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Abstract

In two experiments, we explored the influence of affective state, or mood, on inadvertent plagiarism, a memory failure in which individuals either misattribute the source of an idea to themselves rather than to the true originator or simply do not recall having encountered the idea before and claim it as novel. Using a paradigm in which participants generate word puzzle solutions and later recall these solutions, we created an opportunity for participants to mistakenly claim ownership of items that were, in fact, initially generated by their computer 'partner.' Results of both experiments suggest that participants induced into a sad mood before solving the word puzzles made fewer source memory errors than did those induced into a happy mood. Results of Experiment 2 also imply that sad mood reduces some item memory errors. Implications for appraisal theories, such as the affect-as-information hypothesis, are discussed.

Introduction

Plagiarism is the act of appropriating another's intellectual property and claiming it as one's own (Mawdsley *1994*). However, not all instances of plagiarism are intentional. There are situations in which a memory for the idea or work of another is mistaken for a unique and original idea. For example, George Harrison was accused of having plagiarized the melody for his song, "My Sweet Lord," from a hit single by Ronald Mack called "He's So Fine" (e.g., Bright Tunes Music Corp. vs. Harrisongs Music, Ltd. *1976*). He admitted to having heard Mack's song, but he denied deliberate intentions to copy it (Dannay *1980*). Harrison's mistake may have been an instance of cryptomnesia, a type of memory illusion in which individuals mistakenly trust that they have generated a new idea when, in reality, they have merely accessed a previously experienced idea and inadvertently claimed it as their own. This phenomenon, which is also called inadvertent plagiarism, (Marsh et al. *1997*) or unconscious plagiarism (Taylor *1965*), represents a memory failure in which individuals either misattribute the source of the information to themselves rather than to the true originator or they simply do not recall having encountered it before and claim it as their own, novel creation. That is, both situations involve misattributing the source of the information to oneself; however, in the latter instance, a possible source other than the individual is not remembered. While several explanations for this phenomenon have been offered, it is generally explained in terms of the source monitoring framework (e.g., Lindsay *2008*; Marsh et al. *1997*).

In order to better understand this memory error in particular, and source-monitoring in general, we conducted two experiments that assess the influence of one's mood, or affective state, on one's likelihood of committing cryptomnesia. Although mood has been found to influence the performance of time-based prospective memory tasks (Kliegel et al. *2005*), the occurrence of false memories in the Deese-Roediger-McDermott (DRM) paradigm (Deese *1959*; Roediger and McDermott *1995*) (Storbeck and Clore *2005*), and the incorporation of misleading information into eyewitness accounts (Forgas et al. *2005*), it has neither been applied to research on cryptomnesia nor has it been applied to situations that require monitoring the source of one's memory.[1]

Cryptomnesia and the source monitoring framework

Multiple lines of evidence suggest that cryptomnesia involves processes that are specified by the source monitoring framework of Johnson and colleagues (Johnson et al. *1993*; Johnson and Raye *1981*). For instance, generating novel fictitious exemplars leads to less cryptomnesia than does generating common category exemplars (Tenpenny et al. *1998*), presumably because generating novel fictitious items requires cognitive operations above and beyond those demanded by generation of common items, which increased source monitoring accuracy and therefore decreased cryptomnesia.

Similarly, Marsh et al. (*1997*) found that participants who were encouraged to focus on the origin of their ideas made fewer cryptomnesia errors than did participants who were not instructed to monitor source. They also found that those who were placed under time pressure to generate new responses plagiarized more ideas than did those in the non-speeded groups. They concluded that cryptomnesia occurs because people working on creative tasks fail to engage in the systematic (as opposed to heuristic) decision processes specified by the source monitoring framework. That is, cryptomnesia is not the result of forgetting the source of ideas or forgetting the ideas themselves and regenerating them; rather, it results from over-reliance on automatic, heuristic decision processes rather than effortful, systematic decision processes.

Further evidence that cryptomnesia involves processes specified by the source monitoring framework lies in the research of Stark and Perfect (*2006*, *2007*), who found that elaborating on ideas during a retention interval by providing three ways in which the idea could be improved increased cryptomnesia errors. Presumably, generating ways in which ideas could be improved increases source confusion in that participants mistake an idea they improved upon for an idea they originally generated.

Experimental paradigm: Boggle puzzle task

Several researchers have devised paradigms under which to study the occurrence of cryptomnesia (e.g., Brown and Murphy *1989*; Marsh and Bower *1993*; Marsh and Landau *1995*). One such way to elicit cryptomnesia involves asking participants to solve Boggle puzzles. This paradigm was the first to mimic the creative process of idea generation (Marsh and Bower *1993*). In this procedure, participants first form words by stringing together letters that appear in a 4 × 4 matrix according to a set of rules. In this phase, referred to as Initial Generation, participants generated one word on each trial and their computer "partner" generated three words on each trial until the participant had produced four items and the computer had produced 12. Participants were warned not to repeat their own nor the computer's puzzle solutions during this Initial Generation phase. The second phase in this paradigm, called "Recall-Own," involved participants recalling only the words that they had generated as solutions to the Boggle puzzles. In the third phase, "Generate-New," participants were asked to provide additional puzzle solutions that neither they nor the computer player had provided previously.

Cryptomnesia in this paradigm was defined as an instance in which a participant duplicated his or her own earlier response (self-plagiarism) or a previous response of the computer (partner-plagiarism). Because the goal of the Recall-Own task is to report items that the participant himself said, self-plagiarism cannot occur during this phase. Self- and partner-plagiarism can occur in both the Initial Generation and the Generate-New phases, however.

Using this paradigm, Marsh and Bower (*1993*) found that approximately 12 % of the items generated during Initial Generation had actually been presented by the computer. The Recall-Own phase resulted in even more cryptomnesia, with nearly 32 % of recalled items having been offered by the computer. Finally, approximately 28 % of participants' new items in the Generate-New phase were repeated from the computer's responses.

Decision processes in experimental paradigm tasks

Because the focus of the current experiments is on how mood influences source monitoring accuracy, which is compromised in cryptomnesia, it is necessary to review support for the claim that different decision processes are involved in the Recall-Own and Generate-New tasks of the standard cryptomnesia paradigm. Whereas the Generate-New task typically requires novelty-detection processes (because only novel responses are valid for these tasks), the Recall-Own task requires determination of the source of a candidate item (Landau and Marsh *1997*). That is, in order to make an accurate response during the Generate-New phase, one need only determine whether an item was offered at an earlier time in the experiment, regardless of who offered it. In order to make an accurate Recall-Own judgment, however, one needs information regarding whether an item was previously presented as well as information about the origin of items that had been presented.

Several findings support the foregoing distinction between the Generate-New and Recall-Own tasks (e.g., Landau and Marsh *1997*; Macrae et al. *1999*). Landau and Marsh (*1997*) made the cognitive operations associated with self-generated solutions more confusable with those associated with computer-generated solutions by instructing some participants to guess the computer's solutions during the Initial Generation phase. Under conditions in which the self- versus computer-generated items were highly confusable, cryptomnesia in the Recall-Own phase increased; however, this manipulation had no effect on the Generate-New task. These findings are consistent with the source monitoring framework in that anticipating the computer's responses made the solutions more similar to self-generated items, thereby causing participants to confuse the sources.

Similar results were found by Macrae et al. (*1999*), who manipulated perceptual similarity of sources by testing participants in same- or mixed-gender pairs. They found that increased perceptual similarity between the sources increased the incidence of cryptomnesia, but only in the Recall-Own phase, during which source monitoring is necessary.

To summarize, different source monitoring processes contribute to the incidence of cryptomnesia. First, processes that contribute to the likelihood of an item coming to mind are involved in one's claim that an idea is one's own. In addition, the qualitative characteristics of the remembered information determine the source to which the idea is attributed (see Arnold and Lindsay *2007*, for a related finding in the context of the knew-it-all-along effect). Finally, particular decision strategies are used to assess what has been remembered in order to determine whether the information was initially generated by the individual him- or herself.

