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Narrative Mysteries Prompt Creative Participation

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Abstract of the Dissertation

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This project demonstrates the importance of using research on creativity to enhance theories of people's experiences of narrative worlds. My goal was to expand theoretical accounts of the types of cognitive processes that narratives engage. The project addressed ways in which the occurrence of mysteries (gaps in readers' knowledge) prompts people to engage in creative thinking. The overarching claim is that authors invite readers to participate in mysteries, and readers often take up that call. As mysteries unfold in time, so too should the creative process. Therefore, I wrote a series of stories with mysteries, using the creative process as a template. I focused my analyses on two phases of the process—Illumination and verification-validation. During the illumination phase, a person recognizes one or many good possible solutions to a problem. In Experiments 1-3, I manipulated the outcomes of mysteries and the amount of time people had to process the solutions. The outcomes were motivated from the creativity literature and involved either convergent or divergent thinking. In Experiment 1, a reading time analysis

uncovered a processing difference in response to the two types of outcomes. Specifically, divergent outcomes were more difficult to process and took people longer to read than convergent outcomes. In Experiment 2, a speak-aloud paradigm demonstrated the contents of readers' creative participation in response to the outcomes at multiple time points. Convergent outcomes caused people to express certainty, make positive appraisals, and respond with self-reflections (based on long-term memory). In contrast, divergent outcomes led people to express uncertainty, make negative appraisals, and make emotional responses. Experiment 3 explored the possible attentional component of participation in the outcomes. In Experiments 4 and 5, I added an explicit verification-validation phase to the narrative mystery process. During the verification-validation phase, a person checks potential creative solutions against some standard. I manipulated that standard by adding positive and negative character reactions to the convergent and divergent illumination outcomes. In Experiments 4 and 5, I captured reading time differences and speak-aloud responses, respectively. The results suggested that people process and participate differently in response to various creative and emotional features of narratives.

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Narrative Mysteries Prompt Creative Participation

With this project, I intend to illuminate readers' creative participation in narrative experiences. Authors often craft stories that give readers opportunities to participate. I expect that readers will often take up that call by engaging their creative processes. Chiefly, I am concerned with the content and consequences of readers' creative participation.

To test these ideas, I turn to narrative mysteries, or gaps in readers' knowledge (Gerrig, Love, & McKoon, 2009). I chose to explore mysteries, because narratives often contain mysteries that give readers opportunities to participate creatively. Consider this narrative mystery (Thompson Walker, 2012):

> We drove east from the coast on the old two-lane road beneath a wide and blazing sky. My father was at work—or so he said—but he planned to meet my mother at the party. We were driving a silver station wagon, although the police report would later describe it as blue (p. 132).

Walker has created a narrative mystery that provides a context in which readers might participate creatively. Mysteries affect people's narrative experiences by prompting them to consider all types of questions and, possibly, attempt to solve the mysteries in the moment. For example, what might prompt the police report? A reader could guess that there would be a car accident. Depending on what readers preferred or expected to happen, they would likely have different narrative experiences when outcomes to mysteries are revealed and characters react to those outcomes. With my dissertation, I will explore those various possibilities from the perspective of creative cognition.

No other theory of text processing has included the construct of creative cognition (for reviews of modal theories, see McNamara & Magliano, 2009). Therefore, this line of inquiry is

meant to expand theoretical accounts of the types of cognitive processes that narratives engage and what moments in the narratives prompt the engagement. To motivate the experiments, I begin with a review of literature on narrative participation. Next, I describe the constructs of creative cognition and the creative process. After that, I explain how narrative mysteries can be modeled on the phases of the creative process. By modeling mysteries on the creative process, I am able to make predictions about readers' creative engagement. Finally, I describe experiments that examine my predictions.

Note that I intend my analyses to extend to the full range of circumstances in which people experience narrative mysteries (i.e., as viewers of films, television productions, live performances, and advertisements, as addressees for conversational stories, and so on). Although I use the term "readers" to refer to consumers of the narratives in my experiments, I intend that term as shorthand to refer to people's roles as experiencers of narrative mysteries across a full range of media.

Participation

A critical claim of the participatory perspective is that, when immersed in stories, people participate in the narratives and respond to the stories as if they were experiencing the events in the real world (Allbritton & Gerrig, 1991; Gerrig 1993). Gerrig and Jacovina (2009) reviewed the features of the participatory perspective. In their review, the authors noted that participation could be based on both automatic and strategic processes. In addition, several types of representations contribute to participation. However, Gerrig and Jacovina were careful to point out that participation goes beyond any of the standard theories of text processing. That is, the participatory perspective accounts for many additional forms of engagement that are absent in other theories. For example, readers engage with their own and characters' preferences, as well as the decisions of characters (Jacovina & Gerrig, 2010). In addition, readers participate in the problem solving of characters (Gerrig & Bernardo, 1994). Readers also feel suspense and respond to suspenseful situations in narratives (Bezdek, 2012; Bezdek, Foy, & Gerrig, 2013). Finally, people engage with and participate in mysteries (Gerrig et al., 2009; Love, McKoon, & Gerrig, 2010). The responses people make to narratives are called *participatory responses*. For example, people might (mentally) yell at a character in the movie *Jaws* (Spielberg, 1975) "Don't go in the water!" even though they know that they cannot influence the character's decision. Bezdek et al. (2013) specified that participatory responses do not add information to people's mental models of narratives. Rather, participatory responses are the products of emotional engagement.

The current project explored novel implications of the participatory perspective. I merged the concepts of participation and creativity by reimagining the role of mysteries as prompting people to engage in the creative process. Therefore, the idea that mattered most in the

context of this project was that people often do engage with mysteries overtly. Gerrig et al. (2009) demonstrated that participants engaged with mysteries by showing that mysteries continue to occupy working memory until they are resolved. However, mysteries could have many possible consequences for participation. Specifically, mysteries could cause readers to have creative experiences and generate creative thoughts.

To exemplify this claim, I will describe research by Bezdek et al. (2013). To demonstrate that viewers avail themselves of opportunities to participate, Bezdek et al. showed participants four suspenseful movie clips and instructed people to think aloud as they watched the excerpts. One of those clips was of the film *Marnie* (Hitchcock, 1964). In an early scene, Marnie robs an office safe and is trying to leave a building without being caught. As she begins to exit, Marnie sees a cleaning lady and is visibly worried that the cleaning lady will thwart her escape. Undaunted, Marnie acts creatively, removes her high-heel shoes, and puts them in the pockets of her jacket. But the shoes begin to slip out! To make this fact salient to viewers, Hitchcock intercuts close-ups of the slipping shoes with wider shots of an unaware Marnie. And then a shoe falls!

This moment from *Marnie* provides viewers with an optimal opportunity to encode participatory responses. Gerrig and Wenzel (in press) suggested that people might engage in narratives with creative thinking. In fact, many of the verbal responses to the scene from *Marnie* revealed that people were engaged creatively. For example, one participant said:

> That's what I thought she should do. She should take her shoes off so no one hears her. She's probably going to slip on the water or her shoe's going to drop. Good one…she should've held them.

This viewer initially assessed the situation and agreed with Marnie's creative decision to take off her shoes to escape. However, the viewer then generated two possible unforeseen problems that might result from Marnie's action. When one of those unforeseen problems manifested in the clip, the viewer expressed a sense of validation for thinking creatively. Finally, the viewer produced an alternate creative solution to Marnie's problem that might have worked better.

After Marnie's shoe drops, the cleaning lady does not hear the sound, and Marnie is able to get away undetected. At that point in the film, some viewers added creative material that indicated they had recognized the presence of a mystery and then attempted to solve that mystery. For example, one participant said, "How'd she not even notice that? She must be like a deaf old woman." In the following scene, viewers find out that the cleaning woman is, in fact, hearing impaired. The viewers' responses, in the project by Bezdek et al., provide preliminary evidence that people participate creatively in narratives. However, their goal was to define a taxonomy of responses to suspenseful narratives, and not to show how narratives might cause people to participate creatively.

The current project expanded the participatory perspective in two ways. First, I examined how narrative mysteries prompted creative participation. This analysis added the perspective of creative cognition to theoretical accounts of narrative participation. Second, I showed how various features of narrative mysteries caused readers to participate by prompting different types of creative thinking.

Creative Cognition

I expected mysteries to prompt people to participate in narratives by engaging two types of creative thinking—*divergent thinking* and *convergent thinking* (Eysenck, 2003; Guilford, 1959). Essentially, divergent thinking breaks new mental ground and convergent thinking makes appropriate connections. Divergent thinking is responsible for novelty and allows people to form many solutions to problems with ill-defined answers. Consider a person who has two constraints when planning a vacation—a $2000 budget and a one-week window of opportunity for travel. A person engaged in divergent thinking should generate a relatively long list of possible vacation plans that might allow him or her to work around the constraints of the situation.

Although novelty is the main measure for divergent thinking ability, one might also consider fluency and flexibility of responses (e.g., Torrance, 1962). To exemplify what fluency and flexibility might mean, I turn to a classic divergent thinking test, known as the Alternate Uses Task (Getzels & Jackson, 1962; Guilford, 1967; Wallach & Kogan, 1965). For the Alternate Uses Task, people must generate many uses for common objects, such as a brick. Fluency is the number of separate idea units produced by a person. A person who generates twenty different uses for a brick would be highly fluent. In contrast, a person who generates just two uses for a brick would not be very fluent. Flexibility is the number of different categories represented within those idea units. For example, a category of uses for a brick might be *to stack* the bricks in some way. A less flexible person might stack the bricks to make a wall, stack the bricks to make a fence, and stack the bricks to make a fireplace. However, a highly flexible person might also generate additional categories such as *to grind* the brick, *to throw* the brick, *to stand on* the brick, and *to bury* the brick—all for various purposes.

The second type of creative thinking is convergent thinking. It is responsible for appropriateness and is combinatorial in nature. Convergent thinking helps to fuse ideas, pull concepts together, and find solutions to problems with only one well-defined answer. For example, a person engaged in convergent thinking would likely choose the most appropriate vacation plans based on the $2,000 budget and one-week window of opportunity. The person engaged in convergent thinking might plan a faster route to and from the destination and form a more appropriate itinerary with which to structure the trip within the limits of the situation. The seminal convergent thinking test is known as the Remote Associates Test (Bowden & Jung-Beeman, 2003; Mednick, 1962). The Remote Associates Test requires people to make distal word associations. For example, an individual would be challenged to generate the correct word that connects these three words—crab, pine, and sauce. The correct response is *apple*, because it forms crabapple, pineapple, and applesauce.

Most often, people must use both divergent and convergent thinking to be truly creative. If a person is able to navigate between engagement with both divergent and convergent thinking, he or she might generate many novel vacation destinations. In addition, he or she will be able to form an efficient plan. Essentially, the creative person who is able to juggle both divergent and convergent thinking might be able to arrange a trip to go bird watching in the Himalayas for under $2000 and make it happen within the one-week time frame.

When acting creatively, people typically undergo a multi-phase process. The classic model of the creative process, originated by Wallas (1926), has four phases—preparation, incubation, illumination, and verification. Preparation involves defining and setting up the problem to be solved. Incubation is the part of the process during which people step away from actively engaging with a problem but continue to work on the problem unconsciously. During

incubation, people might form associations and idea combinations, reject bad ideas, and isolate good ideas. The next phase is illumination, during which people have an aha-moment where the best possible solution generated during incubation leaps from the unconscious mind into the conscious mind. Finally, verification involves conscious work on the solution that includes evaluating, refining, and developing ideas.

Drawing on the Wallas model, Cropley and Cropley (2008) introduced an updated seven-phase model and explicitly noted the importance of a person's ability to engage in both divergent and convergent thinking throughout the creative process. In addition, the creative person should be able to move through the seven phases of the creative process, changing approaches to suit the demands of each phase.

As shown in Figure 1, the first phase of the Cropley and Cropley model was preparation, which involved acquiring knowledge of a particular domain or context. The second phase was activation and required problem finding, goal setting, and specifying solution criteria. The third phase was cogitation. Cogitation contrasts with incubation in that during cogitation, both conscious and unconscious processes might work together to make associations and see implications of problems and solutions. The fourth phase was illumination, during which a person recognizes good possible solutions to a problem. The fifth phase was verification in which a person checks potential solutions against some standard. The sixth phase was communication when a person reveals their position or solution to a problem. Finally, the seventh phase was validation. In the validation stage, judges should be charged with either accepting or rejecting the final product and making their assessment known to the inventor. If the product of the creative process was good (i.e., novel and appropriate), the judges should encourage the inventor to continue generating ideas. The person engaging in the creative process

might choose to stop at some point and start over again or continue through to completion. For example, a person might choose to stop at cogitation and return to preparation if they do not have sufficient background knowledge to make associations or see implications.

Cropley and Cropley noted that preparation was convergent. Activation was divergent. Cogitation was divergent. Illumination was convergent, and verification was convergent. However, there might be various ways for authors to construct the experience of illumination. In addition, there might be different ways for authors to construct the experiences of verification and validation. With this project, I explored the possibility that illumination could be convergent or divergent. In addition, I examined how the standard by which a person verifies and validates the products of illumination could be neutral, positive, or negative. I did so in the domain of narrative mysteries.

Mysteries Guide the Creative Process

In this section, I will explain how the phases of the creative process readily map onto the stages of narrative mysteries. By following the phases of the creative process, narrative mysteries should successfully prompt readers to engage in creative thinking. In the sections that follow, I will describe each phase and how mysteries model those phases of the creative process. In addition, I will describe relevant implications at each stage for prompting readers' creative participation. Although each phase is important for creative participation, I focused the majority of my analyses on two phases—illumination and the combined phase of verification-validation. I believed those were the most efficient phases in which to manipulate and capture the effects of readers' creative participation. When I get to each of those subsections, I will explain my perspective in more detail.

Preparation phase. The preparation phase involved the process of acquiring knowledge of a particular domain or context. The purpose of the preparation phase in the current project was to develop a narrative backdrop on which people could participate. In my project, all stories contained a preparation phase. The preparation phase was the longest part of the stories.

Consider a story that I wrote for this study about two characters, Lucy and Daryl. The background phase of the story read:

> Lucy and Daryl had been dating for several years and were madly in love. One afternoon, Daryl and Lucy took a walk in the park where they had gone on their first date. When they got to a scenic spot, Daryl held Lucy's hand and asked her if she would like to go to a fancy dinner with him at their favorite French restaurant. Lucy gladly accepted the invitation to go on such a romantic date. That night, Daryl picked Lucy up at her apartment. He complimented Lucy on her outfit and said, "You look beautiful tonight, as

usual." When they arrived at the restaurant, the host seated them at a table by the window that overlooked a charming pond. The couple ordered a bottle of red wine and began talking about what they would have for dinner.

In this case, the background phase set the expectation that Daryl was likely going to propose to Lucy or, at least, make some other type of grand romantic gesture.

Activation phase. The activation phase involved problem finding, goal setting, and specifying solution criteria. The purpose of the activation phase in the current project was to offer a natural invitation for readers to participate in the mysteries. Like the preparation phase, all stories in this project contained an activation sentence.

In my story about Lucy, the activation phase read, "Daryl felt nervous as they talked, because he was concealing something under his coat. The object dug sharply into the left side of his ribcage." During activation, I expected people to participate by starting to generate possible solutions to the primary mystery of what Daryl was going to give Lucy.

Cogitation phase. During the cogitation phase, people might use both conscious and unconscious processes to make associations and see implications of problems and solutions. In this project, the purpose of the cogitation phase was to give readers a moment to reflect and think consciously and unconsciously about the mysteries. Like the previous phases, all stories in this project contained a degree of cogitation. Without cogitation, the probability that people would participate was likely reduced.

In the story of Lucy, the cogitation phase read:

It was a gift that he could not wait to give Lucy. Daryl was never good at keeping secrets from her, so he quickly put the box on the table. When she saw the box, Lucy almost

jumped out of her seat. Lucy got even more excited as Daryl handed her the package. She opened it and examined the contents for a moment.

During cogitation, I expected people to narrow down the possible gifts that Daryl might give Lucy. They would likely have generated a possible solution, such as "Daryl is going to give Lucy a diamond ring."

Illumination phase. During the illumination phase, a person recognizes one or many good possible solutions to a problem. In this project, each problem was a mystery that must be solved. Therefore, the purpose of the illumination phase was to present outcomes that resolved each mystery. This should have increased the chances that readers would recognize and then take up the call to participate creatively. There is evidence that readers participate in the decisions of characters (Jacovina & Gerrig, 2010) and problem solving for characters (Gerrig & Bernardo, 1994). Therefore, I also expected readers to participate in the outcomes that affected characters.

During the illumination phase, I implemented my first experimental manipulation. I focused my efforts on cases in which outcomes converged with or diverged from the prior context. That is, I structured the illumination outcomes in my stories on the two types of creative thinking. Both were relevant to readers' experience of mysteries. Specifically, convergent outcomes were appropriate and matched the narrative context. An example of a convergent outcome from my story about Lucy read, "The box contained a ring." In contrast, divergent outcomes were novel and mismatched the prior context. An example of a divergent outcome read, "The box contained a gun." It is important to note that both outcomes were possible in the real world.

During the illumination phase, I expected people to continue generating responses that engaged creative processes consistent with the outcome. For example, when Lucy received a ring, someone said:

> I think it was pretty sweet. Uh, he didn't really ask her the question "will you marry me." Just put the ring on the table I guess, and she picked it up, and I guess she really wanted to marry him. She- they- they seem like they're in love. One thing I would like to say is that, uh, when you tell a women that you are beautiful you don't say you are beautiful as always. You wanna-you want it to be that every time you say you are beautiful it seems as if it is the first time you've actually seen her. Not like "Yo, you are beautiful like always." Like I mean really? Like always?

This person (I will call him Carl) generated many creative ideas in response to the story about Lucy. Specifically, he expressed ideas that were convergent in nature. First, Carl made a positive appraisal by saying how sweet the scene had been. Then, he reflected on how to give a proper compliment to a woman. He was certain in his convictions and in his understanding of the narrative.

