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Class Meets: Weekdays 1:30-4:00pm @ 9B114

SKKU ISS3147

Myths and Mysteries of Human Learning and Memory

Emotion & Memory

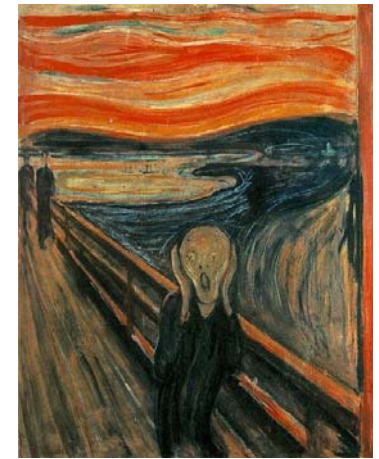
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Does emotion influence the likelihood of remembering an event?

If so, does it enhance or impair memory?

And is an emotion-specific mechanism involved?



Edvard Munch's *The Scream*

2

What do you remember about these events, and the circumstances in which you heard the news?

- Death of Osama bin Laden (2011)
- Death of Pope John Paul II (2005)
- September 11 terrorist attacks (2001)
- USS Cole bombing (2000)
- Death of Princess Diana (1997)
- Death of former French President François Mitterand (1996)
- OJ Simpson murder trial acquittal (1995)
- Oklahoma City bombing (1995)
- Death of Belgian King Baudouin (1993)
- Resignation of British PM Margaret Thatcher (1990)
- Hillsborough football disaster (1989)
- Assassination of Swedish PM Olof Palme (1986)
- Attempted assassination of President Ronald Reagan (1981)

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Flashbulb Memories

“memories for the circumstances in which one first learned of a very surprising and consequential (or emotionally arousing) event...It has a primary, ‘live’ quality that is almost perceptual. Indeed, it is very like a photograph that indiscriminately preserves the scene in which each of us found himself when the flashbulb was fired.”

- Brown and Kulik (1977), who coined the term, proposed that a special mechanism in the brain causes the (highly surprising) moment to be indelibly recorded.

“an impression may be so exciting emotionally as almost to leave a scar upon the cerebral tissues”

- William James (1890)

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More facts of nature: All forest animals, to this very day, remember exactly where they were and what they were doing when they heard that Bambi's mother had been shot.

Gary Larson's (1993)
Far Side Collection:
The Chickens are
Restless

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Colegrove (1899)

33 yrs after President Abraham Lincoln's assassination, 179 people were asked: Do you recall where you were when you heard that Lincoln had been shot?

"My father and I were on the road... in the state of Maine to purchase the fixings needed for my graduation. When we were driving down a steep hill into the city we felt that something was wrong. Everybody looked so sad, and there was such terrible excitement that my father stopped his horse, and leaning from the carriage, called 'What is it my friends? What has happened?' 'Haven't you heard?' was the reply—'Lincoln has been assassinated.' The lines fell from my father's limp hands and with tears streaming from his eyes he sat as one bereft of motion. We were far from home, and much must be done, so he rallied after a time, and we finished our work as well as our heavy hearts would allow."

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Esquire magazine (1973)

The 10-Year Anniversary of the Kennedy Assassination
Where were you? Nobody Forgets

"Julia Childs was in the kitchen eating *soupe de poisson*. Billy Graham was on the golf course but he felt a presentiment of tragedy. Philip Berrigan was driving to a rally; Julian Bond was in a restaurant; Tony Randall was in the bathtub."

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Brown and Kulik (1977)

"Do you recall the circumstances in which you first heard that..."

	<u>Caucasian</u>	<u>African-Am</u>
J.F. Kennedy	98%	100%
Malcolm X	3%	35%
Martin Luther King	33%	75%
Robert Kennedy	63%	50%
A personal shock	93%	80%

CONSEQUENTIALITY (1 to 5 scale; 5 = very consequential)

	<u>Caucasian</u>	<u>African-Am</u>
J.F. Kennedy	3.4	3.0
Malcolm X	1.5	3.4
Martin Luther King	2.9	4.3
Robert Kennedy	3.1	3.6
A personal shock	3.7	4.2

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Brown and Kulik (1977)

2 important features of flashbulb memories:

- Surprising event
- Strong consequentiality (or personal significance)

Commonly recalled details:

- Place (where they were)
- Ongoing activity (what they were doing)
- Informant (who brought them the news)
- Emotional reaction in others
- Emotional reaction in self
- Immediate aftermath

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Flashbulb Memories of *Challenger* Explosion

“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.”