Mood and memory

We now turn to the body of literature that describes the influence of mood on memory. Much research has been conducted on the concepts of mood-congruent and mood-dependent memory. This research suggests that the accessibility of memories of life experiences that are congruent in valence with the individual's current mood are enhanced by that mood state (e.g., Bower and Mayer *1989*; Eich et al. *1994*; Eich and Metcalfe *1989*; Kihlstrom *1989*; Macaulay et al. *1993*).

However, in comparison, little research has investigated the effect of mood on memory for emotionally neutral material. The results of this smaller body of literature suggest that when individuals are in a happy mood they tend to process information more globally or relationally (Fiedler *2001*; Gasper and Clore *2002*; Isen and Daubman *1984*), and when they are in a sad mood, they tend to process information in a more local or item-specific manner (Bless et al. *1996*; Bodenhausen *1994*; Isbell *2004*; Gasper and Clore *2002*). Some of the effects of this mood-related difference in cognitive processing are that happy individuals may be more likely than sad individuals to "chunk" information (Isen et al. *1987*) and to make more schema-consistent intrusions on a recognition memory test (Bless et al. *1996*). In addition, false memories that result from the DRM paradigm (Deese *1959*; Roediger and McDermott *1995*) decrease when one is in a sad mood (Storbeck and Clore *2005*). Presumably, the effects of mood on this false memory phenomenon occur because individuals in a sad mood are focusing on item-specific details of the studied items rather than on general categories, thereby inhibiting the activation of critical lures.

One explanation for these effects of mood on memory is the affect-as-information hypothesis (Clore *1992*, *1994*; Clore et al. *1994*; Schwarz and Clore *1983*, *1988*, *1996*), according to which individuals' moods provide them with information about the psychological nature of the current situation. As Schwarz (*1990*) explains, a positive mood informs the individual that the situation poses no threat and, therefore, that it is safe and, indeed, advantageous to use the information that is currently available to them. This includes general knowledge structures, stereotypes, scripts, and other heuristic processing devices. In contrast, a negative mood provides individuals with a signal that the current situation is problematic and that currently available strategies for interpreting the situation are not effective. This cue indicates that the situation requires more systematic, bottom-up processes (see Clore et al. *2001* for a more detailed explanation).

Other theoretical accounts of the relationship between mood and cognition also hypothesize that one's mood can provide them with information about their performance on a cognitive task. Martin et al. (*1993*), for example, maintain that one's mood influences performance on cognitive tasks, but how performance is affected depends on the specific demands of the task. Wright et al. (*2005*) tested this notion in their examination of the effect of mood on false memories in the DRM paradigm. They instructed participants either to recall as many words as they were able or as many words as they felt like recalling. Their results suggest an interaction such that the effect of mood on false recall of critical lures depended on which instructions participants received: when participants were instructed to recall as many words as they were able, those induced into a sad mood false recalled more critical lures than did those induced into a happy mood, however, when participants were instructed to recall as many words as they felt like, those induced into a happy mood false recalled more critical lures than did those induced into a sad mood.

These results are explained according to the mood-as-input hypothesis (e.g., Martin and Stoner *1996*), in which one's mood can signify whether he or she has performed the task at-hand adequately. People in a happy mood misattribute their positive mood state to their performance of the task to the best of their ability when they are asked to perform the task to the extent that they are able. This leads them to stop performing the task earlier than people in a sad mood condition, who misattribute their negative mood state to not performing as well as they can. When people are asked to complete the task to the extent that they 'feel like' doing so, however, the opposite effect emerges; people in a happy mood continue performing the task for longer than those in a sad mood because participants in both conditions misattribute their mood to how enjoyable the task is to perform—those who are in a happy mood wish to continue the task that they perceive to be making them happy.

Although mood has been shown to affect memory in a variety of ways (e.g., Gray *2001*; Gray et al. *2002*; Packard et al. *1994*; Storbeck and Clore *2005*), little is known about how it can influence one's ability to monitor accurately the source of one's memories, as is required in order to avoid some cryptomnesia errors. One aspect of the relationship between mood and source monitoring that is unclear is whether the reliance on heuristics observed in individuals in happy moods (e.g., Bless et al. *1996*) also applies to the heuristic decision processes that the source monitoring framework proposes. Likewise, the more "item-specific" processing associated with a sad mood may include the systematic processes outlined by the source monitoring framework. If this is the case, then the mere circumstance of being in a happy mood may prevent the encoding of contextual details of an event, which could result in a failure to retrieve relevant source information such as who generated an idea (Johnson et al. *1993*).

In two experiments, we investigated the effect of mood on source monitoring accuracy using cryptomnesia as a proxy for source monitoring performance. If the heuristic processing typically observed in individuals induced into a happy mood is consistent with the effortless, automatic decision processes described by the source monitoring framework, then individuals induced into a happy mood should be more likely than those induced into a sad mood to plagiarize inadvertently the ideas of someone else. The lower rates of cryptomnesia in those induced into a sad mood, then, would reflect their engagement in more effortful, systematic decision processes. Such results would not only support the affect-as-information hypothesis, they would implicate mood in the decision processes involved in monitoring the source of one's memories as well.

Experiment 1

The principal goal of Experiment 1 was to examine the hypothesis that sad mood would produce more accurate source monitoring than would happy mood, as measured in a standard cryptomnesia paradigm. Specifically, we expected that individuals induced into a happy mood would make more cryptomnesia errors than would those induced into a sad mood. We derived this prediction from previous research showing that individuals in happy moods tend to engage in more heuristic processes while those in sad mood tend to employ systematic processes (e.g., Bless et al. *1996*).

According to the affect-as-information hypothesis (e.g., Clore et al. *1994*), participants induced into a happy mood should encode the Initial Generation phase more heuristically than participants induced into a sad mood, which may result in impaired encoding and hence erroneous retrieval of contextual details by individuals in a happy mood. Such an effect would result in higher cryptomnesia rates for individuals induced into a happy mood than for those induced into a sad mood.

What is not clearly predicted by the affect-as-information hypothesis is how mood would affect cryptomnesia in the Generate-New task. One possible outcome is that a sad mood would reduce cryptomnesia in the Recall-Own task, but have no effect in the Generate-New task. This result could be predicted based on the results of previous research showing the effects of various factors on tasks that require source monitoring, but not on tasks for which item memory processes are sufficient for accurate performance (e.g., Macrae et al. *1999*). More specifically, this line of reasoning would predict no effect of mood in the Generate-New phase, which relies only on item memory and does not require accurate determination of source. In other words, mood does not need to be appraised for primarily familiarity-based processes like those required in the Generate-New task. This prediction is consistent with the finding of Riener et al. (*2003*) that being in a sad mood leads to an overestimation of hill slant, but only on explicit measures, thereby indicating that mood does not influence more automatic processes such as those involved in item memory decisions. Further support for this prediction lies in the finding of Bless et al. (*1996*; E1) that mood did not affect the item memory processes involved in recognition of script-atypical or script-unrelated information.

Alternatively, mood may affect cryptomnesia similarly in the Recall-Own and Generate-New tasks. If it is the case that a sad mood state encourages systematic decision processes, then individuals in a sad mood may benefit from more accurate retrieval, regardless of whether source monitoring is required. That is, if being induced into a sad mood affords accurate encoding of contextual details such as who generated a particular item, then this benefit may appear not only in performance on the Recall-Own task, in which source monitoring is required, but also in performance on the Generate-New task, in which item memory may be enhanced by retrieval of contextual details.

