

---

CASSIE S. BLAIR  
MICHAEL D. MUMFORD

## Errors in Idea Evaluation: Preference for the Unoriginal?

---

**ABSTRACT** Idea evaluation has, in recent years, received more attention as a critical component of creative thought. One key influence on how people evaluate new ideas may be found in the standards, or attributes, people look for in appraising ideas. The intent of the present study was to examine the influence of different attributes on people's willingness to support new ideas. Initially undergraduates were asked to generate ideas that might be funded by a foundation. Based on this material, ideas displaying different attributes were identified. Another smaller sample of undergraduates were asked to evaluate ideas for funding by the foundation. It was found that people preferred ideas that were easy to understand, provided short-term benefits to many, and were consistent with prevailing social norms, while disregarding risky, time consuming, and original ideas. Original and risky ideas, however, were more likely to be preferred when evaluation criteria were not especially stringent and time pressure was high. The implications of these findings for understanding how people go about evaluating new ideas are discussed.

**INTRODUCTION** What exactly is creativity? Many researchers have tried to explain this phenomenon, and still there is a lack of consensus as to a perfect definition. Nicholls (1972) has suggested that the discrepancy may be due to researchers focusing on different aspects of the creative process rather than on creativity itself. Creativity has been looked at as an aspect of intelligence, as an unconscious process, as an aspect of problem solving, and as an associative process (Glover, Ronning, & Reynolds, 1989). The most common definition of creativity, however,

holds that it involves the production of high quality solutions to resolve novel, ill-defined problems (Lubart, 2001; Ghiselin, 1985; Mumford & Gustafson, 1988).

To generate high quality solutions, there are two critical elements involved (Mumford, Mobely, Uhlman, Reiter-Palmon, & Doares, 1991). The first of these elements is knowledge. Weisberg (1999), for example, demonstrated the role of expertise in creative problem-solving and creative achievement. The second element is the process by which people process this information. A number of models of the processes involved in creative thought have been proposed. Basadur, Runco, and Vega (2000) portrayed creativity as a three-phase process of a) finding good problems, b) solving them, and c) implementing solutions. Wallas (1926) formalized a four-stage model of the creative process involving preparation, incubation, illumination, and verification. A more general model of the processes involved in creative thought has been proposed by Mumford, Mobley, Uhlman, Reiter-Palmon, and Doares (1991). This model holds that creative thought involves eight core processes: problem construction, information encoding, category selection, category combination and reorganization, idea generation, idea evaluation, implementation planning, and solution monitoring.

Of these processes, idea evaluation has received less attention than production processes such as problem finding, conceptual combination, and idea generation (Basadur, Runco, & Vega, 2000; Brown, 1989; Runco & Chand, 1991, 1994). With this point in mind, the purpose of the present study is to explore the role of idea evaluation in creative thought. More specifically, we hope to identify the attributes of new ideas that influence people's willingness to pursue an idea following idea evaluation.

#### Idea Evaluation

*Process.* Idea evaluation plays an important role in creative thought (Glover, Ronning, Reynolds, 1989; Mednick, 1962). Accordingly, a number of scholars have discussed idea evaluation under rubrics such as verification (Wallas, 1926), evaluative skill (Runco & Smith, 1992; Runco & Chand, 1995), selective attention (Campbell, 1960), and convergent thinking (Isaksen & Treffinger, 1985). Although many scholars have discussed the relevance of idea evaluation, only a few studies have expressly examined how idea evaluation operates (Loneragan, Scott, & Mumford, 2004).

One model of the idea evaluation process has been provided by Guilford and his colleagues (e.g., Wilson, Guilford, Christensen, & Lewis, 1954). They proposed a four phase model which

includes a) conceptual foresight — generating and identifying significant downstream consequences, b) penetration — identifying implications of nonobvious changes in the meaning of information or events, c) redefinition judgment — shifting the use of an object vis-à-vis situational demands, and d) problem sensitivity — solution monitoring and problem construction.

Another model of the idea evaluation process has been proposed by Mumford, Loneragan, and Scott (2002). This model holds that idea evaluation is based on a contextual assessment of the consequences of pursuing an idea. Accordingly, idea evaluation is held to begin with forecasting or prediction of the likely outcomes and consequences of implementing an idea within a particular setting (Doerner & Schaub, 1994). The projected outcomes of pursuing an idea are then appraised with respect to a set of performance standards applicable to the setting (Kuipers, Moskowitz, & Kassinger, 1988). This standard based appraisal will lead to a decision to implement the idea as is, drop the idea, or revise the idea to enhance its' performance with regard to the standards being applied in idea evaluation (Goor & Sommerfeld, 1975; Lubart, 2001).

Some initial evidence bearing on the validity of the model has been provided by Loneragan, Scott, and Mumford (2004). They examined the effects of task structure (ill structured vs. semi-structured), idea appraisal standards (innovative vs. operative), and revision standards (innovative vs. operative). Participants evaluated ideas that had been proposed, ideas of varying quality and originality, for a new advertising campaign. They were then asked to appraise a set of proposed ideas while suggesting revisions to the idea and developing an implementation plan should the idea be accepted. The quality, originality, and feasibility or workability of the resulting advertising plans was evaluated. The results obtained in this study indicated that better advertising plans were obtained when innovative standards were applied to high quality ideas and when operative standards were applied to highly original ideas. These findings, of course, suggest that the standards applied in appraising and revising ideas are a crucial component of the idea evaluation process.

*Standards.* These findings, of course, bring to fore a new question, what kind of standards do people routinely apply in evaluating new ideas? In one study along these lines, Runco, Okuda, and Thurstone (1987) found that ideas are appraised initially on appropriateness and relevance, and, subsequently on originality. Along similar lines, Bink and Marsh (2000) found

that appraisals of appropriateness revolve around contextual aspects of the environment such as perceived fit and practical benefit. In keeping with this observation, Rodgers and Adhikarya (1979) found that low implementation cost, consistency of the idea with extant systems, and rate of return influenced the adoption of new ideas.

With regard to these findings, however, it is important to recognize that these pragmatic, economic standards are not the only attributes people might consider in appraising new ideas. The evidence accrued by Abbey and Dickson (1983) and Sternberg and Lubart (1996) indicates that people consider a number of unique attributes of an idea as well as social consequences — taking into account feasibility and likelihood of success as well as benefits. Not only do people consider outcome attributes, they may also consider more complex characteristics of an idea such as the fit of the idea to social context, peoples' ability to understand the idea, and the requirements for idea implementation (Mumford & Hunter, in press). In fact, Sharma's (1999) observations suggest that people will also consider negative outcomes and the problems that arise in idea implementation due to the risk attached to new ideas.

Sharma's (1999) study reminds us that certain forecasted attributes of new ideas may influence peoples' willingness to pursue these ideas. For example, given peoples' known risk aversion (Gouada, 1999), it seems reasonable to expect that people will reject risky ideas just as they accept ideas that can be implemented within extant systems to obtain multiple short-term rewards. Along similar lines, because highly original ideas, by virtue of their novelty, limit the confidence that can be placed in forecasts, one would expect that people tend to discount the value of highly original ideas (Licuanan, Dailey, & Mumford, in press). Based on these observations, the following two hypotheses seemed indicated:

Hypothesis 1: In idea evaluation, people will tend to prefer ideas that have evident benefits and are consistent with extant social systems.

