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Flashbulb Memory for the Events of 9-11: An Analysis of Facts, Feelings, and Flow[1]

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Undergraduates enrolled in psychology courses at Robert Morris University reported their personal memories surrounding the events of September 11, 2001. These memories were collected within two days of the incident and then re-collected again approximately ten years later. The present study examined three accuracy factors that have not been examined previously in the flashbulb memory literature: facts, feelings, and flow. Results demonstrated typical accuracy distortions (facts), as well as an expected increase in emotional memories (feelings), while evidence for changes in organizational memory for events (flow) was mixed.

Introduction

Flashbulb memory has been defined as vivid, detailed, long lasting memory of circumstances in which an individual first learned about an unexpected or shocking event (Brown & Kulik, 1977). Flashbulb memories are autobiographical and are considered to be episodic (Bohannon & Symons, 1992), as well as, having strong associations with feelings and physical experiences (Curci & Lanciano, 2009). It is because of the detailed and emotional components of such memory that people believe that flashbulb memories remain unchanged. This belief has been challenged by flashbulb memory researchers.

Emotion and memory researchers have been investigating flashbulb memory for decades. Some researchers have primarily focused on memory that pertains to the circumstances in which individuals first hear about major public events (Brown & Kulik, 1977; Christianson, 1989) or natural/man-made disasters (Christianson & Engelberg, 1999; Neisser & Harsch, 1992; Wright, 1993).

According to Brown and Kulik (1977), flashbulb memories are caused by a special memory mechanism that appears during the encoding process. These special memory mechanisms during encoding involve how formation and maintenance of memory are processed and stored. The special memory mechanisms include specific criteria that should be met such as: the intensity of people's emotional reactions to the news (Bohannon, 1988; Bohannon & Symons, 1992; Conway, Anderson, Larsen, Donnelly, McDaniel, McClelland, Rawles, & Logie, 1994; Curci, Luminet, Finenauer, & Gisle, 2001; Davidson & Gilsku, 2002; Hornstein, Brown, & Mulligan, 2003; Pillemer, 1984; Rubin & Kozin, 1984; Schmolck, Buffalo, & Squire, 2000), surprise (Christianson, 1989; Cohen, Conway, & Maylor, 1994; Conway et al., 1994; Davidson & Glisky, 2002; Finkenauer, Luminet, Gisle, El-Ahmadi, Van der Linden, & Philippot, 1998; Pillemer, 1984; Rubin & Kozin, 1984), personal importance (Conway et al., 1994), national importance (Conwayet al., 1994; Curci et al., 2001) and rehearsal (Bohannon, 1988; Conway et al., 1994; Curci et al., 2001; Davidson & Gilsky, 2002; Finkenauer et al., 1998; Rubin & Kozin, 1984). As stated above personal importance is just one criterion to examine when investigating the special memory mechanisms; Brown and Kulik (1977) claim that in order to receive flashbulb memory, an individual must consider the event not only to be important but to have some sort of consequence.

Researchers collect memories for major events or disasters as a first step to determine how accurate flashbulb memory is. At a later date researchers contact these same individuals to have them recall the same memories again. The two recollections are then compared in order to identify matching and mismatching memories for the event. When an event initially takes place the information

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that is first learned about and remembered is considered to be reception context (Luminet, Curci, Marsh, Wessel, Constantin, Gencoz, & Yogo, 2004) or event memory that can be perceived as semantic memories (Tulving, 1972). This reception context information is gathered again after a period of time to compare and contrast the consistency of memory (Luminet, et al., 2004). Some memories will be consistent as others will fade or become distorted. Individual's are commonly able to remember everyday details such as location, how the event was learned, what activity was taking place when the incident was learned, who the individual was with (Luminet, et al., 2004). In contrast, characteristics nonessential to the memory of the event, such as: what was worn during the time of the event taking place, first initial thought of the event, etc. are typically lost (Romeu, 2006).

According to Conway (1995), it is neither acceptable nor possible to assess flashbulb memory shortly after the information has been encoded. This is because a delayed retest is required to assess the preservation and consistency of details preserved over time. However, no ideal or consistent time span has yet been identified. Instead, researchers have examined flashbulb memories over a wide variety of delay intervals. Bohannon, Gratz, and Cross (2007) have investigated a variety of time spans; for example, the explosion of the space shuttle Challenger, with delay groups of fifteen, thirty-six, and sixty months. Bohannon (1988) sampled memory for the same event at two weeks and eight months. Memories for the bombing of Pearl Harbor were examined after a delay of fifty years (Bohannon, Gratz, & Cross, 2007). Memories based on the attack on Iraq was examined with delays less than two weeks (Bohannon, Gratz, & Cross, 2007), and the death of Princess Diana was examined within two weeks (Bohannon, Gratz, & Cross 2007). Fifty years was the longest interval examined and the results focused on how one learns of shocking news and how that might determine the type and extent of memory (Bohannon, Gratz, & Cross, 2007). Unfortunately, the research was not based on time span. Examining the fifty year memory delay for the events of Pearl Harbor resulted in the conclusion that those who talked about the events reached out to learn more about the events.