Because there is not yet any published research on the direct effect of mood on source monitoring, we used a standard cryptomnesia paradigm to create a situation in which participants must make source monitoring decisions. Specifically, participants engaged in idea generation with a computer "partner" and then were required to differentiate their ideas from the ideas of a computer "partner" and subsequently to generate additional new items. This paradigm allowed us to examine two aspects of memory: (1) overall memory for what items were reported by the computer and by the participant during the initial idea generation phase and (2) the particular type of errors that participants made when they attempted to differentiate their ideas from those of the computer or when they attempted to generate new items. In other words, this paradigm permitted us to answer two questions: How often were participants wrong, and, when participants were wrong, how were they wrong?

Method

Participants

Fifty undergraduate students (21 women and 29 men) at the University of Virginia volunteered and received partial course credit for their participation. Although 67 total participants completed the study, the data of 17 of them were excluded based on the Exclusion Criteria outlined in the Results section. Each omitted participant's data were replaced by running another participant in that condition in order to obtain equal numbers of participants in each cell. Of the 50 participants whose data were not excluded, 25 were randomly assigned to the Happy Mood condition and the remaining 25 were assigned to the Sad Mood condition. A control/neutral group was not included in this study because control groups induced with a neutral mood manipulation typically report positive mood (Diener and Diener *1996*) and yield results similar to those in a happy mood (e.g., Storbeck and Clore *2005*). Likewise, there are similar brain activation patterns, as measured by PET, in those who experienced either a positive or neutral mood induction procedure (Baker et al. *1997*; George et al. *1995*). Participants were tested individually in sessions that lasted approximately 90 min.

Design and materials

In this experiment, we used a 2×2 mixed-factorial design, with mood (Happy vs. Sad) as a between-participants variable and test phase (Recall-Own vs. Generate-New) as a within-participants variable. Seven Boggle-type puzzles (one practice puzzle and six experimental puzzles) were created with the aid of online word puzzle generators and online dictionaries. Each puzzle contained 16 letters arranged in four rows of four letters each. Each of the seven puzzles had between 110 and 130 possible solutions; puzzles were constructed to minimize the number of words that any two puzzles (including the practice puzzle) had in common.

We also created a mood manipulation check questionnaire for this study (see "Appendix"). This self-report questionnaire was designed to determine the extent to which the mood induction was successful. It included three ratings of how participants were feeling while writing their happy or sad story and three ratings of how they were feeling at the end of the experiment. We averaged the three responses (which were made on a 7-point scale) regarding how they were feeling while writing their story to obtain one indicator of how effectively mood was induced. We also averaged the three ratings of how participants felt at the end of the experiment to determine whether the mood induction persisted throughout the experiment. To be clear, participants made these mood ratings at the end of the experiment; this is because we wanted to minimize the likelihood that participants would be aware that their mood was being manipulated.

Procedure

Before the experiment began, the researcher explained each step of the experiment to participants so that they could complete the experiment without interacting with researchers or other individuals. The reason for this procedural step was to avoid the possibility that personal interaction would negate the effects of the induced mood (Erber et al. *1996*). Once the procedure was sufficiently explained to participants by the researcher, they were left to complete the experiment uninterrupted.

Participants first underwent the mood manipulation, which involved writing about an especially happy or sad personal experience for 7 min. They were told that the purpose of this task was for the experimenters to obtain a writing sample to help them compare the types of words that participants used in their writing to the types of words they located in the puzzles.

At the beginning of the Initial Generation phase, participants read detailed instructions on how to complete the puzzle task, as well as examples of solutions to this task. In order to reduce the orthographic overlap of words within any given puzzle, we provided participants with several rules of item generation. These included the following: (a) a valid word must have three or more adjoining letters that could be connected horizontally, vertically, or diagonally, (b) no letter could be used twice in the same word within a puzzle, (c) no proper nouns were allowed, and (d) words formed by adding or removing an affix or suffix were not allowed; (e.g., “cat” was acceptable, but “cats” was not). Incorrect responses (nonwords, words formed through violations of the rules, etc.) caused an “invalid entry” message and participants were instructed to try again; a valid generation was required in order to proceed. It was possible for participants to continue to the next Initial Generation trial without submitting a valid response by clicking on a “Skip” button; however, participants did not utilize this option (only one participant skipped any trials; the calculation of her results took into account the three trials she skipped during Initial Generation). Plagiarisms were never considered invalid responses. In addition, the computer program included the stipulations that it would never plagiarize the puzzle solutions already offered by the participant and that any word that had been plagiarized during Initial Generation would not be double-counted as an instance of cryptomnesia in the Recall-Own or Generate-New phases.

After reading the instructions, participants spent 1 min generating items from a practice puzzle. The computer then instructed participants that they and their computer “partner” would take turns generating solutions to the six Boggle-type puzzles in this first phase (Initial Generation). The first experimental puzzle then appeared on the computer screen, accompanied by the computer player’s first word. Participants were instructed to locate and confirm this word and to click a button at the bottom of the screen to indicate that they had done so. Immediately after the participant made this response, the computer presented two more solutions individually, each of which the participant located and confirmed before continuing to the next. After the computer’s three solutions were presented, the participant generated a solution and typed it into the response field. Participants were instructed to produce a new solution each time and not to repeat any previous responses. The computer player then presented three more solutions individually and the process repeated three more times for each of the six puzzles (as in the delayed test condition of Marsh and Bower *1993*), resulting in 24 participant-generated items and 72 computer-generated items. After completing the third of six puzzles, participants continued writing their happy or sad story for an additional 3 min. The purpose of this procedural step was to reactivate the mood induction. Participants then completed the remaining three puzzles. For each participant, the order of presentation of puzzles was randomized. Following the Initial Generation phase, participants were given a 10 min spatial relations distractor task to eliminate recency effects.

Participants then proceeded to the Recall-Own phase, in which they saw each puzzle again in the same order as they were presented during Initial Generation and they were asked to recall and type in all four of the puzzle solutions that they provided for each puzzle in the Initial

Generation phase. Participants were always required to give four valid (although not necessarily accurate) responses to each of the puzzles before they could continue.

Next, participants proceeded to the Generate-New phase, in which they saw each puzzle for the third time, and they were instructed to generate four new solutions to each puzzle that were presented neither by themselves nor by the computer player in the previous two phases. Participants were always required to give four valid (although not necessarily accurate) responses to each of the puzzles before they could continue.

At the conclusion of the Generate-New phase, the computer instructed participants to locate the experimenter, who distributed the mood manipulation check questionnaire and instructed participants to complete it. Upon turning in their questionnaires, the experimenter fully debriefed and thanked participants for their involvement.

Results

Exclusion criteria

There were three conditions under which a participant's data were excluded from the statistical analyses: (1) Based on the analysis of preliminary data, mood was most likely to be induced effectively when participants wrote at least 100 words and when their story truly reflected a personal experience (rather than a fictional tale). Therefore, participants' data were excluded if their story contained fewer than 100 words or if it did not describe a personal experience. This resulted in the omission of three participants' data (one due to the story length requirement and two due to the story content requirement). (2) Because the computer program accepted only possible puzzle solutions, when a participant entered a misspelled word, a word that was not contained within the puzzle, or gibberish, the computer "bounced" this response and alerted the participant that another response should be made. We expected that participants would occasionally misspell a word or make a few errors in locating words at the beginning of the experiment. However, we interpreted a large number of bounced responses as reflecting a lack of effort or misunderstanding of the instructions. Therefore, if a participant was "bounced" for 30 % or more of his or her responses throughout the experiment, his or her data were eliminated from the analyses. This exclusion criterion resulted in the dismissal of three participants' data ("bounced" an average of 25.67 times). (3) The participant did not complete the study. This exclusion criterion resulted in the dismissal of 11 participants' data, all of which were due to technical failure (i.e., computer program malfunction, power outage, etc.).