Hypothesis 2: In idea evaluation, people will tend to reject ideas that are risky or highly original.

*Context.* Although standards have been found to be an essential component in the evaluative process, the application of these standards may be influenced by certain situational variables (Stokes & Fisher, 2005). Time pressure has been identified as a variable influencing consumer decision-making

(Howard & Sheth, 1969). Dhar and Nowlis (1999) found that under time pressure, consumers are more influenced by distinctive factors among product choices and are less likely to consider common or general features. Additionally, Nowlis (1995) found that consumers, under time constrained conditions, were more likely to select: 1) higher quality and more expensive brands, and 2) high quality brands over low-quality brands. One explanation for these time-constraint effects has been provided by Kaplan, Wanshula, and Zanna (1993). They found that, under time-constrained conditions, people are more likely to employ simplifying heuristics (Kruglanski & Freund, 1983; Sanbonmatsu, & Fazio, 1990) — leading to a preference for known high quality products. Studies by De Dreu (2003) and Suri and Monro (2003) have indicated that when people are put under time pressure restrictions, stress and other contextual factors reduce information-processing capacity leading to superficial analysis and a preference for rapid closure. Other studies by Kasof (1997) and Smith, Michael, and Hocevar (1990) indicate that stress, or anxiety, may have similar effects on creative problem-solving. One implication of these findings is that people placed under time pressure can be expected to reject abstract ideas that prove difficult to understand. Hence, hypothesis three:

Hypothesis 3: In idea evaluation, time pressure will lead people to discount difficult, cognitively demanding ideas.

Two other situational variables that might influence the attributes applied in idea evaluation are the need for extensive evaluation and social evaluative pressure. For example, one would expect that when evaluation criteria are stringent (or people can only pursue a limited number of ideas) that they will apply standards stressing fit with existing structures and tangible short-term benefits due to the need to minimize opportunity costs (Hitt, Hoskisson, Johnson, & Mosel, 1996). Along similar lines, social evaluative pressure may lead people to reject more risky, and more original, ideas for ideas yielding tangible short-term benefits due to: a) the tendency of evaluative pressure to induce extrinsic motivation (Collins & Amabile, 1999), and b) attempts by people to maintain an image of competence (Choi, 2004). These observations lead to our final two hypotheses,

Hypothesis 4: In idea evaluation, stringent evaluation criteria will lead people to prefer ideas

displaying tangible short-term benefits to ideas that evidence risk and originality.

Hypothesis 5: In idea evaluation, social evaluation pressure will lead people to prefer ideas displaying tangible short-term benefits to ideas that evidence risk and originality.

**METHOD** This study was conducted in two stages. The sample used  
**Subjects** in the first stage of the study included 210 undergraduate students from the University of Oklahoma. The sample included 146 females and 64 males. Subjects ranged from ages 17-31, with an average age of 19. The average ACT/SAT score was 24.

The sample used in the second stage of the study included 165 undergraduate students from the University of Oklahoma. The sample included 101 females and 64 males. Subjects ranged from ages 17-30, with an average age of 19. The average ACT/SAT score was 25. The students for both phases were enrolled in an introductory psychology course and received two course credits for their voluntary participation.

**Covariate Measures** During the first hour of each stage of the study, participants completed five covariate measures. The covariate measures chosen for this study were intended to measure and control for variables that might influence individual performance on creative problem-solving tasks. First, participants completed Guilford's (1984) Consequences "A" test, which assessed the creativity skill divergent thinking. The consequences "A" test contains five items where people are asked to list outcomes of environmental change events. This test was scored for fluency (total number of unique responses). The consequences test, when scored for fluency, has been shown to evidence adequate predictive validity (Merrifield, Guilford, Christensen, & Frick, 1962). In the sample at hand, this measure yielded a coefficient alpha of .82.

The next covariate, verbal reasoning skills, was drawn from the Employee Aptitude Survey (EAS) to control for the potential influence of verbal skills on the quality and originality of written ideas. The EAS contains 30 analogical reasoning items and yields re-test reliabilities in the .70s. Evidence for the validity of this measure was provided by Ruch and Ruch (1980).

Zuckerman's (1994) sensation seeking scale was also used in this study. Because sensation seeking has been shown to be related to risky behavior, this measure was used to control

for the potential influence of risk-taking on idea preferences. This scale assesses sensation-seeking based on 40 self-report items indicating behavioral predispositions such as “I get bored seeing the same old faces”. This test has been shown to have adequate predictive validity (Zuckerman, Eysenck, & Eysenck, 1978) and produced a coefficient alpha of .77.

Goldberg’s (1990) “adjective checklist” was employed to measure participants’ personality characteristics using a “Big Five” model. This measure includes scales measuring neuroticism, openness, agreeableness, conscientiousness, and extraversion. The measure asks people to indicate, on a 9-point likert scale, the extent to which adjectives such as active, emotional, talkative, and nervous, depict an accurate or inaccurate description of themselves. This measure was included to examine individual differences that may influence performance on the experimental task in the present study. Evidence bearing on the reliability and validity of this measure has been provided by Goldberg (1990).

The final two covariates were drawn from Tierney and Farmer (2002). The first measure examined creative self-efficacy. This measure evaluated creative self-efficacy based upon five items (e.g., “I feel that I am good at generating novel ideas”). Participants were asked to indicate the extent to which each statement applied by utilizing a 7-point likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). This measure provided a coefficient alpha of .82 in the sample at hand.

Tierney and Farmer’s (1999) measure of intrinsic motivation was also used in this study. This covariate was included to control for the potential influences of participants’ motivation orientation on idea evaluation. This behavioral self report measure presents descriptive statements (e.g., “I enjoy finding solutions to complex problems”) on a 6-point likert scale ranging from 1 (strongly agree) to 6 (strongly disagree). In this study sample, the reliability of this measure was .85 as assessed using coefficient alpha.

#### Experimental Task

*Phase 1.* As noted previously, this study was conducted in two stages. At the outset of the first phase of the study, participants read through a scenario that established the framework for the initial experimental task. In this scenario, participants were given a brief history of the non-profit foundation, including the origin of the foundation, its mission statement, and the expectations for members of the foundation’s Advisory Board. This background information indicated that the primary goal of the Jackson foundation was to expand their project

portfolio to cover new and unique coverage areas. In addition, participants were presented with projects that had putatively been funded in the past as a way of familiarizing them with the variety and type of ideas the foundation had supported in the past. This background information informed participants that their primary responsibility would be to produce a set of ideas that might be considered for funding.

After reading the scenario, participants in the phase one effort were asked to assume the role of a member of a non-profit organization's outreach program. As a member of the outreach program, they would be responsible for generating ideas that would cover new and unique target areas that would serve to expand the foundation's outreach options and would potentially be a source for proposal development. Participants were then given a worksheet and were asked to generate 15-20 ideas to be considered for proposal development. In addition to generating 15-20 proposal ideas, participants were also expected to list in one line bullet point format, three advantageous characteristics of each proposal idea. This requirement was imposed to permit content analysis of the ideas produced. The ideas obtained in phase one served as the stimulus material for phase two.

