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National Program on Technology Enhanced Learning (NPTEL)

Presents



Course Title:

Basic Cognitive Processes

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Lecture 36: Everyday Memory & Memory Errors!!!

I am 34 years old and since I was eleven I have had this unbelievable ability to recall my past....I can take a date between 1974 and today, and tell you what day it falls on, what I was doing that day and if anything of great importance...occurred on that day I can describe that to you as well....Whenever I see a date flash on the television (or anywhere else for that matter) I automatically go back to that day and remember where I was, what I was doing, what day it fell on and on and on and on and on. It is non-stop, uncontrollable and totally exhausting....I run my entire life through my head every day and it drives me crazy!!!

Excerpt: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. *Wadsworth Publishing*. 4th Ed. (pp. 204).

- The experiences revealed are those of a woman called A.J. who can remember what happened on each day of her life, from the age of 11 onwards.
- She contacted James McGaugh, a memory researcher at the UCLA. & has undergone a series of tests etc. details of which are published in a paper Parker, Cahill & McGaugh (2006).
- A.J. describes her memories as happening automatically & not being under her conscious control.

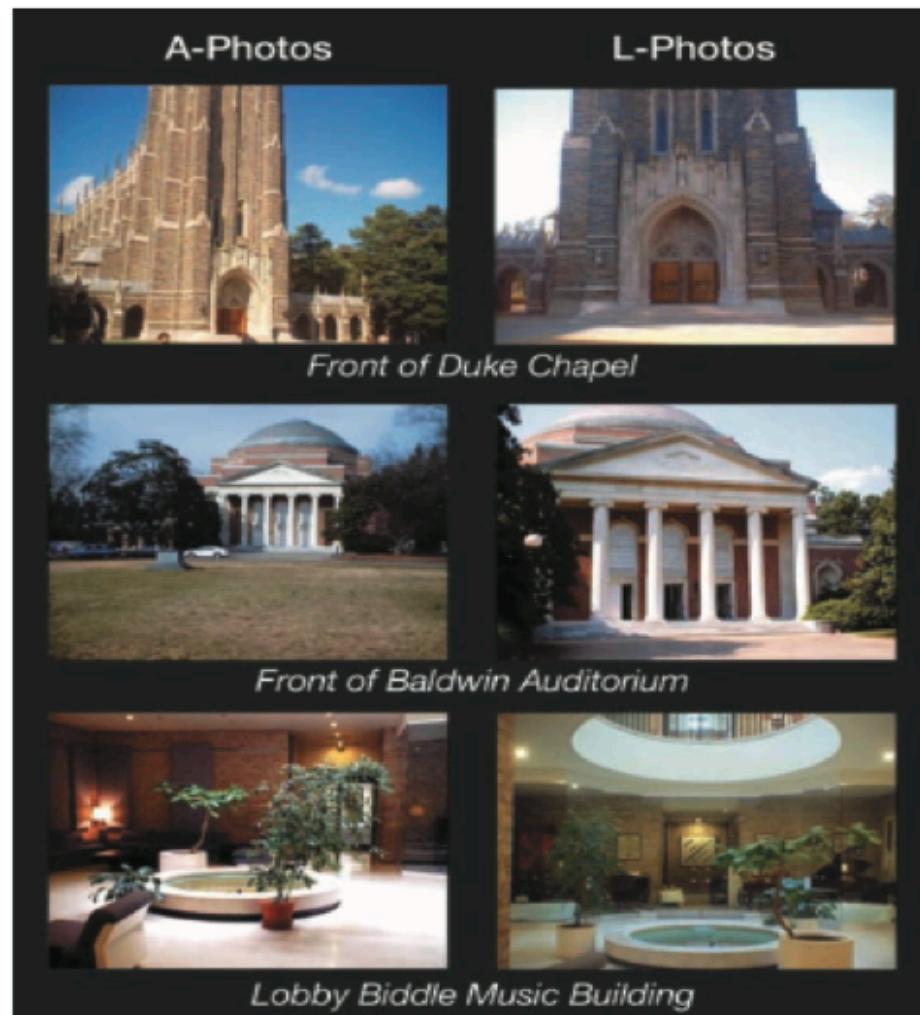
- When given a date she would, within seconds relate personal experiences and also special events that occurred on that day, & these recollections proved to be accurate when checked against a diary of daily events that A.J. had been keeping for 24 years.

- A.J.'s memories cause her distress because she has trouble turning off the "movie" of her life & she cannot forget negative events from her past, though positive memories keep her "sane".
- A.J. has an exceptional memory for personal experiences, things that make up what is called *autobiographical memory*.

Autobiographical Memory

- has been defined as recollected events that along to a person's past (Rubin, 2005). e.g an AM of a childhood birthday party might include images of the cake, people at the party, games being played (episodic memory) and also when the party occurred, where was your family living at the time, general idea of parties (Semantic memory) (Cabeza & St. Jacques, 2007).
- AM are far more complex than memory that might be measured in the laboratory by asking a person to remember a list of words. AM are multidimensional because they consist of spatial, emotional & sensory components.

- Greenberg & Rubin (2003) found that patients who had lost their ability to recognise visual objects because of damage to visual areas of the cortex, also experienced a loss to AM.
- Cabeza & coworkers (2004) measured the brain activation caused by two sets of stimulus photos - one that the participant took and another set that was taken by someone else
- These photos were taken by 12 Duke University students who were asked to take pictures of 40 specified campus locations over a 10 day period.

