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Internal and External Sources of Misinformation in Adult Witness Memory

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At 8:30 PM on July 17, 1996, Trans-World Airlines flight 800 crashed into the ocean. Reports consistent with the theory that a missile attack may have caused the crash soon spread among witnesses, investigators, and the media. Despite physical evidence pointing to another cause, discussion of the missile theory of the crash persisted for years. How did so many witnesses become convinced they had seen a nonexistent missile? And why did their reports continue to convince investigators, the media, and interested observers despite accumulating evidence of another cause? Some analyses suggest that post-event suggestion in the form of widespread speculation about causes of the crash may have brought about the initial potentially false reports consistent with the involvement of missiles. Within days of the crash, the media further fueled the missile theory by publishing seemingly supportive evidence and witness accounts. For example, the New York Daily News ran a story with the headline “Was TWA Jet Shot Down? Missile Attack, Bombing Probed.” Other stories speculated about whether a bomb or possibly a surface-to-air missile more likely caused the crash. Witnesses claiming to have seen a missile were interviewed extensively, leading other witnesses to come forward with similar stories. Their stories in turn encouraged investigators to process evidence with the missile theory as a primary hypothesis, perhaps biasing interpretation of that evidence toward support of the theory.

This highly publicized TWA case provided a host of excellent real-life illustrations of the many biasing influences confronting witnesses and others in our judicial system. We address a number of these in this chapter in the context of our discussion of sources of misinformation in adult witness memory reports. Specifically, we review internal and
external influences that cause (a) selective memory or selective failure to remember, (b) false memories for things not actually witnessed or experienced, and (c) distortion or alteration of memories for things actually witnessed or experienced. We consider two general sources of these memory failures: (1) schematic and inferential processing and (2) sources of specific misinformation. We begin our review with consideration of the effects of schematic and inferential processing processes on memory and then turn to additional internal and external sources of specific misinformation.

Perhaps the most central feature of organic information processors is the constructive nature of perception and comprehension. We add to or alter what we perceive or experience to render it comprehensible; we engage in this constructive processing at every level, ranging from simple sensory perception (for example, see Hoffman, 1998, for a fascinating review of constructive processes in visual perception) to processing of complex social events, oral and written discourse and narratives, and conversations; and we engage in constructive processing in response to stimulus features of the information being processed, as well as internal and external stimuli and events both preceding and following the target stimulus (for reviews see Davis & Friedman, this volume; Green, Strange, & Brock, 2002; Taylor & Crocker, 1981; Wyer & Srull, 1989; Wyer, 2002, 2004). Hence, original perceptions and judgments as well as later memory and judgments include a mixture of actual features of the original information or event and altered, distorted, or added features resulting from schematic/inferential processing and/or influential information external to the event. Predictable judgmental biases and distortions in memory result.

Schematic processing involves relatively automatic (unconscious or uncontrolled) effects of the activation of specific concepts. Inferential processing, on the other hand, involves more deliberate and deliberative controlled processing of information in order to explain or disambiguate incoming information, or to select and plan responses to it (e.g., Graesser, Olde, & Klettke, 2002). We begin with consideration of these processes.

SCHEMATIC PROCESSING

Schematic processing is among the most pervasive sources of predictable errors in memory. Schemas are organized knowledge structures that include beliefs and expectations concerning the nature, characteristics, and behaviors or functions of objects, people, events, and other cognizable entities. Schemas selectively direct attention to relevant and useful information; facilitate the processes of perception, recognition, and understanding of incoming information; direct integration of new information with old; lend structure and meaning to experiences and events; guide information searches and retrieval; and provide the foundation for evaluative processes, problem-solving, anticipation of the future, setting goals, and making and carrying out plans. Without schematic processing, we would not know how to reduce the sea of input to manageable chunks, how to interpret what we see, what to expect of the world around us, or how to plan effective actions. However, although schematic processing is necessary and generally helpful, it also results in systematic errors in perception, judgment, and memory, including errors of the three categories we consider here: selective memory/forgetting, false mem-
ories for events that did not occur, and distortions/alterations in memory for those that did occur (for reviews see Hastie, 1981; Kunda, 1999; Taylor & Crocker, 1981; Wyer & Srull, 1989; Wyer, 2002, 2004).

A wide variety of schemas affect processing, including (a) category schemas telling us what the members of particular social or object categories are like; (b) person schemas involving perceptions and expectations of particular individuals; (c) self-schemas consisting of how we think about ourselves; (d) role schemas specifying characteristics and likely behaviors of those occupying specific social roles; (e) event schemas (or scripts) containing expected components and sequences for events, including crimes; (f) causal schemas containing theories of what causes what and how (for example, linking specific motives to specific crimes; Davis & Follette, 2002; 2003); and (g) procedural schemas specifying how specific tasks are executed, among others. We even have spatial schemas involving placement and motion that produce predictable errors of motion perception and spatial memory (e.g., Hubbard, 1996).

Of particular importance to the legal arena is narrative processing and construction, which may be viewed as an overarching story structure involving a collage of relevant schemas and scripts that together inform the overall narrative. Essentially narratives may be constructed to explain complex events such as a crime, and may include a variety of scripts and person, category, and causal schemas of various kinds involving particular relevant persons and episodes (both current and historical) within the overall narrative. Generally, we tend to think of and try to understand complex events in terms of narratives, as illustrated, for example, by the “story model” of jury decision making (e.g., Hastie & Pennington, 1995; Pennington & Hastie, 1986; 1992). For those who construct or listen to them alike, such narratives are particularly persuasive (e.g., Spiecker & Worthington, 2003) and influential for judgments and decisions of all sorts, from product choice to juror verdicts. Because they involve multiple schematic influences, they profoundly influence memory (see reviews in Green, Strange, & Brock, 2002; Hastie & Pennington, 2000; Wyer, 2004; Wyer, Adaval, & Colcombe, 2002).

Schema Activation

To understand when schemas are likely to affect processing and memory, we must understand how they are activated. Schemas are sometimes activated by bottom-up processes, whereby properties of observed objects or situations themselves activate the schema (such as when seeing a man in a police uniform activates the “police” category schema, the “getting a traffic ticket” script, or the “why the man smoking marijuana ran” causal schema). Schemas may also be activated by top-down processes in which a schema is activated by something other than properties of what is being observed (e.g., media accounts of the “missile theory”). Top-down activation and application of a schema can result in any of the following ways (for reviews see Fiske & Taylor, 1991; Hastie, 1981; Kunda, 1999; Taylor & Crocker, 1981).

First, relatively stable features of observers may result in chronic activation of particular schemas and in their use (whether relevant or not) for processing incoming stimuli. Schemas important to the person’s self concept (e.g., honesty as central to the self
concept of clergy) or to categorization/evaluation functions important to professional functioning (e.g., honesty as central to police interrogators' evaluation of suspects) will tend to be chronically activated and widely applied to incoming stimuli. A policeman, for example, might mistakenly interpret innocent behavior as suspicious because of chronic activation of crime/criminal-related schemas (see Thomassin & Alain, 1990, for illustration). Recovered memory therapists (who tend to chronically evaluate clients in terms of sexual abuse) tend to process, interpret, and search incoming information for abuse-relevant content (see Davis, Loftus, & Follette, 2001; Loftus & Ketcham, 1994). Similarly, the greater importance of personal appearance to women has been offered as one explanation for the superiority of women's memories for the appearance of others (i.e., descriptions of clothing/personal physical appearance vs. perpetrator identifications) (see Horgan, Mast, Hall, & Carter, 2004, for a recent review and demonstration).

Even social roles can activate category-based schematic processing. Social power appears to encourage category-based perception of subordinates, whereas lower power positions appear to encourage individuated processing. For example, Richeson and Ambady (2003) found that placing whites in higher power roles relative to blacks increased racial bias, whereas Richeson and Ambady (2001) found similar effects of roles on automatic gender biases. Power can also affect other automatic associations, as illustrated by Bargh and his colleagues (Bargh, Raymond, & Pryor, 1995), who found that placing males in higher power roles relative to female subordinates tends to activate sexual thoughts (presumably the result of automatic power-sex associations).

Second, temporary influences such as acute concerns, interests, or processing goals, or features of the context in which a stimulus is encountered can trigger specific schema activation. Rachel Remen, for example, tells of the time in medical school when she was learning to draw blood, when she found herself scanning the veins of strangers, categorizing them in terms of the ease with which one could draw blood (Remen, 1996, XXV). Acute concerns can also trigger general activation of a broad set of schemata. Rejection, for example, tends to promote selective attention to social rather than nonsocial information (e.g., Gardner, Pickett, & Brewer, 2000).

Third, schemas recently activated (or primed) in irrelevant contexts may remain active or easily accessible and hence affect processing of new information (see Wyer & Srull, 1989; Wyer, 2004, for reviews)—as, for example, when a woman sitting on a jury for a child sexual abuse trial suddenly views affectionate behavior between her child and the child's uncle in more suspicious terms. Finally, schemas may be activated by external influences—including prominently statements from others—that directly suggest a particular event category ("Look at that fight!"), stereotype ("Hello, I'm doctor Smith."); causal schema ("Could a missile attack have caused this crash?" "He had a clear motive to kill him for the money."); script ("Well, if you did kill him, how might you have gone about it?"); person schema ("I thought he was rather evasive and deceptive."); or narrative ("It all began when three guys met by chance at a bar.").

Although necessary to facilitate information processing, once activated, schemas exert a wide range of biasing effects on perception and interpretation, ranging from what a person believes he or she has observed to the perceived meaning or underlying causes of the event.
Although we do not exhaustively review the literature on schematic influences on processing and memory here, we illustrate these varied effects with selected legally relevant empirical demonstrations. (For more exhaustive reviews, see Davis & Follette, 2001; Fiske & Taylor, 1991; Green, Strange, & Brock, 2002; Hastie, 1981; Hastie & Pennington, 2000; Kunda, 1999; Taylor & Crocker, 1981; Wyer, 2004; Wyer et al., 2002; Wyer & Srull, 1989).

