A JOURNAL OF THE ASSOCIATION FOR PSYCHOLOGICAL SCIENCE aps

Research Report

Creating Illusions of Past Encounter Through Brief Exposure

Alan S. Brown[1] and Elizabeth J. Marsh[2]

[1]Southern Methodist University and [2]Duke University

ABSTRACT—*Titchener (1928) suggested that briefly glancing at a scene could make it appear strangely familiar when it was fully processed moments later. The closest laboratory demonstration used words as stimuli, and showed that briefly glancing at a to-be-judged word increased the subject's belief that it had been presented in an earlier study list (Jacoby & Whitehouse, 1989). We evaluated whether a hasty glance could elicit a false belief in a prior encounter, from a time and place outside of the experiment. This goal precluded using word stimuli, so we had subjects evaluate unfamiliar symbols. Each symbol was preceded by a brief exposure to an identical symbol, a different symbol, or no symbol. A brief glance at an identical symbol increased attributions to preexperimental experience, relative to a glance at a different symbol or no symbol, providing a possible mechanism for common illusions of false recognition.*

Imagine the following situation: You briefly glance both ways before crossing a street, but hesitate as a new display in the window of a Starbucks captures your eye. When your attention returns to traversing the street, the scene feels strangely familiar. According to Titchener (1928), this severing of "two phases of a single consciousness" (p. 425) makes the subsequent, fully aware perception feel familiar because of the prior glance, but this familiarity is misattributed to a much earlier experience.

Jacoby and Whitehouse (1989) modeled this phenomenon in the laboratory by using a brief prime to simulate a hasty glance. After studying a list of words, subjects made old/new decisions for test words, each of which was preceded by a briefly flashed word (either the same word or a different word) or no word at all. Critically, subjects were more likely to falsely identify a new word as "old" if it was primed with itself than if it had been preceded by a different word or no word at all. This finding demonstrated that a brief exposure can enhance the familiarity of a nonstudied word, and that this sense of familiarity is then misinterpreted as stemming from the word's presentation in the preceding study list.

Originally, Jacoby and Whitehouse (1989) believed that the enhanced familiarity depended on subjects' lack of awareness of the primes and used what they thought was a subliminal prime exposure. Subsequent research has challenged whether the prime was actually subliminal and, more important, has consistently demonstrated that the central finding also occurs when primes are presented at or above threshold (I.H. Bernstein & Welch, 1991; Gellatly, Banton, & Woods, 1995; Joordens & Merikle, 1992; Klinger, 2001). Jacoby and Whitehouse's dramatic outcome has been broadly applied to a variety of other phenomena, such as mere exposure (how prior exposure increases liking) and perceptual judgments (how effects of memory are misinterpreted as attributes of physical stimuli).

Our focus is on whether this recognition illusion can be pushed farther back in time and attributed to a *preexperimental* encounter. Titchener's example (1928) involves a misattribution to a more distant personal past, but laboratory research has yet to confirm that this episodic illusion can involve an ambiguously distal time frame. That a sense of familiarity generated in the lab could extend to a preexperimental experience is neither theoretically or logically obvious. People do not necessarily make source misattributions to all possible sources with equal likelihood. For instance, subjects often show a bias to misattribute false alarms to external sources rather than to themselves (the it-had-to-be-you bias; Johnson & Raye, 1981).

A focus on misattributions to preexperimental experience ruled out using word stimuli in the experiment reported here, given that all words (recognized as such) must have been encountered before the experimental session. To this end, we used

Address correspondence to Alan S. Brown, Department of Psychology, Southern Methodist University, Dallas, TX 75275, e-mail: abrown@smu.edu.

Psychological Science RESEARCH, THEORY, & APPLICATION IN PSYCHOLOGY AND RELATED SCIENCES

novel and low-familiarity stimuli (symbols; see the top and middle portions of Fig. 1) that were unlikely to have been experienced before the experiment. The use of symbols allowed us to use only a test list, forgoing the initial study list used by Jacoby and Whitehouse (1989).