Wright, Gaskell, & O'Muircheartaigh (1998) reports that flashbulb memory research is often based upon the assumption that detailed recollections of personal circumstances imply a vivid memory. Wright et al. (1998) found that flashbulb memories differed according to the vividness of the recalled event. That is, the more emotionally relevant the event, the clearer the reported memory (see also Gaskell & Wright, 1997). Although the results reported by Wright, et al (1998) demonstrated an effect of emotion on reported clarity of memory, no evidence was provided regarding whether participants' recollections were accurate or consistent with their initial memories.

A common characteristic of flashbulb memory is the high degree of confidence participants report in the accuracy of those memories (Talarico & Rubin, 2003). Brown and Kulick (1977) claimed that flashbulb memories do not decay like memories from other events, but are "always there". While some research has reported remarkably accurate memories (Conway et al., 1994; Neisser, Winograd, Bergman, Schreiber, Palmer, & Weldon, 1996) most research finds that what are classified as flashbulb memories can be as error prone as any other kind of memory (McCloskey, Wible & Cohen, 1988; Nesisser, 1982). Accuracy in recall of episodic material has been found to be related more to an individual's emotional involvement in the original experience than in the semantic material (Bohannon & Symons, 1992; Curci & Luminet, 2006; Curci et al., 2001; Smith, Bibi, & Sheard, 2003).

The present study was designed to examine flashbulb memories after a ten year delay. The particular event used to explore flashbulb memory was the 9-11 tragedy, described by Luminet, et al. (2004) who compared responses of U.S. participants with Non-U.S. participants:

> *"On September 11, 2001 more than 3,000 people died in the worst terrorist attacks ever committed on American soil. In a coordinated plan of action, four commercial airliners were hijacked and turned into missiles aimed at buildings that symbolized American prosperity. Two planes hit the north and south towers of the World Trade Center in New York City,*

> *leading to the eventual collapse of both buildings. A third plane hit the Pentagon near Washington D.C., and a fourth plane crashed in rural Pennsylvania. The attacks were allegedly planned and executed by members of Al Qaeda, a terrorist group based in Afghanistan"* (p. 200).

The present study extends the literature on flashbulb memory in two important ways. First, participants shared their reactions, thoughts, concerns, and information about the event through free writing. This is in contrast to typical approaches that make use of questionnaires that use Likert-scales (Luminet, et al., 2004; Romeu, 2006) and fill in the blank questions related to the event (Luminet, et al., 2004; Romeu, 2006). Second, the present research examined recollection accuracy of the 9-11 events in multiple ways: (1) Accuracy was assessed in terms of the number of matching statements (facts); (2) Emotional content was examined to explore whether emotions play a greater role in storage or retrieval (feelings); and (3) the sequence of reported events was analyzed in order to assess whether distortions in memory are more subtle than simply the recollection of facts (flow).

Method

Participants

There were one hundred and five participants who originally generated memory reports of the events of September 11, 2001. These individuals were college-aged students recruited from two undergraduate psychology courses at Robert Morris University in the fall semester of 2001. Of these original participants, 15 have thus far contributed to the second phase of data collection which occurred approximately ten years later. Data collection is ongoing, so it is likely that more data will be added to the current sample.

Design

The test and retest writing samples were prompted with the same instruction. Participants were asked to write about their memories of the 9-11 events. Specifically, they were to include a discussion of where they were, what they were doing, and any other details they could recall surrounding their personal experiences of the day in question. The two writing samples derived from participants were analyzed in terms of the components: Facts, Feelings, and Flow.

Facts. Participants' sentences were broken down into "factual" stems and counted. For example, "I was eating breakfast at Denny's when I first heard about September 11, 2001" contains two factual pieces of information: An activity (eating breakfast) and a location (at a Denny's restaurant).

Feelings. Once the number of factual pieces of information was identified, the number of emotional facts was determined. For example: "At first I was just shocked, but when I heard that it was a coordinated attack, I became furious" contains two emotional reactions: shock and fury.

