

**Age and Cohort Differences in Flashbulb Memory**

By  
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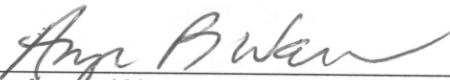
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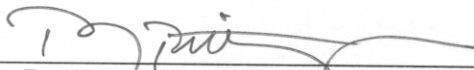
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### Abstract

Current research in autobiographical memory gives evidence of both a retention effect (older adults are more likely to have better recall for events of the most recent decade) and the “reminiscence bump” (older adults are likely to recall their most vivid autobiographical memories from the time when they were between the ages of 10 and 30). Furthermore, there is evidence of an age-related decline in older adults’ ability to vividly recall certain memories. The purpose of the present study was to investigate the existence of both an age-related decline and the reminiscence bump in flashbulb memories, which Brown and Kulik (1977) describe as detailed, vivid, and persistent memories for unexpected, emotional events. UTC students and alumni (n = 220) from three age groups (older, middle-aged, young adults) were questioned about 3 potential flashbulb memory events appropriate to their ages (9/11, JFK’s assassination, and Pearl Harbor). Younger adults had more elaborate free recall accounts for 9/11 than middle-aged and older adults, but both groups of older adults rated their memories for 9/11 as more vivid, accurate, and clear than younger adults did. Comparing across events for the older adults, memories of 9/11 and Pearl Harbor were equally elaborate, but JFK memories were less elaborate. Furthermore, older adults rated their memories of Pearl Harbor and JFK as less vivid and clear than their 9/11 memories. These findings only partially support the reminiscence bump, retention effect, and aging decline hypotheses.

### Age and Cohort Differences in Flashbulb Memory

The attack on Pearl Harbor in 1941 and the assassination of John F. Kennedy in 1963 are considered prime examples of flashbulb events; memories for these events are described by Brown and Kulik (1977) as detailed, vivid, and persistent. Though the concept behind flashbulb memory has been studied since the late 19<sup>th</sup> century, Brown and Kulik coined the term and their work is considered the foremost initial account. The basis for this phenomenon is that, for certain events, we have such imprinted memories that we do not have to be reminded of the details of the events. This alone seems remarkable, however memory for the factual information of the event is almost secondary compared to the personal memories that are associated with it. With flashbulb memory, the intrigue lies not in remembering a certain event, but in the specific, personal details each individual has of first hearing the news.

Brown and Kulik (1977) looked specifically at the extreme unexpectedness of the events. Their study focused on people's memory for the assassination of JFK, along with eight other novel events, including six other assassinations, two events involving political figures, and one event personal to each individual. They gave lengthy questionnaires to 40 white Americans and 40 black Americans with median ages in their mid twenties. Upon scoring of these questionnaires, six canonical categories of recall became evident. These categories were found in participants' general

descriptions of first hearing the news. They include source (how they heard), location (where they were), ongoing activity (what they were doing), personal affect (how they felt), affect in others (how others felt), and aftermath (what happened immediately afterwards); they also noticed that many participants gave idiosyncratic memories, both concrete and abstract in nature. In addition to the free recall information, Brown and Kulik also studied the effects of consequentiality (how much they thought the event would affect their futures and socio-political events) and rehearsal (how much they talked about the event and their discovery of the news). They suggested that both consequentiality and rehearsal were positively correlated with the elaboration of the person's response (i.e. the number of words). In summary, Brown and Kulik believed that these surprising, consequential events, and the personal circumstances surrounding their discoveries, were indelibly imprinted into memory.

The events of September 11, 2001 have probably left most people with a new flashbulb memory. The purpose of the present study was to examine memories of 9/11 in relation to age or cohort differences. As soon as the terrorist attacks had occurred, there were media reports comparing them to the Pearl Harbor attack, and suggesting that September 11<sup>th</sup> would be this generations' defining event. Cohort effects refer to the differences between generations, or groups of people born around the same time, due to different socio-historical events, whereas age effects are those due to chronological,

physical age. For example, older people might not remember an event as well as younger people due to physical changes in the brain that cause declines in information processing abilities (age effect). On the other hand, older people might not remember the event as well because the event did not seem as shocking or consequential in light of the many other historical events that they have experienced (cohort effect).

For this particular project, the cohort groups were determined by the participants' year of college graduation. Specifically, we wanted to determine whether there was an age or cohort difference in the clarity of flashbulb memories for three different flashbulb-provoking events. The events selected for the study included the attack on Pearl Harbor, December 7, 1941, the assassination of President John F. Kennedy, November 22, 1963, and the terrorist attacks in New York City and Washington, D.C., September 11, 2001. The first two events have been included in previous research, with a great deal of attention given to JFK's assassination. As with our study, other researchers assumed that the affect or emotion related to 9/11 would yield collective flashbulb memories, and there are already several studies related to memories for this event (Fass, 2002; Stefanucci, Poppe, & Spellman, 2002).

Regarding the potential for a cohort effect in flashbulb memory, prior research on autobiographical memory details a phenomenon known as the "reminiscence bump." This so-called bump describes the finding that people

generally recall significantly more autobiographical memories for events taking place when they were between the ages of ten and thirty (Rubin & Schulkind, 1997; Rubin, Rahhal, & Poon, 1998). Although it is unclear exactly why this bump occurs, one idea is that this particular age range is the time in which most people are “defining” themselves. Rubin, Rahhal, and Poon (1998) imply that the later years of the bump are a time when events are fully understood for the first time; there is also little interference from similar previous events. Memories from this time period may serve as models for structuring and organizing later information. All of this information more or less leads to the possibility that responses falling into the bump area are “easier” for the participant to recall.

So far, investigation of this bump has been somewhat limited to the study of personal, autobiographical memories, though a few of the studies asked participants for their most “vivid” memories (Rubin & Schulkind, 1997; Rubin, et al., 1998). In similar fashion, articles concerning flashbulb memory rarely mention this bump, even those with a wide age range of participants.

#### *Past Research on Aging and Flashbulb Memories*

Several previous flashbulb memory studies have used the resignation of British Prime Minister Margaret Thatcher as the flashbulb event (Cohen, Conway, & Maylor, 1994; Conway et al., 1994; Wright, Gaskell, & O’Muircheartaigh, 1998). According to one article, this event that took place on November 22, 1990 was significant to most U.K. citizens because it

indicated the end of an era in British politics in which many controversial changes had taken place (Conway et al., 1994). Also of note is the fact that in light of her increasingly troublesome government, Ms. Thatcher pledged her commitment to carry on as Prime Minister—less than 12 hours before she resigned (Conway et al., 1994). Media coverage of Ms. Thatcher lasted for several days in the U.K., much longer than in any other country (Conway et al., 1994). It has been shown that this event rendered flashbulb memories in Americans only in rare instances, but in regard to British citizens, the event certainly qualifies as a flashbulb event.

The 1994 article by Cohen, Conway, and Maylor served as the initial basis for the present study, since it dealt directly with the topic of flashbulb memories in older adulthood. This developmental study used a test-retest method in regard to Thatcher's resignation. A total of 82 participants were asked for their recollections of this event, with 41 people being grouped into the "elderly" group (Mean age=71.6) and 41 people classified as the "young" group (Mean age=22.4). All of the participants were from similar educational backgrounds. The researchers examined variables thought to affect the initial encoding of the memories (i.e. affect or emotional reaction, importance, prior knowledge) and rehearsal, defined as the number of times each participant thought, talked, or heard about the event.

