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Idea evaluation: Error in evaluating highly original ideas

ABSTRACT Idea evaluation is a critical aspect of creative thought. However, a number of errors might occur in the evaluation of new ideas. One error commonly observed is the tendency to underestimate the originality of truly novel ideas. In the present study, an attempt was made to assess whether analysis of the process leading to the idea generation and analysis of product originality would act to offset underestimation error in the evaluation of highly original new ideas. Accordingly, 181 undergraduates were asked to evaluate the originality of marketing campaigns being developed by six different teams where the level of idea originality was varied. Manipulations were induced to encourage active analysis of interactional processes and the originality of team products. It was found that active analysis of product originality and appraisal of interactional processes reduced errors in evaluating the originality of highly novel ideas. The implications of these findings for the evaluation of new ideas are discussed.

INTRODUCTION

When J. K. Rowling wrote her first book in the *Harry Potter* series, it was rejected by a long list of publishers who saw little appeal, and little originality, in the idea of a school for wizards. When executives at International Business Machines (IBM) were presented with the first personal computers, they viewed personal computers as toys having no real implications for IBM's key product at the time — mainframe computers. When the United States military was first presented with the Wright Brothers flying machine, they failed to anticipate the marked impact airplanes would have on our world.

Although other examples of this sort might be cited, the following examples seem sufficient to make our basic point. When people are presented with original ideas, they seem to underestimate, or discount, the originality of fundamentally new ideas. In other words, people seem to suffer from a "so what" bias in evaluating highly original new ideas (Mumford, Blair, Dailey, Leritz, & Osburn, in press). Accordingly, the intent of the present study was two-fold. First, to provide some initial empirical evidence bearing on the existence of this error in the evaluation of original ideas. Second, to identify a set of strategies that might be used to offset peoples' tendency to underestimate the originality of truly novel new ideas.

Idea Evaluation

Over the course of the last twenty years, students of creativity have made substantial progress in understanding the nature of creative thought (Brophy, 1998; Lubart 2001; Rich & Weisberg, 2004). Ongoing programs of research have allowed us to identify the core processes involved in the production of new ideas such as problem construction (e.g., Okuda, Runco, & Berger, 1991; Rostan, 1994), information gathering (e.g., Mumford, Baughman, Supinski, & Maher, 1997), concept selection (e.g., Davidson & Stenberg, 1984), and conceptual combination (e.g., Baughman & Mumford, 1995; Finke, Ward, & Smith, 1992). Not only have we attained a better understanding of the processes that make it possible for people to generate new ideas, we can also specify with some certainty the strategies required for effective execution of these processing activities (e.g., Scott, Lonergan, & Mumford, 2005; Ward, Patterson, & Sifonis, 2004).

Although we know more about the processes underlying initial generation of new ideas, less is known about the processes involved in the refinement and implementation of these ideas (Mumford, 2003). Nonetheless, there is reason to suspect that implementation processes, such as idea evaluation, implementation planning, and monitoring, represent important aspects of creative thought (Heinzen, 2003; Runco, 2003). For example, Lubart (1994), in a study of university students, found that evaluation contributed to the production of more creative stories and drawings. Basudur, Runco, and Vega (2000), in a study of managers, found that skill in evaluating creative ideas was strongly related to indices of creative capacity obtained through measures of divergent thinking skills.

Recently, Lonergan, Scott, and Mumford (2004) and Mumford, Lonergan, and Scott (2003) proposed a model of the cognitive operations occurring during idea evaluation. This

model holds that ideas, once generated, lead people to forecast the outcomes of idea implementation. Based on these forecasted outcomes of idea implementation, people appraise the viability of the idea with respect to implementation requirements and applicable standards. Appraisals of ideas in relation to applicable standards and implementation requirements results in a decision to drop the idea, pursue the idea "as is," or revise the idea.

In one study intended to test this model, Lonergan, Scott, and Mumford (2004) asked undergraduates to evaluate more or less original ideas for a new product advertisement. Instructional manipulations were used to encourage application of different standards when evaluating and revising ideas. It was found that more creative advertising campaigns were obtained when generative, or innovative, standards were applied to less original ideas, and when implementation, or operating efficiency, standards were applied to more original ideas. In another study, Dailey and Mumford (in press) asked undergraduates to evaluate new ideas drawn from the education and public policy domains. Specifically, they were asked to forecast resource requirements and the consequences of idea implementation. It was found that the accuracy of these forecasts improved under conditions intended to encourage idea implementation.

Errors in Idea Evaluation

Given the available support for this model of the idea evaluation process, a new question comes to fore. What does this model tell us about the kind of errors likely to occur in the evaluation of new ideas? In fact, this model suggests that idea evaluation will be subject to a number of processing errors (Mumford, Blair, Dailey, Leritz, & Osburn, in press). For example, optimistic biases may lead people to underestimate the time and resources needed to implement new ideas (Buehler, Griffin, & Ross, 1994; Josephs & Hahn, 1995), thereby undermining idea evaluation and revision. Alternatively, the tendency of people to focus on a limited number of positive relationships in forecasting (Doerner & Schaub, 1994; Hogarth & Makridakis, 1981) may lead to inaccurate rather superficial appraisals of new ideas. More centrally, there is reason to suspect that people may underestimate the originality of highly novel new ideas — a bias leading to premature rejection and inadequate development.

