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Emotion and False Memory

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Abstract

Emotional memories are vivid and lasting but not necessarily accurate. Under some conditions, emotion even increases people's susceptibility to false memories. This review addresses when and why emotion leaves people vulnerable to misremembering events. Recent research suggests that pregoal emotions—those experienced before goal attainment or failure (e.g., hope, fear)—narrow the scope of people's attention to information that is central to their goals. This narrow focus can impair memory for peripheral details, leaving people vulnerable to misinformation concerning those details. In contrast, postgoal emotions—those experienced after goal attainment or failure (e.g., happiness, sadness)—broaden the scope of attention leaving people more resistant to misinformation. Implications for legal contexts, such as emotion-related errors in eyewitness testimony, are discussed.

Keywords

emotion, eyewitness testimony, false memory, misinformation effect

Memories of events that evoked powerful emotions are vivid and lasting but not necessarily accurate (Levine & Edelstein, 2009; Reisberg & Heuer, 2007). Under some conditions, emotion even increases people's susceptibility to false memories. This is of great concern in legal settings where people often need to recall information that elicited intense emotion. Consider a victim describing the perpetrator of a crime, a witness testifying about a terrifying experience, or a juror recalling gruesome photographs of a crime scene. Distortions in memory for emotional information in these contexts can result in false accusations, lawsuits, and wrongful criminal convictions (Loftus, Doyle, & Dysart, 2013). A prominent example is the repressed memory controversy that peaked in the 1990s. Hundreds of adults claimed to have recovered memories, often during therapy sessions, of having been victims of childhood sexual abuse. Close investigation later revealed that many therapists used

highly suggestive techniques to help patients "remember" instances of abuse, leading patients to form emotional but false memories (Loftus & Ketcham, 1996). These events revealed that even highly emotional memories can be inaccurate and that memory errors can have a devastating human toll.

The issue of when and why emotion leaves people vulnerable to misremembering events has been vigorously debated, with investigators variously claiming that people are most susceptible to memory errors when experiencing intense emotion, positive emotion, or negative emotion. Here we review research on the malleability of memory and on the relation between emotion and false memory, focusing on studies relevant to the interdisciplinary field of emotion and law. We identify discrepancies in the literature, and argue that taking into account the effects of discrete emotions on attention and motivation helps to resolve seemingly contradictory findings. We also discuss implications

Author note: The views expressed here are those of the authors and do not necessarily represent the policies of the U.S. Bureau of Labor Statistics.

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of emotion-related memory errors in legal contexts and outline directions for further research.

The Malleability of Memory

When evaluating eyewitness testimony from victims or witnesses of a crime, people commonly assume that memory is a simple recording of past events that can be played back at will. This assumption has been shown to be false. Researchers have analyzed exonerations based on DNA evidence and found that inaccurate memory and mistaken eyewitness identification are the most common causes of false convictions in the United States (Garrett, 2011). Errors occur because memories can be altered by people's subsequent knowledge or beliefs. In a well-known study, Loftus, Miller, and Burns (1978) presented participants with a slideshow depicting a car at a yield sign. Later, some participants were informed that the car was at a stop sign rather than at a yield sign. Those exposed to this misleading information were significantly more likely to endorse having seen the nonexistent stop sign. This study inspired hundreds of investigations of what is now called "the misinformation effect" which revealed the ease with which memories can be distorted by the introduction of misleading information after an event has been experienced (for a review, see Loftus, 2005).

Exposing people to misleading information about events can also lead them to "remember" patently false events with great confidence, ranging from childhood sexual abuse to alien abductions (Loftus & Bernstein, 2005; McNally et al., 2004). Researchers have instilled memories for entire events that never happened using techniques such as increasing their plausibility (e.g., Hart & Schooler, 2006), repeated questioning (e.g., Loftus & Pickrell, 1995), repeated imagination of events (e.g., Sharman & Scoboria, 2009), and guided imagery (e.g., Hyman & Pentland, 1996). The resulting "rich false memories" are often confidently held, highly detailed, and emotional (Loftus & Bernstein, 2005).