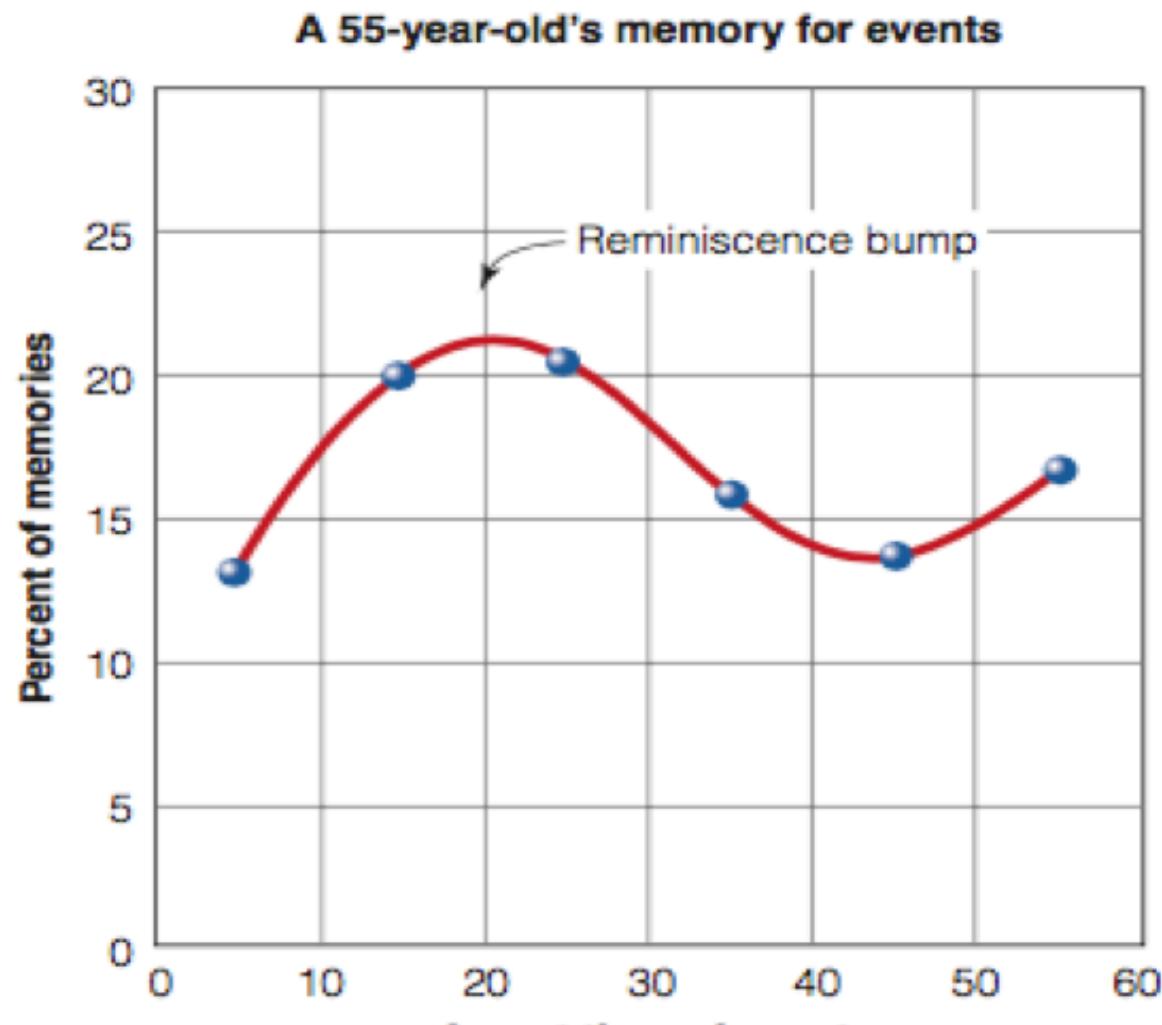


● **FIGURE 8.1** Photographs from Cabeza and coworkers' (2004) experiment. A-photos ("autobiographical photographs") were taken by the participant; L-photos ("laboratory photographs") were taken by someone else.

Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.1; pp. 205).

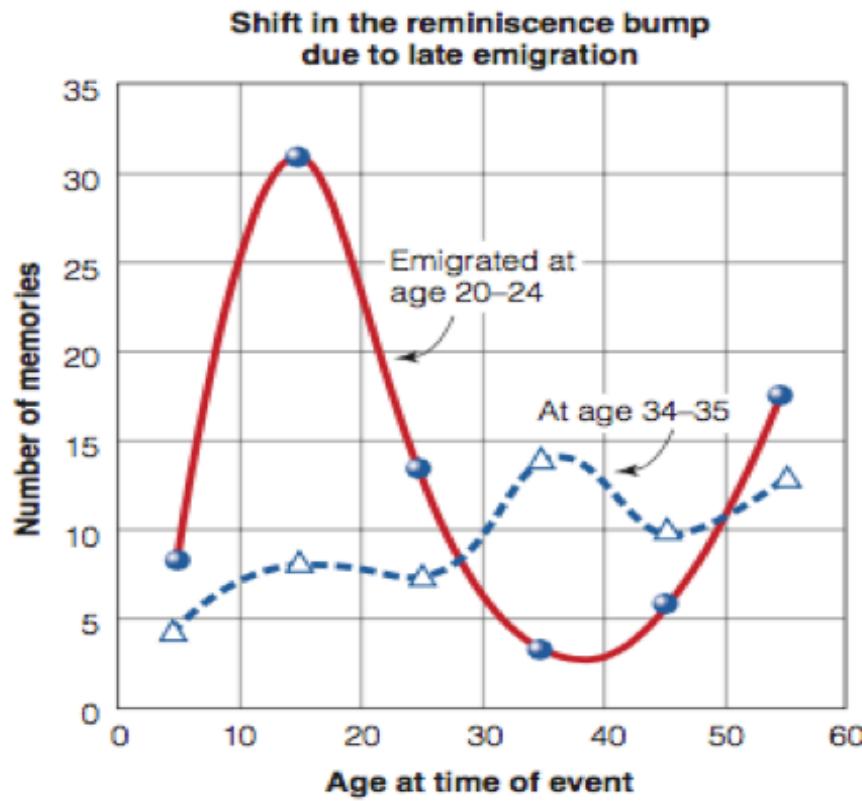
- After taking the photographs, each participant was shown his/her own photos (A - photos) or photos taken by other participants (L- photos).
- A few days later they were shown photos (L - photos) they had seen before & some new they had never seen. & they were asked to indicate whether each stimulus was an A - photo, a seen L - photo or a new L - photo.
- The brain scans of these participants showed that while A photos & L - photos activated many of the same structures in the brain - mainly ones like the MTL that are associated with episodic memory; the A- photos also activated regions associated with processing information about self, with memory for visual space & those linked with recollection.

- These activations reflect the richness of experiencing autobiographical memories as compared to laboratory memories.
- What kind of memories stay on?
 - personal milestones; transition points etc.
 - When participants over 40 are asked to remember events in their lives; memory is found to be high for recent events and for events experienced in the adolescence & early adulthood - this is called **reminiscence bump**.



● **FIGURE 8.3** Percentage of memories from different ages, recalled by a 55-year-old, showing the reminiscence bump. (Source: R. W. Schrauf & D. C. Rubin.)

Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.3; 207).



● **FIGURE 8.4** The reminiscence bump for people who emigrated at age 34 to 35 is shifted toward older ages, compared to the bump for people who emigrated between the ages of 20 to 24. (Source: R. W. Schrauf & D. C. Rubin, "Bilingual Autobiographical Memory in Older Adult Immigrants: A Test of Cognitive Explanations of the Reminiscence Bump and the Linguistic Encoding of Memories," *Journal of Memory and Language*, 39, 437–445, Fig. 1. Copyright © 1998 Elsevier Ltd. Republished with permission.)

Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.4; 207).

- Possible Explanations:
 - Rathbone & coworkers (2008) propose that memory is enhanced for events that occur as a person's self image or life - identity is being formed: the self image hypothesis.
 - The cognitive hypothesis proposes that periods of rapid change that are followed by stability cause stronger encoding of memories. adolescence & young adulthood fit this description.
 - Finally, the cultural life script hypothesis distinguishes between person's life story i.e. all events in a person's life & a cultural life script, i.e. events happening at a particular time.

TABLE 8.1 Explanations for the Reminiscence Bump

Explanation	Basic Characteristic
Self-image	Period of assuming person's self-image.
Cognitive	Encoding is better during periods of rapid change.
Cultural life script	Culturally shared expectations structure recall.

Table: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. *Wadsworth Publishing*. 4th Ed. (Table 8.1; 207).

- **Memory & Emotion:** Personal events such as the beginning or ending of relationships, or events experienced by many people simultaneously like the 9/11 attacks seem to be remembered more easily & vividly than less emotionally charged events.
 - LaBar & Phelps (1998) tested participant's ability to recall arousing words and neutral words immediately after they were presented & observed better memory for arousing words.
 - Dolcos & coworkers (2005) tested participants' ability to recognise emotional & neutral pictures 1 year after they were presented and observed better memory for the emotional pictures.
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- the Amygdala seems important in memorising emotional information. For example: Dolcos & coworkers obtained fMRI scans while people were remembering lists of words and revealed higher amygdala activity for emotional words.
- Similarly, the patient B.P who had amygdala damage had preserved memory for non - emotional part of a story shown to him via a slide show but much worse memory for the emotional part of a story narrated to him (Cahill et al., 1995).
- It appears therefore that emotional may trigger mechanisms in the amygdala that help us remember events that are associated with emotions.

- **Flashbulb Memories:** What were you doing when you heard about the 9/11 attack? India won the Cricket WC?
- memories that refer to memory for circumstances surrounding hearing about shocking highly charged events but not memory for the event itself.
- Acc. to Brown & Kulik, there is something special about the mechanisms for flashbulb memories.
- these memories not only occur under highly emotional circumstances, but also are remembered for long periods of time & are specially vivid and detailed. they referred to the mechanism as a “Now Print” mechanism.

