Running head: FLASHBULB MEMORIES OF RECENT AND DISTANT EVENTS

Flashbulb Memories of Recent and Distant Events: Effects of Time Delays and Nationality on Personal Memories Surrounding the Death of Princess Diana and September 11

Lia Kvavilashvili, Jennifer Mirani, Simone Schlagman and Diana E. Kornbrot

University of Hertfordshire

Address for correspondence:

Lia Kvavilashvili

Department of Psychology

University of Hertfordshire

College Lane

Hatfield, Herts, AL10 9AB

United Kingdom

Tel. +44 (0) 1707 285121

Fax +44 (0) 1707 285073

Email: L.Kvavilashvili@herts.ac.uk

Abstract

This study examines flashbulb memories of an important recent and a distant public event to assess patterns of forgetting in the formal characteristics of these memories. Two studies were conducted in which memories of a recent event (September 11) were compared to memories of a distant event (the death of Princess Diana) in several samples of British and one sample of Italian participants. In British participants, the 51-month old memories of the death of Princess Diana were as detailed and specific as their memories of a 3-month old event, September 11. Moreover, their memories of Princess Diana were not different from memories of the terrorist attack on New York collected immediately or very soon after September 11 in two other groups of British participants. Results suggest that flashbulb memories of a distant public event can be as detailed, specific and vivid as memories of a very recent event. This, however, was not the case for Italian participants whose flashbulb memory scores for September 11 were reliably higher than for the death of Princess Diana. The results also showed that there was a small albeit reliable loss of specificity in British participants' memories of September 11 in the first three months after this event. Possible implications of these findings for flashbulb memory research are discussed.

Flashbulb Memories of Recent and Distant Events: Effects of Time Delays and Nationality on Personal Memories Surrounding the Death of Princess Diana and September 11

Flashbulb memories can be defined as particularly vivid and detailed autobiographical memories that are both veridical and immune to the processes of forgetting. It is quite common to have such vivid and long lasting memories of personally important and/or emotional events (e.g., one's first date or a car accident). However, in memory research it has been customary to study flashbulb memories via unexpected and dramatic public events as, for example, the assassination of John F. Kennedy (Brown & Kulik, 1977), the explosion of space shuttle Challenger (Neisser & Harsh, 1992) or the resignation of British Prime Minister Margaret Thatcher (Conway et al., 1994). The interesting feature of these studies is that they do not examine memories for the details of the original event itself but the so called *reception event*, i.e., one's memories for the personal circumstances when the news of the event was first heard. Because of the emphasis on this particular methodology, the flashbulb memories have often been defined as "memories for the circumstances in which one first learned of a very surprising and consequential (or emotionally arousing) event" (p. 73, Brown & Kulik, 1977).

An interesting finding that emerged from one of the first (and seminal) study on flashbulb memories conducted by Brown and Kulik (1977) was that 79 out of their 80 participants (99%) appeared to have flashbulb memories of circumstances in which they first heard of the assassination of President John F. Kennedy. Brown and Kulik (1977) found this result extraordinary given that 13 years had passed from this event at the time of testing in 1975 (for similar results see Yarmey & Bull, 1978). The examination of participants' memory descriptions revealed that people were able to recall at least one of the six so called "canonical categories" about the reception event such as the place,

activity one was engaged, source of news or informant, own emotion, others emotion and immediate aftermath. Many descriptions also contained information about irrelevant details such as "the weather was cloudy and grey", or "we all had on our blue little uniforms". According to Brown and Kulik (1977) it is these irrelevant details that give the flashbulb memories their "primary, 'live' quality that is almost perceptual" (p. 74).

It is interesting that Brown and Kulik (1977) took their participants' memory descriptions at face value and never questioned their accuracy. In contrast, the subsequent research has mainly concentrated on the issue of veridicality or accuracy of these memories. Several test-retest studies of flashbulb memories have shown very little forgetting in participants' flashbulb memory scores when the re-test occurred within 6 to 18 months from the reception event (e.g., Cohen et al, 1994; Conway et al., 1994; Er, 2003; Neisser et al., 1996; Pillemer, 1984; Schmolck et al., 2000). However, in those two studies where the re-test occurred after 32 to 34 months, the significant forgetting and distortion was reported (Neisser & Harsh, 1992; Schmolck, et al., 2000).

Given that people may have highly accurate memories for the reception event over the first year the important question that needs to be addressed is how stable these memories are over time. Could it be that flashbulb memories are relatively stable after the first few months or a year but they become less vivid and detailed as years go by so that after several years there is not much that can be remembered? (McCloskey et al., 1988). As pointed out by Rubin (1992) the stability of flashbulb memory descriptions "is a valid and theoretically informative question independent of the issue of accuracy" (p. 267).

However, few have tested this research question (as an exception see Schmolck et al., 2000). The best method for studying the effects of time delays on flashbulb memories is *the longitudinal test-retest method*. This involves retesting groups of people at increasing time intervals from the original reception event (e.g., Schmolck et al. 2000).

However, the major problem with this method is the high drop out rate. It is often difficult to get hold of the same participants even after a year or two from the reception event let alone after several years (*cf*. Conway et al., 1994; Neisser &Harsh, 1992).

In order to overcome this problem one could use *the cross-sectional method* in which different groups of participants are tested for their memory of the reception event at increasing time intervals from this event (e.g., see Bohannon, 1988). Although this eliminates the problem of high drop out rate it will be difficult to study the effects of very long time delays as the researchers will have to wait for several years before they can complete their study.

There is, however, a method that can avoid the problems of longitudinal and cross-sectional methods. In order to assess the stability of flashbulb memories over very long time delays, *irrespective their veridicality*, one can compare the flashbulb memories of two public events, one that happened recently and another which happened several or many years ago (*cf*. Tekcan & Peynircioglu, 2002). If people's memories of the "old" event do not reliably differ from those of the more recent event (in terms of the quantity, specificity and clarity of recalled information) then one could conclude that flashbulb memories of events that happened several years ago are quite stable and less prone to forgetting. However, a possible problem for this method is to find two public news events that would be comparable in terms of surprise, emotional shock, significance, etc.

