HOW EVALUATIONS OF RECENT EXPERIENCE CONSTRAIN CREATIVE ACTIVITIES

by

GABRIEL I. COOK

(Under the Direction of Richard L. Marsh)

ABSTRACT

The current experiment examined constraints on creativity caused by perceived beliefs about the source of examples. Participants were shown three experimenter-provided examples which were depicted as having been generated by high-credibility (e.g., expert) versus low-credibility (e.g., novice) sources. In a generative task, participants created novel entities corresponding to one of two different topical domains. Conformity to features common among the examples was greatest when participants believed that the examples were created by highly credible sources. The results are discussed in terms of the levels of abstraction approach (Ward, 1995) to creative generation tasks.

INDEX WORDS: Creativity, Source credibility, Generative task, Levels of abstraction, Conformity, Unconscious plagiarism.

HOW THE EVALUATION OF RECENT EXPERIENCE CONSTRAINS CREATIVE ACTIVITIES

by

GABRIEL I. COOK

B.A., Bloomsburg University of Pennsylvania, 1999

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2002

HOW THE EVALUATION OF RECENT EXPERIENCE CONSTRAINS CREATIVE ACTIVITIES

by

GABRIEL I. COOK

Major Professor: Richard L. Marsh

Committee: Zachary C. Estes
Adam S. Goodie

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
December 2002

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION

Studies of creative cognition attempt to specify and then examine the cognitive processing that contributes to creative thought. This field of inquiry is potentially important because such processes result in the production of novel instantiations of common, everyday things (e.g., tools or utensils, buildings, ideas and theories, computer software, etc.). Among the experimental paradigms available for studying creative (or generative) thought, one approach has been to ask participants to engage in an exemplar-generation task. For example, they might be asked to create novel entities that could belong to a particular category (e.g., space creatures). Participants often approach such a generative task in a structured manner by basing their new creations on existing exemplars that are retrieved from memory. Regardless of whether these exemplars are older memories or particular instances from recently experienced examples, these recollections nevertheless serve as starting points for creating something new. Ward (1994) has referred to this approach as structured imagination in which the cognitive processes used take a "path of least resistance."

In this theory, participants typically settle first on some known category member and then they attempt to modify it in novel ways to generate something "creative." To illustrate, an architect who is designing a new skyscraper to be used as an office building might first begin with a building structure that serves a similar purpose. This element of the category would then be modified in interesting ways such as by changing its shape or by using nontraditional materials. When the architect is finished, the new design will

most certainly contain vestiges of past experience, but nevertheless should be distinct in some ways from other buildings. How much the new design differs from the old designs that served as the starting point(s) will determine, in part, how "creative" or "novel" the new design is ultimately judged by others.

In an in depth analysis of creative activities, Perkins (1981, 1988) has argued that truly novel products will always contain vestigial characteristics drawn from memories of previous experience. Because memories fade over time, novel instantiations of features taken from temporally distant past experiences will often fail to replicate them perfectly. And when older ideas are recombined into new ones through this process of "harking back," the final product of generative thought is often judged to be both creative and novel. By contrast, products of these same generative cognitive activities are often judged as less creative, less novel, and even considered plagiarism when recently experienced memories are used and recombined in an otherwise identical fashion (e.g., Marsh, Landau, & Hicks, 1996; Smith, Ward, & Shumacher, 1993; Ward, 1994).

The present experiment explores the degree to which recently provided examples will or will not constrain creative generation tasks such as those just described. More specifically, the examples that were shown to participants prior to engaging in a generative task were depicted as either having been generated by more knowledgeable experts or relative novices in the domain in which new products were to be created. Manipulating the beliefs that people hold about their recent experience was hypothesized to change the particular starting points in the generative drawing task

being studied here. This hypothesis was derived from a particular theory of generative cognition, as described next.

In the structured imagination approach, Ward (1994) has argued that people will depend on examples to a greater extent, or conform to the features of those examples, if their cognitive processes push them "downward" in an imaginary hierarchy of abstract thinking toward specific experiences. Conversely, they will depend on these same experiences less if their cognitive processes push them "upward" and away from specific features by focusing their thoughts toward more abstract concepts and the overarching goals of the creative endeavor at hand. Accordingly, creating novel products is a direct consequence of moving away from specific examples in an upward fashion within the abstraction hierarchy in an attempt to search for new ideas and novel solutions. Because the generated products must be comprised of specific features, moving back downward in the hierarchy from nodes higher in it should lead to starting points different from the recently experienced examples.