Mood ratings[2]

Results of the mood questionnaires suggest that the mood manipulation was successful. Participants induced into a happy mood gave significantly higher ratings of their mood after the mood induction ($M = 5.26$; $SD = 0.86$) than did those induced into a sad mood ($M = 2.88$; $SD = 0.85$), $F(1, 45) = 91.00$, $MSE = 0.73$, $p < .001$, $\eta_p^2 = .67$. Participants' ratings of their mood at the end of the experiment, however, did not differ between individuals in the happy mood condition ($M = 4.22$; $SD = 1.20$) and those in the sad mood condition ($M = 4.52$; $SD = 0.95$), $F(1, 44) = 0.91$, $MSE = 1.17$, $p = .35$, $\eta_p^2 = .02$, an observation that we revisit in Experiment 2.

Types of errors

Different types of errors are possible on the Recall-Own and Generate-New tasks. In the Recall-Own task, an item that was originally presented by the computer player but reported by the participant as her own was considered a Partner-Plagiarism. New Errors occurred when a participant claimed that a new item was, in fact, previously presented by her. In the Generate-New task, an item that the participant claimed to be new but that was originally presented by the computer player was considered a Partner-Plagiarism. An item that the participant claimed to be new but that was originally presented by the participant herself was considered a Self-Plagiarism.

Data analysis

In all analyses, α was set at .05. We submitted proportions of responses of each item type (i.e., correct, partner-plagiarism, self-plagiarism, new error) to a series of two-way analyses of variance with mood (happy vs. sad) and phase (Recall-Own vs. Generate-New) as independent factors. Because proportions were calculated by dividing the number of each item type by the total number of responses (which was the same for all participants), comparisons made between mood groups would yield the same results regardless of whether we chose absolute frequencies or relative frequencies. We chose to analyze relative frequencies (i.e., proportions) for ease of comparison of our findings to the findings of previous researchers (e.g., Marsh and Bower *1993*) (see also McEnery and Wilson *2001*, for a discussion of the linguistic advantages of comparing figures as percentages rather than as simple frequencies).

Overall results

The overall analysis of variance revealed no main effect of mood on proportion of responses that were correct, $F (1, 96) = 0.64$, $MSE = 0.02$, $p = .43$, $\eta_p^2 = .01$. There was, however, a main effect of task such that proportion of responses that were correct was higher in the Generate-New task ($M = 0.81$; $SD = 0.11$) than in the Recall-Own task ($M = 0.50$; $SD = 0.14$), $F (1, 96) = 140.72$, $MSE = 0.02$, $p < .001$, $\eta_p^2 = .59$. This is to be expected given that there are far more opportunities to produce a new word in the puzzles than to recall one's own contribution from an earlier phase. The mood x task interaction was not statistically significant, $F (1, 96) = 0.20$, $MSE = 0.02$, $p = .66$, $\eta_p^2 = .00$.

On proportion of responses that were partner-plagiarisms, there was no main effect of mood, $F(1, 96) = 2.69$, $MSE = 0.01$, $p = .10$, $\eta_p^2 = .03$, no main effect of task, $F(1, 96) = 0.02$, $MSE = 0.01$, $p = .88$, $\eta_p^2 = .00$, and no mood x task interaction, $F(1, 96) = 2.59$, $MSE = 0.01$, $p = .11$, $\eta_p^2 = .03$. Furthermore, on proportion of responses that were new errors (in the Recall-Own task) or self-plagiarisms (in the Generate-New task), there was no main effect of mood, $F(1, 96) = 0.02$, $MSE = 0.01$, $p = .88$, $\eta_p^2 = .00$. There was, however, a main effect of task such that proportion of responses that were new errors were higher in the Recall-Own task ($M = 0.39$; $SD = 0.12$) than was proportion of responses that were self-plagiarisms in the Generate-New task ($M = 0.08$; $SD = 0.09$), $F(1, 96) = 197.09$, $MSE = 0.01$, $p < .001$, $\eta_p^2 = .67$. The mood x task interaction was not statistically significant, $F(1, 96) = 0.25$, $MSE = 0.01$, $p = .62$, $\eta_p^2 = .00$.

In the following sections, we report the results of the analyses when divided by task. In other words, we conducted one-way analyses of variance on the effect of mood on the proportions of responses that were correct, partner-plagiarisms, and new errors in the Recall-Own task and the proportion of responses that were correct, partner-plagiarisms, and self-plagiarisms in the Generate-New task. The results are reported below.

Recall-own phase

Figure 1 displays mood differences in average proportion of each response type in the Recall-Own phase of Experiment 1. Participants in the happy and sad moods did not differ in their proportions of correct responses in the Recall-Own phase, $F(1, 48) = 0.62$, $MSE = 0.02$, $p = .44$, $\eta_p^2 = .01$.[3] Therefore, mood did not affect overall memory accuracy in this phase. Because there were no differences in overall accuracy in the two mood conditions, we analyzed the raw rates of errors. Regarding the types of errors that participants made, the key finding is that, consistent with our predictions, the proportion of responses that were Partner-Plagiarism errors in the Recall-Own phase was higher for participants who had been induced into a happy mood ($M = 0.14$; $SD = 0.08$) than for those who had been induced into a sad mood ($M = 0.09$; $SD = 0.05$), $F(1, 48) = 5.98$, $MSE = 0.00$, $p < .05$, $\eta_p^2 = .11$.[4] By contrast, there was no difference between participants in the happy and sad mood conditions in the proportions of responses that were New Errors, $F(1, 48) = 0.16$, $MSE = 0.02$, $p = .69$, $\eta_p^2 = .00$. It is important to emphasize that the increased rate of partner-plagiarisms by the participants in the happy mood group did not occur because of an overall increase in all kinds of errors by participants in this group because there were no differences between the two mood groups in overall accuracy (i.e., total error rates are the inverse of the proportion of responses that were correct).

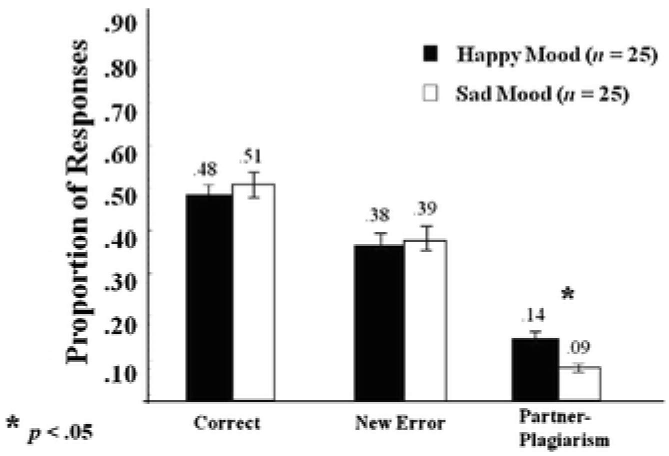

Fig. 1

The proportion of responses constituting each response type as a function of mood in the Recall-Own phase of Experiment 1. Error bars indicate standard error of the mean

Overall, in the Recall-Own phase, mood selectively affected the proportion of responses that were partner-plagiarism errors such that sad mood resulted in a lower proportion of these errors than did happy mood.

Generate-new phase

Figure 2 shows a nearly identical pattern of performance in the Generate-New phase by the participants in the happy and sad mood groups. Because two types of cryptomnesia errors were possible in this phase (partner-plagiarism and self-plagiarism), we combined these two error types in order to assess overall effects of mood on cryptomnesia in this phase. Given that scores represent proportions of each response type, total errors can be defined as 1–Proportion Correct (i.e., the inverse of accurate responses). Results of a one-way ANOVA indicated no effect of mood on (both types of) cryptomnesia in the Generate-New phase, $F(1, 48) = 0.08$, $MSE = 0.01$, $p = .78$, $\eta_p^2 = .00$.[5] In addition, mood did not differentially affect the two types of cryptomnesia errors separately; that is, when we analyzed what proportion of errors were partner-plagiarisms, we found no difference between the happy mood group ($M = 0.62$; $SD = 0.25$) and the sad mood group ($M = 0.62$; $SD = 0.36$), $F(1, 47) = 0.01$, $MSE = 0.10$, $p = .93$, $\eta_p^2 = .00$.[6] Because rates of self-plagiarism were simply the inverse of partner-plagiarism rates, there was, naturally, no effect of mood on the proportion of errors that were self-plagiarisms.

