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Publisher: Routledge

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Memory

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/pmem20>

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Published online: 18 Mar 2013.

To cite this article: Martin V. Day & Michael Ross (2014) Predicting confidence in flashbulb memories, *Memory*, 22:3, 232-242, DOI: [10.1080/09658211.2013.778290](https://doi.org/10.1080/09658211.2013.778290)

To link to this article: <http://dx.doi.org/10.1080/09658211.2013.778290>

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Predicting confidence in flashbulb memories

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Years after a shocking news event many people confidently report details of their flashbulb memories (e.g., what they were doing). People's confidence is a defining feature of their flashbulb memories, but it is not well understood. We tested a model that predicted confidence in flashbulb memories. In particular we examined whether people's social bond with the target of a news event predicts confidence. At a first session shortly after the death of Michael Jackson participants reported their sense of attachment to Michael Jackson, as well as their flashbulb memories and emotional and other reactions to Jackson's death. At a second session approximately 18 months later they reported their flashbulb memories and confidence in those memories. Results supported our proposed model. A stronger sense of attachment to Jackson was related to reports of more initial surprise, emotion, and rehearsal during the first session. Participants' bond with Michael Jackson predicted their confidence but not the consistency of their flashbulb memories 18 months later. We also examined whether participants' initial forecasts regarding the persistence of their flashbulb memories predicted the durability of their memories. Participants' initial forecasts were more strongly related to participants' subsequent confidence than to the actual consistency of their memories.

Keywords: Flashbulb memory; Confidence; Rehearsal; Emotion; Social bond.

Do you remember,
Those special times,
They'll just go on and on,
In the back of my mind.
—Michael Jackson, “Remember the Time”

Sometimes people claim strikingly detailed flashbulb memories of the personal circumstances in which they learned about surprising, major news events (Brown & Kulik, 1977). Months and even years afterwards many people report vivid details of the context (e.g., what they were doing, where they were) in which they first heard about the death of President Kennedy (Brown & Kulik, 1977), the death of Princess Diana (Kvavilashvili, Mirani, Schlagman, & Kornbrot, 2003), and the terrorist attacks of September 11, 2001 (Hirst et al., 2009).

In the introduction to their landmark flashbulb memory studies Brown and Kulik (1977, p. 74) reported their own memories for the context in which they heard the news of President Kennedy's assassination. Kulik recalled:

I was seated in a sixth-grade music class, and over the intercom I was told that the president had been shot. At first, everyone just looked at each other. Then the class started yelling, and the music teacher tried to calm everyone down. About ten minutes later I heard over the intercom that Kennedy had died and that everyone should return to their homeroom. I remember that when I got to my homeroom my teacher was crying and everyone was standing in a state of shock. They told us to go home.

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There is no equivocation. Kulik wrote as if he were completely confident of his flashback recall, as did Brown. This confidence likely contributed to Brown and Kulik's belief that flashback memories are remarkably accurate, far more accurate than typical autobiographical memories. Brown and Kulik invented a special memory mechanism to explain this supposed accuracy.

More recently researchers have found that flashback memories evidence a pattern of forgetting similar to that of normal autobiographical memories (Hirst et al., 2009; Talarico & Rubin, 2003; Winningham, Hyman, & Dinnel, 2000). In investigations of accuracy researchers have repeatedly documented, but typically not explained, people's confidence in the validity of their memories (Conway, Skitka, Hemmerich, & Kershaw, 2008; Neisser et al., 1996; Schmolck, Buffalo, & Squire, 2000; Talarico & Rubin, 2003, 2007; Weaver, 1993; Weaver & Krug, 2004). Interestingly, the decline in accuracy over time tends not to be associated with a comparable decrease in confidence (e.g., Hirst et al., 2009; Talarico & Rubin, 2003, 2007). Research suggests that confidence (i.e., perceived accuracy) is a more defining characteristic of flashback memories than genuine accuracy is (e.g., Talarico & Rubin, 2003).