When Lucy received a gun, someone else said:

> Hopefully it's the first date, um, because Lucy better start running. [Daryl] seems like a bit of a psychopath. Unless…there's really no unless. It's just he's…It's a little crazy, uh, seeing a gun, especially at a restaurant in front of everyone. Um, other people will just probably call the cops on him. Better run Lucy!

This person (I will call her Deb) also generated many creative ideas in response to the story. However, Deb took a much different approach than Carl when responding creatively. Specifically, she expressed ideas that were divergent in nature. First, she made a negative

appraisal of Daryl by calling him a psychopath. Then, she made an emotional plea for Lucy to run. She displayed a hint of uncertainty about the whole situation.

I examined the effects of the illumination manipulation by capturing reading times (Experiment 1), speak-aloud responses (Experiment 2), and response times to a visual secondary task probe (Experiment 3). These measures helped me to assess the consequences and contents of readers' creative participation through the stage of illumination.

Verification-validation phase. During the verification-validation phase, a person checks potential solutions against some standard. In this phase, judges are charged with either accepting or rejecting the final product and making their assessment known to the inventor. In my proposed model, I have combined verification and validation into a single stage. In this phase, readers had the opportunity to check their creative contributions against the standard provided by the story and judge each contribution's relative worth. In that sense, readers were both creators and judges of their own products.

In Experiments 1 to 3, readers encountered characters who considered the implications of each outcome. For example, the story about Lucy read, "She realized exactly what this moment would mean." I called these sentences *neutral* verification-validation sentences, because the character did not provide any explicit judgment about the outcome. In that case, there was no standard by which readers could interpret their own expectations and reactions to the outcomes. The sentence only provided more time for people to engage in the creative process and consider the outcomes.

For Experiments 4 and 5, I modified the stories so that readers encountered characters who explicitly indicated verification-validation. Specifically, I implemented my second manipulation by having characters make either positive or negative emotional reactions. In the

story about Lucy, the positive reaction read, “Lucy proclaimed to Daryl, ‘I will always cherish you for this.’" The negative reaction read, “Lucy proclaimed to Daryl, ‘I will always despise you for this.’" A character’s explicit verification-validation should have set the standard by which readers could judge the outcomes. As a result, readers could use that standard to evaluate their own expectations and reactions.

In Experiments 4 and 5, I expected positive and negative reactions to cause readers to participate differently in response to convergent and divergent outcomes. Readers likely expected characters to make positive reactions to convergent outcomes and negative reactions to divergent outcomes. I examined the effects of the explicit verification-validation manipulation by capturing reading times (Experiment 4) and speak-aloud responses (Experiment 5). These measures helped me to assess the consequences and contents of readers’ creative participation through the stage of verification-validation.

Communication phase. During the communication phase, people reveal their position or solution to a problem. The purpose of the communication phase in the current project was to give readers the opportunity to communicate responses to narrative mysteries. In Experiments 2 and 5, the communication phase was similar to the task used by Bezdek et al. (2013) that had participants speak aloud their thoughts. With this project, I focused on readers’ communication following illumination and neutral verification-validation sentences (Experiment 2) and explicit verification-validation sentences (Experiment 5) to provide evidence for the creative content of readers’ participation.

Summary

In this introduction, I explained that I used mysteries as a means to examine creative participation in narratives. I described the participatory perspective, creative cognition, and how mysteries guide the creative process. In addition, I made general predictions about creative participation at various phases of the process. To test my predictions, I designed five experiments that sought to capture differences in how people participated during the phases of illumination and verification-validation.

In Experiments 1 to 3, I manipulated illumination outcomes. People either experienced a convergent or divergent outcome for each story. Convergent outcomes likely matched whereas divergent outcomes likely mismatched the content of people's prior creative participation during the earlier phases of activation and cogitation.

For Experiment 1, I predicted that divergent outcomes would engage more divergent thinking, and convergent outcomes would engage more convergent thinking. I predicted that divergent thinking would be more time-consuming than convergent thinking. That is, I expected that it would be more difficult for people to break new mental ground than to makes appropriate connections. I measured reading times to test my prediction.

For Experiment 2, I expected convergent versus divergent outcomes to cause people to participate creatively in different fashions. Further, I expected an effect of fluency and flexibility in how people would respond based on how long they had spent in the creative process. To test these predictions, I collected verbal responses to audio stories immediately following illumination outcomes, and one sentence later after neutral verification-validation sentences.

For Experiment 3, I predicted there would be attentional consequences of participation in response to outcomes. I will explain why I believe that to be the case in the introduction to

Experiment 3. In this experiment, I measured response times to a visual secondary task probe to capture the possible attentional effects of participation.

In Experiments 4 and 5, I added an explicit verification-validation phase in which characters made positive or negative reactions to outcomes. This gave people a standard by which to judge their own reactions. I expected positive reactions to match how people participated in convergent outcomes and mismatch how they participated in divergent outcomes. In contrast, I expected negative reactions to match how people participated in divergent outcomes and mismatch how they participated in convergent outcomes.

For Experiment 4, I predicted that matching outcome-reaction pairs would be easier for people to process than mismatching outcome-reaction pairs. That is, I thought mismatching pairs would require more divergent thinking, which would take longer compared to convergent thinking. To test that prediction, I conducted another reading time study. For Experiment 5, I conducted another speak-aloud study to capture people's verbal responses to audio stories that contained the outcome-reaction pairs. I predicted that people would participate differently in relation to the outcome-reaction pairs. Again, I expected there to be effects of fluency and flexibility in how people responded.

Experiment 1

The purpose of Experiment 1 was to demonstrate that divergent outcomes to narrative mysteries would cause readers to slow down, relative to convergent outcomes. I expected divergent outcomes to take longer to process, because they would tap divergent thinking processes. I expected that it would be more difficult for people to break new mental ground than to make appropriate connections. I tested my prediction by recording reading times.

Method

Participants

Participants in Experiment 1 were 27 Stony Brook University undergraduates who participated for partial course credit. I removed three participants due to computer error, two for failing to do well enough on a series of comprehension questions (i.e., they answered less than 80% correct), and two for not finishing the experiment in the allotted time. That left 20 participants.

Materials and Apparatus

Experimental stories. There were 16 experimental stories, each of which contained a primary mystery. The mysteries were always about an object that was hidden in a specific container. There were two possible objects for each container—one convergent and one divergent. For example, in the story about Lucy and Daryl, Daryl concealed either a ring (convergent) or a gun (divergent) in a box. I matched the convergent and divergent objects for number of words and syllables.

Each experimental story included the creative process phases of preparation, activation, cogitation, illumination, and neutral verification-validation. During the phases of preparation, activation, and cogitation, stories presented background information to establish a context,

introduced the primary mystery by describing a container that hid an object, and added some details to allow readers to make associations. During the illumination phase, a convergent or divergent outcome solved the primary mystery. After the illumination outcome, a neutral verification-validation sentence described characters considering implications for the object that they had found in the container. Then, the stories ended with three more neutral sentences. See Appendix A for sample stories.

Three true-false comprehension questions accompanied each experimental story. I randomly chose eight stories to have two true answers and one false answer. The other eight stories had one true answer and two false answers.

Filler stories. There were eight filler stories. I included filler stories to limit the possibility that people would guess the purpose of the experiment. Like the experimental stories, the filler stories contained a primary mystery. In addition, the filler stories were loosely structured on phases of the creative process. That is, the stories contained a preparation phase, an activation phase, and a cogitation phase. However, the stories did not include the illumination or verification-validation phases. As such, the primary mysteries in the filler stories were never solved. For example, one story was about a character named Cheryl who burned down a bush while at a party. The story mentioned that the other people at the party wondered how Cheryl accomplished such a ridiculous feat, but the story never gave the solution to that mystery. In another filler story, a dog named Rover barked wildly during the night to get outside into the backyard. His owner let him outside and heard a series of unidentifiable noises. The story never solved the mystery of what was outside, even though it was clear that Rover's owner wanted to know what was happening out there.

Each filler story was accompanied by three comprehension questions. In the same way that comprehension questions related to experimental stories, half of the filler stories had two true answers and one false answer, whereas the other half had one true answer and two false answers.

Practice stories. There were two practice stories with corresponding comprehension questions. The practice stories were in the same format as the filler stories.

Apparatus. I presented the stories with a Dell Optiplex desktop computer and keyboard, using DirectRT software. The text appeared on a black background in white 16-pt font.

Design and Procedure

Design. Experiment 1 had two conditions. I counterbalanced and randomly assigned the experimental stories across conditions with a Latin Square. As such, each condition had eight mysteries with convergent outcomes and eight with divergent outcomes.

Procedure. After giving informed consent, participants read instructions on the computer that said:

> In this experiment you will read stories presented on the screen one sentence at a time. During the stories, press the spacebar to advance forward after reading each sentence. Please read the stories as you would normally read a story, quickly but still processing all the information. If you need to take a break, do so when the screen says, "press the spacebar to advance to the next story." After each story, you will be presented with several statements, and the instructions will be accompanied by a beep. If a statement is true, press the key labeled "yes" on the keyboard. If a statement is false, press the key labeled "no" on the keyboard. Press any key to continue.

After reading the instructions, participants read the practice stories to acclimate to the procedure. Participants read stories one sentence at a time. To move from one sentence to the next, they pressed the spacebar. After reading each practice story, they answered the comprehension questions in randomized order. Participants heard a short beep and answered the comprehension questions by pressing the / key labeled *Yes* or the Z key labeled *No*. At the end of the practice stories, participants read, "The practice stories are done. Let the experimenter know if you have any questions. Press the spacebar to read the first story." The experimenter answered any questions participants might have had.

Finally, each participant read the experimental and filler stories in a different random order and answered the corresponding comprehension questions. At the end of the experiment, the experimenter debriefed participants. Experiment 1 took less than an hour to complete.

Results and Discussion

To prepare the data for analysis, I pruned reading time outliers by condition. To do so, I removed reading times that were less than 300 ms. In addition, I removed reading times that were more than 3 *SD*s above each condition mean. As a result, I removed five data points out of 320 total observations, or 1.56% of the data. I conducted separate repeated-measures ANOVAs on the outcome sentences, using participants (F_1) and items (F_2) as random variables.

The goal of Experiment 1 was to demonstrate that divergent outcomes would cause readers to slow down, relative to convergent outcomes. To test the difference between divergent and convergent outcomes, I conducted a two-way mixed repeated measures ANOVA with reading times as a within-subjects factor and condition as a between-subjects nested factor. As predicted, there was a significant main effect of outcome type, such that reading times were longer for divergent outcomes (M=1759.94, SD=480.63) than convergent outcomes (M=1282.51,

SD=329.91) (F_1(1,18)=37.64, *MSe*=2,279,397.46, p<.001; F_2(1,14)=39.82, *MSe*=1,798,003.18, p<.001).

The results of Experiment 1 suggested that divergent outcomes did tap divergent thinking processes, and divergent thinking was more time consuming than convergent thinking. However, I could not be confident that differences in creative thinking contributed to the reading time effect until I uncovered the content of people's responses. Therefore, I designed my second experiment to assess the contents of people's thoughts in response to the convergent and divergent outcomes.

Experiment 2

The purpose of Experiment 2 was to capture the actual content of people's creative participation that could explain the reading time difference in Experiment 1. I conducted a speak-aloud experiment in which people listened to audio versions of stories and generated verbal responses at two critical points—directly following the convergent or divergent outcomes, or one sentence later after the neutral verification-validation sentences.

There has been a long history of research that primed creative thinking for various purposes (for reviews, see Ma, 2006; Scott, Leritz, & Mumford, 2004). According to the priming perspective on creativity, divergent and convergent thinking are malleable skills that can be changed and enhanced by different types of interventions. For example, Fischer and Hommel (2012) primed divergent and convergent thinking to examine how divergent thinking (Alternate Uses Task) and convergent thinking (Remote Associates Test) might affect attention during multi-tasking. Then, participants performed two tasks in which they made judgments about whether a number stimulus was larger or smaller than five. The results suggested that divergent thinking made people more flexible when switching between the two tasks. My project drew upon such successful demonstrations of priming of convergent and divergent thinking. In my experiments, I expected the convergent outcomes to prime convergent thinking and divergent outcomes to prime divergent thinking. The different creative mindsets should have had various consequences for how people participated in stories.

To make predictions for convergent and divergent mindsets, I also drew upon research that has documented individual differences in creativity. When being creative, people use some combination of divergent and convergent thinking. However, not everyone is good at being divergent and not everyone is good at being convergent. Research suggests that individuals

often have stable preferences that predispose them either to be better at convergent or divergent thinking. For example, Rickards and Puccio (1992) suggested that innovators are associated with divergent thinking strategies, and adaptors are associated with convergent thinking strategies. Innovators question assumptions, lack discipline, and approach tasks from unusual angles whereas adaptors are disciplined, methodical, and predictable. Innovators create by threatening the system whereas adaptors create by working within a given system (Kirton, 1976, 1987). The term "system" applies to the general rules and norms of a particular domain. Further, Brophy (2001) demonstrated that divergent thinking is related to extraversion and intuition preference (i.e., the desire to induce generalized conclusions from particular concepts). On the other hand, convergent thinking is related to introversion and reasoning preference (i.e., the desire to deduce particular conclusions from general notions).

To make specific predictions for how people would participate in response to convergent and divergent outcomes, I explored the consequences of these mindsets within an established taxonomy of participatory responses (Bezdek et al., 2013). However, Bezdek et al. did not base their predictions on individual differences in creativity and did not intend to capture creative participation. Therefore, I had to add or modify several categories of responses to encompass the special considerations of creativity. Notable additions to the previous taxonomy included the categories of certainty and uncertainty. In addition, I changed the categories of positive and negative character evaluations to capture a more general sense of positive and negative appraisals of the system (i.e., judgments of characters, the narrator, the story, situations, and so on). Finally, I included self-reflections to capture a general memory-based and reasoning component of people's responses. See Table 1 for the complete set of possible response categories, definitions, and examples.

I expected convergent outcomes to cause people to act like convergent thinkers (adaptors), such that their responses would mimic the traits of convergent thinkers. I predicted that convergent outcomes would lead people to be disciplined, methodical, and predictable in their approach to the speak-aloud task. Those types of thinking should have manifested as certainty in people's responses. I also expected that convergent outcomes would cause people to work within the system. As such, I predicted that people who encountered convergent outcomes would make more positive appraisals to align with the system. Finally, recall that convergent thinking is related to introversion and reasoning preference. Therefore, I predicted that convergent outcomes would prompt people to respond with more self-reflections based on internal memory representations and reasoning strategies.

In contrast, I expected divergent outcomes to cause people to act like divergent thinkers (innovators), such that their responses would mimic the traits of divergent thinkers. I predicted that divergent outcomes would lead people to question assumptions, lack discipline, and approach stories from unusual angles. That should have manifested as uncertainty in people's responses. In addition, I expected people who encountered divergent outcomes to function creatively by threatening the system. As such, I predicted that divergent outcomes would cause people to make more negative appraisals. Finally, recall that divergent thinking is related to extraversion and intuition preference. Therefore, I expected people who encountered divergent outcomes to adopt a style of extraversion and intuition that would lead to more emotional responses.

I had one additional set of expectations for creative participation in this experiment. I predicted that as people spent more time engaged in the creative process, they would make more fluent and flexible responses. When people responded after the neutral verification-validation

sentences, as compared to immediately following the outcomes, I expected them to experience less time pressure and have more of an opportunity to engage in critical information processing. As such, people should have been more fluent and flexible when they responded after the neutral verification-validation sentences than immediately following the outcomes.

Method

Participants

Participants in Experiment 2 were 20 Stony Brook University undergraduates who participated for partial course credit.

Materials and Apparatus

Experimental stories. The 16 experimental stories were audio recordings of the 16 experimental stories used in Experiment 1.

Recording the experimental stories. To create the audio stories, I directed a female narrator to first record the convergent and divergent outcome manipulation words in a randomized order. She did so prior to reading any of the stories so that she was naïve to the story contexts in which the words would be embedded. The narrator annunciated the words enthusiastically, as if reading them to first grade students.

Next, the narrator read the 16 experimental stories in a random order. Her goal was to read the stories with natural inflection and dynamics but also to maintain an overall consistent volume and tempo. As she read, I monitored the volume through headphones and by watching a visual volume meter on the computer screen. If the narrator made a mistake while reading a sentence, she continued reading from the beginning of that sentence. I marked on a printed script where to edit any mistakes during post-production. When the narrator reached the manipulation sentence in each story, she read up to the word prior to the manipulation word (e.g., “The room

inside was filled with…"), and then she paused. After a brief pause, she continued on to the neutral verification-validation sentence and through the end of the story.

After the manipulation words and stories were recorded, I fixed any mistakes that occurred during recording and performed a rough mastering of the volume across tracks to ensure consistent volume across stories. In addition, I cut and pasted the convergent and divergent outcome manipulation words into the stories to create two versions of each. I made sure to match the volume, onset, and duration of manipulation words across the different versions of each story.

Probe positions for the experimental stories. The goal of having probe positions was to allow for two breaks in each story where a visual speak-aloud probe would appear. For the experimental stories, I randomly chose the first probe point for each story that came at the end of a sentence and occurred somewhere after the first three sentences of the story. In addition, the first probe point came before the illumination sentence and had at least three full sentences between it and the start of the illumination sentence. The first probe in each story was filler and was meant to keep participants engaged prior to the critical second probe. I strategically varied the second probe point, which occurred in two possible positions. That is, the second probe position came either directly after the outcome of the mystery (immediate) or after the neutral follow-up sentence (delayed).

I formed immediate and delayed probe versions of each convergent and divergent story by splitting the stories into three segments. The first segment was always from the beginning of a story to the first randomly chosen probe position. The second segment was from the first probe position to the second probe position that either immediately followed the illumination outcome

or was delayed until after the neutral verification-validation sentence. The third segment was from the second probe position to the end of the story.