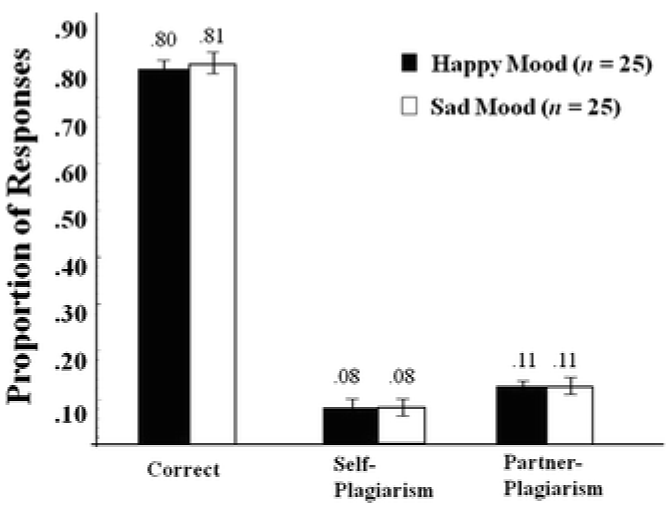

Fig. 2

The proportion of responses constituting each response type as a function of mood in the Generate-New phase of Experiment 1. Error bars indicate standard error of the mean

In summary, sad mood selectively decreased the occurrence of partner-plagiarisms in the Recall-Own phase but had no effect on the rate of errors (of either type) in the Generate-New phase.

Discussion

According to appraisal theories such as the affect-as-information hypothesis (e.g., Gasper and Clore *2002*; Storbeck and Clore *2005*), individuals experiencing positive affect process information in a more relational, global manner, using strategies and heuristics, whereas those experiencing negative affect process information in an item-specific, local fashion. In this way, affective cues are experienced as feedback relative to the task and determine whether one engages in relational processing. Building from this framework, the results supported our prediction that participants induced into a happy mood would make more partner-plagiarism errors in the Recall-Own phase than did those who were induced into a sad mood. As for the effect of mood on cryptomnesia in the Generate-New phase, for which the affect-as-information hypothesis does not make a clear prediction, we found no differences between the mood groups. This result suggests that the heuristic processing typically observed in individuals induced into a happy mood is consistent with the effortless, automatic decision processes described by the source monitoring framework and that the item-specific processing typically observed in individuals induced into a sad mood is consistent with effortful, systematic decision processes. Based on previous research showing that some manipulations can affect source memory, but not item memory processes (e.g., Macrae et al. *1999*), it makes sense, then, that mood would affect cryptomnesia in the Recall-Own phase, which requires source monitoring, but not in the Generate-New phase, which does not require the same type of item-specific processing that the Recall-Own phase does (Landau and Marsh *1997*). The results of Experiment 1 indicate that being in a sad mood provides information to individuals that they should process the situation in a more item-specific manner, which results in fewer source-monitoring errors in a standard cryptomnesia paradigm.

Experiment 2

The purpose of Experiment 2 was to follow-up on the null effect of mood on the Generate-New task in Experiment 1. Although the results from Experiment 1 were consistent with the notion that one's mood can affect the extent to which they engage in the automatic and systematic decision processes specified by the source monitoring framework, there is an alternative, "dissipating mood manipulation" explanation: the mood manipulation wore off by the time participants reached the Generate-New phase, which always occurred last. Consequently, the lack of difference in performance between the two mood groups on the Generate-New task may not be due to the particular memorial qualities of this task but to the absence of difference in the moods of the participants in these two groups. In fact, participants' self-reported mood ratings support this alternative explanation; whereas participants in the happy mood group gave higher ratings of their mood during the experiment than did those in the sad mood group, there was no difference between mood groups in ratings of mood at the end of the experiment. Thus, it appears that by the end of the experiment, the mood manipulation was no longer effective.

This alternative explanation for the results of Experiment 1 would be consistent with previous research showing more accurate item memory for those in a sad mood. For example, sad mood results in better item recall and recognition for unusual objects placed at a naturalistic scene (Forgas et al. *2009*) and participants who were induced into a sad mood before studying word lists made fewer item memory errors than those induced into a happy mood (Storbeck and Clore *2005*). The results of both of these studies support the notion that mood does, in fact, affect item memory, but that our results in Experiment 1 did not reveal such an effect because the mood manipulation dissipated before the experimental phase that directly measures item memory processes.

In Experiment 2, we investigated the aforementioned alternative explanation by manipulating the tests between-participants, such that each participant received either the Recall-Own task or the Generate-New task, but not both. This allowed for direct comparison between performance in the two tasks without the confounds of temporal distance or order effects. If our interpretation of Experiment 1 is correct that mood affects source monitoring accuracy but not item memory, then we should observe similar results in Experiment 2—namely, an effect of mood on cryptomnesia in the Recall-Own task but not in the Generate-New task. By contrast, if the "dissipating mood" explanation is correct, then we should observe an effect of mood on cryptomnesia in both tasks because the mood manipulation should be comparably effective for both tasks.

Method

Participants

Eighty undergraduate students (53 women and 27 men) at the University of Virginia volunteered and received partial course credit for their participation. Ninety-eight total participants completed the study; however, as in Experiment 1, the data of 18 of them were excluded based on the Exclusion Criteria outlined in the Results section and 18 more participants' data were run to obtain equal numbers of participants in each cell. Of the 80 participants whose data were not excluded, 20 were randomly assigned to each of the four conditions: (1) Happy, Recall-Own; (2) Happy, Generate-New; (3) Sad, Recall-Own; and (4) Sad, Generate-New. Participants were tested individually in sessions that lasted approximately 60 min.

Design and materials

This experiment used a 2 (Mood: Happy vs. Sad) × 2 (Task: Recall-Own vs. Generate-New) between-participants design. The same materials from Experiment 1 were used in Experiment 2.

Procedure

The procedure of Experiment 2 was identical to that of Experiment 1 with the exception that participants completed either the Recall-Own or the Generate-New task. Participants assigned to the Recall-Own condition proceeded to the Recall-Own task (as described in Experiment 1) after the Initial Generation phase, whereas those assigned to the Generate-New condition proceeded directly to the Generate-New task (as described in Experiment 1) after the Initial Generation phase (i.e., skipping the Recall-Own phase). All other procedural details were identical to those of Experiment 1.

Results

Exclusion criteria

The conditions under which a participant's data were excluded from the Experiment 2 statistical analyses were identical to those of Experiment 1. Five participants' data were excluded due to excess bounces (30 % or more of their responses; "bounced" an average of 32.80 times). The data of three participants were excluded because of failure to meet mood induction story requirements (two participants wrote stories with non-personal content and one participant did not write a story at all and, therefore, did not undergo a mood manipulation) and 10 participants' data were excluded due to technical failure.

Mood ratings

Participants in the Recall-Own condition who were induced into a happy mood gave significantly higher ratings of their mood after the mood induction ($M = 4.75$; $SD = 1.45$) than did those induced into a sad mood (M = 3.20; SD = 1.15), F (1, 38) = 14.06, MSE = 1.71, $p < .001$, $\eta_p^2 = .27$. Participants in the Generate-New condition who were induced into a happy mood also gave significantly higher ratings of their mood after the mood induction (M = 4.75; SD = 1.12) than did those induced into a sad mood (M = 3.15; SD = 0.81), F (1, 38) = 26.80, MSE = 0.96, $p < .001$, $\eta_p^2 = .41$. Participants' ratings of their mood at the end of the experiment revealed that the induced mood was still present; in the Recall-Own condition, individuals induced into a happy mood rated their mood significantly higher (M = 4.60; SD = 0.88) than did those in the sad mood condition (M = 4.05; SD = 0.69), F (1, 38) = 4.84, MSE = 0.63, $p < .05$, $\eta_p^2 = .11$. Likewise, although marginally significant, individuals in the Generate-New condition who were induced into a happy mood rated their mood at the end of the experiment higher (M = 4.15; SD = 0.93) than did those induced into a sad mood (M = 3.60; SD = 0.94), F (1, 38) = 3.45, MSE = 0.88, $p = .07$, $\eta_p^2 = .08$.