*Phase II.* At the outset of the second experimental task, participants were asked to read through a scenario that established the framework for the experiment. Again, this scenario provided a brief history of the non-profit foundation, including the origins of the foundation, its mission statement, and expectations for participants as members of the Advisory Board. This background information indicated that the Jackson foundation's primary goal was to expanding their program along new and useful avenues that might serve to lessen society's significant problems.

After reading the scenario, participants were asked to assume the role of a member of the non-profit organization's outreach program. As a member of the outreach program, they would be responsible for deciding which ideas would be considered for proposal development. Participants would be responsible for reviewing 72 pairs of proposal ideas and choosing the better idea of each pair (a preference measure). After making these decisions, participants were asked to select a subset of ideas they would recommend for funding (a choice measure).

The ideas gathered from phase one of the experiment served to populate phase two of the study. As mentioned previously,



phase one participants were responsible for generating ideas, while phase two participants were responsible for evaluating ideas. After the ideas from phase one were collected, four raters were assembled to rate each of the ideas based on 12 attributes. These attributes were drawn from the literature reviewed earlier. Figure 1 lists these attributes, their operational definitions, and supporting citations.

The raters consisted of four Ph.D. candidates in industrial and organizational psychology who were familiar with creativity research. Each rater participated in a training program in order to maximize interrater reliability. Initial rater training meetings included examples of high, medium, and low ideas containing each of the attributes being assessed. After attributes were discussed, each rater judged a sample of ideas evidencing each of the attributes under consideration. After these ratings had been made, raters reconvened to discuss their judgments. Once an acceptable coefficient had been reached, each rater proceeded with the rating task. The resulting interrater agreement coefficients ranged from .45 to .73, with an average of .60. Due to the nature of the reliabilities, item reliability versus scale reliability, the .60 average is acceptable.

Evidence for the construct validity of these ratings was obtained by examining the cross-scale correlations. Broadly speaking, these correlations provided some evidence for the convergent and divergent validity of these ratings. For example, ease of implementation was correlated with understandability ( $r = .29$ ), consistency with extant social norms ( $r = .42$ ), and probability of success ( $r = .58$ ). Implementation difficulty was positively correlated with complication ( $r = .40$ ) and risk ( $r = .15$ ), but negatively correlated with perceived probability of success ( $r = -.29$ ).

The ideas gathered in the phase one study were grouped into pairs.

To create these pairs, six ideas receiving high ratings (a mean rating above 4.0 on a 5-point scale) on the target attribute were identified. Next, six ideas receiving low ratings on the target attribute (a mean rating below 2.0) but high ratings (a mean rating above 4.0) on one or more other attributes were identified. These pairings were made under the constraint that all ideas included in a pair must have above average ratings on usefulness (a mean rating above 3.0) and that the comparison ideas must have received high ratings (ratings above 4.0) on at least six different attributes.

FIGURE 1. Attribute Definitions and Citations

Attribute	Definition	Citation
1. Risky	High probability of acquiring a loss	Sternberg and Lubart (1991, 1995, 1996); Sharma (1999)
2. Easy to Understand	Clear meaning without a lot of ambiguity	Finke, Ward, and Smith (1992); Mumford and Hunter (in press)
3. Original	Unusual; novel; unique; uncommon	Guilford (1950); Finke, Ward, and Smith (1992)
4. Complete Description	Provides detailed steps needed to make the plan work	Guilford (1962)
5. Complicated	Involves intricate details	Mumford et al. (1991); Rubenson and Runco (1992)
6. Consistent with Extant Social Norms	Popular and consistent with societal norms	Rodgers and Adhikarya (1979); Runco and Chand (1991)
7. High Probability of Success	Likely to be successful	Jausovec (1994)
8. Easy to Implement	Not difficult to implement	Basadur, Runco, and Vega (2000)
9. Benefits a Number of People	Benefits society as a whole	Rubenson and Runco (1992)
10. Provides Desired Outcomes	Produces societal rewards	Runco and Chand (1991)
11. Time and Effort to Implement	Time and effort required during implementation	Rodgers and Adhikarya (1979); Rubenson and Runco (1992)
12. Implementation Complexity	Many steps likely required	Basadur, Runco, and Vega (2000)

As a program member, participants in the second phase would be responsible for the evaluation of these ideas. After reading through the scenario and set of instructions, participants were asked to review 72 pairs of ideas and to choose one idea per pair that they felt was the better choice. After reading through the sets of ideas, participants were then asked to make their final recommendations for funding. Upon making their final recommendations, participants were reminded of the foundations primary goal of expanding its research along new and useful avenues.

Experimental  
Manipulations

Three manipulations were made vis-à-vis the instructions presented in describing the phase two study. The first manipulation focused on the amount of time subjects had to complete the experimental task. This manipulation was established by either setting a 20-minute time limit for completion of the experimental task, or by allowing as much time as necessary to complete the task. Pilot studies indicated that a 20 minute time limit was sufficient to induce evaluation pressure.

The second manipulation focused on stringency levels. This manipulation was implemented during the final recommendation phase. After the participants reviewed the 72 pairs of ideas, half of the participants were asked to record five ideas they felt were deserving of funding. The other half of the participants were told to record all the ideas they felt were deserving of funding.

The third and final manipulation focused on social evaluative pressure. This manipulation was established through the instructions given to people participating in the second phase of this study. After reading through the set of instructions, half of the participants were told that their final recommendations would be compared to others' recommendations and to make their selections wisely. The other half of the participants were told that there would be no comparison to others' recommendations and to feel free to include those they felt deserved funding.

Dependent  
Variables

The first dependent variable examined attribute preference based on the 72 idea pairs. The preference measure involved a count of the number of times an idea, displaying an attribute as either the target or comparison idea, was selected divided by the total number of times the attribute appeared in either the target or comparison ideas. Hence, the first dependent variable reflected participants' attribute preferences for the ideas presented in pairs.

The second dependent variable focused on the idea selection, on choice, as opposed to idea preference. After reading through the sets of ideas, participants were then asked to

select those ideas out of the possible 144 that they would recommend to receive funding. Each idea selected was assessed in terms of the relevant attributes. A count was obtained for each attribute associated with the ideas recommended for funding. This count, divided by the total number of times the attribute appeared, provided the choice measure applied in the present study.

#### Analyses

The dependent variables examined in the first set of analyses were the attribute preference scores derived from the idea pairs. A multivariate analysis of covariance was conducted where attributes were treated as a repeated measures variable and the individual difference measures were treated as covariates. Stringency, time pressure, and social evaluative pressure were included as independent variables. A covariate control variable was retained in this analysis only if it provided effects significant at the .05 level.

The second set of analyses examined the ideas participants recommended for funding in their final selections. A multivariate analysis of covariance was again conducted where attributes were treated as a repeated measures variable and the individual difference measures were treated as covariates. Once again, a covariate control was retained only if it was significant at the .05 level.