Practice stories. There were two practice stories. The practice stories were audio versions of the same practice stories used in Experiment 1.

Recording the practice stories. The same female narrator, again, read each story enthusiastically as if reading to children. As before, I directed her to control volume and tempo. There was no need for the narrator to pause during the practice stories, so she always read non-stop from beginning to end. I dealt with errors in the same way as the experimental stories. I mastered the volume of practice stories to be consistent with the experimental stories.

Probe positions for the practice stories. For the practice stories, I randomly chose two probe points that occurred between sentences after the first three sentences of each story. In addition, at least three sentences separated the probe positions, and a probe could not come after the final sentence. I split the stories into three segments at the probe positions.

Visual probe. The visual probe was a 10”x10” light blue box with the words “Speak Your Thoughts” in white 100-pt font and “You have one minute, or you can press the spacebar to continue when you are sure you are done speaking” in white 18-pt font.

Apparatus. I presented the audio stories and visual probes through a Dell Optiplex desktop computer using DirectRT software, with stereo audio playback from speakers on each side of the screen. I used a Telex M-560 microphone to record participants’ verbal responses.

To record the audio stimuli, I used a MacBook Pro laptop computer, Audible Live Lite 8 recording software, a Focusrite Sapphire 6 USB audio interface, an XLR cable, Audix ADX51 condenser microphone with phantom power, a tripod microphone stand with boom, and headphones. I added a subtle reverb effect on the tracks for warmth.

The experiment also used Audacity audio software to listen to participants' responses for the purpose of transcription.

Design and Procedure

Design. Experiment 2 had four conditions with a 2x2 design. I counterbalanced and randomized the experimental stories across conditions with a Latin Square. As such, each condition had eight mysteries with convergent outcomes and eight with divergent outcomes. In addition, I paired convergent and divergent outcomes with a probe that appeared immediately after the outcome or was delayed until after a neutral verification-validation sentence that came one sentence later. I also counterbalanced and randomized the probe positions across conditions. Then, I randomized the order of the stories and assigned story types to the conditions of convergent-immediate probe, convergent-delay probe, divergent-immediate probe, and divergent-delay. Therefore, each condition had four convergent stories with immediate probes, four convergent stories with probes that appeared after the neutral verification-validation sentence, four divergent stories with immediate probes, and four divergent stories with probes that appeared after the neutral verification-validation sentence. This completed the 2x2 design.

Procedure. After participants gave informed consent, the experimenter reviewed the instructions with each participant. Participants read instructions on the computer that said:

> In this experiment you will listen to a series of audio stories presented through the speakers. Listen to the stories carefully as you would normally listen to stories, enjoying them but still processing all the information. At various points throughout the stories, a blue box with the words "Speak Your Thoughts" will appear on the screen. When you see the blue box, begin speaking any and all thoughts you might have. Say whatever you are thinking at that moment. There are no right or wrong things to say.

> Speak at a conversational volume, and the microphone will pick up what you say. You will have up to one minute to speak your thoughts. If you are absolutely certain that you have nothing more to say before time is up, press the spacebar to continue. If you have any questions during the experiment, feel free to ask the experimenter. However, please do so between stories, when the screen says, "The End. Press the spacebar to begin the next story." We will begin with some practice stories. Press the spacebar to continue.

Next, participants completed the practice stories. They listened to the stories and, when each story paused and the visual probe appeared, participants spoke responses out loud. The experimenter stayed in the room with participants during the practice stories. The experimenter used several phrases during the practice stories. If a participant successfully spoke their thoughts (i.e., said anything at all), the experimenter used phrases like "good" and "okay" to signal participants that they were doing the task correctly. If the participant did not speak when the visual probe appeared, the experimenter would say something along the lines of, "What are you thinking? Say whatever is on your mind. There are no right or wrong things to say." If the participant spoke too softly, the experimenter asked the participant to please speak up. In addition, participants had the opportunity to ask any questions they might have had. Only a few participants had questions, such as "How many stories will I listen to?" or "Should I only talk about the stories?" The experimenter answered questions about the number of stories by saying something like "You'll be listening to a decent number of stories, but you will have plenty of time to finish." The experimenter answered questions about whether responses should focus only on the stories by saying something like "That might often be the case but, again, there are no right or wrong things to say. Say whatever comes to mind." At the end of the practice

stories, participants read, “The practice stories are done. Press the spacebar to continue with the experiment.”

Finally, participants completed the experimental stories. Each participant listened to the stories in a different random order. Participants spoke aloud when the stories paused and the visual probe appeared on the computer screen. Whenever they finished speaking, they pressed the spacebar to continue the stories. At the end of the experiment, the experimenter debriefed participants. Experiment 2 took less than an hour to complete.

Results and Discussion

Transcription and coding of verbal responses

To begin the analyses, I had coders transcribe the verbal responses and then sort them into the various response categories. Three coders used Audacity audio software to listen to participants’ verbal responses (32 responses x 20 participants = 640 total responses). The coders worked as a team, splitting the workload roughly equally, to transcribe each verbal response into text. After transcribing the responses as a team, the coders split up to categorize their own complete set of responses. For each coder’s set of responses, I stripped subject and condition numbers to keep coders blind to that information. Next, I separately randomized the order of all 640 responses for each coder. Before doing any actual coding, the coders studied the list of pre-established categories and definitions that I had modified from Bezdek et al. (2013) (see Table 1). After studying the category definitions, coders worked sequentially through the responses. First, coders counted the number of discrete idea units in a response. Then, coders classified the ideas into one or more categories. Note that it was possible for individual idea units to fit into multiple categories. I instructed coders that if they had to debate whether a response fell into a

specific category then there was likely some evidence pointing to the response fitting that category. Therefore, they should code the response as having fit into that particular category.

When all coders finished coding the entire set of responses, I tested the extent to which the coders agreed with one another. I calculated a two-way random effects intraclass correlation coefficient for average measures of absolute agreement (Landers, 2011; Nichols, 1998; Shrout & Fleiss, 1979). The results showed that 74.5% of the variance in the category coding was picked up by the three coders, ICC(2,3) = .745. I resolved all differences in coded responses between coders by a majority rule. That is, if at least 2/3 of the coders had, or had not, placed a response into a specific category, then that is how I coded the response. For example, if at least 2/3 of the coders said a response fit into the uncertainty category, then I counted that response as having been uncertain. However, if only one coder said a response fit into the uncertainty category, then I did not count that response as uncertain. All responses met these criteria.

The overall goal of Experiment 2 was to demonstrate that convergent outcomes would cause people to respond like convergent thinkers and divergent outcomes would cause people to respond like divergent thinkers. I made specific a priori predictions for certainty and uncertainty, positive and negative appraisals, self-reflections, and emotional reactions. I report data for each category of responses as percentages. In addition, I made predictions for fluency (i.e., number of idea units) and flexibility (i.e., number of categories). For each category of responses, I will provide a reminder about my specific predictions in the relevant sub-sections.

Certainty and uncertainty

I predicted that convergent outcomes would prompt people to make more certain responses. In contrast, I predicted that divergent outcomes would prompt people to make more uncertain responses. My predictions were based on previous studies that have primed

convergent and divergent thinking, as well as literature on individual differences in creativity. That is, I expected convergent outcomes to prompt convergent thinking and divergent outcomes to prompt divergent thinking. In addition, I expected that convergent outcomes would cause people to be disciplined, methodical, and predictable, whereas divergent outcomes would cause people to question assumptions, lack discipline, and approach reading from unusual angles. I expected these effects to be independent of response position, such that there would not be an effect of response position and no interaction between outcome and response position. To test my predictions, I conducted a set of 2x2x2 mixed repeated measures ANOVAs with outcome and response position as within-subject factors and condition as a nested between-subjects factor. For each analysis, I conducted separate ANOVAs, using participants (F_1) and items (F_2) as random variables.

Certainty (see Figure 2). As predicted, there was a significant main effect of outcome, such that convergent outcomes prompted people to make more certain responses than when they encountered divergent outcomes ($F_1(1,16)=10.84$, $MSe=.957$, $p<.01$; $F_2(1,12)=12.29$, $MSe=.77$, $p<.01$). In addition, there was no main effect of response position and no interaction between outcome and response position (all F's < 1.09, all p's > .10).

Uncertainty (see Figure 3). As predicted, there was a significant main effect of outcome. Divergent outcomes, as compared to convergent outcomes, prompted people to make more uncertain responses ($F_1(1,16)=16.23$, $MSe=1.13$, $p=.001$; $F_2(1,12)=14.07$, $MSe=.90$, $p<.01$). In addition, there was no main effect of response position and no interaction between outcome and response position (all F's < 2.64, all p's > .10).

Positive and negative appraisals

Convergent outcomes should have caused people to work within the system, whereas divergent outcomes should have caused people to function creatively by threatening the system. Therefore, I predicted that convergent outcomes would prompt people to make more positive appraisals, whereas divergent outcomes would prompt more negative appraisals. Again, I did not expect there to be a main effect of response position and no interaction between outcome and response position. To test my predictions, I conducted a pair of 2x2x2 mixed repeated measures ANOVAs with outcome and response position as within-subject factors and condition as a nested between-subjects factor.

Positive appraisals (see Figure 4)**.** As predicted, there was a significant main effect of outcome, such that convergent outcomes prompted more positive appraisals than divergent outcomes ($F_1(1,16)=7.35$, $MSe=.345$, $p<.05$; $F_2(1,12)=5.03$, $MSe=.28$, $p<.05$). By participant, there was no main effect of response position ($F_1(1,16)=1.53$, $MSe=.063$, $p>.10$). However, by items, there was a main effect of response position ($F_2(1,12)=5.17$, $MSe=.05$, $p<.05$). It is possible that neutral verification-validation sentences, on some occasions, undermined readers' positive enthusiasm for some outcomes. In addition, there was no significant interaction between outcome and response position ($F_1(1,16)=3.03$, $MSe=.10$, $p>.10$; $F_2(1,12)=2.28$, $MSe=.08$, $p>.10$).

Negative appraisals (see Figure 5). As predicted, there was a significant main effect of outcome, such that divergent outcomes prompted more negative appraisals than convergent outcomes ($F_1(1,16)=25.93$, $MSe=.851$, $p<.001$; $F_2(1,12)=29.43$, $MSe=.68$, $p<.001$). In addition, there was no main effect of response position and no interaction between outcome and response position (all F's < 1, all p's > .10).

Self-reflections (see Figure 6)

Self-reflections are based on people's long-term memory. Because convergent outcomes were more common (in the real world), people could have likely drawn on more personal experiences in which they encountered similar outcomes in the real world. In addition, I expected convergent outcomes to cause people to act like introverts and adopt a reasoning preference. For these reasons, I predicted that convergent outcomes would prompt more self-reflections than divergent outcomes. Again, I did not expect there to be a main effect of response position and no interaction between outcome and response position. To test my prediction, I conducted a 2x2x2 mixed repeated measures ANOVA with outcome and response position as within-subject factors and condition as a nested between-subjects factor.

As predicted, the main effect was significant, such that convergent outcomes prompted more self-reflections than did divergent outcomes ($F_1(1,16)=5.54$, $MSe=.113$, $p<.05$; $F_2(1,12)=5.54$, $MSe=.09$, $p<.05$). In addition, there was no main effect of response position and no interaction between outcome and response position (all F's < 1, all p's > .10).

Emotional responses (see Figure 7)

I expected divergent outcomes to cause people to act like extraverts and adopt an intuition preference. Therefore, I expected divergent outcomes to prompt more emotional responses than convergent outcomes. Again, I did not expect there to be a main effect of response position and no interaction between outcome and response position. To test my prediction, I conducted a 2x2x2 mixed repeated measures ANOVA with outcome and response position as within-subject factors and condition as a nested between-subjects factor.

As predicted, there was a significant main effect of outcome, such that divergent outcomes caused people to make more emotional responses than convergent outcomes ($F_1(1,16)=7.13$, $MSe=.15$, $p<.05$; $F_2(1,12)=6.39$, $MSe=.12$, $p<.05$). In addition, there was no

main effect of response position ($F_1(1,16)=2.17$, $MSe=.05$, $p>.10$; $F_2(1,12)=1.71$, $MSe=.04$, $p>.10$). By participants, there was no interaction between outcome and response position ($F_1(1,16)=2.25$, $MSe=.05$, $p>.10$). However, by items, the interaction was marginally significant ($F_2(1,12)=4.00$, $MSe=.04$, $p=.07$). Because the interaction was not significant by participants and only marginally significant by items, I did not conduct a test of simple effects.

Fluency (see Figure 8)

In creativity research, fluency is the number of ideas a person generates. To calculate the fluency of verbal responses, I averaged the coders' individual counts of idea units for each response. I expected that the longer people engaged in the creative process, the more idea units they would generate. Specifically, I predicted that, independent of the type of outcome, people would generate more fluent responses when responding after the neutral verification-validation sentence than immediately after the illumination outcome. I expected that with more time to spend in the creative process, people would likely experience less time pressure. In addition, with more time spent in the creative process, people should have had more of an opportunity to engage in critical information processing. Low time pressure combined with better information processing should have promoted a more generative mindset. To test my prediction, I conducted a 2x2x2 mixed repeated measure ANOVAs with outcome and response position as within-subject factors and condition as a nested between-subjects factor.

As predicted, there was a significant main effect of response position. People made more fluent responses after the neutral verification-validation sentences than immediately after the outcomes ($F_1(1,16)=4.85$, $MSe=6.42$, $p<.05$; $F_2(1,12)=6.49$, $MSe=5.14$, $p<.05$). In addition, there was no main effect of outcome and no interaction between outcome and response position (all F's < 1, all p's > .10).

Flexibility (see Figure 9)

In creativity research, flexibility is the number of different categories of responses that people generate. To calculate flexibility, I added up the number of categories in each verbal response from the final compiled set of coded responses. I expected that the longer people engaged in the creative process, the more flexibly they would generate ideas. For the same reasons as in my analysis of fluency, I expected that with more time to spend in the creative process, people would likely experience less time pressure and have more of an opportunity to engage in critical information processing. Specifically, I predicted that, independent of outcome, people would generate more flexible responses when responding after the neutral verification-validation sentences than immediately after the illumination outcomes. To test my prediction, I conducted a 2x2x2 mixed repeated measure ANOVAs with outcome and response position as within-subject factors and condition as a nested between-subjects factor.

As predicted, there was a significant main effect of position. People made more flexible responses after the neutral verification-validation sentences than immediately after the outcomes ($F_1(1,16)=4.94$, $MSe=3.30$, $p<.05$; $F_2(1,12)=16.44$, $MSe=2.64$, $p<.01$). In addition, there was no main effect of outcome and no interaction between outcome and response position (all F's > 1.48, all p's > .10).

My major predictions for Experiment 2 were confirmed. The results indicated that mysteries prompted people to participate creatively. Convergent outcomes caused people to respond like convergent thinkers, and divergent outcomes caused people to respond like divergent thinkers. In addition, there were effects related to fluency and flexibility. As expected, the longer people spent engaged in the creative process, the more fluent and flexible they were when generating their verbal responses.

Experiment 3

The purpose of Experiment 3 was to capture a possible attentional tuning effect of convergent and divergent outcomes that extended beyond the end of the illumination sentences. The expansive nature of divergent thinking should, theoretically, cause deeper engagement with the narratives than the associative processing of convergent thinking.

One way to test this prediction is to ask participants to do a concurrent task that measures secondary reaction times. There is a long history of using secondary tasks to infer engagement in a primary task (for a review, see Bezdek, 2012). In a secondary task reaction time paradigm, people perform some sort of primary task, such as reading a story, listening to a story, or watching a film. In addition, they must attend to a secondary task outside the focus of the primary task. For example, the person might have to press a button in response to external stimuli, such as audio beeps or visual cues (Basil, 1994). As secondary reaction times increase (i.e., people take longer to change their focus from the primary task to the secondary task), researchers can infer that people had been more focused on the primary task. Bezdek (2012) used a secondary task probe to demonstrate the attentional consequences for narrative events. Specifically, he used an audio probe during suspenseful film clips to demonstrate that "hot spots" (moments when negative outcomes are salient) caused people to narrow their attentional focus relative to "cold spots" (moments where negative outcomes are not salient). During hot spots in the films, participants were slower to respond to the probes and completely missed more of the probes.

In the current experiment, I focused on visual probes during audio narratives. I introduced the critical probes after illumination and neutral verification-validation sentences. I expected that readers' deeper engagement in response to divergent outcomes would cause more

of their attention to be focused within the narrative world. As such, I expected to see longer secondary task reaction times to visual stimuli when participants were engaged with divergent versus convergent outcomes.

Method

Participants

Participants in Experiment 3 were 39 Stony Brook University undergraduates who participated for partial course credit. I removed three participants because of a program error. That left 36 participants.

Materials and Apparatus

Experimental stories. The 16 experimental stories were the audio stories from Experiment 2. However, each story also included three comprehension questions that were the same as in Experiment 1.

Probe positions for the experimental stories. The goal of these probe positions was to provide places during each story for visual secondary-task probes to appear. There were four probe positions in each story. I kept two of the probe positions the same as in Experiment 2, but added two additional probes to each story in the following way. Using the first probe from Experiment 2 as a starting point, I created an additional third probe position by counting the number of sentences from the beginning of the story to the first probe and after the first probe to the earliest strategically placed second probe from Experiment 2 (i.e., the one immediately following the outcome of the mystery). Wherever there were more sentences, I randomly chose a position at the end of a sentence that was not the first or last sentence in that section. There were a couple of exceptions to this rule for choosing the third probe position. Namely, if there were an equal number of sentences before and after the first probe, I flipped a coin to decide

whether to place the third probe before or after the first. In addition, if there were less than five seconds separating the onset of multiple probes after randomly choosing the third probe position, I moved the third probe one sentence further away from the existing probe. This movement was either forward or backward in the story, depending on which section of the story the third probe was set to occur. The fourth probe always came at the end of the second-to-last sentence in each story. If there were not at least five seconds between the fourth probe and the end of the story, I added a short amount of silence to the end of the story to allow enough time for the fourth probe to run its course.