Far from providing an exact recording of events, then, people's memories are malleable. Memories may include errors concerning what happened, when an event happened, where it happened, and who was involved, or memories may be entirely fabricated. Importantly, laboratory studies on false memory mimic real-world practices in the criminal justice system. In police interrogations, witnesses are often subject to repeated questioning and may be asked to imagine events or confirm false information. Misleading information provided to witnesses by authority figures often appears plausible (Loftus & Ketcham, 1996). Because people can be exposed to, and asked to elaborate on, inaccurate information in a number of phases of criminal investigations, memory distortions are common (Loftus et al., 2013).

Emotional Arousal and Memory

Events that cause people to become involved in the legal system are often extremely emotional, raising the issue of how emotion affects people's susceptibility to false memories. Researchers examining this issue have focused primarily on emotional

arousal, the dimension of emotion that ranges from calm relaxation to intense excitement or tension. Their findings show that several cognitive and biological processes contribute to vivid and lasting memories of emotionally arousing events. People pay more attention to emotional than neutral events and, as a result, emotional events are more likely to be encoded in memory. Once encoded, stress hormones in the brain consolidate or stabilize emotional memories making them more enduring (McGaugh, 2004). People also think about and recount emotional events more often than neutral events. Each of these processes enhances memory for emotional information (Laney, Campbell, Heuer, & Reisberg, 2004; Levine & Edelstein, 2009) and can reduce people's susceptibility to false memories (English & Nielson, 2010).

Emotional arousal can also impair memory and increase susceptibility to misinformation, however (e.g., Drivdahl, Zaragoza, & Learned, 2009). Whether emotion enhances or impairs memory depends greatly on how important the information being remembered is to the individual. With increasing emotional arousal, attention narrows to features of events that are of central importance. This results in enhanced memory for central information at the expense of peripheral details (Christianson & Loftus, 1991), a phenomenon referred to as emotional memory narrowing (Kensinger, 2009) or tunnel memory (Safer, Christianson, Autry, & Osterland, 1998). Researchers have documented emotional memory narrowing both in laboratory studies (e.g., Kensinger, 2009) and across a wide range of real-world events including natural disasters (Bahrick, Parker, Fivush, & Levitt, 1998), physical injuries (Peterson & Bell, 1996), and crime scenes (Reisberg & Heuer, 2007). Of particular relevance to criminal investigations, laboratory studies provide evidence of "weapon focus," in which witnesses focus on and remember the features of a crime scene that threaten safety, such as the weapon used to commit the crime, at the expense of details such as the perpetrator's face or clothing that are of importance to police (Loftus, Loftus, & Messo, 1987; Steblay, 1992). Rather than enhancing memory generally, then, emotion often leads to a trade-off in attention to, and memory for, central versus peripheral information.

Under conditions of severe emotional arousal or stress, people may focus almost exclusively on survival, endurance, and efforts to regulate emotion. This extremely narrow attentional focus can result in poor memory even for the events that elicited emotion (e.g., Deffenbacher, Bornstein, Penrod, & McGorty, 2004) and leave people highly susceptible to misinformation. In a striking example, researchers assessed memory for an interrogation in over 800 military personnel who were going through survival training as part of the U.S. Navy Survival School (Morgan, Southwick, Steffian, Hazlett, & Loftus, 2013). Trainees were placed in a mock prisoner of war camp and endured a stressful interrogation that involved threats and physical assault. Researchers later interviewed participants about their experiences and provided inaccurate information such as a photograph that falsely depicted their interrogator. Participants' memory was poor both for details of the interrogation and for the interrogator. In some conditions, more than

half of the trainees falsely identified their interrogator (also see Houston, Clifford, Phillips, & Memon, 2013). Thus, memories of events that are highly stressful and evoke extreme levels of emotional arousal are vulnerable to substantial error following exposure to misinformation.

Laney and Loftus (2008) found that it is even possible to create entirely false memories for emotional events such as being hospitalized overnight or witnessing a violent fight between one's parents. When they compared memories for emotional events described by participants who actually experienced them versus by participants who were induced to believe they had experienced them, true and false memories were indistinguishable on most dimensions. Similarly, people can generate detailed but false memories of committing a crime. Using suggestive interviewing techniques, Shaw and Porter (2015) induced undergraduates to generate emotional false memories of having engaged in theft, assault, or assault with a weapon that led to police contact in their early adolescence. After three suggestive interviews, including supposed corroboration by caregivers and guided imagery, the majority of participants indicated that they remembered having committed the crime and provided a detailed false account. False memories of committing a crime were similar to memories of emotional events that had actually occurred with respect to the presence of sensory details (e.g., visual, auditory, and tactile details) and reported anxiety during the event. This study showed that detailed false memories of committing crimes can be generated in a controlled experimental setting and reveals the types of conditions that may lead to false confessions.