Selective Attention

A pervasive consequence of schematic processing is selective attention to, and hence memory for, schema-relevant over schema-irrelevant aspects of incoming information. Given the same background file for a 30-year-old man, for example, a clinical psychologist expecting to see the young man as a patient is likely to notice and remember information relevant to potential psychological problems and diagnoses, whereas a potential employer is likely to notice and remember information relevant to anticipated job (see Taylor & Crocker, 1981; Wyer et al., 2002; Wyer & Srull, 1989; Wyer, 2004, for reviews of empirical demonstrations).

Relevant schema-inconsistent information is sometimes remembered better than schema-consistent information. Schema-inconsistent information may be surprising and require greater processing to understand or explain and hence may trigger elaborative inferential processing and therefore be remembered better than schema-consistent information requiring less processing (e.g., see Bower, Black, & Turner, 1979; Grasser, Gordon, & Sawyer, 1979; Schank, 1982; Hastie, 1982, for illustrations regarding text processing, event memory, and social information processing). Upon hearing that their pastor was heard screaming obscenities at a local elderly widow, parishioners could be expected to find this unexpected behavior surprising (even shocking) and to speculate at length about possible causes. Unfortunately for the pastor, given such extensive processing, the story would not soon be forgotten.

Schema-Based Effects on Categorization

Schemas fundamentally involve the processes of categorization and understanding of incoming stimuli. Without schematic processing, we would be unable to understand much of what we see or hear (e.g., Bransford & Johnson, 1972). However, although this categorization function of schemas is crucial to perception, it can also lead to predictable errors. When a schema is activated, incoming stimuli are more likely to be categorized in terms of the activated schema. Race and gender categories tend to be automatically activated when others are perceived (e.g., Ito & Urland, 2003). Once racial schemas are activated, information and behaviors relevant to such racial schemas are likely to be noticed and remembered, whereas if others such as occupational schemas are also made salient, persons are likely be thought of in occupational categories as well, and occupation-relevant information is more likely to be noticed and remembered. Hence, the likelihood that a witness will remember specific information will be strongly affected by which schemas were active when the original event occurred. Schema-irrelevant
information, which is less likely to be closely attended to during the target event, is less likely to be encoded and available for later retrieval.

**Trickle-Down Categorization and the Misperception of Weapons**

Labeling sets up an expectation of life that is often so compelling we can no longer see things as they really are. . . We are in a relationship with our expectations and not with life itself.

—Rachel N. Remen, *Kitchen Table Wisdom*, 1996, XXV

Once categorized, one may suffer what might be called *trickle-down categorization*, whereby other features or behaviors, and associated targets such as belongings, are categorized or interpreted in a manner consistent with the activated person category. In the broadest sense, this occurs when persons are assigned to undesirable social categories, thereby activating a generally negative bias in categorization and interpretation of other traits and behaviors. Even unrelated stimuli are affected by the activation of social stereotypes. For example, white subjects were able to categorize good words faster (in a lexical decision task) when primed subliminally with the word *white* and negative words faster when primed with the word *black* (e.g., Wittenbrink, Judd, & Park, 1997), and this was true particularly for words stereotypically associated with the racial category. Similarly, white subjects asked to determine whether words were “good” or “bad” categorized favorable words as “good” faster when primed subliminally with a white face, but categorized unfavorable words as “bad” faster if primed with a black face; whereas the reverse was true for black subjects (Fazio, Jackson, Dunton, & Williams, 1995). Even black clothing biased perception of offenders and suspects who wore it, toward greater aggressiveness and threatening intentions than those who wore light clothes, presumably because of the stereotypical association of the color black with evil, aggression, and bad characteristics or objects (e.g., Vrij, 1997; see also Frank & Gilovich, 1988, for a similar demonstration of effects of uniform color on perceptions of football players’ actions).

Generally, priming a particular stereotype can affect activation in three ways. First, the valence of a primed social category tends to facilitate perception of equivalently valenced categorizations and evaluations of associated stimuli (including those strictly temporally associated, as in the study by Fazio et al.). That is, persons primed with negative stimuli or words are quicker to recognize and categorize other negative stimuli.

Second, the prime may facilitate perception of all prime-relevant stimuli, irrespective of valence, such as when priming a black face would facilitate recognition of both weapons and athletic equipment (e.g., Judd, Blair, & Chapleau, 2004; Kawakami, Dion, & Dovidio, 1998). Finally, the prime may facilitate perception of stimuli that are both stereotypic of the primed category and of the same valence (e.g., Wittenbrink et al., 1997), such as when priming a black face facilitates recognition only of bad things associated with blacks (but not good things associated with blacks or bad things associated with whites). These processes may be responsible for the variety of situations in which police judge and respond to the behaviors of black citizens with greater suspicion and more negative reactions (e.g., Winkel, 1999).
Several notorious research examples of this phenomenon were inspired by the 1999 case of Amadou Diallo, a black man killed by four New York City police officers who misperceived the wallet in Diallo’s hand as a gun. Shortly after this incident, researchers began to investigate whether these misperceptions could have resulted from racial stereotypes associating violence with blacks. Years earlier, Allport (1947) had shown that as participants transmitted descriptions of a scene depicting a white man holding a razor arguing with an unarmed black man, at some point in the series of retellings the black man was depicted as holding the razor instead for more than half of the groups of storytellers. To show that stereotypical associations of violence with blacks can have more immediate effects on reactions, Payne (2001) asked participants to rapidly categorize objects as either weapons or tools after a brief prime with a picture of a white or black face. Those primed with a black face were quicker to categorize weapons than those primed with a white face and, when required to respond very quickly, were more prone to mistake tools for weapons, whereas the reverse was true of those primed with a white face. Furthermore, these biases tend to work in reverse as well, in that activation of abstract concepts such as “crime” or “basketball” tends to induce attentional biases toward black male faces (Eberhardt et al., 2004).

Recent studies have used computer game simulations that require participants to shoot only targets holding weapons. Respondents were more likely to “shoot” at black than at white targets holding harmless objects (see Correll, Park, Judd, & Wittenbrink, 2002; Eberhardt, Goff, Purdie, & Davies, 2004; Judd, Blair, & Chapleau, 2004; Payne, Lambert, & Jacoby, 2002; Plant, Peruche, & Butt, 2005). Even police officers show this bias (Plant & Peruche, 2005). Greenwald, Oakes, and Hoffman (2003) recently provided evidence that these errors can result both from increased perceptual difficulty in distinguishing between weapons and harmless objects when held by blacks, and a response bias toward treating objects held by blacks as guns.

Although these studies did not address biases in memory for weapons (as opposed to errors of perception) and the various additional schemas that might facilitate mistaken memory or perception for weapons (such as those for criminals, hunters, police, adversarial encounters, gangs, etc.), these issues offer both important and fertile ground for future exploration. The first author was recently retained for a case involving contested possession of a weapon by a man in a domestic dispute. Could knowledge of characteristics of the defendant, the history and nature of the relationship with the woman, stereotypes involving social class or those involved in domestic disputes, or other features of the event in question trigger schema-based expectations that would bias perception or memory toward inclusion of a weapon in the defendant’s hand? The “weapons false alarm” research clearly suggests that they could.

Schematic Effects on Interpretation

In addition to affecting perception and categorization, schemas bias the search and interpretation of incoming information—and hence later memory for it—toward consistency with activated applicable schemas. Broadly, such biases are reflected in heavily documented tendencies to interpret school work, essays, art, daily routines, or behaviors and
other personal products or behaviors in more favorable terms when described as coming from relatively favored social groups (e.g., men, capitalists, whites, intelligent persons, or smart vs. dumb rats) than when described as coming from stigmatized groups such as women, communists, minorities, or the less intelligent (see review by Kunda, 1999). Such confirmation biases have also been investigated in studies of clinical diagnosis and judgment (e.g., Rosenhan, 1973). When diagnostic categories are made salient—through labeling of a patient, or even simply by asking the question of whether or not the person may suffer a specific disorder—the clinician tends to confirm the diagnosis. Given the same file, for example, clinicians asked to determine whether the person suffers from bipolar disorder will tend to diagnose the person as bipolar at a greater rate than if asked to determine whether the person might be histrionic (see reviews by Maddux, 1993; Salovey & Turk, 1991; Turk & Salovey, 1988). In part, such confirmatory diagnoses result from biased interpretation of incoming information. However, research on hypothesis testing has shown that information searches are biased by schematic influences, such that hypothesis testers tend to seek information that would confirm the hypothesis, but fail to seek disconfirming (and more informative) information (e.g., Wason, 1960). Interviewers, for example, select questions that would tend to elicit answers confirming rather than disconfirming the hypothesis (e.g., Copeland & Snyder, 1995; Snyder & Thomsen, 1988). Such diagnosis-driven interviewing choices and interpretations of client symptoms and information have been widely criticized, particularly by critics of “recovered memory therapy” (e.g., Loftus, 1993; Loftus & Ketcham, 1994; McNally, 2003; Ofshe & Watters, 1994; Piper, Pope, & Borowiecki, 2000; Pope, Oliva, & Hudson, 2002).

A few studies have addressed schema-based distortions in perception and memory for physical appearance. Perception of facial features or expressions, for example, can be biased by schema-driven interpretative processes (see Carroll & Russell, 1996). Students told that a man was a Gestapo leader responsible for barbaric medical experiments on concentration camp victims were more likely to judge his facial expression as cruel, whereas those told he was a leader of the World War II anti-Nazi underground were more likely to judge it as warm and kind (Rothbart & Birrell, 1977). Of particular importance for eyewitness identification processes, memory for faces spontaneously categorized or labeled as belonging to particular racial/ethnic groups tends to shift over time toward typicality for that category (Corneille, Huart, Becquart, & Bredart, 2004; see also Eberhardt, Dasgupta, & Banaszynski, 2003), and faces labeled as angry or sad are later remembered as physically appearing more extremely angry or sad (e.g., Halberstadt, 2003). Temporary personal goals can also bias facial perception. Self-protection goals, for example, led white participants to perceive greater anger in black and Arab faces (outgroups associated with threat); whereas mate-search goals led male participants to perceive more sexual arousal in attractive targets (Maner, Kenrick, Becker, Robertson et al., 2005).