Filler stories. The eight filler stories were audio versions of the filler stories from Experiment 1. Each filler story had three comprehension questions.

Recording the filler stories. The same female narrator who had recorded the experimental and practice stories in Experiment 2 recorded the filler stories. She did so in the same way she had recorded the practice stories from Experiment 2.

Probe positions for the filler stories. There were four probe positions in each filler story. I randomly generated the probe positions in a similar way as for the experimental stories, anchoring each additional probe to the positions that came before it.

Practice stories. There were two practice stories. The practice stories were the same as in Experiment 2, except they included the three comprehension questions from Experiment 1.

Probe positions for the practice stories. There were four probes in each practice story. I randomly placed the four probes in the same way as I did for the filler stories.

Visual probe. The visual probe was a 10”x10” light blue box with the words “Press the Spacebar” in white 100-pt font.

Apparatus. I presented the audio stories and visual probes with a Dell Optiplex desktop computer and keyboard, using Medialab software with stereo audio playback from speakers on each side of the screen.

I used the same recording equipment as experiment 2.

Design and Procedure

Design. Experiment 3 had four conditions and the same 2x2 design as Experiment 2. Once again, I randomly assigned experimental stories across conditions with a Latin Square.

Procedure. After participants gave informed consent, the experimenter reviewed instructions with participants. Participants read instructions on the computer that said:

> In this experiment, you will listen to a series of stories. Listen to the stories normally, the way you would listen to any story. Try to enjoy the stories, but pay attention to the details. At the end of each story, you will answer several Yes/No comprehension questions. While listening to the stories, you will have another task. At various times during each story, a blue box will appear on the screen that says to press the spacebar. When you see a blue box appear on the screen, press the spacebar as quickly as possible. You will begin with a couple practice stories. Press the spacebar to continue.

Next, participants listened to the practice stories and pressed the spacebar when a visual probe appeared on the computer screen. Visual probes appeared immediately at the end of a sentence, as the stories played continuously (i.e., without pausing). Therefore, probes overlapped the audio presentation of stories. They remained on the screen for five seconds, or until participants pressed the spacebar. At the end of the practice stories, participants read, "The practice stories are done. Please let the experimenter know if you have any questions. Press the spacebar to continue." The experimenter answered any questions.

Finally, each participant listened to the experimental and filler stories in a different random order. They pressed the spacebar whenever the visual probe appeared and answered the comprehension questions at the end of each story. At the end of the experiment, the experimenter debriefed each participant. Experiment 3 took less than an hour to complete.

Results and Discussion

To prepare the data for analysis, I pruned reaction time outliers by condition. To do so, I removed response times that were less than 300ms. In addition, I removed response times that were more than 3 *SD*s above each mean. As a result, I removed 19 data points out of 576 total observations, or 3.30% of the data.

The goal of Experiment 3 was to examine the possibility that readers' attention was drawn more into the stories at moments that engaged creative processes. I was mainly interested in reaction times to probes that immediately followed outcomes or that came one sentence later after the neutral verification-validation sentence. I expected the results to mirror those of Experiment 1. That is, I expected divergent outcomes to capture more attention and, thus, cause people to take longer to respond to a visual secondary task probe that followed divergent outcomes.

To test my prediction, I first conducted a 2x2x2 mixed repeated measures ANOVA with outcome and response position as within-subjects factors and participant condition as the nested between-subjects factor. Divergent outcomes (M=845.37, SD=336.01) caused people to be slower when responding to the probes than convergent outcomes (M=801.15, SD=296.60), but the main effect was not significant, ($F_1(1,32)=1.95$, MSe=70,423.89, $p>.10$; $F_2(1,12)=1.58$, MSe=14,611.25, $p>.10$). In addition, there was no main effect of response position and no interaction between outcome and response position (all F's < 1.06, all p's > .10).

However, I thought that perhaps the attentional effect was not strong enough to persist long after the outcomes. It was possible that the delay between outcomes and verification-validation attenuated any attentional component of people's experiences of the outcomes. Therefore, I conducted a two-way mixed repeated measures ANOVA with reaction times as a within-subjects factor (only for probes that immediately followed the outcomes) and condition as a between-subjects nested factor. Divergent outcomes (M=865.59, SD=364.07) caused people to be slower when responding to the probes than convergent outcomes (M=798.60, SD=277.08). Although the effect was closer to what I had predicted, it was only marginally significant by participant ($F_1(1,32)=3.27$, MSe=80,785.25, p=.08) and not significant by items ($F_2(1,12)=2.82$, MSe=21,311.81, $p>.10$).

Unfortunately, the results in Experiment 3 did not confirm my prediction that divergent outcomes would capture more of people's attention than convergent outcomes. This could be a testament to the high entertainment value of all versions of my stories. In addition, the lack of an effect might have been due to divergent outcomes causing people to be more flexible when switching between tasks, as suggested by Fischer and Hommel (2012). That hypothetical increase in people's ability to switch between listening to stories and responding to the visual probes might have partially overridden my predicted effect of attention capture. However, most likely, the lack of an effect was due to the probe task being too easy. Further, the probe task in this experiment was different from that of Bezdek (2012). Specifically, he had people watch films and respond to auditory probes. In my study, people listened to stories and responded to visual probes. Because the visual probes appeared between sentences, they were inherently accompanied by silence, which could have acted to heighten their salience. In any case, because

these results were not significant, I decided not to pursue the attentional component of participation in mysteries any further.

Experiment 4

The purpose of Experiment 4 was to add an explicit verification-validation phase to the mysteries. Verification-validation took the form of positive and negative character reactions to the outcomes of the primary mysteries. Experiment 4 examined reading time differences associated with positive and negative reactions that were paired with convergent and divergent outcomes.

As in the previous experiments, I expected divergent outcomes to prompt more divergent thinking and take longer for people to process than convergent outcomes. I predicted that I would replicate the reading time effect of Experiment 1 that showed divergent outcomes took longer to read versus convergent outcomes.

In addition, I expected that there would be downstream consequences of convergent and divergent thinking that had been prompted by the outcomes. Specifically, the result from Experiment 2 that people made more positive appraisals to convergent outcomes led me to expect that convergent outcomes would bias readers toward expecting characters to have positive reactions. In contrast, the result from Experiment 2 that people made more negative appraisals to divergent outcomes led me to expect that divergent outcomes would bias readers toward expecting characters to make negative reactions. As such, I expected that, when characters' reactions matched the readers' bias, people would adopt more of a convergent thinking strategy. However, when characters' reactions mismatched the readers' bias, I expected that people would adopt a more divergent thinking mindset. Therefore, my main prediction was that, when outcome-reaction pairs mismatched readers' biases, a divergent mindset would prompt people to spend more time processing the reactions. People should have taken longer to read the mismatched outcome-reaction pairs versus matched pairs.

Method

Participants

Participants in Experiment 4 were 26 Stony Brook University undergraduates who participated for partial course credit. I removed six participants for failing to do well enough on a series of comprehension questions (i.e., they answered less than 80% correct). That left 20 participants.

Materials and Apparatus

Experimental stories. The experimental stories were similar to those in Experiment 1, except the stories included an explicit verification-validation phase. That is, each story included a positive or negative emotional reaction to the outcome of the primary mystery. For example, a positive story read, "Lucy proclaimed to Daryl, 'I will always cherish you for this.'" A negative version of the same story read, "Lucy proclaimed to Daryl, 'I will always despise you for this.'" I matched the positive and negative reactions for word and syllable length. The emotional reaction sentences replaced the neutral verification-validation sentences from Experiment 1. See Appendix A for sample stories.

Each experimental story was accompanied by the same three comprehension questions as the experimental stories in Experiment 1.

Filler stories. The filler stories and comprehension questions were the same as in Experiment 1.

Practice stories. The practice stories and comprehension questions were the same as Experiment 1.

Apparatus. The apparatus was the same as Experiment 1.

Design and Procedure

Design. Experiment 4 had four conditions and a 2x2 design. As in previous experiments, I counterbalanced and randomized the number of convergent and divergent stories across conditions with a Latin Square. In addition, I included the counterbalanced and randomly assigned factor of emotional reactions (positive or negative) to the outcomes. Therefore, each condition had four convergent outcomes with positive reactions, four convergent outcomes with negative reactions, four divergent outcomes with positive reactions, and four divergent outcomes with negative reactions. This completed the 2x2 design.

Procedure. The procedure for Experiment 4 was the same as Experiment 1.

Results and Discussion

To prepare the data for analysis, I pruned reading time outliers by condition. To do so, I removed reading times that were less than 300 ms. In addition, I removed reading times that were more than 3 *SD*s above each condition mean. As a result, I removed 10 data points out of 640 total observations, or 1.56% of the data.

My initial goal for Experiment 4 was to replicate the main effect of illumination outcome from Experiment 1, such that divergent outcomes would cause participants to read more slowly, relative to convergent outcomes. My second goal was to demonstrate that reading times for positive versus negative verification-validation sentences would depend on which type of outcome had preceded it. Specifically, I predicted an interaction, such that it would take participants longer to read positive than negative reactions when those reactions were preceded by divergent outcomes. In contrast, I predicted that it would take participants longer to read negative than positive reactions when those reactions were preceded by convergent outcomes.

For my first analysis, I tested whether the main effect from Experiment 1 would replicate. To do so, I conducted a two-way mixed repeated measures ANOVA with outcome as the within-

subjects variable with two levels (i.e., divergent and convergent) and condition as the between-subjects nested factor. As predicted, it took people longer to read divergent outcomes (M=1631.54, SD=573.21) than convergent outcomes (M=1146.45, SD=390.96) (F_1(1,16)=61.15, MSe=2,353,098.83, p<.001; F_2(1,12)=51.79, MSe=2,024,516.34, p<.001).

Next, I tested for the predicted interaction between outcomes and reactions. To test the differences in reading times, I conducted a 2x2x2 mixed repeated measures ANOVA. I included convergent and divergent outcomes as one within-subjects factor with two levels, positive and negative reactions as a second within-subjects factor with two levels, and condition as a nested between-subjects factor.

Figure 10 shows the results of the interaction. As predicted, there was a significant interaction between outcome and reaction, such that people were slower to read positive reactions that followed divergent outcomes and slower to read negative reactions that followed convergent outcomes, (F_1(1,16)=20.33, MSe=4,067,531.43, p<.001; F_2(1,12)=17.58, MSe=3,122,752.85, p=.001). By participants, there was a marginal main effect of outcome (F_1(1,16)=3.44, MSe=386,385.25, p=.08). However, by items, the effect was not significant (F_2(1,12)=2.54, MSe=270,159.55, p>.10). By participants, there was also a marginal main effect of reaction (F_1(1,16)=4.41, MSe=780,371.90, p=.052). However, by items, the effect was not significant (F_2(1,12)=1.26, MSe=497,668.52, p>.10).

Next, to help interpret the significant interaction, I conducted a test of simple effects. This allowed me to suggest how the outcome-reaction pair(s) contributed to the interaction. I compared the difference among means of positive and negative reactions for each fixed level of outcome. For convergent outcomes, the difference in reading times of positive and negative reactions was significant (F_1(1,16)=25.26, MSe=5,052,038.28, p<.001; F_2(1,12)=8.35,

MSe=1,482,931.38, $p<.05$). For divergent outcomes, the difference in reading times of positive and negative reactions was only marginally significant ($F_1(1,16)=3.05$, *MSe*=610,125.39, $p=.10$), and the contrast by items did not reach significance ($F_2(1,12)=2.74$, *MSe*=486,614.61, $p>.10$).

Therefore, the results of the test of simple effects suggest that the interaction was mainly driven by stories with convergent outcomes. That is, there was a significant difference in reading times of positive and negative reactions only for stories with convergent outcomes. Because divergent outcomes had caused an initial slow-down, those outcomes might have had a sort of carryover effect. The initial slow-down caused by divergent outcomes likely buffered against the potential speed-up of reading times related to a match between divergent outcomes and negative reactions. It seems that, once divergent outcomes prompted people to become divergent thinkers, they stayed divergent thinkers for the duration of those stories.

Experiment 5

The purpose of Experiment 5 was to capture people's creative participation that yielded the reading time interaction in Experiment 4. In this experiment, I collected participants' verbal responses to stories with convergent and divergent outcomes that were paired with positive or negative reactions. I expected that convergent outcomes that were paired with negative reactions would prompt people to respond like divergent thinkers. In parallel to the reading time results of Experiment 4, I expected that, once divergent outcomes turned people into divergent thinkers, they would respond like divergent thinkers for the duration of those stories.

As such, I made predictions for the categories of certainty, uncertainty, positive appraisals, negative appraisals, self-reflections, and emotional responses. I report data for each category of responses as percentages. In addition, I made predictions for fluency (i.e., number of idea units) and flexibility (i.e., number of categories) of responses. I will describe my specific predictions in the relevant results sections. See Table 2 for an overview of those predictions. The Table outlines a general framework for the type of creative thinking that each outcome-reaction pair should ultimately prompt.

Method

Participants

Participants in Experiment 5 were 20 Stony Brook University undergraduates who participated for partial course credit.

Materials and Apparatus

Experimental stories. The experimental stories were audio recordings of the 16 experimental stories used in Experiment 4.

Recording the experimental stories. The same female narrator as in Experiments 2 and 3 recorded the audio stimuli. First, she recorded the emotional reaction words or phrases in a random order. Next, she recorded the sentences in which I would later embed the reactions, also in a random order. When she got to the point in the sentences that would contain the emotional reactions, she took a brief pause, and then continued through to the end of the sentences. Next, I embedded the positive and negative reaction words into the corresponding sentences. Finally, I replaced the neutral verification-validation sentences from Experiment 2 with the emotional reaction sentences. This resulted in four versions of each story, such that each story had a convergent or divergent outcome paired with a positive or negative reaction.

Probe positions for the experimental stories. I broke the experimental stories up into three segments. The first segments were exactly the same as in Experiment 2, extending from the beginning of each story to the first filler probe position. The second segments always extended from the first probe positions to the end of the emotional reaction sentences, where the second probes would occur. The third segments extended from the second probe positions after the reaction sentences to the ends of the stories.

Practice stories. The practice stories were the same as those used in Experiments 2 and 3.

Visual probe. The visual probe was the same as Experiment 2.

Apparatus. The apparatus was the same as Experiment 2.

Design and Procedure

Design. Experiment 5 had four conditions and the same 2x2 design as Experiment 4. Again, I randomized and counterbalanced story outcomes and reactions across conditions with a Latin Square.

Procedure. The procedure was the same as Experiment 2.

Results and Discussion

Transcription and coding of verbal responses

To begin the analyses, I had coders transcribe the verbal responses and then sort them into the various response categories. The same three coders from Experiment 2 transcribed and coded the verbal responses for this experiment. They performed the task in the same way as before. When all coders finished coding the entire set of responses, I assessed the extent to which the coders agreed with one another. Again, I calculated a two-way random effects intraclass correlation coefficient for average measures of absolute agreement. The results showed that 75.0% of the variance in the category coding was picked up by the three coders, ICC(2,3) = .750. As in Experiment 2, I resolved all coding differences by a majority rule. That is, if at least 2/3 of the coders had or had not placed a response into a specific category, then that is how I coded the response. For example, if at least 2/3 of the coders said a response fit into the uncertainty category, then I counted that response as having been uncertain. However, if only one of the coders said a response fit into the certainty category, I did not count that response as uncertain. All responses met these criteria.

The overall goal of Experiment 5 was to demonstrate the contents of readers' verbal creative participation in response to the illumination outcomes when paired with positive and negative reactions. As in Experiment 2, I made specific a priori predictions for certainty and uncertainty, positive and negative appraisals, self-reflections, and emotional reactions. In addition, I made predictions for fluency (idea units) and flexibility (category units). For each category of responses, I will distribute my specific predictions to the relevant sub-section.

Certainty (see Figure 11)

In the current experiment, I expected the match between convergent outcomes and positive appraisals to bias people to expect positive reactions. I predicted that the match between convergent-positive pairs would prompt more certainty than the mismatch between convergent-negative pairs. However, the results of Experiment 4 revealed that there was no significant difference in reading times for divergent outcomes with positive and negative reactions. Therefore, I expected divergent outcomes paired with both negative and positive reactions to prompt people to act like divergent thinkers. Overall, I predicted an interaction between outcomes and reactions that would be driven by differences in responses of certainty to positive and negative reactions that followed convergent outcomes. To test my prediction, I conducted a 2x2x2 mixed repeated measures ANOVA with outcome and reaction as within-subject factors and condition as a nested between-subjects factor.

I had predicted an interaction between outcome and reaction that would be driven by reactions to convergent outcomes. Although the pattern of results mirrored my prediction, the interaction was only marginally significant by participants ($F_1(1,16)=3.22$, $MSe=.13$, $p=.09$), and not significant by items ($F_2(1,12)=1.31$, $MSe=.08$, $p>.10$). In addition, there was not a significant main effect of outcome by participants ($F_1(1,16)=2.32$, $MSe=.18$, $p>.10$), and the main effect was only marginally significant by items ($F_2(1,12)=3.23$, $MSe=.14$, $p=.10$). There was not a significant main effect of reaction ($F_1(1,16)=1.07$, $MSe=.04$, $p>.10$; $F_2(1,12)=1.40$, $MSe=.03$, $p>.10$). The results suggest that the apparent match and mismatch between outcomes and reactions was not enough to drive a significant interaction.