The first questionnaire was given within 10-14 days after Ms. Thatcher's resignation, while the second was approximately 11 months later.

The consistency of the two memories was the main factor for this study. Upon return of the second questionnaires, they used a scale of 0-2 to score the data. A score of 0 indicated that the participant had forgotten a detail mentioned in the first questionnaire, 1 meant the response was almost correct, and 2 showed a response that was exactly the same. Additionally, five memory attributes (description, people, place, activity, and source) were scored with the same scale according to the relationship between the first and second responses. Using this procedure, the scores fell on a scale of 0-10 and were modified so that they were expressed as scores between 0 and 1; a score of 1 or .9 was necessary for the response to even be considered a flashbulb memory.

Only 42% of the elderly group gave recollections that qualified as flashbulb memories, while 90% of the young group gave flashbulb-like responses. The elderly group's memories were less detailed than the young group's memories. Also of interest, emotion was the best predictor of flashbulb memories in the young group, while rehearsal was the best for the elderly group, as rehearsal outweighed the surprise of the event. The ultimate conclusion of this study was that these causal factors of encoding and rehearsal might actually change with age due to source amnesia or a deficit in memory for context. Source amnesia refers to difficulty when trying to remember where or when an event was experienced or a fact was learned (Craik, 2000). Contextual details include background or other related

materials that are present at the time of encoding; one article identifies these details as “environmental supports” ( Craik, 2000). In summary, Cohen, Conway, and Maylor suggested that older adults had deficits that inhibited the formation of true flashbulb memories, and these deficits were due to chronological age.

The study by Cohen, Conway, and Maylor (1994) was part of a similar ongoing project. This particular study by Conway et al. (1994) dealt with Thatcher’s resignation, however, the focus was on the formation of flashbulb memories rather than age differences. This study grouped participants based upon whether or not their responses qualified as flashbulb memories. The general conclusions of this article were that the importance of the original event is critical, as participants with flashbulb memories for Thatcher’s resignation had higher levels of affect and considered the event more important than those that gave non-flashbulb memories. The study also suggests that prior knowledge of her government played a key role in the formation of the flashbulb memories. Ultimately, Conway et al. established that the importance of an event on the national and individual levels is critical in the formation of flashbulb memories.

In a study by Savoye (1999), six residents of one home and six of their neighbors were asked to give their recollections for first learning of the *Challenger* disaster and that their home had been destroyed by a tornado. Results of this study showed that all 12 participants viewed the loss of the

house as more consequential, giving a more detailed memory for context, further strengthening the support for personal consequentiality as a factor in the ability to recall flashbulb events. Perhaps older and younger adults differ in their feelings about the personal consequentiality of events, which in turn may lead to age differences in the occurrence or quality of flashbulb memories.

A study by Wright, Gaskell, and O'Muircheartaigh (1998) used the Hillsborough football disaster (95 people were trampled to death following a game) in addition to the resignation of Prime Minister Thatcher. Several major differences of this study included conducting 2,136 face-to-face interviews as opposed to administering questionnaires, interviewing only once rather than employing a test-retest method, and surveying participants on a national level. They found that Thatcher's resignation produced a clearer memory, but that the event was deemed less important or less emotional. Clarity was determined using a 5-point scale ranging from 1="I can't remember" to 5="I can remember". Interestingly enough, the men had clearer memories for the football disaster, though they did not find this event to be quite as important or emotional as the female participants. They also briefly touched on differences among age groups. Their results did *not* show that the younger participants gave clearer reports than older participants. There was no consistent decline in the older participants' responses, but the data did suggest that a mild decline might occur. Contrary to the prior results

suggesting that chronological age is responsible for declines in flashbulb memories, these studies seem to suggest that if age differences exist, they may be due to cohort differences in consequentiality, knowledge of government, or varying life experiences and interests.

Previous research findings seem to agree that there are several causal factors leading up to the formation of flashbulb memories. These factors include consequentiality, prior knowledge, and rehearsal. According to Conway et al. (1994), the personal and national importance placed upon an event is a critical factor in developing flashbulb memories. Not only does consequentiality play a key role in formation, but it is also considered to be related to the amount of detail a person is able to recall for a flashbulb event. Savoye (1999) furthers this notion with a much smaller-scale study, suggesting that greater personal consequentiality leads to a much more vivid and detailed response. One study suggests that emotion and rehearsal play an important part in the formation and retention of flashbulb memories (Wright, Gaskell, & O'Muircheartaigh, 1997). Another study agrees with the findings that emotion and rehearsal are important factors, but goes into further detail by suggesting that emotion is the best predictor of flashbulb memories for younger adults and rehearsal is more influential for older adults' recall (Cohen, Conway, and Maylor, 1994).

*Overview of the present study*

The present study examined the effects of age or cohort groups in regard to each participant's memory and their confidence in their memories for their discoveries of three historical events. Three groups of participants were included; a younger group who experienced only the most recent event, a middle-aged group who experienced JFK's assassination in addition to 9/11, and an older group who experienced all three events (including Pearl Harbor).

We first hypothesized that the youngest group would have the best or most detailed memories for the events of 9/11. We also hypothesized that the reminiscence bump would be in full effect, with the oldest group remembering the attack on Pearl Harbor with more detail than the other events, and that the middle group would show a similar effect for JFK's assassination compared to 9/11.

## Method

### *Participants*

To control for educational background, I surveyed UTC/UC alumni and students from the classes of 1942, 1950, 1964, 1970, 1972, and May 2002. These years were selected because the students, as college seniors or high school freshmen, would presumably have been between ten- and 30-years-old at the time of the target events, which is the typical range for the "reminiscence bump" (Rubin & Schulkind, 1997). Of course, many of the respondents did not matriculate immediately upon high school graduation. In

addition to the alumni, freshmen at Soddy Daisy High School in Soddy Daisy, Tennessee were given questionnaires, with 284 usable responses returned. These data, however, are not included in the results of the present study.

In August of 2002, I mailed packets to 450 University of Tennessee at Chattanooga and University of Chattanooga alumni. As the primary mailing, 150 alumni from each of the three groups were mailed packets. There were only 52 surviving members of the class of 1942, so they were all mailed a packet containing a questionnaire for each event, along with 98 members of the class of 1950. I mailed packets containing two questionnaires each to 75 members of the class of 1964 and 75 members of the class of 1972. Out of several hundred May 2002 graduates, 150 were mailed a packet containing one questionnaire each. The class of 1942 was the only group in which all members were selected to participate; all other participants were randomly selected from the alumni mailing lists. The May 2002 graduates were listed in alphabetical order, while the other lists grouped alumni by the city and state of their current residence. Of the 450 total packets that were sent out, two were returned by the postal service and seven were returned because the person was either ill or deceased. One person returned the packet because she was not an alumna, and another returned the packet stating that she was too busy to complete it. One man called me at home to offer his account over the phone since he would not physically be able to fill out the information (I was unable to interview him). During the first week of the fall 2002 semester at

UTC, questionnaires were given to 17 students in an undergraduate cognitive psychology class. Two other students were of age to complete an additional questionnaire for their memory of the JFK's assassination.

