The Eureka Error: Inadvertent Plagiarism by Misattributions of Effort

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The authors found that the feeling of authorship for mental actions such as solving problems is enhanced by effort cues experienced during mental activity; misattribution of effort cues resulted in inadvertent plagiarism. Pairs of participants took turns solving anagrams as they exerted effort on an unrelated task. People inadvertently plagiarized their partners' answers more often when they experienced high incidental effort while working on the problem and reduced effort as the solution appeared. This result was found for efforts produced when participants squeezed a handgrip during the task (Experiment 1) or when the anagram was displayed in a font that was difficult to read (Experiments 2, 3a, and 3b). Plagiarism declined, however, when participants attended to the source of the effort cues (Experiments 3a and 3b). These results suggest that effort misattribution can influence authorship processing for mental activities.

Keywords: plagiarism, effort, conscious will, thought

Eureka! Eureka! [I have found it! I have found it!]

—Archimedes, ~250 B.C.

How do we know that we are the maker of our own ideas? Unlike physical action, mental action is invisible. We cannot see ourselves think, and we cannot mark our mental actions in the same way that artists sign their work. Like physical actions, however, mental activities often involve effort. One clue to indicate that our thoughts are our own, then, may simply be the experience of effort during the task of thinking, along with a release of that effort when the task of thinking has yielded the desired thought. In the following experiments, we examined whether concurrent incidental effort that follows this pattern—increased effort while thinking about a problem and reduced effort coinciding with a solution—might prompt people to judge a solution to a problem as their own even when the solution was produced by someone else.

AUTHORSHIP OF THOUGHT

How could our thoughts *not* be our own? To the normal mind, our own thoughts are easy to distinguish from the thoughts of others because we typically feel both a sense of *ownership* (they occur to us) and a sense of *authorship* (we make them happen) (Campbell, 1999; Graham & Stephens, 1994; Stephens & Graham, 2000). These experiences can be untrustworthy in psychopathologies such as schizophrenia, however, giving rise to phenomena such as auditory hallucinations (experiencing one's thoughts as external events, voiced by others) and thought insertion (experiencing one's thoughts as internal events produced by others). Such malfunctions in thinking suggest that there is a mechanism in the healthy mind that somehow sorts out thoughts, events, and other experiences, labeling some subset of all these things as thoughts authored by oneself.

This process must work even in normal thinking, because there are some thoughts that we feel we have surely authored and others that seem less due to our will and more due to happenstance. Instances of insight, for example, are often characterized by the sudden appearance of the idea in one's mind, feeling like a flash of knowledge from out of the blue (Metcalfe, 1986; Schooler & Melcher, 1995). Theoretical accounts of the experience of the authorship of thought have focused mainly on the degree to which the thought is predictable or understandable in the context of prior thoughts (Wegner, 2002). In the case of schizophrenia, for example, Hoffman (1986) proposed that unpredictability is the key to experiencing one's own thoughts as an instance of "hearing voices." When thoughts occur that do not follow from prior thoughts (or from anything that one can remember thinking or feeling), it is possible to attribute such thoughts to external sources such as the voices of others. Predictability is also essential to the authorship of thoughts in the case of creative problem solving. The

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experience of "getting warmer" as one approaches a solution often involves an increasing ability to predict the solution to the problem (Metcalfe & Weibe, 1987). This predictability, in turn, reduces the tendency to experience the solution as an insight and may enhance the experience of authorship of the solution (Schooler & Melcher, 1995).

EFFORT IN THINKING

Another cue to thought authorship beyond predictability is the experience of effort associated with the thinking (Wegner & Sparrow, 2004). Thought can feel more or less difficult, and this observation has been the basis of many studies aimed at distinguishing the properties and processes of effortful thinking from those of effortless thinking (e.g., Bargh & Chartrand, 1999; Hasher & Zacks, 1979; Kahneman, 1973). As a rule, such research has defined effortful thought by sidestepping self-reports or other measures of the experience of effort per se, focusing instead on less subjective criteria for establishing effort—such as the degree to which thought undergoes interference posed by concurrent tasks (Logan, 1997). Effortful thought is generally more susceptible to interference, is easier to stop, and feels more intentional than less effortful thought (Bargh, 1994; Wegner & Bargh, 1998).

For physical action, the study of the sense of effort in movement was an early chapter in the exploration of the will (Merton, 1964; Scheerer, 1987), and much research has established that a sense of effort accompanying action is an important indicator that the action is self-authored. Sensations that contribute to a feeling of effort—for example, feelings of muscle movement or shifting joints—arise from both efferent (feedforward) and afferent (feedback) pathways and are helpful for identifying actions as opposed to externally imposed movements (Gandevia, 1987; Jeannerod, 1997; Matthews, 1982). A sense of effort produced artificially by vibrating the muscle results in an illusion of movement in the direction of the muscle being stretched (Goodwin, McCloskey, & Matthews, 1972).

Just as illusions of authorship can occur for physical actions when effort cues are misperceived, the misattribution of effort during mental tasks may produce changes in the experience of authorship of thoughts. The effortlessness of creative bursts can sometimes make creativity feel as if it is happening to one, rather than being authored by oneself (Csikszentmihalyi, Abuhamdeh, & Nakamura, 2005), as though the artist is the medium for an external source of inspiration. People are often confused by the ease of retrieval of a memory, for example, perceiving effortless retrieval as an indicator that they have had the thought before (Schwarz et al., 1991; Tversky & Kahneman, 1973). A variety of such "cognitive feelings," experiences such as confusion or certainty, arise as metaperceptions of mental operations (Clore, 1992; Schwarz & Clore, 1996). The experience of effort in thinking could provide information about the functioning of the mind in a number of ways, one of which is to provide a cue to the authorship of thoughts.

There is evidence to indicate that physical effort and mental effort may not only be similar experiences that inform each other but also may be transmutable. Physical effort can produce cognitive load and interfere with mental tasks, just as mental efforts can yield such load (e.g., Wegner, Ansfield, & Pilloff, 1998). Efforts at physical self-regulation deplete mental resources (Vohs, Baumeister, Twenge, Schmeichel, & Tice, 2006) just as efforts at mental self-regulation deplete physical strength (Muraven, Tice, & Baumeister, 1998). Theories of embodied cognition (Barsalou, Niedenthal, Barbey, & Ruppert, 2003; Glenberg, 1997; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005) suggest that the gulf between efforts experienced as arising from physical and mental activities may not be as wide as a Cartesian mind/body dualist might suspect. One pathway for the formation of experiences of mental effort is through physical cues from the body that accompany mental activity. Cacioppo, Petty, and Morris (1985) observed that cognitive effort was often accompanied by a visible or invisible activation of the corrugator (brow) muscle. In turn, furrowing the brow can elicit feelings of mental effort. Stepper and Strack (1993) found that feelings of difficulty could be manipulated by the facial expression that participants were led to adopt (see also Strack & Neumann, 2000).