- However, it has been shown that although people report that these flashbulb memories are especially vivid, they are often inaccurate or lacking in detail.
 - for example, Neisser & Harsch (1992) did a study in which they asked participants about how they had heard about the explosion of the space shuttle Challenger.
 - participants in the experiment filled out a questionnaire within a day after the explosion and then filled out the same questionnaire 2.5 - 3 years later.
- It was found that for a large number of participants they first reported hearing about the explosion at one place but later changed that to hearing on TV.
-

I was in my religion class and some people walked in and started talking about [it]. I didn't know any details except that it had exploded and the schoolteacher's students had all been watching, which I thought was so sad. Then after class I went to my room and watched the TV program talking about it, and I got all the details from that.

Excerpt: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. *Wadsworth Publishing*. 4th Ed. (p. 210).

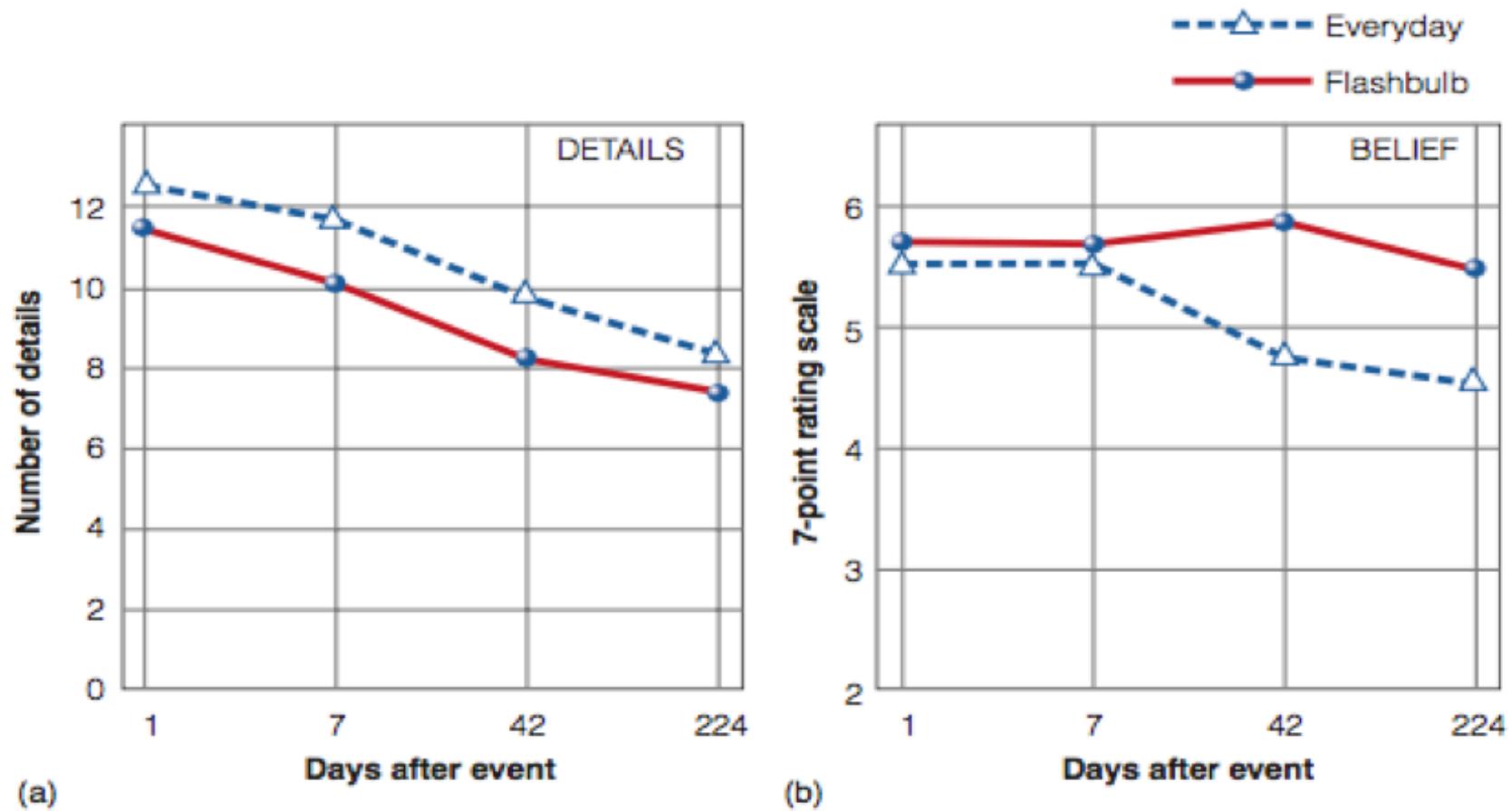
Two and a half years later, her memory had changed to the following:

When I first heard about the explosion I was sitting in my freshman dorm room with my roommate, and we were watching TV. It came on a news flash, and we were both totally shocked. I was really upset, and I went upstairs to talk to a friend of mine, and then I called my parents.

Excerpt: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. *Wadsworth Publishing*. 4th Ed. (p. 210).

- Similarly, another experiment by Talarico & Rubin (2003) tested a group of college students on September 12, 2001 for their memory of when they heard of the 9/11 World Trade Tower incident.
- Some questions were about (“When did you first hear the news?”) & other were similar questions about an everyday event in the person’s life that occurred in the days just preceding the attacks.
- after picking the everyday event, the participant created a 2 - 3 word description that could act as a cue for the event, in the future. Some participants were re - tested 1 week later, some 6 weeks later & some 32 weeks later.

- One result of this experiment was that the participant remembered fewer details and made more errors at longer intervals after the events, with little difference between the results for the flashbulb and everyday memories.
- However, another result did indicate a difference between the flashbulb memories & everyday memories: People's *belief* that their memories were accurate stayed high and constant for the flashbulb memories but dropped for the everyday memories.
- Thus the idea that flashbulb memories are special seems based partly on the idea that people **think** that these memories are stronger and more accurate, though in **reality** there was little or no difference in the amount & accuracy of the memories.