#### RESULTS Preferences

Table 1 presents the results obtained in the multivariate analysis of covariance examining attribute preferences. Although no significant covariates emerged in this analysis, the attribute variables produced a highly significant main effect ( $F(11, 147) = 90.35, p \leq .001$ ). The effect size estimate ( $\eta^2 = .87$ ) indicated that people had marked preferences in the attributes they found desirable in ideas. In support of Hypothesis 1, the mean scores obtained on these variables, relative to the overall attribute preference score ( $\bar{X} = .48, SE = .007$ ) indicated that people preferred ideas that 1) were consistent with extant social norms ( $\bar{X} = .57, SE = .006$ ); 2) were likely to provide desired outcomes quickly ( $\bar{X} = .55, SE = .008$ ); 3) were complex to implement ( $\bar{X} = .54, SE = .008$ ); 4) were easy to understand ( $\bar{X} = .53, SE = .007$ ); and, 5) would benefit a number of people ( $\bar{X} = .52, SE = .007$ ). Although the preference for complex implementation requirements may at first glance appear surprising, the complexity of implementation may have provided people with a justification for funding. This finding aside, a rather straightforward pattern of preferences emerged indicating that people preferred ideas that were readily understood and appropriate to the social context which provided evident short-term benefits.

TABLE 1. Summary of the Results of the Multivariate Analysis of Covariance for Attribute Preferences.

	<i>F</i>	<i>df</i>	<i>p</i>	$\eta^2$
Covariates				
None significant				
Main Effects				
Attributes	90.356	11, 147	.000	.871
Time Pressure	.006	1, 157	.938	.000
Stringency Level	.403	1, 157	.526	.003
Social Evaluative Pressure	7.452	1, 157	.007	.045
Two way Interactions				
Attributes $\times$ Time Pressure	1.600	11, 147	.104	.107
Attributes $\times$ Stringency Level	.706	11, 147	.732	.050
Attributes $\times$ Social Evaluative Pressure	.656	11,147	.778	.047
Time Pressure $\times$ Stringency Level	4.277	1, 157	.040	.027
Time Pressure $\times$ Social Evaluative Pressure	.754	1, 157	.386	.055
Stringency Level $\times$ Social Evaluative Pressure	3.311	1, 157	.071	.021
Three way Interactions				
Attributes $\times$ Time Pressure $\times$ Stringency Level	1.063	11, 147	.396	.074
Attributes $\times$ Time Pressure $\times$ Social Evaluative Pressure	1.013	11, 147	.437	.070
Attributes $\times$ Stringency Level $\times$ Social Evaluative Pressure	1.545	11, 147	.122	.104
Time Pressure $\times$ Social Evaluative Pressure $\times$ Stringency Level	1.325	1, 157	.251	.008
Four way Interactions				
Attributes $\times$ Time Pressure $\times$ Stringency Level $\times$ Social Evaluative Pressure	.909	11, 147	.533	.064

Note: *F* = *F* Ratio; *df* = Degrees of Freedom; *p* = Significance Level using Roy's Largest Root;  $h^2$  = Effect Size as Percent Variance Accounted for.

In keeping with this observation, and in accordance with Hypothesis 2, people tended to reject two types of ideas, 1) ideas that were original ( $\bar{X} = .40$ ,  $SE = .008$ ) and 2) ideas that were risky ( $\bar{X} = .41$ ,  $SE = .011$ ). People, apparently, tend to reject risky original ideas when considering resource investments. In addition, however, they also tended to reject ideas that had complete descriptions ( $\bar{X} = .33$ ,  $SE = .009$ ) – perhaps because ideas that could be fully described quickly were viewed as too obvious, or too simplistic, to be worthy of resources.

Although the situational variables evidenced weaken effects on idea preference scores, some potentially noteworthy context effects were observed. A marginally significant interaction was obtained for time pressure and attribute preference interaction ( $F(11, 147) = 1.6$ ,  $p \leq .15$ ). When given no time limit, people tended to prefer ideas, relative to overall scores ( $\bar{X} = .486$ ,  $SE = .009$ ), that 1) were complicated ( $\bar{X} = .585$ ,  $SE = .009$ ); 2) were likely to provide desired outcomes quickly ( $\bar{X} = .566$ ,  $SE = .012$ ); 3) were complex to implement ( $\bar{X} = .545$ ,  $SE = .011$ ); and, 4) were easy to understand ( $\bar{X} = .532$ ,  $SE = .009$ ). Additionally, people tended to disregard ideas that had complete descriptions ( $\bar{X} = .321$ ,  $SE = .013$ ) and were original ( $\bar{X} = .412$ ,  $SE = .011$ ).

When put under, relative to overall scores ( $\bar{X} = .485$ ,  $SE = .011$ ), conditions of time pressure, people tended to prefer ideas that 1) were consistent with extant social norms ( $\bar{X} = .571$ ,  $SE = .008$ ); 2) required a large amount of time to implement ( $\bar{X} = .549$ ,  $SE = .011$ ); and, 3) were likely to provide desired outcomes quickly ( $\bar{X} = .538$ ,  $SE = .011$ ). In addition, people tended to disregard ideas that had complete descriptions ( $\bar{X} = .343$ ,  $SE = .012$ ) and were original in nature ( $\bar{X} = .395$ ,  $SE = .011$ ). This pattern of results indicates that, when given no time limit, people tended to prefer ideas that were complicated and required complex implementation. On the other hand, when put under conditions of time pressure people tended to prefer ideas that were consistent with extant social norms and provided desired outcomes quickly. This pattern of findings is, of course, consistent with hypothesis three, although the associated effect size was not large ( $\eta^2 = .10$ ).

In addition to these effects of time pressure, a significant main effect was obtained for the social evaluation pressure manipulation ( $F(1, 157) = 7.45$ ,  $p \leq .01$ ). Across attributes, higher preference scores were obtained when people expected that their final choices would be compared to others ( $\bar{X} = .49$ ,  $SE = .003$ ) than when they were not lead to believe their choices

would be compared to others ( $\bar{X} = .48$ ,  $SE = .003$ ). Apparently, when people believed their choices would be compared to others, they tended to prefer ideas that were more extreme manifestations of the various attributes under consideration. These preferred attributes, however, apparently varied from person to person idiosyncratically and did not provide overwhelming effects ( $n^2 = .045$ ).

A significant interaction was also obtained between stringency and time pressure ( $F(1, 157) = 4.28$ ,  $p \leq .05$ ). Inspection of the relevant cell means indicated that when put under conditions of time pressure, and told to recommend only 5 ideas, higher overall mean scores were obtained, ( $\bar{X} = .49$ ,  $SE = .004$ ), as opposed to when put under no time pressure and told to recommend as many ideas as they wished, ( $\bar{X} = .48$ ,  $SE = .004$ ). Hence, when given a time limit and forced to choose the top 5 ideas, people tended to prefer distinct characteristics in the ideas presented. These effects, however, would be expected if time and processing constraints force people to retain distinctive ideas with respect to idiosyncratically preferred attributes. Again, however, the magnitude of these effects was not large ( $n^2 = .027$ ).