It may be, then, that the experience of authoring a thought can be influenced by concurrent experiences of effort—an effort misattribution. However, it seems likely that changes in effort may be more likely to produce such effects than constant levels. Just as the physical effort of contracting a muscle that is followed by the muscle's relaxation could lead to the impression that an action had been completed, mental effort followed by its release would suggest that a mental task had been performed. The lack of effort can be informative as to how to interpret the content of thought—as when fluency of perception is taken as evidence that items being perceived have been seen before (Jacoby, Kelley, Brown, & Jasechko, 1989). However, the lack of effort that follows effort is especially informative. When the experience of effort peaks during a mental task and then subsides when the task is completed, it would be tempting to conclude that one is the author of any thought that ensues.

INADVERTENT PLAGIARISM

As people are trying to solve problems together, experiences of authorship of ideas can be the basis for unintended plagiarism. When one is truly generating an idea or solution, mental effort would be high as one grapples with the problem and then would decline rapidly when the idea comes to mind and is recognized as the solution. The point of idea realization creates a shift from difficult thought to mental ease, and this experience may prompt feelings of personal accomplishment for the clever thought. However, if feelings of effort are transferable from one activity to another, then experiencing oneself as the author of thoughts could be indicated by a period of increased effort of any kind immediately prior to the appearance of the idea, followed by a relaxation of effort when the idea appears. This change in effort may result in plagiarism if one person's shift from high to low effort coincides with the generation of ideas by others.

The inadvertent theft of an idea or thought actually generated by someone else has been termed *cryptomnesia* (Taylor, 1965) and has been studied in an experimental tradition initiated by Brown and Murphy (1989). In their paradigm, participants working in pairs are asked to generate ideas together (such as naming kinds of birds) and later are asked to identify which of the ideas they personally generated. People inadvertently plagiarize about 3%–9% of the time, either by regenerating the other person's thought or by falsely recalling the other's thought as their own. In the present research, we predicted that a shift from high to low effort would result in more instances of inadvertent plagiarism. We tested this hypothesis by having people solve anagrams with another person as they exerted effort that was only incidental to the anagram task. Participants took turns solving an anagram with a partner. On a given trial, an anagram problem appeared on the screen to both partners, as one partner tried to solve it. After a few seconds, the solution then appeared on screen to both participants. This paradigm allowed us to control the specific timing of effort that people felt during the process of solving a problem. During the participants' consideration of a problem and its solution, the effort that they were required to exert for an extraneous task fluxed between high or low in each phase. On different trials, the effort required was (a) low during both the anagram problem and the solution, (b) high during both the problem and the solution, (c) low during the problem, then high during the solution, or (d) high during the problem, then low during the solution. The high–low pattern of effort (i.e., shift from high to low effort as solution was presented) most closely resembled the sequence of real effort experienced when one generates a solution and was expected to lead people to misattribute their pattern of effort to the process of authoring the thought—and so to recall later that they had produced ideas that they had not.

EXPERIMENT 1: PHYSICAL EFFORT

In this study, we investigated whether the feeling of agency for mental actions might be similar to authorship processing for physical acts. People took turns solving anagrams on a computer with a partner, during which time they sometimes exerted effort by squeezing a handgrip as cued by the computer. We predicted that people would be more likely to plagiarize their partners' solutions if they had squeezed the handgrip when the problem appeared and released the grip as the solution came on screen—in the high–low pattern of effort normally associated with idea generation.

Method

Participants

Twenty-six female undergraduate students were recruited from Harvard University. Participants were compensated with partial fulfillment of the study pool requirement or with $8.

Design and Procedure

Stimuli. Anagram trials were presented on a computer screen, 60 trials for each player for a total of 120. All anagrams (e.g., OLCKC) had a single solution (e.g., CLOCK) and were made from 5-letter words with a familiarity value of 400–500 on a scale ranging from 0 to 700 that was based on merged values from three sets of familiarity norms (Coltheart, 1981). Anagrams were presented in the center of the computer screen in black uppercase 24-point Times New Roman font.

Instructions. Participants were brought into the laboratory in pairs and were told that they would be taking turns trying to solve anagrams on a computer. Participants were identified as either Player 1 or Player 2 and were taken to separate but adjacent rooms. After the consent agreement was completed, experimenters gave the following instructions for the task:

> In today's experiment, you will be taking turns solving anagrams with your partner next door. An anagram will appear on the screen for 4 seconds, during which time you will try to solve it. At the end of the 4 seconds, the solution will appear. As you go through the trials, write down all the anagram solutions on this piece of paper, including words on both yours and your partner's turn. Later in the experiment, you will be asked to seal the sheet in this envelope. You are Player 1 (or 2) so you will be going first (second). You will also be asked to squeeze this handgrip at certain times during the experiment, which will be indicated by the appearance of a red dot on the screen. These instructions will be repeated on the computer in more detail before you begin.

After receiving these instructions, participants were left alone. The instructions were repeated on the computer screens in both participants' rooms before the anagram task began.

Anagram trials. Participants took turns solving the anagrams. Each trial began when the active player pressed the *Enter* key. The anagram was presented on the screen for 4 s. At that time, the player was asked whether she knew the answer to the anagram (1 = *yes*, 2 = *no*). The solution was then presented for 1 s, and both players wrote down the solution on a sheet of paper. When ready, the other player pressed the *Enter* key to proceed to the next anagram. After the anagram task, participants were instructed to seal the solutions in the envelope and set it aside.

Although participants were tested in pairs, the anagram task was programmed so that they could work independently. We designed the program in this way so to maximize control over the experimental procedure and minimize any unanticipated effects of interaction. On the "partner" trials, the ready prompt ("Press *Enter* key when you are ready for the next anagram") was displayed for 5,000 ms, and the solution question ("Do you think you know the answer?") was displayed for 1,500 ms, approximately the average response times for these stimuli. Although the partners' computer programs were not really interactive, one partner per pair was given the complementary half of anagram trials to solve.

Effort manipulation. Participants squeezed a hand grip periodically over the course of the anagram task. Before the study began, participants were told that they would be signaled to squeeze the grip with their nondominant hand whenever the red dot (2.5 cm in diameter) appeared in the bottom right corner of the screen, and they were shown an example signal. Participants were instructed to squeeze the grip for the entire time that the red dot was displayed. The timing of the red dot varied across the presentation of the anagram problem and solution in four different patterns: (a) during the presentation of the anagram problem only (high–low effort), (b) during the anagram solution only (low–high), (c) during both problem and solution (high–high), or (d) during neither problem nor solution (low–low).