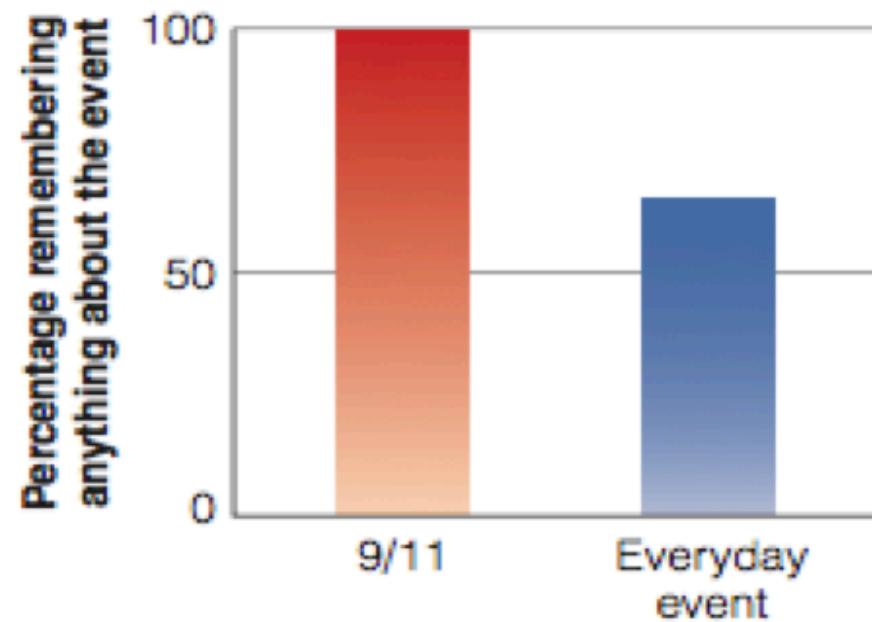
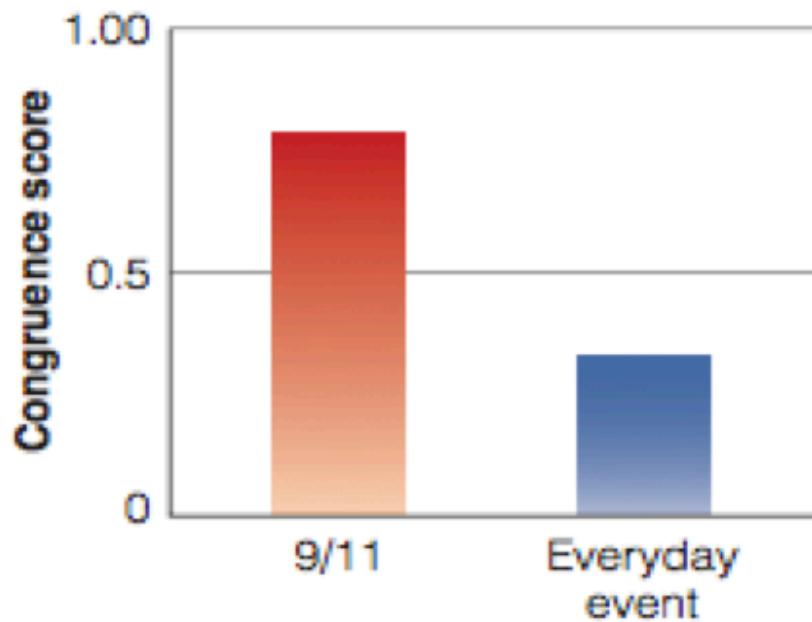
● **FIGURE 8.8** Results of Talarico and Rubin's (2003) flashbulb memory experiment.
 (a) The decrease in the number of details remembered was similar for memories of 9/11 and for memories of an everyday event. (b) Participants' belief that their memory was accurate remained high for 9/11, but decreased for memories of the everyday event. (Source: J. M. Talarico & D. C. Rubin, "Consistency and Key Properties of Flashbulb and Everyday Memories," *Psychological Science*, 14, 5, Fig. 1 & 2. Copyright © 2003 American Psychological Society. Reproduced by permission.)

Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.8; p. 211).

- In another experiment, shortly after the 9/11 attacks, Davidson & coworkers (2006) asked participants questions such as “How did you hear the news?”, “Where were you when you heard about the attack?”, and “Who was present?”. They also had participants answer questions for an everyday event - the most interesting event that had occurred in the few days preceding 9/11.
- One year later, the participants were contacted for a surprise memory test in which they were asked the same questions as before.

- they were given 0 points if they could not remember or remembered very inaccurately, 1 point if their memory was partially correct or less specific than the original memory & 2 points if their memory was very similar to the original report.

- The resulting congruence score was determined by adding points for all the questions and scaling the total so that 1.0 was the maximum score possible.
- Congruence score for 9/11 memories was fairly high (0.77) 1 year later, but the score for everyday events was much lower (0.33).
- Also, whereas all the participants had no trouble remembering 9/11, only 65% of them were able to recall what the everyday event was, even after being given the cue.



● **FIGURE 8.9** Results of Davidson et al.'s (2006) flashbulb memory experiment. (a) Congruence score for 9/11 memories and memories for the everyday event, measured 1 year after the events. (b) Percent of participants who were able to remember at least something about the 9/11 and everyday events. Note that 35 percent of the participants could not remember anything about the everyday event. (Based on data from Davidson et al., 2006, and personal communication.)

- The results of both the studies show that memory for flashbulb events does decline over time & are not like a photograph (as earlier proposed).
- The poor recall of everyday events in the latter study could be due to lack of good quality retrieval cues.

- Better memory for events like 9/11 is probably due to 2 characteristics: first, they involve high emotions & second, that of the added rehearsal viz. the *narrative rehearsal hypothesis*.
- multiple repetitions of these kinds of events can be come across in the media, conversations & discussions.

- **The Constructive Nature of Memory:** - what people report as memories are partly constructed by them based on what actually happened plus additional factors such as the person's knowledge, experiences & expectations.
- The mind constructs memories based on a number of sources of information.
- An interesting example was Frederick Bartlett's "War of the Ghosts" experiment, published in 1932 but which was run before WWI.
 - participants read the following story from Canadian Indian Folklore:
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THE WAR OF THE GHOSTS

One night two young men from Egulac went down to the river to hunt seals, and while they were there it became foggy and calm. Then they heard war cries, and they thought: "Maybe this is a war party." They escaped to the shore and hid behind a log. Now canoes came up, and they heard the noise of paddles and saw one canoe coming up to them. There were five men in the canoe, and they said:

"What do you think? We wish to take you along. We are going up the river to make war on the people."

One of the young men said: "I have no arrows." "Arrows are in the canoe," they said. "I will not go along. I might be killed. My relatives do not know where I have gone. But you," he said, turning to the other, "may go with them."

So one of the young men went, but the other returned home. And the warriors went on up the river to a town on the other side of Kalama. The people came down to the water, and they began to fight, and many were killed. But presently the young man heard one of the warriors say: "Quick, let us go home; that Indian has been hit." Now he thought: "Oh, they are ghosts." He did not feel sick, but they said he had been shot.

So the canoes went back to Egulac, and the young man went ashore to his house and made a fire. And he told everybody and said: "Behold I accompanied the ghosts, and we went to fight. Many of our fellows were killed, and many of those who attacked us were killed. They said I was hit, and I did not feel sick."

He told it all, and then he became quiet. When the sun rose, he fell down. Something black came out of his mouth. His face became contorted. The people jumped up and cried. He was dead. (Bartlett, 1932, p. 65)

- After his participants read this story, Bartlett asked them to recall it as accurately as possible. He then used the technique of **repeated reproduction**, in which the same participants came back a number of times to try to remember the story at longer & longer intervals after they first read it.
- At longer times after reading the story, participants forgot much of the information in the story. Most of the participant's reproductions of the story were shorter than the original and contained many omissions and inaccuracies.
- Could have happened that participants created their memories from two sources: one was the original story & the other was what they knew about stories in their own culture.

- The idea calls for the importance of **source monitoring**.

- **Source Monitoring** is the process of determine the origins of our memories, knowledge or beliefs (Johnson et al., 1993). e.g. Who told you about that latest gossip?
- source monitoring errors are also called **source misattributions**, because the memory is attributed to the wrong source.
- Source monitoring provides an example of the constructive nature of memory because we remember something, we usually retrieve the memory first and then use a decisions process to determine where that memory came from.