Choices

Table 2 presents the results obtained in the multivariate analysis of covariance where attribute scores of the ideas recommended for funding were examined. Again, no significant covariates were obtained. The attributes under consideration, however, provided a significant effect ( $F(11, 133) = 11.11$ ,  $p \leq .001$ ) and stable main effect ( $n^2 = .47$ ). As might be expected based on our forgoing observations, and in accordance with Hypothesis 1, people tended to recommend ideas for funding that 1) would benefit a number of people ( $\bar{X} = .082$ ,  $SE = .005$ ); 2) would be complex to implement ( $\bar{X} = .071$ ,  $SE = .005$ ); 3) were consistent with extant social norms ( $\bar{X} = .074$ ,  $SE = .004$ ); 4) were complicated ( $\bar{X} = .074$ ,  $SE = .005$ ); and, 5) would likely provide desired outcomes ( $\bar{X} = .069$ ,  $SE = .005$ ) – as compared to the overall attribute choice score ( $\bar{X} = .063$ ,  $SE = .004$ ). Apparently, in choosing ideas to fund, people continue to evidence their preferences for ideas consistent with extant systems that would benefit many while preferring to invest funds where the demands of the effort justified expenditures. In keeping with this observation, people also tended to reject ideas that had complete descriptions ( $\bar{X} = .031$ ,  $SE = .004$ ) or were easily understood ( $\bar{X} = .056$ ,  $SE = .003$ ). It was also found, consistent with Hypothesis 2, that people tended not to recommend highly original ideas for funding ( $\bar{X} = .051$ ,  $SE = .004$ ).

TABLE 2. Summary of the Results of the Multivariate Analysis of Covariance for Attribute Choices.

	<i>F</i>	<i>df</i>	<i>p</i>	$\eta^2$
Covariates				
None significant				
Main Effects				
Attributes	11.116	11, 133	.000	.479
Time Pressure	22.855	1, 143	.000	.138
Stringency Level	91.028	1, 143	.000	.389
Social Evaluative Pressure	1.833	1, 143	.178	.013
Two way Interactions				
Attributes × Time Pressure	1.868	11, 133	.049	.134
Attributes × Stringency Level	2.328	11, 133	.012	.161
Attributes × Social Evaluative Pressure	1.330	11, 133	.215	.099
Time Pressure × Stringency Level	22.993	1, 143	.000	.139
Time Pressure × Social Evaluative Pressure	.049	1, 143	.825	.000
Stringency Level × Social Evaluative Pressure	1.908	1, 143	.169	.013
Three way Interactions				
Attributes × Time Pressure × Stringency Level	1.912	11, 133	.043	.137
Attributes × Time Pressure × Social Evaluative Pressure	.720	11, 133	.717	.056
Attributes × Stringency Level × Social Evaluative Pressure	1.192	11, 133	.298	.090
Time Pressure × Social Evaluative Pressure × Stringency Level	.334	1, 143	.564	.002
Four way Interactions				
Attributes × Time Pressure × Stringency Level × Social Evaluative Pressure	1.313	11, 133	.224	.098

Note: *F* = *F* Ratio; *df* = Degrees of Freedom; *p* = Significance Level using Roy's Largest Root;  $h^2$  = Effect Size as Percent Variance Accounted for.



Attribute choice and time pressure also produced a significant interaction, ( $F(11, 133) = 1.87, p \leq .05$ ) associated with a modest effect size ( $n^2 = .13$ ). When given no time limit, people tended to recommend ideas that 1) were consistent with extant social norms ( $\bar{X} = .093, SE = .006$ ); 2) would benefit a number of people ( $\bar{X} = .098, SE = .007$ ); 3) were likely to provide desired outcomes quickly ( $\bar{X} = .089, SE = .007$ ); 4) were complicated ( $\bar{X} = .088, SE = .007$ ); and, 5) would be complex to implement ( $\bar{X} = .087, SE = .007$ ), as compared to the overall average ( $\bar{X} = .078, SE = .006$ ). Additionally, people tended to disregard ideas that had complete descriptions ( $\bar{X} = .039, SE = .006$ ) and were original ( $\bar{X} = .054, SE = .007$ ). When put under conditions of time pressure, and contrary to Hypothesis 3, people tended to recommend ideas that 1) would benefit a number of people ( $\bar{X} = .065, SE = .007$ ); 2) were complicated ( $\bar{X} = .060, SE = .006$ ); 3) would be complex to implement ( $\bar{X} = .055, SE = .007$ ); 4) were consistent with extant social norms ( $\bar{X} = .055, SE = .006$ ); and, 5) would require a lot of time and effort to implement ( $\bar{X} = .054, SE = .006$ ), as compared to the overall average ( $\bar{X} = .048, SE = .006$ ). In addition, people tended to disregard ideas that were easy to understand ( $\bar{X} = .037, SE = .006$ ) and had complete descriptions ( $\bar{X} = .343, SE = .012$ ). Apparently, time pressure inhibited application of the evaluation criteria leading to the acceptance of more complex, complicated, and original ideas.

A significant effect was also obtained for the attribute choice and stringency interaction, ( $F(11, 133) = 2.33, p \leq .05$ ), which produced a moderate effect size estimate ( $n^2 = .16$ ). When told to include all recommendations they felt necessary, as compared to the overall average ( $\bar{X} = .092, SE = .006$ ), people tended to recommend ideas that 1) would benefit a number of people ( $\bar{X} = .120, SE = .007$ ); 2) were consistent with extant social norms ( $\bar{X} = .110, SE = .006$ ); 3) were complicated ( $\bar{X} = .106, SE = .007$ ); 4) were likely to produce desired outcomes quickly ( $\bar{X} = .103, SE = .007$ ); and, 5) were complex to implement ( $\bar{X} = .102, SE = .007$ ). Furthermore, people tended to reject ideas that had complete descriptions ( $\bar{X} = .051, SE = .006$ ) and were original ( $\bar{X} = .074, SE = .006$ ). However, when told to recommend the top 5 ideas, people tended to recommend ideas that would benefit a number of people ( $\bar{X} = .043, SE = .007$ ) and were complicated in nature ( $\bar{X} = .042, SE = .006$ ) as compared to the overall average ( $\bar{X} = .033, SE = .006$ ). Additionally, consistent with Hypothesis 4, people, in comparison to the overall average ( $\bar{X} = .033, SE = .006$ ), tended to

reject ideas that 1) had complete descriptions ( $\bar{X} = .011$ ,  $SE = .006$ ); 2) were original ( $\bar{X} = .027$ ,  $SE = .006$ ); and, 3) were easy to understand ( $\bar{X} = .026$ ,  $SE = .005$ ). These results indicate that under conditions of high stringency, people tended to choose ideas that were consistent with extant social norms and would benefit a number of people. However, when given high stringency levels, people tended to choose complicated ideas that would benefit a number of people.

A significant three-way interaction was also obtained between attribute choice, time pressure, and stringency, ( $F(11, 133) = 1.91$ ,  $p \leq .05$ ) which provided a modest effect size estimate ( $\eta^2 = .13$ ). When given no time limit and less stringent criteria, people tended to prefer ideas that would benefit a number of people ( $\bar{X} = .153$ ,  $SE = .010$ ) and ideas that were likely to provide desired outcomes quickly ( $\bar{X} = .145$ ,  $SE = .010$ ) as compared to the overall average ( $M = .121$ ,  $SE = .009$ ). Moreover, they tended to reject original ideas ( $\bar{X} = .087$ ,  $SE = .009$ ) that had complete descriptions ( $\bar{X} = .066$ ,  $SE = .009$ ). However, when given no time limit and high stringency, people tended to prefer ideas that would benefit a number of people ( $\bar{X} = .044$ ,  $SE = .010$ ) and ideas that were easy to implement ( $\bar{X} = .038$ ,  $SE = .007$ ) as compared to the overall average ( $\bar{X} = .033$ ,  $SE = .009$ ). They also tended to reject ideas that had complete descriptions ( $\bar{X} = .013$ ,  $SE = .008$ ) and were original ( $\bar{X} = .022$ ,  $SE = .009$ ).