Dependent measures. After a 5-min filler task, participants were given a surprise memory task for the anagram solutions. We presented 170 words on the memory task, including 50 new words that had not appeared in the anagram task but that were equivalent to the anagram solutions in familiarity. Participants were told that some of the words would be new but were not told how many new words there would be. Participants were asked to categorize the word as new (i.e., not on the anagram task), as an anagram that had been presented on their partner's turn, or as an anagram that had been presented on their own turn. If, and only if, a participant identified a word as an anagram presented on her own turn, she was then asked to rate whether she or her partner had solved the anagram in time (0 = *sure that I did not solve it*, 6 = *sure that I solved it*). To minimize any effects of visual recognition, we had the words appear in the upper left corner of the computer screen in blue 24-point lowercase Arial font. At the end of the experiment, participants were asked to indicate whether they had been squeezing the grip when the red dot appeared (*yes* or *no*). Participants were asked whether they had an idea about the purpose of the study and, if so, to describe the suspected hypothesis.

Results

Manipulation Check

All participants reported that they had been squeezing the grip when the dot appeared, and all were included in analysis. No participants reported any suspicions relevant to the hypothesis.

Plagiarism

Plagiarisms were defined as instances in which a participant falsely recalled both that (a) a partner's anagram had been on one's own turn and that (b) the anagram was successfully solved in time (rated as "solved," with a score of 4 or above on the 0–6 scale). We calculated the proportion of partner's words that were plagiarized in each effort sequence (low–low, low–high, high–low, high–high). We conducted a one-way repeated measures analysis of variance (ANOVA) on the proportion of items plagiarized per effort pattern. An overall difference was found among the means, $F(3, 23) = 5.11$, $p < .01$, $\eta_p^2 = .40$. To test the specific prediction that plagiarism would increase in the high–low pattern compared with the other three patterns, we used a Helmert contrast comparing this pattern to the other three. As predicted, this contrast was significant, $F(1, 25) = 6.56$, $p < .05$, $\eta_p^2 = .21$. The level of plagiarism was highest on the high–low effort items ($M = 10.5\%$) compared with the level of plagiarism on items in the other three effort patterns ($M_{\text{low–low}} = 6.2\%$, $M_{\text{low–high}} = 5.0\%$, $M_{\text{high–high}} = 2.8\%$).

Participants' Own Solutions

We examined authorship attributions to the anagrams presented on each participant's own turn. On average, people successfully solved the anagrams on 53.1% of items presented on their own turn. There was no overall difference in actual success across the effort patterns, $F(3, 23) = 1.00$, *ns*. A planned contrast comparing high–low effort items with items in the other three patterns was also not significant, $F < 1$. From the participants' own solved items, we calculated the percentage of items that were correctly recalled as solved (true claims) and from their own *unsolved* items, we calculated the percentage that were falsely recalled as solved (boasts) within each effort pattern. There was no overall difference for true claims, $F(3, 23) = 1.55$, *ns*; however, the planned contrast was marginal $F(1, 25) = 3.91$, $p = .06$, with more true claims made for high–low effort items ($M_{\text{high–low}} = 48\%$) than for the other patterns ($M_{\text{low–low}} = 37\%$, $M_{\text{low–high}} = 43\%$, $M_{\text{high–high}} = 39\%$). For boasts, there was no overall difference among effort patterns, $F < 1$, nor was the planned contrast significant, $F(1, 25) = 2.30$, *ns*.

Discussion

In this study, greater plagiarism of partners' solutions occurred in cases in which participants experienced high effort when the problem was originally presented and then low effort when the solution appeared. Plagiarism was inflated only in this high–low effort pattern, not in the low–high or high–high effort patterns, suggesting that plagiarism was not due to effort in general or to a shifting in effort intensity per se. Rather, the feeling of authorship was cued by the specific change of effort from high to low difficulty. Reported solutions during the task did not vary across effort patterns; thus, there was no evidence that effort affected actual ability to solve problems.

These results cannot be explained by a source monitoring account—for example, that squeezing the handgrip was a distraction that increased plagiarism as a result of improper attention to the source of the solution. If this were the case, greater plagiarism should have occurred when the solution, not the problem, was associated with high effort because the solution was the item that people later had to recall and associate with a source—the opposite of our observed pattern of findings. Furthermore, plagiarism did not increase for high–high effort items when distraction and the possibility of source confusion were most likely. These results suggest that the experience of changing from high to low effort that occurs during the production of a thought cues feelings of authorship for that thought.

The results also revealed that this tendency to remember another's solutions as one's own under conditions of high–low effort did not extend significantly to authorship attributions made for anagrams encountered on one's own turn. Although the high–low effort pattern marginally enhanced memory for true claims of anagram solution, it did not influence memory for boasts of solution. It may be that when there are already cues present for one's own effort that are associated with one's own solutions, these internal cues override or perhaps obscure the interpretation of false effort cues provided by the associated handgrip task. The effort manipulation could have mimicked the experience of internal generation but would have been redundant for instances of genuine internal generation. For items that participants did not solve, it is possible that there is a Ziegarnik effect (Ziegarnik, 1927) at work, that anagrams not solved in time were better remembered because they were interrupted. Alternatively, it may be that the experience of following effort instructions (to squeeze the grip) had differential effects during a participant's own versus others' trials. In any event, the influence of the false "eureka" feeling appeared to be most profound when it occurred for the thoughts produced by the other person.

EXPERIMENT 2: MENTAL EFFORT

Experiment 1 provided evidence that feelings of authorship of mental action increases when people experience high effort (squeezing a handgrip) just before the solution appears. In Experiment 2, we wanted to use a method of manipulating effort that was more similar to mental effort than to physical effort. One factor that has been shown to affect perceived mental ease is the clarity of a stimulus (Jacoby, Baker, & Brooks, 1989). For example, Epley and Norwick (2005) induced feelings of concentration by changing the legibility of the font that participants read. We adopted a similar font manipulation in this study. As in Experiment 1, people worked in pairs on the anagram task. Effort was manipulated by the legibility of the problems and solutions as they appeared on the computer screen. An additional benefit to this method is that it provided a relatively unobtrusive manipulation of effort, inducing effort without any additional awareness or vigilance of participants.

Method

Participants

We recruited 51 undergraduate students (19 men, 28 women, and 4 participants who did not report their gender) as in the prior experiment and tested them in pairs. In a few cases when one of the subjects failed to show up, a research assistant was used as a confederate to pose as the second participant.

Design and Procedure

The anagram paradigm and dependent measures used in Experiment 1 were used in this experiment. The same instructions were given, excluding the instructions about the handgrip. An additional 10 new words were added to the memory test for a total of 180 words.