Uncertainty (see Figure 12)

For uncertainty, I made a similar prediction as I had for certainty. That is, I expected the mismatch between convergent outcomes and negative reactions to cause people to act more like

divergent thinkers. That increase in divergent thinking should have caused people to respond with more uncertainty. In contrast, I expected divergent outcomes paired with both negative and positive reactions to prompt people to act like divergent thinkers. I did not expect characters' reactions to cause a difference in how people made uncertain responses when the reactions followed divergent outcomes. Overall, I predicted an interaction between outcomes and reactions that would be driven by differences in uncertainty between positive and negative reactions that followed convergent outcomes. To test my prediction, I conducted a 2x2x2 mixed repeated measures ANOVA with outcome and reaction as within-subject factors and condition as a nested between-subjects factor.

I had predicted an interaction between outcome and reaction that would be driven by reactions to convergent outcomes. As predicted, there was a significant interaction between outcomes and reactions ($F_1(1,16)=8.49$, $MSe=.39$, $p=.01$; $F_2(1,12)=11.90$, $MSe=.30$, $p<.01$). In addition, there was a main effect of outcome ($F_1(1,16)=4.51$, $MSe=.28$, $p=.05$; $F_2(1,12)=6.85$, $MSe=.20$, $p<.05$). The main effect of reaction was significant by participants ($F_1(1,16)=4.54$, $MSe=.15$, $p<.05$). However, the main effect of reaction was not significant by items ($F_2(1,12)=3.10$, $MSe=.12$, $p>.10$).

Next, to test the second part of my prediction that the effect would be driven by the difference between positive and negative reactions that followed convergent outcomes, I conducted a test of simple effects. These tests allowed me to suggest how the outcome-reaction pair(s) contributed to the interaction. I compared the difference among means of positive and negative reactions for each fixed level of outcome. For convergent outcomes, the simple effect contrast was significant ($F_1(1,16)=14.73$, $MSe=.68$, $p=.001$; $F_2(1,12)=13.89$, $MSe=.35$, $p<.01$).

However, for divergent outcomes the simple effect contrast was not significant ($F_1(1,16)<1$, $MSe=.03$; $F_2(1,12)<1$, $MSe=.01$).

Therefore, as expected, the significant interaction was driven by stories with convergent outcomes. It is likely that people were uncertain when they encountered the divergent outcomes, and that original uncertainty carried through both positive and negative reactions.

Positive appraisals (see Figure 13)

In Experiment 2, results showed that convergent outcomes prompted more positive appraisals, whereas divergent outcomes prompted more negative appraisals. In the current experiment, I expected the match between convergent outcomes and positive reactions to prompt more positive appraisals than the mismatch between convergent outcomes and negative appraisals. However, I did not expect the match between divergent outcomes and negative reactions to prompt more positive appraisals than the mismatch between divergent outcomes and positive appraisals. Overall, I predicted an interaction that would be driven by the difference in positive appraisals between positive and negative reactions to convergent outcomes. To test my prediction, I conducted a 2x2x2 mixed repeated measures ANOVA with outcome and reaction as within-subject factors and condition as a nested between-subjects factor.

The results for positive appraisals revealed that there was a significant interaction between outcome and reaction by participants ($F_1(1,16)=8.89$, $MSe=.10$, $p<.01$). However, the interaction did not reach significance by items ($F_2(1,12)=3.33$, $MSe=.08$, $p=.09$). Therefore, I needed to be careful not to over-interpret the interaction and did not conduct simple effects tests. In addition, the pattern of the interaction was not in the predicted direction, adding to my caution when interpreting the results. That is, there were very few positive appraisals following negative

reactions. The majority of the positive appraisals occurred after positive reactions, even though the effect seemed to be larger for convergent outcomes.

There was a significant main effect of outcome by participant, such that people made more positive reactions following convergent outcomes ($F_1(1,16)=6.84$, $MSe=.10$, $p<.05$). However, by items, the main effect of outcome was only marginally significant ($F_2(1,12)=4.08$, $MSe=.07$, $p=.07$). In addition, there was a significant main effect of reaction, such that people made more positive appraisals following positive reactions ($F_1(1,16)=15.49$, $MSe=.50$, $p=.001$; $F_2(1,12)=21.07$, $MSe=.39$, $p=.001$). Therefore, the results suggest that people made more positive appraisals following positive reactions and, tentatively, people made the most positive appraisals in response to positive reactions that followed convergent outcomes.

Negative appraisals (see Figure 14)

For negative appraisals, I expected the opposite of positive appraisals. That is, I predicted that the mismatch between convergent outcomes and negative reactions would cause more negative appraisals than the match between convergent outcomes and positive reactions. However, I did not expect the mismatch between divergent outcomes and positive reactions to cause more negative appraisals than the match between divergent outcomes and negative reactions. Overall, I predicted an interaction that would be driven by the difference in negative appraisals between positive and negative reactions to convergent outcomes. To test my predictions, I conducted a 2x2x2 mixed repeated measures ANOVA with outcome and reaction as within-subject factors and condition as a nested between-subjects factor.

Although I had predicted an interaction between outcomes and reactions, the effect was not significant ($F_1(1,16)<1$, $MSe=.001$; $F_2(1,12)<1$, $MSe=.001$). There was a marginally significant main effect of outcome ($F_1(1,16)=4.13$, $MSe=.07$, $p=.059$), suggesting that divergent

outcomes might have prompted more negative appraisals than convergent outcomes. However, the main effect of outcome by items was not significant ($F_2(1,12)=1.29$, $MSe=.05$, $p>.10$). In addition, there was not a significant main effect of reaction ($F_1(1,16)=1.02$, $MSe=.04$, $p>.10$; $F_2(1,12)<1$, $MSe=.03$).

Self-reflections (see Figure 15).

Again, I expected convergent outcomes with positive reactions to cause people to act as convergent thinkers. Similar to my predictions for other types of responses, I did not expect the match between divergent outcomes and negative reactions to prompt people to act like convergent thinkers. Overall, I predicted an interaction that would be driven by the difference in self-reflections between positive and negative reactions to convergent outcomes. To test my prediction, I conducted a 2x2x2 mixed repeated measures ANOVAs with outcome and reaction as within-subject factors and condition as a nested between-subjects factor. As predicted, there was a significant interaction between outcome and reaction, such that people made more self-reflections following convergent-positive reactions and divergent-negative reactions ($F_1(1,16)=10.23$, $MSe=.18$, $p<.01$, $F_2(1,12)=5.49$, $MSe=.14$, $p<.05$).

Next, to help interpret the significant interaction, I conducted tests of simple effects. These tests allowed me to suggest how the outcome-reaction pair(s) contributed to the interaction. I compared the difference among means of positive and negative reactions for each fixed level of outcome. As predicted for convergent outcomes, people made significantly more self-reflections following positive reactions than negative reactions ($F_1(1,16)=8.35$, $MSe=.14$, $p<05$; $F_2(1,12)=8.85$, $MSe=.23$, $p<.05$). In addition, as expected for divergent outcomes, people did not make significantly more self-reflections in response to negative than positive reactions ($F_1(1,16)=2.13$, $MSe=.04$, $p>.10$; $F_2(1,12)=1.14$, $MSe=.03$, $p>.10$).

Therefore, the results of the simple effects tests suggest that the interaction was mainly driven by stories with convergent outcomes. When people encountered positive reactions to convergent outcomes, they made more self-reflections than when they encountered negative reactions to convergent outcomes.

Emotional responses (see Figure 16)

I expected people to make the fewest emotional reactions when they encountered positive reactions to convergent outcomes. I did not expect to observe a difference for divergent outcomes. Overall, I predicted an interaction that would be driven by the mismatch between convergent outcomes and negative reactions. Again, I conducted a 2x2x2 mixed repeated measures ANOVAs with outcome and reaction as within-subject factors and condition as a nested between-subjects factor. The predicted interaction was not significant ($F_1(1,16)<1$, $MSe=.01$; $F_2(1,12)<1$, $MSe=.01$). In addition there was no significant main effect of outcome ($F_1(1,16)=1.13$, $MSe=.04$, $p>.10$; $F_2(1,12)=1.77$, $MSe=.03$, $p>.10$) and no significant main effect of reaction ($F_1(1,16)<1$, $MSe=.01$; $F_2(1,12)<1$, $MSe=.01$).

The pattern of results for emotional responses looked more similar to those from Experiment 2 than I had expected. However, because characters provided emotional reactions in the Experiment 5 stories, there could have been fewer opportunities for people to also react emotionally and add emotional content than I had initially expected.

Fluency (see Figure 17)

To calculate the fluency of verbal responses, I averaged the coders' individual counts of idea units for each response. I expected people to have the most thoughts in response to negative reactions, independent of outcome. Therefore, I predicted that negative reactions would prompt the most fluency. To test my prediction, I conducted a 2x2x2 mixed repeated measures ANOVA

with outcome and reaction as within-subject factors and condition as a nested between-subjects factor.

As predicted, there was a significant main effect of reaction, such that people generated more ideas following negative reactions than positive reactions ($F_1(1,16)=8.05$, $MSe=4.29$, $p<.05$; $F_2(1,12)=4.81$, $MSe=3.77$, $p<.05$). There was no main effect of outcome and no interaction between outcome and reaction (all F's < 2.75, p's > .10).

Flexibility (see Figure 18)

To calculate flexibility, I added up the number of categories in each verbal response from the final compiled set of coded responses. I previously interpreted the data in Experiment 2 to support the idea that the longer a person spends engaged in the creative process, the more flexible he or she will likely be. However, that should only be true until the person encounters conflicting information that needs to be reconciled. If the cognitive system must reconcile two conflicting inputs, it will likely divert resources from flexible to more combinatorial processes. That shift should cause people to generate fewer categories of ideas. In a sense, conflicting information should capture more attention and cause people to focus on resolving the conflict. Thus, I predicted that when people experienced a convergent outcome with a positive reaction and a divergent outcome with a negative reaction, they would be relatively more flexible in the number of categories of ideas they expressed. In contrast, I predicted that when a reader encountered a convergent outcome with a negative reaction or a divergent outcome with a positive reaction, they would express fewer categories of ideas as they focused on trying to resolve the conflict. I conducted a 2x2x2 mixed repeated measure ANOVAs with outcome and reaction as within-subject factors and condition as a nested between-subjects factor.

As predicted, people generated more flexible responses to convergent outcomes with positive reactions and divergent outcomes with negative reactions ($F_1(1,16)=4.74$, $MSe=.92$, $p<.05$). Unfortunately, the interaction analysis by items was not significant ($F_2(1,12)=2.14$, $MSe=.49$, $p>.10$), so I must not over-interpret these results. In addition, there was no main effect of outcome and no main effect of reaction (all F's < 1.04, all p's > .10).

In Experiment 5, some of my predictions were confirmed and some were not. The interactions between outcome and reaction were more elusive than the main effects that I had obtained for Experiment 2. Overall, it seems like convergent endings allow for several reasonably pure contrasts between positive and negative reactions. However, results of this experiment demonstrated the once people became divergent thinkers, they tended to stay divergent thinkers.

General Discussion

This project highlighted the importance of considering creative cognition for theories of narrative processing. I used mysteries as a means to explore that new perspective. I modeled mysteries on the creative process and focused my experiments on the phases of illumination and verification-validation.

In Experiments 1 to 3, I manipulated the outcomes of mysteries during the illumination phase. I defined two types of outcomes—divergent and convergent—motivated by literature on creative cognition. I expected divergent outcomes to turn people into divergent thinkers and convergent outcomes to make them convergent thinkers.

In Experiment 1, I showed that divergent outcomes took longer for people to read than convergent outcomes. The result suggested that the expansive processing of divergent thinking took longer than the associative processing of convergent thinking. However, it is important to note that most, if not all, theories of text processing would predict the same difference in reading time. That is, readers often find it more difficult to process information that is inconsistent with prior narrative contexts (e.g., Albrecht & O'Brien, 1993; Cook, Halleran, & O'Brien, 1998; O'Brien, Rizzella, Albrecht, & Halleran, 1998; Rapp, Gerrig, & Prentice, 2001). People form expectations when they read, and if those expectations are violated, people most often slow down to comprehend the new information. I agree that my divergent outcomes were less expected than the convergent outcomes. However, rather than stopping with the reading time difference, my project addresses how people respond when narratives violate expectations and, thereby, create mysteries.

My perspective has been to illustrate the creative contents of people's responses to convergent and divergent outcomes that go beyond reading time differences. I maintain that

convergent outcomes caused people to act more like convergent thinkers, whereas divergent outcomes caused people to act like divergent thinkers. I believe that those different types of thinking caused my observed reading time effect in Experiment 1. In addition, I suspect that reading time differences in earlier explorations of violations of expectations also captured, in part, readers' creative responses to mysteries.

To provide additional support for my theory that the outcomes prompted people to adopt divergent and convergent mindsets, I conducted another experiment to uncover the actual contents of people's thoughts in response to divergent and convergent outcomes. In Experiment 2, I used a speak-aloud paradigm to demonstrate that readers do take up the call of authors to participate in mysteries by thinking creatively. Overall, people's responses suggested that they did respond creatively. For example, in response to Lucy receiving a gun from Daryl, one person said:

> (laughs) Going on a Bonnie and Clyde style, (laughs) adventure. Thieving across the country together. Um, really expecting it to be an engagement ring, I think most people would be (laughs)."

Another person said:

> Does he want her to kill herself, her to kill him, or her to kill somebody else? I think this is a really strange gift. I would not be happy to receive this. I would be really really scared.

Yet another person said:

> What does it mean? Um, is he a cop now? And aren't they in a restaurant? Isn't it illegal to flash a gun in a restaurant? I thought it was like a jewelry box or like an engagement ring or something.

The results of Experiment 2 revealed the contents of people's thoughts as they contemplated convergent and divergent outcomes. Based on previous work that explained how convergent and divergent thinking might be primed (e.g., Fischer & Hommel, 2012; Ma, 2006; Scott, Leritz, & Mumford, 2004), I expected convergent outcomes to prime convergent thinking mindsets and divergent outcomes to prime divergent thinking mindsets. In addition, I tapped previous literature on individual differences in creativity to better understand the possible features of those convergent and divergent mindsets. Based on the individual differences literature (Brophy, 2001; Kirton, 1976, 1987; Rickards & Puccio, 1992), I expected that convergent outcomes would lead people to be disciplined, methodical, and predictable in their approach to the speak-aloud task. I predicted that those types of thinking would manifest as certainty in people's responses. I also expected that convergent outcomes would cause people to work within the system of each narrative world. Recall that the general term "system" has been used by Kirton (1976, 1987) to encapsulate the sets of rules or norms of a given domain. Therefore, I predicted that people who encountered convergent outcomes would make more positive appraisals to align with the system. Finally, I expected people who encountered convergent outcomes to act like introverts and adopt a reasoning preference. I predicted that introversion and the reasoning preference would cause people to respond with more self-reflections based on memory representations.

I expected divergent outcomes to cause people to act like divergent thinkers. Therefore, I predicted that divergent outcomes would lead people to question assumptions, lack discipline, and approach reading from unusual angles. That should have manifested as uncertainty in people's responses. In addition, I expected people who encountered divergent outcomes to function creatively by threatening the system of each narrative world. Therefore, I predicted that divergent outcomes would cause people to make negative appraisals. Finally, I expected that

divergent outcomes would cause people to act like extraverts and adopt an intuition preference. As such, I expected people who encountered divergent outcomes to make more emotional responses.

The results of Experiment 2 suggested that convergent outcomes did cause people to act like convergent thinkers and divergent outcomes did cause people to act like divergent thinkers. Specifically, convergent outcomes prompted certainty, positive appraisals, and self-reflections whereas divergent outcomes prompted uncertainty, negative appraisals, and more responses that contained emotion. In addition, the results suggested that the longer people engaged in the creative process, the more fluent and flexible they were in how they generated verbal responses.

I would like to think that the results of Experiments 1 and 2 were related. That is, I believe that the creative mindsets that readers adopted after encountering convergent and divergent outcomes contributed to the reading time difference in Experiment 1. However, it seems unlikely that readers in Experiment 1 made the extensive mental responses that I observed in Experiment 2. Although I did my best to make participants comfortable during my experiments, there was inherent time pressure to finish each task. In addition, the structured laboratory environment likely inhibited people's creative motivation. The stifling effects of time pressure and environment would have been especially likely to influence how people were thinking during the reading task in Experiment 1. However, in the real world, I would expect readers to take more time and expend more effort to participate creatively in narratives. Therefore, I would expect the results of my experiments to be heightened in the real world, as readers would be more likely to reflect on mysteries and outcomes on a moment-by-moment basis.

In Experiment 3, I attempted to show that there was an attentional component of people's engagement in convergent and divergent outcomes. In that experiment, people listened to stories and responded to visual probes. I based my experimental design on work by Bezdek (2012). He used suspenseful film clips and secondary task audio probes to capture secondary task reaction times. He showed that moments with particularly salient negative outcomes made people respond more slowly to the secondary probes. Therefore, he suggested that the salient negative outcomes captured more of people's attention and were more engaging than moments when the negative outcomes were not as salient.

I used Bezdek's paradigm and results as the basis for my own study and prediction. If people are working harder within the narrative world to think divergently (as suggested by the reading time effect in Experiment 1), they should be less aware of information outside the story world. Therefore, I expected people to respond more slowly to visual secondary task probes that followed divergent versus convergent outcomes.

The results of Experiment 3 trended in the right direction, such that people who experienced divergent outcomes, as compared to convergent outcomes, took longer to respond to the visual probes. However, the results were only marginally significant. The lack of a significant effect was likely due to the visual probe task being too easy. Further, the probe task in Experiment 3 was different from that of Bezdek (2012). Specifically, Bezdek had people watch films and respond to auditory probes. In my study, people listened to stories and responded to visual probes. Because the visual probes appeared between sentences, each probe was inherently accompanied by a moment of silence. The silence could have acted to heighten the salience of probes and helped to draw people's attention out of the story world. In addition,

it is possible that visual probes during audio stories are simply more salient than audio probes during films.