The cognitive operations involved in idea evaluation, and the kind of biases observed in human information processing, suggest three reasons why people might underestimate the

originality of highly novel new ideas while evidencing greater accuracy in appraising the originality of less novel ideas. First, in evaluating ideas, people focus on current operative goals (Gehm, 1984; Gollwitzer & Brandstatter, 1997). By evaluating ideas with respect to current goals and opportunities, however, people may fail to recognize the emergent goals associated with highly original ideas. Failure to recognize emerging opportunities will, in turn, lead people to underestimate idea originality.

Second, in evaluating ideas, people will tend to frame their evaluations in terms of past performance. Because highly original new ideas are relatively rare (Huber, 1998; Sharma, 1999), baseline expectations with regards to idea originality will tend to be set low. These low baseline expectations, when combined with anchoring bias, or the failure to make adequate adjustments when appraising departures from the norm (Gouada, 1999; Newman, 1980; Tversky & Kahneman, 1974), may result in a tendency to underestimate the true value of highly original ideas.

Third, by virtue of their novelty, information relevant to the key attributes of highly original new ideas will not be readily accessible. People, as a result, will tend not to apply this information in evaluation and decision-making (Andersen, Glassman, Mcaffe, & Pinelli, 2001; Culnan, 1983). This point is of some importance because accurate assessment of relevant attributes is required for appropriate evaluation of new ideas (Morera & Budescu, 2001; Scott, Lonergan, & Mumford, in press; Ward, Patterson, & Sifonis, 2004), and these attributes will be less accessible for highly original new ideas than less original new ideas.

Goal framing, anchoring, and attribute accessibility, represent three mechanisms that would lead people to underestimate the originality of highly novel new ideas while evidencing greater accuracy in appraising the originality of less novel ideas. When this observation is considered in light of the findings of Runco and his colleagues (Runco & Chand, 1994; Runco & Smith, 1992; Runco & Vega, 1990) concerning peoples' ability to accurately identify original ideas, it suggests the following hypothesis:

> *Hypothesis one*: People will be less accurate in evaluating the originality of highly novel new ideas but will be more accurate in evaluating the originality of less novel new ideas.

In considering this hypothesis, however, it is important to bear in mind another point. It is not simply having information that is critical to the evaluation of new ideas. Instead, what is required is information that is relevant to the attributes of the ideas under consideration. This point is of some importance because it suggests that accuracy in evaluating the originality of highly novel ideas, where relevant attributes are not readily accessible, will be greater if access to relevant information is not subject to interference by the presence of extraneous information complicating the analysis of idea attributes. Hence,

Hypothesis two: Increased complexity attributable to idea irrelevant information will lead to decreases in the accuracy of originality evaluations for highly novel ideas but not necessarily less novel ideas.

Error remediation

Our foregoing observations about peoples' tendency to underestimate the originality of highly novel new ideas poses a practical question. If people are, in fact, found to underestimate the originality of highly novel ideas vis-à-vis less novel ideas, what steps might be taken to improve the accuracy of appraising highly novel ideas? The feasibility of designing interventions that would address this question, of course, depends on the mechanisms giving rise to this evaluation error.

If anchoring is the primary mechanism operating to induce underestimation error with respect to the originality of highly novel ideas, it is unlikely that short-term performance interventions will have much effect on these underestimation errors due to the slow rate at which experiential frames change (Langholtz, Gettys, & Foote, 1995). If, however, poor analysis of novel attributes is the source of this error, then interventions intended to induce an extended search for, and analysis of, original attributes of the idea should reduce error. Contrawise, interventions that induce an extended search for, and analysis of, other idea attributes (e.g., performance quality as opposed to originality) should increase error by focusing attention on idea attributes irrelevant to originality. Based on these observations, the following two hypotheses seemed indicated if attribute analysis is the primary mechanism underlying underestimation error in appraising the originality highly novel ideas.

Hypothesis three: Manipulations intended to induce active processing of ideas with respect to originality considerations will improve the accuracy of peoples evaluations of the originality of highly novel ideas.

Hypothesis four: Manipulations intended to induce active processing of ideas with respect to performance quality will reduce the accuracy of peoples' evaluations of the originality of highly novel ideas.

In addition to interventions intended to increase active analysis of original features, another plausible intervention would be to encourage people to focus on the activities giving rise to the generation of original ideas. Although this originality framing might be induced in a number of ways, one way originality framing might be induced is by having people focus information search on the process of idea generation rather than a specific outcome or product (Kristensson & Norlander, 2003; Taggar, 2003). In fact, prior studies have provided a reasonably clear description of the processes that characterize creative teams with highly creative teams showing more lateral communication (Van Gundy, 1981), less rigid adherence to norms (Thurston & Runco, 1999), greater member autonomy (Paolillo & Brown, 1978; Pelz & Andrews, 1976), higher intrinsic motivation (Collins & Amabile, 1999), and greater interpersonal support (Amabile, Schatzel, Moneta, & Kramer, 2004). Accordingly, one might expect that

Hypothesis five: Interventions intended to focus people on the creative processes giving rise to new ideas will lead to more accurate evaluations of the originality of highly novel ideas produced by teams working on an idea generation task.

METHOD

Sample

The sample used to test these hypotheses consisted of 181 undergraduates attending large southwestern university. The 80 men and 101 women who agreed to participate in this study were recruited from undergraduate psychology courses providing extra-credit. Most sample members were psychology majors in their sophomore year who were 19 or 20 years old. Their scores on the scholastic aptitude test lay above the national norms for matriculating students but were typical of the university as a whole.