We reasoned that the terrorist attack in New York on September 11, 2001 provides a unique opportunity for studying the flashbulb memories of a recent event as it elicited high levels of surprise, emotional impact and extended media coverage world-wide.[1] Another very unexpected and tragic public event for the British people was the death of Princess Diana on 31 August in 1997. This event undoubtedly elicited very high levels of surprise, emotional shock and extended media coverage in Britain (comparable

to the terrorist attack in New York), and therefore would provide an equally unique opportunity to study the flashbulb memories of an "old" reception event.

With this in mind, a Flashbulb Memory Questionnaire (FMQ), designed after Conway et al. (1994) was administered to 65 young British participants in December 2001, three months after the September 11 attack and 51 months (4 years and 3 months) from the death of Princess Diana. The questionnaire consisted of two parts, one for each of these two public events. In each part there was a space for a free recall of the reception event, followed by a probed recall of 5 canonical categories of time, place, activity, source, and others present. At the end of the section participants had to provide the self-report measures of vividness of their memory image as well as the ratings of surprise, emotion and personal and national importance on 10-point rating scales.

By obtaining the flashbulb memory scores for the recent event in New York and comparing them to the memory scores for the death of Princess Diana we hoped to assess the amount of forgetting that could occur in formal characteristics of memory over as many as four years. If flashbulb memories are relatively immune to forgetting then people's memories for the death of Princess Diana should be as detailed, specific and vivid as for the terrorist attack in New York.

Furthermore, various researchers have emphasised how personal and public importance is vital for the formation of flashbulb memories (e.g., Cohen et al., 1994; Conway et al., 1994). One way of studying this would be by doing a cross-cultural comparison, and examining the memory descriptions of the reception event in the country where the event took place and in the country that was not involved in the event. The death of Princess Diana would be an appropriate event to study since it was likely to have much stronger impact on British people than for people living in other countries.

Therefore, in the present study we also tested 59 Italian participants who were provided with a translated version of the same questionnaire distributed to the British sample.

It was hypothesised that the British sample would have high flashbulb memory scores for both the death of Princess Diana and September 11. On the other hand, it was expected that the Italian sample would have as high flashbulb memory scores for September 11 as the British sample but reliably lower scores for the Death of Princess Diana. In other words, it was hypothesised that while British sample would have similar flashbulb memories for both recent and relatively distant events, Italian sample would have flashbulb memories only for September 11 but not for the death of Princess Diana.

The above hypotheses are based on two assumptions. First, the death of Princess Diana and September 11 had similar impact and importance for British people. Second, September 11 had similar impact and meaning for British and Italian participants due to an extraordinary nature of this event both in terms of its political importance for the international community and extended media coverage in both of these countries. The collection of various self-report measures at the end of the each section of flashbulb memory questionnaire aimed to assess the correctness of these assumptions. Participants had to rate their levels of surprise and initial emotion at hearing the news as well as personal and national importance of the event. In addition, they also had to rate the vividness of their flashbulb memories. Although vividness is considered to be an important characteristic of flashbulb memories that gives them almost live perceptual quality it has rarely been assessed in previous studies (but see Neisser & Harsh, 1992; Pillemer, 1984). It is, however, interesting to see if people consider their memories of reception events to be as vivid as posited by Brown and Kulik (1978), and if the vividness ratings decline for those reception events that happened several years ago.

Study 1

Method

Participants

A total of 124 participants took part in the study, 65 in the British group (18 males and 47 females) and 59 in the Italian group (33 males and 26 females). Mean age of British sample was 32.23 years (*SD*=13.18, range 18-59) and was not reliably different (*F*<1) from that of Italian sample (*M*= 30.32, *SD*=12.08, range 19-54). Participants were also matched for professional background as each sample consisted of employees, undergraduates and hospital personnel. Participants were not paid and, in case of students, did not get course credit for filling in the questionnaire.

Materials

The Flashbulb Memory Questionnaire was modelled after the questionnaires used by Conway et al. (1994), Neisser and Harsh (1992), and Pillemer (1984). The questionnaire was divided into two main sections, one section concerning the death of Princess Diana and the other concerning the terrorist's attack in New York on September 11. The order of these two sections in the questionnaire was counterbalanced across participants. Identical questions were asked about both reception events.[2]

In the first part of both sections the participants were asked to provide a short but detailed narrative description about their personal circumstances upon hearing the news (i.e., free recall of the reception event). This was followed by specific questions about the reception event (i.e., probed recall of the reception event). These included the questions about the time (when did you hear about the news), the place (where were you at the time), the activity (what were you doing), the source of the news (how did you find out), and others present (if not alone then indicate who else was present).

Finally, participants were asked to supply self-ratings on several 10-point rating scales measuring the vividness of their memory for the reception event (1=*no image at all*, 10= *extremely vivid image, almost like normal vision*) as well as their levels of surprise, intensity of initial emotion, and personal and national importance of the event (1= *not surprised /emotional*, etc, 10= *extremely surprised/emotional*, etc.).

Procedure

All participants were provided with an envelope containing the Flashbulb Memory Questionnaire with the consent form attached. A covering letter, explaining that the study was concerned with memories of one's personal circumstances upon hearing the news of an important public event, was also included in the envelope. Participants were informed that their memory would be assessed for two such events: the death of Princess Diana and, a more recent event, the terrorist attack in New York on September 11. After having read and signed the consent form participants filled out the questionnaire, which on average took 20 minutes to complete. Most participants answered the questionnaire immediately, however, others took it home and returned it on the following day.

Design

The design was a 2 x 2 mixed factorial with nationality (British *vs*. Italian) as the between-subject variable and the event (death of Princess Diana *vs*. September 11) as the within-subject variable.

Scoring

The answers to five specific questions about time, place, activity, source and others present were scored by using a 3-point scoring system (with the scores of 0, 1 and 2) that was similar to the one previously used by Conway et al. (1994). However, there was an important difference between the two procedures. While Conway et al. used it to

assess the accuracy of flashbulb memories in their test-retest paradigm, we used it to assess only the specificity of recalled information (*cf.* Tekcan & Peynircioglu, 2002).