At the one-year anniversary of the events of September 11, I had received completed questionnaires from 113 participants. Of the 113, 34 were from the oldest group (classes of 1942 and 1950), 28 were from the middle group (classes of 1964 and 1972 and two current students), and 49 were from the youngest group (May class of 2002 and current students). In October of 2002, I mailed out packets to 25 more of the 1950 graduates and gave questionnaires to approximately 60 more undergraduates. I also obtained the mailing lists for the class of 1970. I mailed 75 packets to members of this class along with 25 more packets to members of the class of 1950. In January of 2003, I had received completed questionnaires from 220 participants, with 53 from the oldest group, 50 from the middle group, and 117 from the youngest group.

A total of 220 participants returned usable information regarding their memories for these specific events, and while the differences in age or cohort groups were the focus of this study, participants were also asked to report information such as their gender, race or ethnicity, and college major. Due to changes in trends of college matriculation and graduation, the data more or less show a gradual shift in all of these areas.

A total of 219 participants reported their gender with 115 being female (52.3%) and 104 male (47.3%). A shift seems to be most evident by looking at the gender differences. The oldest group had 36 men and 17 women, while the middle group had 29 men and 21 women. The youngest group, which should be most closely representative of the trend as it is today, had 39 men and 77 women. The trend shows students being predominantly male in the first half of the 20<sup>th</sup> century, followed by an evening out in the middle, and a reversal in the early part of the 21st century, with students being predominantly female.

In terms of race or ethnicity, participants were allowed to report their individual background using whatever terms they deemed appropriate. For analysis, their responses were classified in terms of *White*, *Black*, *Other*, and *No Response*. Participants reporting a race other than *White* or *Black* or reporting a more ambiguous definition (for instance, "Welsh") were placed in the *Other* group. Participants that did not report a race or used a completely unrelated term (for instance, "Betty White") were assigned to the *No Response* group. For coding purposes, *White*=1, *Black*=2, *Other*=3, and *No Response*=4. Overall, 186 participants (84.5%) were *White*, 16 (7.3%) were *Black*, 4 (1.8%) participants listed something other than *White* or *Black*, and 14 (6.4%) did not give a usable answer. The oldest group consisted of 33 white males, 15 white females, and 5 participants that did not respond. The middle group was made up of 28 white males, 19 white females, 1 black

female, and 2 participants without responses. The youngest group showed the most diversity with 30 white males, 61 white females, 5 black males, 10 black females, 4 participants listing themselves as something other than white or black, and 6 participants who did not respond.

Participants were also asked for their college major in an attempt to look at relationships that might be found between memory or emotion and the field of study or career. Majors were separated into four groups, with those not fitting into these groups being classified as "other." The four groups included "business," "arts and sciences," "education," and "engineering." Majors such as criminal justice, nursing, human ecology, leisure studies, and a few others were classified as "other" along with those participants who did not report a major; 50 (22.7%) participants fell into this group. Arts and sciences majors made up 37.7% (83) of the participants, while business and education majors made up 17.7% (39) and 17.3% (38), respectively. Engineering majors comprised only 4.5% (10) of the participants. Within the oldest group, 14 were business majors, 26 had majors related to the arts and sciences, 2 were education majors, and 5 were engineering majors. There were 6 participants from the oldest group that did not fall into any of those four categories. For the middle group, 10 were business majors, 18 had majors related to the arts and sciences, 15 were education majors, and 3 were engineering majors. Only 4 participants in the middle group did not fall into any of those four categories. The youngest group showed 15 as

business majors, 39 as arts and sciences majors, 21 as education majors, and 2 as engineering majors. There were 40 participants in the youngest group that did not fall into any of those four categories, suggesting an increasing diversity of the university's curriculum.

Of the 220 participants included in the study, 113 (51.4%) were surveyed before September 11, 2002 and 107 (48.6%) were surveyed after the anniversary. The oldest group had 53 participants and a mean age of 77.08 years ( $SD=3.583$ ). The middle group had 50 participants and a mean age of 58.26 years ( $SD=6.815$ ). The youngest participants had a mean age of 23.36 years ( $SD=6.636$ ), and made up the largest group with 117 participants. The ages for all participants ranged from 85 years (born in 1917) to 18 years (born in 1984). There was a range in age of 11 for the oldest group ( $SD=3.583$ ), with a minimum age of 72 and a maximum age of 83. All participants were between the ages of 11 and 22 at the time of the attack on Pearl Harbor in 1941. The participants in the middle group showed an age range of 39 ( $SD=6.815$ ), with a minimum age of 46 and a maximum age of 85. These participants were between the ages of 7 and 44 at the time of Kennedy's assassination in 1963. The deviation for this group is most likely due to current undergraduates being alive in 1963, but not quite old enough to meet the qualifications for the reminiscence bump. In addition to these current students, one participant most likely returned to school at a later age and graduated with either the class of 1964 or 1972. The age range for

the youngest group was 35 ( $SD=6.636$ ) with a minimum age of 18 and a maximum of 53. Obviously, these participants were between the ages of 17 and 52 at the time of September 11, 2001. The increase in deviation for this group is most likely caused by current undergraduate students who completed only one questionnaire though they were old enough to complete a questionnaire for their memory of JFK's assassination. The events of September 11, therefore, took place during the reminiscence bump for approximately 85% of the youngest group's participants, while the assassination of JFK took place during the bump for about 95% of the middle group's participants. Only the oldest participants were all between the ages of ten and 30 when "their" event, the attack on Pearl Harbor, took place.

#### *Procedure*

Each questionnaire consisted of a one-page sheet (front and back), and the questionnaires were identical for all three events. The front side asked nine questions and allowed free recall for questions related to the canonical categories originally noted by Brown and Kulik (1977). These categories include features such as informant, ongoing activity, affect in self, affect in others, location, and aftermath. Please refer to Appendix A for a complete listing of these nine questions. Participants were invited to attach additional pages if necessary, as there was no set limit for the length of their recall. They were also asked to rate the confidence of their answers using a scale of 1 to 3, with 1 being "unsure," 2 meaning "fairly sure," and 3 being

“sure.” On one question, participants were asked to identify the type of source or informant that first told them the news; they were further given the option of circling a media choice (radio or both television and radio) or a person. A code of 1 was assigned to “media” responses and “people” responses were given a 2. On another question, participants were asked to describe the intensity of emotion that they experienced upon initially hearing the news of the event being surveyed. They were asked to rate emotion using a scale of 1-10, with 1 equaling mildly upset through 10 equaling “shocked speechless.” This side of the questionnaire was adapted from the design used by Weaver (1993).

The back side of the questionnaire was made up of 20 incomplete statements that asked participants to fill in the blank using a given rating scale. These 20 statements were adapted from the Memory Characteristics Questionnaire developed by Johnson, Foley, Suengas, and Raye (1988). Statements asked participants to rate their memories for verifiable details such as the day of the week or the hour in which they learned the news, along with their memories for things unique to each individual. Statements such as “I remember details of events preceding the moment that I learned the news” (rating scale of 1=not at all to 7=clearly) or “At the time, it seemed like the event would have serious implications” (scale of 1=not at all to 7=definitely), allowed participants to give insight into their memories of less palpable information without going into the detail of free recall. The participants were

also asked to include general biographical information. This portion of the questionnaire can be found in Appendix B.

