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Illusions of face memory: Clarity breeds familiarity☆

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Abstract

When people perform a recognition memory task, they may avail themselves of different forms of information. For example, they may recall specific learning episodes, or rely on general feelings of familiarity. Although subjective familiarity is often valid, it can make people vulnerable to memory illusions. Research using verbal materials has shown that "old" responses are often increased by enhancing *perceptual fluency*, as when selected words are shown with relatively higher contrast on a computer. Conversely, episodic memory can create an erroneous sense of perceptual advantages for recently studied words. In this investigation, symmetric fluency effects were tested in face memory, a domain that is often considered neurologically and psychologically unique. In eight experiments involving over 800 participants, we found consistent memorial and perceptual illusions—fluency created feelings of familiarity, and familiarity created feelings of fluency. In both directions, these effects were manifested as response biases, suggesting effects based on memorial and perceptual attributions.

Keywords: Face recognition; Fluency; Heuristics; Recognition memory

When recalling information from memory, what decision-making processes are used to distinguish passing thoughts from true experiences? Recently, Whittlesea and Leboe (2000; Whittlesea & Williams, 2001a; 2001b) suggested that people use *memory decision heuristics* when evaluating recollections. By this hypothesis, the act of remembering (particularly recognition) entails two stages: (1) the production of mental responses to stimuli, and (2) evaluation of those responses. For example, suppose you encounter a famous person in an unexpected place, such as a neighborhood restaurant. In the first stage, the memory prompt (famous face) activates prior memory traces, as conceived in many theories (e.g., Hintzman, 1986). In the second stage, the source of this activation must be evaluated: for example, you may instantly recognize the person. Alternatively, you may only achieve a nagging feeling of familiarity, without ever achieving recognition.

Jacoby and Dallas (1981) originally proposed that recognition decisions entail attributions, building upon a theory by Mandler (1980). According to Mandler, people can make recognition decisions using different forms of information, either retrieval of specific encoding events or general feelings of familiarity. In fact, these classifications of experience later formed the response options in the "remember/know" paradigm (Tulving, 1985). Although most people equate remembering with the former experience (episodic retrieval), Jacoby and

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Dallas (1981; also Kelley, Jacoby, & Hollingshead, 1989) argued that "old" responses often reflect familiarity. The different reliance on retrieval or familiarity is driven by task or stimulus factors—when retrieval is made difficult (e.g., by limiting rehearsal), people rely more on familiarity cues. When those cues are directly manipulated, people may experience a false sense of memory.

In essence, the memory-attribution framework suggests that recognition often requires a person to decide that a target stimulus feels "old," although its specific study episode cannot be recalled. Without this critical cue, people behave in a manner consistent with signal-detection theory: Some strength of evidence (familiarity) is evoked by a stimulus, which is then evaluated against an internal criterion. Thus, recognition is often inferential. Returning to the previous example, it is generally uncommon to encounter celebrities in daily life, so most people would never resolve their nagging sense of familiarity. By contrast, when dining in Hollywood, people may interpret every tingle of familiarity as a brush with fame—the change of venue is used as a "rule of thumb," creating a more liberal criterion. Without absolute criteria for discriminating true and false recognition, people rely on *memory decision heuristics*. Whittlesea and Leboe (2000) described three such heuristics, called *generation*, *resemblance*, and *fluency*. The present study focused on the fluency heuristic, as originally described by Jacoby and Dallas (1981).

The Fluency heuristic

By the fluency heuristic, Jacoby and Dallas (1981) and Jacoby, Kelley, and Dwyan (1989) suggest that, when familiarity is the major determinant of recognition, people often use the fluency (ease) of perceptual processing as a memory cue. Many data suggest that perceptual processing is enhanced when target stimuli are more familiar (Jacoby & Dallas, 1981; Logan & Etherton, 1994). People seem to implicitly assume this relationship, as suggested by "memory illusions" created by manipulations of fluency. That is, when stimulus perception is enhanced, feelings of familiarity often arise, leading to increased "old" recognition judgments. Although this effect occurs among old items, it is generally larger for new items, because familiarity is their only available cue. When fluency increases familiarity (appropriately or not), people will show a liberal criterion shift in recognition.

Prior studies have shown that fluency can create illusions of memory. For example, Jacoby and Whitehouse (1989) showed participants a study word list, followed by a standard recognition test. During the test, all words were preceded by subliminal primes (either related or unrelated to the targets). Related primes evoked more "old" responses (increasing both hits and false-alarms) than unrelated primes. The authors suggested that related primes facilitate lexical access—this enhanced perception is experienced as familiarity. When participants were made aware of the priming words, the effect was eliminated. In experiments combining word identification (in noise) with recognition judgments, small improvements in signal-to-noise ratios often elicit more "old" judgments. This has been shown in both the visual (Whittlesea, Jacoby, & Girard, 1990) and auditory (Goldinger, Kleider, & Shelley, 1999) domains. Moreover, Whittlesea (1993) showed that variations in *conceptual* fluency also create familiarity illusions. In one experiment, people judged whether target words were semantically related to any words in previous study lists. "Conceptual fluency" was manipulated by presenting target words in either predictive or neutral sentences. Words in predictive sentences evoked more (correct and incorrect) "old" responses than words in neutral sentences. Whittlesea suggested that contextually supported words have a processing advantage that feels like familiarity.

The foregoing studies show that perceptual fluency can affect memory judgments. Others have shown the complementary effect—i.e., that memory can affect perceptual judgments. For example, Witherspoon and Allan (1985) showed people study words, followed later by new and old test words. In a duration judgment task, participants consistently gave longer time estimates to previously studied words, suggesting that recent memory facilitated perception, creating a false sense of bottom-up support (see also Whittlesea et al., 1990). In the auditory domain, Jacoby, Allan, Collins, and Larwill (1988) played old and new sentences to listeners. These were mixed with varying levels of white noise; participants made recognition judgments and subjective noise estimates. Old sentences gave the impression of greater perceptual clarity (less noise), even when listeners believed the sentences were new (see also Goldinger et al., 1999).

Face recognition

In Whittlesea and Leboe's (2000) framework, the fluency heuristic is portrayed as a general principle relating memory and perception. However, fluency effects have typically been tested using linguistic stimuli, such as words or sentences (Goldinger et al., 1999; Whittlesea et al., 1990). This limited test-bed raises a potential concern: Although reading is a highly practiced perceptual process, it is a learned behavior. As such, it may be particularly vulnerable to fluency manipulations, relative to more ingrained perceptual processes. By contrast, face recognition is a natural ability, present at birth (Pascalis, Petit, Kim, & Campbell, 1999; Segerstrale & Molnar, 1997). Many data suggest that infants