Our primary goal in the present research was to test a model of predictors of people's confidence in their long-term flashback memories. Despite the central role of confidence in flashback memories, researchers have not tested models that propose to explain high levels of confidence. To evaluate such a model we conducted two sessions about 18 months apart. The first session occurred a few days after the flashback event (the death of Michael Jackson). We examined the extent to which participants' responses during the first session predicted their confidence in their flashback memories 18 months later.

As a secondary goal we studied an aspect of metamemory relevant to confidence. At the initial session participants assessed the likelihood that they would accurately recall their flashback memories more than a year later. Reflecting their general confidence in flashback memories, people are quite certain that they will retain such memories well into the future (Echterhoff & Hirst, 2006). We examined the degree to which participants' initial estimates of the permanence of their flashback memories related to the consistency of, as well as participants' confidence in, their flashback memories 18 months later.

PREDICTORS OF CONFIDENCE IN LONG-TERM FLASHBULB MEMORIES

In relevant past research, researchers have studied whether people's sense of "connection" to the news event predicts flashback memory qualities and experiences (Schaefer, Halldorson, & Dizon-Reynante, 2011). Connectedness factors indicate the degree of importance¹ of the news event to individuals. For example, some researchers have examined flashback memories of individuals differing in nationality, ethnicity, or other group memberships (Brown & Kulik, 1977; Conway et al., 1994; Curci, Luminet, Finkenauer, & Gisle, 2001; Luminet & Curci, 2009). In such cases there are reasons to suppose that the news event is more relevant and important to individuals in one group than in other group(s). Connectedness may also be indicated by the amount of physical distance between individuals and the location of the news event (Echterhoff & Hirst, 2006; Pezdek, 2003; Sharot, Martorella, Delgado, & Phelps, 2007), or by actual involvement in a newsworthy event (Er, 2003; Neisser et al., 1996). Although there are variations between studies in terms of methods and results for specific variables, more connectedness to the news event, as we have outlined it, tends to enhance flashback memory qualities and experiences.

In the current study we examined the relation between connectedness and people's confidence in the accuracy of their flashback memories. We assessed connectedness in terms of people's sense of attachment to the individual or individuals involved in a major news event. We regard this sense of attachment as a social bond between the rememberer and the target(s) of the news event. The social bond is often (but not always) a psychological connection to the targets. Although not limited to such cases, sports fans and admirers of celebrities exemplify how people can feel a

¹We distinguish between importance and the notion of consequentiality, as these terms have overlapped or been combined in past research. By importance we mean that an event is, in some form, relevant and meaningful to one's personal life, one's nation, one's group, etc. We do not use the term to refer to downstream consequences of a news event. Events such as an assassination, death, or disaster may not necessarily affect the lives and routines of people who have only heard about the news. The results of much research suggest that the role of objective consequentiality in flashback memories is doubtful (see Talarico & Rubin, 2009, and Brown et al., 2009).

strong sense of attachment to individuals whom they have never met. We propose that a perceived social bond with the targets renders a news event more relevant and important, and indirectly leads to higher levels of confidence in flashbulb memories.

The hypothesis that people's social bond with the target predicts confidence in flashbulb recall is broadly consistent with past research on what we have defined as connectedness factors. For example, French respondents reported greater confidence in their flashbulb memories for hearing news of the death of French President Mitterand than did Belgian respondents. This finding was based on confidence scores from initial reports (1–2 months after the event) and 1 year after initial testing. The consistency of flashbulb memories between the first and second sessions did not differ significantly between social groups (Curci et al., 2001). In a study that examined degree of event experience, earthquake experiencers had higher mean confidence in their flashbulb memories after a year and a half compared to those who had only heard the news, as well as higher levels of memory consistency (Neisser et al., 1996). Differences between first-hand experiences as compared to hearing the news are difficult to interpret because the experiences differ not only on degree of connectedness to the news event, but also on several other dimensions (e.g., Pillemer, 2009). Although these studies were not designed to examine models of predictors of confidence, the results are consistent with our reasoning that more connectedness may be associated with more confidence in flashbulb memories.