In summary, whether emotional arousal promotes or impairs memory accuracy depends on the features of events people are asked to remember and the intensity of arousal they experience. In addition to being influenced by people's knowledge and beliefs, memories are influenced by the focus of people's attention—a process powerfully swayed by emotion. Emotional arousal enhances memory for information that captures attention, features of events that are of the greatest importance to the individual. However, this memory advantage often comes at the expense of memory for peripheral details and can leave people vulnerable to false memories concerning such details (for a review, see Levine & Edelstein, 2009). Under conditions of extreme stress, this narrow attentional focus can lead to overall memory deficits and pronounced susceptibility to misinformation (Morgan et al., 2013). People are also able to piece together fragments of autobiographical information with information gathered from external sources to generate emotionally rich and coherent memories of events that never occurred (Shaw & Porter, 2015). The sobering implication of these findings for the legal system is that, just because a remembered event is reported with high confidence and strong emotion, does not mean it represents authentic experience.

Emotional Valence and Memory

The negative or positive tone of an individual's emotional response to an event may also affect his or her susceptibility to false memories. According to Schwarz and Clore (2003),

emotional valence signals the type of information-processing strategy likely to be most adaptive in the current circumstances. People experience negative emotion when problems arise. Negative feelings signal the need to focus on problems and carefully monitor the environment for information relevant to addressing them. People experience positive emotion when no problem requires their immediate attention. Positive feelings signal that it is adaptive to attend to a broad range of stimuli to take advantage of new opportunities.

The consequences of these differing information-processing strategies for memory are not clear because the research literature includes contradictory theories and findings. Some investigators have found that people experiencing positive emotion are more vulnerable to incorporating misleading information into memory than people experiencing negative emotion. This may occur because positive emotion promotes a broader and less detail-oriented information-processing style than negative emotion, allowing people to confuse events they witnessed with similar events that they did not witness (e.g., Forgas, Laham, & Vargas, 2005; Kensinger & Schacter, 2006; Levine & Bluck, 2004).

Other investigators have argued that, by narrowing the scope of attention to central information, *negative* emotional arousal (rather than emotional arousal generally or positive emotion) leaves people susceptible to memory errors concerning peripheral details (Berntsen, 2002; Waring & Kensinger, 2009; also see Porter, Taylor, & ten Brinke, 2008). For instance, people remembering negative photographs had fewer false memories about central details of the images, but more false memories about peripheral details, than people remembering positive or neutral photographs (Van Damme & Smets, 2014). These findings raise concerns about the accuracy of people's memory for negative, arousing information in legal settings. Witnesses recalling a crime scene, and jurors presented with upsetting testimony during a trial, are likely to remember central, threatening details. However, they may be susceptible to misinformation concerning peripheral details, such as the setting in which the crime occurred, that are important for establishing a defendant's innocence or guilt.

Like arousal, then, emotional valence influences memory but is a fickle guide to whether particular memories will be resistant or susceptible to distortion. Research findings conflict concerning whether people are more susceptible to false memories when experiencing positive emotion or negative emotion. Moreover, research on valence neglects potential effects of discrete emotions on memory. Events that come to the attention of the legal community are typically emotionally arousing and negative but individuals may react to these events with fear, anger, or despair. These considerations have prompted investigators to take a more nuanced approach to examining the effects of emotion on memory that takes into account a third dimension of emotion, its motivational intensity.

Motivational Intensity and Memory

To understand the effects of emotion on memory it is essential to consider the goals and motivations associated with specific

emotions and the relevance of the information being remembered to these goals. Motivational or goal relevance approaches distinguish between pregoal and postgoal emotions and provide insight into the specific types of information likely to be remembered in different emotional states (e.g., Harmon-Jones, Price, & Gable, 2012; Kaplan, Van Damme, & Levine, 2012; Levine & Edelstein, 2009; Levine & Pizarro, 2004; Montagrin, Brosch, & Sander, 2013). According to appraisal theories (e.g., Ellsworth & Dougherty, 2016; Scherer, 1999), emotions are inherently tied to changes in the status of people's goals. People experience emotions when they perceive that goal attainment or failure is imminent or has occurred, making it necessary for them to modify their beliefs, plans, or goals. Once evoked, emotions direct cognition and motivate action in a manner that is useful for ensuring, preventing, or adjusting to those changes in the status of goals.