The packets that were mailed out consisted of a questionnaire for each event relevant to the participant's age, an informed consent letter, and a return envelope. For participants receiving more than one questionnaire, the order in which they were enclosed was varied to control for the possibility that participants might grow tired or disinterested after completing the initial questionnaire. Current students received a questionnaire and informed consent letter during undergraduate psychology classes.

### *Scoring*

Analysis of the participants' memories took place in several forms. The numerical ratings that each participant gave for both the confidence of their free recall statements and their selection used to complete each of the 20 statements on the adapted Memory Characteristics Questionnaire (Johnson et al., 1988) were simply entered into SPSS. Participants rated the confidence of each free recall response on a scale of 1 to 3. Responses for which the participant failed to rate his or her confidence were left blank. Additionally, a score of 1 or 2 was included based on the participant's response regarding the manner in which they first heard the news of the specific event. For participants circling a type of media, a score of 1 was given, while those who heard from a person were assigned a score of 2; this item was left blank for participants who did not circle anything. The numerical

data included a rating of 1 to 10 for emotional reaction on one question. Participants responded to the 20 statements adapted from the MCQ by using the given scale, which was always 1 to 7 despite changes in the criteria respective to the statement. Again, items were left blank if the participant did not give a response.

The open-ended questions were scored as follows. The first question of the free recall data asks the participants to describe in as much detail as possible how they first heard the news of the event in question. For this question, we counted the number of words to establish a way of looking at each participant's degree of elaboration as Brown and Kulik did in their 1977 study. All of the words in Question 1 were counted, with the exception of "hazy" words and phrases like "probably," or "I think" since they imply uncertainty of the memory.

In addition to the word count scores, all of the free recall scores were coded using a scale of 0-3. Free recall accounts in which the participant gave at least one definite answer (regardless of length or inclusion of other uncertain statements) were given a score of 3. For Question 3, regarding the time in which they heard the news, participants received a 3 only if they responded with an exact time, such as "8:45 a.m." The score of 2 was used almost exclusively for Question 3. On this question, many participants responded with *definite* answers, but the answers themselves were often much more vague than the previous example of a *definite* time. Statements

like “morning,” “at the time that it occurred,” or “during the *Today* show” were given a score of 2 because, while less exact, they were still definite responses. In the event that a participant gave a range of times, exact ranges such as “8:45 a.m. - 9:14 a.m.” were scored as 3 and less exact ranges like “between 10:00 a.m. and 4:00 p.m.” were assigned a score of 2. The score of 1 was designated for less certain responses. Statements that included phrases such as “I think,” “I believe,” “it seems like,” and so on were given a score of 1 since the participant *did* offer a response, albeit an indefinite or uncertain one. In the event that participants stated that they did not know or remember specific details, a score of 0 was given. A score of 0 was also given to participants who failed to give any response at all for a question.

For the scoring of open-ended questions, inter-rater reliability was established. Raters were asked to use the above-referenced criteria in order to score nine questions from the September 11 questionnaires, nine questions from the JFK questionnaires, and nine questions from the Pearl Harbor questionnaires. In addition to serving as the first rater, I counted the number of words for each participant’s response to Question 1. The nine free recall questions were then scored a second time by an independent rater. The second rater was given the questionnaires from the first 20% of participants in each group, which converted to roughly 10 participants from the oldest group (30 questionnaires), 10 from the middle group (20

questionnaires), and 20 from the youngest group (20 questionnaires). Of the 27 questions (9 for each event), acceptable reliability (90% or greater) was established for all but three. Scores from Question 9 from the 9/11 questionnaires showed only 60% agreement. For the Pearl Harbor questionnaires, scores for Question 6 showed 60% agreement, while scores for Question 9 showed only 40% agreement. All scores were in agreement of 90% or better for the JFK questionnaires. The three sets of differing scores were examined again, and the consensus answers were entered for analysis.

### Results

I hypothesized that older adults would have less detailed or less confident memories for the events of 9/11 than younger adults. I also hypothesized that the reminiscence bump would be in effect for each group. According to the bump theory, the oldest group would have a better recollection for the attack on Pearl Harbor than for the other two events, while the middle-aged group would recall JFK's assassination better, and the youngest group would show the most detailed or confident memories for the events of 9/11.

#### *Free Recall Questions*

I first conducted a MANOVA on the confidence ratings for Questions 1 through 9 of the free recall section using class (age) as the grouping variable. There appeared to be no significant differences in the participants' responses to these questions. However, the data for Question 3 suggested an age trend

for memory of the time of day,  $F(2,180)=3.058$ ,  $p=.049$ . This trend suggested that the younger participants had a slightly more definite response, as in they gave responses of a definite time like “2:00 p.m.” as opposed to a vague response like “afternoon.” While there was no significant age difference in participants’ confidence ratings, they were most confident for Question 1 ( $Mean=2.98$ ,  $SD=.165$ ) and Question 2 ( $M=2.99$ ,  $SD=.148$ ), which asked for a general description and source of first hearing the news. They were least confident in their answers for Question 3 relating to time ( $M=2.38$ ,  $SD=.626$ ) and for Question 9, which asked for miscellaneous information ( $M=2.55$ ,  $SD=.668$ ).

The free recall responses themselves were scored based upon the previously discussed criteria (scale of 0-3). In this case, the effect of age was not significant overall. Many of the questions received scores leading to means of 3.00, or the criteria’s ceiling score. However, answers to the questions concerning the time, ongoing activity, emotion, and other information related to first learning the news of 9/11 showed an age trend. The trend showed the oldest group as offering less affirmative statements in response to these questions. This trend can be viewed in Table 1.

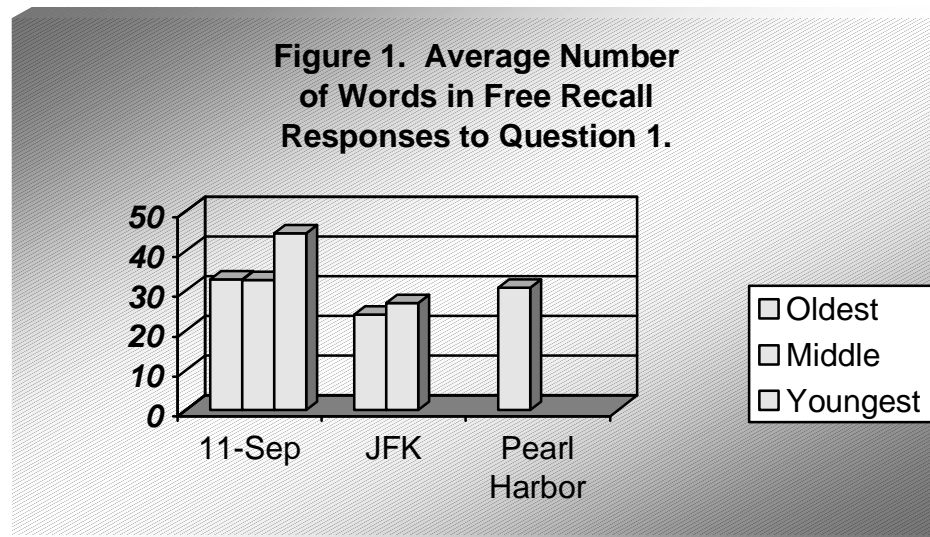
Table 1 Means and standard deviations for free recall response scores by Age.