To illustrate, consider the commonly used paradigm in which an experimenter shows three examples of "novel" designs to participants. Unbeknownst to the observers, all three examples share three common features (e.g., four legs, a tail, and antennae for space creatures). If one were to activate the properties of the provided examples and then modify them (as depicted in Ward's theory), the finished products would likely bear more than a passing resemblance to the original examples. In particular, many of the new designs should contain one or more the three shared features of the experimenter-provided examples (even despite admonition instructions

to avoid doing so). This exact result has been documented numerous times and has been labeled alternatively as the "conformity effect" and as unconscious plagiarism (Brown & Halliday, 1991; Brown & Murphy, 1989; Marsh & Bower, 1993). By contrast, if one were to consider new examples by activating abstract representations of a category, the finished product would likely share fewer overlapping features with the examples (i.e., less conformity).

To our knowledge, focusing participants away from specific experimenter-provided examples has not been studied as means of avoiding the path of least resistance by which recent experience becomes represented in novel creations. However, there is evidence to suggest that Ward's (1994) theory is correct. For instance, adopting an abstract goal for designing car brakes (e.g., reduce kinetic energy) moves the designer away from the details or features (e.g., brake pads) specific to current or recently experienced solutions. In an empirical test in this domain, a design process that involved movement away from concrete but toward abstract definitions of the problem allowed engineering students to produce designs that were judged as more novel (Condoor, Brock, & Burger, 1993; Karuppor, Burger, & Chona, 2002). This result suggests that even though participants typically take a path of least resistance, they can avoid this approach when *explicitly* instructed to consider abstract representations that are (presumably) higher in the abstraction hierarchy.

In the present experiment, different groups of participants were presented with identical examples that were depicted as having been generated by individuals with either more versus less expertise in the domain. To a first approximation, the groups

received examples depicted as having been created by credible versus non-credible sources. One prediction from the levels of abstraction approach is that viewing examples that were created by a highly credible source prior to beginning a generation task may decrease the probability of activating more abstract representations (or formulating more abstract definitions) of the creative task at hand. This prediction would come to pass if participants inferred that the examples were good, and consequently, adopted the strategy of relying on them more heavily. If they did so, then they would conform to the three common features of those examples. By contrast, the theory of structured imagination might also predict that viewing examples created by a less credible source would foster a different strategy of relying on them less. Because the examples are not necessarily good ones anyway, participants may feel compelled to consult other representations stored in memory thereby forcing them higher in Ward's hierarchy (1995), and consequently, changing their starting points. Focusing cognitive processing away from the examples in this way should reduce reliance on the properties of the examples and thereby reduce the magnitude of the conformity effect. Following from this logic, greater conformity would be expected to examples believed to be generated by a highly credible source as compared with examples believed to be generated by a less credible source.

To date, this hypothesis concerning credibility of examples has not been tested directly in a drawing paradigm, although one empirical investigation has been conducted that bears directly on these predictions. In Ward's (1994, 1995) creature drawing paradigm, an identical set of examples was described alternatively as either

constraining creativity (diverge instructions) or representing good examples to which participants should conform (converge instructions; Smith et al., 1993). As compared to a control condition that was not shown any examples, the diverge condition was more successful at avoiding the three common features in the examples as compared with the converge condition, but both conditions nevertheless incorporated features of the recently experienced examples. Although the diverge versus conform instructions are more dramatic (i.e., explicit) forms of the credibility manipulation proposed here, the results from that study are nevertheless consistent with the predictions just outlined.

Manipulating source credibility is a somewhat more subtle way of addressing constraints on creative generation and one that is perhaps more ecologically valid than direct instructions concerning the use of recent experience. After all, the credibility manipulation requires participants to infer that the examples provided to them are better versus worse examples and the cognitive processing that results could be different from asking them directly either to conform or to diverge from those examples. There has been one previous attempt at this subtle manipulation of source credibility in a creative generation paradigm, albeit in a very different domain with verbal rather than visual materials. Bink, Marsh, Hicks, and Howard (1999) investigated the influence of source credibility in a brainstorming idea generation task. In that study, participants unconsciously plagiarized ideas on how to reduce traffic accidents provided by a credible source (traffic planner) to a greater extent than they plagiarized the identical ideas depicted as coming from a less credible source (college freshman). Although Bink et al. (1999) did not relate their results to Ward's (1994) theoretical framework of abstract

versus concrete thinking, those results are nevertheless entirely consistent with the analysis and predictions that have been made here for the creative drawing task.