Pregal emotions, such as desire, hope, anger, fear, and disgust, reflect appraisals that goal attainment or failure is anticipated or threatened. These emotions, irrespective of their positive or negative valence, are characterized by high motivational intensity and an impetus to act. When experiencing pregoal emotion, people's attention narrows to information that is central to their goals. For example, anger prepares people to remove obstacles to their goals, and fear prepares people to avoid or escape threats to their goals (Cunningham & Brosch, 2012). Because the angry individual focuses on the agent obstructing a goal, and the fearful individual focuses on the source of threat, the range of information attended to, encoded in, or retrieved from memory is narrow. This narrow focus leads to poorer memory for details that are not relevant to the individual's current goal, resulting in greater vulnerability to misinformation concerning those details. In contrast, postgoal emotions, such as happiness and sadness, are lower in motivational intensity because they reflect appraisals that goal attainment or failure has already occurred. When experiencing postgoal emotions, attention broadens as people consider the consequences of goal attainment or failure, change their beliefs and expectations, and orient toward new goals. Thus, postgoal emotions increase the breadth of information processing, allowing people to encode and retrieve peripheral details (Kaplan et al., 2012).

Examining the motivations associated with specific emotions, and their implications for cognition, represents a promising theoretical approach that helps to resolve seemingly contradictory findings in the literature. For example, research showing cognitive narrowing for negative emotion, and broadening for positive emotion, has often contrasted *pregoal* negative emotion (e.g., fear, disgust) with *postgoal* positive emotion (e.g., happiness, amusement). Conflicting findings may reflect the fact that emotions of the same valence can vary in motivational intensity. For example, Gable and Harmon-Jones (2010) showed participants photographs that evoked disgust (pregoal), sadness (postgoal), or a neutral state. They then assessed the breadth of participants' attention with a separate task. Viewing disgusting images narrowed attention, and viewing sad pictures broadened attention, relative to viewing neutral pictures.

Although research is sparse on how the motivations associated with specific emotions affect memory, we believe this approach is important for understanding memory distortion in legal settings. During a trial, jurors may be exposed to testimony or gruesome photographs that evoke fear, anger, or disgust. They may also be exposed to testimony or photographs that convey the devastating impact a crime had on victims, evoking sadness (Bandes & Salerno, 2014). Further research is needed to understand how pregoal emotions such as anger and fear, and postgoal emotions such as sadness, affect the specific types of information that witnesses and jurors attend to, encode, and retrieve and their susceptibility to false memories.

In a recent study, we assessed people's susceptibility to memory distortion when they were instructed to elaborate on information associated with pregoal and postgoal emotions (Van Damme, Kaplan, Levine, & Loftus, 2015). While watching a slideshow depicting an interaction between a woman and her boyfriend, participants were asked to empathize with the woman's emotional state. For different groups of participants, the woman was described as feeling hopeful (pregoal positive), fearful (pregoal negative), happy (postgoal positive), or devastated (postgoal negative). After watching the slideshow, participants were asked to reflect on the interaction they had witnessed, including events that had actually occurred in the slideshow (true events) and events that did not occur (false events). Later, participants' memory was tested for true and false events that were relevant or irrelevant to the woman's goals. Participants in the pregoal conditions (hope, fear) remembered more false events that were irrelevant to the woman's goals than participants in the postgoal conditions (happiness, devastation). Participants in the pregoal conditions were also more confident in correctly rejecting goal-relevant false events than participants in the postgoal conditions. These findings are consistent with the view that, irrespective of emotional valence, pregoal emotion enhances memory for information relevant to goal pursuit at the expense of irrelevant information (Harmon-Jones, Price, & Gable, 2012; Kaplan et al., 2012; Montagrin et al., 2013).