No.	Canonical Category	Oldest	Middle	Youngest
		Mean age=77.08	Mean age=58.26	Mean age=23.36
1	Description	Mean=2.94 SD=.412	Mean=3.00 SD=.000	Mean=3.00 SD=.000
2	Source	Mean=2.94 SD=.412	Mean=3.00 SD=.000	Mean=3.00 SD=.000
3	Time	Mean=2.19 SD=.735	Mean=2.49 SD=.505	Mean=2.41 SD=.559
4	Location	Mean=2.94 SD=.412	Mean=3.00 SD=.000	Mean=3.00 SD=.000
5	Ongoing Activity	Mean=2.83 SD=.700	Mean=2.94 SD=.429	Mean=3.00 SD=.000
6	Others Present	Mean=3.00 SD=.000	Mean=2.94 SD=.429	Mean=2.97 SD=.277
7	Personal Affect	Mean=2.77 SD=.800	Mean=3.00 SD=.000	Mean=3.00 SD=.000
8	Aftermath	Mean=2.94 SD=.412	Mean=3.00 SD=.000	Mean=3.00 SD=.000
9	Other Information	Mean=2.19 SD=1.316	Mean=2.59 SD=1.019	Mean=2.65 SD=.959

Finishing analysis of the free recall data, I conducted an ANOVA for the number of words given in response to Question 1 for 9/11 by age group. The data showed that age groups significantly differed in the amount of words recalled,  $F(2, 216)=4.987$ ,  $p=.008$ , with the Oldest group giving an average of 32.79 words ( $SD=31.217$ ) and the Middle-aged group giving an average of 32.63 words ( $SD=25.260$ ). The significance was the result of the Youngest group responding with an average of 44.38 words ( $SD=26.164$ ) for their personal details of learning the news of the terrorist attacks of 9/11. Figure 1 reflects each group's average number of words offered in response to Question 1 on each applicable survey.

Upon repeated measures of analysis by event within age groups, I found that there was a significant effect for event on the amount of words recalled. The Oldest group showed a significant difference,  $F(2, 51)=6.229$ ,

$p=.004$ , in that they *did* show a decline in the amount of words given for their memories of JFK's assassination ( $M=24.04$ ,  $SD=21.508$ ) compared to 9/11 ( $M=32.79$ ,  $SD=31.217$ ). However, their responses for memories of Pearl Harbor's attack ( $M=30.75$ ,  $SD=25.245$ ) were quite similar to the amount of elaboration given for 9/11. For the Middle group, a significant event effect was also established,  $F(1, 100)=12.097$ ,  $p=.001$ . They too provided shorter answers to Question 1 on the JFK ( $M=26.82$ ,  $SD=16.692$ ) survey than on the 9/11 survey ( $M=32.63$ ,  $SD=25.260$ ). The average number of words given for Question 1 of the surveys can be seen in Figure 1 below.



The free recall data does not fully support nor negate either hypothesis. The trend in free recall scores *suggests* that there is an age-related decline in the quality of older adults' memories for the events of 9/11. These data also show that the reminiscence bump is not in effect for the older two groups, and without a comparison measure for the youngest group, there

is no way of knowing if the bump is in effect for them. Word count scores of Question 1 do not support the notion of an age-related decline; a decline is shown, but the least elaborate memory offered is for JFK's assassination rather than Pearl Harbor or 9/11. The amount of elaboration for the youngest group suggests that the reminiscence bump is in effect, though accuracy cannot be established since they were only questioned for one event.

#### *Adapted Memory Characteristics Questionnaires*

Following the somewhat inconclusive analysis of the free recall data, I conducted a MANOVA for all of the MCQ questions, with class (age) as the grouping variable. The effect of class was significant overall,  $F(40, 344)=2.012, p=.000$ . The data in Table 2 contradicts our hypothesis since the oldest and middle-aged subjects showed higher memory ratings than the younger subjects.

Table 2 Means (and standard deviations) for 9/11/01 MCQ questions by Age

QUESTION	Oldest Mean age=77.08	Middle Mean age=58.26	Youngest Mean age=23.36
*Clarity of memory (1=dim, 7=sharp)	Mean=6.76 SD=.560	Mean=6.77 SD=.693	Mean=6.29 SD=.863
*Overall vividness (1=vague, 7=very detailed)	Mean=6.61 SD=.731	Mean=6.53 SD=.869	Mean=5.96 SD=1.017
*Memory for details (1=sketchy, 7=very detailed)	Mean=6.51 SD=.794	Mean=6.57 SD=.793	Mean=5.96 SD=1.008
*Consequentiality or likely to have serious implications (1=not at all, 7=definitely)	Mean=6.67 SD=.826	Mean=6.41 SD=1.457	Mean=6.06 SD=1.514
*Overall quality of memory (1=hardly remembered, 7=very well remembered)	Mean=6.84 SD=.373	Mean=6.70 SD=.944	Mean=6.51 SD=.683
*Accuracy of memory (1=great deal of doubt, 7=no doubt whatsoever)	Mean=6.67 SD=.555	Mean=6.68 SD=.516	Mean=6.09 SD=.922
*Rehearsal or discussion has occurred for this event (1=not at all, 7=many times)	Mean=6.66 SD=.717	Mean=6.64 SD=.792	Mean=5.97 SD=1.661

\*denotes significant age difference ( $p < .01$ )

I followed up with repeated measures ANOVAs on MCQ ratings for the oldest age group across the 3 events: 9/11, JFK's assassination, and Pearl Harbor. I found that there was a significant effect for several of the questions (see Table 3 for significant questions), with memories for the most recent event being rated as more vivid and detailed than memories for the long-ago events. Again, this contradicted the hypothesis that memories would be strongest for the event experienced between 10 and 30 years of age. This same contradiction was apparent when we followed up with repeated measures ANOVAs for the middle-aged group across 2 events: 9/11 and JFK's assassination. There was a significant effect of *Event* for the examined questions, with memories for 9/11 being rated as more vivid or detailed than memories for JFK's assassination (see Table 4).