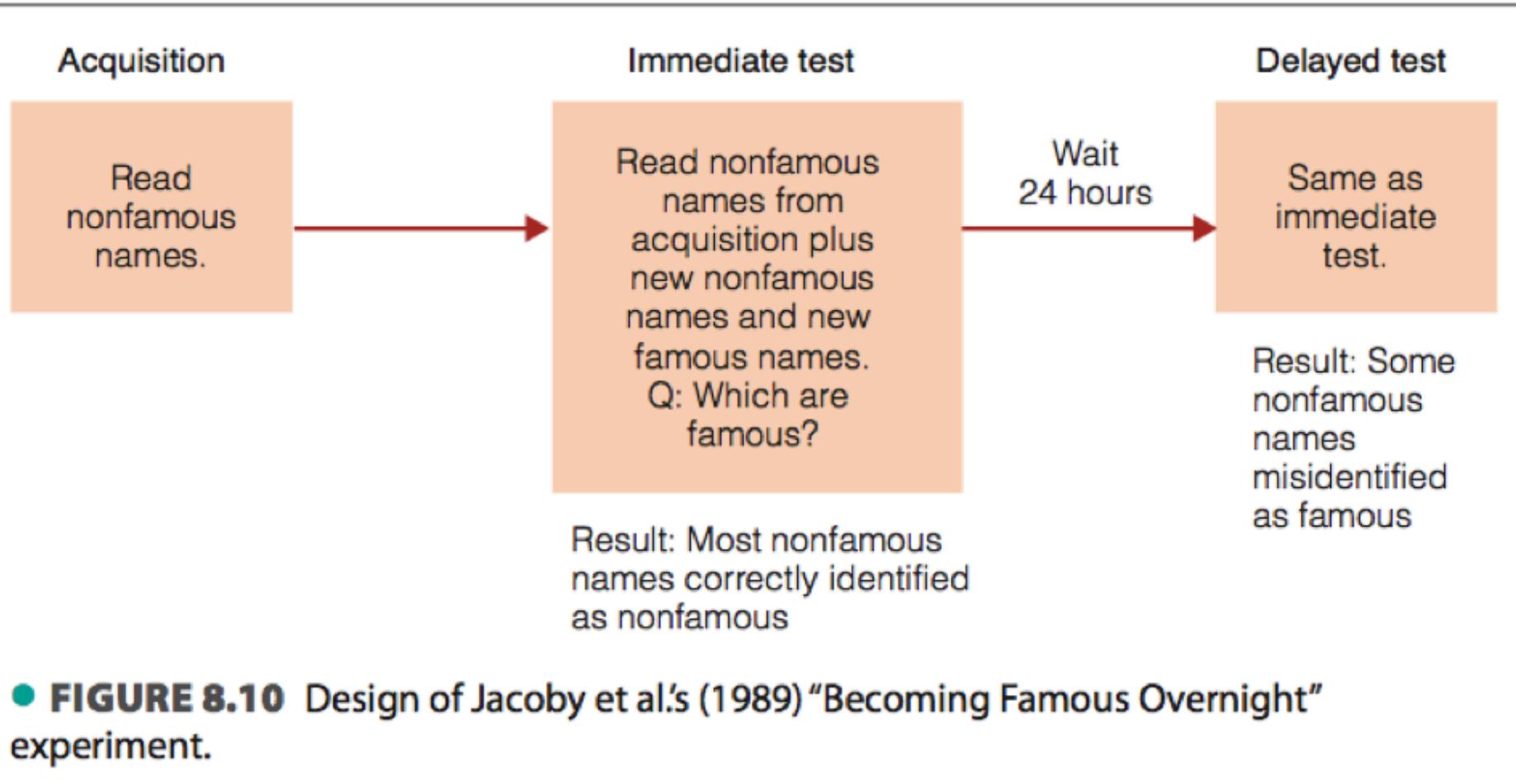
- Source monitoring errors are common, and we are often unaware of them.
- Some of the more sensational example of source monitoring errors are cases **cryptomnesia**, i.e. unconscious plagiarism of others. For example, Beatle George Harrison was sued for appropriating the melody from the song *He's So Fine* (originally recorded un 1960s group The Chiffons) for his song *My Sweet Lord*.

- Source Monitoring errors are important because the mechanisms responsible for them are also involved in creating memories in general.
- Johnson (2006) describes memory as a process that makes use of a number of types of information:
 - primary source of information is information from the actual event. &
 - additional sources of information that influence memory will include their knowledge of the world, preceding events etc.

- An experiment was done by Jacob and coworkers (1989) demonstrates an effect of source monitoring errors by testing participant's ability to distinguish between famous & non - famous names.
- In the acquisition part of the experiment, participants had read a number of non - famous names like Sebastian Weissdorf etc..
- In the immediate test, which was presented right after the participants saw the list of non famous faces, participants were told to pick out the names of famous people from a list containing 1) the non famous names they had just seen 2) new non famous names & 3) famous names.



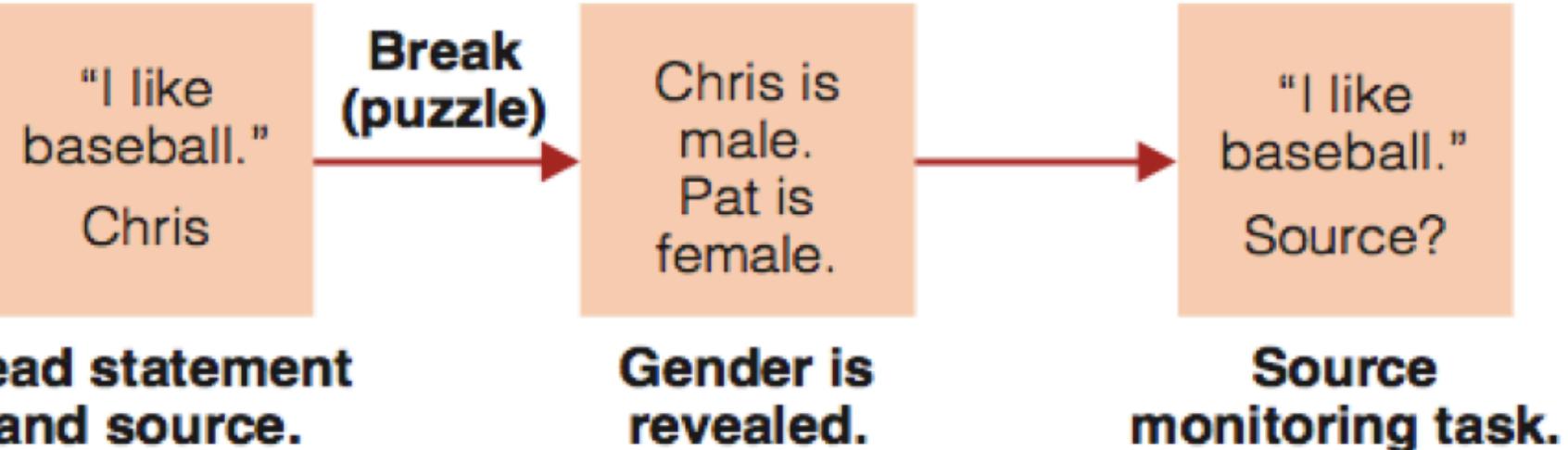
- Just before this test, they were told that all of the names they had seen in the first part were all non famous.
- Because the test had been given immediately, participants correctly recognised most of the old non famous names,
- But in the delayed test, 24 hours later, when tested on the same list of names; participants were more likely to recognise the old non famous names as famous.



● **FIGURE 8.10** Design of Jacoby et al.'s (1989) “Becoming Famous Overnight” experiment.

Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.10; p. 216).