Data analysis

As in Experiment 1, we submitted proportions of responses of each item type (i.e., correct, partner-plagiarism, self-plagiarism, new error) to a series of two-way analyses of variance with mood (happy vs. sad) and phase (Recall-Own vs. Generate-New) as independent factors.

Overall results

The overall analysis of variance revealed the same pattern of results that we found in Experiment 1. There was no main effect of mood on proportion of responses that were correct, F (1, 76) = 0.43, MSE = 0.02, $p = .51$, $\eta_p^2 = .01$, there was a main effect of task such that proportion of responses that were correct was higher in the Generate-New task (M = 0.82; SD = 0.14) than in the Recall-Own task (M = 0.53; SD = 0.12), F (1, 76) = 103.36, MSE = 0.02, $p < .001$, η_p

^{2} = .58, and the mood x task interaction was not statistically significant, $F(1, 76) = 0.61$, $MSE = 0.02$, $p = .44$, $\eta_p^2 = .01$.

Of particular importance in this experiment is the effect of mood on proportions of responses that were partner-plagiarisms. A one-way analysis of variance revealed a main effect of mood such that, across both tasks, participants induced into a happy mood made more partner-plagiarism errors ($M = 0.14$; $SD = 0.07$) than did those induced into a sad mood ($M = 0.10$; $SD = 0.07$), $F(1, 76) = 9.27$, $MSE = 0.01$, $p < .005$, $\eta_p^2 = .11$. As in Experiment 1, there was no main effect of task on partner-plagiarisms, $F(1, 76) = 1.79$, $MSE = 0.01$, $p = .19$, $\eta_p^2 = .02$, and no mood x task interaction, $F(1, 76) = 0.09$, $MSE = 0.01$, $p = .76$, $\eta_p^2 = .00$.

Also consistent with the results of Experiment 1, on proportion of responses that were new errors (in the Recall-Own task) or self-plagiarisms (in the Generate-New task), there was no main effect of mood, $F(1, 76) = 1.03$, $MSE = 0.01$, $p = .31$, $\eta_p^2 = .01$. There was, however, a main effect of task such that proportion of responses that were new errors was higher in the Recall-Own task ($M = 0.35$; $SD = 0.09$) than was proportion of responses that were self-plagiarisms in the Generate-New task ($M = 0.07$; $SD = 0.11$), $F(1, 76) = 152.82$, $MSE = 0.01$, $p < .001$, $\eta_p^2 = .67$. The mood x task interaction was not statistically significant, $F(1, 76) = 0.50$, $MSE = 0.01$, $p = .48$, $\eta_p^2 = .01$.

In the following sections, we report the results of the analyses when divided by task. In other words, we conducted one-way analyses of variance on the effect of mood on the proportions of responses that were correct, partner-plagiarisms, and new errors in the Recall-Own task and the proportion of responses that were correct, partner-plagiarisms, and self-plagiarisms in the Generate-New task. The results are reported below.

Recall-own task

Figure 3 displays mood differences in average proportion of each response type in the Recall-Own condition of Experiment 2. Participants in the happy and sad moods did not differ in their proportions of correct responses in the Recall-Own task, $F(1, 38) = 1.18$, $MSE = 0.02$, $p = .29$, $\eta_p^2 = .03$.[7] This indicates no effect of mood on overall memory accuracy, which replicates the findings of Experiment 1. Replicating the Recall-Own results of Experiment 1, the proportion of responses that were partner-plagiarism errors was higher for participants in the happy mood condition ($M = 0.16$; $SD = 0.06$) than for those in the sad mood condition ($M = 0.10$; $SD = 0.08$), $F(1, 38) = 5.79$, $MSE = 0.01$, $p < .05$, $\eta_p^2 = .13$.[8] Also as in Experiment 1, mood had no effect on the proportion of responses that were new errors, $F(1, 38) = 0.05$, $MSE = 0.01$, $p = .82$, $\eta_p^2 = .00$. Therefore, while mood had no effect on overall memory accuracy in the Recall-Own task, it did selectively reduce partner-plagiarism errors.

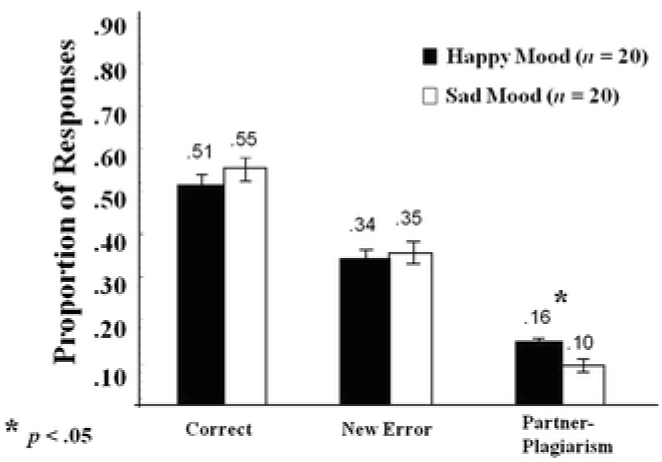

Fig. 3

The proportion of responses constituting each response type as a function of mood in the Recall-Own condition of Experiment 2. Error bars indicate standard error of the mean

Generate-new task

Figure 4 displays mood differences in average proportion of each response type in the Generate-New condition of Experiment 2. The key analysis in this experiment was whether mood specifically affected cryptomnesia in the Generate-New task when task was manipulated between-participants. As in Experiment 1, the two types of cryptomnesia errors were combined to assess overall effects of mood on both types of cryptomnesia in this task. Again, cryptomnesia is 1–Proportion Correct. Results indicate that participants in the happy and sad moods did not differ in their overall rates of cryptomnesia, $F(1, 38) = 0.01$, $MSE = 0.02$, $p = .94$, $\eta_p^2 = .00$; in other words, there was no difference between those in the happy and sad mood groups on overall accuracy. This suggests that our failure to find an effect of mood on cryptomnesia in the Generate-New phase in Experiment 1 may not be because our mood manipulation was no longer effective during that phase. Because there are two different types of cryptomnesia in the Generate-New phase, however, we further explored whether mood differentially affected the type of cryptomnesia errors that participants made in the Generate-New condition.