Table 3 *Repeated Measures of Analysis of Variance within the Oldest group by Event*

QUESTION	9/11/01	JFK	Pearl Harbor
<b>1) Clarity of memory</b> (1=dim, 7=sharp)	Mean=6.81 SD=.487	Mean=6.04 SD=1.386	Mean=5.50 SD=1.873
<b>2) Overall vividness</b> (1=vague, 7=very detailed)	Mean=6.65 SD=.683	Mean=5.94 SD=1.259	Mean=5.31 SD=1.832
<b>3) Memory for details</b> (1=sketchy, 7=very detailed)	Mean=6.50 SD=.814	Mean=5.92 SD=1.291	Mean=5.34 SD=1.934
<b>8) Consequentiality</b> (1=not at all, 7=definitely)	Mean=6.60 SD=1.125	Mean=6.54 SD=1.056	Mean=6.13 SD=1.572
<b>14) Overall quality of memory</b> (1=hardly, 7=very well)	Mean=6.85 SD=.357	Mean=6.29 SD=1.010	Mean=5.67 SD=1.950
<b>17) Accuracy of memory</b> (1=great deal of doubt, 7=no doubt whatsoever)	Mean=6.69 SD=.547	Mean=6.18 SD=.953	Mean=6.02 SD=1.606
<b>18) Rehearsal</b> (1=not at all, 7=many times)	Mean=6.67 SD=.706	Mean=5.46 SD=1.732	Mean=6.13 SD=1.669

Table 4 *Repeated Measures of Analysis of Variance within the Middle group by Event*

QUESTION	9/11/01	JFK
<b>1) Clarity of memory (1=dim, 7=sharp)</b>	Mean=6.76 SD=.693	Mean=6.04 SD=1.306
<b>2) Overall vividness</b> (1=vague, 7=very detailed)	Mean=6.51 SD=.869	Mean=5.84 SD=1.328
<b>3) Memory for details</b> (1=sketchy, 7=very detailed)	Mean=6.54 SD=.798	Mean=5.60 SD=1.425
<b>8) Consequentiality</b> (1=not at all, 7=definitely)	Mean=6.41 SD=1.457	Mean=5.80 SD=1.893
<b>14) Overall quality of memory</b> (1=hardly, 7=very well)	Mean=6.76 SD=.718	Mean=6.11 SD=1.257
<b>17) Accuracy of memory</b> (1=great deal of doubt, 7=no doubt whatsoever)	Mean=6.68 SD=.528	Mean=6.00 SD=1.192
<b>18) Rehearsal</b> (1=not at all, 7=many times)	Mean=6.65 SD=.779	Mean=5.59 SD=1.755

### *Effects of Source and Emotion*

I also looked at the effect that source and emotion might have on the ability to recall flashbulb events, following Bohannon and Symons' (1992) findings that the source of surprising news had a significant effect on participants' abilities to recall vivid or more detailed flashbulb memories. I conducted MANOVAs first using class and source as grouping variables, then class and emotion as grouping variables, and the 20 MCQ questions as dependent variables. I found that there was no significant effect of source on any level or for any event. For the sake of brevity, I will refrain from further discussion of source as a factor.

Emotion was rated on a scale from 1 to 10, with the average rating for each age group hovering around 7.5. I recoded emotion into 3 levels, low (representing scores of 1 to 3), moderate (scores of 4 to 7), and high (scores of 8 to 10). The MANOVA using class and emotion as grouping variables

again showed a significant effect of class,  $F(40, 344)=2.012$ ,  $p=.000$ . This analysis also showed a significant effect for emotion,  $F(40, 344)=2.412$ ,  $p=.000$ , and for the class and emotion interaction,  $F(80, 696)=1.422$ ,  $p=.012$ . Overall, higher emotion ratings led to higher scores for the MCQ rating scales. The youngest group seemed to experience this effect most often; however, on some questions, MCQ ratings were high for both low and high emotion ratings, and low for moderate emotion ratings. Though the pattern is not consistent, these findings partially support past research by suggesting that emotion is a greater predictor of flashbulb memories for younger adults than for older adults.

I also conducted an ANOVA using class and emotion as the grouping variables and the word count for Question 1 of the free recall section of the 9/11 questionnaires as the dependent variable. The overall effects of age and emotion were not significant, but there was a trend for an interaction,  $F(4, 203)=1.846$ ,  $p=.121$ . For younger adults, higher emotion ratings were associated with longer event narratives for 9/11, whereas the reverse was true for both the middle-aged and older adults. Again, it appears that emotion is a more consistent predictor of younger adults' memories than of older adults' memories.

#### *Free Recall Excerpts*

In addition to the quantitative data, many wonderful qualitative statements were returned. Several suggest the flashbulb quality of their

memories: For September 11<sup>th</sup>, a 74-year-old male writes, “It became imprinted in my memory.” A 55-year-old female recalls learning of JFK’s assassination with, “I remember that I wanted to smile when I arrived at school to let everyone see I had no braces on, but I didn’t get to smile because of the bad news about President Kennedy. I’ll never forget that day!” Others suggest the intense emotion that they experienced: one 82-year-old male recalls the attack on Pearl Harbor with the statement, “...I immediately began to hate the Japanese even though I had never met a Japanese person. This feeling seemed to be universal...” and a 60-year-old female states, “My most vivid memory was the Sunday following. My husband and I were watching TV when Jack Ruby shot Oswald. This was when I was shocked speechless.” Still others reported rather idiosyncratic details, not unlike those that Brown and Kulik noticed in 1977. One participant, a 73-year-old female, recalls in great detail about the breakfast meeting that she was hosting on September 11<sup>th</sup>, “I do remember the startling contrast of the Towers-Terror vs. our topic: Darkness of demonic power vs. the Light of Jesus’ love reaching out to 100 of the most at-risk young boys in the inner-city...Probably because of the News, hearts were mightily stirred. To this day, people associate the News with the contrast of the Kingdoms.” A 54-year-old female recalls hearing of JFK’s death on a somewhat more personal level by responding, “First of all, my family had shared lunch with the President and Mrs. Kennedy in August. I felt I knew the man personally. The weather was cool and I was

wearing a flannel nightgown.” Incidentally, more than one person’s dog was run over on November 22, 1963, and these two separate participants recalled the event of taking the dog to the animal hospital! Most interesting of these qualitative responses, however, seem to be those in which the participant refers to another flashbulb event. A 78-year-old male recalls the news of September 11<sup>th</sup> with the thought, “Pearl Harbor again? My thoughts went back to WW2 and my being drafted, trained, and sent to war in Europe.” while an 18-year-old female responds to the same event with the fragmented, if not clairvoyant statement, “Pearl Harbor. This changes textbooks. How dare they! This means war.” Several of these qualitative statements suggest that participants had less than confident memories for some questions, as they used phrases such as “I assume...” or “I was probably...” According to McCloskey, Wible, and Cohen (1988), these responses allow researchers to infer that participants do not remember every detail of their memories and they are “filling them in” through inferences or other techniques. Such questions of confidence and accuracy will subsequently be discussed in further detail.

### Discussion

Previous research supports the idea that older adults have generally less vivid and less detailed memories than younger age or cohort groups when questioned about the moment in which they first learned of flashbulb events such as the assassination of John F. Kennedy, the resignation of

British Prime Minister Margaret Thatcher, and the Space Shuttle *Challenger*. There is also some support for the existence of a “reminiscence bump” within autobiographical memory, wherein recall for events taking place during the ages of 10 and 30 is typically more detailed or given more importance than recall for events falling into other age ranges. Support for these theories is offered by the present study as the youngest group *did* recall or elaborate with the most detail for the events of 9/11, and possibly by the fact that the oldest group remembered the attack on Pearl Harbor better than JFK’s assassination. However, the results of the present study do *not* fully support the notion that older adults show age-related declines in memory or the idea that a reminiscence bump will take place for flashbulb memories as it does for more typical autobiographical memories.