In short, in each trial, participants saw a brief flash of the target symbol (identical prime) or a different symbol (different prime), or saw no symbol at all (no prime), before the target symbol appeared. Subjects then evaluated whether the target symbol had been encountered before the experiment. Given that Jacoby and Whitehouse (1989) found a much larger false-recognition effect with a brief (17% at 50 ms) than long (9% at 200 ms) prime exposure, a prime exposure close to threshold was used to maximize any possible effect of our manipulation. Finally, subjects were asked a few questions about déjà vu at the end of the experiment, to test whether our paradigm captured the phenomenology described by Titchener (1928).

METHOD

Participants

Twenty-four undergraduates at Southern Methodist University participated in the investigation and received extra course credit as an incentive.

Materials

A total of 300 simple, black line drawings were selected from various sources (Arnstein, 1983; Dreyfuss, 1972; Koch, 1930; Lehner, 1950, 1956). The background familiarity of the symbols was determined through a pilot study in which 10 subjects, who did not participate in the main experiment, evaluated each symbol on a 6-point scale (1 = *totally unfamiliar*, 6 = *totally familiar*). On the basis of the mean ratings, we classified 64 symbols as having high familiarity (mean rating between 5.9 and 6.0), 64 symbols as having low familiarity (mean rating between 3.3 and 4.8), and 64 symbols as being novel (mean rating less than 2.7; Fig. 1).

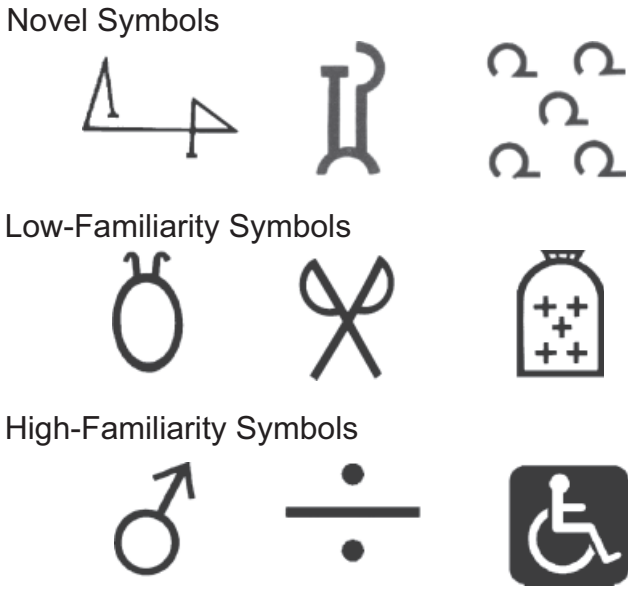

Fig. 1. Examples of novel, low-familiarity, and high-familiarity symbols.

Design

We used a 2 (symbol familiarity: novel or low) × 3 (prime: identical, different, or none) within-participants design. In addition to the critical trials with novel and low-familiarity symbols, we included filler trials with high-familiarity targets (and primes) to allow subjects to utilize the full range of familiarity ratings. These high-familiarity symbols (see Fig. 1) were neither counterbalanced nor considered a factor in the design. As one can see from Figure 1, participants were likely to have experienced these symbols before the experiment. Given their near-ceiling baseline familiarity, high-familiarity symbols are inherently insensitive to a manipulation designed to increase a feeling of preexperimental encounter, and were thus not included in the analyses.

Novel and low-familiarity symbols were divided into four sets of 16 symbols each; familiarity was approximately equal within each set. Across subjects, each set appeared equally often in each of four functions: as targets in the identical-prime condition, as targets in the different-prime condition, as targets in the no-prime condition, and as primes in the different-prime condition. Different primes were always from the same category (novel, low familiarity, or high familiarity) as the accompanying target.

Procedure

Participants were tested individually with MediaLab and DirectRT software (Jarvis, 2004a, 2004b) on a personal computer. Each trial followed the same sequence. First, a "READY" signal was displayed in the center of the computer screen for 2,000 ms. This was followed by a premask for 500 ms, and then the identical or different prime or no prime for 35 ms. After the prime, a postmask was displayed for 500 ms, followed by the test symbol accompanied by the question: "Have you ever encountered this symbol prior to this study? Yes or No." The test symbol remained on the screen until participants pressed a computer key corresponding to their answer, after which the screen went blank for 1,000 ms before the next trial. The pre- and postmasks were identical and consisted of a complex series of squiggly lines designed to adequately mask the variety of different symbols. Six practice trials (two with no primes, two with identical primes, and two with different primes) preceded the 144 critical trials. The trial sequence was randomized separately for each participant. Afterward, participants answered three questions: "Did you ever get confused in the experiment when deciding whether or not you had seen the symbol before today's study ('yes' or 'no')?" "Did you have a déjà vu experience in response to any of the symbols during this session ('yes' or 'no')?" "How often do you have déjà vu experiences ('never,' 'less