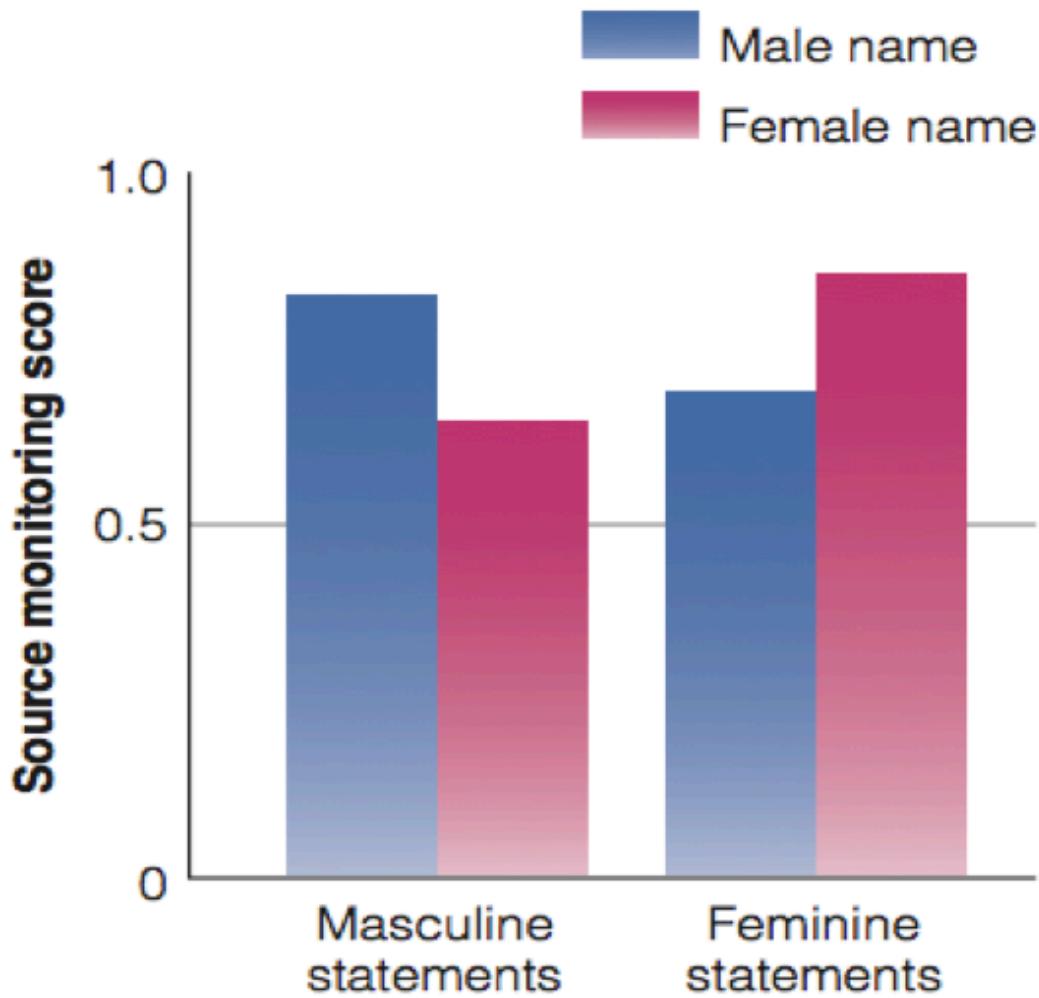
- Source Monitoring & Gender Stereotypes: Marsh & coworkers (2006) showed that people's performance on a source monitoring task can be influenced by gender stereotypes.



● **FIGURE 8.11** Design of Marsh and coworkers' (2006) source monitoring and gender stereotype experiment.

Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.11; p. 217).

- The results indicate that gender labels affected the participants memory judgments.
- 83% of the masculine statements were associated with the male, but only 65% of the masculine statements were associated with the female. & vice - versa.



● **FIGURE 8.12** Result of March and coworkers' (2006) experiment.

Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.12; p. 217).

- Real world knowledge also affects memory formation as people make inferences about stuff based on their experiences and knowledge.
- In a classic experiment, Bransford & Johnson (1973) had participants read a number of actions statements in the acquisition part of the experiment and then tested their memory for the statements later.

1. *Experimental Group*: John was trying to fix the birdhouse. He was pounding the nail when his father came out to watch him and help him do the work.
2. *Control Group*: John was trying to fix the birdhouse. He was looking for the nail when his father came out to watch him and help him do the work.

Excerpt: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (p. 218).

- Both the groups of participants were tested by presenting a number of statements that they had not seen and were asked to indicate whether they had seen before.

3. Experimental and Control Groups: John was using a hammer to fix the birdhouse when his father came out to watch him and help him do the work.

Excerpt: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (p. 218).

- Participants in the experimental group said they had previously seen 57% of the test statements, but participants in the control group said they had previously seen only 20% of the statements.
- Apparently, participants in the experimental group inferred from the use of the word *pounding*, that a hammer had been used, even though it was never mentioned.
- This is an example of participants' inference causing an error of memory.

● FIGURE 8.13

Design and results of Bransford and Johnson's (1973) experiment that tested people's memory for the wording of action statements.

More errors were made by participants in the experimental group, who identified more sentences as being originally presented even though they were not.

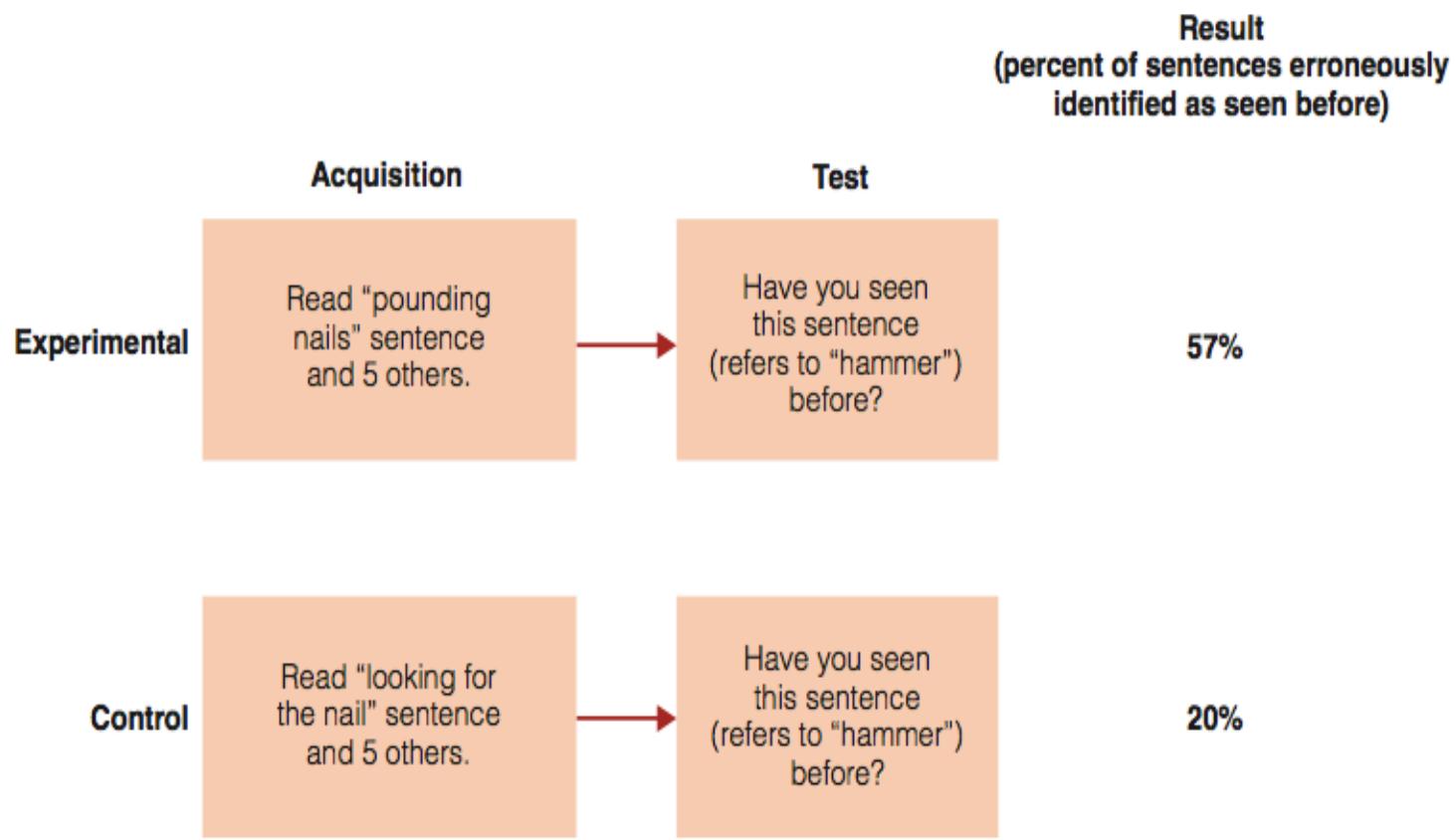


Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.13; p. 218).

- **The Misinformation Effect:** misleading information presented after a person witnesses an event can change how the person describes that event later.
- This misleading information is referred to as misleading post event information.
 - A classic experiment was done by Loftus & coworkers (1978) where participants saw a series of slides in which a car stops at a stop sign and then turns the corner & hits a pedestrian.