Perceived effort was manipulated by the clarity of the font being used during the anagram and the solution presentation. Two font colors were used for lettering—black and yellow. In both instances, the lettering was 24 point Garamond typeface on a light gray background. The contrast with the gray background made the black font easy to read and the yellow font relatively difficult to read. In parallel with Experiment 1, there were four different effort patterns of font difficulty for the problem anagram and the solution to the anagram: low–low, low–high, high–low, and high–high. At the end of the study, we also asked participants to rate the reading difficulty of the two fonts on 5-point scales (1 = *very easy*, 5 = *very difficult*).

Results

Manipulation Check

As a manipulation check, we looked at the self-report measures of font difficulty. The yellow font was judged to be much more difficult to read (M = 3.77, SD = .94) than was the black font (M = 1.32, SD = .76), $F(1, 46) = 232.73$, $p < .0001$, $\eta_p^2 = .84$. Four participants did not report font difficulty.

Plagiarism

Plagiarisms were defined as in the prior study. We conducted a one-way repeated measures ANOVA among all four font patterns (low–low, low–high, high–low, high–high) and found an overall difference among patterns on levels of plagiarism, $F(3, 48) = 2.89$, $p < .05$, $\eta_p^2 = .15$. The level of plagiarism was highest for the high–low effort items (M = 8.8%) compared with the levels for items in the other three patterns ($M_{\text{low–low}}$ = 5.6%; $M_{\text{low–high}}$ = 6.1%, SD = 8.8; $M_{\text{high–high}}$ = 6%). To test the specific prediction that the level of plagiarism would increase in the high–low pattern compared with the levels in the other three patterns, we used a Helmert contrast comparing plagiarism in this pattern to plagiarism in the other three. As predicted, this contrast was significant, $F(1, 50) = 8.57$, $p < .01$, $\eta_p^2 = .15$.

Our prediction in this study was based on the assumption that people would experience a shift from high to low effort as the anagram font changed from yellow to black type when the solution was revealed. The manipulation check on perceived difficulty showed that people experienced the yellow font as more difficult to read than the black, so the change was experienced as a shift in effort. However, there were differences among people in the perceived intensity of that effort, particularly for ratings of the yellow font. Depending on the degree of difficulty, the shift in effort might feel light or intense—which should have influenced the effects of the high–low effort pattern. Difficulty ratings for the yellow font did correlate with plagiarism on high–low effort items, $r(47) = .38$, $p < .01$, but were not significantly related to plagiarism for items in the other effort patterns (see Figure 1). To examine this question in greater detail, we entered participants' difficulty ratings for reading the yellow font as a covariate in the one-way ANOVA. The main effect of the yellow font difficulty covariate was significant, $F(1, 45) = 4.22$, $p < .05$, $\eta_p^2 = .09$, but the overall effect of effort pattern was no longer significant, $F(3, 43) = 2.11$, *ns*. More important, however, the Effort × Difficulty interaction was significant on the target contrast comparing high–low effort with the other patterns, $F(1, 45) = 5.19$, $p < .05$, $\eta_p^2 = .10$, suggesting that the inflated plagiarism for high–low effort items relative to the items in the other patterns was moderated by the perceived difficulty of reading the yellow font.

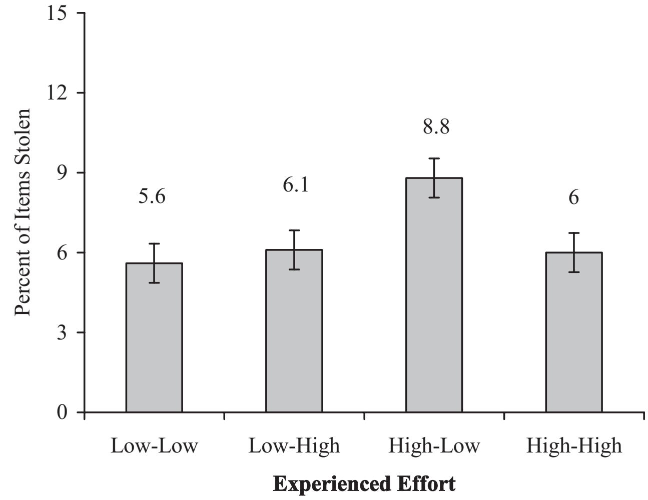

Figure 1. Occurrence of plagiarism by effort sequence, Experiment 2. Effort was manipulated by font clarity: black lettering (low effort) versus yellow lettering (high effort).

Participants' Own Solutions

As in Experiment 1, we also examined authorship attributions to the anagrams presented on each participant's own turn.[1] On average, people successfully solved the anagrams on 51% of items presented on their own turn. There was no overall difference in actual success across the effort patterns, $F(3, 26) = 2.43$, *ns*, nor was the contrast significant, $F = 1.60$, *ns*. From participants' own solved items, we calculated the percentage that were correctly recalled as solved (true claims), and from participants' own unsolved items, we calculated the percentage that were falsely recalled as solved (boasts) within each effort pattern. There was no overall difference for true claims, $F(3, 26) = 2.22$, *ns*, and the planned contrast was marginal, $F < 1$. For boasts, there was no overall difference among effort patterns, $F < 1$, nor was the planned contrast significant, $F < 1$.

Discussion

The results of this study provide further evidence that feelings of authorship for thoughts are influenced by a period of mental effort

[1] Due to programming error, data from the anagram task were lost for 22 participants, leaving only 29 in this analysis. We repeated all analyses on the plagiarism effects for only these 29 participants and found comparable results: One-way ANOVA: $F(3, 26) = 3.26$, $p < .05$, $\eta_p^2 = .27$. Planned contrast: $F(1, 28) = 8.81$, $p < .01$, $\eta_p^2 = .24$ ($M_{\text{high–low}}$ = 11.7%, $M_{\text{low–low}}$ = 8.1%, $M_{\text{low–high}}$ = 7.3%, $M_{\text{high–high}}$ = 8.2%). For the individual differences in perceived font difficulty, the main effect of the yellow difficulty covariate was marginal, $F(1, 26) = 3.19$, $p = .09$, and the Effort Pattern × Font Difficulty interaction was significant, $F(3, 24) = 3.12$, $p < .05$. Effort × Difficulty interaction was significant on the target contrast comparing high–low effort with the other patterns, $F(1, 24) = 9.45$, $p < .01$, $\eta_p^2 = .27$.

prior to the mental action. As in Experiment 1, plagiarism was most likely when people experienced high effort during the problem phase and low effort during presentation of the solution, simulating the experience of idea generation. Plagiarism was greater for this sequence than for any of the other three sequences. These effects did not extend to feelings of authorship for anagrams presented on one's own turn, either for true claims for items actually solved or for boasts on items not solved. As we discussed in Experiment 1, the false effort cues created by the effort might have had a specific influence on feelings of authorship of others' ideas because there might be other competing cues involved in genuinely creating an idea and failing to solve a problem.