Conclusions

Scholars across a multitude of disciplines have called for a more complete understanding of the role emotion plays in legal processes (Bornstein & Wiener, 2010). Research shows that memories are shaped, and can be misshaped, by people's knowledge and beliefs, attention, and motivation—all processes that are influenced by emotion. People's most vivid and lasting memories are typically emotional ones. These memories are selective, however. When experiencing intense emotion, people attend to the features of events that are most relevant to their current goals, promoting detailed and accurate memory for that central information. This advantage comes at the expense of memory for information that is not relevant to their goals and can leave people vulnerable to misinformation concerning such details. Under conditions of extreme stress, attentional narrowing can lead to overall memory deficits and pronounced susceptibility to misinformation.

These findings have important implications for practitioners in the legal system. Eyewitnesses are often asked to remember details of events that were extremely stressful long after the events occurred. They may be exposed to misleading information about the events from other witnesses' reports, leading questions by investigators, and pretrial news reports (Frenda, Nichols, & Loftus, 2011). Because memory for emotional events is both selective and malleable, law enforcement professionals should take great care that witnesses are not exposed to information that might alter their memories. For jurors and judges listening to emotional testimony, these findings mean that testimony should not be given more credibility simply because it is conveyed with emotion. Witnesses may convey information with substantial emotion but be inaccurate. They may even be genuinely emotional about memories that are entirely false (Laney & Loftus, 2008; McNally et al., 2004; Shaw & Porter, 2015). Information about memory processes should be a standard component of the instructions given to jurors and of the education received by law enforcement personnel, attorneys, and judges.

Investigators have also examined the specific dimensions of emotional experience that render people most susceptible to false memories. The findings are complex and investigators have variously claimed that people are rendered most susceptible to misinformation by intense emotional arousal, positive emotion, or negative emotion. We have argued that a more nuanced approach is needed that takes into account the motivations associated with discrete emotions. Emotions high in motivational intensity, such as fear, disgust, and anger, powerfully direct attention to features of events that are of central importance to the individual for avoiding threats and removing obstacles to their goals. When people's attentional resources are limited, misinformation effects are easier to obtain (Loftus, 2005). Thus, this narrow focus leaves people susceptible to false memories concerning features of events that are peripheral to their goals. Investigating the effects of discrete emotions on people's susceptibility to false memories represents an important research direction for the field of memory and the law.

Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

References

- Bahrick, L. E., Parker, J. F., Fivush, R., & Levitt, M. (1998). The effects of stress on young children's memory for a natural disaster. *Journal of Experimental Psychology: Applied*, 4, 308–331. doi:10.1037/1076-898X.4.4.308
- Bandes, S. A., & Salerno, J. M. (2014). Emotion, proof and prejudice: The cognitive science of gruesome photos and victim impact statements. *Arizona State Law Journal*, 46, 1003–1056.
- Berntsen, D. (2002). Tunnel memories for autobiographical events: Central details are remembered more frequently from shocking than from happy experiences. *Memory & Cognition*, 30, 1010–1020. doi:10.3758/BF03194319
- Bornstein, B. H., & Wiener, R. L. (2010). Emotion and the law: A field whose time has come. In B. H. Bornstein & R. L. Wiener (Eds.), *Emotion and the law: Psychological perspectives* (pp. 1–12). New York, NY: Springer.
- Christianson, S.-Å., & Loftus, E. F. (1991). Remembering emotional events: The fate of detailed information. *Cognition & Emotion*, 5, 81–108. doi:10.1080/02699939108411027
- Cunningham, W. A., & Brosch, T. (2012). Motivational salience: Amygdala tuning from traits, needs, values, and goals. *Current Directions in Psychological Science*, 21, 54–59. doi:10.1177/0963721411430832
- Deffenbacher, K. A., Bornstein, B. H., Penrod, S. D., & McGorty, E. K. (2004). A meta-analytic review of the effects of high stress on eyewitness memory. *Law and Human Behavior*, 28, 687–706. doi:10.1007/s10979-004-0565-x
- Drivdahl, S. B., Zaragoza, M. S., & Learned, D. M. (2009). The role of emotional elaboration in the creation of false memories. *Applied Cognitive Psychology*, 23, 13–35. doi:10.1002/acp.1446
- Ellsworth, P. C., & Dougherty, A. (2016). Appraisal and reappraisals in the courtroom. *Emotion Review*, 8(1): pp. 20–25.
- English, S. M., & Nielson, K. A. (2010). Reduction of the misinformation effect by arousal induced after learning. *Cognition*, 117, 237–242. doi:10.1016/j.cognition.2010.08.014
- Forgas, J. P., Laham, S. M., & Vargas, P. T. (2005). Mood effects on eyewitness memory: Affective influences on susceptibility to misinformation. *Journal of Experimental Social Psychology*, 41, 574–588. doi:10.1016/j.jesp.2004.11.005
- Frenda, S. J., Nichols, R. M., & Loftus, E. F. (2011). Current issues and advances in misinformation research. *Current Directions in Psychological Science*, 20, 20–23. doi:10.1177/0963721410396620
- Gable, P., & Harmon-Jones, E. (2010). The blues broaden, but the nasty narrows. *Psychological Science*, 21, 211–215. doi:10.1177/0956797609359622
- Garrett, B. L. (2011). *Convicting the innocent: Where criminal prosecutions go wrong*. Cambridge, MA: Harvard University Press.
- Harmon-Jones, E., Price, T. F., & Gable, P. A. (2012). The influence of affective states on cognitive broadening/narrowing: Considering the importance of motivational intensity. *Social and Personality Psychology Compass*, 6, 314–327. doi:10.1111/j.1751-9004.2012.00432.x
- Hart, R. E., & Schooler, J. W. (2006). Increasing belief in the experience of an invasive procedure that never happened: The role of plausibility and schematicity. *Applied Cognitive Psychology*, 20, 661–669. doi:10.1002/acp.1218
- Houston, K. A., Clifford, B. R., Phillips, L. H., & Memon, A. (2013). The emotional eyewitness: The effects of emotion on specific aspects of eyewitness recall and recognition performance. *Emotion*, 13, 118–128. doi.org/10.1037/a0029220
- Hyman, I. E., Jr., & Pentland, J. (1996). The role of mental imagery in the creation of false childhood memories. *Journal of Memory and Language*, 35, 101–117.
- Kaplan, R. L., Van Damme, I., & Levine, L. J. (2012). Motivation matters: Differing effects of pre-goal and post-goal emotions on attention and memory. *Frontiers in Psychology*, 3(404). doi:10.3389/fpsyg.2012.00404
- Kensinger, E. A. (2009). Remembering the details: Effects of emotion. *Emotion Review*, 1, 99–113. doi:10.1177/1754073908100432
- Kensinger, E. A., & Schacter, D. L. (2006). When the Red Sox shocked the Yankees: Comparing negative and positive memories. *Psychonomic Bulletin & Review*, 13, 757–763. doi:10.3758/BF03193993
- Laney, C., Campbell, H. V., Heuer, F., & Reisberg, D. (2004). Memory for thematically arousing events. *Memory & Cognition*, 32, 1149–1159. doi:10.3758/BF03196888
- Laney, C., & Loftus, E. F. (2008). Emotional content of true and false memories. *Memory*, 16, 500–516.
- Levine, L. J., & Bluck, S. (2004). Painting with broad strokes: Happiness and the malleability of event memory. *Cognition and Emotion*, 18, 559–574. doi:10.1080/02699930341000446