Script-based expectations can also bias interpretation of facial expressions. This was first demonstrated by Russian film director Kulechov (and hence dubbed the “Kulechov effect”). Kulechov created three short films that first showed either a dead woman, a dish of soup, or a girl playing, and then presented the face of an actor with a neutral expression. Viewers judged the identical expression as relatively sad, thoughtful, or happy,
depending upon which version of the film they saw. Similar effects have since been documented in more systematic research. For example, students told a person in a photo was being threatened by a vicious dog tended to view his expression as fearful, whereas those told he had just won money tended to see the expression as one of happiness (Trope, 1986). Causal schemas can also distort memory for facial expressions. People asked to explain why ambiguous faces are expressing anger perceived and remembered those faces as angrier than those asked to explain why they were expressing sadness, and these distortions were greater than those produced by simple application of the emotion label to the faces (Halberstadt, 2003, 2005; Haberstadt & Niedenthal, 2001).

Finally, Davis and colleagues (Davis, Vanous, & Cucciare, 2005) have recently shown that motion schemas involving expectations of continuity in motion can contribute to failures to perceive differences between separate actors (i.e., “change blindness”; Simons & Levin, 1998). The authors demonstrated that participants were more likely to confuse two actors when they appeared in a sequence that promoted the illusion of continuity in motion, than to confuse two who appeared in a sequence involving equal temporal separation, but that did not promote the illusion of continuity. Furthermore, the actor who appeared in an apparently continuous sequence with a thief stealing a bottle of wine was later misidentified as the thief at a greater rate than the actor who appeared in the apparently discontinuous sequence involving the thief.

**Constructive Processes and Distortion**

Schemas not only bias veridical memory toward schema-relevant features, they also form the basis of constructive errors in memory whereby one “remembers” additional schema-consistent information that was not part of the witnessed event. In its simplest form, such constructive processes have been demonstrated in what is known as the DRM paradigm (e.g., Roediger, 1996; Roediger & McDermott, 1995; Roediger & McDermott, 2000). Participants in the DRM research are asked to study lists of semantically related words (such as dream, tired, bed, snore) and then to try to recall or recognize the words they have heard. A central finding is that participants are prone to falsely remember nonpresented but schema-associated words (sleep). Ironically, these effects can be stronger when participants attempt to suppress memory for stereotypical information (Aray, Ekehammar, & Akrami, 2003).

Similar effects have been found for social stimuli such as descriptions or observations of people and social events. In a typical experiment, participants study a description of a person (or watch an event involving a person or people). A script or schema may be activated either bottom up (because the information suggests a particular social or event category) or top down (by labeling the participants or event with a particular category). Later, participants’ memories for the original information or event are tested. Participants tend to falsely recall or recognize schema-consistent, but unpresented, information (see reviews by Graesser & Nakamura, 1982; Kunda, 1999; Taylor & Crocker, 1981; Wyer & Srull, 1989). They infer characteristics, events, or behaviors based upon information they are exposed to and later falsely recall that these constructions were actually part of the original event or information. Furthermore, the likelihood that any
given specific schema or script-based information will intrude into memory is greater the more strongly it is associated with a particular schema or script (e.g., Graesser & Nakamura, 1982). Although such processes have been demonstrated across a wide range of stimuli and schemas, two illustrations are particularly relevant to witness event memory.

Several studies have investigated the effects of crime-related schemas or scripts on memory. Witnesses to crimes tend to accurately remember script-relevant actions (whether consistent or inconsistent) more than script-irrelevant actions; but they also falsely remember crime-script consistent but unwitnessed actions—particularly those more central to the script—and such intrusions are more likely when questioned at longer retention intervals, or when the original event was shorter or more ambiguous (Garcia-Bajos & Migueles, 2003; Greenberg, Westcott, & Bailey, 1998; List, 1986; Tuckey & Brewer, 2003, in press; see also Brewer & Treyens, 1981; Lampinen, Copeland, & Neuschatz, 2001; Neuschatz, Lampinen, Preston, Hawkins, & Tohia, 2002; Pezdek, Whetstone, Reynolds, Askari, & Cougherty, 1989, for similar results regarding script-based memory errors for teacher behaviors and schema-based memory intrusions for objects). Interestingly, one such intrusion involved the misreport of a bag as a gun (Tuckey & Brewer, 2003). Hence, like the previously discussed race-based expectations of violence, the script-based expectation that a robber would have a gun led subjects to misperceive or misremember the bag. Such crime script-based expectations seem to pervasively influence the trial process, as they have been shown to also bias jurors’ memory for witness testimony (Holst & Pezdek, 1992; Smith & Studebaker, 1996) and verdicts (Smith, 1991).

Hannigan and Reinitz (2001) investigated the impact of causal schemas on memory intrusions. Participants viewed a scene involving a potential cause without an effect (a person removing an orange from the bottom of a stack) or an effect without a cause (a spilled stack of oranges). Those who saw the spilled stack of oranges later tended to falsely remember seeing the cause (i.e., someone removing an orange from the bottom of the stack). Hence, it appears that script-based intrusions will include typical actions or component events, including those expected to play a causal role in the overall event.

Schematic processes may also be responsible for source memory errors. Statements we believe, for example, tend to be misremembered as coming from a more credible source, presumably as a result of expectations that believable information comes from credible sources (e.g., see review in Fragaile & Heath, 2004). These authors provided a particularly disturbing demonstration of this principle involving source attributions for incriminating evidence. That is, participants led to believe a suspect was guilty tended to misremember incriminating evidence as coming from a higher credibility source than those led to believe he was not guilty.

Several studies have shown that we are prone to misremember who said what in predictable schema-driven ways. When asked to remember which of several speakers contributed a particular statement to a discussion, for example, participants are more likely to misattribute the statements of one member of a social category to another person from the same category (i.e., those of the same gender, race, age, attractiveness, hometown, clothing color, educational status, etc.) than to someone from a different category—perhaps because they seem more similar, and source confusions between similar sources
are more likely than between dissimilar source categories (see reviews in Davis & Friedman, this volume; Davis, Kemmelmeier, & Follette, 2005; Klauer & Wegener, 1998). For this reason, objects and episodes from one action sequence are more likely to be misattributed to an episode of the same general class (e.g., Restaurant Episode A to Restaurant Episode B) than to one of a different class (e.g., Hannigan & Reinitz, 2003).

Moreover, schematic source errors can derive from trait schemata. For example, trait-related statements, such as "I work out almost every day" tend to be disproportionately misattributed to a person fitting that trait (e.g., an athlete) when they were actually made by a different speaker (Mather, Johnson, & De Leonardis, 1999; see also Sherman & Bessenoff, 1999; and Bayen, Nakamura, Dupuis, & Yang, 2000, for demonstrations of schema-driven source monitoring errors associating objects with rooms). Such schematic effects also appear to be stronger among those with poorer overall memory (Spaniol & Bayen, 2002), older persons (see Davis & Loftus, 2005, for a review), and those with stronger stereotyped associations (as measured by the Implicit Attitudes Test; Greenwald, McGhee, & Schwartz, 1998; Gawronski et al., 2003).

Although source errors may sometimes be benign, they are raised and disputed surprisingly often in legal contexts. Which of a group of persons uttered a threat may be crucial, for example, and the target of an utterance can be equally important (such as who the threat addressed; see Davis & Friedman, this volume; Davis, Kemmelmeier, & Follette, 2005, for illustrations and research).

Reconstructive Processes

Information acquired after exposure to target events can also activate schema-based reconstructive memory processes that bias memory in favor of information consistent with the newly activated schema—processes apparently central to the reports of witnesses to the TWA incident. Post-event schema activation can occur through several processes.

Post-Event Information. Post-event information from external sources may activate a particular schema. For example, in a seminal study of such reconstructive processes, Snyder and Uranowitz (1979) had participants read about "Betty K" and after a delay told them that Betty was either heterosexual or gay. In a later memory test, participants reported memories of the original description of Betty that were consistent with the newly acquired category labels of "gay" versus "heterosexual." They were more likely to correctly remember previously presented schema-consistent information, but also incorrectly reported nonpresented schema-consistent information.

A classic study by Cohen (1981) demonstrated that category schemas exerted essentially equivalent effects on memory, whether activated at the time an event was witnessed or later. Participants witnessed a video of a woman interacting with her husband. They were told either before or after witnessing the event that the woman was a waitress or a librarian. Those told she was a waitress tended to remember her appearance and behavior as more consistent with their stereotypes of waitresses (e.g., blond hair, drinks beer, affectionate with her husband, listens to rock and roll, etc.), whereas those told she was a librarian tended to remember librarian-consistent behaviors and attributes (such
as brown hair, drinks wine, listens to classical music, etc.; see Davis & Follette, 2001; Hirt, McDonald, & Markman, 1998; Schacter, 1996, for reviews of the tendency to reconstruct memories of past events toward consistency with current expectations).

Present Knowledge and Reconstructive Hindsight Biases

Life is lived forwards, but understood backwards.  
—Søren Kierkegaard

Knowledge of current events, emotions, or outcomes is well known to bias memory and judgments of processes leading up to them. Victims of the hindsight bias (Fishhoff, 1975) have been shown not only to overestimate, in hindsight, how likely a particular outcome was to occur, but also to overestimate what others could have, or should have, anticipated in foresight, thus giving them undue credit or blame for the outcome. Moreover, unaware of their own hindsight biases, they cannot accurately remember their own behavior or judgments before the outcome was known, recalling instead that they were wiser (“I knew it would happen this way.”), and more confident (“I was sure of it!”), and that they had behaved more consistently with this knowledge (“I told you so!”) before the event than was actually the case (see reviews by Christensen-Szalanski & Willham, 1991; Davis & Follette, 2001; Hawkins & Hastie, 1990; Hoffridge & Pohl, 2003).