An important finding in this study was the role of perceived difficulty. The intensity effort was associated with increased levels of plagiarism for the items associated with the high–low effort shift but did not appear to affect plagiarism for items associated with the other effort patterns. This is consistent with our hypothesis: Greater effort felt during problem solving should be interpreted as harder work in trying to solve the anagram.

EXPERIMENT 3

Experiment 3a: Reminded Effort

In Experiments 1 and 2, people were more likely to take credit for solving someone else's anagram when the problem and solution of the anagram were initially accompanied by a feeling of high and then low effort. The findings of our first two experiments fitted in with a long line of research on the perception of psychological states via observation of internal physiological states (James, 1890; Schachter & Singer, 1962; Schwarz & Clore, 1996). However, physiological states do not always have a clear cause; thus, a person could confuse fear-induced anxiety for amorous anxiety (Dutton & Aron, 1974) or attribute the good mood caused by sunny weather to overall life satisfaction (Schwarz & Clore, 1983). Such mistakes are less likely when the source of the physiological state becomes salient (Schachter & Singer, 1962). Likewise, if the experience of high–low effort shift was being misinterpreted in these studies as feelings of authorship of thoughts, then attention to effort cues might prevent misattribution. In this study, we introduced a condition in which participants were reminded of the effort following each anagram trial. We predicted that inflated levels of plagiarism in the high–low effort pattern would be reduced or eliminated by awareness of the source of effort.

Method

Participants

Fifty-eight undergraduate students (25 men and 33 women) were recruited from Harvard University as in the prior studies.

Design and Procedure

The general procedure from Experiments 1 and 2 was repeated here. As in Experiment 2, effort was manipulated by the clarity of the font being used during presentation of the anagram and the solution. We modified the procedure by using only two different sequences of font difficulty: low–high and high–low.

All participants were informed that the fonts would be in different colors during the instructions. Participants were randomly assigned to either a reminder condition or a control condition. In the reminder condition, participants were asked to report the font color of the anagram and the solution immediately after each anagram problem/solution exposure trial. In the control condition, for a comparable but irrelevant task, participants were asked to report the second letter of the anagram and the solution following each trial.

Results

Manipulation Check

As in the prior experiments, the yellow font was judged as more difficult to read ($M = 2.85$, $SD = 1.19$) than the black font ($M = 1.67$, $SD = 1.13$), $F(1, 57) = 53.92$, $p < .0001$. This difference held for both the control condition, $F(1, 28) = 47.48$, $p < .0001$, and the reminder condition, $F(1, 28) = 14.70$, $p = .001$.

Plagiarism

Plagiarism was examined in a 2 (low–high vs. high–low effort) × 2 (reminder vs. control condition) ANOVA with repeated measures on the first variable. There was no main effect of effort pattern on plagiarism ($F < 1$) nor a main effect of condition ($F < 1$). However, as hypothesized, the interaction between effort and condition was significant, $F(1, 56) = 5.66$, $p < .05$, $\eta_p^2 = .09$. When we analyzed the simple effects of effort pattern within each condition, we found a significant effect in the control condition, $F(1, 56) = 4.88$, $p < .05$, with greater plagiarism occurring with the high–low effort items ($M = 10.0\%$) compared with the low–high effort items ($M = 7.6\%$), replicating our previous results. However, for participants who were asked to report the font color following each trial, plagiarism was no different for high–low effort items ($M = 8.4\%$) than for low–high items ($M = 9.7\%$), $F(1, 56) = 1.34$, *ns,* see Figure 2.

Experiment 3b: Forewarned Effort

In Experiment 3a, control participants were more likely to plagiarize the anagram that their partners had solved when it had originally been presented in the high–low effort pattern; this finding replicated results from Experiments 1 and 2. However, the effort associated with font color was made salient to participants during encoding; effort cues were discounted and did not lead to inflated plagiarism for high–low effort items. Our hypothesis had been that it is the feeling of high–low effort during the generation of an idea that can lead one to misattribute authorship of the idea, and it was supported by the finding that the awareness of effort prevents misattributions. However, it is not clear from these results whether participants discounted effort because of attention to the experience itself or because of an awareness of the effort sources in general. It is possible that the mere knowledge of influence of effort might inoculate one from misattributions, even if one pays no attention to the specific feelings during the experience. In the present study, we tested this hypothesis by giving participants a general warning at the outset of the study about the potential effects of font difficulty during the task, without prompting specific attention to the effort experience during the problem-solving process. If judgments of responsibility are influenced by lay theories of mental effort and mental action, then mere awareness of extraneous effort cues may be enough to prevent misattributions

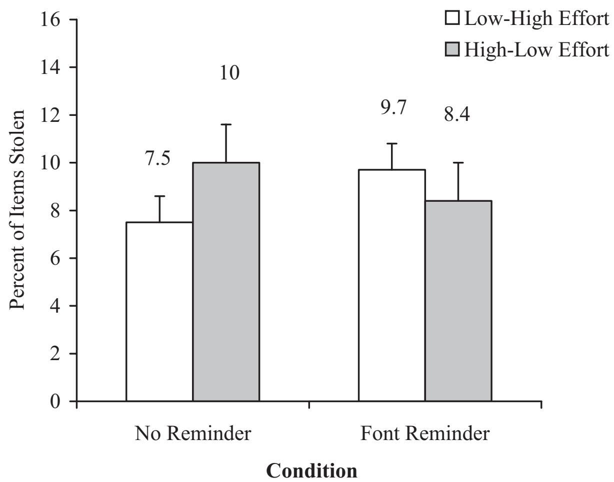

Figure 2. Occurrence of plagiarism by font pattern and reminder condition, Experiment 3b.

on the high–low effort trials. However, if authorship is cued more by the experience of effort at the time that the mental action occurs—the feeling of generating an idea—then general knowledge of extraneous effort should have no specific impact on plagiarism in high–low trials, and the same pattern should be observed as in the control condition.

Method

Participants

Thirty-eight undergraduate students (13 men and 25 women) were recruited as in the prior studies.

Design and Procedure

We manipulated effort via font color, following the procedure described in Experiment 2. As in Experiment 3a, we used two effort patterns: low–high and high–low. Participants were randomly assigned to either a warning condition or a control condition. After presentation of the general instructions but before the presentation of problems and solutions, participants in a warning condition were told, "The color of the font will vary as you do this task between a yellow font and a black font. Some people find the yellow font more difficult to read, so those anagrams might feel harder to do." Those in a control condition did not receive this warning.

Results

Manipulation Check

As a manipulation check, we looked at the self-report measures of font difficulty. The yellow font was judged as more difficult to read, $M = 3.00$, $SD = 1.09$, than the black font, $M = 1.34$, $SD = 0.75$, $F(1, 36) = 102.01$, $p < .0001$. This difference held for both the control condition, $F(1, 18) = 43.56$, $p < .0001$, and the warning condition, $F(1, 18) = 45.76$, $p < .0001$.