There is a possibility that both the reminiscence bump and the retention effect occur for older adults’ flashbulb memory accounts. The retention effect states that older adults will have the most recall for events taking place during the most recent decade, with progressively less recall for each previous decade (Rubin & Schulkind, 1997). By giving their most vivid or detailed recall for 9/11, the older adults could be illustrating the retention effect, then a decline in memory for JFK’s assassination, followed by similarly elaborate recall of Pearl Harbor as part of the effects of the reminiscence bump.

When comparing all of the 9/11 questionnaires, results from rating scales adapted from the Memory Characteristics Questionnaire (Johnson et al., 1988) showed a significant difference for age on questions related to clarity, vividness, consequentiality, remembrance, accuracy, and rehearsal for 9/11. This difference was the opposite of that predicted, with the oldest adults and the middle-aged adults rating themselves as having stronger memories than the youngest group for the terrorist attacks of 9/11. Furthermore, analyses within class or age groups showed that these two groups typically had stronger memories for 9/11 than for the assassination of JFK or the attack on Pearl Harbor for the majority of MCQ ratings. These latter findings clearly support a retention effect.

There is considerable research documenting age-related declines in memory, as well as many other articles that provide evidence of a reminiscence bump for memories of early adulthood. Several factors should be addressed as causal factors possibly responsible for such contradictory results. Specifically, these factors include aspects of the study's methodology and concepts directly related to the theory and definition of flashbulb memory. These potential factors are problematic as a direct result of the main question underlying the concept of flashbulb memory itself, this question being whether significance of an event is determined at the actual time of the event or afterwards due to rehearsal effects and other memory enhancers.

With his 1982 article, Ulric Neisser raised the question that every researcher of flashbulb memory has had to deal with when conducting his or her study: is flashbulb memory created at the time of the event and remembered through subsequent rehearsals or is it these rehearsals of the event that ultimately cause people to develop such strong memories? Neisser (1982) postulates that the latter is the case because we are constantly maintaining our own personal histories as well as a separate overarching history for the events around us; he states that flashbulb memories occur when these independent histories run together. Colegrove (1899) studied the phenomenon of flashbulb memory for the assassination of Abraham Lincoln, and surmised that such events cause vivid memories that are easily recalled. Brown and Kulik (1977) took this further through the "Now Print!" (Livingston, 1967a) concept, suggesting that the surprise, emotion, and consequentiality form pictures that are indelibly imprinted in memory. Neisser takes Colegrove's findings further by turning Brown and Kulik's original theory on its head.

In light of these conflicting theories, the methodology of any flashbulb memory study becomes questionable. The majority of flashbulb memory studies use questionnaires or face-to-face interviews as a means of collecting data, with the primary question asking participants to recall as much detail as possible for a specified, often dated, event. This question is usually followed by a set of schematic questions, meaning that participants are asked to recall

the journalistic five W's (who, what, where, when, and why) involved in their memories. Responses to these questions provide the canonical data (source, location, affect, and so on) that Brown and Kulik (1977) considered to be prime aspects of the evidence of flashbulb memories. Appearance of some collection or degree of these categories is typically a basis for determining what is or is not a flashbulb memory; further, these aspects are scored in some manner as a means of determining how significant a person's memory is for detail and vividness. Neisser (1982) argues that there is no surprise that people recall such information because they are provided with this narrative structure of questioning. Simply put, Neisser states that by using questions set up in a narrative format, researchers are more or less "creating" flashbulb memories.

Neisser (1982) also calls attention to the fact that memories can be altered, especially when consequentiality is established at a date later than the actual moment one hears the news of a flashbulb event. He gives an example of a woman who did not really believe that JFK had been assassinated; she later had a flashbulb memory of initially hearing the news. In the present study, one person offered the recall of a close friend who had been out of town on September 11<sup>th</sup>. This friend happened to be camping on an island with no electricity, no forms of media or communication whatsoever, and very few other people. Even though he did not return home until several days after 9/11, he was able to tell his friend everything that he did on 9/11.

He suggested that he had had a feeling that something was wrong, and it was that feeling that caused him to take note of his day and to imprint a flashbulb memory. While that might be possible, it seems much more likely that learning the consequentiality of the event later caused him to go back and relive his day in order to connect his personal narrative with a historical narrative. Neisser views flashbulb memories as benchmarks of life because they allow people to line up their personal histories with history itself, thereby giving them a place in history.

Neisser (1982) is not the only one to find problems with the original flashbulb study. In their 1988 study, McCloskey, Wible, and Cohen challenged the idea that there is a special mechanism that creates permanent flashbulb memories immediately upon learning the news of a flashbulb event. They suggest that flashbulb memories should be viewed as deriving from the same normal processes as all other types of memories. The authors studied flashbulb memory using a typical format of a questionnaire asking for the main canonical categories. They classified responses as being “general” or “specific.” Their results showed that memories were generally consistent over a four-month interval. However, upon a closer inspection of the types of responses, there was considerable evidence that participants had forgotten details or were inaccurate in their recall. The frequency of general to specific answers and a decline in the confidence of answers gave support to this suggestion, as well as the fact that many participants showed confidence in

inconsistent memories. McCloskey, Wible, and Cohen (1988) determined that no special mechanism exists, and that flashbulb memories are subject to many of the same errors as normal memory, specifically, reconstructive errors where participants cannot recall information and fill it in through inference and guesswork. Many participants in the present study show evidence of such errors, making statements such as, "I would've been wearing a suit as I was at work." or "I assume I was wearing my normal pants." Most of these reconstructive errors were related to less important details such as the clothes that they were wearing.

In 1992, Bohannon and Symons published their work on the confidence, consistency, and quantity of flashbulb memories, siding more with Brown and Kulik's (1977) position and opposing the findings of McCloskey, Wible, and Cohen (1988) and Neisser (1992). The authors state that a "strong empirical relationship between self-reported affect and the extent of flashbulb memory suggests a mechanism related to arousal at encoding." (1992, p. 70). With their study, Bohannon and Symons wanted to determine whether affect ratings and estimates of recounts (retellings) due to media exposure would change. It was hypothesized that memories would become more emotional or revisited more often due to the extensive media coverage of the event. They found that affect ratings remained the same, and that estimates of recounts increased due to increased media exposure. Additionally, they found that affect was more closely related to free recall

responses. They did concede that participants may supply some inaccurate information, but maintained that high affect must be present for the memory to be stored as a flashbulb memory. Bohannon and Symons suggest that despite evidence of forgetting and inconsistencies, there is, in fact, a special mechanism underlying flashbulb memory as these memories are recalled more often and more vividly than comparative memories dealing with semantic, factual details. They feel that research in the field would benefit from a uniform methodology, with specific attention given to use and comparison of appropriate measures and use of ratings for affect, recounts, and exposure.

Finally, McCloskey, Wible, and Cohen (1988) suggested that flashbulb memory is like normal memory, but as a phenomenon, it should be used to study memory processes from a new perspective. Through their work, along with Neisser's and many others, it is clear that there are numerous theories about what flashbulb memory is, how it is formed, maintained, and above all, studied. Researchers use a variety of formats with which to study this topic, and it is unclear as to whether or not certain methods are beneficial or detrimental to the study itself. Without more information about the processes that lead to or cause the formation and maintenance of flashbulb memory, researchers will continue to face questions such as these.