- A college student's recollection in 1988, ~2.5 yrs after the incident

“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.”

- The same student's recollection in 1986, ~1 day after the incident

(Neisser & Harsch, 1992) 12

Criticisms of the concept of flashbulb memories

(as originally proposed by Brown & Kulik)

B&K did not assess the *consistency* of so-called “flashbulb” memories.

Neisser and Harsch (1992):

- 44 college students, tested <1 day after the *Challenger* explosion, and tested again ~2.5 yrs later.
- Various attributes were scored: e.g., location, ongoing activity, informant, time, others present.
- Out of a max. score of 7 (if all the attributes recalled were consistent in both tests), mean score was only 2.95. Only 3 subjects received perfect scores.
- Despite poor recall accuracy/consistency, subjects rated their confidence very highly (mean of 4.17 out of 5).

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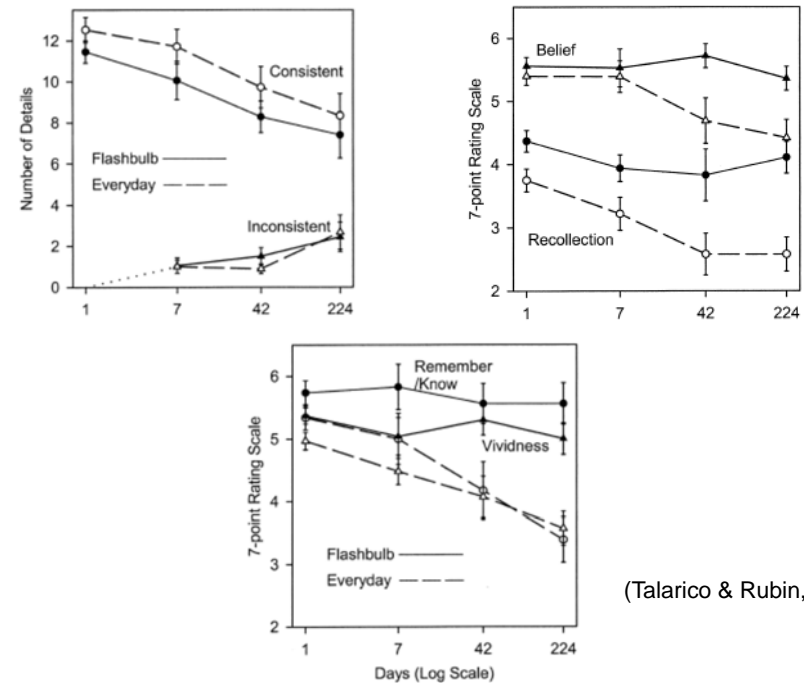
CONFIDENCE, NOT CONSISTENCY, CHARACTERIZES FLASHBULB MEMORIES

Jennifer M. Talarico and David C. Rubin

Duke University

Abstract—On September 12, 2001, 54 Duke students recorded their memory of first hearing about the terrorist attacks of September 11 and of a recent everyday event. They were tested again either 1, 6, or 32 weeks later. Consistency for the flashbulb and everyday memories did not differ, in both cases declining over time. However, ratings of vividness, recollection, and belief in the accuracy of memory declined only for everyday memories. Initial visceral emotion ratings correlated with later belief in accuracy, but not consistency, for flashbulb memories. Initial visceral emotion ratings predicted later posttraumatic stress disorder symptoms. Flashbulb memories are not special in their accuracy, as previously claimed, but only in their perceived accuracy.

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(Talarico & Rubin, 2003)

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What contributes to enduring vividness & confidence?

- Increased rehearsals for flashbulb events
- Community commemoration (e.g., media attention, public memorials)

What leads to inaccuracy / inconsistency?

- Confusions of time slices
- Confusions with other people's stories
- Confabulations
- Reliance on schemas to fill in the gaps
- Embellishments become "truth"

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Emotion and...