Baruch Fishhoff (1975) described this tendency to view past events as inevitable consequences of their predecessors “creeping deterministic.” In effect, outcome knowledge tends to activate causal schemas for how such outcomes are produced, which in turn engage schema-driven searches and reviews of past information and reconstructive memory processes that reorganize memory. These processes bias memory toward retrieval of information consistent with the now activated causal schema and promote schema-consistent memory distortions and judgments of past events (see recent theoretical analyses of hindsight effects by Erdfelder & Buchner, 1998; Roese & Olson, 1996; Winman, Juslin, & Bjorkman, 1998).

A number of studies have examined implications of the hindsight bias in the legal system. Judgments in hindsight can be inappropriately harsh because people blame themselves or others for incorrect decisions, even though in foresight they were appropriate in light of available information. This has been shown with respect to medical and psychotherapeutic judgments and decisions, financial advisement, behaviors prior to rape, and judgments of probable cause, suggesting that both decisions to file suit and jury verdicts can be influenced by hindsight (Carli, 1999; Goggin & Range, 1985; see reviews in Christensen-Szalanski & Willham, 1991; Davis, 1991; Hawkins & Hastie, 1990; Hoffridge & Pohl, 2003). Moreover, the production of evidence, rather than reactions to it, can be influenced by hindsightful witnesses, as illustrated by Ulric Neisser’s (1981) classic study of hindsight biases in John Dean’s testimony before the Watergate hearings. John Dean testified that he warned the president that the cover-up would eventually be discovered and lead to Nixon’s loss of the presidency, whereas no such warnings actually took place (see Davis & Friedman, this volume, for discussion of studies assessing biases in John Dean’s memory, including hindsight and other schematic processing effects).
Davis and colleagues (Davis, Lopez, Koyama, et al., 2005) recently found hindsight biases in memory for a conversation between a couple arguing over an interaction between the girl and a male classmate. Her boyfriend exhibited extreme jealousy and suspicion of her relationship with the classmate. Later half of the participants learned that the couple had broken up, whereas the other half were told the female was found dead, and her boyfriend was charged with murder. Those who learned he was charged with murder were both more likely to accurately remember threatening statements he made to his girlfriend during the argument, and more likely to falsely remember that he had hit his girlfriend during the vignette, and that he had also threatened her classmate.

Hindsight and other retrospective biases are likely to exert pervasive influences on crucial witness reports, distorting memories of the past (including one’s own) toward consistency with present knowledge (e.g., Dawes, 1991; Ross, 2000; Rubin, 1996; Schacter, 1996). Countless reports concern events, objects, or people witnessed well before the litigated event occurred, and often even longer before the witness was questioned about it. When asked about these issues after learning of the target event, retrospective or hindsight biases likely come into play. A witness who observed a vigorous conversation between a couple may remember it as “a fight” in light of new knowledge that the wife has been found murdered. Past behaviors of an employer newly accused of sexual harassment may suddenly be remembered as more sexually suggestive or coercive than before the accusation. Even memories of our own attitudes, emotions, or behaviors are colored by hindsight (“I always felt creepy when he was around”; see Dawes, 1991; Keeler & Safer, 1998; Levine, 1997; Ross, 2000; Safer, Levine, & Drapalski, 2002). Such processes may well have contributed to witness reports of inappropriate interactions with children in the case of superstar Michael Jackson. The memories of witnesses who learned of the allegations of sexual abuse well after they witnessed Jackson’s interactions with the children could well have been distorted by current knowledge of the accusations.

Hindsight biases may also contribute to the development of false “recovered memories” of sexual abuse, in that once the person has developed a self-schema as an abuse survivor, past events may be selectively searched and reinterpreted to fit the new self-identity (see Loftus & Davis, 2006; Loftus & Ketcham, 1994; McNally, 2003). Indeed, researchers interested in autobiographical recollections, life stories, and narrative approaches to understanding experience have highlighted the way personal “identity” consists of evolving narrative constructions of the self that continually restructure the past to fit current conceptions of the self (see Fivush & Haden, 2003; Greenwald, 1980; McAdams, 2001; Ross, 2000; Rubin, 1996; Wilson & Ross, 2003 for reviews) or levels of self-esteeem (e.g., Christensen, Wood, & Barrett, 2003; Tafarodi, Marshall, & Milne, 2003). In countless ways, old events, emotions, and behaviors take on new characteristics and meanings as new knowledge provides revised context for their interpretation.

**SOURCES OF SPECIFIC MISINFORMATION**

In addition to schema-based intrusions, misinformation may creep into memory from a variety of external and internal sources of specific incorrect information. Specific
misinformation may be mistakenly incorporated unchanged into memory, thereby simply adding false information to (for example, inserting the memory of a car) or replacing (substituting memory of a truck for that of a car) veridical memory. However, it may also distort memory (for example, changing the color or location of the car) and activate schematic processing, which causes far-reaching related inferential processing and associated distortions in memory. In this section, we consider sources of specific misinformation, provide examples of misinformation effects on event memory, and discuss proposed mechanisms via which misinformation affects memory.

External Sources of Misinformation

**Media**

Media coverage of criminal and civil litigation is perhaps among the most common sources of misinformation in witness memory. Sometimes within hours of a target crime, the incident, and perhaps various witness reports and other evidence, are reported in television news accounts—reports that are soon followed by others in printed media. And these reports are typically repeated and elaborated upon in subsequent reports as the case unfolds or nears trial. Research has established the biasing effects of such reports and pretrial publicity among the community and prospective jurors, and motions for change of venue for the trial are commonly filed and granted on the basis of demonstrations of widespread case-relevant knowledge and biased opinions among the population of jurisdictions saturated with such publicity (e.g., Abbot & Batt, 1999; Davis & Follette, 2004). There is experimental as well as anecdotal evidence that media reports can also distort witness memory. For example, Loftus and Banaji (1989) directly tested the impact of case-related publicity on witness memory. The authors presented subjects with a 4-minute videotape of a robbery and shooting incident. It depicted two police officers on rounds at night who hear shots and confront two robbers. One officer and one robber were injured in the confrontation. Later, subjects were exposed to a television report of the incident, which they viewed under the premise that they were to decide whether the reporter was sufficiently talented to obtain a job in a major national news operation. The TV reporter inserted misinformation into the account shown to “misled” subjects but not into the version shown to “control” subjects. For example, in the misled version she suggested that there were three robbers rather than two, or that the victim liquor store was named “Midtown Liquor” rather than “Pete’s Liquor.” When tested later, control subjects almost never gave the suggested answer (1%), but misled subjects frequently did (28%).

Loftus and Castelle (2000) offered a systematic analysis of the influence of media reports on witness memories of the widely publicized crash of TWA flight 800. Within days of the crash, the media began to present and discuss the theory that the plane had been downed by a missile attack—including graphic illustrations of how the shooting could have occurred and of witness accounts that could be interpreted as support for such a theory. The authors’ account of the investigation of the case illustrated how the testimony of the primary witnesses was altered over time as publicity of the missile theory
escalated, and how ultimately 183 other witnesses came forward with testimony sup-
porting the theory.
A more controlled study was conducted by Hans Crombag and his colleagues
(Crombag, Wagenaar, & Van Koppen, 1996), who studied Dutch residents’ memories
of the crash of an El Al Boeing 747 into an 11-story Amsterdam apartment building.
Media coverage never included the crash itself, but began within the first hour after
the crash and included films of the ensuing fire and rescue operations. In two surveys,
10 months after the crash, the authors found that 55% and 66% of respondents reported
having actually seen the crash on TV, and of those many gave vividly detailed descrip-
tions of the crash they could not have actually seen. The authors attributed these false
memories to the effects of imagination. That is, based on widespread media descriptions
of the crash, participants would tend to visualize the crash and hence later falsely at-
ttribute the source of these images to TV videos of the crash rather than their own
imaginations.

**Memory Conformity: Effects of Co-witnesses**

The first author served as a memory expert for the case of Mr. Stroud, who was ac-
cused of robbing a Portland bank. Evidence included a police tape in which an employee
of the bank reported the robbery. Having been asked to provide a description of the as-
sailant, the employee responded, “Wait a minute, we’re getting a consensus on that.”
What effect might such consensus-seeking discussions or other influences between wit-
tnesses have on memory accuracy?

If witnesses seek consensus, disagreements must necessarily be resolved through
alteration of conflicting accounts toward consistency. However, even in the absence of
such absolute consensus seeking, witness accounts are influenced by those of others (for
example, see accounts in Memon & Wright, 1999; Schacter, 2001, of influence between
the three witnesses who reported that Timothy McVeigh (the Oklahoma City bomber)
was accompanied by another man when he rented the truck used in the bombing). There
is direct evidence from the eyewitness literature demonstrating that co-witnesses can
influence the accuracy of one another’s testimony as well as their confidence in those ac-
counts. For example, Loftus and Greene (1980) found that participant-witnesses incor-
porated misleading details from other witnesses’ written descriptions into their own de-
scriptions of target faces. More recently, memory conformity has been demonstrated for
diverse stimuli such as cars (Wright, Self, & Justice, 2000), details of written stories
(Betz, Skowronski, & Ostrom, 1996), objects from various scenes (Meade & Roediger,
2003; Roediger, Meade, & Bergman, 2001), time estimation (Conway, 2004), and reports
of witnessed criminal events (Gabbert, Memon, & Allan, 2003).

Perhaps the clearest demonstration of these effects can be seen in a series of three
studies by Shaw, Garven, and Wood (1997). In the first study, student witnesses were
questioned in ways that were intended to be analogous to the experience of a witness
who receives misinformation from an interviewer or questioner about what other wit-
tnesses have already said. A second and third study simulated the situation where wit-
tnesses received the information directly from co-witnesses. In all three studies, witness
reports were significantly affected by information about the reports of other witnesses, whether they received the information directly from the co-witnesses or indirectly from the interviewer. The most errors, however, were committed by witnesses who received incorrect information both directly from other witnesses and indirectly via the misleading questions of the interviewers. Similar results were obtained in a study of the induction of false memory reports by children of wrongdoing by a classroom visitor. False reports were most likely to come from children exposed to both reinforcement of such claims by the experimenter and co-witness information from other children (Garven, Wood, & Malpass, 2000).