Researchers who have assessed people's confidence in their flashbulb memories have mostly focused on its relation to the consistency of memory details across at least two recall tests. As it is difficult to assess the accuracy of flashbulb memories directly, researchers tend to use the consistency of flashbulb memories as a proxy for accuracy. The strength of the relationship between confidence and consistency is believed to indicate whether confidence estimates are grounded in reality. Associations between confidence and the consistency of flashbulb memories range from strong (Schmolck et al., 2000; Weaver, 1993) to moderate (Kvavilashvili, Mirani, Schlagman, Foley, & Kornbrot, 2009; Winningham et al., 2000) and non-existent (Neisser & Harsch, 1992; Talarico & Rubin, 2003). On average there

appears to be a modest positive relation between consistency and confidence.

Researchers have also examined the association between degree of rehearsal after an event (e.g., privately thinking about and publicly sharing flashbulb memories) and confidence. Rehearsal can vary considerably (e.g., depending on conversation partners) and researchers find a mixture of significant and nonsignificant associations with memory accuracy (consistency) (Talarico & Rubin, 2009). Rehearsing flashbulb memories seems more strongly related to increases in individuals' confidence in the consistency of their memories than to increases in the actual consistency of their memories (Hirst et al., 2009; Talarico & Rubin, 2003).

Another factor related to confidence may be the difficulty or ease with which flashbulb memories are recalled (e.g., Kelley & Lindsay, 1993; Koriat & Levy-Sadot, 1999). Easier retrieval predicts greater confidence in memories for non-shocking events, such as New Year's Eve; however, current research indicates that ease-of-retrieval may not predict confidence estimates for personal memories of highly shocking events such as 9/11 (Echterhoff & Hirst, 2006).

In our model we identify social bond with the target of a news event as a key (albeit indirect) predictor of flashbulb memory confidence (see Figure 1). We suggest that a stronger sense of attachment to the target of the news event will be associated with more personal reactions to the event. Because increases in attachment render the flashbulb event more meaningful and relevant to individuals, we hypothesize that stronger attachment will be related to heightened feelings of surprise and stronger emotional intensity. For the same reasons, stronger attachment should also be related to greater rehearsal of flashbulb memories. Consistent with past theorising on the relations between these factors (Finkenauer et al., 1998), we expect that elevated surprise will lead to greater emotional intensity (Lazarus, 1982), which in turn will predict rehearsal of flashbulb memories (Rime, Philippot, Boca, & Mesquita, 1992). We reason that initial rehearsal of flashbulb memories serves to shore up beliefs in the validity of these memories. Thus those who experience more intense personal reactions and, in particular, engage in more subsequent rehearsal of seemingly accurate memories, are likely to be confident in their later recall. Increased confidence may also reflect normative beliefs about the nature of memory (i.e., metamemory). People

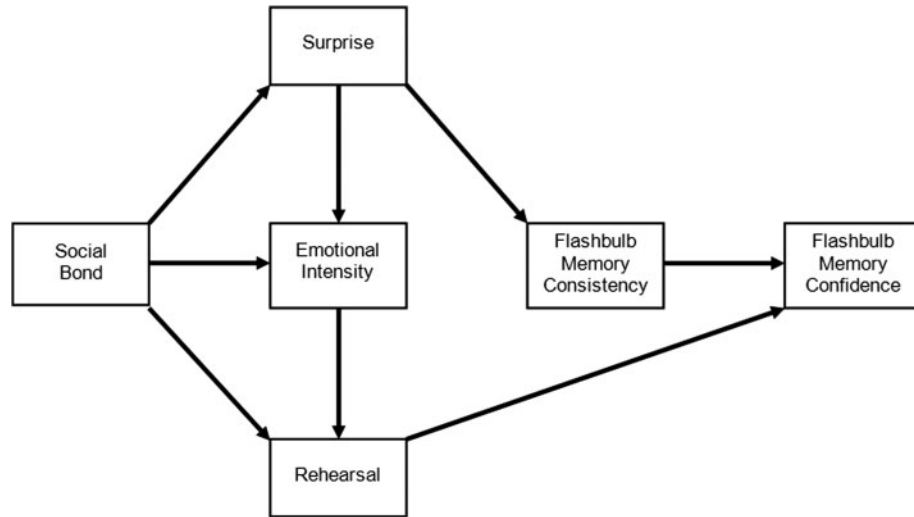


Figure 1. Predicted model of flashbulb memory confidence.

may suppose that they should accurately recall memories related to personally important and emotional events that they have “successfully” rehearsed.