- Some of the participants then answered a number of questions including “Did another car pass the red Datsun while it was stopped at the stop sign?” Other participants (MPI group) answered “Did another car pass the red Datsun while it was stopped at the yield sign?”

- Those in the MPI group were more likely to say that they had seen the picture of the car stopped at the yield sign.
- In another similar experiment, Loftus & Palmer (1974) showed participants films of a car crash & then asked either 1) How fast were the cars going when they *smashed into* each other? or 2) How fast were the cars going when they *hit* each other?.
- Although both groups saw the same event, the average speed estimated by the participants who heard “smashed” was 41 miles per hour as opposed to those who heard the word “hit” who estimated that to be at 31 miles per hour.



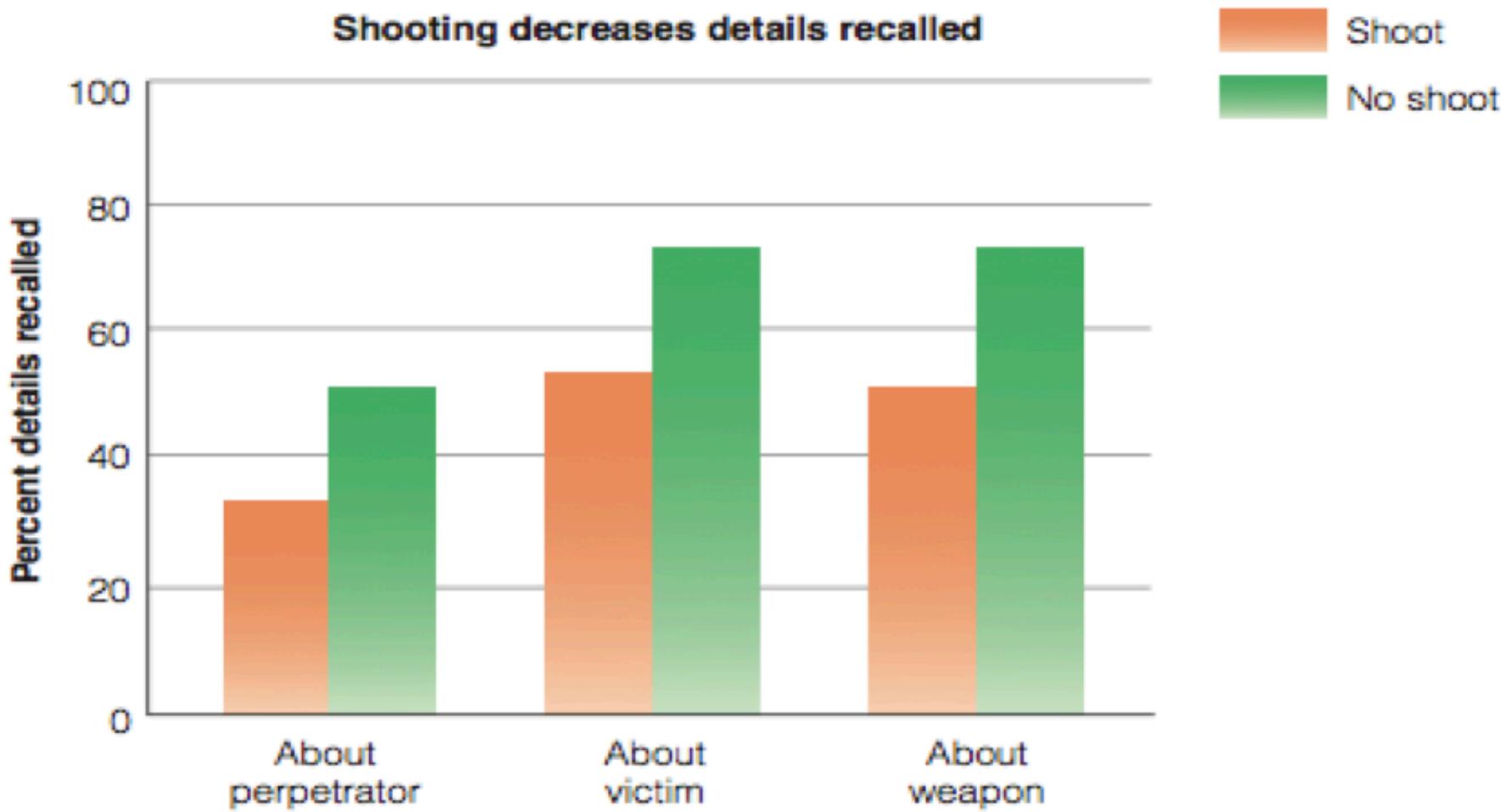
● **FIGURE 8.16** Participants in the Loftus and Palmer (1974) experiment saw a film of a car crash, with scenes similar to the picture shown here, and were then asked leading questions about the crash.

Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.16; p. 223).

- MPI as:
 - **replacing the original memory:** acc. to the memory trace replacement hypothesis which states that MPI impairs or replaces memories that were formed during the original experience of the event.
 - **causing interference:** original information is forgotten because of retroactive interference, which occurs when more recent information interferes with memory for something that happened in the past.
 - **causing source monitoring errors:** acc. to source monitoring the person incorrectly concludes that the source of his memory was the slide show & not the actual experience.

- **Eyewitness Testimony:** testimony by an eyewitness to a crime about he or she saw during the commission of the crime.
 - EWT is one of the most convincing types of evidence to a jury, but unfortunately many innocent people have been incarcerated based on mistaken identification by eyewitnesses.
 - These errors may be caused due to a variety of reasons: for example difficulty in perceiving the person's face & others by inaccurate memory for what was perceived.
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- **Errors Associated with attention:** emotions run high during commission of a crime & this can affect what a person pays attention to and what the person remembers later.
- an example is weapons focus, i.e. the tendency to focus attention on a weapon results in narrowing of attention, so witnesses might miss seeing relevant information as the perpetrator's face.
- Stanny & Johnson (2000) studied weapons focus by measuring how well participants remembered details of a filmed simulated crime. They found that participants were more likely to recall the details of the perpetrator, the victim, and the weapon , in the “no-shoot” condition than in the “shoot condition”.