Consistent with the general literature on opinion and behavioral conformity, memory conformity appears to be greatest among those with less clear recollections of the original stimulus and among those exposed to more sources of bogus information (larger groups), and less when there are dissenters who break the unanimity of the bogus group reports or when the credibility of the other person is suspect (Hoffman, Granhag, See, & Loftus, 2001; Walther et al., 2002). Participants in the Walther et al. study were also less affected by bogus group judgments for stimuli that were sufficiently unusual as to cause them to believe they would have remembered them if they had seen them before, and under conditions where a clear lack of memory would reasonably be a valid indication that the event did not occur. In other words, participants appeared to use "metacognitive knowledge," that is, situational cues (such as original conditions of encoding), along with characteristics of the bogus group claims (such as whether it was plausible that the participant could forget the particular style of stimulus the group claims to have seen), group size, and degree of agreement among group members, to determine whether their own memories or the claims of the group members would be most likely to be accurate. These effects occurred for both correct and incorrect claims.

The witness memory-conformity studies suggest that discussions between co-witnesses have great potential to influence the testimony of all witnesses, with far-reaching consequences. First, co-witnesses can shape one another’s initial reports. When interviews by police or other investigators suggest information similar to that being conveyed by other witnesses, a target witness will be particularly likely to adopt the suggested account. Furthermore, a witness’s first statements have been shown to shape reports during subsequent interviews or court appearances. In other words, once a witness has told his or her version of what happened, that witness is likely to stick with that account in the future. This phenomenon is sometimes referred to as the freezing effect (see Loftus, 1979). As time goes by, it becomes increasingly difficult for a witness to change or back down from an initial statement or identification.

The first statements of even a single witness may also influence the subsequent investigation of a case, just as helicopter pilot Meyer’s initial report of the TWA explosion triggered the “missile theory” of the crash and thousands of hours of investigation of that theory and influenced countless reports of witnesses who heard Meyer’s account on television before their own interviews. Similarly, based upon one witness’s initial account of a criminal incident, police may construct lineups, choose particular mug shots, interview specific witnesses, formulate detailed theories about the commission of the crime, and
even make an arrest. Hence, even minor errors, misstatements, or omissions in one witness's initial memory report can have far-reaching effects on the investigation of the case, whether civil or criminal.

**Inflation of Witness Confidence Through Collaboration/Corroboration.** Discussions with other witnesses may not only contaminate memory, but also inflate confidence in information “confirmed” by others. Luus and Wells (1994), for example, showed that witness confidence in perpetrator identifications was affected by confirming or disconfirming identifications by other witnesses. They staged a theft in front of 70 pairs of witnesses. Witnesses who were told their co-witness had made the same identification showed an increase in confidence in their identifications, as expressed to an ostensibly police officer. Those who thought their co-witness disagreed showed deflation of confidence (see Semmler, Brewer, & Wells, 2004; Wells & Bradfield, 1998; Wells, Olson, & Charman, 2003, for similar demonstrations of the effects of police feedback on witness confidence; and Hafstad, Memon, & Logie, 2004; Meudell, Hitch, & Kirby, 1992; Stephenson & Wagner, 1989, for other demonstrations showing that collaboration inflates confidence in eyewitness identification; and Stephenson, Bandstatter, & Wagner, 1983, for effects of cooperation on validity and inflation of confidence in story recall; however, also see Allwood, Granhag, & Johansson, 2003, for conditions under which collaboration may increase the correspondence of witness confidence and witness accuracy).

Inasmuch as witness confidence is perceived by jurors as an important indicator of accuracy, it is not surprising that feedback-inflated confidence can in turn affect the credibility of the witness’s later testimony. Luus and Wells showed tapes of the 70 witnesses to other mock jurors who judged the credibility of their testimony. Witnesses who had experienced confirming feedback from their co-witnesses were judged as more credible by the mock jurors than those who had experienced disconfirming feedback, or who had not been given any feedback. In other words, witness confidence was affected by information about the opinions of other witnesses, and the witnesses’ confidence, in turn, affected mock juror judgments of their credibility.

Finally, it is important to point out that social influence between witnesses may occur because of influence of the information conveyed between them and the potential for motivational distortions in memory created by any desire they may have to avoid rejection, or to help or support other fact witnesses, investigators, or parties to the case (see Asch, 1955; see also Reysen, 2005, for evidence that memory conformity results from both processes). To the extent this motivation exists, it would tend to both distort the witness's own memories in the direction consistent with the interests of the other person, and to render the witness more susceptible to the influence of any source who might be reporting the events in line with the other's interests.

Expert testimony on issues of witness contamination can be valuable, because jurors will not understand the potential for witness collaboration to influence both memory and confidence. Rather they instead assume that confidence strongly reflects accuracy (see Davis & Follette, 2001, for a review, as well as Shaw, McClure, & Dykstra in this volume and Leippe & Eisenstadt in Volume 2 of this handbook).
Forensic and Clinical Interviews and Procedures

Among the most prolifically investigated issues in eyewitness psychology is the manner in which forensic interviewing procedures can lead to fabrication or distortion. This line of research began in the 1970s with the early studies of Loftus and her colleagues of the effects of question wording (see Loftus, 1979, for a summary). Participants were shown videos and other event depictions and later interviewed about their memories of the events. In some studies, for some participants the interviewers’ questions more strongly implied particular information than for others (e.g., “Did you see ‘the’ [vs. “a”] broken headlight?”). The more strongly the interviewer’s questions implied a particular answer, the more likely participants were to report memories consistent with the expectation. In other studies, wording was shown to affect estimates such as speed (e.g., “How fast was the car going when it ‘hit’ [vs. “bumped into” or “smashed”] into the other car), such that wording implying more forceful impact led to greater estimates of speed, as well as greater numbers of false reports of having seen broken glass. Although not conducted in the context of witness memory studies, studies among linguists and social psychologists have shown that both memory and inferences are affected by such additional features of questions as whether the target (e.g., an alleged rape victim) is described as the subject (“Did you dance with the defendant?”) versus the object of the sentence (“Did the defendant dance with you?”); or whether the question inquires about action verbs (“Did you talk to the defendant?”), versus state verbs (“Did you like the defendant?”). Respondents providing answers to questions involving actions (as opposed to states) of the target and those depicting the target as the subjects (rather than objects) of the sentence tend to attribute more causality to the target for the event in question (e.g., “I talked to the defendant because I...” versus “I talked to the defendant because he...”), and that these differences are associated with a variety of other inferences that affect memory, judgments regarding the event, as well as future predictions involving the parties and recurrent or similar events. Furthermore, judgments by those who listen to the responses are reliably affected by the wording of the questions (see Semin & De Poot, 1997a,b).

Loftus and her colleagues subsequently demonstrated that false information suggested during interviews can lead to the development of false memories for objects or events that were not included in the originally witnessed events—a phenomenon dubbed the misinformation effect. In these studies, participants were again shown depictions of scenes or events. However, the experiments then proceeded in two phases. In the first phase, witnesses were interviewed about what they had just witnessed. However, some were given misinformation during the interview. In some studies, they received false information about something that had been seen (e.g., that they had seen a stop sign when they had actually seen a yield sign), whereas in others the false information suggested events or objects not actually witnessed at all (such as broken glass, barns, or wounded animals). Participants were later interviewed again, after varying times of delay.

In some early studies, Loftus showed that (mis)leading questions can cause witnesses to falsely remember seeing a yield rather than a stop sign, a conspicuous barn in a bucolic scene actually containing no buildings, broken glass, tape recorders or wounded animals that were not present, incorrect colors of objects, curly rather than straight hair,
and Minnie Mouse when they actually saw Mickey. Thus, these studies showed that misleading questions can lead people to both add things to their memories and alter memories of things they did see (Loftus, 2003; Loftus & Greene, 1980; Loftus & Palmer, 1974; Loftus, 1975, 1977, 1979). Unfortunately, interviewees confronted with interviewers’ misinformation are most likely to ignore it rather than to comment on or correct it (Hunt & Borgida, 2001), perhaps enhancing their vulnerability to later incorporating it into memory. Furthermore, a number of studies exposed participants to written or oral narratives after they had witnessed the original events. Like the biased questioning procedures, these post-event accounts led participants to alter or add to their memories of the original event (e.g., Eakin, Schreiber, & Sergent-Marshall, 2003).

Susceptibility to misinformation effects is generally related to the ability to detect discrepancies between event information and post-event misinformation (the “Principle of Discrepancy Detection”; Tousignant, Hall, & Loftus, 1986; see review in Garry, Garry, & Loftus, 2005). Hence, factors associated with the ability to detect discrepancy (such as characteristics of the witness or event, or of the similarity between the event and misinformation) or with the tendency to look for or notice discrepancies (such as the credibility of the source or the plausibility of the misinformation) predict the magnitude of the effect.

Misinformation effects tend to be stronger for some people (see Eisen, Winograd, & Qin, 2002; Gudjonsson, 2003, for reviews of individual differences in general suggestibility). Misleading information creates more distortion among children than among adults (e.g., Ceci, Ross, & Toglia, 1987) and among elderly versus younger adults (see Davis & Loftus, 2003; Mueller-Johnson & Ceci, 2004; Polczyk et al., 2004, for reviews). Age differences may reflect the importance of cognitive resources, as misinformation effects are stronger when one encounters or retrieves information under conditions of stress, limited attentional resources, or heavy cognitive load (Klein & Boals, 2001; Zaragoza & Lane, 1998), and among persons with chronically low cognitive resources, such as those with lower working memory capacity (Jaschinski & Wentura, 2002), poorer overall recall for the original information (Liebmann et al., 2002; Tomes & Katz, 1997), lower IQ (see Gudjonsson, 2003), or poorer neuropsychological functioning (Lee, 2004). Surprisingly, acute anxiety is has been associated with reduced suggestibility (e.g., Ridley & Clifford, 2004; Ridley, Clifford, & Keogh, 2002), although this relationship can be reversed for suggestibility in other contexts. Sometimes one’s abilities confer increased suggestibility, as has been shown for those with enhanced ability or propensity for visual imagery (Dobson & Markham, 1993; Lindsay, 1990; Tomes & Katz, 1997; Winograd, Peluso, & Glover, 1998), although results for this have been somewhat mixed (see discussion in Hekkanen & McEvoy, 2002).