Flow. Because the events occurred when students were attending college, there is some likelihood that memories can be reconstructed accurately simply based on a familiarity with a typical college routine. In other words, accuracy scores may be inflated due to schema-consistent recollection rather than actual memories of events. While the extent that this affected recall cannot be directly measured, it is possible that the sequence of events recalled may be less affected by schemas. To explore whether students accurately recalled the order of events, a measure for flow was created. For example, "I went to class but it was cancelled so I went to my dorm where everyone watched television, then my mother called to tell me she was coming to take me home the next day" would be scored as three events. The event "went to class" would receive a 1, the event "watched TV in dorm room" would receive a 2, and the event "phone call with mother" would receive a 3. Upon later recall, the order of events would be similarly coded such that absolute difference scores between identical events can be summed. The lower the summed differences, the closer to the original flow the participant was able to achieve upon later recall. In the above example, consider a later recall account of, "I was in my dorm where we watched the planes keep hitting the buildings. I didn't want to go to class, but I didn't know what else to do. When I got there class was cancelled so I called my mother and she said she was going to get me the next day." In this case two of the three events receive different sequence values. The event "went to class" would receive a 2, the event "watched TV

in dorm room" would receive a 1, and the event "phone call with mother" would again receive a 3. Had the events occurred in the same order for both recollections, the summed differences would have been 0, but in this case, the differences yielded a score of 2 indicating a discrepancy in flow.

Procedure

Within a week of the September 11, 2001 attacks, participants were given the initial task during their scheduled course time to write down on a sheet of paper their memories. They were not informed that they were participating in a flashbulb memory study, nor were they told that they would be asked to recall this information again in the future. Approximately ten years later as many of the original participants as could be found were contacted and asked to recall their memories once again. These memories were electronically delivered to the researcher via the social network *Facebook.*

Results

As can be seen in Table 1, there were some interesting differences observed between tellings. There was an increase in number of facts from response one to response two, as well as an increase in number of emotion words used (feelings) from response one to response two. We observed a notable loss of facts (mean = 11.8) as well as a sizable number of new facts (mean = 19.7).

These variables were examined to determine the degree to which they correlated with one another. Four significant correlations were identified. First, the correlation between number of facts given in the first reporting and number of facts lost was significant, $r(13)= 0.88$, $p < 0.05$. As participants wrote more facts in their first reports, more facts were lost between responses.

Secondly, there was a positive correlation between number of facts stated in the first response and emotion words used (feelings) in the second response, $r(13)=0.47$, $p <0.05$. As participants wrote more facts in their first response they tended to produce more emotion words (feelings) in their second response. Thirdly, there was a correlation between facts in the first response and feelings reported in the first response, $r(13)=0.58$, $p < 0.05$. In other words, students who wrote more facts in the first report also produced more emotional content in that response. Lastly, there was a correlation between feelings reported in the first response and feelings reported in the second response, $r(13)=0.49$, $p < 0.05$. As more feelings were reported in the first telling, more emotional words were generated in the second telling.

Table 1. Mean descriptors for each of the variables of interest as a function of response timing.

	Facts	Feelings	Flow	New Facts	Lost Facts
First Response	16.2	2.1			
Second Response	24.1	4.1	6.5	19.7	11.8

Discussion

With regard to the current findings, it is important to consider the sources of influence on participants' memories since 2001. Many factors likely converged on each person's memories of the widely televised events of 9-11. The effects of 9-11 have been widespread and persistent in affecting our lives throughout the intervening ten years. Participants have probably thought about, discussed, and been exposed to events related to the 2001 attack on a monthly (or more often) basis. Rehearsal (discussing, listening about, or being exposed to information through personal, as well as, multimedia sources) therefore plays an important role in both the modification and retrieval of the current flashbulb memories. Rehearsal of the tragedy would include long-term cognitive and social influences on memory (Bohannon & Symons, 1992; Christianson, 1989; Finkenauer et al., 1998; McCloskey, Wible, & Cohen, 1988; Neisser, 1982; Wright, 1993). Cognitive influences due to personal reflections of the emotional components of the event also have been firmly planted in each individual's memories (Martin & Tesser, 1989, 1996; Tait & Silver, 1989). The social aspects consisting of the urge to communicate with others about the emotional circumstances, share feelings and reactions to the events are all observed in the reports from participants (Luminet, Bouts, Delie, Manstead, &

Rime, 2004; Rime, Finkenauer, Luminet, Zech, & Philipott, 1998; Rime, Mesquita, Philippot, & Boca, 1991).

Cohen (1981) showed that cognitive structures such as attitudes affected the way people approached and reacted to different scenarios. Results of many studies support the observation that people pay attention to information that fits with their expectations. People's expectations guide later retrieval (Hirt, Erickson, & McDonald, 1993). Prior knowledge and attitudes facilitate a specific organization and assimilation of the incoming information into existing semantic structures in memory (Conway et al.; Finkenauer et al.). Information that is inconsistent with such organization may be lost or altered to better fit expectations.

With regards to the present findings, we suspect that the increased amount of feelings in participant's responses could be due to their increased level of maturity acquired over the intervening ten year time span. Given that the first response was taken the week of the event, participants might have been overwhelmed with feelings from the event. The increase in number of factual statements in the second report appear to have been due to participants wanting to elaborate on how the events of 9-11 affected their lives and their family relationships. These aspects were obviously not as developed when they were college students. The participants were mostly single college students when the tragedy took place. Now most, if not all, have their own families.

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