A maximum score of '2' was assigned when the participant's response contained specific information such as a particular radio program (e.g., Capital FM) in response to a question about the source. A score of '1' was assigned to a general response that was not specific enough, for example, when the participant answered “at home” in response to a question about the place. This answer is too general because the participant could have been more specific by saying “in the lounge”. If the participants indicated that they could not remember an answer to a specific question, this was scored as '0'. A score of '0' was also assigned if no answer was provided. However, in those few occasions when the participant had left the question blank we checked if the relevant information was provided in the memory description (i.e., free recall). If it was, then we actually assigned the score on the basis of this information.[3]

Since the maximum score one could obtain for each of the five specific questions was 2, a total possible score for memory specificity was 10. We used a proportional score by dividing a sum of scores by the total possible score of ten. The resulting memory specificity scores are therefore expressed as values between 0 and 1. The closer the score is to 1 the more specific the individual was in his/her answers (*cf.* Conway et al., 1994; Tekcan, & Peynircioglu, 2002).

One judge (the second author), who is an English and Italian speaker, assigned scores for all 124 participants. The other two independent judges (one English and one Italian speaker) assigned scores for the British and Italian samples, respectively. The agreement between the judges on the specificity scores for each of the five canonical categories was high and ranged from 92% - 97%. Any disagreement was discussed until an agreement between the two judges was found.

Results and Conclusions

As pointed out in the introduction the formal characteristics of flashbulb memories can be defined via the *quantity* and *specificity* of recalled information and the self-rated *vividness of memory image*. Initially, we wanted to assess the quantity via the number of canonical categories provided by participants in their free memory recall of the reception event (see Bohannon, 1988). However, on many occasions when a particular category was not mentioned in the free recall (e.g., place or time) participants would provide a detailed answer about this category (i.e., where they were and what time it was) in the probed recall section of the questionnaire. It thus appears that probed recall of canonical categories can provide a more accurate assessment of flashbulb memories than the free recall. Therefore, it was decided to assess both the quantity and the specificity of recalled information based on the data obtained in the probed recall section of the questionnaire in which participants had to recall information about each of the five canonical categories such as time, place, activity, source and others present.

Probed recall

Memory quantity. The quantity of information retrieved in response to 5 specific questions was assessed by comparing the percentage of cases in which participants explicitly stated that they could not remember the answer to the question to the percentage of cases when participants did provide an answer to the question. The percentages of these "Remember" responses are presented in Table 1.

INSERT TABLE 1 HERE

The message that this table delivers is clear and in line with the hypotheses outlined in the introduction. For September 11, both British and Italian people could

remember the details (with more or less specificity) of the 5 canonical categories in almost 100% of cases. The "Don't remember" responses were virtually non-existent for this 3-month old reception event. In contrast, there were highly significant differences across the nationalities for the death of Princess Diana. While the remember responses in British sample were again very high and comparable to that of September 11, in Italian sample they were reliably lower than in British sample for each of the five canonical categories as shown by a series of 2 (nationality) x 2 (memory response) chi-squared tests (all $p_s < .01$).

Memory specificity. Next we assessed the specificity of recalled information. The mean proportional scores of memory specificity were entered into a 2 nationality (British, Italian) x 2 event (Princess Diana, September 11) mixed ANOVA with the repeated measures on the last factor. This analysis revealed a significant main effect of event $F(1, 120)= 27.47$, $p< .001$. Mean specificity scores were significantly higher for September 11 (M=.78) than for Princess Diana (M=.68). There was also a significant main effect of nationality $F(1,120)= 65.35$, $p< .001$. Overall, British participants were more specific in their answers (M=.83) than Italians (M= .63). Most importantly, these main effects were qualified by a highly significant event by nationality interaction $F(1,120) = 53.87$, $p< .001$.

A test of simple main effects showed that there was a highly significant difference between the mean scores of British (M=.85) and Italian (M=.50) participants for the death of Princess Diana, $F(1,120) = 79.89$, $p< .001$; effect size - $\eta^2 =.40$), whereas the difference between the groups for September 11 was much smaller (M_1=.81, and M_2=.75, respectively) albeit significant $F(1,120)=6.38$, $p<.02$; effect size - $\eta^2 =.05$ (see Figure 1). Alternatively, there was no effect of event in British participants, $F(1,120)=2.31$, $p>.05$), but highly significant effect in Italians $F(1,120)=75.43$, $p<.001$; $\eta^2 =.38$.

INSERT FIGURE 1 HERE

Self-ratings

Vividness. Next we analysed participants ratings of vividness of the reception event on a 10-point rating scale in which 1=*no image at all* and 10=*extremely vivid image, almost like normal vision*. The mean vividness ratings were entered into a 2 (nationality) x 2 (event) mixed ANOVA which revealed a significant main effect of event $F(1,121) = 102.28$, $p < .0001$. Mean vividness ratings were significantly higher for September 11 (M=8.84) than for Princess Diana (M =6.50). There was also a significant main effect of nationality $F(1,121) = 14.86$, $p < .001$. Overall, British participants had higher ratings of vividness (M=8.23) than Italians (M=7.03). Most importantly, these main effects were again qualified by a highly significant event by nationality interaction $F(1,121) = 53.87$, $p < .001$.

A test of simple main effects showed that there was a highly significant difference between the mean ratings of British (M=7.75) and Italian (M=5.09) participants for the death of Princess Diana, $F(1,121) = 30.45$, $p < .001$; $\eta^2 = .20$, whereas the difference between the groups for September 11 was not significant ($F<1$) (see Figure 2). Alternatively, while vividness ratings of Italian participants were significantly higher for September 11 than for Princess Diana, $F(1,121)=124.69$, $p<.0001$, with a massive effect size of $\eta^2 = .51$, this effect was much smaller for British participants, $F(1,121)=8.45$, $p<.01$; $\eta^2 = .06$).