than once per year,' 'about once per year,' 'about once every six months,' 'about once a month,' or 'about once a week')?" Subjects were then debriefed and thanked for participating.

RESULTS

All results were significant at the .05 level unless otherwise noted.

Table 1 shows the mean proportion of symbols identified as experienced prior to the experiment as a function of symbol familiarity and prime condition. Data on high-familiarity filler targets are provided in the footnote for comparison, but were not analyzed (see explanation in Method). As expected, most high-familiarity targets (87%) were judged as having been encountered before the experiment. In contrast, only 3% of novel symbols and 13% of low-familiarity symbols were judged as having been seen before the experiment (in the baseline, or no-prime, condition).

A 2 × 3 repeated measures analysis of variance revealed significant main effects of symbol familiarity, $F(1, 23) = 35.97$, $MSE = 0.01$, $\eta_p^2 = .61$, $p_{rep} = .97$ (Killeen, 2005), and of prime condition, $F(2, 46) = 5.55$, $MSE = 0.05$, $\eta_p^2 = .19$, $p_{rep} = .99$, but no interaction between these effects, $F < 1$. Reports of preexperimental encounters were higher for low-familiarity symbols than for novel symbols, as predicted from the pilot ratings. However, reports for both low-familiarity and novel symbols were far less frequent than reports for the high-familiarity symbols, as expected. Supporting the hypothesis that a brief glance affects judgments of preexperimental encounter, symbols in the identical-prime condition elicited preexperiment attributions significantly more often than did symbols in the different-prime condition, $t(23) = 2.25$, $SE = 0.05$, and the no-prime condition, $t(23) = 2.45$, $SE = 0.06$. There was a marginally significant difference between the different- and no-prime conditions, $t(23) = 1.98$, $SE = .01$, $p = .06$, with a trend toward the different-prime condition eliciting more preexperiment attributions; however, separate comparisons revealed no significant difference between the different- and no-prime conditions within either novel symbols, $t(23) < 1$, or low-familiarity symbols, $t(23) = 1.80$, $SE = 0.02$, $p = .085$.

On the questionnaire, 19 subjects (79%) indicated that they were sometimes confused about whether they had seen a symbol before the experiment, and 12 (50%) said they had experienced déjà vu during the study. This later finding is impressive given that self-reports indicated déjà vu was infrequent in everyday life: Four subjects reported never having experienced it, 3 subjects reported it occurred less than once a year, 10 subjects said it happened about every 6 months, and 7 subjects said it occurred monthly.

TABLE 1

Mean Proportion of Symbols Classified as Encountered Prior to the Experiment, as a Function of Symbol Familiarity and Prime Type

	Prime type			
Target symbol	Identical	Different	None	Overall mean
Novel (no familiarity)	.15 (.30)	.03 (.06)	.03 (.04)	.07 (.11)
Low familiarity	.28 (.26)	.16 (.13)	.13 (.11)	.19 (.12)
Mean	.22 (.27)	.10 (.07)	.08 (.06)	.13 (.11)

Note. Standard deviations are given in parentheses. The mean proportion of high-familiarity targets classified as encountered prior to the experiment was .87 (*SD* = .18).

DISCUSSION

A brief prior glance at an unfamiliar symbol can increase one's belief that it has been seen sometime before the experimental session, as compared to a brief glance at a different symbol or no symbol at all. This finding is an important extension of prior research (I.H. Bernstein & Welch, 1991; Gellatly et al., 1995; Jacoby & Whitehouse, 1989; Joordens & Merikle, 1992; Klinger, 2001) in two different respects. First, it shows that this type of false recognition is not limited to items that are inherently familiar (words), but also occurs with relatively unfamiliar stimuli—that is, symbols that were unlikely to have been seen before the investigation. The second noteworthy aspect involves the extended temporal framework within which this illusion can occur. Whereas prior research demonstrated that a brief glance led subjects to misattribute a nonstudied event to a study list presented a few minutes earlier, our subjects made misattributions to experience outside the laboratory, to a more distal time and another place.

