.182	4.538
47			3	2.83%	4.833	3.667	6.167	5.833	16.273	16.000
48			2	1.89%	3.667	5.600	5.333	6.400	5.273	7.385
49			2	1.89%	6.000	5.000	5.333	7.000	8.727	8.154
50			3	2.83%	4.500	5.077	6.000	5.231	9.818	14.077
51			4	3.77%	6.400	4.500	6.400	5.833	18.727	15.538
52			1	0.94%	2.714	4.667	4.143	6.000	9.091	5.846
53			1	0.94%	3.500	4.500	5.500	6.250	7.545	4.308
54			1	0.94%	2.500	4.400	2.000	6.400	1.182	10.154
55	5	2	3	2.83%	5.875	4.400	6.250	5.000	27.182	28.000
56			4	3.77%	2.500	4.200	6.500	5.600	3.000	12.692
57			2	1.89%	4.333	4.200	5.500	5.600	13.909	17.308
58			1	0.94%	4.571	5.444	5.429	3.778	16.091	9.385

## VITA

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The author was born in Davidson, North Carolina on December 7, 1971. She received her B.S. in Psychology from Duke University in Durham, North Carolina in May of 1993. While there she completed a Concentration in Neuroscience and was also the recipient of the Fletcher Music Scholarship for all four years. She received her M.A. in Experimental Psychology from the College of William & Mary in May of 1997, and from there will attend the Ph.D. program in Industrial/Organizational Psychology at the University of Tennessee at Knoxville.