INSERT FIGURE 2 HERE

Self-rated impact of events. This was assessed via participants' ratings of surprise, emotion, personal and national importance. Mean ratings as a function of nationality and event are presented in Table 2. For each variable, we conducted a 2 (nationality) x 2 (event) mixed ANOVA. Each of these analyses revealed a significant nationality by event interaction (all p_s <.002*).*

INSERT TABLE 2 HERE

The tests of simple effects revealed that these interactions were primarily due to highly significant effects of event in Italian sample but no effects (or very small effect in case of personal importance) in British sample. Thus, Italian participants were reliably less surprised, $F(1,120)=32.72$, $p<.001$, $\eta^2 =.21$, and less emotional $F(1,119)=38.34$, $p<.001$, $\eta^2 =.24$) for the death of Princess Diana and this event was less important for them (both personally and nationally) than September 11 (for personal importance $F(1,120)=105.33$, $p<.0001$, $\eta^2 =.47$; for national importance $F(1,120)=127.91$, $p<.0001$, $\eta^2 =.52$). In contrast, for British participants the two reception events were equally surprising ($F<1$) and emotional, $F(1,119)=2.21$, $p=.14$, and had very high national importance ($F<1$). It was only on personal importance that British participants had higher ratings for September 11, $F(1,120)=28.57$, $p<.001$. However, the size of this effect was much smaller ($\eta^2 =.19$) than that for Italian group ($\eta^2 =.48$). On the whole, these results support our initial assumption that September 11 and the death of Princess Diana had similar impact and meaning for British but not for Italian people.

Next, we examined if September 11 had similar impact on British and Italian samples by examining the alternative set of simple effects. Both British and Italian participants reported similar and very high levels of surprise and national importance for

this event (F_s <1.83). However, Italian people reported reliably higher levels of emotion, $F(1,119)=11.89$, $p<.002$, $\eta^2 =.09$, and personal importance $F(1,120)=9.76$, $p<.01$, $\eta^2=.07$). This finding may seem puzzling at first sight given that Italian people did not have more vivid and detailed memories of September 11 than British participants. If anything, their scores on memory specificity were slightly lower than those of British participants. However, this finding becomes less puzzling when one examines the means of Italian and British participants for Princess Diana.

Table 2 shows that Italian participants considered themselves to be as emotional as British people upon hearing the news of the Death of Princess Diana and considered this event to be as personally important to them as British people (both F_s <1). Given that their memory for Princess Diana was significantly worse than in British people and that they regarded this event less surprising and of less national importance the only way to explain these findings would be to suggest that there are some differences across nationalities in rating their levels of emotion and personal importance. It appears that Italian people have a tendency to report higher levels of emotion and personal importance than British people do. This is reflected in the fact that Italians gave similar ratings to the British for the distant event of the death of Princess Diana, but elevated levels of ratings for September 11.

In summary, the analyses of the formal characteristics of flashbulb memories obtained in the probed recall of 5 canonical categories (in terms of both quantity and specificity of retrieved information) as well as the vividness ratings of these memories revealed a broadly similar pattern of results. British participants' memories for a remote (51-month old) reception event of the death of Princess Diana were as detailed, specific and almost as vivid as for a more recent (3-month old) event of September 11. This, however, was not the case for Italian participants whose memories for the death of

Princess Diana were significantly less detailed, specific and vivid than for September 11. Somewhat unexpectedly the results showed that Italian participants had less specific memories for September 11 in comparison to British participants. However, this effect explained only a small percentage of variance (η^2 =.05) in memory specificity scores. In addition, their memories of September 11 did not differ from those of the British sample in terms of quantity of information recalled or vividness of memory image.

Study 2

The major finding of Study 1 was that British participants' memory scores of a distant event did not differ from those of a recent 3-month old event. In other words, no forgetting appears to have taken place in the formal characteristics of flashbulb memories of the death of Princess Diana in more than 4 years from the reception event. One possible way of explaining this interesting finding is to suggest that perhaps most forgetting in flashbulb memories occurs in the first few weeks or months since the reception event with no further forgetting occurring thereafter (*cf*. a consolidation hypothesis of Winningham et al., 2000).

Some support for this idea comes from a study conducted by Weaver (1993) in which participants filled in flashbulb memory questionnaires immediately after the bombing of Iraq by US in January 1991 and then after 3 months and 11-12 months from this reception event. The results showed that initial forgetting occurred after three months but no further forgetting was observed on subsequent testing at 11-12 months. Therefore, if one assumes that such initial forgetting did indeed occur in British participants' memories of September 11, by the time of conducting Study 1 in December 2001, then it is perhaps unsurprising that there were no significant differences between the formal characteristics of the 3-month old memories of September 11 and the 51-month old memories of the death of Princess Diana.

In order to examine this possibility one would need to compare the memory scores of British participants in Study 1 to the scores obtained immediately or very soon after September 11 on other samples of British participants. Fortunately, such data was collected by us as part of another study on two groups of young British participants. One group was interviewed about September 11 on the second and third day after the event (on 12-13 September), and another was interviewed after 10 and 11 days had passed (on 20-21 September). Both groups provided memory descriptions, answered 5 specific questions and made similar ratings to participants in Study 1. We will refer to these groups as the 2/3-day and 10/11-day Groups, respectively, and contrast them with a 3-month Group - a British sample from Study 1.

By comparing the memory scores of September 11 of a 3-month Group to those of the 2/3-day and the 10/11-day Groups we could assess the amount of forgetting that was occurring, if at all, in the first three months after this important public event (i.e., September 11). On the other hand, by comparing the memory scores of the death of Princess Diana of a 3-month Group to those of September 11 in the 2/3-day and the 10/11- day Groups we could assess if the memory of a distant event was as specific and vivid as memories of an event that occurred only a few days ago (2-3 *vs.* 10-11 days ago).

Method

*Participant*s

A total of 85 young British people volunteered for the study (40 males and 45 females). Their mean age was 32.74 (*SD*= 10.00, range 20-59) and they were recruited by word of mouth from the staff and students of Psychology Department and from the friends/relatives of the four researchers conducting the interviews. There were 45 participants in the 2/3-day Group and 40 participants in the 10/11-day Group.