It was beyond the scope of the current project to manipulate the difficulty of the secondary task, but it might be possible in future experiments to make the secondary task more difficult. For example, instead of participants performing a simple button-press task, they might make some sort of cognitively demanding decision that would require additional resources to process. If the secondary task were more cognitively demanding, I would expect to find the effect of attentional capture that I had predicted.

In Experiment 4, I made a novel contribution to the participatory perspective and to the literature on expectation violations by adding an explicit verification-validation phase to each mystery's outcomes. In those verification-validation sentences, characters made positive or negative reactions to the outcomes of each mystery. I expected convergent outcomes to bias readers toward expecting a positive reaction. In contrast, I expected divergent outcomes to bias readers toward expecting a negative reaction. I based those expectations on the results of Experiment 2 that demonstrated that people made more positive appraisals in response to convergent outcomes and more negative appraisals in response to divergent outcomes. Further, I expected matched outcome-reaction pairs (e.g., convergent outcomes with positive reactions) to prompt people to engage in more convergent thinking whereas mismatched outcome-reaction pairs (e.g., convergent outcomes with negative reactions) should have prompted more divergent thinking. Again, I expected divergent thinking to take longer than convergent thinking in response to the mysteries.

Specifically, I predicted that people would take longer to read reactions that did not match their appraisals of prior outcomes. The results of the reading time study provided support

for that claim. Mismatched pairs caused people to read more slowly than matched pairs. However, the effect was driven by stories with convergent outcomes. There seemed to be some sort of carryover effect of divergent thinking that began during illumination that limited the difference in reading times between positive and negative reactions.

In Experiment 5, I used a speak-aloud paradigm to examine the types of responses people made to the outcome-reaction pairs that I introduced in Experiment 4. I based my predictions on the reading time interaction from Experiment 4 that showed that people read reactions that matched with outcomes more quickly than those that mismatched outcomes. I predicted that matched outcome-reaction pairs would prompt people to respond like convergent thinkers and mismatched pairs would prompt people to act like divergent thinkers. In addition, I expected that any effects would be driven by the difference in responses to reactions that followed convergent outcomes. Once people adopted a divergent thinking mindset in response to divergent outcomes, that mindset should have persisted through the end of each story. The persistent divergent mindset could have limited any effects related to people's participation that would have otherwise been caused by the match versus mismatch of divergent outcomes and reactions.

Note that the results of Experiments 4 and 5 suggest that it might be harder, as a general feature of creative cognition, for people to switch from divergent thinking to convergent thinking than from convergent thinking to divergent thinking. That is, once people adopted a divergent mindset, it seemed to persist through the ends of the stories. I could test the possibility that this might be a general feature of divergent and convergent thinking across domains with classic divergent and convergent thinking tasks, such as Alternate Uses Task and Remote Associates Test. It should, theoretically, be harder for people to make the transition from the Alternate Uses

Test to Remote Associates Test than the reverse. If this effect were to persist in other domains, this theory would have implications for how people structure their workdays, how teachers structure the order of their lessons, and how people approach the creative process in general.

To summarize Experiment 5, several of the results conformed to my predictions. For example, stories with convergent outcomes and negative reactions caused people to be the most uncertain. In addition, stories with convergent outcomes and positive reactions caused people to make the most self-reflections. There were also some main effects of note. For example, positive reactions caused people to make the most positive appraisals. In addition, negative reactions to outcomes caused people to be more fluent in their responses.

The fact that people made more fluent responses to negative reactions could add nuance to previous work that considered readers' responses to positive and negative endings to stories. In their study, Egidi and Gerrig (2009) used stories to manipulate readers' moods. After inducing positive or negative moods, the authors had people read stories with positive or negative endings. In one story, Danny and Claire competed in a dance competition and seemed to perform fairly well. The positive ending read, "The judges gave Danny and Claire high marks." The negative ending read, "The judges gave Danny and Claire low marks." Egidi and Gerrig demonstrated that, independent of induced mood, readers took longer to process negative versus positive story endings. They explained that the effect was due to negative endings capturing more attention. It is important to note that the reactions of the judge in the story of Danny and Claire paralleled the reactions of characters in my stories. From my perspective, people likely took longer to read negative endings because they were acting more creatively once they encountered negative endings. People likely generated more fluent responses to the negative versus positive endings, and the increased fluency took longer to process. There could

be other instances similar to this one in which my results would suggest alterative mechanisms that underlie known reading time differences.

In addition to adding to theories of participation in narratives, this project provides new ideas about creative cognition. My work evokes the many ways that people have attempted to create interventions that change the type and extent of people's creative products (for reviews, see Ma, 2006; Scott, Leritz, & Mumford, 2004). For example, Förster, Friedman, and Liberman (2004) designed a series of studies to test the effects of temporal construals on abstract generative thinking (divergent thinking) and analytical reasoning (convergent thinking). They asked participants to *travel in time* and imagine their lives in general "one year from now" or "tomorrow." They showed that distant future construals made people more creative than near future construals on a generative thinking task. However, near future construals improved performance on an analytical reasoning task. In the current project, I have shown that convergent outcomes prompted people to act more like convergent thinkers and divergent outcomes prompted them to act more like divergent thinkers. It seems likely that the different stories could affect creative performance on other tasks. For example, convergent outcomes might improve convergent thinking performance on the Remote Associates Test (Mednick, 1962) that requires people to make associative connections between words. In contrast, divergent outcomes might improve divergent thinking performance on the Alternate Uses Task (Getzels & Jackson, 1962; Guilford, 1967; Wallach & Kogan, 1965) that requires people to generate many alternate uses for common objects, such as a brick.

Various creative contexts might also affect how people perform on tasks that are closely related to the story world. In my experiments, the speak-aloud tasks were undirected and open-ended. I would be curious to see how people would respond if given a more focused task. For

example, I might ask people to generate endings to each story. None of my stories fully resolved the narrative mysteries, so they were left open for further interpretation. For example, in the story of Lucy, the reader never found out if the couple got married after Daryl gave her a ring. Maybe it was not an engagement ring after all. When Daryl gave Lucy a gun, the divergent outcome introduced an entirely new and highly salient mystery. Why did he give her a gun? It could be possible that convergent outcomes might cause people to generate more appropriate endings, whereas divergent outcomes might cause people to generate more novel endings. If I were to collect and score endings for novelty and appropriateness, I would be in a position to use that information in additional experiments. For example, I could use the normed endings to manipulate the extent to which outcomes are convergent or divergent on a continuum. As such, I could affect creative mindsets more incrementally than I have done with the current project.

My theoretical perspective also opens the possibility of readers' having different responses to narratives as a product of individual differences in creativity. There is an abundance of individual differences related to creativity. Individual differences in creativity have many cognitive consequences. For example, Groborz and Nęcka (2003) showed that divergent thinking ability was positively related to people's cognitive control on the Navon task (Navon, 1977) and the Stroop task (Stroop, 1935). In addition, people who are more creative tend to cheat more on tasks that allow for flexible rationalization of the bad behavior (Gino & Ariely, 2012). Further, I have conducted my own studies on individual differences in creativity that suggest peoples' creative abilities lead to differences in how they unconsciously plagiarize (i.e., inadvertently claim someone else's ideas as their own) (e.g., Brown & Murphy, 1989). In our research, people low in creativity unconsciously plagiarized more total ideas than people high in creativity during a generate-and-recall paradigm (Wenzel, Gerrig, & Rajaram, 2014). In

addition, people low in creativity unconsciously plagiarized many more low creative ideas than high creative ideas. There was no difference for people high in creativity. The results suggested that people attended to their own creative ability and the creativity of other people's products when deciding which ones were their own.

With the current experiment, I did not test for individual differences in creative abilities that might affect differences in reading times or speak-aloud performance. Readers who have native skill in convergent thinking could participate in story outcomes and reactions differently than unskilled convergent thinkers. Similarly, skilled divergent thinkers might participate in outcomes and reactions differently than unskilled divergent thinkers. In addition, I did not measure the likelihood that people would respond to the different outcomes. When authors invite participation in narratives, they only create opportunities for readers to act creatively in the moment. However, there is no guarantee that people will participate creatively. There could be many reasons why a person might take up an author's call to play along or choose to decline the invitation. One possible measure that could speak to people's willingness to play along might be creative self-efficacy (e.g., Tierney & Farmer, 2002), or one's own belief in their creative abilities. If people are more confident in their creative abilities, they might be more willing to take up the call of authors to participate creatively. Another individual difference, tolerance of ambiguity, might also affect how willing people are to participate. Tolerance of ambiguity is positively associated with fluency of divergent thinking performance (Zenasni, Besançon, & Lubart, 2008). Therefore, someone who is highly tolerant of ambiguity might be more willing to respond creatively to divergent outcomes that prompt uncertainty than someone who is intolerant of ambiguity. In contrast, someone who has a low tolerance of ambiguity might choose to turn

the page to find out why Daryl gave Lucy a gun than to generate his or her own possible solutions in the moment.

Besides individual differences among readers that might affect creative participation, there could be differences in the types of stories that prompt creative participation. Thus far, I have only examined mysteries. However, the results of my experiments suggest that other types of stories (and the various features of those stories) might also invite people to participate creatively. For example, recent research by Foy and Gerrig (2014) suggested that readers participate in realistic stories (e.g., a story about a normal boy named Bobby) in different ways than they participate in fantastic stories (e.g., a story about Peter Pan). Foy and Gerrig demonstrated that readers used information related to story worlds to help them assimilate narrative events. In the realistic stories, readers were faster to read realistic events, such as "He got into his car and drove to her house," than fantastic events, such as "He leapt into the air and flew to her house." However, the opposite was true of fantastic stories, such that people read the fantastic events more quickly than realistic events. It might be possible to consider realistic story worlds as convergent stories and fantastic story worlds as divergent stories. Then, given the opportunity to make participatory responses, people might act like convergent thinkers when Bobby drove to the house and Peter flew there. In contrast, it could be possible that people would act like divergent thinkers when Bobby flew to the house and Peter drove there.

In summary, this project examined how various features of narratives prompt people to adopt different creative mindsets in response to mysteries. Overall, my experiments suggest that readers took up the invitation to participate in mysteries. In addition, different outcomes and outcome-reaction pairs successfully primed convergent and divergent mindsets. These effects enlarge the role of creativity in theories of narrative processing and participation.

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Tables

Table 1

Experiment 2: Speak-aloud categories, definitions, and examples

Category	Definition	Example
Certainty	Expressing certainty	I had a feeling it was a shark since he is surfing and normally sharks come towards surfers.
Uncertainty	Expressing uncertainty	What would it mean if somebody gave me a gun on my date? What?
Positive appraisals	Positive judgments of characters, the narrator, the story, the situation, etc.	That was very nice of the guy.
Negative appraisals	Negative judgments of characters, the narrator, the story, the situation, etc.	I think it's kinda weird that they would put a wig underneath his pillow.
Self-reflections	Talking about any personal issue outside the story or reflecting on what they had said about the story	Hmm, a dollar can't really buy you much. But I mean, when I was younger, a dollar could buy me two bags of chips and a juice.
Emotional Responses	Using emotional language	Shock!; (Laughs) What is happening here? I thought he was surfing. How did he see a bear? That's actually pretty hysterical (Laughs).
Explanations	Offering any sort of explanation of a scene, event, or what a participant said	That's really good luck that she found it, found the pouch and the coins at the last minute. Um, it must be worth a lot.
Replotting	Undoing (or re-doing) an event or outcome	Um, I thought that was really interesting that there was a shovel in an instrument case. That makes me think, oh he could of killed someone and used the shovel to bury the body.
Descriptions	Describing the scene or events of a story as it had been told	Um, she got a family call she was expecting.
Elaborations	Adding details to a story, situation, character, etc.	I guess it's a cooler filled with an entirely different kind of ice.
Problem Solving Instructions	Directly instructing a character to carry out a particular action to accomplish a goal	Hopefully it's the first date, um, because Lucy better start running.

Problem Solving Assertions	Suggesting a particular course of action without specifically addressing a character	Pancakes are delicious. They can fix anything.
Outcome Preferences (Specific & Concrete)	Expressing a preference for a specific concrete outcome	There's obviously a reason there's a bunch of scientists working on oil spills. If people didn't want more bad press, they're probably trying to fix it.
Outcome preferences (Open & Abstract)	Expressing openness to alternative outcomes or abstract outcomes	Grass clippings seem like a very anti-climactic choice, um, that doesn't excite me at all, except maybe what's under the grass clippings…
Self-projections	Describing how the listener would feel or act in a situation in a story	Earthworms is a really weird thing to give someone, and personally I wouldn't eat it.
Calculating Demeanor	Using calculating language	Um, I'm guessing these tomatoes and the other things in these photos are somehow important if they're in an evidence locker.
Meta-comments	Talking about the experiment; making predictions about the experiment; talking about other stories	This sort of reminds me of that story with Blaine.

Table 2

Experiment 5: Summary of predictions

Outcome	Outcome Examples	Reaction (Positive/Negative)	Reaction Examples	Predicted Type of Creative Thinking
Convergent	The box contained a ring.	Positive	Lucy proclaimed to Daryl, "I will always cherish you for this."	Convergent
		Negative	Lucy proclaimed to Daryl, "I will always despise you for this."	Divergent
Divergent	The box contained a gun.	Positive	Lucy proclaimed to Daryl, "I will always cherish you for this."	Divergent
		Negative	Lucy proclaimed to Daryl, "I will always despise you for this."	Divergent

Figures

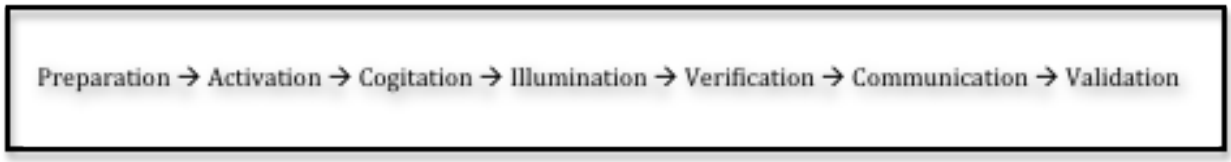

Figure 1. Cropley and Cropley's seven-phase model of the creative process.