General Procedures

Participants were recruited to participate in what was purported to be a study of managerial decision-making. During the first hour and a half of this study, participants were asked to complete a battery of individual differences measures intended to serve as covariate controls. After completing these measures, participants were asked to assume the role of a middle manager working in a large advertising agency where

they would be responsible for teams developing new marketing campaigns for a health club and a spring break travel package.

Half the participants were asked to work through a self-paced instructional package intended to help them manage the teams for which they would be responsible. This instructional material described the nature of the process variables that contribute to creativity in team settings while illustrating the importance of creativity to team performance. This instructional material took participants an hour and a half to complete.

During the last hour of this study, participants were asked to read through a series of email exchanges among the members of the six teams working on the two kinds of advertising campaigns. These email exchanges illustrated group processes as well as describing the final idea produced by the team. As the manager of these teams, participants were to write a report providing an evaluation of team performance after reading through the email exchange among team members. They were then asked to evaluate the originality of the idea produced by the team. The accuracy of these evaluations was assessed by comparing participants' evaluations of idea originality to idea originality as defined by the investigators in construction of the relevant email exchange.

Individual Difference Measures

The first set of covariate control measures was intended to assess cognitive abilities influencing performance on creative problem-solving tasks (Vincent, Decker, & Mumford, 2002). The Employee Aptitude Survey (EAS) Verbal Reasoning Scale was intended to take into account general intelligence. The EAS Verbal Reasoning Scale is a 30 item analogical reasoning measure yielding estimates of re-test reliabilities in the .70s. Evidence for the validity of this measure has been provided by Ruch and Ruch (1980). In addition to this measure of general intelligence, participants were asked to complete Christensen, Merrifield, and Guilford's (1953) Consequences "A" test. The Consequences "A" test provides a measure of divergent thinking by asking people to anticipate the consequences of a change event (e.g., What would happen if sea levels rose?). When the five questions included in this test were scored for fluency, they produced internal consistency coefficients in the .70s. Evidence for the construct validity of this measure may be obtained by consulting Merrifield, Guilford, Christensen, and Frick (1962) and Vincent, Decker, and Mumford (2002). The final cognitive measure, derived from Lonergan, Scott, and Mumford (2004), was intended to take

into account differential expertise in marketing. Expertise in the marketing domain was assessed using a life history measure examining exposure to marketing courses, course performance, and experiences in marketing positions. Evidence for the reliability and validity of this measure has been provided by Lonergan, Scott, and Mumford (2004).

In addition to these cognitive measures, participants were asked to complete two personality measures intended to capture awareness of social interactions. The first measure, drawn from the Eysenck Personality Inventory (EPI, Form A; Eysenck & Eysenck, 1968), was intended to assess introversion/extroversion. The 27 items included in the EPI assess introversion/extraversion based on agree/disagree responses concerning the descriptive value of behavioral statements (e.g., Do you often long for excitement?). This measure produces internal consistency coefficients in the .70s. The second measure, used to capture social appraisal and manipulation skills, was Christie and Geis' (1970) Machiavellianism scale. This 20 item inventory asks people to read through three belief statements and mark the one that is most true, and the one that is most false, according to their beliefs. This measure produces internal consistency coefficients in the .70s. Evidence for the validity of the Machiavellianism scale may be obtained by consulting Christie and Geis (1970), while evidence for the validity of the EPI may be obtained by consulting Eysenck (1968).

Experimental Task

In the scenario presented to participants after they had completed the battery of individual differences measures, participants were asked to assume the role of a recently promoted senior manager in a large, prestigious, advertising firm. This scenario began by describing the nature of the firm noting that the firm had received multiple awards for past campaigns and was considered a leader in the field. The firm, however, was currently experiencing intense competitive pressure. Before taking over their positions as a senior manager, they had decided to take a few weeks vacation. While they were on vacation, however, the president of the agency had asked them to monitor the activities of six teams working on developing advertising campaigns for one of two new clients. One client was a chain of health clubs while the other client was a travel agency attempting to sell spring break packages to college students. After reading through the email exchanges generated by the teams working on these advertising campaigns, they were asked to provide the president of the company with an evaluation of the originality of the idea developed by each team.

Development of the email exchanges began by generating a series of ideas that would provide the basis of the idea to be proposed by the three health club and three spring break teams. These ideas were generated by a psychologist, following a review of the advertising and marketing literature, to reflect low, medium, and high levels of originality. Once these ideas had been formulated, they were presented to a panel of three Industrial and Organizational psychologists familiar with the literature on marketing. Panel members were asked to rate the originality of these ideas using a 5-point scale. The resulting interrater agreement coefficient was .72 based on the procedures suggested by Shrout and Fleiss (1979). More centrally, the mean originality ratings ascribed to these ideas by the judges were consistent with the initial target level of idea originality with a) the low originality spring break and health club ideas receiving an average originality rating of 1.2, b) the medium originality spring break and health club ideas receiving an average originality rating of 3.3, and c) the high originality spring break and health club ideas receiving an average rating of 4.7.

Once these ideas had been formulated, development of the email exchanges began. Each email exchange was two to three pages long and involved 20 to 35 messages sent between different members of the team involving issues relevant to development of the idea, as well as broader organizational issues. These email messages were two to six lines in length and involved exchanges among three to six members of the team. Figure 1 illustrates the nature of the email exchanges presented for the high originality health club campaign.