Materials and Procedure

The Flashbulb Memory Questionnaire (FMQ), similar to that used in Study 1, was employed. However, unlike Study 1, participants in Study 2 were interviewed over the telephone and all their responses (i.e., memory descriptions, specific questions and ratings) were recorded by the interviewer into the relevant sections of the FMQ. The interviews lasted approximately 10-15 minutes.[4] The only difference between this questionnaire and the one used in Study 1 was that it consisted of one section about September 11. Participants' memories of the death of Princess Diana were not tested.

Design

The design was a 1-way between participants ANOVA with the Groups as an independent factor (2/3-day, 10/11-day, 3-month). The dependent variables were the mean (proportional) memory specificity scores and the self-rated vividness of the memory image.[5]

Scoring

The scoring was done by two judges (the first and the third author) in the same way as it was done in Study 1. The agreement between the judges on specificity scores for each of the five canonical categories in probed recall was high and ranged from 95% to 98%. Any disagreement was solved by discussion.

Results and Conclusions

The results reported in this section will be based on the comparisons across Study 2 (2/3-day and 10/11-day Groups) and the British sample of Study 1 (3-month Group). The first set of comparisons will involve September 11 and will therefore assess how much forgetting may have occurred during the first three months after the event. The second set of analyses will involve comparing memories of September 11 in the 2/3-day and 10/11-day Groups to memories of the death of Princess Diana in the British sample

of Study 1. This will allow to examine if the 51-month old memories of the death of Princess Diana can be as specific and vivid as only the few days old memories of September 11.

September 11 - Forgetting in the first three months

Memory specificity. The mean (proportional) scores of participants' answers to 5 specific questions concerning September 11 for the 2/3-day, 10/11-day and 3-month Groups are presented in Table 3. A one-way between participants ANOVA revealed the main effect of Group $F(2,147)=9.92$, $p<.001$; $\eta^2 = .12$. Post hoc comparisons (Tukey HSD) showed that the mean scores of the 3-month Group were not only reliably lower than those of the 2/3-day Group ($p<.001$) but also lower than those of the 10/11-day Group ($p<.05$). The difference between the scores of the 2/3-day and 10/11-day Groups was not significant ($p>.05$).

INSERT TABLE 3 HERE

Vividness of memories. Despite the fact that 3-month Group had somewhat less specific memories of September 11 than the 10/11-day Group and especially the 2/3-day Group, there was no reliable difference between the groups in the ratings of vividness of the memory image of one's personal circumstances upon hearing the news of September 11 ($F(2,146)=1.90$, $p=.15$) (see Table 3 for the means).

Memories of Princess Diana and Few Days Old Memories of September 11.

The mean (proportional) memory specificity scores of the death of Princess Diana in the British sample of Study 1 and the specificity scores of September 11 in the 2/3-day and 10/11-day Groups of Study 2 are presented in Table 3. Although the mean for the distant 51-month old event (.85) is nominally lower than those for a recent event (.91 and

.87), this difference was not statistically significant $F(2,146)= 2.58$, $p<.08$. In addition, the mean vividness rating for the death of Princess Diana in the 3-month Group (M=7.75) was not significantly different (F<1) from the mean vividness ratings of September 11 in the 2/3-day and 10/11-day Groups (M_1=8.13; M_2=8.08, respectively).

In conclusion, the analyses of the data convincingly show that in British participants the 51-month old memories of the death of Princess Diana were as specific and vivid as only the few days old memories of September 11. This suggests that virtually no forgetting has occurred in formal characteristics of memory for this reception event. On the other hand, the data for September 11 showed that a certain amount of forgetting was present for this event in British participants in terms of specificity of information recalled. Thus, the 3-month old memories of September 11 were reliably less specific than 2/3-days old and 10/11-days old memories. Although this was surprising, especially in the light of results obtained for the death of Princess Diana, it should be kept in mind that even after 3 months the specificity scores were still very high (above .80) and the scores for the 10/11-days old and especially 2/3-days old memories of September 11 were close to ceiling.

General Discussion

The aim of the present investigation was to compare flashbulb memories of important recent and distant public events in order to assess if any forgetting is occurring over a long delay in the formal characteristics of these memories (such as the quantity, specificity and clarity of recalled details) irrespective of their veridicality. Two studies were conducted in which memories of a recent event (September 11) were compared to memories of a distant event (the death of Princess Diana) in several samples of young British participants and one sample of young Italian participants.

Several important findings emerged from these studies. For example, virtually no forgetting appears to have occurred in the formal characteristics of flashbulb memories of the death of Princess Diana in British participants over as many as 4 years. Similar and converging findings have been recently reported by Tekcan and Peynircioglu (2002) who investigated young and old Turkish people's memories of the relatively recent 36 month old event (the death of the 8th President of Turkey) and a very old event - the death of the 1st Turkish President that happened as long as 58 years ago (this event was tested in old participants only). The results showed that 90% of young and 72% of old people had flashbulb memories of the 36-month old event. Most importantly, however, as many as 70% of old Turkish participants had flashbulb memories of the 58-years old reception event. Taken together, the results of this and our own study convincingly show that memories of highly surprising and important public events may be preserved for many years while retaining the live and almost perceptual qualities of very recent memories.

However, our results also show that memories of public events are preserved for a long time only if these events have had a sufficiently strong impact on the people. Thus, for Italian participants the death of Princess Diana was significantly less surprising, less emotional, and having less personal and public importance than the terrorist attack in New York and consequently their memories for the death of Princess Diana were significantly less detailed, specific and vivid than for September 11. In other words, while no forgetting had occurred for the death of Princess Diana in British participants a very substantial forgetting had occurred in Italian participants on all three formal characteristics of memory (i.e., quantity, specificity and vividness). This finding is in line with the results of the Conway et al. (1994) test-retest study in which British participants were far more likely to have flashbulb memories of the resignation of Margaret Thatcher after 11 months from the event than American participants.