The foregoing analysis of theory and existing data suggests that examples from sources that differ in their perceived credibility might influence the probability of activating abstract properties versus adopting and using specific features of the examples as two strategies to satisfy task goals. Thus, examples provided by a highly credible source might decrease the likelihood that participants consult alternative representations whereas examples provided by a low credibility source might encourage them to do so. Of course, Ward's (1994, 1995) path of least resistance and hierarchical levels of abstraction do not uniquely make the preceding predictions. Simple principles of categorization might also predict different degrees of influence from sets of identical examples that otherwise differ in source credibility. For example, good or prototypical examples might indicate to participants that the examples share essential or typical features of members of that category. These features might then be retained as part of an otherwise novel design. By this account (which is similar to abstraction), the shared features of examples become prototypical features in the way that most birds have wings or most utensils have a handle or means of grip. By contrast, poor or atypical examples might indicate to participants that the shared features are not prototypical or defining features, and thus, are not likely to be present on more central members of the category. These same features, now experienced in the context of poor examples might not be retrieved and incorporated into the final design.

For generality of the results, participants engaged in one of the two generation tasks that differed only in the topical domain. Half of the participants were shown three examples of space creatures that shared three common features and then generated novel space creatures. The remaining participants were shown examples of toys that shared three common features and instead designed novel toys. In addition to the high versus low credibility depictions of the experimenter-provided examples, a control condition was tested that did not have the opportunity to view any examples. When crossed orthogonally with the topical domains of toys versus space creatures, six between-subjects conditions were tested.

CHAPTER 2

METHOD

Participants

One-hundred ninety-three University of Georgia undergraduates volunteered to participate in the current experiment in partial fulfillment of a course research requirement. Groups of two to seven participants were quasi-randomly assigned to one of six between-subjects experimental conditions. Assignment was based on their arrival to the laboratory and maintaining relatively equal sample sizes across all conditions. The experiment took approximately 30 min to complete.

Materials

A total of six experimenter-provided line drawings (three toys and three space creatures) were taken from previous research (Marsh, Landau, & Hicks, 1996; Smith et al., 1993). The example toys shared three common attributes, or critical features: an electronic component, a ball, and exercise involvement. Similarly, the example space creatures all shared the following three critical features: four legs, antennae, and a tail. The three common attributes were identified on each example with verbal labels, as were many of the other features. Consistent with previous studies using this general paradigm, each example drawing included a brief verbal description. An example of a space creature and a toy is provided in Figure 1.

Design and Procedure

As previously mentioned, two separate drawing conditions were manipulated in the present study. Half of the participants were asked to design novel toys for a toy

company and the other half was asked to design novel creatures to inhabit a distant planet. Within each of the toy and creature generation conditions, three different between-subjects groups were tested to manipulate the degree of source credibility. One group served as a control condition and the remaining two served as high-credibility and low-credibility sources, respectively. Therefore, the current study employed a 2 (generation task: toys or creatures) X 3 (source credibility: control, high credibility, or low credibility) orthogonal between-subjects design.

The general procedure used here was identical to previous experiments using this paradigm except as it related to how the examples were depicted. In previous research (e.g., Marsh, Bink, & Hicks, 1999; Smith et al., 1993), participants were asked to generate novel designs, were shown several examples, admonished to avoid copying the examples, and then given time to design their own creations. In this way, the examples were shown without any identifying source. The identical procedure was used here except that the high-credibility and low-credibility groups were informed who had ostensibly created the examples they were being shown. The details are as follows. For sake of clarity, the instructions for the toy-generation task are presented first, followed by those used for the creature-generation task. However, the only differences between those two conditions were the minor necessary adjustments to the instructions.

Participants in the toy-generation condition were informed that their task was to design new toys for a toy company that was in need of new ideas. The experimenter then provided additional instructions to each of the high credibility, low credibility, and control conditions. The low-credibility condition was told that the examples that they

were about to see were drawn by a chef who had neither knowledge about what constituted a good toy nor a fun toy. By contrast, the high credibility condition was informed that an expert toy designer had created the examples. To emphasize the toy designer's credibility, participants learned that the designer was successful at his job and had considerable knowledge. Consequently, the high-credibility and low-credibility conditions saw the same three examples, but all that differed was who had ostensibly designed them. The control condition was not shown examples. However, in an attempt to equate the experimental timing procedures for all groups, the control condition was asked to listen to an unrelated passage about pedestrian safety enhancements taking place on campus. The length of distractor passage was designed to occupy the same amount of time that the groups receiving examples spent listening to the source descriptions and viewing the example designs.