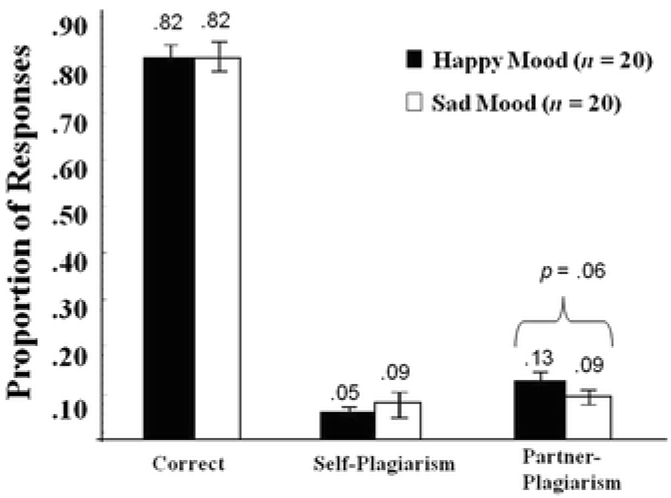

Fig. 4

The proportion of responses constituting each response type as a function of mood in the Generate-New condition of Experiment 2. Error bars indicate standard error of the mean

In order to detect the effect of mood on the type of cryptomnesia errors that participants made, we examined the overall proportion of errors that were partner-plagiarisms. Interestingly, we found that those in the happy mood group were more likely to make partner-plagiarism errors ($M = 0.77$; $SD = 0.23$) than were those in a sad mood ($M = 0.58$; $SD = 0.32$), $F(1, 32) = 4.12$, MSE = 0.08, p = .05, η_p^2 = .11,[9] and, therefore, slightly less likely to make self-plagiarism errors (although the latter difference was only marginally significant, p = .08). Further evidence that mood affected partner-plagiarism errors in the Generate-New task lies in the finding that, independently of self-plagiarism errors, partner-plagiarism errors were higher for those in the happy mood group (M = 0.13; SD = 0.07) than for those in the sad mood group (M = 0.09; SD = 0.07), F (1, 38) = 3.64, MSE = 0.01, p = .06, η_p^2 = .09. Mood did not, however, affect proportion of responses that were self-plagiarism errors, F (1, 38) = 1.34, MSE = 0.01, p = .26, η_p^2 = .03. Together, these results suggest that sad mood may have specifically reduced partner-plagiarism errors in the Generate-New task and that the “dissipating mood” explanation for the results of Experiment 1 may be valid, at least for one type of cryptomnesia error, partner-plagiarism.

Discussion

As in Experiment 1, on the Recall-Own task, participants in a sad mood made fewer partner-plagiarism errors than did those in a happy mood, indicating mood’s selective effect on this specific type of memory error. However, the results from the Generate-New task suggest an effect of mood on partner-plagiarism errors, which indicates that mood may affect the item memory processes involved in the Generate-New task, and that the null effect of mood in the Generate-New task of Experiment 1 may have resulted from the dissipation of the induced mood. Although this result just barely evaded statistical significance, the moderately-large effect size implies that the effect is reliable. In summary, the results of Experiment 2 support the involvement of mood in source monitoring accuracy, which is assumed to be required in the Recall-Own task, as well as on item memory, which is required in the Generate-New task.

General discussion

Together, these experiments are the first to explore the influence of mood on memory errors in a cryptomnesia paradigm. The Recall-Own task required individuals to report only those items that they generated earlier; successful performance (or, alternatively, partner-plagiarism errors), therefore, depends on accurate source memory. By contrast, the Generate-New task required individuals to generate novel items and to not report any item that was encountered earlier, regardless of the source. Thus, whereas accurate source memory is paramount for successful performance on the Recall-Own task, it is irrelevant for performance on the Generate-New task.

In two experiments, we showed that a sad mood reduced partner-plagiarism errors on the Recall-Own task, which suggests that mood can affect accuracy in source monitoring. Moreover, Experiment 2 provided evidence that a sad mood can also reduce item memory errors, in the form of partner-plagiarism errors on the Generate-New task. These experiments also ruled out an alternative explanation of the effect of mood on partner-plagiarism errors. That is, the reduction in partner-plagiarism errors on the Recall-Own task cannot be attributed to differences in overall accuracy (i.e., overall frequency of errors), as there were no significant differences between the sad and happy mood groups in overall accuracy in the Recall-Own task across experiments.

Given the reduction in partner-plagiarism errors shown by participants induced into a sad mood, it seems that being in a sad mood results in engagement in more effortful, systematic decision processes, which contribute to lower partner-plagiarism rates both when source monitoring is required (i.e., in the Recall-Own task) and when it is not (i.e., in the Generate-New task). This suggests that the heuristic processing typically associated with a happy mood state is consistent with effortless, automatic decision processes and that the item-specific processing typically associated with a sad mood state is consistent with effortful, systematic decision processes described by the source monitoring framework. Furthermore, being in a sad mood seems to facilitate more systematic processing, which selectively reduces partner-plagiarism errors in both the Recall-Own and Generate-New tasks.

Our results are generally consistent with the affect-as-information hypothesis, which maintains that affective state is used as information on which one bases a decision regarding how to interpret a given situation. People in a happy mood use their positive feelings as a cue to continue using available cognitive strategies to process the situation (e.g., Clore et al. *1994*; Schwarz and Clore *1983*), while people in a sad mood use their negative feelings as a cue to process the given situation very carefully, as general strategies that they use in other situations might not work in this one. Therefore, they adopt processing strategies that are better tuned to the requirements of the situation, which tends to improve their cognitive performance.

In addition, the current results support the levels-of-focus hypothesis (e.g., Clore et al. *2001*), a more recent version of the affect-as-information hypothesis, which proposes that affective cues are experienced as information relevant to the given task and that happy moods facilitate greater focus on attention to global processing whereas sad moods facilitate greater focus on attention to local stimuli (e.g., Gasper and Clore *2002*). More specifically, a sad mood seems to inhibit a global focus, while a happy mood encourages such category-level attention. Importantly, this hypothesis argues for mood-related differences not in the amount of information that is processed, but in the type of processed information.

An explanation of the present pattern of Recall-Own results may stem from the increased ability of participants in the happy mood group to generate puzzle solutions during Initial Generation (i.e., encoding), as compared to participants in the sad mood group. Indeed, previous research has found that a happy mood facilitates creative problem solving (e.g., Isen *2000*; Isen et al. *1987*). Presumably, this is because a happy mood is interpreted as an indication that the situation is “safe” and, therefore, that it is appropriate to use more cognitively flexible and exploratory strategies (e.g., Isen *2000*; Isen et al. *1985*). Recall that during Initial Generation, participants must report four puzzle solutions while their computer partner reports twelve solutions. If participants in the happy mood group have many more puzzle solutions come to mind than do the participants in the sad mood group, then the happy participants have a higher probability of generating but not reporting solutions that are in turn reported by their computer partner. Consequently, increased partner-plagiarism errors on the Recall-Own task by the happy mood group may be a byproduct of their increased confusion about whether they or their computer partner reported a particular item. By contrast, because the sad mood group spontaneously thinks of fewer solutions in this scenario, there is a lower probability that they will generate but not report a solution that is later reported by their computer partner, thus accounting for the lower rates of partner-plagiarism on the subsequent Recall-Own task.

One other key aspect of the results is that the decrease in partner-plagiarism errors in the sad mood group is not accompanied by an across-the-board improvement in performance on the Recall-Own task, as there were no differences between the two mood groups in overall accuracy. If participants in the happy mood group generated many solutions during Initial Generation but only reported a subset of these items, then, all else equal, the happy mood group should have shown lower levels of accuracy on the Recall-Own task than the sad mood group because of their greater difficulty remembering which items they reported. One possible explanation for the comparable rates of overall accuracy between the two mood groups is that the happy participants are using more cognitive operations to generate items at encoding, as more have been made available by their heuristic (rather than analytic) processing. If this is the case, then happy participants should have greater memory for each individual item, on average, than should the sad group (see Johnson et al. *1981*, for a complete explanation). Overall, then, while the happy participants may think of more solutions at encoding, which by itself would predict worse overall accuracy, there may be the countervailing factor that the happy participants have better memory for each individual item so that, in sum, there is no difference in accuracy between the happy and sad groups.

We now turn to the Generate-New task results, in which mood did not affect the overall quantity of errors that participants made but it did seem to affect the types of errors. Participants were equally accurate at generating novel words in the sad mood and happy mood conditions. The pattern that emerged in Experiment 2, however, was that the types of errors that participants made varied as a function of mood. Specifically, participants in a sad mood made fewer partner-plagiarism errors than those in a happy mood; however, self-plagiarism rates were comparable across mood conditions. Approached another way, those in a sad mood group did not differ in their proportions of partner-plagiarism and self-plagiarism errors, but participants in a happy mood made more partner-plagiarism than self-plagiarism errors. Generally, this seems consistent with the idea that happy moods facilitate more creative problem-solving (e.g., Isen *2000*; Isen et al. *1987*), which results in more solutions coming to mind during Initial Generation for those induced into a happy mood than for those induced into a sad mood. Happy participants in this scenario would have a higher probability of generating but not reporting solutions that may or may not be later reported by their computer partner. This, then, may lead to increased confusion about which items were actually reported during Initial Generation, which may result in higher proportions of partner-plagiarism errors on the Generate-New task for those induced into a happy mood.