In comparison, when put under time pressure and given stringent criteria, people tended to recommend ideas that had complete descriptions ( $\bar{X} = .099$ ,  $SE = .008$ ) and ideas that were risky ( $\bar{X} = .044$ ,  $SE = .011$ ) as compared to the overall average ( $\bar{X} = .041$ ,  $SE = .008$ ). They tended to reject ideas that were easily understood ( $\bar{X} = .022$ ,  $SE = .006$ ) and were consistent with extant social norms ( $\bar{X} = .033$ ,  $SE = .008$ ). When put under time pressure and given less stringent criteria, however, people tended to recommend ideas that would benefit a number of people ( $\bar{X} = .088$ ,  $SE = .009$ ) and were consistent with extant social norms ( $\bar{X} = .077$ ,  $SE = .009$ ) relative to the overall average ( $\bar{X} = .062$ ,  $SE = .008$ ). They also tended to reject ideas that had complete descriptions ( $\bar{X} = .035$ ,  $SE = .008$ ) and ideas that were risky ( $\bar{X} = .051$ ,  $SE = .011$ ). This pattern of results suggests that time pressure and stringent criteria inhibited the application of evaluation criteria, leading to the recommendation of risky ideas.

In addition to strong attribute preferences, a significant main effect was obtained for time pressure ( $F(1, 143) = 22.86$ ,

$p \leq .001$ ), stringency ( $F(1, 143) = 91.03, p \leq .001$ ), and time pressure and stringency interaction ( $F(1, 143) = 22.99, p \leq .001$ ). Examination of the relevant cell means indicated that, when given no time limit and told to recommend all ideas they felt necessary, higher overall mean scores were obtained. In other words, when given more time to choose ideas and given less stringent criteria, people selected more ideas. Hence, the more ideas they selected, the more attributes that were present. These effects, however, would be expected given the nature of the choice measure vis-à-vis the manipulations under consideration.

**DISCUSSION** Perhaps the most salient conclusion to be drawn from this study is the undeniable disdain for risky and original ideas. Specifically, we found ideas evidencing risk and originality were not preferred vis-à-vis other ideas and were not selected for further development. Before elaborating on these findings, we should acknowledge certain limitations regarding the study at hand. One possible constraint, which is applicable to any laboratory task in the study of real-world creativity, was the use of a college sample. Although college samples are often used in academic studies, it should be noted that generalizability of the results may be open to question. In this regard, however, it should be noted that the task employed was reasonably realistic. This foundation grant award task, moreover, proved to be reasonably engaging for undergraduates.

Another limitation of the present study derives from our use of an undergraduate sample. It is possible that attribute preferences may be moderated by certain characteristics of the judges under consideration. Thus, highly creative people (Basadur, Runco, & Vega, 2000) and people who have substantial expertise working in a domain (Weisberg, 1999) may apply different standards in evaluating ideas.

Still another limitation to the present study is the number of attributes, or standards, selected for evaluation. More specifically, the attributes being evaluated are a mere sub-sample of those that can be considered during the evaluation phase. The literature presents many attributes that can be considered during idea evaluation. However, the present study focuses on a sub-sample in order to establish a working ground and to advance findings in regard to evaluation research. It is, of course, possible that a more comprehensive examination of relevant attributes might reveal a limited set of underlying dimensions. Although examination of these underlying attributes would be

desirable, potentially producing stronger effects, the exploratory nature of the present study, and lack of a comprehensive examination of all relevant attributes, precluded this kind of analysis.

Even bearing these limitations in mind, however, the results obtained in the present study appear to have some noteworthy implications for how people go about evaluating ideas. Results from the present study reveal that people favor ideas across both preference and choice tasks that are safe and consistent with societal norms and expectations. More specifically, people seek out ideas that are consistent with extant social norms, ideas that will benefit a number of people, and ideas that are complicated to implement. These results support the findings of Rodgers and Adhikarya (1979) that suggest acceptance of ideas is influenced by consistency with extant social systems and the extent to which short-term gains will result from pursuit of a new idea.

Conversely, people have a marked disdain for original and risky ideas. Results from the present study reveal that, for both the preference and choice tasks, risky and original ideas were discounted. These results are, of course, consistent with prior findings indicating that people consider potential negative outcomes during idea evaluation (Sharma, 1999). Furthermore, the nature of risky and original ideas implies that limited confidence can be placed in ideas evidencing these attributes. The ambiguity that surrounds the outcomes of pursuing these ideas may lead people to actively search and screen out these ideas as a self-protection or risk reduction measure (Mumford, Blair, Dailey, Lertz, & Osburn, in press).

Some support for this conclusion may be obtained by considering the findings obtained for the time pressure manipulation. Prior studies indicate that information processing capacities are reduced when put under time pressure which leads to superficial analysis and preference for rapid closure (De Dreu, 2003; Suri & Monro, 2003). Consistent with the notion that people actively seek to eliminate original high risk ideas, reduction of processing capacity by induction of time pressure leads to the acceptance of original, high risk ideas. In other words, only when monitoring and evaluation processes are disrupted will people pursue high risk, original ideas — a finding suggesting, in accordance with the effect size obtained from attribute differences, that people have a strong bias against these ideas in favor of ideas providing tangible short-term benefits.

The question that arises at this juncture involves the processes leading to rejection of high risk, original ideas. Implicit in our forgoing observations is the notion that people avoid risk (Hogarth, 1980), leading to the rejection of both risky and original ideas which, by virtue of their ambiguity, entail risk and uncertainty. However, at least three other explanations exist that might account for these results. First, original, high risk ideas also have the potential to produce negative outcomes. As a result, it is possible peoples' forecasting of negative outcomes, and the salience of negative outcomes under conditions of ambiguity, may lead people to search for, and screen out, high risk, original ideas.

A second explanation comes from the idea that people may feel it is irresponsible to pursue risky or original ideas. In the context of resource allocation on funding tasks, people may assume accountability for resource allocation leading to rejection of ideas where a reasonable "return on investment" can not be assured. Some support for this proposition may be found in the tendency of people to fund complicated ideas given the justification complexity provides for funding.

A third explanation for the rejection of original and risky ideas is a broader sense of social responsibility. People may feel drawn towards ideas that are compatible with social needs. In fact, in the present study, people seemed to prefer ideas that were consistent with extant social norms and would benefit a number of people. Failure to allocate resources to these ideas, due to a preference for exciting, novel, high risk ideas — may be viewed as self-centered and self-indulgent. As a result, attempts to maintain a positive self-concept may lead to the rejection of risky and original ideas.

Not only do all of these explanations provide a plausible explanation for the results obtained in the present study, it is, in fact, possible that all of these explanatory systems are operating simultaneously. Some indirect evidence bearing on this point may be found in the magnitude of the obtained effects. The effect size obtained for these attribute preferences was unusually large suggesting that multiple evaluative systems were operating synchronistically to determine peoples' preferences — and, their eventual choices. In fact, these attribute preferences were so strong they appeared to overwhelm the various manipulations under consideration in the present study.