Plagiarism

Instances of plagiarism were examined in a 2 (low–high vs. high–low effort) × 2 (warning vs. control condition) ANOVA with repeated measures on effort. Consistent with our prediction, there was a main effect of effort on plagiarism, $F(1, 36) = 4.92$, $p < .05$, $\eta_p^2 = .12$, with more plagiarism occurring in the high–low sequence ($M = 9.5\%$) than in the low–high sequence ($M = 7.2\%$). There was also a main effect of condition, with less plagiarism in the warning condition, ($M_{control} = 10.9\%$, $M_{warning} = 5.8\%$), $F(1, 36) = 4.10$, $p = .05$, $\eta_p^2 = .10$. There was no interaction between effort pattern and warning condition, $F < 1$. Participants in both conditions replicated the general effect, with more plagiarism occurring in the high–low effort pattern. Warning participants of the font difficulty did affect the level of plagiarism, but it suppressed overall levels of plagiarism on all items, not just those items in the high–low effort pattern.

Discussion: Experiments 3a and 3b

In Experiment 3a, reminding participants of font color as they read the individual items eliminated the difference between effort patterns. In this reminder condition, attention to effort decreased plagiarism on the high–low effort items only, so that the number of plagiarisms was equal for items in both effort patterns. These results support our hypothesis that mental authorship is linked to the experience of effort exertion and release during mental actions. In Experiment 3b, a general warning to pay attention to the difficulty of the yellow font led to a general suppression of plagiarism. Replicating our previous results, more plagiarism occurred with anagrams presented in the high–low effort pattern than with anagrams in the low–high effort pattern. In contrast with Experiment 3a, a general warning about effort did not specifically prevent inflated plagiarism on the high–low effort items. The warning made people less likely to misattribute overall, but more plagiarism still occurred with high–low effort items than with low–high effort items.

The juxtaposition of these two studies is informative about the role of the feeling of effort in authorship judgments. Participants in Experiment 3a were forced to consider their effort experience after each anagram trial. Any enhanced feeling of authorship that they had as a result of the high–low effort pattern could be discounted at this time, preventing the inflated level of plagiarism normally associated with this effort pattern. This was not so for participants in Experiment 3b, who were given only the general warning. Over the course of 120 anagrams, this warning might have become diluted, and it might have been difficult for participants to keep track of what they should or should not be discounting. Without being reminded to discount effort cues on a case-by-case basis, they became more conservative in their plagiarism in general. At the later memory test, participants warned in this way may have merely increased the acceptable threshold for feelings of agency as a strategy, rather than using a specific discounting cue for every single anagram. Together, these findings suggest that these misattributions of authorship occur at encoding and are cued by the experience of the high–low effort shift that occurs in sync with the solution of a problem.

GENERAL DISCUSSION

In four studies, we found that instances of plagiarism increase if one experiences a period of mental exertion and release that coincides with mental activity. People falsely recalled having solved their partner's anagrams more often if they had been induced to exert irrelevant effort during the problem phase and then to relax that effort at the point that the solution was presented. Inadvertent plagiarism was greater on trials with a high–low effort pattern than on trials with other patterns—for example, low effort followed by a sudden onset of effort at the presentation of the solution or a constant level of high effort. In Experiment 1, we found that plagiarism of anagram solutions increased if people squeezed a handgrip during the presentation of the problem and then released the grip as the solution was presented. This finding provided initial support for our hypothesis and suggests that there might be a common process of authorship that applies to both physical and mental acts. In Experiment 2, we manipulated effort via the visual clarity of the anagrams themselves on a gray background, switching between fonts with black type (low effort) or pale yellow type (high effort). Again, the predicted effect was significant, with more plagiarism of high–low effort items compared with items in the other patterns.

In both Experiments 3a and 3b, we found that directing participants' attention to effort decreased inclinations to plagiarize. Exactly how plagiarism decreased in these studies depended on how participants were reminded of the effort. In Experiment 3a, some participants were assigned to a reminder condition in which they reported the font color of both the problem and the solution immediately following each trial. Participants in the control condition who did not receive these reminders plagiarized more high–low effort items in the memory test, replicating the findings of the prior experiments. The effect was eliminated, however, for participants reminded of the font color on every trial. In Experiment 3b, some people were given a general warning about effort associated with the font colors at the beginning of the study. These participants showed lower levels of plagiarism across both effort patterns than did controls, but they still showed more plagiarism for high–low effort items. Together, the results of Experiments 3a and 3b suggest that these misattributions of authorship may result from the feeling of effort experienced during mental actions. The feeling of authorship that is artificially induced by the high–low effort pattern could be effectively discounted only when participants attended to effort cues on each trial, not when they were given a general warning to pay attention to effort.

Alternative Accounts

One alternative explanation for these findings is that plagiarism increased because of source confusion (Johnson, Hashtroudi, & Lindsay, 1993): People were too distracted at the time to properly monitor who was generating the solution. In other studies, difficulties in source monitoring have indeed affected plagiarism (e.g., Macrae, Bodenhausen, & Calvini, 1999; Marsh, Landau, & Hicks, 1997). Plagiarism increases, for example, when people are under high cognitive load during the first appearance of the idea (which should undermine memory of the source of the idea), and plagiarism decreases when people are specifically instructed to pay attention to the origin of their ideas (Marsh et al., 1997).

Although source monitoring difficulties may certainly result in plagiarism in other contexts, source confusion is not a useful explanation for the present findings. The source monitoring account should actually predict the opposite pattern of results than those we obtained. If the effort that participants experienced in these tasks served as a distractor, then we might expect that more plagiarism would have arisen from the low–high effort pattern versus high–low because it was the solution (not the problem) that people had to recall later for the source. Another version of the source confusion account might predict the greatest level of plagiarism when high effort was maintained throughout the anagram task because that was the most distracting condition. But this was not found either—plagiarism was greater in the high–low sequence than in other conditions.

Another alternative account of our results could suggest that the plagiarism observed in these studies is not truly plagiarism at all; rather, people actually solved the anagram on their partners' turn even though it was not their responsibility to solve at the time. Here the error would only be in misremembering whose turn it was, not in misattributions of authorship of solutions. It is true that participants could see the problems presented on their partner's turn and therefore that they could have been solving their partner's anagrams during the trials. However, people were no better at solving their own high–low effort items, so there would be no reason to expect that they might have been better at solving their partner's items.