Researchers rarely present the relation of confidence to other flashbulb memory related experiences. Past models of the retention of flashbulb memories commonly include predictor variables representing the experience of surprise, emotional intensity, and rehearsal (Berntsen, 2009; Brown & Kulik, 1977; Conway et al., 1994; Er, 2003; Finkenauer et al., 1998). We examine the important role that these factors play in predicting rehearsal, and the possibility, based on prior research, that they may predict consistency of flashbulb memories.

In line with relevant past research, we expect that degree of surprise will predict flashbulb memory consistency, but emotional intensity and rehearsal will not (Finkenauer et al., 1998; see Luminet, 2009). We include consistency in the model to examine its predictive value in relation to confidence and to control for any differences in the recall of flashbulb memories. Based on prior research, we expect that flashbulb memory consistency and confidence in these memories will be modestly related. We do not expect that people’s sense of attachment to the target will predict the consistency of flashbulb memories. Past research on social groups that may have differed in attachment tended not to significantly differ in flashbulb memory consistency (Curci et al., 2001; Curci & Luminet, 2006). The present research provides the first broad test of predictors of people’s confidence in their flashbulb memories.

PEOPLE’S FORECASTS OF FLASHBULB MEMORY CONSISTENCY

Finally we examined people’s expectations of how well they will remember their flashbulb memories. We tested whether these early forecasts are useful indicators of later memory consistency. Estimates of future memory performance (prospective confidence) are often quite accurate in studies of recognition memory (Leonesio & Nelson, 1990), where the time between prediction and recall tends to be short. Only one prior published study examined consistency predictions in the context of flashbulb memories. Predictions made shortly after a news event were moderately related with flashbulb memory consistency at 3 months (Weaver, Terrell, Krug, & Kelemen, 2008). In the current study of more long-term flashbulb memories (18 months) it is less evident that people’s forecasts will predict the consistency of their memories. Consistency forecasts may be more strongly related to downstream judgements of confidence. Both assessments reflect, in part, beliefs about memory, especially perhaps the belief that personally meaningful events are more memorable (Weaver et al., 2008).

THE CURRENT STUDY

We studied confidence in flashbulb memories in response to the death of Michael Jackson. This type of news event is similar to those in other flashbulb memory investigations that involved the deaths of famous individuals (e.g., President John

F. Kennedy, Princess Diana, etc.). Michael Jackson was a popular music artist for several decades. Although over half of Americans polled report being fans of Jackson (CNN, 2009), his popularity was better represented internationally. His death occurred unexpectedly and produced front-page headlines around the world. In the year of his death Jackson's name was the most popular search term on Google (Google, 2009). Reactions to his death also reflected its significance for his fans. There are countless examples of fans commemorating Jackson's life with messages, musical tributes, and paraphernalia.

We conducted an initial survey shortly after Michael Jackson's death. To test our hypotheses about the importance of people's bond with Jackson we recruited participants who varied in their attachment to Jackson. We conducted two surveys. The first assessed the extent to which participants were fans of and felt connected to Jackson, their reactions to news of Jackson's death, as well as the details of their flashbulb memories. A subset of participants completed a second survey approximately 18 months later. The second survey assessed respondents' flashbulb memories and confidence in their recall. We tested our proposed model using structural equation modelling (SEM).

METHOD

Participants

A total of 135 participants (96 women, 38 men, 1 undisclosed; $M_{\text{age}} = 30.74$ years, $SD = 10.19$) volunteered for a survey on memories related to the death of Michael Jackson. Participants were recruited through online advertisements on social media websites. No financial compensation was provided. Of these respondents, 75 completed the second survey approximately a year and a half later ($M = 18.69$ months, $SD = 0.19$) in response to an e-mail sent to all of the original participants. Participants who completed the second survey had the opportunity to enter a draw for \$200 worth of gift certificates.