Both of these points are captured in the following analogy: Our paradigm models the experience of seeing a Martian for the first time (preceded, of course, by a glance) and feeling that one has seen such a creature sometime in one's past. In contrast, the word paradigm models the less dramatic experience of looking at an oak tree, and sensing that one has seen this same tree recently.

Other research has demonstrated that experimentally induced familiarity can be misattributed to different aspects of the stimulus, such as likeability (Seamon, Brody, & Kauff, 1983), credibility (Brown & Nix, 1996), and background noise (Jacoby, Allan, Collins, & Larwill, 1988). However, these studies differed from ours in that they all involved alterations of a single attribute of a stimulus; in contrast, we instilled a false sense of an entire prior encounter. More similar is the false-fame effect (Jacoby, Kelley, Brown, & Jasechko, 1989), in which subjects are more likely to misidentify a nonfamous name as famous if they have seen it in a prior list than if they have not. Their nonfamous names resemble our unfamiliar symbols, and a "famous" judgment implies some prior preexperimental encounter with that name (e.g., in a newspaper or movie). However, on closer examination, some names in the false-fame paradigm (e.g.,

"Sebastian" from Sebastian Wiesdorf) are likely to have preexperimental familiarity, which raises issues (brought up earlier) with respect to the use of words (e.g., Jacoby & Whitehouse, 1989). Another important distinction is that false fame depends on both enhanced familiarity and a failure of explicit memory for the prior study list. We used a similar explanation for a different demonstration of false recognition (Brown & Marsh, 2008). Undergraduates shallowly processed pictures of a college campus they had never visited before, and then a week later judged whether they had visited any of those locations. Prior exposure increased false "visit" judgments, presumably because the test pictures were familiar but the familiarity was not attributed to the earlier study phase. Both outcomes (Brown & Marsh, 2008; Jacoby et al., 1989) involve misattributions of familiarity combined with a failure of explicit recollection. In contrast, a failure of recollection was not involved in the present finding, as there was no study list to forget.

Perhaps most similar is work by D.M. Bernstein, Whittlesea, and Loftus (2002). Their subjects became more confident that they had experienced an event in their childhood (e.g., breaking a window while playing ball) after unscrambling a key word presented as an anagram: "broke a *dwniwo* playing ball" (a variant of the revelation effect; cf. D.M. Bernstein, Godfrey, & Davison, 2004). Although their results are impressive, one cannot be sure that their subjects had not, in fact, experienced the target events, whereas we are sure that subjects have never seen our novel symbols before. It is also not clear what real-world behavior is modeled by unscrambling an anagram before making the test judgment, whereas a brief identical prime nicely parallels a quick glance in the real world.

The extension to a more distal time and another place is important in the sense that it closely connects the current findings to a real-life manifestation of false recognition, known as déjà vu. Experienced by most individuals at some point in their lives (Brown, 2003), déjà vu typically involves situations or settings that are objectively new, yet feel like they have been experienced at some vaguely defined point in one's past (Brown, 2004). Despite its near universality, empirical support for any possible explanation remains elusive. Different versions of a double-perception (or split-perception) cause for déjà vu have been suggested by at least a dozen researchers (e.g., Heymans, 1904; Lalande, 1893; Osborn, 1884; Titchener, 1928; Wigan, 1844; cf. Brown, 2004, Chapter 15). Jacoby and Whitehouse's (1989) hasty-glance paradigm provides a solid initial step in this direction, and our postexperiment questionnaire provided some additional support for this speculation: Half of the participants answered "yes" when directly asked if they had experienced déjà vu in response to any of the symbols.

In summary, the present investigation confirms prior demonstrations that a brief glance can elicit a false sense of prior episodic experience (D.M. Bernstein et al., 2002, 2004; I.H. Bernstein & Welch, 1991; Gellatly et al., 1995; Jacoby & Whitehouse, 1989; Joordens & Merikle, 1992; Klinger, 2001). Our findings extend this susceptibility beyond material that is familiar (words) to that which is unfamiliar (novel abstract symbols), and beyond misattributions to a recent study list to a more remote, preexperimental episodic exposure. This outcome suggests that one's impressions of personal familiarity are malleable in the moment and can be altered by a brief preliminary glimpse.