In developing these email exchanges, the material in the email was written to ensure not only that relevant substantive material involved in idea development was presented but that the nature of the interpersonal exchanges occurring in these emails was consistent with the targeted level of idea originality. Accordingly, a review of the literature was conducted to identify the interactional process variables related to creativity in team settings (e.g., Kurtzberg & Amabile, 2001; Osborn, 1953; Pelz & Andrews, 1976; Taggar, 2002) such as autonomy, flexibility, lateral communication, and intrinsic motivation. The 24 variables identified in the literature review were used to structure the nature of the exchanges presented in these emails such that a) exchanges reflecting low levels of these variables were presented in emails describing the development of less original ideas, b) exchanges reflecting high levels of these variables

FIGURE 1. Example of Email Exchange for Health Club Campaign of High Originality.

Jeff: Hey everyone! Good morning. . . . I hope you all had a chance to read over the memo that was sent out last week regarding the new health club in town called the Sports Complex.

Tara: Hey Jeff! Yeah, I read it. Gee, out of all the marketing companies out there, I'm really happy they chose us to head up its promotions department.

Dan: Me too, especially with all of the competition out there. Well guys if I may, can we clarify some of the details and iron out exactly what they're asking us to do? From my understanding the club will be having its Grand Opening on July 1st which is perfect since it falls in the beginning of summer. They are located in the heart of the city and are said to be the biggest and most up to date facility in comparison to the other 4 clubs located nearby.

Jeff: Yeah, that's right. They are said to have 2 basketball courts, 15 racquetball courts, 2,000 square foot weight room, 4 aerobics rooms, child care facility, 2 Olympic size pools, restaurant, clothes/ nutrition store, and an indoor track. With all that, they basically want us to put together a really attractive package deal to recruit new members.

Tara: I used to work as a health trainer for my old health club. They always had different promotions going on, so I have some ideas that we may be able to use.

Dan: Well let's keep in mind what the other competing clubs have to offer. I have a flyer description of each of their package deals including initiation fees, monthly dues, and what the facilities have to offer. We can break it down piece by piece and see where we are weak and where we are strong and form our package deal out of that. I'd hate to boast about something that another club already has to offer. We need to be different and kinda daring.

Jeff: Good point ! I agree . Hey Tara also if you can write down all of the ideas from your club that you think worked well we can then look at it and maybe use it as a springboard for some of our ideas. Then we can use Tara's idea and create a gap list of we have and don't have and then use some of Sal's ideas to fill in the holes.

Dan: Let's remember they're paying us to come up with our own ideas. I just don't want to get caught up and use all of Sal's club's ideas.

FIGURE 1. (continued) Example of Email Exchange for Health Club Campaign of High Originality.

Jeff: You're right. We're just using Sal's ideas as a starting point and not as a substitute for ours. We can also see what ideas didn't work well so we don't spend time on it and it not working in the long run.

Dan: I see your point. In that case I agree. I can see how good ideas can come from that.

Tara: Sorry to chime in but guys don't forget about the luncheon they're having in the lobby at noon. Some of the management employees from the Colorado branch will be here to answer any questions we have regarding our department. Just a reminder to keep an eye on the time.

Dan: Sue from marketing will be here to give us some new ideas on promotions. That may help a lot with what we're working on.

Tara: So what do you think about putting together about 3-5 possible packages and then narrowing it down to the top 2 and present it to management and get their input on the best one. I'm thinking we need to get this pretty much done 2 months from now which leaves 2 additional months to publicize it around town before the grand opening. That sounds pretty realistic. You think?

Dan: I agree. Sounds like a good time frame. So, as a starting point, let's start with the dollar amount. A competitive price would be $200 initiation and $85 monthly dues. It's reasonable given that the city is majority middle to upper class working professionals. It may be risky given that we are $25 dollars more than the other clubs in monthly dues. But, no other club has 2 pools, childcare, huge weight room, and 2 full size basketball courts.

Tara: My club charged only $65 and had all the facilities except the 2 pools and childcare. But, it may not be a problem since childcare these days is a huge bonus for parents that work out daily and have young ones that are too young for school.

Dan: Let's meet a middle point with their price. Well how about making it $79 per month? The whole number 8 might scare people off. You know how that whole numbers and marketing thing works.

Jeff: Guys let's put together some new ideas. Yes, we do have more facilities to offer but why would they want to join??? We need to create incentives.

FIGURE 1. (continued) Example of Email Exchange for Health Club Campaign of High Originality.

Tara: What about ,for a limited time, if you bring one extra person in then the person and the new member get 75% off the initiation fee???

Dan: Yeah, that worked for me at my old club. I brought in my sister and they waived my first 2 months for free. The whole money saving deals works well. But, don't waive too much money off. The club can lose in the long run. Remember, this is a huge club and rent and stuff like that are really high.

Jeff: That's true but we need to kinda be on the edge at first because we are trying to convince people that it's worth coming to our club and not the others and you can save as a bonus for joining. The more people that join and the reputation that the club will create will bring more and more people in time which will eventually take care of the money issue.

Tara: I think we're doing well with this angle. We need to continue and focus on the incentive issues. What about the store. How do you guys think we use that as an incentive?

Dan: I think people can receive points for every person that they bring in. One person may be equal to 10 points. If someone gets 20 points that will be equal to $25 worth of gift certificates to the shop. Another incentive type deal to work with. That can be combined with the whole discount with bringing someone else as a member.

Jeff: I appreciate your idea, but it might not go well with the club management. I've seen incentives similar to this but had many complications with it. Record keeping for example of when someone brought someone in was not recorded properly. Then people would complain when they are denied the certificates.