Encoding

- Encoding requires attention.
- Emotion affects attention.
- Emotion affects the interpretation of events.

Retention Interval

- Emotional events may be rehearsed more frequently.

Retrieval

- Less forgetting?
- Emotion as a retrieval cue

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The cognitive cost of “keeping one’s cool”

Stimulus: Short film clip in which a husband confesses to his wife that he has had an extramarital affair and that the other woman is pregnant as a result. Clearly heartbroken, the wife becomes agitated and upset. A shouting match and physical scuffle ensue. The couple's fight is witnessed by their young child, who begins to sob.

Half the subjects were instructed to watch the video and not let their feelings show (i.e., suppress expression of emotion); the control group was told to just watch the video.

Subjects were later given a surprise memory test on details in the video. Those who suppressed expression of emotions performed worse.

Trying to hide one's emotions *harms* memory (uses cognitive resources, like dividing one's attention)

(Richards & Gross, 2000) 18

Central vs. Peripheral Details

Subjects viewed sequence of 15 slides, and for each slide they had to write down its most central / distinguishing feature:

Neutral condition

Mother & son leave house
Walk through park
Cross bridge
Walk through downtown area

Traumatic condition

Mother & son leave house
Walk through park
Cross bridge
Walk through downtown area

Mother & son look for taxi
Get into taxi
Head to school
Mother drops off son at school

Boy gets hit by car
On bonnet, bleeds heavily
Transported by ambulance
Mother leaves son at hospital

Mother makes phone call
Returns to neighbourhood
Enters house

Mother makes phone call
Returns to neighbourhood
Enters house

(Christianson & Loftus, 1987)

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Central vs. Peripheral Details

Two types of test:

1. Recall central features of the slides
2. 4AFC recognition of the slides



(Christianson & Loftus, 1987)

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Central vs. Peripheral Details

Results:

Central features remembered better for the emotional scenes than the neutral scenes (i.e., on the recall test).

But peripheral features remembered worse for the emotional scenes than the neutral scenes (i.e., subjects were less able to recognise the original photos from other photos taken from slightly different angles).

(Christianson & Loftus, 1987)

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Central vs. Peripheral Details

Subjects viewed sequence of 15 slides. The 8th was the critical slide. Either:

- Woman riding a bicycle (Neutral)
- Woman lying next to a bicycle, injured (Emotional)
- Woman carrying a bicycle (Unusual)

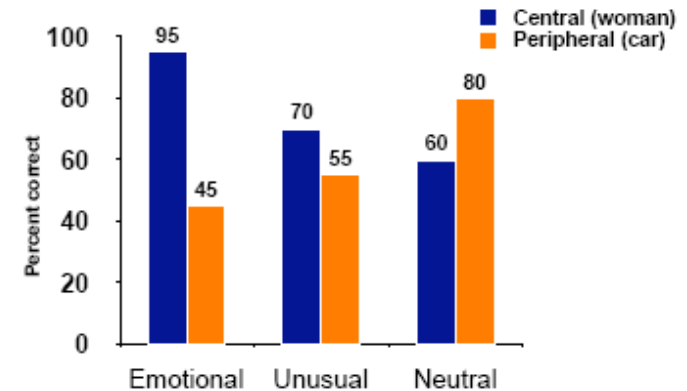
In all cases, a car could be seen in the background.

Later, subjects were tested on their memory for details about the woman (central) and the car (peripheral).

(Christianson & Loftus, 1991)

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Central vs. Peripheral Details



Emotional condition led to best memory for central details, at the expense of memory for the peripheral details.