Future Directions

The anagram paradigm that we used in these studies had several benefits. First, the anagrams were a simple task that could be repeated over many trials. Given that the base rate of inadvertent plagiarism was fairly low (5%–10% of items), it was essential that participants have numerous opportunities to claim authorship of another's idea. Of particular importance to our hypotheses was the use of font clarity as a manipulation of effort, and the precise timing of the solution presentation was easily controlled by the computer program. These assets to our experimental paradigm not withstanding, it is important to note that this research is limited by the fact that the anagram task was the only paradigm used. Thus, the possibility remains that our theoretical claims—that the experience of high–low effort serves as a cue for mental authorship—pertain only to this specific anagram task. Further research on inadvertent plagiarism could use different methods; for instance, an interesting extension of this research would be an investigation of feelings of authorship of ideas as they occur, rather than as memory effects. Online feelings of mental authorship might be better studied if investigators used insight problems rather than plagiarism because it is less likely that people would plagiarize another person's idea immediately after it is generated. Unlike the anagram task used in these studies, insight problems may be solved at a moment when no conscious attention is being directed toward the problem. The solution seems to pop into one's mind when one has exerted no effort and has no personal control of the idea, and—although one may be more than willing to take credit for the solution—how one managed to find the solution is somewhat of a mystery. Unlike noninsight problems, feelings that one is "getting warmer" do not predict solutions for insight problems (Metcalfe & Weibe, 1987). The solution is usually found after one has reached an impasse and ceased any deliberate attempts to solve the problem (Kaplan & Simon, 1990; Schooler & Melcher, 1995). A research paradigm that used extraneous effort tasks during insight and noninsight problems could result in less surprise and more feelings of control for solutions to insight problems.

Why Have Authorship of Thought?

An important question to consider in this research is why authorship of thoughts might exist at all, not just in distinguishing one's own ideas from those of others but in identifying thoughts within one's own consciousness as products of the self. Rather than picking a few of those thoughts to feel that one personally willed, it might be easier to feel a sense of responsibility connected to all thoughts that pass through one's consciousness. Instead, a range of authorship of thoughts is felt, from those thoughts that seemed very intentional to those thoughts that seem to intrude on one's otherwise peaceful line of thought. In many instances, thoughts seem to come unbidden and can affect responses and behavior outside one's conscious control or awareness (Bargh, Chen, & Burrows, 1996; Greenwald & Banaji, 1995). Attempts to regain control over thought in such cases may only be partially effective (Gilbert, 1989) or sometimes entirely ineffective (Wegner, 1989). Despite these difficulties, the sense that we command thoughts remains very important, and people show strong resistance to suggestions that their minds may be operating largely automatically (Bargh & Chartrand, 1999; Dijksterhuis, Aarts. & Smith, 2005; Wegner, 2005).

Campbell (1999) suggested that thoughts feel authored to the extent they are consistent with the "background psychology" of a person, the sum total of that person's desires and attitudes. To an individual, thoughts that fit into this background feel as if that individual personally caused them to be created, but thoughts that clash with the background seem suspiciously out of place. Discussions of the function of an authorship emotion for physical action point to the importance of feeling that there is a controller of action, an internal operator who guides our decisions (e.g., Wegner, 2005). We identify this controller as the true self, or sometimes, the soul. There is an even greater need to establish authority over our mental actions because thought is connected even more intimately to our experience of self, especially the self as the observer of the world. The division between thoughts that feel authored and those that feel unauthored is important in one's decisions regarding the self—for example, decisions about goals to pursue and actions to take. If thoughts return to one's mind with regularity, however, they may be internalized and begin to affect other behavior (Wegner, 1989).

The findings of our experiments suggest that perceptions of effort may be a kind of currency in which authorship for our own thoughts is computed. The key issues of responsibility that surround our thoughts every day may be understood through an accounting system that combines perceptions of the predictability of thoughts with perceptions of how hard it was to have them and how much relief we felt when they came to mind. The experience of consciously willing what our minds do may accrue from both a cognitive system for understanding our authorship (Wegner & Wheatley, 1999) and an embodiment-based system that is influenced by our feelings of effort.

Concluding Remarks

In both arts and academia, original ideas are lauded, and authors of those ideas are given prestigious awards. The greatest iconoclasts become icons themselves, earning a special place in the collective history of humans and on the dormitory walls of college students. For these reasons, plagiarism is considered one of the most shameful sins. If found out, the transgressor may be punished, scorned, publicly humiliated, and ostracized from the community. During the course of this research, conversations with colleagues about research experiences have revealed that this kind of plagiarism is surprisingly common. Sometimes these stories are retold with humor, sometimes with resentment. Unfortunately, the intangible nature of thought can make attributions difficult to make with certainty, whereas the importance of thought to the self and identity underscores the importance of making these attributions accurately. Considering these dire consequences, it is unfortunate and frightening to consider that we might plagiarize unintentionally. Despite one's best intentions for honesty and integrity, misleading indicators of mental agency can cause one to take credit for that which is not rightly one's own.

References

Bargh, J. A. (1994). The four horsemen of automaticity: Awareness, intention, efficiency, and control in social cognition. In J. R. S. Wyer & T. K. Srull (Eds.), *Handbook of social cognition* (2nd ed.). Hillsdale, NJ: Erlbaum.

Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist, 54,* 462–479.

Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal of Personality and Social Psychology, 71,* 230–244.

Barsalou, L. W., Niedenthal, P. M., Barbey, A. K., & Ruppert, J. A. (2003). Social embodiment. In B. H. Ross (Ed.), *The psychology of learning and motivation* (Vol. 43, pp. 43–92). San Diego, CA: Academic Press.

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

Cacioppo, J. T., Petty, R. E., & Morris, K. J. (1985). Semantic, evaluative, and self-referent processing: Memory, cognitive effort, and somatovisceral activity. *Psychophysiology, 22,* 371–384.

Campbell, J. (1999). Schizophrenia, the space of reasons, and thinking as a motor process. *The Monist, 82,* 609–635.

Clore, G. (1992). Cognitive phenomenology: Feelings and the construction of judgment. In L. L. Martin (Ed.), *The construction of social judgments* (pp. 133–163). Hillsdale, NJ: Erlbaum.

Coltheart, M. (1981). *MRC psycholinguistic database user manual: Version 1.*

Csikszentmihalyi, M., Abuhamdeh, S., & Nakamura, J. (2005). Flow. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 598–608). New York: Guilford.

Dijksterhuis, A., Aarts, H., & Smith, P. K. (2005). The power of the subliminal: On subliminal persuasion and other potential applications. In R. Hassin, J. S. Uleman, & J. A. Bargh (Eds.), *The new unconscious* (pp. 19–36). New York: Oxford University Press.

Dutton, D. G., & Aron, A. P. (1974). Some evidence for heightened sexual attraction under conditions of high anxiety. *Journal of Personality and Social Psychology, 30,* 510–517.