Participants in the creature drawing condition were asked to imagine a planet just like Earth existing somewhere else in the universe. They were asked to generate new creatures to inhabit this planet without duplicating anything living or extinct on Earth. The low-credibility condition was further informed that the example creatures were drawings created by learning-disabled teenagers who clearly had no expertise in astronomy or the evolution of living organisms. By contrast, the high-credibility condition was told that the examples were created by an evolutionary biologist who had considerable expertise in understanding the physical adaptation of living organisms over time. Ostensibly, the control condition (who received no examples) was identical

to control condition for toy drawing. Participants were asked to listen to the same brief passage about pedestrian safety.

For groups receiving experimenter-provided examples, each drawing was presented individually via an overhead projector for 30 s. The experimenter then explained that the examples were to be used to help them think about creating their own original toys (or creatures) and to get their creative juices flowing. Participants were further admonished not to copy the examples, but rather to concentrate instead on designing their own original creations. As mentioned earlier, the control conditions listened to the innocuous passage about pedestrian safety. Specific instructions for the 20 min drawing task were then explained. These directions consisted of asking participants to draw each toy (or creature) on one sheet of opaque paper in a packet provided for them. They were further instructed to include front and side views of their creations, to label each feature of their designs, and to provide a brief description about each one. After each novel design was completed, they were asked to turn the page and begin anew for each design and not reflect back upon their previous creations. They were asked to draw as many toys (or creatures) in the 20 min as they were able.

CHAPTER 3

RESULTS

An alpha level of .05 was adopted for all statistical analyses unless otherwise noted along with its respective test statistic. Two independent raters scored each design for the presence of the critical features that were shared among the examples. In addition as a standard output measure of creativity, the raters counted the total number of designs that each participant drew (Smith et al., 1993). To reiterate, the critical features contained in the example toys were a ball, an electronic component, and exercise whereas for space creatures they were four legs, antennae, and a tail. The average proportion of these three critical features for each participant was computed as a measure of conformity to experimenter-provided examples.

Creative Output

In terms of total output, the average number of completed designs for participants drawing novel toys was 4.13, 3.89, and 3.39 in the control, low credibility, and high credibility conditions, respectively. For the creature conditions, the comparable averages were 4.28, 3.85, and 3.91 designs, respectively. In a 2 (generation task: toys and creatures) X 3 (source credibility: control, low credibility, and high credibility) between-subjects ANOVA neither main effect nor interaction was statistically significant. This outcome suggests that total output was not affected by the source-credibility manipulation, and further, that the average number of toys created was equivalent to the number of creatures generated. In this regard, the manipulations had no effect whatsoever on an output metric of creativity.

Conformity Effect

The experimenter-provided examples have been used in previous research, and consequently, conformity should have been greater in groups provided with examples as compared with their respective control conditions. Confirmation of this result would demonstrate the basic conformity effect that has been demonstrated in past research. Pooling over the two levels of credibility and contrasting these with their control condition led to significant effects for both the creature and toy conditions, smaller $F(1, 94) = 5.30$, $MSE = .10$. More specifically, conformity for the creature and toy conditions was .18 and .38, respectively whereas conformity in the control conditions was .11 and .25. As displayed in Figure 2, these data confirm that the basic conformity effect was obtained in which participants used features shared among examples that were recently experienced.

Conformity and Source Credibility

Having established the presence of the basic conformity effect, the fundamental question was whether the credibility of the source of the examples would influence the degree to which they were used as starting points for novel designs. Recall that examples from highly credible sources were expected to be the basis of novel creations more often than were otherwise identical examples depicted as having been generated by a less credible source. To test this hypothesis, a 2 (generation task: toys and creatures) X 3 (source credibility: control, low credibility, and high credibility) between-subjects ANOVA was conducted on the conformity scores displayed in Figure 3. There were main effects of both type of generation task and source credibility, smaller $F(2, 187)$

= 14.18, *MSE* = .02, but no interaction. Removing the control conditions results in a 2 X 2 ANOVA in which both the task and source credibility main effects remained statistically significant, $F(1, 128) = 7.29$, *MSE* = .02 again with no reliable interaction. Therefore, as can be seen in Figure 2, conformity was higher in the toy domain than in the creature domain, but most importantly, conformity was higher in both domains when participants believed that more expert (i.e., highly credible) sources designed the examples that they were shown. Both simple-effects analyses revealed that participants conformed more in the high credibility condition of the creature-drawing task, $t(64) = 2.04$, *SED* = .03, and in the toy-drawing task although this second result fell on the cusp of conventional statistical significance, $t(64) = 1.78$, *SED* = .04, $p = .08$.

Although conformity to the example toys was not expected a priori to be greater than to the example creatures, nevertheless it was, $F(1, 128) = 61.31$. There are a number of potential explanations for such an outcome. For example, participants may have more recent exposure or familiarity with space creatures (e.g., television, movies, etc.) and less so with toys. They may have richer experiences with natural kinds that are more diverse (e.g., mutable) than manmade artifacts such as toys. Although this outcome may be interesting in its own right, a complete analysis of it remains for a different study and it is not considered further.