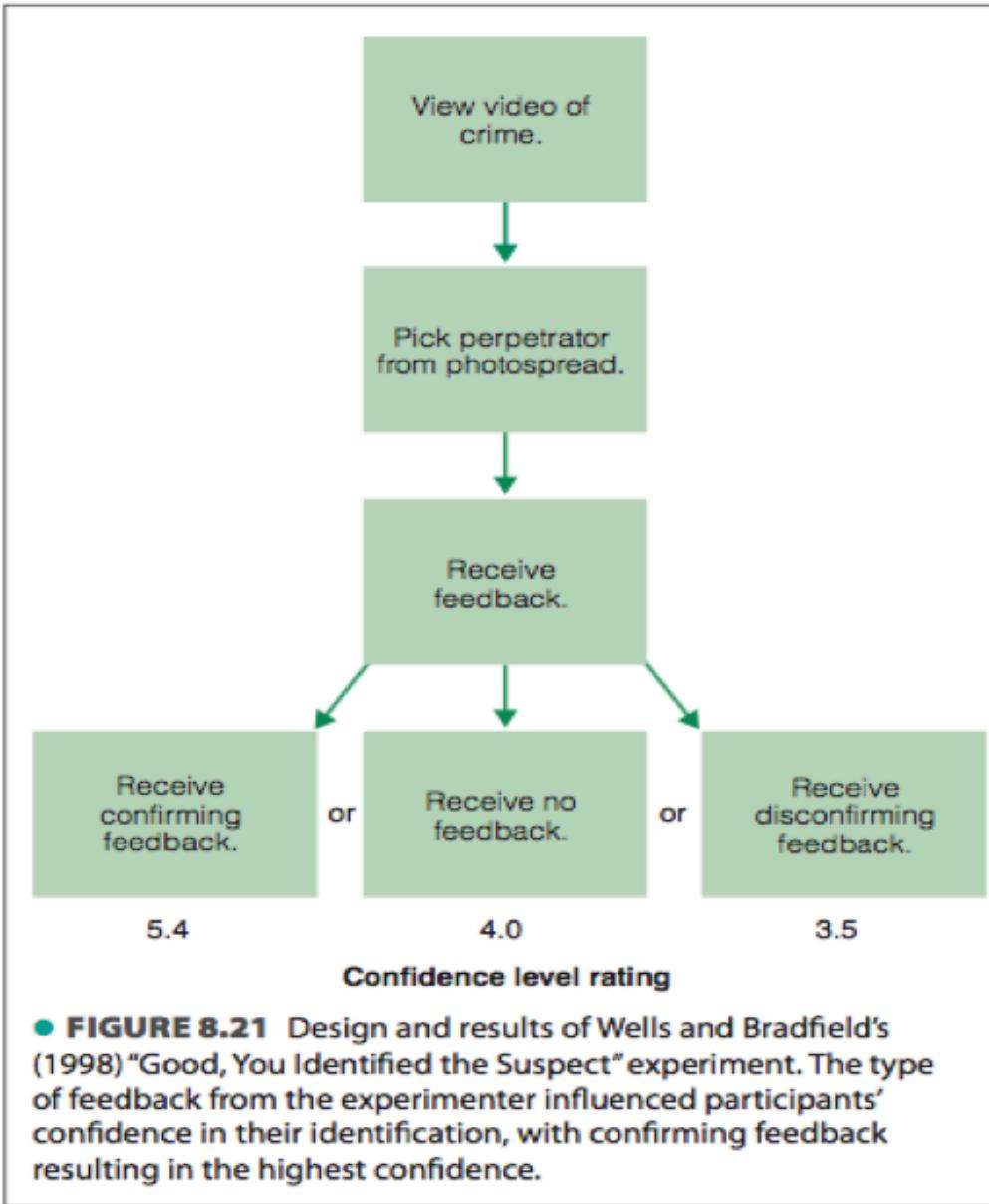
● **FIGURE 8.19** Results of Stanny and Johnson's (2000) weapons focus experiment. Presence of a weapon that was fired is associated with a decrease in memory about the perpetrator, the victim, and the weapon.

Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.19; p. 228).

- Errors due to familiarity: Crime not only involves a perpetrator & a victim, but often includes innocent bystanders.
- These bystanders add yet another dimension to the testimony of the eyewitnesses as there is a chance that a bystander could be mistakenly identified as perpetrator because of familiarity. for example: a ticket agent at a railway station was robbed and subsequently identified a sailor as being the robber. Luckily for the sailor, he was able to show that he was somewhere else at the time of the crime.
- when asked why he identified the sailor, the ticket agent said that he looked familiar. The sailor looked familiar because he lived near the station and regularly bought tickets from the agent.

- **Errors due to suggestion:** It is possible that a police officer asking a witness, “did you see the white car?” could influence the testimony of the witness about what he/she saw.
 - In a paper titled, “Good You Identified the Suspect”, Wells & Bradfield (1998) had participants view a video of an actual crime and then asked them to identify the perpetrator from a photodspread that did not actually contain the perpetrator.
 - All of the participants picked one of the photographs & following their choice, witnesses received either confirming feedback from the experimenter (“Good, you identified the suspect.”), no feedback, or disconfirming feedback (“Actually the suspect was..”)

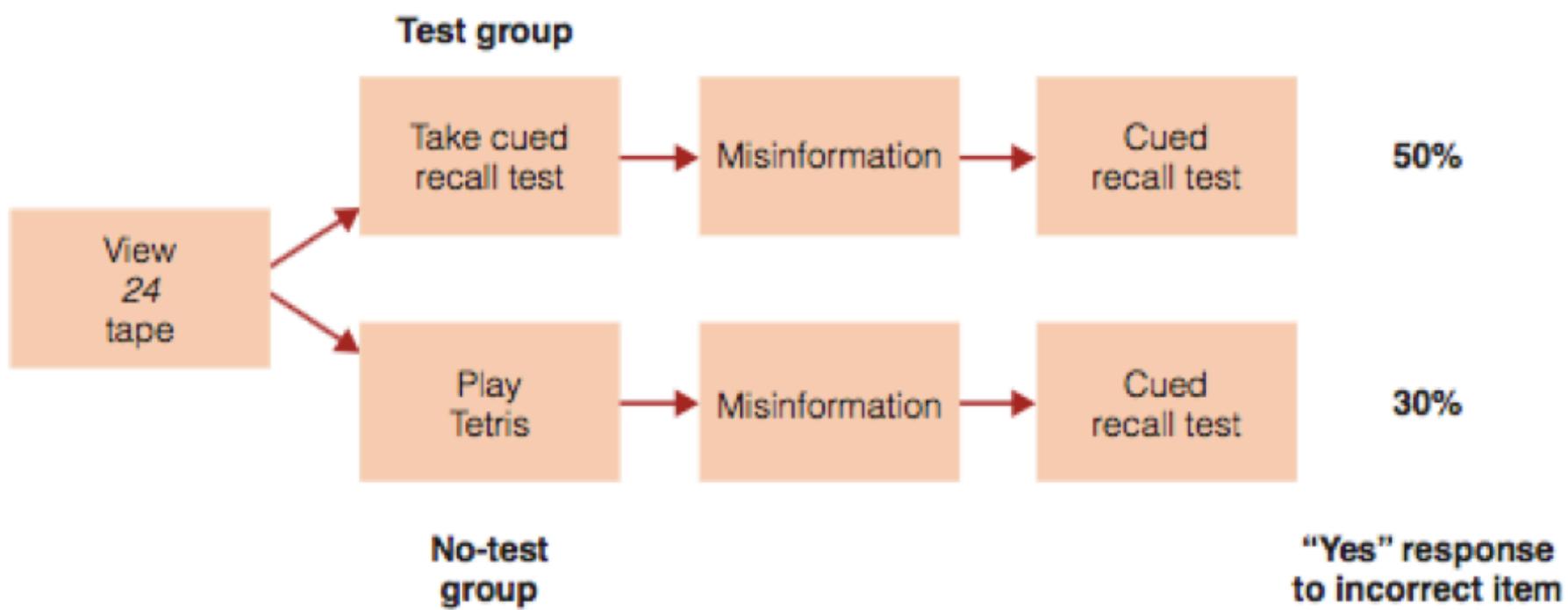
- A short time later, the participants were asked how confident they felt about their identification.
- The results indicate that the participants who received the confirming feedback were more confident of their choice.
- Wells & Bradfield called this the **post identification feedback effect**.
 - this creates a serious problem in the criminal justice system because jurors are strongly influenced by the confidence of the eyewitnesses' judgments.



● **FIGURE 8.21** Design and results of Wells and Bradfield's (1998) "Good, You Identified the Suspect" experiment. The type of feedback from the experimenter influenced participants' confidence in their identification, with confirming feedback resulting in the highest confidence.

Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.21; p. 230).

- **The Effect of Post - event Questioning:** In another experiment, Chan & coworkers consider the question:
 - How does taking a recall test after witnessing an event and before being exposed to misleading post event information influence the memory of the event?



● **FIGURE 8.22** Design and results of Chan et al's (2009) experiment that demonstrated the reverse testing effect. Participants were presented with a distraction task before receiving the misinformation.

Image: Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. Wadsworth Publishing. 4th Ed. (Fig. 8.22; p. 230).

- The results show that participants who took a recall test after the event said yes to the incorrect information 50% of the time.
- This result called the **reverse testing effect** shows that taking a recall test right after seeing the program became more sensitive to the misinformation.
- Why?
 - reconsolidation?

References

- Goldstein (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. *Wadsworth Publishing*. 4th Ed.