To test our hypotheses we used the data from the 55.6% of the respondents in the original sample (53 women, 22 men; $M_{\text{age}} = 29.91$ years, $SD = 8.88$) who completed both surveys. Major ethnic groups in the final sample were White (82.7%), Asian (8.0%), and East Indian (4.0%). Participants were mostly residents of Canada

(72.0%), the United States (17.3%), or a European country (5.3%). Participants in the final sample did not differ significantly in age or gender from those who only completed the first survey ($M_{\text{age}} = 31.78$, $SD = 11.62$; 43 women, 16 men, 1 undisclosed), $F(1, 133) = 1.13$, $p = .29$; $\chi^2 = 0.08$, $p = .78$, respectively. Participants who completed both surveys were less enthusiastic fans of Jackson than those who completed the first survey only, $F(1, 133) = 6.63$, $p = .01$. However, we still obtained our goal of a full range (i.e., 1–7) of scores in the final sample ($M = 3.52$, $SD = 1.58$, $Mdn = 3.33$), with only a mild positive skew (0.54) that is within a practical range of skewness (e.g., –1 to 1).

Procedure and measures

We administered the first survey 3–5 days ($M = 3.36$ days, $SD = 1.04$) after the news of Michael Jackson's death on June 25th 2009. In the first survey participants described their personal memories of when they first heard the news that Michael Jackson had died. Participants were asked seven specific questions probing the details of their flashbulb memories. As in much past research, the questions were based on the canonical features of flashbulb memories identified by Brown and Kulik (1977): (a) the day and time that they first learned of the death, (b) how they first heard the news, (c) what they were doing, (d) where they were, (e) how they felt, (f) who else was there, and (g) what they did immediately afterward. Next, participants rated their reactions on five variables described below, some of which were adapted from past research.

Participants indicated how surprised they were by the news of Jackson's death (1 = *not at all*, 7 = *very surprised*). Participants rated the strength of their emotional reaction when they first heard the news (1 = *not at all*, 7 = *very strong*). To broaden the measurement of emotion we also asked participants to indicate the degree to which they experienced four visceral emotion states when recalling their memory, "I feel my heart pound or race", "I feel tense all over", "I feel sweaty or clammy", and "I feel knots, cramps, or butterflies in my stomach" (1 = *not at all*, 7 = *more than for any other memory*) (Talarico & Rubin, 2003). Responses to these last five items were combined to form an emotional intensity index ($\alpha = .91$). Participants estimated on two separate scales the degree to which they privately thought about

Michael Jackson's death and how much they talked about it since they heard the news (1 = *not at all*, 7 = *very much*). They also reported how many people they talked to about the incident, and how many media stories (e.g., newspaper, blog, TV clips) they read or viewed after hearing the news (1 = *none*, 7 = *more than 15*) (Finke-nauer et al., 1998; Talarico & Rubin, 2003). Responses to these four items were averaged to create a measure of overall rehearsal ($\alpha = .81$). Participants rated the degree to which they felt connected to Michael Jackson, were a fan of Michael Jackson, and a fan of his music (1 = *not at all*, 7 = *very much*). Responses to these three questions were averaged to form an index variable of participants' social bond with Jackson ($\alpha = .82$). A continuous rather than dichotomous main predictor variable should better capture the greater variance that occurs when there is more heterogeneity among respondents (Luminet & Curci, 2009). Participants also estimated how well they would remember their personal experiences (i.e., their flashbulb memories) when they heard that Michael Jackson had died, after 1 year and after 2 years (1 = *not at all*, 7 = *very well*). The average of these two items provided an estimate of their predicted consistency at 18 months ($\alpha = .98$).

Respondents completed the second survey, on average, 18.69 months after the first. It included the same seven specific questions probing the details of their personal memories as in the first survey. Participants also indicated their confidence in the accuracy of their recollection of each of the seven memory attributes (1 = *not at all*, 7 = *very confident*) (Schmolck et al., 2000). Participants reported each confidence judgement directly after they described their corresponding memory. The measure of flashbulb memory confidence consisted of the average of these seven judgements ($\alpha = .91$).