An unexpected finding in relation to the data of Italian sample was that their memories of September 11 were less specific than those of the British sample. The reasons for obtaining this result are unclear. It may be that Italian participants were less inclined to provide detailed information than British participants or that they experienced sharper drop in their specificity scores. It will be interesting to test British and Italian people's memories of September 11 in future to find out whether the small difference in specificity scores has increased further after a long time delay and how this might be related to participants' evaluation of this event.

Finally, the results of Study 2 showed that there was a small albeit reliable loss of specificity (but not quantity or vividness) in memories of September 11 in the 3-month Group in comparison to the 2/3-day and 10/11-day Groups. This is an interesting finding as it seems to provide some support for the *consolidation hypothesis* of Winningham et al. (2000), and has therefore a potential to explain some of the controversy in flashbulb memory research with some studies showing the consistency in flashbulb memories at the re-test and others showing significant inconsistencies and distortions.

According to Winningham et al. (2000) most forgetting of the reception event may be occurring in the first few days or weeks of the original event. After this, the memory traces consolidate into a relatively permanent narrative account. An interesting prediction of this hypothesis is that the consistency of flashbulb memories should be higher in those test-retest studies in which the initial test is conducted after a few weeks (or months) since the reception event when the traces have already consolidated. Winningham et al. (2000) tested the consolidation hypothesis in their study of flashbulb memories of the acquittal of O.J. Simpson and showed that the participants who were initially tested immediately after this event were reliably less consistent at the re-test than participants who were initially tested after one week from this event.

The most likely reason for obtaining this result is the initial loss of specificity in recalled details that may be occurring within the first few weeks (or months) after the reception event. However, two important questions arise in relation to the loss of specificity. The first concerns the onset of this process. The results of the present study seem to suggest that the initial loss of specificity occurs some time between 10/11 days and 3 months from the reception event. In future studies it would be advisable to test people at various times between 10/11 days and 3 months from the reception event to ascertain more precisely the onset of this process.

A related issue is whether the initial loss of specificity occurs for all or only some reception events. Since the mean specificity score of the death of Princess Diana in the 3-month Group was not reliably different from the specificity scores of September 11 in the 2/3-day and 10/11-day Groups (see Table 3) one could suggest that no loss of specificity had occurred for the death of Princess Diana in British participants. However, the mean specificity score for Princess Diana was .85. If one assumes that the specificity scores immediately after the death of Princess Diana were slightly higher (say .95) than those of the 2/3-day Group for September 11 (.91) then the loss of specificity would have been present for this event as well. In other words, the score of .85 seems to us low enough to allow a reliable drop in specificity given that the initial scores could have been at ceiling.

In summary, the present study produced several interesting and novel findings. Unlike the previous studies that also relied on participants' flashbulb memory reports irrespective of their accuracy (e.g., Bohannon, 1988; Brown & Kulik, 1977; Winograd & Killinger, 1983; Yarmey & Bull, 1978) our study used more refined methodology by taking into account all three aspects of the formal characteristics of these memories (i.e., quantity, specificity and vividness). Perhaps the most important result that emerged from the study is that British participants' 51-month old memories of the death of Princess

Diana were as detailed, specific and vivid as the 2/3- and 10/11-days old memories of September 11. The results, however, do not answer an important question about the accuracy of these very long-term memories. Given that Neisser and Harsh (1992) and Schmolck et al. (2002) found significant distortions in participants' memories after 32 to 34 months from an initial testing it is possible that these very old but highly vivid and detailed memories are partially or even completely wrong. The present results therefore highlight the importance of conducting further flashbulb memory studies with much longer retention intervals in order to test the accuracy of these memories, and to find out at what stage and how do people start substituting, if at all, their initial and accurate memories with equally detailed and vivid but inaccurate memories.

References

Bohannon, J. N. (1988). Flashbulb memories for the Space Shuttle disaster: A tale of two theories. *Cognition, 29,* 179-196.

Brown, R., & Kulik, J. (1977). Flashbulb memories. *Cognition, 5*, 73-99.

Cohen, G., Conway, M. A., & Maylor, E. A. (1994). Flashbulb memories in older adults. *Psychology and Aging, 9*, 454-463.

Conway, M. A. (1995). *Flashbulb memories*. Hillsdale: Lawrence Erlbaum Associates.

Conway, M. A., Anderson, S. J., Larsen, S., Donnely, C. M., McDaniel, M. A., McClelland, A. G. R., Rawles, R. E., & Logie, R. H. (1994). The formation of flashbulb memories. *Memory & Cognition, 22,* 326-343.

Davidson, P. S. R., & Glisky, E. L. (2002). Is flashbulb memory a special instance of source memory? Evidence from older adults. *Memory, 10*, 99-111.

Er, N. (2003). A new flashbulb memory model applied to the Marmara earthquake. *Applied Cognitive Psychology, 17*, 503-517.

McCloskey, M., Wible, C. G., & Cohen, N. J. (1988). Is there a special flashbulb memory mechanism? *Journal of Experimental Psychology: General, 117,* 171-181.

Neisser, U., & Harsh, N. (1992). Phantom flashbulbs: False recollections of hearing the news about Challenger. In E. Winograd, & U. Neisser (Eds.), *Affect and accuracy in recall: Studies of "flashbulb memories"* (pp. 9-31). Cambridge: Cambridge University Press.

Neisser, U., Winograd, E., Bergman, E. T., Schreiber, C. A., Palmer, S. E., & Weldon, M. S. (1996). Remembering the earthquake: Direct experience vs. hearing the news. *Memory, 4*, 337-357.

Pillemer, D. B. (1984). Flashbulb memories of the assassination attempt on President Reagan. *Cognition, 16,* 63-80.

Rubin, D. C. (1992). Constraints on memory. In E. Winograd, & U. Neisser (Eds.), *Affect and accuracy in recall: Studies of "flashbulb memories"* (pp. 265-273). Cambridge: Cambridge University Press.