The results obtained in the current study have some noteworthy practical implications. To begin, individuals benefit from original and risky ideas in that they may provide new ways of

solving problems (Sternberg & Lubart, 1996). If people reject novel, risky ideas, the likelihood that they will generate truly viable solutions to novel problems will be reduced. Thus, the rejection of original and risky ideas may act to undermine creative thought. By undermining creative thought the feasibility of innovation and effective organizational change is reduced.

Perhaps the most critical implication of the findings obtained in the present study involves the process by which ideas, products, and projects are reviewed. Most ideas and project proposals go through a screening process conducted by panels of committee members. Typically, in this screening process, ideas are eliminated based on a set of standards that are central to the organization (Bink & Marsh, 2000). The present findings indicate that original and risky ideas will tend to be rejected in this review process — a problem that will be exacerbated by a sequential multi-step review process (Bercovitz, de Figueiredo, & Teele, 1997). As a result, the truly original ideas many organizations seek to fund will be rejected.

Of course, one implication of these observations is that there would be value in providing managers or reviewers with training in the application of appropriate standards for idea evaluation. In fact, studies by Basadur and Hausdorf (1996) and Treffinger (1995) suggest that interventions of this sort may increase peoples' capability and willingness to identify and pursue original ideas. The results obtained in the present study, however, suggest that the effectiveness of this training may also be enhanced by encouraging people to accept the risk entailed in original ideas and consider standards in idea appraisal other than short-term gain and the ease of implementation.

In addition to these practical implications, the present study points to a broader theoretical conclusion. Consistent with the observations of Lonergan, Scott, and Mumford (2004), the idea evaluation process appears contingent on the standards peoples apply in appraising ideas — standards that seem linked to certain preferred attributes. The present study extends this line of research indicating that contextual variables including goals, constraints, and processing demands shape, at least to some extent, the idea evaluation process (Stokes & Fisher, 2005). Hopefully, future research will extend this research to identify the contexts that shape peoples' willingness to pursue original, albeit risky, ideas — ideas that people apparently have a strong tendency to discount.

- REFERENCES
- ABBEY, A., & DICKSON, J. (1983). R&D work climate and innovation in semiconductors. *Academy of Management Journal*, 26, 362-368.
- BASADUR, M., RINCO, M. A., & VEGA, L. A. (2000). Understanding how creative thinking skills, attitudes and behaviors work together: A causal process model. *Journal of Creative Behavior*, 34, 77-100.
- BERCOVITZ, J. L., DE FIGUEIREDO, J. M., & TEELE, D. J. (1997). Firm capabilities and managerial decision making: A theory of innovation biases. In J. Garud & R. Praveen (Eds), *Technological Innovation: Oversights and Foresights* (pp. 233-254). Cambridge, England: Cambridge University Press.
- BERGER, R. M., GUILFORD, J. P., & CHRISTENSEN, P. R. (1957). A factor analytic study of planning abilities. *Psychological Monographs*, 71, 1-29.
- BINK, M. L., & MARSH, R. L. (2000). Cognitive regularities in creative activity. *Review of General Psychology*, 4, 59-78.
- BROWN, R. T. (1989). Creativity: What are we to measure. In J. A. Glover, & R. R. Ronning (Eds.), *Handbook of Creativity* (pp. 3-32). New York, NY: Plenum Press.
- CAMPBELL, D. T. (1960). Blind variation and selective retentions in creative thought as in other knowledge processes. *Psychological Review*, 67, 380-400.
- CHAND, I., & RINCO M. A. (1993). Problem finding skills as components in the creative process. *Personality & Individual Differences*, 14, 155-162.
- CHOI, J. N. (2004). Individual and contextual predictors of creative performance: The mediating role of psychological processes. *Creativity Research Journal*, 16, 187-199.
- COLLINS, M. A., & AMABILE, T. M. (1999). Motivation and creativity. In R. J. Sternberg (Ed.), *Handbook of Creativity* (pp. 297-312). Cambridge, England: Cambridge University Press.
- DE DREU, C. K.W. (2003). Time pressure and closing of the mind in negotiation. *Organizational Behavior and Human Decision Processes*, 91, 280-295.
- DHAR, R., & NOWLIS, S. M. (1999). The effect of time pressure on consumer choice deferral. *Journal of Consumer Research*, 25, 369-384.
- DOERNER, D., & SCHAUB, H. (1994). Errors in planning and decision making and the nature of human information processing. *Applied Psychology: An International Review*, 43, 433-453.
- FINKE, R. A, WARD, T. B., & SMITH, S. M. (1992). *Creative cognition: Theory, research, and applications*. Cambridge, MA: The MIT Press.
- GHISELIN, B. (1985). *The creative process: A symposium*. Berkley: University of California Press.
- GLOVER, J. A., RONNING, R. R., & REYNOLDS, C. R. (1989). *Handbook of creativity*. New York, NY: Plenum Press.
- GOLDBERG, L. R. (1990). An alternative "description of personality": The Big-Five factor structure. *Journal of Personality and Social Psychology*, 59, 1216-1229.
- GOOR, A., & SOMMERFELD, R. E. (1975). A comparison of problem-solving processes of creative students and noncreative students. *Journal of Educational Psychology*, 67, 495-505.

- GOUDA, M. V. (1999). Heuristics, biases, and regulation of risks. *Policy Sciences*, 32, 59-78.
- GUILFORD, J. P. (1950). Creativity. *American Psychologist*, 5, 444-454.
- GUILFORD, J. P. (1962). Factors that aid and hinder creativity. *Teachers College Record*, 63, 380-392.
- GUILFORD, J. P. (1984). Varieties of divergent production. *Journal of Creative Behavior*, 18, 1-10.
- HITT, M. A., HOSKISSON, R. E., JOHNSON, R. A., & MOESEL, D. D. (1996). The market of corporate control and firm innovation. *Academy of Management Journal*, 20, 767-798.
- HOGARTH, R. M. (1980). *Judgement and Choice*. New York: Wiley.
- HOWARD, J., & SHETH, J. (1969). *The Theory of Buyer Behavior*. New York: Wiley.
- ISAKSEN, S. G., & TREFFINGER, D. J. (1985). *Creative problem solving: The basic Course*. Buffalo, NY: Bearly Limited.
- JAISOVEC, N. (1994). Metacognition in creative problem solving. In M. A. Runco (Ed.), *Problem finding, problem solving, and creativity* (pp. 77-95). Norwood, NJ: Ablex.
- KAPLAN, M. F., WANSHULA, T., & ZANNA, M. P. (1993). Time pressure and information integration in social judgment: The effect of need for structure. In O. Stevensen, & A. J. Maule (Eds.), *Human Judgment and Decision Making* (pp. 255-267). New York: Plenum.
- KASOF, J. (1997). Creativity and breadth of attention. *Creativity Research Journal*, 10, 303-316.
- KETTNER, N. W., GUILFORD, J. P., & CHRISTENSEN, P. R. (1959). A factor analysis study across the domains of reasoning, creativity, and evaluation. *Psychological Monographs*, 73, 1-31.
- KRUGLANSKI, A. W., & FREDIND, T. (1983). The freezing and unfreezing of lay inferences: Effects of impressional primacy, ethnic stereotyping and numerical anchoring. *Journal of Experimental Social Psychology*, 19, 448-468.
- KUIPERS, B., MOSKOWITZ, A. J., & KASSINGER, J. P. (1988). Critical decisions under uncertainty: Representation and structure. *Cognitive Science*, 12, 177-210.
- LICUANAN, B., DAILEY, L., & MUMFORD, M. D. (in press). Idea evaluation: Error in evaluating highly original ideas. *Journal of Creative Behavior*.
- LONERGAN, D. C., SCOTT, G. M., & MUMFORD, M. D. (2004). Evaluative aspects of creative thought: Effects of appraisal and revision standards. *Creativity Research Journal*, 16, 231-246.
- LUBART, T. I. (2001). Models of the creative process: Past, present and future (Special Issue). *Creativity Research Journal*, 13, 295-308.
- MEDNICK, S. A. (1962). The associative basis of the creative process. *Psychological Review*, 69, 22-232.
- MERRIFIELD, P. R., GUILFORD, J. P., & FRICK, J. W. (1962). The role of intellectual factors in problem solving. *Psychological Monographs*, 76, 1-21.
- MUMFORD, M. D. (1993). A new combination? Review of R. Finke et al.'s *Creative Cognition*. *Creativity Research Journal*, 6, 475-477.