Dan: Yeah I see your point ,but if we just put extra effort into making the record keeping up to date then the idea will work.

Tara: What if we use both of your ideas by using the incentive program and try to make the record keeping computerized. For example, before a new member is put into the system, the computer will ask who referred or brought them in so it is taken care of right away.

FIGURE 1. (continued) Example of Email Exchange for Health Club Campaign of High Originality.

Dan: By the way speaking of computers, that new hire in human resources started yesterday. She is trying to make timesheets easier by using the computer to have employees fill out timesheets and we then just email it to her.

Tara: That sounds good. My timesheets were getting all messy and mixed up.

Dan: Yeah mine too. . . . This way I won't lose them anymore.

Jeff: Getting back to the incentive thing. Let's just do it and see what they say. Just go for it. It doesn't hurt. If it doesn't work then we can always modify or get rid of it. Let's take a chance.

Dan: So let's say by next week we have a 1 page list of ideas for incentives to have for bringing new members, membership prices, benefits of the location of the club, advantages over other clubs. List about 5-10 things under each of these. Then we can come back next Friday and discuss them further and bring our ideas together.

Tara: Also, each of us should look up a club overseas on the internet and see what packages they offer. Find one similar to ours and list the similarities. Find out their main selling tool of their membership offer i.e. swimming pool. Maybe we can get some ideas. So, next week, also have a summary of the club you researched.

Jeff: So let's meet next week. Remember the spring company picnic is Saturday. Bring a friend or your family.

Dan: Yeah, I'm bringing my best friend. He's going to be in town for the weekend.

Tara: My girlfriend will be coming with me after the wedding she has to go to first.

Dan: Don't forget to bring a dessert of some sort. They wanted to make it a dessert feast!!!

Jeff: Okay guys. I'll talk to you this weekend. Make sure you have your stuff done.

Tara: See you all later . . . .

were presented in emails describing the development of highly original ideas, and c) exchanges reflecting an equal number of high and low levels of different variables were presented in emails describing the development of ideas of average originality. Each email was written to reflect the operation of a single process variable with 12 different process variables being covered in a given exchange.

The variables providing a basis for these exchanges were rotated across the material written to describe the activity of each team in the production of ideas of high, medium, and low levels of originality. Additionally, the order in which these email exchanges were presented to participants was rotated to minimize potential carryover effects. Participants were asked to evaluate idea originality after reading through the email exchanges applying to a given team. Each participant was to evaluate the originality of all six email exchanges — the low, the moderate, and high originality exchanges for both the health club and spring break campaigns. These originality evaluations were made on a 5-point Likert scale where a rating of 5 indicated a highly novel, potentially useful, idea (Mumford & Gustafson, 1988). In addition, to minimize demand characteristics, participants were asked to rate, again on a 5-point scale, the effectiveness of group structure, group process, and group success.

Manipulations

Design. The present study was based on a repeated measures design where level of originality was treated as a repeated measures variable — repeated across the originality evaluations obtained for the spring break and health club campaigns. The design also included three "between subjects" manipulations. These manipulations examined complexity (2 levels), active processing (3 levels), and creativity framing (2 levels). The "between subjects" manipulations were fully crossed resulting in 12 cells where each cell contained 14 to 16 people.

Complexity. The complexity of the material presented in the emails was manipulated by changing the number of participants involved in the exchange of emails and including email exchanges which presented material that had no bearing on the idea being developed. In the high complexity condition, the email exchanges involved six team members while in the low complexity condition the email exchanges involved three team members. The participants involved in an exchange were identified by the names placed at the beginning of each email. Additionally, in the high complexity condition, three administrative emails that had no direct bearing on idea development

were included in the exchange involving 1) a new hire, 2) timesheet completion, and 3) a staff picnic. These administrative emails were dispersed throughout the exchange occurring in the high complexity condition with one administrative email appearing in each third of the exchange. In the low complexity condition, no administrative emails appeared in the exchange occurring among the team members.

Active Processing. Active processing of the material presented in the email exchanges was induced through a report manipulation. In the first condition, a condition intended to induce active processing of idea attributes in terms of originality, participants were asked to provide a one or two paragraph report describing what they saw as "the strengths and weaknesses of the group with respect to the originality of the idea proposed" after reading through each email exchange. In the second condition, a condition intended to induce active processing of idea attributes aside from originality, participants were asked to provide a one or two paragraph report describing what they saw as "the strengths and weaknesses of the group with respect to overall performance" after reading through each email exchange. These reports were to be written prior to making overall ratings of idea originality. In the third condition, the no-report condition, participants were not required to prepare any reports prior to making their overall ratings of idea originality. In this condition, the general instructions were amended to obviate discussion of the need to provide a report after reading through the email exchange among team members.

Creativity Framing: The framing of information search was manipulated through training given to participants prior to reading through the email exchanges. In the no creativity framing condition, the participants were not exposed to this training. In the high creativity framing condition, participants received training focusing on the value of creativity in team settings and the variables reflecting interactional processes likely to promote creativity in team settings.