Schmolck, H., Buffalo, E. A., & Squire, L. R. (2000). Memory distortions develop over time: Recollections of the O.J. Simpson trial verdict after 15 and 32 months. *Psychological Science, 11*, 39-45.

Tekcan, A. I., & Peynircioglu, Z. F. (2002). Effects of age on flashbulb memories. *Psychology and Aging, 17,* 416-422.

Weaver, C.A. III. (1993). Do you need a "flash" to form a flashbulb memory? *Journal of Experimental Psychology: General, 122*, 39-46.

Winningham, R. G., Hyman, I. E., & Dinnel, D. L. (2000). Flashbulb memories? The effects of when the initial memory report was obtained. *Memory, 8,* 209-216.

Winograd, E., & Killinger, W. A. (1983). Relating age at encoding in early childhood to adult recall: Development of flashbulb memories. *Journal of Experimental psychology: General, 112*, 413-422.

Yarmey, A. D., & Bull, M. P. III (1978). Where were you when President Kennedy was assassinated? *Bulletin of the Psychonomic Society, 11*, 133-135.

Author Note

Lia Kvavilashvili, Department of Psychology, University of Hertfordshire; Jennifer Mirani, Department of Psychology, University of Hertfordshire; Simone Schlagman, Department of Psychology, University of Hertfordshire; Diana E. Kornbrot, Department of Psychology, University of Hertfordshire.

The preparation of this manuscript was supported by the Economic and Social Research Council grant (RES-000-22-0144) to the first and the fourth author. We are grateful to Cynthia Dio for her help in translating the Flashbulb Memory Questionnaire and coding the data of Italian participants, and to Laura Goldner and James Erskine for their assistance in data collection in Study 2.

Correspondence concerning this article should be addressed to Lia Kvavilashvili, Department of Psychology, University of Hertfordshire, College Lane, Hatfield, Herts, AL10 9AB, UK. Email: *L.Kvavilashvili@herts.ac.uk*

Footnotes

[1] In this respect, this event probably surpasses even the assassination of President John F. Kennedy which has been reported to elicit the highest incidence of flashbulb memories (Brown & Kulik, 1977; Conway, 1995).

[2] In order to administer this questionnaire to the Italian sample, the questionnaire was translated from English to Italian by the second author, the native Italian speaker. The questionnaire was then translated back into English by an Italian assistant of the second author. The original version of the English questionnaire and the translated version were then compared and the few differences agreed and adjusted.

[3] Memory specificity scores for the Death of Princess Diana were not calculated for one British and one Italian participant. This was because the relevant page was missing in the questionnaire of the British participant. The Italian participant, on the other hand, left the entire section of the questionnaire about the death of Princess Diana blank. Since the reason for this omission was not clear it was decided not to include the data of this participant.

[4] Previous research on flashbulb memories has shown that the data obtained by the questionnaires and the telephone interviews are comparable. For example, in the Schmolck et al.(2000) study, 32 months after the O.J. Simpson's trial verdict, 22 participants were re-tested by telephone and 13 by filling in the questionnaire. There were no differences between the telephone and mail respondents in terms of their memory accuracy and confidence ratings (see also Davidson & Glisky, 2002).

[5] Since the memory quantity scores for September 11 were at ceiling in Study 1 only the memory specificity scores and the vividness ratings were analysed in Study 2.

Table 1

Percentage of Participants (Raw Numbers in Brackets) Who Provided an Answer to a Question about Each of the 5 Canonical Categories in Probed Recall as a Function of Nationality (British vs. Italians) and Event (Princess Diana vs. September 11) in Study 1

	Canonical Categories				
Nationality	Time	Place	Activity	Others Present	Source
	Death of Princess Diana				
British N= 64	97% (N=62)	98% (N=63)	97% (N=62)	95% (N=61)	100% (N=64)
Italian N=58	65% (N=38)	79% (N=46)	60% (N=35)	76% (N=44)	86% (N=50)
	September 11				
British N= 65	100% (N=65)	100% (N=65)	98% (N=64)	98% (N=64)	100% (N=65)
Italian N=59	100% (N=59)	100% (N=59)	98% (N=58)	98% (N=58)	100% (N=59)

Table 2

Mean Ratings of Surprise, Emotion, Personal and National Importance on 10-Point Rating Scales as a Function of Nationality (British vs. Italian) and Event (Princess Diana vs. September 11) in Study 1

	British		Italian	
	Princess Diana	September 11	Princess Diana	September 11
Surprise	9.19	9.14	7.74	9.36
	(1.99)	(1.82)	(2.44)	(1.28)
Emotion	6.11	6.56	6.22	8.16
	(3.12)	(2.98)	(2.62)	(1.94)
Importance Personal	5.00	6.81	4.52	8.17
	(3.18)	(2.53)	(2.63)	(2.26)
Importance National	9.27	9.05	6.07	8.67
	(1.48)	(1.28)	(2.10)	(1.76)

Table 3

Mean Memory Specificity Scores and Mean Vividness Ratings as a Function of Event (Princess Diana vs. September 11) and Group (2/3-day vs. 10/11-day vs. 3- month) in Study 2