To evaluate the consistency of participants' reports we had two coders compare the responses from surveys 1 and 2 to each of the seven memory questions. A score of 2 was provided if the responses were highly consistent, a score of 1 if the responses were mostly consistent, and a score of 0 if the responses were markedly different between surveys. A more specific coding scheme was used for the time attribute. These responses were scored a 2 if the day and time (within 3 hours) were both highly consistent, a 1 if the day or time was highly consistent, and a 0 otherwise. The mean internal reliability between coders was

high ($\alpha = .89$). To assess the proportion of consistent responses for each participant, we averaged the coders' consistency scores for each attribute, summed across the 7 memory questions, and then divided by 14 (maximum possible score).²

RESULTS

The intercorrelations of variables and their means appear in Table 1. Other than the consistency and confidence variables, the measures reported in Table 1 were obtained in the first survey. All of the other variables correlated positively with confidence. Of the proposed model variables, only confidence was significantly related to consistency scores. On average, participants reported that they felt a moderate social bond with Michael Jackson. Participants reported substantial surprise about Jackson's death and based on our emotional intensity index, relatively low emotional responses. Although we used the entire emotional intensity index in the main analyses, we explored this low emotion result by examining the means and standard deviations of the four visceral responses ($\alpha = .93$) and the intensity item. It appears that visceral emotions were rated as low³ ($M = 1.82$, $SD = 1.36$), whereas strength of emotional reaction was rated as moderate ($M = 3.81$, $SD = 2.06$). Participants also indicated a moderate amount of rehearsal of the event in the days between hearing about his death and completing the first survey. Participants initially reported a high proportion of flashbulb memory attributes with 97.4% reporting all but one attribute. Of the participants, 68 reported all seven requested attributes, 5 reported six attributes, 1 reported five attributes and 1 reported four attributes. Participants' recollections during the second survey were scored as 55% consistent with their memories in the first survey.

The model (Figure 1) was tested using SEM (AMOS 19.0). To evaluate the goodness of fit of the model we used the following standard set of criteria for SEM models as recommended by Kline (2011): $\chi^2 p > .05$, Comparative Fit Index (CFI) $> .95$, and Root Mean Square Error of

²In one case, where a memory attribute was absent at both times, the consistency score was based on the average of the other attributes.

³High scores on this measure would indicate emotion reactions greater than those for any other memories.

TABLE 1
Intercorrelations and means of variables

Variable	1	2	3	4	5	6	7	M (SD)
1. Social bond	(-)	.38**	.67**	.75**	.10	.43**	.50**	3.52 (1.58)
2. Surprise		(-)	.47**	.41**	.22 [†]	.45**	.59**	5.76 (1.45)
3. Emotional intensity			(-)	.70**	.17	.44**	.46**	2.22 (1.39)
4. Rehearsal				(-)	.10	.60**	.45**	4.29 (1.47)
5. Consistency					(-)	.32*	.24*	0.55 (0.24)
6. Confidence						(-)	.51**	4.92 (1.56)
7. Predicted consistency							(-)	4.47 (2.12)

[†] <.10, * <.05, ** <.01. *n* = 75.

Approximation (RMSEA) <.08. The model fit the data well, χ^2 (*N* = 75) = 6.08, *p* = .53, CFI = 1, and RMSEA = 0. We examined the effects of social bond, as well as reactions to Michael Jackson's death (surprise, emotional intensity, and rehearsal) on both the consistency and confidence of the memory descriptions at approximately 18 months (Figure 2). Those with a stronger social bond indicated more surprise and emotional reaction in response to Jackson's death, as well as greater rehearsal of their flashbulb memories. Consistent with past research and theorising, surprise predicted emotional intensity, which in turn predicted rehearsal. In our model, surprise was the only significant predictor of the consistency of memories across the two surveys.⁴ Participants' confidence in the accuracy of their memories was significantly predicted by consistency and rehearsal. We conducted bootstrap analyses (3000 resamples) to test for any indirect effect of social bond. As hypothesised, the degree that participants felt a bond with Michael Jackson had a sizable indirect effect on confidence ($\beta = .45$, *p* < .001).⁵ Emotional intensity ($\beta = .21$, *p* < .001), and surprise ($\beta = .11$, *p* < .01) also showed indirect effects on confidence. Thus all predictor variables were positively associated (directly or indirectly) with levels of confidence. We also tested whether social bond with Jackson had an indirect effect on consistency. This association was positive but not significant ($\beta = .08$, *p* = .08).