This training followed a self-paced instructional format consisting of four segments. In the first segment, the variables influencing creativity in teams were defined and the impact of these variables on creativity was described. After reading through the material, participants, in the second segment, were presented with a set of three multiple-choice questions examining the factual information presented for each variable. Following these multiple-choice questions, participants were

presented, in the third segment, with three one paragraph scenarios describing a team performance (e.g., a meeting to establish a neighborhood watch). After reading through each scenario, participants were asked to answer multiple-choice questions about what the group did right, and what the group did wrong, with respect to the variables under consideration. After each set of multiple-choice questions, both the scenario questions and the knowledge questions, had been answered, the correct answers, and the reasons these answers were correct, were described on the following page. In the fourth segment of this training program, participants were presented with a more complex, two or three paragraph, scenario describing a team performance where they were asked to indicate more creative and less creative features of the team's interactions.

This self-paced training was structured to incorporate six 20-minute modules. Each module considered eight process variables found to influence creativity in team settings — with four variables examining phenomena that enhance creativity and four variables examining phenomena that inhibit creativity. This mixture of positive and negative influences was used to help maximize realism and provide a basis for active analysis of the training material in the final segment of the training program.

Dependent Variable and Analyses

The primary dependent variable examined in the present study was the accuracy with which participants appraised the originality of the ideas developed by the six teams. Accordingly, for each idea, the absolute difference was obtained between participants' originality ratings and the a priori originality of the ideas — where ascribed an a priori score of 4.5, unoriginal ideas were ascribed an a priori score of 1.5, and ideas of average originality were ascribed an a priori score of 3.0. It is of note, the a priori scores were applied in calculating differences because 1) the ideas presented were developed with these scores in mind, 2) and judges' ratings confirmed these scores within the limits of sampling error. To take into account differences in the directional range of possible deviations from the a priori scores, only absolute score differences were applied in the multivariate analysis of covariance.

In the multivariate analysis of covariance, the individual difference measures were treated as covariate controls. A given covariate was retained in the final analysis only if it was significant beyond the .05 level. In the multivariate analysis of covariance, level of idea originality was treated as a repeated measures variable while complexity, active processing, and

creativity framing were treated as independent variables. If a multivariate effect was significant, relevant univariate effects were assessed and broken down by domain, spring break versus health club, based on the results obtained in a pilot study indicating that undergraduates had more familiarity with the day-to-day operation of health clubs than travel agencies.

RESULTS Table 1 presents the results obtained in the multivariate analysis of covariance. No significant ($p > .05$) effects were obtained for the various individual difference variables under consideration. However, a significant main effect ($F(4, 166) = 13.53$;

TABLE 1. Summary of the Results of the Multivariate Analysis of Covariance.

	F	*df*	*p*	h^2
Covariates				
Non significant				
Main Effects				
Level of Originality	13.53	4, 166	.001	.246
Complexity	16.92	2, 168	.001	.168
Active Processing	1.28	2, 168	.280	.015
Creativity Framing	1.12	2, 168	.328	.013
Two way Interactions				
Level × Complexity	2.24	4, 166	.066	.051
Level × Active Processing	.76	4, 167	.550	.018
Level × Creativity Framing	1.89	4, 166	.113	.044
Complexity × Active Processing	.45	2, 169	.634	.005
Complexity × Creativity Framing	.53	2, 168	.588	.006
Active Processing × Creativity Framing	1.22	2, 169	.296	.014
Three way Interactions				
Level × Complexity × Active Processing	4.01	4, 167	.004	.088
Level × Complexity × Creativity Framing	1.30	4, 166	.271	.030
Level × Active Processing × Creativity Framing	3.57	4, 167	.008	.008
Complexity × Active Processing × Creativity Framing	4.81	2, 169	.009	.054
Four way Interactions				
Complexity × Active Processing × Creativity Framing × Level	6.05	4, 167	.001	.127

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.

$p < .001$) was obtained for the repeated measures variable. Inspection of the relevant cell means indicated, as expected, that inaccuracy in evaluations of originality, the absolute difference between targeted levels of originality and peoples' judgments, was greater for highly original ideas ($M = 1.23$, SE = .069) than for ideas of average ($M = .83$, SE = .047) originality and ideas of low ($M = .91$, SE = .058) originality. Not only did these effects hold across the health club and spring break campaigns, indicating some generality in this error, inspection of the raw difference scores indicated, as expected, that people tended to underestimate the originality of highly novel ideas.

The only other main effect observed in this analysis was the significant effect obtained for complexity (F (2, 168) = 16.92, $p < .001$). As might be expected, inaccuracy in evaluations of originality were greater for the more complex ($M = 1.22$, SE = .048) as opposed to the less complex ($M = .89$, SE = .0471) email exchanges bearing on the development of ideas for the spring break vacation package. However, for the health club advertisements, inaccuracy in evaluations of originality were greater for the less complex ($M = 1.01$, SE = .044) than more complex ($M = .83$, SE = .045) email exchanges. Apparently, in more familiar domains, health clubs as opposed to travel, complexity is less likely to exert negative effects on the accuracy of originality appraisals.

This effect, however, should be interpreted cautiously given the results obtained in examining the marginally significant level by complexity interaction ($F(4, 166) = 2.24$, $p < .10$). More specifically, when complexity was high, substantially greater inaccuracy was observed in the evaluation of highly original ideas ($M = 1.32$, SE = .098) than ideas of moderate ($M = .82$, SE = .064) and low originality ($M = .93$, SE = .082). These effects, however, were less pronounced in comparing ideas of high originality ($M = 1.15$, SE = .097) with ideas of moderate ($M = .90$, SE = .075) and low ($M = .88$. SE = .090) originality in the low complexity condition. Given this fact that these effects held across idea types (spring break versus health club campaigns), it appears reasonable to conclude that people are especially poor at evaluating original ideas when the evaluation is made more complex by the involvement of multiple parties and the inclusion of information irrelevant to development of the idea. As might be expected, based on the findings obtained for level, evaluations of original ideas under conditions of complexity were associated with a tendency to underestimate originality in the appraisal of highly original ideas.