CHAPTER 4

DISCUSSION

When confronted with a creative endeavor similar to the task that participants faced here, people usually activate mental representations of past experience that are related to the task (Ward, 1994). Those representations are then modified and used to fulfill the task goal of creating novel entities. The experimenter-provided examples fall into the category of past experience even though the exposure to them was quite recent. Consequently, participants incorporate properties (or features) of those examples into their designs despite admonition instructions to avoid doing so (Marsh et al., 1996; Smith et al., 1993; Ward, 1994).

Nevertheless, the manipulation of perceived credibility of the examples changed the degree to which shared features were incorporated into novel designs. As such, conformity appears not to be an all-or-none phenomenon, but rather, is influenced by variables other than the mere presence or absence of examples from the recent past. The results suggest that although a conformity effect to experimenter-provided examples will occur, the degree to which that takes place is determined, in part, by participants' beliefs about the quality of those examples. Good examples from credible sources (i.e., with more knowledge in a domain) foster a strategy of taking a path of least resistance whereas worse examples from less credible sources appears to foster a strategy of consulting more abstract representations. As mentioned earlier, the credibility manipulation is somewhat more subtle than instructing participants to conform to or to

diverge from the examples as a means of observing changes in the rate of conformity (Smith et al., 1993).

The current results dovetail with theories of source monitoring which have been used in the past as an explanation for why participants might conform to examples or otherwise unconsciously plagiarize previously presented ideas (Macrae, Bodenhausen, & Calvini, 1999; Marsh & Landau, 1995; Marsh, Landau, & Hicks, 1997). Source monitoring explanations of unconscious plagiarism argue that people fail to identify the original source of the features being considered when they are generating something novel. They confuse themselves as the origin of the candidate features as opposed to correctly attributing them to the recently experienced external source (e.g., experimenter-provided examples). Marsh et al. (1997) argue that the cognitive demands of generative cognitive activities dissuade participants from fully considering source information. When explicitly queried about this information, however, they do possess it. Therefore, people may not use source information as completely as they could under the demands of creative generation. To ensure that the entity being designed is truly novel, however, it would behoove participants to attribute the candidate features to the correct source. When they fail to allocate sufficient attentional resources toward an examination of source information, the result can be greater incidence of conformity, unconsciously plagiarized ideas, or even less creative entities as judged by others.

The attention-demanding nature of creative tasks may in and of itself give rise to the strategy of taking the path of least resistance. From this perspective, all participants could have taken a path of least resistance when generating their novel creations and

used recently experienced examples as the starting point(s) of their designs. Because all participants viewed the identical three examples, conformity to those examples should have been equivalent for both the high- and low-credibility conditions. This result was not obtained, however, and instead, examples depicted as being more credible evoked more conformity than those depicted as being less credible. Therefore, evaluating the examples and inferring that they were good exemplars ultimately placed greater constraints on creating novel products. This result suggests that when the path of least resistance strategy fails (as in the context of low-credibility sources), another strategy that is invoked to fulfill the task goals could result in fewer constraints, and more creative solutions, to the task at hand.

If the theory of structured imagination is correct, then the alternative strategy used in place of the least-resistance approach involves moving away from the features of the examples toward more abstract representations of the task. Some of these representations might come from considering how a space creature would locomote or communicate. This approach increases the probability that features provided in the examples are replaced with features different from those experienced recently (i.e., that might feel familiar). By moving away from examples that are perceived as inferior (e.g., generated by novices) and conforming to them less, participants end up producing more creative entities as judged subjectively by independent raters (Marsh et al., 1996).

The current results suggest that that there are in fact more subtle ways of inducing participants to adopt different kinds of strategies in what is arguably a cognitively demanding task. Similarly, more subtle manipulations likely exist that could

be used to encourage participants to examine the source characteristics of their stored memories as opposed to explicit manipulations. For example, Marsh et al. (1997) asked participants to rate on a 5-point scale how closely their new ideas were related to those offered by others in a previous brainstorming session. This manipulation, although not very subtle, nevertheless reduced the probability that old ideas were claimed to be new products of one's own creation. As the relationship between source monitoring and studies of creative cognition becomes stronger, perhaps even more subtle manipulations can be developed to avoid constraints on creativity (Macrae et al., 1999). In other words, increasing the likelihood that a designer considers the source of features before incorporating them into some creation might increase some objective or subjective measures of creativity. This is because they should edit out the features that were part of the examples and consequently use them less. By contrast, manipulations or situations that reduce the probability of considering the source of candidate features should lead to relying on them more. For example, cognitive distraction (divided attention), stress, or any other factor that reduces the ability to engage in reflective cognitive resources could increase the conformity effects observed here. To the extent that it takes time and resources to revive and to inspect source information (Johnson, Kounios, & Reeder, 1994), anything that decreases the effectiveness of those processes should increase conformity.