- MUMFORD, M. D. (2001). Something old, something new: Revisiting Guilford's conception of creative problem-solving. *Creativity Research Journal, 13*, 267-277.
- MUMFORD, M. D., BLAIR, C. S., DAILEY, L., LERITZ, L. E., & OSBURN, H. K. (in press). Errors in creative thought? Cognitive biases in a complex processing activity. *Journal of Creative Behavior*.
- MUMFORD, M. D., & GUSTAFSON, S.B. (1988). Creativity syndrome: Integration, application, and innovation. *Psychological Bulletin, 103*, 27-43.
- MUMFORD, M. D., & HUNTER, S. T. (in press). Innovation in organizations: A multi-level perspective on creativity. In F. J. Yammariono & F. Dansereau (Eds.), *Research in multi-level issues: Volume IV*. Oxford, England: Elsevier.
- MUMFORD, M. D., LONGERGAN, D. C., & SCOTT, G. M. (2002). Evaluating Creative Ideas: Processes, standards, and context (Special Issue). *Inquiry: Critical Thinking Across the Disciplines, 22*, 21-30.
- MUMFORD, M. D., MOBLEY, M. I., UHLMAN, C. E., REITER, PALMON, R., & DOARES, L. (1991). Process analytic models of creative capacities. *Creativity Research Journal, 4*, 91-122.
- NICHOLLS, J. G. (1972). *Creativity* in the person who will never produce anything original and useful: The concept of *creativity* as a normally distributed trait. *American Psychologist, 27*, 717-727.
- NOWLIS, S. M. (1995). The effect of time pressure on the choice between brands that differ in quality, price, and product features. *Marketing Letters, 6*, 287-296.
- RUBENSON, D. L., & RUNCO, M. A. (1992). The psychoeconomic approach to creativity. *New Ideas in Psychology, 10*, 131-147.
- RODGERS, E. M., & ADHIKARYA, R. (1979). Diffusion of innovations: Up to date review and commentary. In D. Nimmo (Ed.), *Communications yearbook 3* (pp. 67-81). New Brunswick, NJ: Transaction Books.
- RÜCH, F. L., & RÜCH, W. W. (1980). *Employee Aptitude Survey*. Los Angeles, CA: Psychological Services.
- RUNCO, M. A. (1991). The evaluative, valuative, and divergent thinking of children. *Journal of Creative Behavior, 25*, 311-319.
- RUNCO, M. A. (1994). Problem finding, problem solving, and creativity. Norwood, NJ: Ablex Publishing Corporation.
- RUNCO, M. A., & CHAND, I. (1994). Problem finding, evaluative thinking, and creativity. In M. A. Runco (Ed.), *Problem finding, problem solving, and creativity* (pp. 40-76). Norwood, NJ: Ablex.
- RUNCO, M. A., & CHAND, I. (1995). Cognition and creativity (Special Edition). *Educational Psychology Review, 7*, 243-267.
- RUNCO, M. A., OKUDA, S. M., & THURSTON, B. J. (1987). The psychometric properties of four systems for scoring divergent thinking tests. *Journal of Psychoeducational Assessments, 5*, 149-156.
- Runco, M. A., & Smith, W. R. (1992). Interpersonal and intrapersonal evaluations of creative ideas. *Personality and Individual Differences, 13*, 295-302.
- SANBONMATSU, D. M., & FAZIO, R. H. (1990). The role of attitudes in memory-based decision making. *Journal of Personality and Social Psychology, 59*, 614-622.

- SHARMA, A. (1999). Central dilemmas of managing innovation in large firms. *California Management Review*, 41, 146-164.
- SMITH, K. L., MICHAEL, W. B., & HOCEVAR (1990). Performance on creativity measures with examination taking intended to induce high or low levels of test anxiety. *Creativity Research Journal*, 3, 265-280.
- STERNBERG, R. J., & LUBART, T. L. (1991). An investment theory of creativity and its development. *Human Development*, 34, 1-32.
- STERNBERG, R. J., & LUBART, T. I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. New York: Free Press.
- STERNBERG, R. J., & LUBART, T. I. (1996). Investing in creativity. *American Psychologist*, 51, 677-688.
- STOKES, P. D., & FISHER, D. (2005). Selection, constraints, and creativity case studies: Max Beckmann and Danielle Fisher. *Creativity Research Journal*, 17, 283-291.
- SURI, R., & MONROE, K. B. (2003). The Effects of Time Constraints on Consumers' Judgments of Prices and Products. *Journal of Consumer Research*, 30, 92-104.
- TIERNEY, P., & FARMER, S.M. (2002). Creative self-efficacy: Its potential antecedents and relationship to creative performance. *Academy of Management Journal*, 45, 1137-1148.
- WALLAS, G. (1926). *The art of thought*. New York: Harcourt Brace.
- WEISBERG, R. W. (1999). Creativity and knowledge: A challenge to theories. In R. J. Sternberg (Ed.), *Handbook of Creativity* (pp. 226-250). New York, NY: Cambridge University Press.
- WILSON, R. C., GUILFORD, J. P., CHRISTENSEN, P. R., & LEWIS, D. J. (1954). A factor-analytic study of creative thinking abilities. *Psychometrika*, 19, 297-311.
- ZUCKERMAN, M. (1994). *Behavioral Expressions and Biosocial Bases of Sensation Seeking*. New York, NY: Cambridge University Press.
- ZUCKERMAN, M., EYSENCK, S. B. G., & EYSENCK, H. J. (1978). Sensation seeking in England and America: Cross-cultural, age, and sex comparisons. *Journal of Consulting and Clinical Psychology*, 46, 139-144.

---

Correspondence should be addressed to Dr. Michael D. Mumford, Department of Psychology, The University of Oklahoma, Norman, Oklahoma 73019 or mumford@ou.edu.

**ACKNOWLEDGEMENTS** We would like to thank Matt Allen, Amanda Angie, Sarah Cotten, Sam Hunter, and Jill Strange for their contributions to the present effort.