Our findings in regard to inaccuracy in the evaluation of highly original ideas, especially when people are presented with a complex stimulus set, brings to fore a new question. Can the accuracy of these evaluations be improved? The significant three way interaction obtained between level, complexity, and active processing (F (4, 167) = 4.01, $p < .01$) suggests that active processing can, at least under certain conditions, influence accuracy. Inspection of the relevant cell means indicated that for highly original ideas, induction of active analysis of originality attributes, by requiring preparation of reports examining idea originality, resulted in more accurate evaluations of originality in the low complexity condition (M = .91, SE = .167 vs. M = 1.29, SE = .167) than all other conditions when highly original ideas were under consideration. In fact, the accuracy of evaluations under these conditions approached the levels of accuracy obtained for ideas of low and medium originality (M = .86, SE = .126). Apparently, assessing products for originality, at least when people are not presented with distracting information, can improve the accuracy with which people evaluate highly original ideas.

A significant three way interaction was also obtained between level, active processing, and creativity framing (F (4, 167) = 3.57, $p <$. 01). Here it was found that framing information gathering in terms of creative processing activities led to greater accuracy in evaluating the originality of highly novel ideas (M = 1.12, SE = .168) with the framing induced by training proving as effective in enhancing the accuracy of these evaluations as the induction of active processing through the preparation of reports assessing originality (M = 1.06, SE = .169) in the no training condition. Both the active analysis of originality attributes and training proved more effective in enhancing the accuracy with which people evaluated highly original ideas than no active processing (M = 1.28, SE = .169) and active processing focused on performance (M = 1.21, SE = .169). Not only does this pattern of findings suggest that the training did not induce fatigue effects, it indicates that, by focusing information gathering on creativity, specifically creative processing activities, errors in the evaluation of highly creative ideas can be reduced. However, the error in evaluation of highly original ideas will still be somewhat greater than that observed for ideas of average and low originality (M = .87, SE = .129).

In addition to the interactions involving the level of idea originality, a significant three way interaction was obtained between

complexity, active processing, and creativity framing (F (2, 169) = 4.81, $p < .01$). Examination of the relevant cell means indicated that errors in evaluating idea originality, regardless of the level of idea originality, were especially likely when people were presented with a more complex email exchange in idea development and were not trained to frame information gathering in terms of creativity markers or required to actively assess original attributes of the idea. Thus, errors in the evaluation of idea originality were greater in the high complexity training condition when people were asked to analyze performance (M = 1.15, SE = .110), or were not required to engage in active analysis of ideas (M = 1.10, SE = .112), in comparison to all other conditions (M = .86, SE = .110). Thus, active analysis of ideas with respect to originality considerations and framing information gathering in terms of creative processing activities apparently proves beneficial in helping people cope with complexity in evaluating idea originality.

In this regard, however, it is important to bear in mind the significant four way interaction obtained between level, complexity, active processing, and creativity framing (F(4, 167) = 6.05, $p < .01$). Inspection of the relevant cell means indicated that this effect could be traced to peoples' errors in evaluating highly original ideas. More specifically, when highly original ideas were presented, requests for performance reports led to especially inaccurate evaluations of originality when the exchanges involved in idea development were complex and information gathering was not framed in terms of creative processing activities (M = 1.70, SE = 2.40 vs. M = .894, SE = .202). This pattern of findings suggests that when people focus on performance under conditions of complexity they are apt to underestimate the originality of highly novel ideas when no training has been provided stressing the value of gathering information about creative processing activities. In other words, a performance focus may inhibit recognition of highly original ideas in complex, real-world, settings where creative processing activities are not considered integral to evaluation.

DISCUSSION

Perhaps the most straightforward conclusion that can be drawn from the present study is that people do underestimate the originality of highly novel ideas. In fact, errors in appraisal of originality were substantially greater for highly original ideas than ideas of average or low originality. Moreover, as the complexity of the setting surrounding idea development increased, these evaluation errors became more pronounced. Apparently,

people have difficulty, substantial difficulty, in recognizing highly original ideas even though they may be good judges of ideas in general as evidenced in Runco and Chand's (1994) finding that people can distinguish popular ideas from original ideas.

The question that arises at this juncture, however, is exactly what is the source of this "so what" bias. In fact, the results obtained in the present study provide some important clues about the likely sources of these errors in the evaluation of highly original ideas. As noted earlier, one potential reason people might underestimate the originality of truly novel ideas is that they have difficulty evaluating these ideas because information bearing on original attributes is not prototypic and thus readily accessible (Barsalou, 1991; Estes & Ward, 2002; Scott, Lonergan, & Mumford, 2005). The fact that the production of reports intended to encourage people to actively analyze the originality of ideas tended to offset this error suggests that attribute accessibility represents one potentially viable mechanism that might account for the tendency of people to underestimate the originality of novel ideas.

Although attribute accessibility represents one potential explanation, the results obtained in the present study point to two other mechanisms that might be operating. First, the findings with regard to framing suggest that this error decreases when people are expressly encouraged to gather information bearing on creativity — specifically creative processing activities in the case of the present study. By framing goals and information search in terms of creativity, people may be more likely to identify the attributes of original ideas and/or recognize the emergent implications of these ideas. The pattern of effects that emerged in examining interactions between the active processing, framing, and complexity manipulations, suggests that framing, in fact, resulted in recognition of emergent opportunities given that framing effects were observed under conditions of high complexity and that framing did not accentuate the effects of preparing originality reports.