(Christianson & Loftus, 1991)

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Weapon Focus

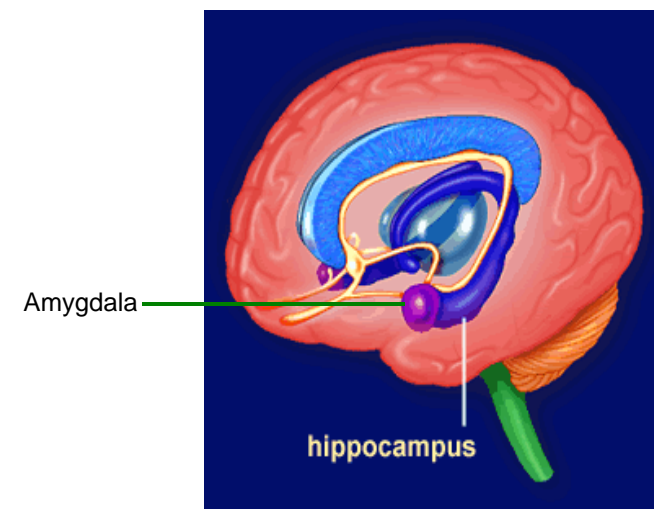
Evidence has shown that critical stressful objects (e.g., gun or knife being used in a crime) can capture people's attention and thus promote memory for the object, but at the expense of other details in the scene.



Consistent with Easterbrook's (1959) hypothesis that increased emotional arousal leads to a narrowing of attentional focus.

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Amygdala – implicated in emotional (esp. fear) processing



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Amygdala – implicated in emotional (esp. fear) processing



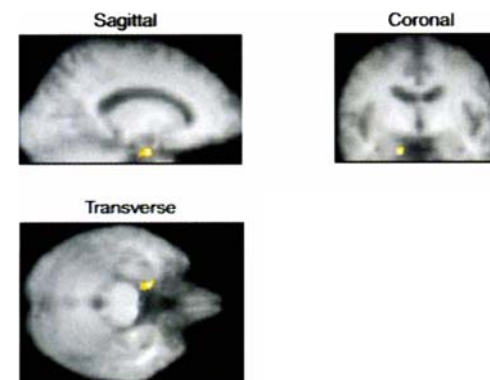
Rats with amygdala lesions failed to avoid an immobile cat.

Cute & cuddly... or fearsome predator?

(Blanchard & Blanchard, 1972)

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Amygdala – implicated in emotional (esp. fear) processing... in humans too!



Increased activity in the left amygdala when faces exhibiting fear were viewed (relative to happy faces)

(Morris et al., 1996)

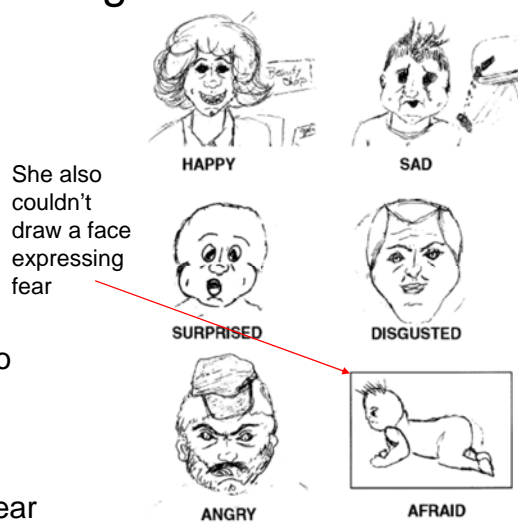
27

Amygdala – implicated in emotional (esp. fear) processing... in humans too!



Patient SM-046 had no difficulty recognising faces, but had great difficulty recognising facial expressions of fear

(Adolphs, Tranel, Damasio, & Damasio, 1995)



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Mood Congruent Memory

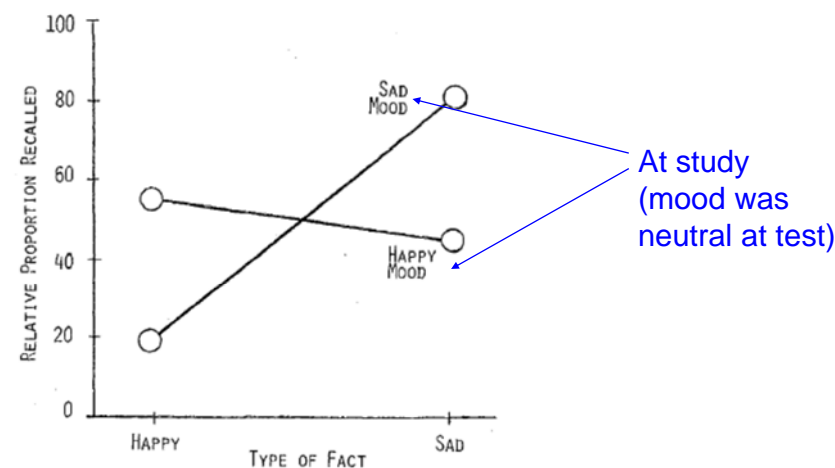


Figure 10. Relative percentages of recall of facts about the happy character versus the sad character by readers who were happy or sad.