Additionally, several personality variables are associated with suggestibility to misinformation, including neuroticism (e.g., Liebman, McKinley-Pace, Leonard, Sheasley, et al., 2002; Zanni & Offermann, 1978), “self-monitoring” (the tendency to monitor one’s own behavior for impressions made on others; Larsiter, Stone, & Weigold, 1988), empathy (Tomes & Katz, 1997), dispositional tendencies toward dissociation (Hekkanen & McEvoy, 2002; see review by Eisen & Lynn, 2001), and “absorption” (as measured by the Tellegen Absorption Scale; Drivdahl & Zaragoza, 2001; Eisen & Carlson, 1998).
Temporary states such as hypnosis can also magnify misinformation effects (e.g., Scoboria, Mazzone, Kirsch, & Milling, 2002), as can even the belief that one is under the influence of alcohol (e.g., Assefi & Garry, 2002) or that one is a “poor” rather than “good” eyewitness (Roper & Shewan, 2002). Nevertheless, the misinformation effect is widely generalizable—even to 3-month-old infants (Rovee-Collier, Borza, Adler, & Boller, 1993), pigeons, rats (Garry & Harper, 2005; Harper & Garry, 2000), and gorillas (Schwartz, Meissner, Hoffman, Evans, & Franziar, 2004)—and applies to other domains, such as experiences with products and public figures (e.g., the advertising misinformation effect; Braun, 1999; Braun, Ellis, & Loftus, 2002; Braun & Loftus, 1998; Cowley & Janus, 2004).

Misleading questions tend to induce the greatest distortion when introduced after a delay, instead of immediately after the event (Loftus, 1979), when the wording of the misleading question is more definite (e.g., “Did you see the stop sign?” versus “Did you see a stop sign?” Loftus & Zanni, 1975); when the source of the misleading information is credible, attractive, of high status or power, or apparently unbiased (Bregman & McAllister, 1982; Ceci, Ross, & Toglia, 1987; Dodd & Bradshaw, 1980; Loftus, 1980; Smith & Ellsworth, 1987; Vornick, Sharman, & Garry, 2003; see Blank, 1998; Vornick et al., 2003 for reviews); and when the person is asked about perceptual details of the suggested event (presumably inducing greater visual imagery of the suggested events promotes false memory; Drivdahl & Zaragoza, 2001). The emotionality of a witnessed scene also appears to affect susceptibility to misinformation such that misinformation regarding highly negative scenes is roughly twice as likely to induce false memories as that regarding either positive or neutral scenes (Porter, Spencer, & Birt, 2003).

Misleading information also creates more distortion when it is more accessible (Eakin, Schreiber, & Sergent-Marshall, 2003), for peripheral rather than central detail (e.g., Loftus, 1979; Roebers & McConkey, 2003; Sutherland & Hayne, 2001), for more poorly remembered information (e.g., Marquis, Marshall, & Oskamp, 1972; Read & Bruce, 1984), when tested by recognition versus recall procedures (Sutherland & Hayne, 2001), and when it is subtle, rather than blatant (Loftus, 1979; Ornstein, Gordon, & Larus, 1992). On the other hand, less distortion is observed for negative information with high personal significance (e.g., Bruck, Ceci, & Hembrough, 1998), for persons specifically asked to indicate the source of the misinformation at retrieval (e.g., Dodson & Johnson, 1993) or to ignore information from the source of the misinformation when reporting memories (e.g., Lindsay, 1990), for misinformation introduced by a suspect source (Dodd & Bradshaw, 1980), for secret versus nonsecret information and when the secret giver as opposed to the nonsecret giver interviews the person at retrieval (Wilson, Powell, Raju, & Romeo, 2004), and for those warned of misinformation effects (Eakin et al., 2003; Highhouse & Bottrill, 1995) or experimenter trickery (Chambers & Zaragoza, 2001). The misinformation effect may also be reduced by explicit training in source monitoring (e.g., Thektr & Spence, 2002) and generally varies with the conditions of encoding or retrieval (see Ayers & Reder, 1998; Blank, 1998; Brainerd & Reyna, 2002; Eakin et al., 2003; Frost, 2000; Gerrie et al., 2005; McCloskey & Zaragoza, 1985; Roebers & McConkey, 2003; Schooler & Tanaka, 1991, for discussions of theoretical mechanisms of the misinformation effect and the conditions under which misinformation is
most likely to induce false memories). Nevertheless, in the years since Loftus's original demonstrations of the misinformation effect, research has shown how (mis)leading information can cause a person to develop false memories of much more dramatic incidents, including those involving the self or others (see Loftus & Davis, 2006).

Faced in the late 1980s with rapidly escalating accounts of child abuse and adult "recovery" of repressed memories of such abuse, psychologists began to devote increasing attention to the issue of how false memories for more dramatic events, and particularly dramatic autobiographical events, might be implanted in memory. Because recovered memory therapy commonly includes direct suggestions from the therapist that the client has been abused, many such studies examined the impact of direct suggestion that a particular event had occurred. For example, Mazzoni and her colleagues (Loftus & Mazzoni, 1998; Mazzoni, & Loftus, 1996; Mazzoni, Loftus, Seitz, & Lynn, 1999; Mazzoni, Lombardo, Malvagia, & Loftus, 1999) studied direct suggestion in the form of a clinical psychologist's bogus interpretation of dreams. For some participants, these bogus interpretations (i.e., the same interpretation given to all subjects, regardless of the dream reported, and with no reason to believe the interpretation applied to each subject) led to false memories for mildly traumatic suggested events. Dreams themselves may also be confused with actual experiences in some cases (Kemp, Burt, & Sheen, 2003).

Perhaps the most widely used paradigm to study the effects of direct suggestion has become known as the "familial informant false-narrative procedure" (Lindsay, Hagen, Read, Wade, & Garry, 2004). Researchers first verify with family members that a childhood event did not take place, but later tell subjects that the event did take place, and that it was provided by the participant's family. Participants are asked to try to remember the events. Using this paradigm, researchers have led participants to develop such diverse false memories as having been lost in a mall for an extended time and later rescued by an elderly bystander, painful physical injuries, having been hospitalized overnight, having an accident at a family wedding, having been nearly drowned and rescued by a lifeguard, having been the victim of a vicious animal attack, hot air balloon rides, and many others (see Lindsay et al., 2004; Loftus, 2003, for reviews). Reviewing a set of such studies, Lindsay et al. (2004) found that on average 31% of participants develop false memories of the suggested event. The term rich false memories was coined to refer to instances in which the person feels confident, provides details, and even expresses strong emotions about made-up events that never happened (Loftus, 2003; Loftus & Bernstein, 2005). However, whereas some sorts of event memories appear to be easy to implant, other, less plausible events (having received a rectal enema) can be more difficult (Pezdek, Finger, & Hodge, 1997).

Another frequently investigated method of implantation of false memories is the use of imagination or visual imagery, generally referred to as "imagination inflation" (Garry, Manning, Loftus, & Sherman, 1996). A host of studies have shown that active imagination/visualization of events, objects, or persons can lead to false memories of having actually seen, performed, or experienced them. These studies demonstrated that imagination/visual imagery can lead to false memories for common and bizarre personal behavior (both recent and historical), simple and complex events, pictures, sounds, written and spoken words/phrases, and inanimate and animate objects and persons, particularly
when a confederate also reports the imagined experience as real (e.g., Hoffman et al., 2001). Imagination has also induced false autobiographical beliefs and memories for a range of historical events (see reviews in Gerrie et al., 2005; Johnson, Hashtroudi, & Lindsay, 1993; Kassin, this volume; Loftus & Davis, 2006; Mazzoni & Memon, 2003; Schacter, 1996; 2001; Smith & Gleaves, this volume; Thomas & Loftus, 2002). Even paraphrasing event descriptions can produce inflation (e.g., Sharman, Garry, & Beuke, 2004).

Although much of this work has primarily addressed the issue of autobiographical memory in an effort to understand the mechanisms underlying creation of false memories of sexual abuse, other work has examined the ability of imagination to create more mundane event predictions or memories. Imagining a future event, for example, has been shown to increase the subjective confidence that the event will actually occur (Carroll, 1978; Gregory, Cialdini, & Carpenter, 1982). Those who more easily imagined produced greater inflation in confidence (e.g., Sherman, Cialdini, Schwartzman, & Reynolds, 1985).

Presumably, imagination and other implantation techniques work in a three-stage process whereby people first come to believe an event is plausible, next come to believe the event did actually occur, and finally reinterpret their narratives and images of the event as actual memories (Mazzoni, Loftus, & Kirsch, 2001; see the recent review by Henkel & Coffman, 2004). Imagery and imagination may contribute to all levels of this process. Imagery is crucial to plausibility and hence persuasion (see Green & Brock’s [2002] review of tests of their “transportation-imagery model” of narrative persuasion, which provides evidence that narratives are persuasive to the extent they evoke imagery of their contents). Research from the source-monitoring tradition has shown that images can be confused with real memories, particularly when they have many of the subjective characteristics of real memories. Johnson, Foley, Suengas, and Raye (1988) found that there were almost no differences between rated characteristics of real and imagined memories for childhood events, although memories for real and imagined recent events differed in a number of respects. The authors reasoned that when real memories are vague and lacking in vivid detail, as when they are from the distant past, or were never encoded richly in the first place, it is easier to confuse imagined and real events. If true memories cannot be distinguished from false memories on the basis of vividness, richness of perceptual detail, and other contextual information, the two will seem equally real, and they will be easier to confuse. Thus, the imagination inflation research suggests that when testifying about events that were long past, were never encoded deeply, or are without rich imaging and contextual embedding, one will be more susceptible to memory distortion or creation through the use of imagination-based techniques.