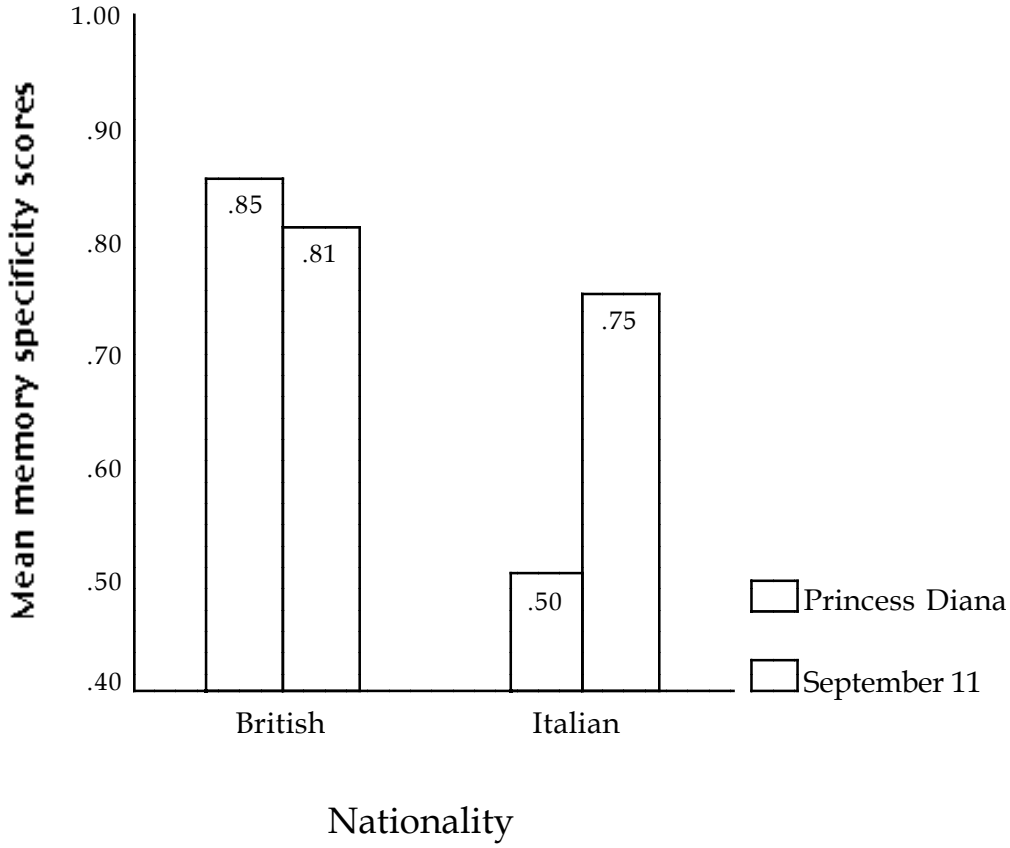
	Participant Groups		
Event	2/3-day	10/11-day	3-month
	Mean Memory Specificity Scores[a]		
Princess Diana	–	–	.85
September 11	.91	.87	.81
	Mean Vividness Ratings[b]		
Princess Diana	–	–	7.75
September 11	8.13	8.07	8.71

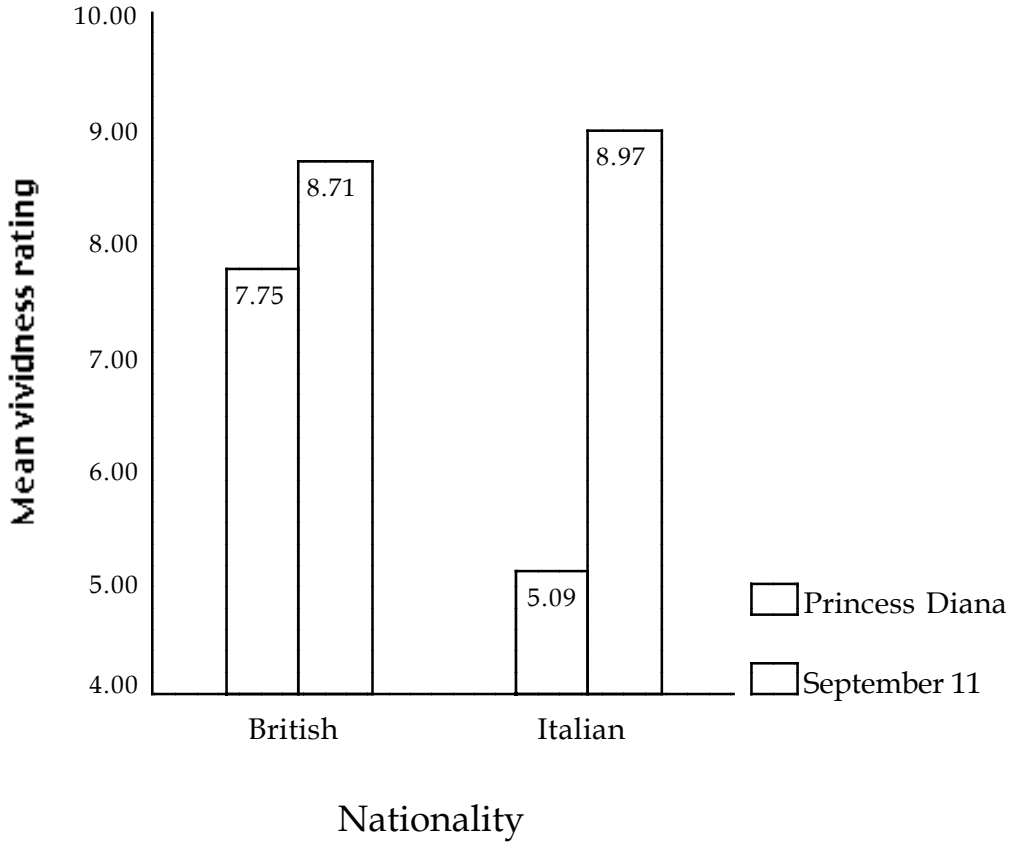
Note. Data for Princess Diana in the 2/3-day and 10/11-day Groups were not collected. [a] Memory specificity scores ranged between 0 and 1. [b] Vividness ratings were made on a 10-point rating scale where 1 = *no image at all* and 10 = *extremely vivid image, almost like normal vision*.

Figure Captions

Figure 1. Mean memory specificity scores as a function of nationality (British vs. Italian) and event (Princess Diana vs. September 11) in Study 1.

Figure 2. Mean ratings of vividness as a function of nationality (British vs. Italian) and event (Princess Diana vs. September 11) in Study 1.


1.00
.90
.80
.70
.60
.50
.40
Mean memory specificity scores
.85
.81
.50
.75
British
Italian
Princess Diana
September 11
Nationality


10.00
9.00
8.00
7.00
6.00
5.00
4.00
Mean vividness rating
7.75
8.71
5.09
8.97
British
Italian
Nationality
Princess Diana
September 11