(Bower, 1981)

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Mood Congruent Memory

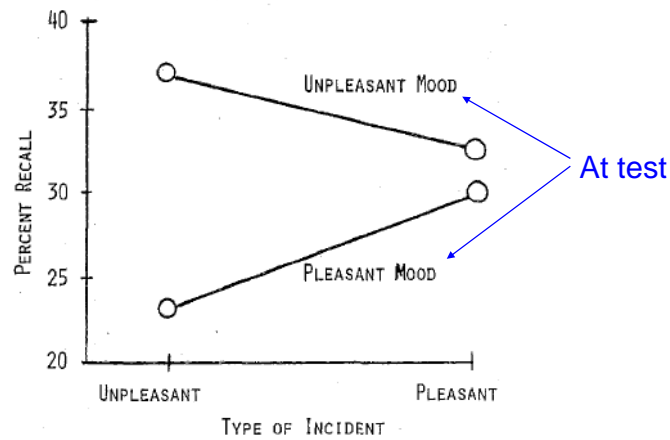


Figure 3. Percentage recall of incidents from an emotional diary depending on whether the incident was pleasant or unpleasant and whether the subject was in a pleasant or unpleasant mood during recall.

(Bower, 1981)

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Mood induction statements (Velten, 1968)

Sad

Today is neither better nor worse than any other day.

However, I feel a little low today.

Sometimes I wonder whether school is all that worthwhile.

Every now and then I feel so tired and gloomy that I'd rather just sit than do anything.

Too often I have found myself staring listlessly into the distance, my mind a blank, when I definitely should have been studying.

Happy

Today is neither better nor worse than any other day.

I do feel pretty good today, though.

This might turn out to have been one of my good days.

If your attitude is good, then things are good, and my attitude is good.

I feel cheerful and lively.

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Mood induction statements (Velten, 1968)

Neutral

Oklahoma City is the largest city in the world in area, with 631.66 square miles.

Japan was elected to the United Nations almost 14 years after Pearl Harbor.

At the end appears a section entitled "Bibliography notes."

We have two kinds of nouns denoting physical things: individual and mass nouns.

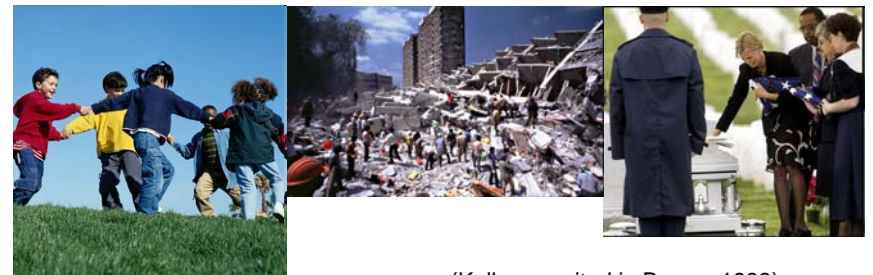
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Possible source of mood congruent memory

Either happy or sad mood induced (using mood induction statements seen earlier), then subjects were given photos to view at their own pace.

Half of the photos were of pleasant scenes; half were of sad scenes.



(Kelley, as cited in Bower, 1983)

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Possible *source* of mood congruent memory

Viewing time for each photo was recorded.

Subjects in a happy mood spent more time looking at pleasant scenes; those in a sad mood spent more time looking at sad scenes.

→ Selective exposure!

(Kelley, as cited in Bower, 1983) 34

Emotional events are often quite well remembered, even if not with perfect accuracy.

Flashbulb memories

PTSD

Rumination and depression

It can be hard to avoid thinking about a recent emotional experience.

In other words, greater rehearsal of emotional events.

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