Second, the effects obtained for the performance reports indicated that errors in evaluating highly original ideas were especially likely to occur when people actively analyzed performance under conditions where complexity was high and no framing intervention occurred. In fact, error was higher under these conditions than if no report was requested. This pattern of findings suggests that a focus on performance, and the induction of performance pressure through reporting

requirements and complexity, will result in error perhaps because extensive analysis of performance attributes leads people to ignore and/or discount both idea implications and originality attributes — especially unique and highly original attributes of the idea that are unlikely to overlap with performance requirements.

Although active processing, framing, and performance pressure seem to represent plausible explanations for the tendency of people to underestimate the originality of highly novel ideas, it is possible that other mechanisms such as anchoring might be operating. However, the susceptibility of these errors to active processing and framing manipulations suggests that anchoring, given the stability of the anchoring phenomenon (Gouada, 1999; Hogarth, 1980; Tversky & Kahneman, 1974), is perhaps a less plausible explanation. Nonetheless, future research is needed in examining other mechanisms giving rise to the tendency to underestimate the originality of highly novel ideas.

Further research along these lines seems justified not only because it might provide strategies for offsetting this "so what" error but also because "so what" errors may have a rather pervasive impact on creative achievement. Of course, one consequence of the tendency to underestimate the originality of highly novel ideas is that it may lead to the premature rejection of otherwise promising new approaches. This evaluation error, however, may have a number of other somewhat more subtle and pernicious effects. For example, one effect of this underestimation error is that sufficient compensatory feedback concerning practical considerations may not be provided thereby undermining the idea revision and implementation process (Lonergan, Scott, & Mumford, 2004). Another effect of underestimating originality is that it may reduce implementation intentions and lead to poor planning with regard to idea implementation (Dailey & Mumford, in press). Still another effect of this underestimation bias is that the truly unique implications of highly original ideas may not be adequately explored with respect to the potential downstream consequences of idea implementation (O'Connor, 1998). All of these effects will, in the long-run, tend to undermine idea development and subsequent innovation.

The results obtained in the present study, however, suggest some concrete steps that might be taken to minimize the impact of errors in the appraisal of highly original ideas. For example, training programs might be initiated that encourage

people to frame evaluations and information gathering in terms of originality (Basadur & Hausdorf, 1996). In fact, one effect of creative process training in managerial populations may be that this training acts to diminish errors in the appraisal of highly original ideas. Alternatively, requiring people to look for, and actively analyze, the implications of ideas and products with respect to originality considerations in reports, or other formal product evaluations, may have value.

In evaluating these conclusions, however, it is important to bear in mind certain limitations of the present study. To begin, although we examined errors in the evaluation of highly original ideas across multiple problem sets, the health club and spring break campaigns, it is also true that both sets of ideas were drawn from one domain — advertising. Thus, the question remains as to whether our findings can be generalized to ideas developed in other types of domains (Baer, 2003). Moreover, in the present study we examined evaluation of others' ideas to ensure adequate control. It is, however, possible that a somewhat different pattern of effects might emerge if people had been asked to evaluate their own ideas.

Along somewhat different lines, it should also be recognized that the present study was based on a "classic" experimental paradigm. This point is of some importance for two reasons. First, despite the fact that undergraduates could perform the task, and found the task engaging, it is also true that undergraduates are not experts in the field of advertising. Thus, the question arises as to whether similar appraisal errors would be observed in samples of experienced managers (Ericsson & Charness, 1994; Mumford, Blair, Dailey, Lertiz, & Osburn, in press). Second, the manipulations designed for complexity and framing, while reasonable analogs of real-world variables, could not fully replicate the multifaceted operation of these variables in real-world settings.

More centrally, however, it should be recognized that we have, in the present study, focused solely on appraisals of idea originality. Thus, the question remains as to whether similar effects would be observed for the kind of high quality original ideas that are often the key to innovation. With regard to these appraisals of idea originality, moreover, we examined absolute differences from a stimuli of known originality. Although the use of this difference score approach ruled out scale point preferences as an explanation for our findings, it is possible that the effects of manipulations might have been to "give people permission" to recognize highly original ideas. However, this

permission, or demand characteristics explanation, does not seem consistent with the observed pattern of effects especially those obtained with regard to framing, complexity, and active processing which exerted effects on evaluations of highly original ideas but not necessarily ideas of low or average originality.

If it is granted that these limitations do not invalidate the conclusions flowing from the present study then a broader conclusion comes to fore. Traditionally, the tendency of people to discount the value of new ideas has been attributed to negative attitudes towards creative people and creative efforts (Mumford & Gustafson, 1988). As Sternberg (in press) has pointed out, however, people seem to value creativity, even as they fail to act on this value. Perhaps one explanation for this "creativity paradox" is that people are simply not aware of how original the idea was in the first place. Although we have not given much attention to the role of processing errors of this sort in accounting for various phenomena observed in studies of creativity (Mumford, Blair, Dailey, Leritz, & Osburn, in press), it is possible that these errors exert powerful and pervasive effects. Hopefully, the present study by identifying one such error, and demonstrating its impact on idea evaluation, will provide an impetus for further research along these lines.

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