Acknowledgments—We thank Barbie Huelser for assistance with programming. We are grateful to Ian Dobbins, Dave Gorfein, and Keith Payne for commenting on an earlier version of this article.

REFERENCES

Arnstein, J. (1983). *The international dictionary of graphic symbols*. London: Kogan Page.

Bernstein, D.M., Godfrey, R.D., & Davison, A. (2004). Conditions affecting the revelation effect for autobiographical memory. *Memory & Cognition*, *32*, 455–462.

Bernstein, D.M., Whittlesea, B.W.A., & Loftus, E.F. (2002). Increasing confidence in remote autobiographical memory and general knowledge: Extensions of the revelation effect. *Memory & Cognition*, *30*, 432–438.

Bernstein, I.H., & Welch, K.R. (1991). Awareness, false recognition, and the Jacoby-Whitehouse effect. *Journal of Experimental Psychology: General*, *120*, 324–328.

Brown, A.S. (2003). A review of the déjà vu experience. *Psychological Bulletin*, *129*, 394–413.

Brown, A.S. (2004). *The deĵà vu experience*. New York: Psychology Press.

Brown, A.S., & Marsh, E.J. (2008). Evoking false beliefs about autobiographical experience. *Psychonomic Bulletin & Review*, *15*, 186–190.

Brown, A.S., & Nix, L.A. (1996). Turning lies into truths: Referential validation of falsehoods. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *22*, 1088–1100.

Dreyfuss, H. (1972). *Symbol sourcebook*. New York: McGraw-Hill.

Gellatly, A., Banton, P., & Woods, C. (1995). Salience and awareness in the Jacoby-Whitehouse effect. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *21*, 1374–1379.

Heymans, G. (1904). Eine enquete und depersonalisation und "fausse reconnaissance." *Zeitschrift fur Psychologie*, *36*, 321–343.

Jacoby, L.L., Allan, L.G., Collins, J.C., & Larwill, L.K. (1988). Memory influences subjective experience: Noise judgments. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *14*, 240–247.

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.

Jacoby, L.L., & Whitehouse, K. (1989). An illusion of memory: False recognition influenced by unconscious perception. *Journal of Experimental Psychology: General*, *118*, 126–135.

Jarvis, B.G. (2004a). MediaLab (Version 2004.2.87) [Computer software]. New York: Empirisoft.

Jarvis, B.G. (2004b). DirectRT (Version 2004.1.0.55) [Computer software]. New York: Empirisoft.

Johnson, M.K., & Raye, C.L. (1981). Reality monitoring. *Psychological Review*, *88*, 67–85.

Joordens, S., & Merikle, P.M. (1992). False recognition and perception without awareness. *Memory & Cognition*, *20*, 151–159.

Killeen, P.R. (2005). An alternative to null-hypothesis significance tests. *Psychological Science*, *16*, 345–353.

Klinger, M.R. (2001). The roles of attention and awareness in the false recognition effect. *American Journal of Psychology*, *114*, 93–114.

Koch, R. (1930). *The book of signs*. New York: Dover.

Lalande, A. (1893). Des paramnesies. *Revue Philosophique*, *36*, 485–497.

Lehner, E. (1950). *Symbols, signs & signets*. Cleveland, OH: World Publishing.

Lehner, E. (1956). *The picture book of symbols*. New York: William Penn.

Osborn, H.F. (1884). Illusions of memory. *North American Review*, *138*, 476–486.

Seamon, J.G., Brody, N., & Kauff, D.M. (1983). Affective discrimination of stimuli that are not recognized: II. Effect of delay between study and test. *Bulletin of the Psychonomic Society*, *21*, 187–189.

Titchener, E.B. (1928). *A text-book of psychology*. New York: Macmillan.

Wigan, A.L. (1844). *The duality of the mind*. London: Longman, Brown, Green, & Longmans.

(Received 3/6/08; Revision accepted 11/2/08)