The findings of the present study suggest that the reminiscence bump and general decline in memory with age are not as influential on a person's

ability to give vivid and detailed recollections as originally thought. Analysis of word count suggests that first, the retention effect, and then the reminiscence bump are in effect for the oldest group's recall of the three events. However, analysis of word count for the middle-aged group suggests that the reminiscence bump is decidedly not in effect. Finally, analysis of participants' responses to the rating scales of the Memory Characteristics Questionnaire suggests that there is not an age-related decline in the vividness, detail, or confidence in the older and middle-aged adults' memories.

The present study was conducted in accordance with the majority of Bohannon and Symons (1992) suggestions for a uniform methodology. While I was unable to test within the suggested time frame for any of the events and did not utilize a test-retest method, I did pay special attention to the ratings for affect or emotion, recounts, and exposure. Without employing a test-retest method, I had no way of establishing accuracy for participants' responses. It is doubtful that older participants' recall of Pearl Harbor and JFK's assassination will change significantly upon retest, but it seems that all participants should be questioned again for their memories of initially learning about the attacks of 9/11 in order to further validate the findings of the present study.

While the present study did not utilize a test-retest method to establish accuracy, a study conducted by Gerdy, Multhaup, and Ivey (2003, March) did, in fact, test older and younger adults for their memories of 9/11 in September

2001 and again in February 2002. This particular study also looked at the effects of aging on flashbulb memories; however, the researchers gathered data by asking participants probed questions over the telephone. In addition to using a test-retest method, this study differed from the present study by using criteria to determine whether or not a memory was of “flashbulb” quality. Based upon Cohen, Conway, and Maylor (1994), a score of 9 - 10 had to be attained in order for a participant’s recall to constitute a flashbulb memory. Unlike Cohen et al. (1994), Gerdy et al. found that older and younger adults did not differ in the frequency of which flashbulb memories occurred. Gerdy et al. also found that the older and younger adults recalled similar numbers of attributes (the canonical criteria set out by Brown and Kulik in 1977), and that the older adults were more confident in their memories than younger adults.

While the present study did not distinguish between flashbulb and non-flashbulb memories, Gerdy et al.’s (2003, March) data would seem to support our findings. Although in the present study, younger participants elaborated more, there did not appear to be a general decline with age in flashbulb memory quality. Moreover, the MCQ data show that older adults rated their recall as significantly better, similar to the older participants in Gerdy et al.’s study. Thus, despite distinct differences in methodology, the results of two recent studies of age differences in flashbulb memory consistently fail to support Conway et al.’s finding of age declines.

In conclusion, the present study found that flashbulb memories are indeed affected by emotion. Higher emotional reaction ratings led to higher memory scores or ratings and lengthier elaboration, at least for the youngest group of participants. The youngest adults responded with the most elaborate memories during the free recall questioning, though they showed the least confidence, vividness, or detail in regard to the rating scales adapted from the Memory Characteristics Questionnaire (Johnson et al., 1988). The present study suggests that older adults might possibly experience a retention effect, followed by the reminiscence bump, in that they have the most vivid recollection for the event occurring within the most recent decade, followed by a vivid recollection of an event taking place when they were between 10 and 30 years old. Ultimately, it appears that emotion is a better predictor of flashbulb memories for younger adults, and that age-related declines are evident only in the length of elaboration.

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## Appendix A\*

<p style="text-align: center;"><b>QUESTIONS</b></p> <p>Answer each question below. If you need to, attach additional pages. At the right of each answer, please rate your confidence that your memory is correct. Please give only one number, using the scale at right.</p>	<p>Confidence in the accuracy of your answer:  <b>1= Unsure</b>  <b>2= Fairly Sure</b>  <b>3= Sure</b></p>
<p>1. Describe in as much detail as possible how you heard about the September 11, 2001 terrorist attacks in New York City and Washington.</p>	<p>Confidence___</p>
<p>2. Did you first hear the news from the media (television/radio) or from another person?</p> <p>Circle one:    Radio       TV       Person</p>	<p>Confidence___</p>
<p>3. What was the time when you heard the news? (be as precise as possible)</p>	<p>Confidence___</p>
<p>4. Describe in as much detail as possible where you were at the time you heard the news.</p>	<p>Confidence___</p>
<p>5. What were you doing when you heard the news?</p>	<p>Confidence___</p>
<p>6. Who were you with when you heard the news?</p>	<p>Confidence___</p>
<p>7. What was your first thought or reaction when you heard the news?</p> <p>(At right, rate your emotional reaction, where 1=mildly upset, 5=very upset, 10=shocked speechless)</p>	<p>Confidence___</p> <p>Emotional Rating: (1-10) _____</p>
<p>8. What did you do after hearing the news?</p>	<p>Confidence___</p>
<p>9. Please note any specific details about your memory of hearing the news, for example, what you were wearing or what the weather was like.</p>	<p>Confidence___</p>

\*The original version of this side of the questionnaire utilizes all of the space on the page in order to give as much room for free recall as possible.

## Appendix B

<u>QUESTIONS</u>	<b>ACCURACY RATING (1-7)</b>
Please read the following statements and rank your response based on the scale given with each statement. Please choose only one number, and write it in the box provided.	
<b>1. My memory for this event is</b> (1=dim, 7=sharp/clear)	
<b>2. Overall vividness for this memory</b> (1=vague, 7=very detailed)	
<b>3. My memory for this event is</b> (1=sketchy, 7=very detailed)	
<b>4. Order of events is</b> (1=confusing, 7=comprehensible)	
<b>5. My memory for the location of where the event took place is</b> (1=vague, 7=clear)	
<b>6. My memory for the day of the week is</b> (1=vague, 7=clear)	
<b>7. My memory for the hour is</b> (1=vague, 7=clear)	
<b>8. At the time, the event seemed like it would have serious implications</b> (1=not at all, 7=definitely)	
<b>9. Looking back, this event did have serious implications</b> (1=not at all, 7=definitely)	
<b>10. I remember how I felt at the time when the event took place</b> (1=not at all, 7=definitely)	
<b>11. My feelings at the time were</b> (1=couldn't care less, 7=shocked speechless)	
<b>12. My feelings at the time were</b> (1=not intense, 7=very intense)	
<b>13. I remember what I thought at the time</b> (1=not at all, 7=clear)	
<b>14. Overall, I remember this event</b> (1=not at all, 7=very well)	
<b>15. I remember events relating to this memory that took place in advance of the event</b> (1=not at all, 7=clearly)	
<b>16. I remember events relating to this memory that took place after the event</b> (1=not at all, 7=clearly)	
<b>17. Do you have any doubts about the accuracy of your memory of this event</b> (1=a great deal of doubt, 7=no doubt whatsoever)	
<b>18. Since it happened, I have thought about this event</b> (1=not at all, 7=many times)	
<b>19. Since it happened, I have talked about this event</b> (1=not at all, 7=many times)	
<b>20. Since it happened, I have heard about this event in the media</b> (1=not at all, 7=many times)	

We need to know a little more about the people who have completed our survey. Please tell us a little bit about yourself by answering the following questions.

**Your age:** \_\_\_\_\_ **Gender:** M F **Race:** \_\_\_\_\_

**UC/UTC Major:** \_\_\_\_\_

**Current Profession (or former, if retired):** \_\_\_\_\_