Epley, N., & Norwick, R. (2005). *Confidence as inference from participative experience*. Unpublished manuscript, Harvard University.

Gandevia, S. C. (1987). Roles for perceived voluntary motor commands in motor control. *Trends in Neuroscience, 15,* 81–85.

Gilbert, D. T. (1989). Thinking lightly about others: Automatic components of the social inference process. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 189–211). New York: Guilford.

Glenberg, A. M. (1997). What memory is for. *Behavioral and Brain Sciences, 20,* 1–55.

Goodwin, G. M., McCloskey, D. I., & Matthews, P. B. C. (1972). The contribution of muscle afferents to kinaesthesia shown by vibration induced illusions of movement and the effects of paralyzing joint afferents. *Brain, 95,* 705–748.

Graham, G., & Stephens, G. L. (1994). Mind and mine. In G. Graham & G. L. Stephens (Eds.), *Philosophical psychology* (pp. 91–109). Cambridge, MA: MIT Press.

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review, 102,* 4–27.

Hasher, L., & Zacks, R. T. (1979). Automatic and effortful processes in memory. *Journal of Experimental Psychology: General, 108,* 356–388.

Hoffman, R. E. (1986). Verbal hallucinations and language production processes in schizophrenia. *Behavioral and Brain Sciences, 9,* 503–548.

Jacoby, L. L., Baker, J. G., & Brooks, L. R. (1989). Episodic effects on picture identification: Implications for theories of concept learning and theories of memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 15,* 275–281.

Jacoby, L. L., Kelley, C., Brown, J., & Jasechko, J. (1989). Becoming famous overnight: Limits on the ability to avoid unconscious influences of the past. *Journal of Personality and Social Psychology, 56,* 326–338.

James, W. (1890). *The principles of psychology* (Vol. 1). New York: Dover.

Jeannerod, M. (1997). *The cognitive neuroscience of action.* Oxford, England: Blackwell.

Johnson, M. K., Hashtroudi, S., & Lindsay, D. S. (1993). Source monitoring. *Psychological Bulletin, 114,* 3–28.

Kahneman, D. (1973). *Attention and effort.* Englewood Cliffs, NJ: Prentice-Hall.

Kaplan, C. A. & Simon, H. A. (1990). In search of insight. *Cognitive Psychology, 22,* 374–419.

Logan, G. D. (1997). The automaticity of academic life: Unconscious applications of an implicit theory. In R. S. Wyer, Jr. (Ed.), *The automaticity of everyday life* (pp. 157–180). Hillsdale, NJ: Erlbaum.

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

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

Matthews, P. B. C. (1982). Where does Sherrington's "muscular sense" originate? Muscles, joints, corollary discharges? *Annual Review of Neuroscience, 5,* 189–218.

Merton, P. A. (1964). Human position sense and sense of effort. *Symposium of the Society of Experimental Biology, 18,* 387–400.

Metcalfe, J. (1986). Feeling of knowing in memory and problem solving. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 12,* 288–294.

Metcalfe, J., & Weibe, D. (1987). Intuition in insight and noninsight problem solving. *Memory & Cognition, 15,* 238–246.

Muraven, M., Tice, D., & Baumeister, R. (1998). Self-control as limited resource: Regulatory depletion patterns. *Journal of Personality and Social Psychology, 74,* 774–789.

Niedenthal, P. M., Barsalou, L. W., Winkielman, P., Krauth-Gruber, S., & Ric, F. (2005). Embodiment in attitudes, social perception, and emotion. *Personality and Social Psychology Review, 9,* 184–211.

Schachter, S., & Singer, J. E. (1962). Cognitive, social, and physiological determinants of emotional states. *Psychological Review, 69,* 379–399.

Scheerer, E. (1987). Muscle sense and innervation feelings: A chapter in the history of perception and action. In H. Heuer & A. F. Sanders (Eds.), *Perspectives on perception and action.* (pp. 171–194). Hillsdale, NJ: Erlbaum.

Schooler, J. W., & Melcher, J. (1995). The ineffability of insight. In S. M. Smith & T. B. Ward (Eds.), *The creative cognition approach.* (pp. 97–133). Cambridge, MA: MIT Press.

Schwarz, N., Bless, H., Strack, F., Klumpp, G., Rittenauer-Schatka, H., & Simons, A. (1991). Ease of retrieval as information: Another look at the availability heuristic. *Journal of Personality and Social Psychology, 61,* 195–202.

Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology, 45,* 513–523.

Schwarz, N., & Clore, G. L. (1996). Feelings and phenomenal experiences. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 433–465). New York: Guilford.

Stephens, G. L., & Graham, G. (2000). *When self-consciousness breaks. Alien voices and inserted thoughts.* Cambridge, MA: MIT Press.

Stepper, S., & Strack, F. (1993). Proprioceptive determinants of emotional and nonemotional feelings. *Journal of Personality and Social Psychology, 64,* 211–220.

Strack, F., & Neumann, R. (2000). Furrowing the brow may undermine perceived fame: The role of facial feedback in judgments of celebrity. *Personality and Social Psychology Bulletin, 26,* 762–768.

Taylor, F. K. (1965). Cryptomnesia and plagiarism. *British Journal of Psychiatry, 111,* 1111–1118.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology, 5,* 207–232.

Vohs, K. D., Baumeister, R. F., Twenge, J. M., Schmeichel, B. J., & Tice, D. M. (2006). *Decision fatigue exhausts self-regulatory resources.* Unpublished manuscript.

Wegner, D. M. (1989). *White bears and other unwanted thoughts: Suppression, obsession, and the psychology of mental control.* New York: Viking/Penguin.

Wegner, D. M. (2002). *The illusion of conscious will.* Cambridge, MA: MIT Press.

Wegner, D. M. (2005). Who is the controller of controlled processes? In R. Hassin, J. Uleman, & J. A. Bargh, (Eds.), *The new unconscious* (2nd ed., pp. 19–36). New York: Oxford University Press.

Wegner, D. M., Ansfield, M., & Pilloff, D. (1998). The putt and the pendulum: Ironic effects of the mental control of action. *Psychological Science, 9,* 196–199.

Wegner, D. M., & Bargh, J. A. (1998). Control and automaticity in social life. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (4th ed., Vol. 1, pp. 446–496). New York: McGraw-Hill.

Wegner, D. M., & Sparrow, B. (2004). Authorship processing. In M. Gazzaniga (Ed.), *The cognitive neurosciences* (3rd ed., pp. 1201–1209). Cambridge, MA: MIT Press.

Wegner, D. M., & Wheatley, T. P. (1999). Apparent mental causation: Sources of the experience of will. *American Psychologist, 54,* 480–492.

Zeigarnik, B. (1927). On the recall of completed and uncompleted tasks. *Psychologische Forschung, 9,* 1–85.

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