- Levine, L. J., & Edelman, R. S. (2009). Emotion and memory narrowing: A review and goal-relevance approach. *Cognition & Emotion, 23*, 833–875. doi:10.1080/02699930902738863
- Levine, L. J., & Pizarro, D. A. (2004). Emotion and memory research: A grumpy overview. *Social Cognition, 22*, 530–554. doi:10.1521/soco.22.5.530.50767
- Loftus, E. F. (2005). Planting misinformation in the human mind: A 30-year investigation of the malleability of memory. *Learning and Memory, 12*, 361–366.
- Loftus, E. F., & Bernstein, D. M. (2005). Rich false memories: The royal road to success. In A. F. Healy (Ed.), *Experimental cognitive psychology and its applications* (pp. 101–113). Washington, DC: American Psychological Association Press.
- Loftus, E. F., Doyle, J. M., & Dysart, J. (2013). *Eyewitness testimony: Civil & criminal* (5th ed.). Charlottesville, VA: Lexis Law.
- Loftus, E. F., & Ketcham, K. (1996). *The myth of repressed memory*. New York, NY: MacMillan.
- Loftus, E. F., Loftus, G. R., & Messo, J. (1987). Some facts about weapon focus. *Law and Human Behavior, 11*, 55–62. doi:10.1007/BF01044839
- Loftus, E. F., Miller, D. G., & Burns, H. J. (1978). Semantic integration of verbal information into a visual memory. *Journal of Experimental Psychology: Human Learning and Memory, 4*, 19–31. doi:10.1037/0278-7393.4.1.19
- Loftus, E. F., & Pickrell, J. E. (1995). The formation of false memories. *Psychiatric Annals, 25*, 720–725. doi:10.3928/0048-5713-19951201-07
- McGaugh, J. L. (2004). The amygdala modulates the consolidation of memories of emotionally arousing experiences. *Annual Review of Neuroscience, 27*, 1–28. doi:10.1146/annurev.neuro.27.070203.144157
- McNally, R. J., Lasko, N. B., Clancy, S. A., Maclin, M. L., Pitman, R. K., & Orr, S. P. (2004). Psychophysiological responding during script-driven imagery in people reporting abduction by space aliens. *Psychological Science, 15*, 493–497. doi:10.1111/j.0956-7976.2004.00707.x
- Montagrin, A., Brosch, T., & Sander, D. (2013). Goal conduciveness as a key determinant of memory facilitation. *Emotion, 13*, 622–628. doi:10.1037/a003306
- Morgan, C. A., III, Southwick, S., Steffian, G., Hazlett, G. A., & Loftus, E. F. (2013). Misinformation can influence memory for recently experienced, highly stressful events. *International Journal of Law and Psychiatry, 36*, 11–17. doi:10.1016/j.ijlp.2012.11.002
- Peterson, C., & Bell, M. (1996). Children's memory for traumatic injury. *Child Development, 67*, 3045–3070. doi:10.1111/j.1467-8624.1996.tb01902.x
- Porter, S., Taylor, K., & ten Brinke, L. (2008). Memory for media: Investigation of false memories for negatively and positively charged public events. *Memory, 16*, 658–666. doi:10.1080/09658210802154626
- Reisberg, D., & Heuer, F. (2007). The influence of emotion on memory in forensic settings. In M. P. Toglia, J. D. Read, D. F. Ross & R. C. L. Lindsay (Eds.), *The handbook of eyewitness psychology, Vol. 1: Memory for events* (pp. 81–116). London, UK: Lawrence Erlbaum Associates.
- Safer, M. A., Christianson, S., Autry, M. W., & Osterland, K. (1998). Tunnel memory for traumatic events. *Applied Cognitive Psychology, 12*, 99–117. doi:10.1002/(SICI)1099-0720(199804)12:2<99::AID-ACP509>3.0.CO;2-7
- Scherer, K. R. (1999). Appraisal theories. In T. Dalgleish & M. Power (Eds.), *Handbook of cognition and emotion* (pp. 637–663). Chichester, UK: Wiley.
- Schwarz, N., & Clore, G. L. (2003). Mood as information: 20 years later. *Psychological Inquiry, 14*, 296–303.
- Sharman, S. J., & Scoboria, A. (2009). Imagination equally influences false memories of high and low plausibility events. *Applied Cognitive Psychology, 23*, 813–827. doi:10.1002/acp.1515
- Shaw, J., & Porter, S. (2015). Constructing rich false memories of committing crime. *Psychological Science, 26*, 291–301. doi:10.1177/0956797614562862
- Stebly, N. (1992). A meta-analytic review of the weapon focus effect. *Law and Human Behavior, 16*, 413–424.
- Van Damme, I., Kaplan, R. L., Levine, L. J., & Loftus, E. F. (2015). *The relevance of goal-irrelevance for false memories: Emotional elaboration in the misinformation paradigm*. Manuscript in preparation.
- Van Damme, I., & Smets, K. (2014). The power of emotion versus the power of suggestion: Memory for emotional events in the misinformation paradigm. *Emotion, 14*, 310–320. doi:10.1037/a0034629
- Waring, J. D., & Kensinger, E. A. (2009). Effects of emotional valence and arousal upon memory trade-offs with aging. *Psychology and Aging, 24*, 412–422. doi:10.1037/a0015526