This tendency can be quite dangerous in legal contexts. Memory recovery techniques emphasizing imagination (hypnosis, guided imagery, and age regression, for example) can lead to the creation of false memories in which the subject has great confidence (see Arbuthnott, Arbuthnott, & Rossiter, 2001, regarding imagery; Mazzoni, Kirsch, & Lynn, this volume, on hypnosis; Spanos, Burgess, Burgess, Samuels, & Blois, 1999, on age regression), as illustrated in many cases of recovered memories (Loftus & Ketcham, 1994; Ofshe & Watters, 1994).
Although false memories are often created in the context of therapeutic use of these techniques, law enforcement personnel sometimes attempt to induce suspects to engage in repeated acts of imagination of the criminal act as a means of inducing them to confess. In part, such imagination exercises were responsible for known cases of false confession, such as Paul Ingram’s confessions to abuse of his children (see Henkel & Coffman, 2004; Kassin, this volume; Loftus & Ketcham, 1994). Another technique common to interrogation—explaining how a particular event might have happened—also tends to inflate confidence that the event actually did occur (Sharman, Manning, & Garry, 2005).

**Props, Drawings, and Photographs**

When witnesses or victims encounter difficulty remembering persons or events, they may be asked to examine props, drawings, or photographs (or to revisit the scene of the event) in order to facilitate memory. Although it is clear that such physical context reinstatement procedures can indeed sometimes aid recall (e.g., Koutstaal, Schacter, & Johnson, 1999; Salmon & Pipe, 2000), it is equally clear that, like many memory retrieval procedures, they can sometimes impair memory and/or trigger creation of false memories as well.

For example, props or other aids used to remind the person of some target information may impair memory for noncued information (e.g., see Koutstaal et al., 1999, for an illustration with use of photographs to facilitate event memory). As well, like forensic interviews, props, photos, and other retrieval aids may themselves incorporate misinformation and thereby lead the interviewee to falsely remember the misinformation as true. Schacter and his colleagues (Schacter, Koutstaal, Johnson, Gross, & Angell, 1997) demonstrated that (particularly older) persons who were shown misleading photos after having previously seen a videotape were later more likely to “remember” that events depicted in the photos had been in the original videotape.

Photos can also bias memory for auditory information. Schacter (1996, p. 70) reported an experiment in which college students looked at photographs of people they had heard speak in either a pleasant or irritating tone of voice. Later, they were asked to recall the speaker’s tone of voice. They were cued with photographs of the speaker posing with either a slight smile or slight scowl. Regardless of the actual original tone of voice of the speaker, subjects who were cued with a smiling face were more likely to “remember” a pleasant tone of voice, and those cued with a scowling face were more likely to “remember” an irritating tone of voice. In other words, memory was greatly influenced by the retrieval cue, drifting toward consistency with the cue.

Unfortunately, autobiographical memory can be similarly distorted through exposure to photographs. Lindsay and his colleagues (Lindsay, Hagen, Read, Wade, & Garry, 2004) asked participants to work at remembering three childhood events (two true and one false, as established by their parents). Half of the participants were also given their school class photos from the years of the target events. The use of the photos significantly increased the rate of false memories of the target pseudo-events, even though they did not directly depict or imply them.
SELF-GENERATED MISINFORMATION

Updating and Reevaluating

As noted earlier, memories and beliefs are continually revised in response to new information and beliefs. This process is reflected in previously reviewed phenomena such as hindsight and misinformation effects, and other schematic reconstructive memory processes. However, studies concerned with the retrospective bias have shown that reports of our own past attitudes or behaviors are biased by current attitudes or recently acquired information. Recollections of past political attitudes, for example, tend to be distorted significantly by current political beliefs (e.g., Dawes, 1991; Levine, 1997). Similarly, recollections of one's own behavior tend to change to conform to newly acquired information about how one should behave. That is, we reconstruct memory of the past so that we believe we behaved in a more consistent, sensible, or desirable way than we actually did. Generally, current self-views, goals, and beliefs bias memories of past selves and behavior (and vice versa; Wilson & Ross, 2003).

Mood and the Affect Infusion Model

It is important to note that mood and other affective states can exert both direct and indirect effects on judgments. For example, the phenomenon called mood congruent retrieval has been shown to affect retrieval through contextual cuing processes (whereby mood serves as a biasing retrieval cue for mood consistent content), as well as motivated retrieval processes, or the desire to avoid mood incongruent memories (e.g., Bower, 1992; Mineka & Nugent, 1995). More generally, Forgas and East (2003) define “affect infusion” as “the process whereby affectively loaded information exerts an influence on, and becomes incorporated into, a person's cognitive and behavioral processes, entering into his or her constructive deliberations and eventually coloring the outcome in a mood-congruent direction.” They provide evidence that affect can indirectly and implicitly influence judgments by affecting access to (i.e., memory of) and use of knowledge and incoming information—and can exert explicit influence when judges simply infer a response based on their current affective state (see the entire January 2002 issue of Psychological Inquiry, 13(1), devoted to Forgas's affect infusion model and related data). In effect, affective states can result in all the same biases in memory and judgment characteristic of schematic processing (see van den Bos, 2003, for specific applications to justice judgments).

Retrieving and Retelling

A particularly pervasive source of misinformation is one's own repeated retrievals and recounts. Unfortunately, although failure to rehearse information tends to impair memory, rehearsal can itself impair or distort memory, especially when the rehearsal is selective or biased, or involves retrieval in a form different from encoding. Some neuroscientists have provided evidence they believe demonstrates that memories become un-
stable during the act of retrieval (see also Estes' (1997) “perturbation” account of memory distortions), thereby requiring new consolidation when the memory is returned to storage. In turn, each reconsolidation can incorporate accurate information as well as misinformation acquired during retrieval and can delete information previously in memory (Nader, 2003; Nader, Schafe, & le Doux, 2000). Although the propositions of Nader and his colleagues are controversial, it is clear that retrieval is not benign.

The phenomenon of “retrieval-induced forgetting,” for example, refers to circumstances in which selective retrieval of some aspects of an event can lead to selective forgetting of others (Barnier, Hung, & Conway, 2004). When retrieval occurs in a mode that is different from that in which the event was experienced, memory can be distorted. Witness attempts to verbally describe perpetrators have been shown to impair later attempts to identify the perpetrator in a lineup—a phenomenon labeled “verbal overshadowing” (see Schoeler & Miesner, this handbook, Vol. II, for a detailed discussion). This can also occur when retrieval requires the person to selectively extract information (e.g., How many times did...?) or to organize or judge the event in terms different from those that occurred when it was originally witnessed (see Davis & Friedman, this volume, and the next section on recounts). The wording one uses to describe some aspects of an event can affect memory for other features, such as duration (Pedersen & Wright, 2002). Furthermore, biased retrievals induced by forensic, therapeutic, or social interactions can induce selective memory and distortion. Even attempts to suppress memory can successfully impair it (Anderson et al., 2004; Anderson & Green, 2001).

Telling and Retelling: Distortion through Conversational Recountings

Although attempts to retrieve information are often themselves sufficient to impair or distort memory, perhaps even greater problems occur as a result of conversational recounts. Even the simple act of repeating a statement can increase the strength of one’s belief in its truth. Memory researchers have dubbed this effect the “illusory truth effect” (e.g., Arkes, Boehm, & Xu, 1991; Arkes, Hackett, & Boehm, 1989; Begg, Anas, & Farinacci, 1992). The effect occurs from the mere act of repetition, even when statements are simply repeated in the laboratory, with no implication the statement is true, and out of context, without the personal involvement and very real consequences inherent in case-relevant testimony. Furthermore, even in the absence of any input from a conversational partner (such as alternative accounts, leading or misleading questions, feedback, therapeutic suggestions and procedures, etc.), persons asked to describe witnessed materials or events (a) bias their descriptions to reflect their own goals (for example, entertainment, deception, or informing accurately) or characteristics of the listener (for example, toward consistency with the listener’s known attitudes or toward selective inclusion of aspects of interest to the listener), (b) subsequently report believing these biased descriptions, and (c) falsely recall the original stimuli as consistent with their biased descriptions (e.g., Higgins & Rholes, 1978; Higgins & McCann, 1984).
Pasupathi (2001) proposed two general principles governing conversational recounting of past events: co-construct (the joint influences of speakers and interpersonal contexts on conversational reconstructions) and consistency (the influence of initial conversational reconstructions on subsequent memory).

Considerable evidence indicates that all recountsings are shaped by (1) the mere expectation that there will be listeners; (2) the speaker’s own goals with respect to the listener(s); (3) characteristics of listeners that affect expectations concerning their likely interest, understanding, or approval of specific content; and (4) listener behaviors and reactions during the interaction. In addition, aspects of the context may affect what is viewed as appropriate, possible, or desirable to discuss. Hence, reports may be adjusted with respect to the reported gist of the event, the nature of opinions expressed about the event, which of many aspects or specific details of an event are discussed, or the interpretation and evaluations of the events; and through additions and distortions designed to please, entertain, or protect oneself from negative reactions by the listener (see reviews by Clark, 1996; Davis & Friedman; Davis, Kemmelmeier, & Follette, 2005; Dudukovic, Marsh, & Tversky, 2004; Holgraves, 2002, this volume; Hyman, 1994; Krauss & Chiu, 1998; Marsh & Tversky, 2004; Pasupathi, 2001; Sedikides, 1990; Todorov, 2002; Tversky & Marsh, 2000). Each such choice affects subsequent memory—both the amount recalled and the specific types of errors in recall (e.g., Tversky & Marsh, 2000).

Such biased reports of witnessed events take place in a wide variety of social interactions, such as parent-child interactions, professional interviews with victims and suspects, therapeutic interactions, and the many conversations that might take place between co-witnesses or between a victim and supportive friends and family prior to reports to police. Indeed, the more informal conversations, which no doubt take place in greater numbers and variety, may shape accounts more powerfully than the professional interactions we have tended to study.