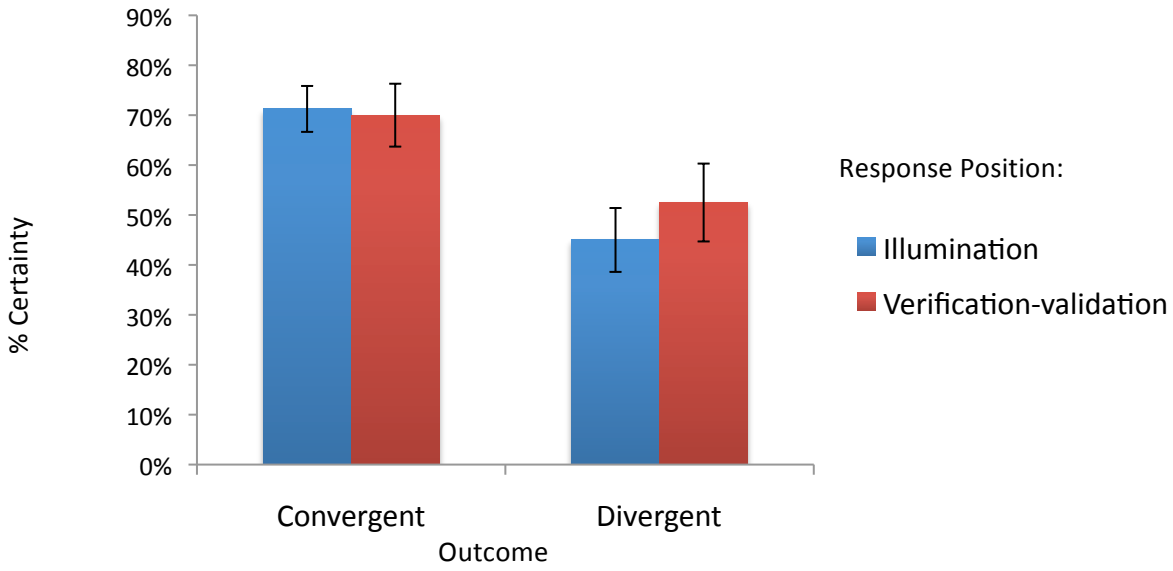

Figure 2. Experiment 2: Certainty

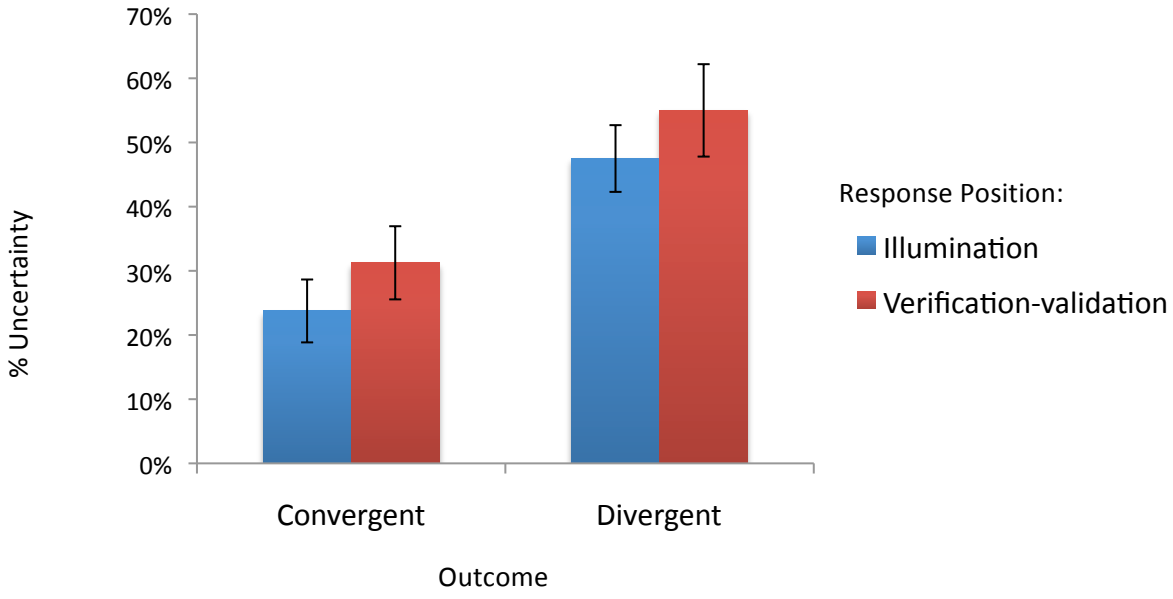

Figure 3. Experiment 2: Uncertainty

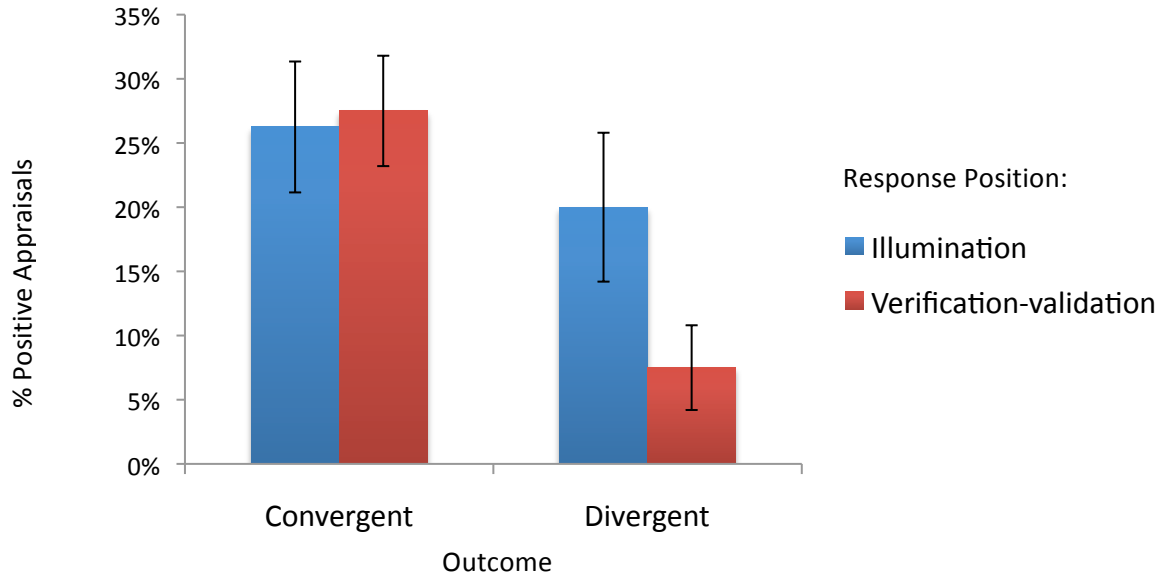

Figure 4. Experiment 2: Positive Appraisals

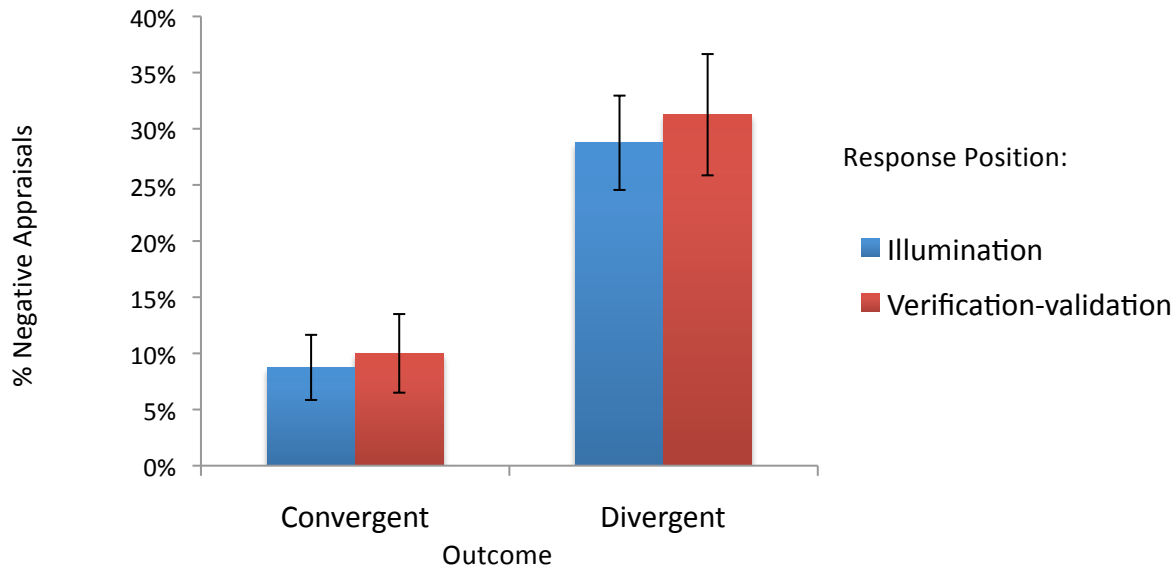

Figure 5. Experiment 2: Negative Appraisals

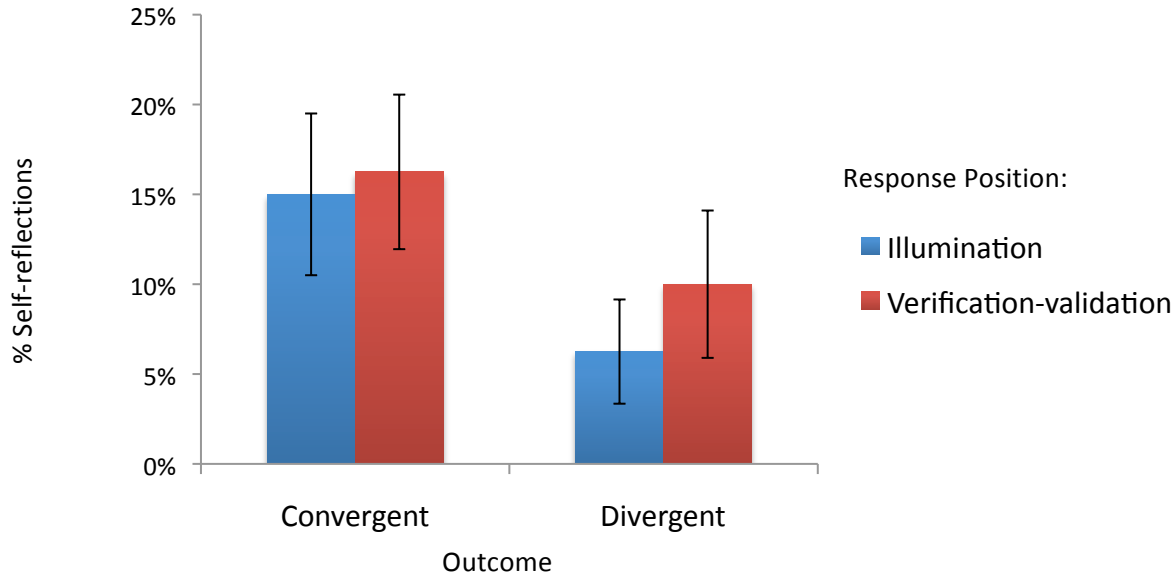

Figure 6. Experiment 2: Self-reflections

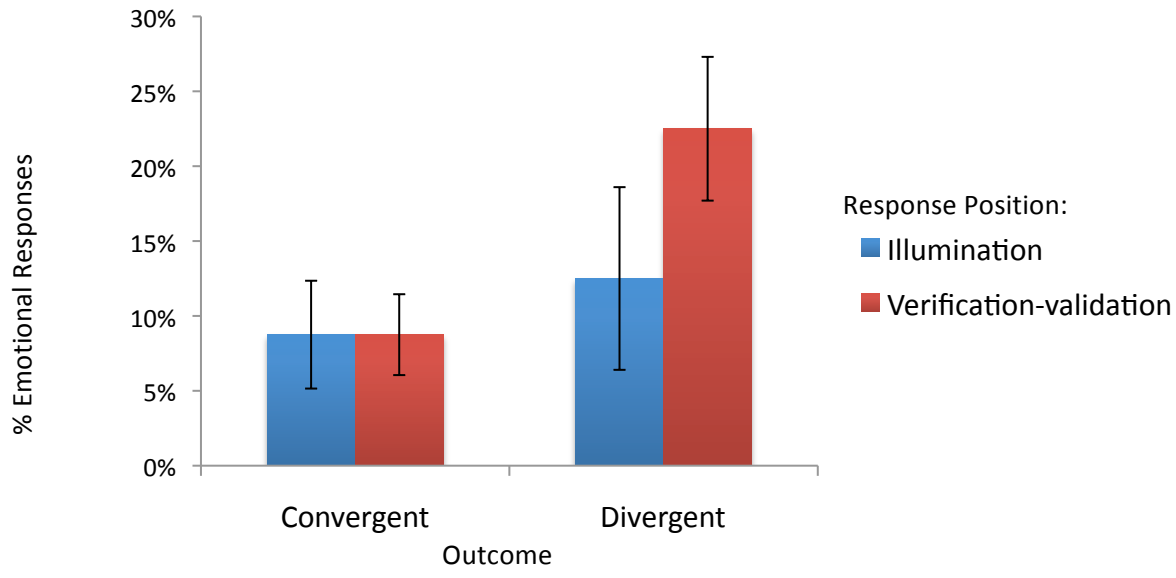

Figure 7. Experiment 2: Emotional Responses

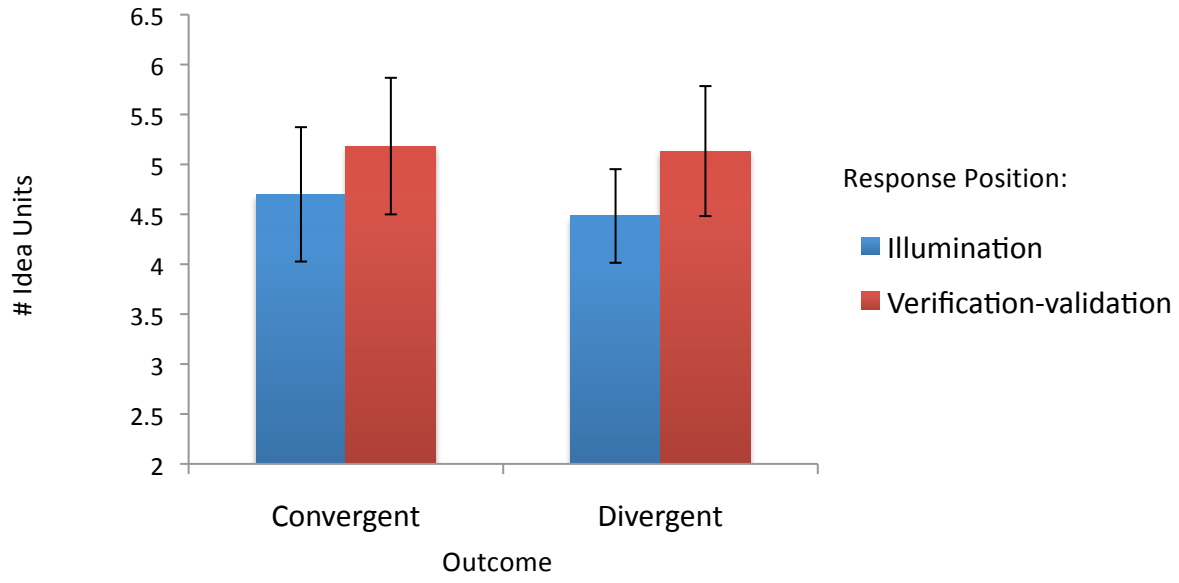

Figure 8. Experiment 2: Fluency

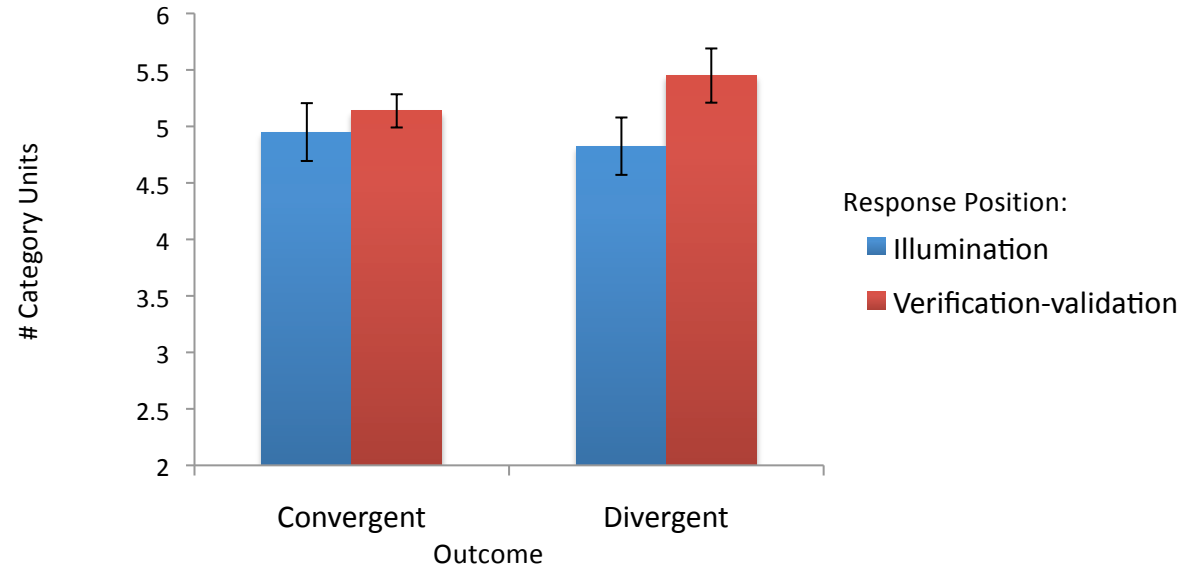

Figure 9. Experiment 2: Flexibility

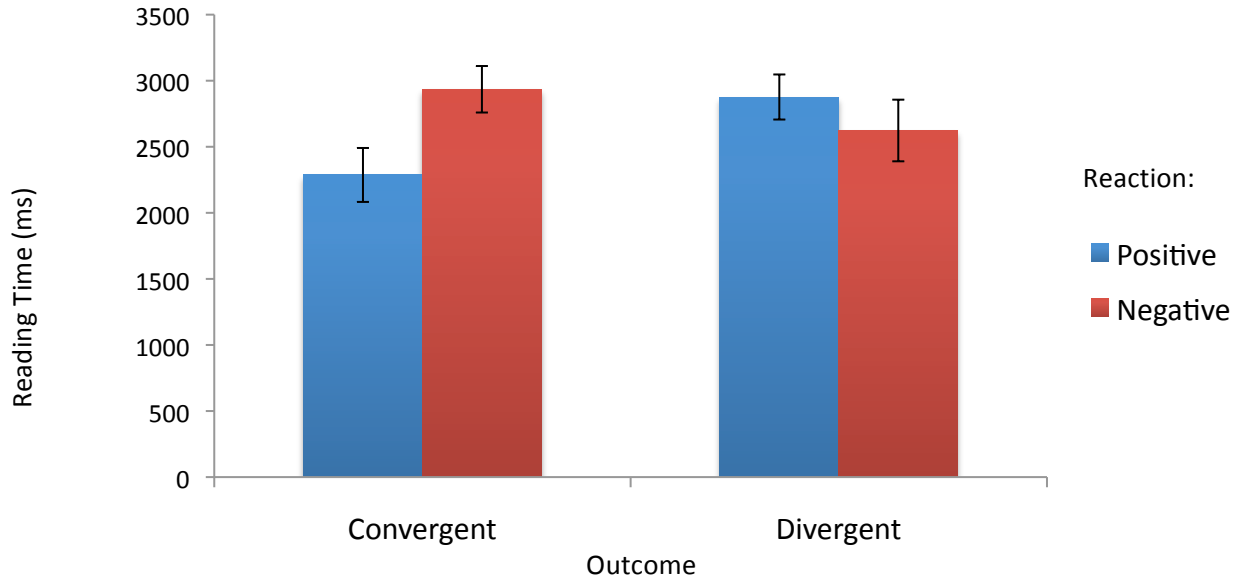

Figure 10. Experiment 4: Interaction between outcomes and reactions

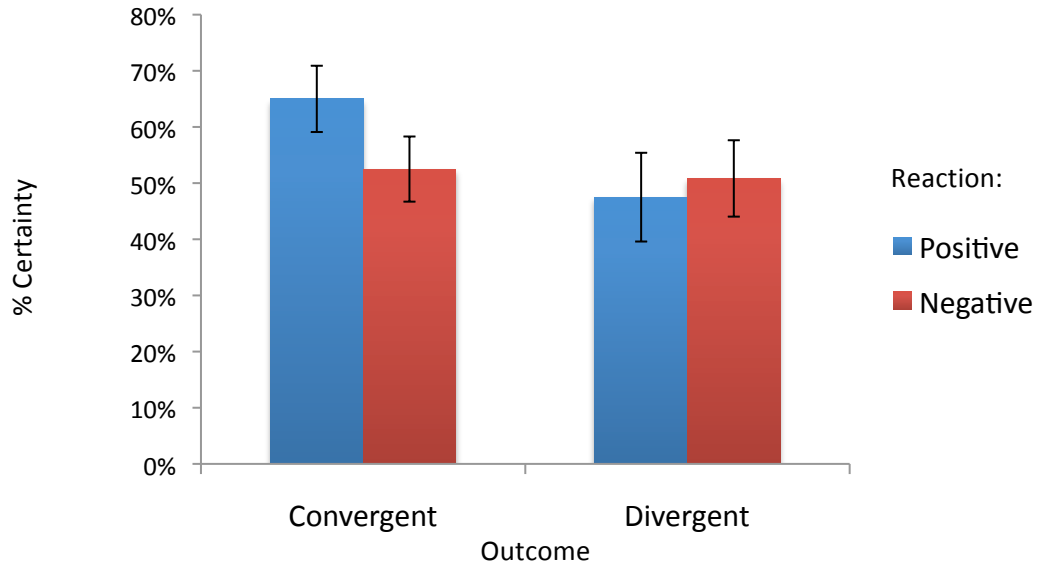

Figure 11. Experiment 5: Certainty

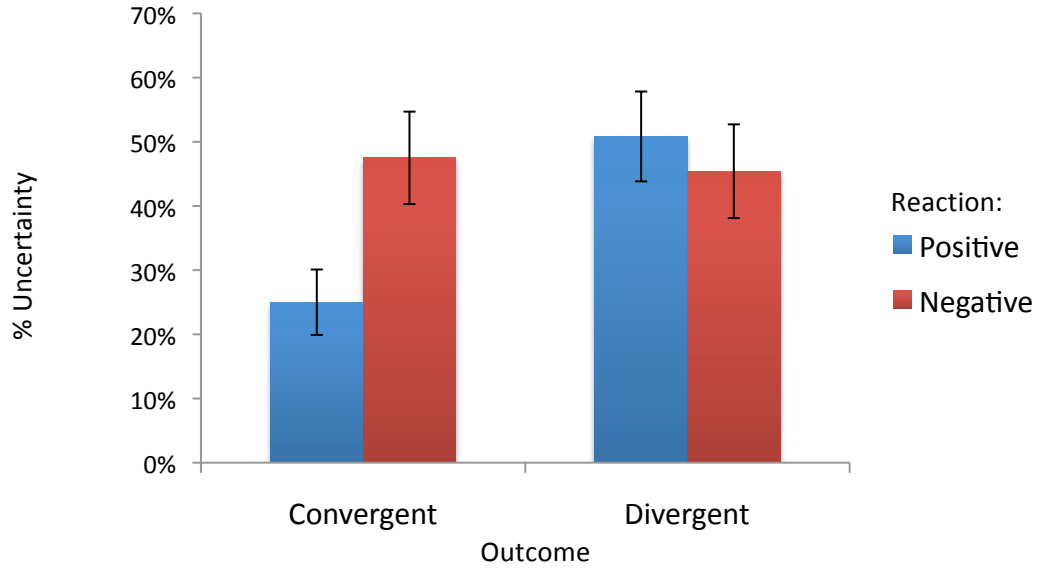

Figure 12. Experiment 5: Uncertainty

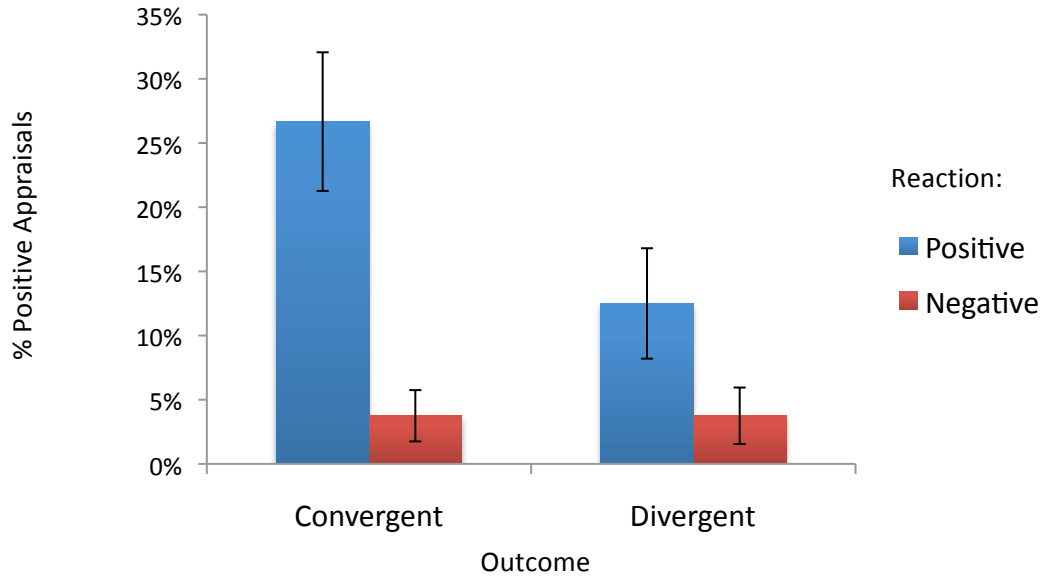

Figure 13. Experiment 5: Positive Appraisals

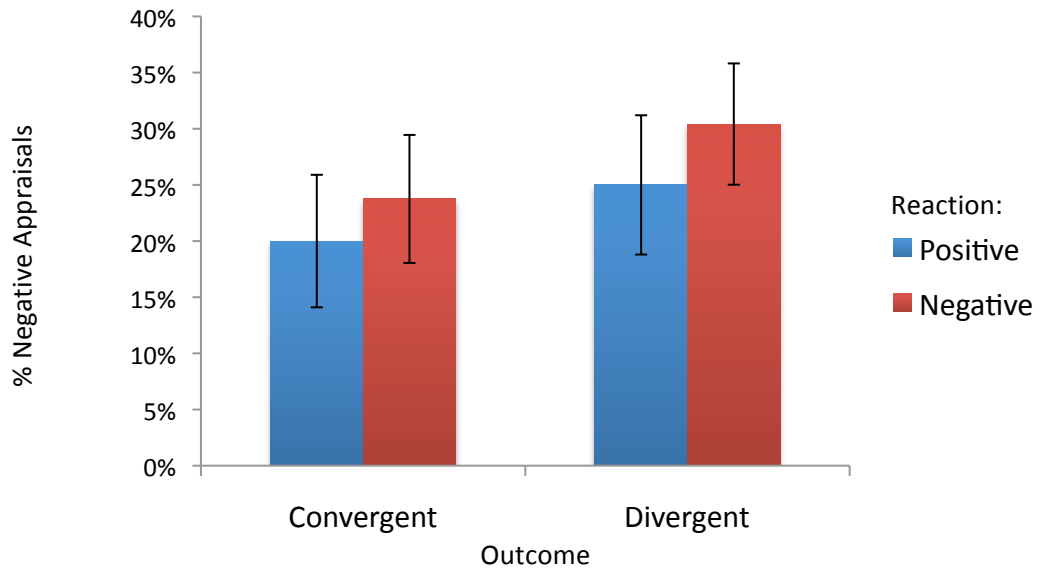

Figure 14. Experiment 5: Negative Appraisals

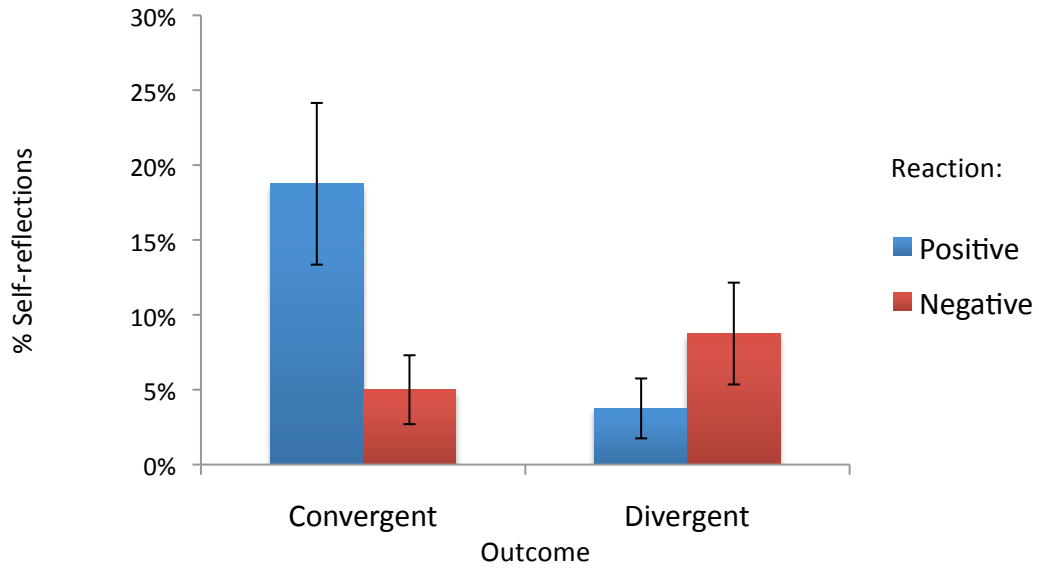

Figure 15. Experiment 5: Self-reflections

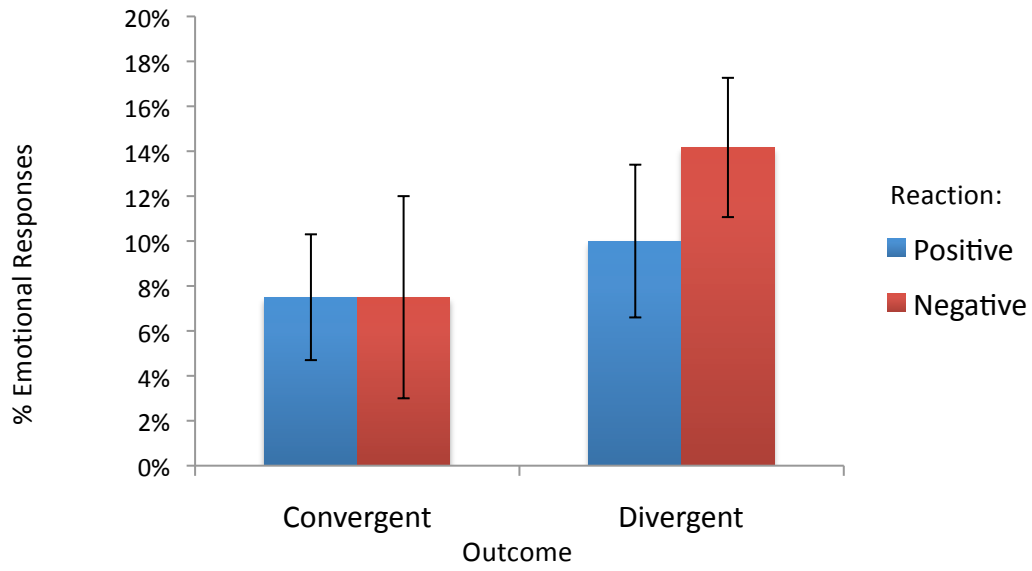

Figure 16. Experiment 5: Emotional Responses

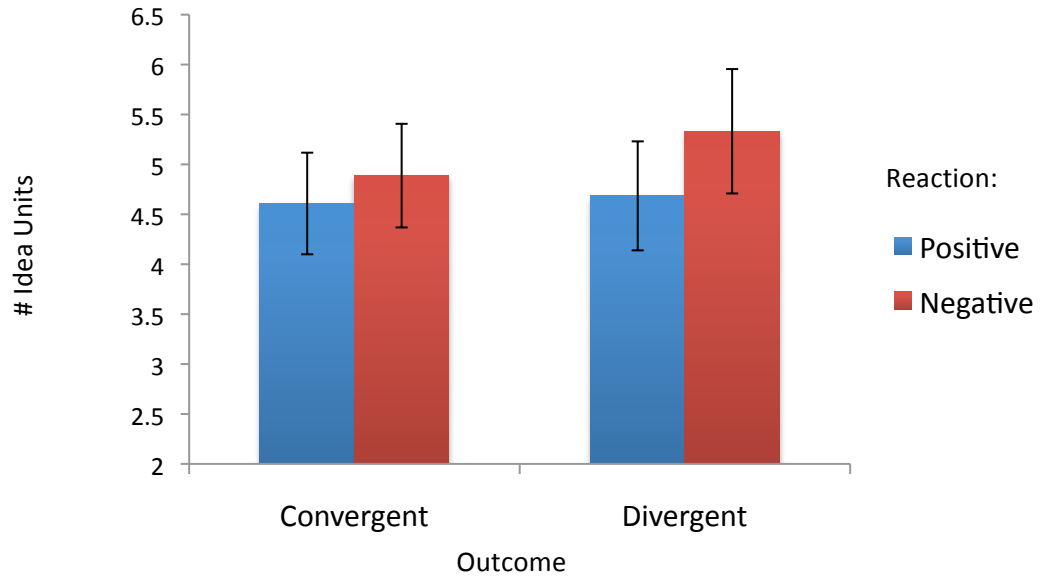

Figure 17. Experiment 5: Fluency

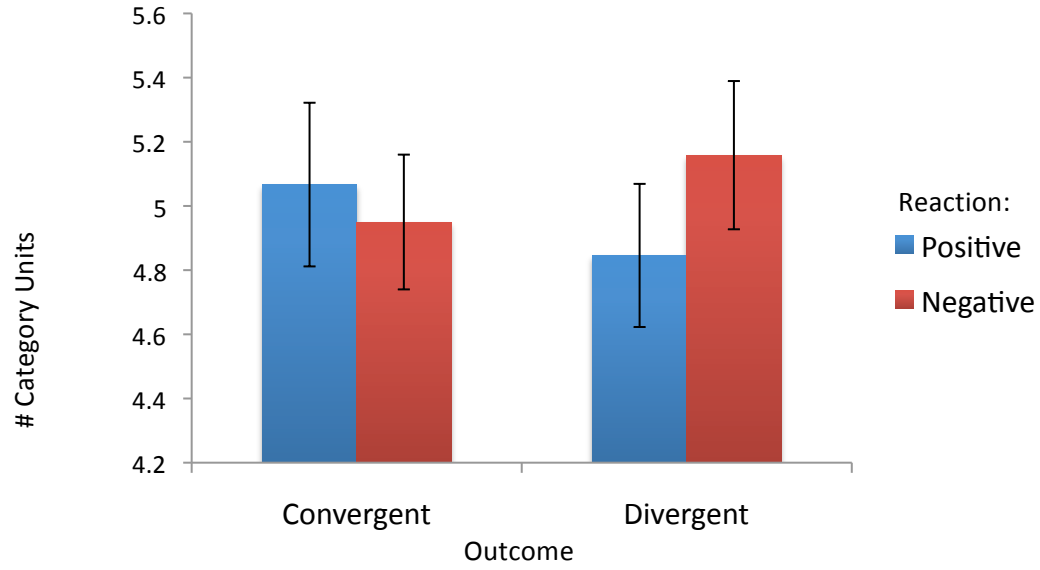

Figure 18. Experiment 5: Flexibility

Appendix

Example Stories

Lucy, Daryl, and the Box

Preparation phase:

Lucy and Daryl had been dating for several years and were madly in love. One afternoon, Daryl and Lucy took a walk in the park where they had gone on their first date. When they got to a scenic spot, Daryl held Lucy's hand and asked her if she would like to go to a fancy dinner with him at their favorite French restaurant. Lucy gladly accepted the invitation to go on such a romantic date. That night, Daryl picked Lucy up at her apartment. He complimented Lucy on her outfit and said, "You look beautiful tonight, as usual." When they arrived at the restaurant, the host seated them at a table by the window that overlooked a charming pond. The couple ordered a bottle of red wine and began talking about what they would have for dinner.

Activation phase:

Daryl felt nervous as they talked, because he was concealing something under his coat. The object dug sharply into the left side of his ribcage.

Cogitation phase:

It was a gift that he could not wait to give Lucy. Daryl was never good at keeping secrets from her, so he quickly put the box on the table. When she saw the box, Lucy almost jumped out of her seat. Lucy got even more excited as Daryl handed her the package. She opened it and examined the contents for a moment.

Illumination phase:

Convergent outcome - The box contained a ring.

Divergent outcome – The box contained a gun.

Neutral verification-validation phase (Experiments 1 to 3):

She realized exactly what this moment would mean.

Explicit verification-validation phase (Experiments 4 and 5):

Positive reaction - Lucy proclaimed to Daryl, "I will always cherish you for this."

Negative reaction- Lucy proclaimed to Daryl, "I will always despise you for this."

Conclusion:

Lucy leapt across the table and gave Daryl a long kiss on his lips. Daryl kissed Lucy back just as the waiter arrived to take their orders. They both got the braised duck with smashed potatoes.

Blaine and the Ocean Waves

Preparation phase:

Blaine was surfing off the coast of a Florida fishing town. He was alone out on the water, taking in the beautiful early morning sun. The sun's rays glistened like diamonds across the great ocean expanse. Blaine watched a flock of seagulls swooping and diving about the water. In the distance, he saw the outline of a pier that was dotted with fisherman casting out their lines. The wind started to pick up, and Blaine felt a surge of water underneath his board. He could sense that a set of waves was about to roll in. He floated up and over several steadily growing swells before spotting a perfect crest in the distance. Blaine turned toward the shore and lined up his board to ride the surge. He paddled hard and attacked the face of the wave that had been his mark. He caught it!

Activation phase:

As he cruised atop the sick wave, Blaine noticed something just below the surface. He cut back, performed a graceful kick-out, dropped to his chest, and paddled back toward what he had seen.

Cogitation phase:

As he approached, he noticed a long shadow underneath the water. The shadow appeared to be moving fluidly with the current. Blaine was very intrigued, because he had surfed those waters his entire life. However, Blaine also felt a little wary about getting too close. Just then, the waves parted long enough for him to get a good look.

Illumination phase:

Convergent outcome - Blaine had seen a shark.

Divergent outcome - Blaine had seen a bear.

Neutral verification-validation phase (Experiments 1 to 3):

He wondered what this meant for the ecosystem of his quaint fishing town.

Explicit verification-validation phase (Experiments 4 and 5):

Positive reaction - Blaine felt that the ecosystem of his town must be blessed.

Negative reaction - Blaine felt that the ecosystem of his town must be cursed.

Conclusion:

Blaine was so distracted that he didn't see the next wave rolling in toward him. He ate it as the curl crashed over his back, sending his board flying. As he emerged from the water, Blaine heard the flock of seagulls squawking.