According to Ward's (1994) theory of structured imagination, creativity should covary with the degree to which people focus their thoughts on abstract concepts related to task goals. If the manipulation of credibility demonstrated here to change conformity

actually is a consequence of considering more abstract, task-related information, then there should be manipulations that remove that same effect. As just mentioned, abstract thinking is likely to require more reflective cognitive processing. Under this assumption, a manipulation that forced participants to draw their novel designs during a very short period of time should result in equivalent levels of conformity between the high- and low-credibility conditions. In this case, time constraints placed on the drawing task might force participants to settle on a starting point that is closer to the experimenter-provided examples and less influenced by abstract thinking. Although the predictions were not grounded in Ward's theory of structured imagination, one previous study has reported evidence to suggest that a speeded manipulation increases unconscious plagiarism of experimenter-provided examples (Landau, Thomas, Thelen, & Chang, 2002).

Although conformity effects in creative tasks are often depicted in a negative light by using such terms as "constraints" or "plagiarism," in fact, there is a non-pejorative sense in which such conformity effects can actually be beneficial. For example, consider an architect who is designing a skyscraper that would be capable of withstanding severe earthquakes. The architect might better model the design after skyscrapers found in the city of San Francisco instead of using design ideas inspired by a recent trip to Philadelphia. This is because the former designs should already contain properties to safeguard the structure against potentially damaging earthquakes. Conformity to ideas is also evidenced when people to come believe truthful advertising claims (e.g., about exercising and preventing heart disease) or when young children

adopt the positive social norms of theirs peers. In these cases, conformity to past experience has a desirable outcome, just as when a client in therapy believes the therapists' suggestions are the product of their own reflective thought. These positive outcomes of conformity have not been studied in the laboratory, but one interesting question might be whether such effects are influenced by the credibility of the source, as well. For example, a partner who tells their spouse to be more assertive may have their message fall on proverbial deaf ears, whereas the same message from a therapist might subsequently be adopted as a product of ones own thought. Although the tradeoff between reflective cognitive processing and creativity remains unclear, the current result highlights the fact that when we attempt to create something entirely new, we tend to borrow ideas from those who appear to know best.

REFERENCES

Bink, M. L., Marsh, R. L., Hicks, J. L., & Howard, J. D. (1999). The credibility of a source influences the rate of unconscious plagiarism. *Memory, 7,* 293-308.

Brown, A. S. & Halliday, H. E. (1991). Cryptomnesia and source memory difficulties. *American Journal of Psychology, 104,* 475-490.

Brown, A.S., & Murphy, D.R. (1989). Cryptomnesia: Delineating Inadvertent Plagiarism. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 15,* 432-442.

Condoor, S. S., Brock, H. R., & Burger, C. P. (1993, June). *Innovation through early recognition of critical design parameters.* Paper presented at the meeting of the ASEE, Urbana, IL.

Finke, R. A., Ward, T. B., & Smith, S. M. (1992). *Creative cognition: Theory, research, and applications.* Cambridge, MA: MIT Press.

Jansson, D. G., & Smith, S. M. (1991). Design fixation. *Design Studies, 12,* 3-11.

Johnson, M. K., Kounios, J. & Reeder, J. A. (1994). Time-course studies of reality monitoring and recognition. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 20,* 1409-1419.

Karuppor, S. S., Burger, C. P. & Chona, R. (2002, March). *Designing better.* Paper presented at the meeting of the ASEE, Lafayette, LA.

Landau, J. D., Thomas, D. M., Thelen, S. E., & Chang, P. (2002). Source monitoring in a generative task. *Memory, 10,* 187-197.

Macrae, C. N., Bodenhausen, G. V., & Calvini, G. (1999). Contexts of cryptomnesia: May the source be with you. *Social Cognition, 17,* 273-297.

Marsh, R. L., & Bower, G. H. (1993). Eliciting cryptomnesia: Unconscious plagiarism in a puzzle task. *Journal of Experimental Psychology: Learning, Memory, & Cognition, 19,* 673-688.

Marsh, R. L., Landau, J. D., & Hicks, J. L. (1996). How examples may (and may not) constrain creativity. *Memory & Cognition, 24,* 669-680.