Dudukovic et al. (2004) reviewed evidence indicating that strict accuracy is rarely the goal of informal interactions and that people widely report lying and otherwise distorting autobiographical and other information in everyday conversations. Such distorted accounts can exert long-term effects on memory. Indeed, accounts given to entertain (likely more typical of everyday conversations than those given with the strict goal of accuracy) are qualitatively different and result in poorer overall memory for the original information than those given with the goal of accurate recounting (e.g., Dudukovic et al., 2004; Wade & Clark, 1993). If the distorted recountsings do elicit reinforcers, one would expect them to be repeated. Moreover, a variety of consistency and other motivations serve to maintain these reconstructed versions.

Once these distorting conversations have taken place, subsequent memory is biased in the direction of the distorted reports—i.e., a “saying is believing” effect (see review in Holgraves, 2002). Pasupathi argued that conversational recountsings influence subsequent memory because they “function as a rehearsal that is selective, is schematic, and can lead to source memory confusions,” (p. 658). Dudukovic et al. (2004) also suggest that retellings affect memory via creation of schemas that are later used to guide reconstruction of events: “Schemas are used during retelling to re-organize events, to select
some details and omit others. The schema provides a top-down structure for events, and thus allows for elaborations in the retelling to bridge across and interpret events" (p. 127).

Over time, a witness who discusses witnessed events with others can be expected to provide biased reports to those others and ultimately to come to believe the distorted accounts and report these false recollections to still others. Even the anticipation of recounting to a specific audience (e.g., children versus adults) tends to shape memory for the narrative to be reported (e.g., Adams, Smith, Pasupathi, & Vitolo, 2002; Schuurmans & Vandierendonck, 1985). And, given the many and varied conversations and interviews any given witness can be expected to experience, multiple conversation-related distortions can be expected to accumulate.

Dudukovic et al. (2004) also noted that the difference in organizational structures during retellings (such as informal conversations involving witnesses) and the target recall (such as during a forensic interview or trial testimony) can impair accuracy. When the story must suddenly be restructured at recall, retrieval pathways do not match the way the information is stored. Indeed, Dudukovic et al. found that when storytellers had to switch perspectives at recall, the new chronological structure aided recall of information not previously recounted in accounts given to entertain, whereas it impaired memory for information that was previously recounted (and hence tightly tied to the story schema), presumably because the organization of that information during the previous storytelling could no longer be used.

Adaval and Wyer (2004) examined the impact of making intervening judgments and reports on later memory for a conversation. Participants witnessed a conversation with the sole objective of comprehension. Subsequently, they either wrote their impressions of the characters involved or described the sequence of interaction, and later completed recognition tasks for aspects of the original conversation. Communicating impressions of the protagonists decreased recognition of verbal aspects of the conversation, but nonverbal behaviors; whereas reporting on the sequence of events decreased recognition of both verbal and nonverbal behaviors. The authors likened their findings to the “verbal overshadowing” (e.g., Schooler & Engstler-Schooler, 1990) findings in the eyewitness identification literature (see also Krauss & Chiu, 1998, for a similar interpretation). Consistent with the “bin” model of social memory (Wyer & Srull, 1989), the authors described the processes promoting distortion as follows:

At the time we witness the interaction, our only objective may be to understand what the protagonists said and did. Later, however, we may be called upon to use the information we have acquired for a reason we did not anticipate. . . . To attain this objective, we presumably retrieve a mental representation of the interaction that we had formed at the time we first observed it and construe its implications for the communication we intend to deliver. In the process of generating the communication, however, we are likely to construct a new representation of the experience whose content and implications differ in several respects from the one we had formed earlier. . . . Once this new representation is formed, it can be used as a basis for reconstructing the initial events we had observed. Our reliance on the new representation can sometimes distort our memory for the original events and in some cases, can lead to memory errors. (Adaval & Wyer, 2004, p. 450)
Deliberate Fabrication: Lying and Feigning Amnesia

Recent research has begun to investigate the role of providing deliberately false accounts of the provider's own subsequent memory. Theoretically, deliberate fabrications—either through knowingly providing false information or through feigning failure to remember—might affect veridical memory through several distinct theoretical processes (e.g., Christianson & Bylin, 1999). First, either focusing on false information or diverting attention from true information in order to feign amnesia can interfere with rehearsal of true information. Second, as suggested by the previously reviewed research on “retrieval-induced forgetting,” selective retrieval of some information might selectively impair memory for the nonreported true information that had been suppressed in order to lie or feign amnesia (e.g., Anderson, Bjork, & Bjork, 1994; Christianson & Bylin, 1999; Ciranni & Shimamura, 1999; Macrae & MacLeod, 1999; Shaw, Bjork, & Handal, 1993; Wright, Loftus, & Hall, 2001). Third, the person may have constructed new information or distorted aspects of witnessed information in order to effectively lie or feign amnesia. Particularly if one developed elaborated scenarios or visualizations of the new or distorted version of events, one might later experience a source-misattribution of the new version to the original event instead of one's own constructions (e.g., Johnson, Hashtroudi, & Lindsay, 1993).

Finally, although the first three processes would tend to impair veridical memory, a fourth, suggested by Polage (2004), would tend to facilitate veridical memory. That is, in order to lie convincingly, the person may have to remember (and hence rehearse) the true information in order to ensure that false information is reported. In addition, this retrieval would occur under conditions involving a clear tag indicating that the new information is false. Indeed, there is evidence that each of these processes occurs under some circumstances.

Polage (2004) tested the fourth process, using the familiar imagination inflation method (Garry et al., 1996). However, instead of being asked to imagine a particular event, participants were asked to lie, falsely claiming that some of the events actually happened to them. The authors found that the most common effect of this procedure was to deflate ratings (given 1 week later) of the likelihood that the falsely reported event had actually occurred. However, a minority of participants (10–16%) in two studies increased their certainty to the maximum rating. Hence, while lying tended to result in “fabrication deflation” (Polage, 2004) for most subjects, some developed great confidence that the lied-about event had actually occurred.

Several studies (Bylin & Christianson, 2002; Christianson & Bylin, 1999; Oorsouw & Merckelbach, 2004) have found evidence of memory impairment among those asked to feign amnesia. These have differed in important methodological details from the Polage studies, however. Participants in the Bylin and Christianson (2002) and Christianson and Bylin (1999) studies read crime narratives while imagining themselves in the role of perpetrator. They were then asked either to report the narrative veridically or to report it as if trying to evade responsibility for the crime, including by feigning memory loss. Oorsouw and Merckelbach (2004) had participants actually engage in a mock crime and then offer veridical or simulations of amnestic reports. In all three studies, participants who reported falsely to evade responsibility and/or simulate memory failure were
less accurate when subsequently asked to report the truth, either immediately or 1 week later. Furthermore, the simulators were equally confident in their memories as previously untested truth-telling controls (Oorsouw & Merkelbach, 2004). Unlike Polage’s (2004) participants, who were specifically asked to lie about whether a specific event had taken place, participants in these studies were allowed to fabricate, distort, or feign amnesia for a variety of details to accomplish their deceptive goals. Hence, they may have constructed more elaborate general scenarios, distorted true events, and added false events. These processes may have facilitated source monitoring errors and provided less clear tags for which things were true and which false than Polage’s procedure of lying about specific events that did not happen.

Pickel (2004) tested the effects of fabrication in witnesses to a robbery. Witnesses correctly described the robber, fabricated a description of him or of someone else, or did not describe anyone. One week later, those who had previously fabricated a description of the robber and those who did not previously describe him remembered fewer correct details than did truthful witnesses or those who fabricated about another person. Those who fabricated about the robber also reported more incorrect details than truthful or noninterviewed witnesses.

Evidence that deliberate fabrications can impair veridical memory is of considerable practical significance, given the prevalence of both lying and feigning amnesia among criminal defendants. Of particular interest is the fact that police interrogators are trained to elicit false accounts from offenders (for example, admitting to inaccurate facts or scenarios that would render their crimes less serious) as a stepping-stone approach to eventually getting the full truth (e.g., Inbau, Reid, Buckley, & Jayne, 2001; see Davis & O’Donohue, 2004, for a review). Police are generally insensitive to the potential of their procedures to elicit false accounts and even less aware of the potential of their procedures to impair memory such that the truth is lost altogether.

Personal Routines and Repeated Events

Repetitive events become easily confused, such that one can lose track of which specific occurrences took place in which event. In line with the tendency for source similarity to increase source confusion (see Wyer, 2004, for a review of effects of similarity between events on event-specific memory), the more additional similar events intervene between the target event and attempt to recall, the greater the likelihood of confusion between them or failure to remember the target at all. Hence, schematic inferences concerning what one was likely to have done, or what was likely to have occurred in the instance in question, tend to replace veridical memory (see review in Haber & Haber, 2000). This is of particular concern for parties to cases involving routinized professional interactions, such as doctor-patient, attorney-client, and others.

CONCLUSIONS

While often witness memory is not only valuable, but crucial, it must be appreciated that even the most scrupulously honest and sincere witness cannot be presumed to be entirely accurate. Human information processors are simply overwhelmed by the magnitude of
incoming information and efforts to process and remember it accurately, leaving us vulnerable to error. Some information is necessarily lost, and other information may be confused or distorted. Misinformation is introduced through countless internal and external mechanisms. We have shown that misinformation can create errors in memory for events that were actually witnessed, and that it can also lead to the planting of entirely false beliefs or memories. It is crucial for the various participants in the legal system to gain greater understanding of the magnitude of the potential for distortion in witness memory and of the many and varied sources of memory distortion for events relevant to a wide variety of litigated events. Unfortunately, expert testimony has been largely restricted to criminal trials and issues of eyewitness identification, child witnesses, and recovered memories (which is also offered in civil trials). This represents only the tip of the iceberg of memory issues with potential relevance to the courts. Davis & Friedman (this volume), for example, point to pervasive testimony involving memory for statements in both civil and criminal trials. Yet memory experts have yet to penetrate barriers to introduction of expert testimony on conversational memory. They have come a long way with their contributions to the legal system. Still, given the varied sources of distortion and the many events for which witness memory is an issue, we can only expect the range of testimony from witness memory researchers to expand in the future.

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