A related potential account for our overall pattern of results is that people in sad moods are more self-focused than those in happy moods.[10] Several studies have shown that negative affect can induce self-focused attention (e.g., Salovey *1992*; Sedikides *1992*; Wood et al. *1990a*, *b*). Perhaps people high in self-focused attention (i.e., those in a sad mood) are better able to recall the items that they generated than those low in self-focused attention (i.e., those in a happy mood). If this is the case, then people in sad moods may be better at recalling which items they generated and which ones their partners generated because they are more focused on the self. This reasoning could also extend to generating new responses in that people in sad moods are more likely to recall their own contributions to the Initial Generation phase because they are experiencing more mood-induced self-focus. In contrast, individuals in happy moods are less likely to engage in self-focused attention, which may contribute to their reduced ability to distinguish between the items that they generated and those that their partner generated. It should be noted that, although we discuss some possible interpretations of our findings, one limitation of our study is that we did not examine that mechanism(s) underlying our results.

Several limitations of the Boggle game paradigm also create hurdles for the interpretation of the foregoing results. One such drawback is that the inflexibility of the rules results in the omission of a large number of participants' data. Perhaps a more lenient computer program could permit the entry of proper names, the inclusion of misspelled words, etc. in order to minimize the amount of excluded data. Additionally, the Boggle paradigm assumes that partner-plagiarism errors in the Recall-Own task only occur when the participant mistakes an item generated by the computer to be his or her own idea. This assumption implies that participants are discriminating between two 'sources'—themselves and the computer. Partner-plagiarism errors may, however, represent ineffective monitoring of more than just these two sources. When participants are asked to recall the items they initially generated, there are three different potential sources of information: (1) items that the computer generated, (2) items that they, themselves, generated, and (3) items that they generated but never reported, such as when the computer reported the items that they generated before they had a chance to report them. Therefore, it is possible that responses coded as partner-plagiarisms represent items that the participant truly did generate, but did not report. While the foregoing results show that participants in a sad mood are more effective than participants in a happy mood at avoiding partner-plagiarisms, further investigation of the specific processes that are involved in the different tasks of this paradigm would be beneficial in explaining the mechanism(s) behind this effect.

Another potential consequence of the assumptions of the Boggle paradigm is that a variety of memory mistakes may be lumped into the general New Error category. That is, responses coded as new errors could represent false recollections of having reported items that were, in reality, new, or they could represent source confusions between what was generated-and-reported and what was generated-but-not-reported. Again, although this limitation does not invalidate the foregoing results, addressing it in future research may reveal information that is helpful for interpreting these results.

Future research could address this complication by allowing participants to report every Boggle puzzle solution that he or she is able to generate and subsequently revealing the computer's responses, instructing participants to retract any responses that overlap. New errors, then, would be less likely to consist of items that were generated but not reported because participants would have been given the opportunity to report all generated items. Another solution would be to reduce the computer's initial generations and increase the participants' such that the participant generates one item after each item that the computer generates. This one-to-one exchange would continue until the participant indicated that he or she was no longer able to generate new puzzle solutions. Not only would this manipulation allow the participants to report every generated item (with the exception of the items reported by the computer before the participant reported them), it also would create a more ecologically valid situation in which cryptomnesia occurs. That is, ideas are not often exchanged in a four-to-one ratio; therefore this highly interactive process would more closely mimic a 'real world' interaction.

Furthermore, future research on this topic might explore whether affective state influences encoding or retrieval processes. Previous research has suggested that affective state influences memory during encoding (e.g., Storbeck and Clore *2005*); however, as previously mentioned, no published research has addressed the effect of mood on source monitoring processes, specifically. In order to isolate the effects of affective state at encoding from those at retrieval, the stage of the experiment during which the mood induction takes place could be manipulated. Participants could receive the mood induction either before encoding the items and their source (i.e., the Initial Generation phase) or just prior to retrieval of the items (i.e., the Recall-Own or Generate-New task). If encoding processes are the principal factor in the effect of mood on partner-plagiarisms, then mood should affect partner-plagiarism errors when mood is induced before Initial-Generation but not when mood is induced after Initial-Generation. By contrast, if retrieval processes are critical, then mood should affect partner-plagiarism errors when mood is induced after Initial-Generation but not when mood is induced before Initial-Generation. The results of such a manipulation might help to clarify the marginally significant effects we found in Experiment 2 and may disambiguate the theoretical underpinnings of how mood and cryptomnesia are related.

Conclusion

Overall, the results of these two experiments support appraisal theories of emotion such as the affect-as-information hypothesis. More specifically, we found evidence that individuals may determine which cognitive strategies are appropriate and effective to use in a given situation based on feedback derived from his or her mood. Furthermore, this feedback can lead individuals in sad moods to make fewer memory errors in which they plagiarize inadvertently the ideas of another source compared to those in happy moods.

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Appendix

See Table 1.

Table 1

Mood manipulation check questionnaire

Please describe how you were feeling while you were writing your story								
1. Very unhappy	1	2	3	4	5	6	7	Very happy
2. Very unpleasant	1	2	3	4	5	6	7	Very pleasant
3. Very negative	1	2	3	4	5	6	7	Very positive
Please describe how you were feeling right now, at this moment								
4. Very unhappy	1	2	3	4	5	6	7	Very happy
5. Very unpleasant	1	2	3	4	5	6	7	Very pleasant
6. Very negative	1	2	3	4	5	6	7	Very positive

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Footnotes

1 However, see Buchner et al. (*2009*) for evidence that memory for the context in which the face of a person with a history of cheating was encountered was better than memory for the context in which other types of faces were encountered.

2 The degrees of freedom in these analyses were slightly reduced because three participants did not complete the first set of ratings in the mood manipulation questionnaire and four participants did not complete the second set of ratings.

3 Including outliers who were originally excluded because they did not meet the story length, story content, or “bounce” criteria did not change the outcome of this analysis ($p = .55$).

4 When we included in this analysis outliers who were originally excluded because they did not meet the story length, story content, or “bounce” criteria, the difference between mood groups failed to reach statistical significance, $F(1, 54) = 1.10$, $p = .30$ $\eta_p^2 = .02$.

5 Including outliers who were excluded because they did not meet the story length, story content, or “bounce” criteria did not change the outcome of this analysis ($p = .95$).

6 One participant’s data were not included in this analysis because she or he did not make any errors in the Generate-New phase, hence the proportion of errors that were partner-plagiarisms could not be calculated. Including outliers who met the story length and content and “bounce” criteria for exclusion did not change the outcome of this analysis ($p = .82$).

7 Including outliers who were excluded because they did not meet the story length, story content, or “bounce” criteria did not change the outcome of this analysis ($p = .62$).

8 When we included in this analysis outliers who were originally excluded because they did not meet the story length, story content, or “bounce” criteria, the difference between mood groups became marginally significant at the $\alpha = .05$ level, $F(1, 41) = 3.79$, $p = .06$, $\eta_p^2 = .09$. Including outliers who were excluded because they did not meet the story length, story content, or “bounce” criteria did not change the outcome of any subsequent analysis.

9 Six participants' data (two happy and four sad) were not included in this analysis because they did not make any errors in the Generate-New phase, hence the proportion of errors that were partner-plagiarisms or self-plagiarisms could not be calculated.

10 We thank an anonymous reviewer for this suggestion.