Marsh, R. L., Landau, J. D., & Hicks, J. L. (1997). The contribution of inadequate source monitoring to unconscious plagiarism during idea generation. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 23,* 886-897.

Marsh, R. L., & Landau, J. D. (1995). Availability in Cryptomnesia: Assessing its Role in Two Paradigms of Unconscious Plagiarism. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21,* 1568-1582.

Perkins, D. N. (1981). *The mind's best work.* Cambridge, MA: Harvard University Press.

Perkins, D. N. (1988). Creativity and the quest for a mechanism. In R. J. Sternberg and E. E. Smith (Eds.), *The psychology of human thought.* New York: Cambridge University Press.

Smith, S. M., Ward, T. B., & Schumacher, J. S. (1993). Constraining effects of examples in a creative generation task. *Memory & Cognition, 21,* 837-845.

Ward, T. B. (1994). Structured imagination: The role of category structure in exemplar generation. *Cognitive Psychology, 27,* 1-40.

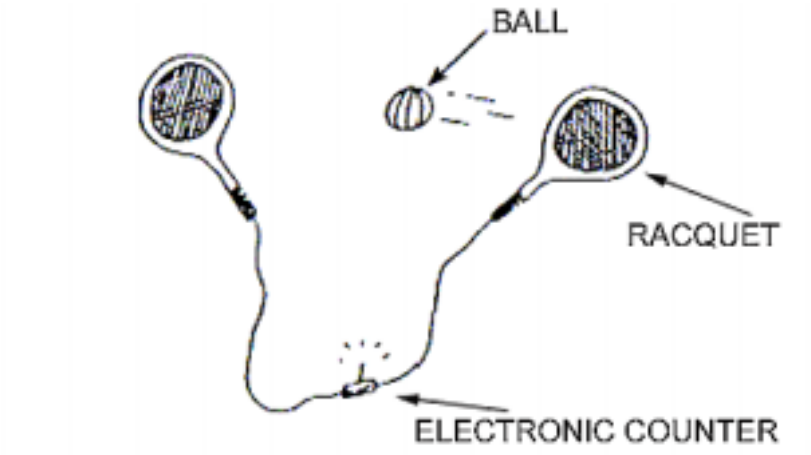
Ward, T. B. (1995). What's old about new ideas? In S. M. Smith, T. B. Ward, R. A. Finke (Eds.), *The creative cognition approach.* (pp. 157-178). Cambridge, MA: MIT Press.

Figure Caption

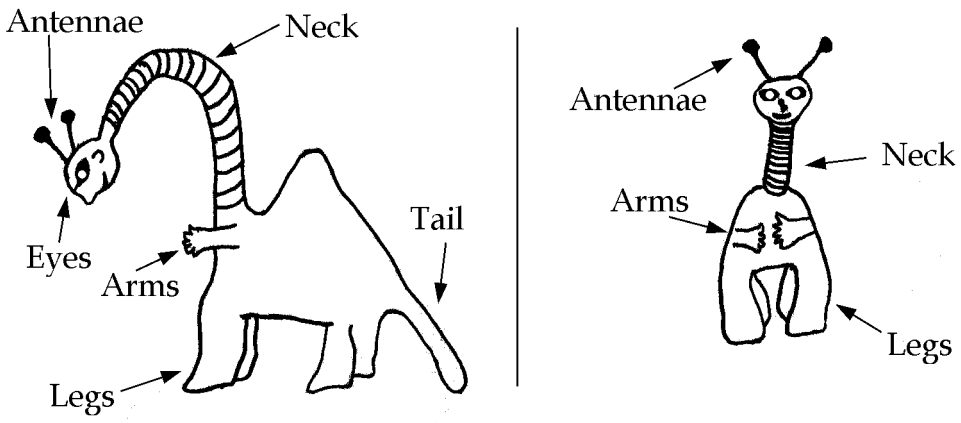
Figure 1. The category exemplars are experimenter-provided examples that correspond to the two topical domains (e.g., toys and space creatures) of the drawing task.

Figure 2. The colored bars represent mean proportional values of conformity to critical features of the provided examples. Light green bars reflect conformity to space creatures whereas dark green bars reflect conformity to example toys. Standard error bars represent the variability in conformity scores within conditions.

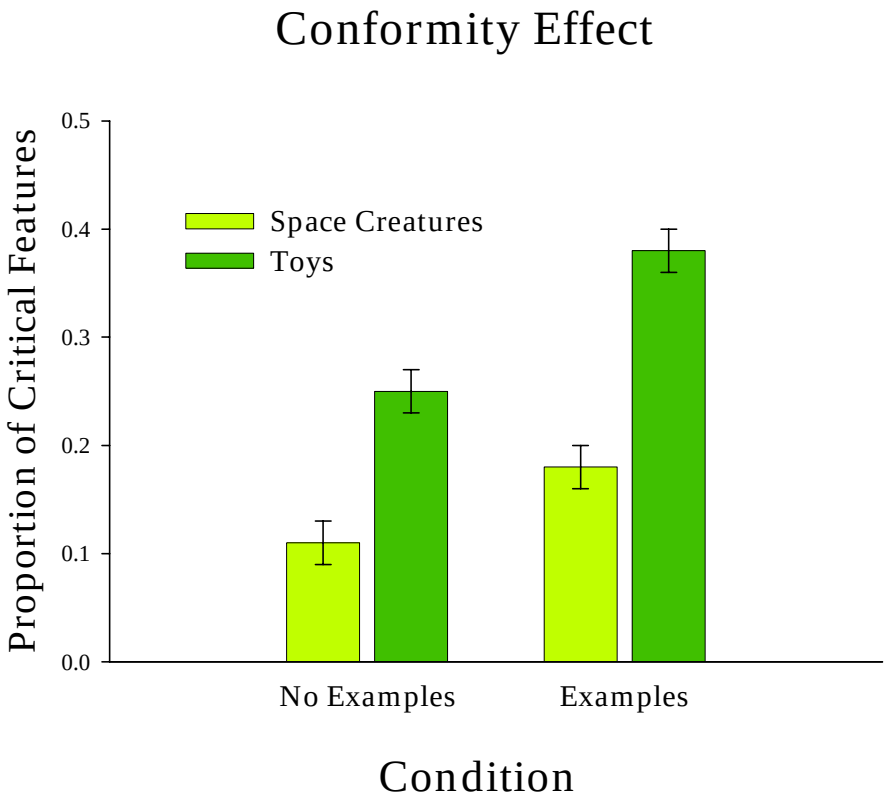
Figure 3. The colored bars represent mean proportional values of conformity to critical features of the provided examples as a function of source credibility. Standard error bars represent the variability in conformity scores within conditions.

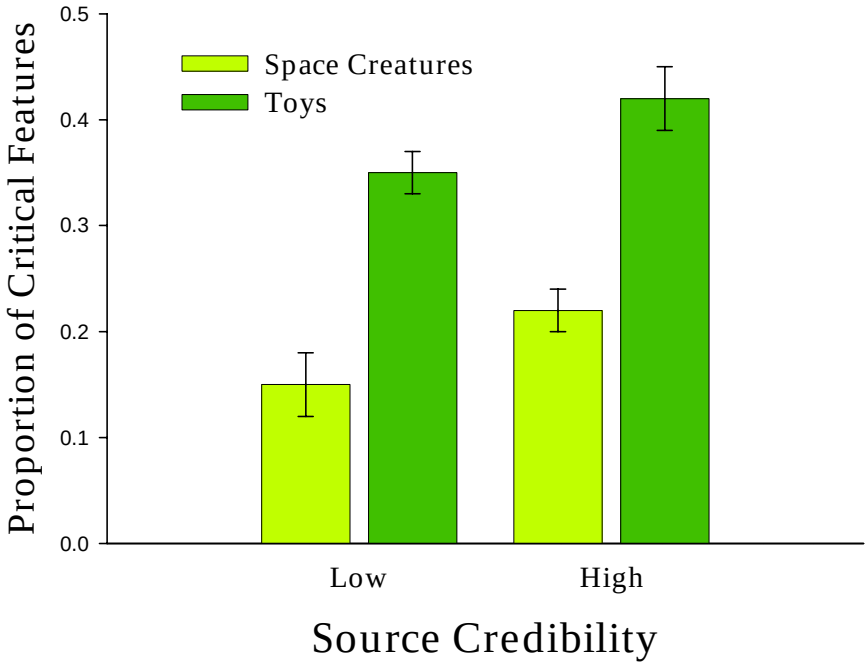


THIS TOY COMBINES EXERCISE AND FUN FOR ONE PERSON. THE SCORE COUNTER ELECTRONICALLY KEEPS TRACK OF THE NUMBER OF HITS OF THE RACQUETS.



This creature is very friendly and has a retractable neck which helps it to eat off of trees


Conformity Effect
Proportion of Critical Features
0.5
0.4
0.3
0.2
0.1
0.0
Space Creatures
Toys
No Examples
Examples
Condition


Proportion of Critical Features
0.5
0.4
0.3
0.2
0.1
0.0
Space Creatures
Toys
Low
High
Source Credibility