⁴ Although not part of the hypothesized model, we also tested whether emotional intensity or rehearsal predicted consistency as this possibility has been examined in past research. Neither of these paths was significant ($\beta = .13$, *p* = .37; $\beta = -.07$, *p* = .67; respectively).

⁵ In a separate test we found support for the claim that the effect of social bond on confidence was through the proposed mediators by also adding the direct path of social bond to confidence within the proposed model. This path was not significant ($\beta = -.04$, *p* = .77).

For our secondary research goal we examined people's forecasts of how well they would recall their flashbulb memories in the future. First we examined how consistency forecasts reported at session one related to consistency scores and confidence judgements after a year and a half. As seen in Table 1, predicted consistency was weakly correlated with measured consistency (*r* = .24), and moderately correlated with confidence in flashbulb memories (*r* = .51). A *z*-test confirmed that participants' consistency predictions were more strongly related to later confidence estimates than consistency scores, *z* = 1.89, *p* = .03.

We also examined the antecedents of consistency predictions, by testing which of the reported session one factors (social bond, surprise, emotional intensity, rehearsal) might uniquely predict participants' consistency forecasts. We conducted multiple regression analysis, simultaneously entering all predictor variables (mean centred) into the regression. Although all variables were correlated with consistency forecasts, results revealed that only social bond ($\beta = .28$, *p* = .05) and feelings of surprise ($\beta = .45$, *p* < .001), significantly explained variance in responding, *R*² = .44. Emotional intensity ($\beta = .05$, *p* = .70) and rehearsal ($\beta = .02$, *p* = .89) did not. Thus a stronger social bond with Michael Jackson, and greater feelings of surprise, helped explain participants' convictions that their memories would be consistently held for a year and a half.

DISCUSSION

To better understand people's confidence in their flashbulb memories we tested a model of predictors of confidence. We found that participants' sense of attachment to the target of a news event directly predicted responses to the news

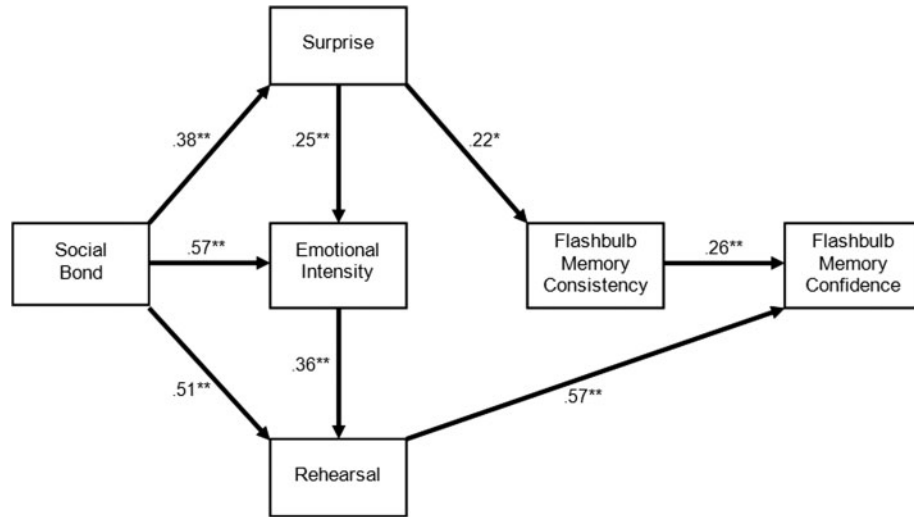


Figure 2. Standardised path coefficients of the effects of social bond with the target of the news event on flashbulb memory confidence. * $< .05$, ** $< .01$.

(i.e., degree of surprise, emotional intensity, and rehearsal). Consistency, and in particular rehearsal, were direct predictors of confidence in flashbulb memories, whereas sense of attachment was an indirect predictor. Although flashbulb memories remained fairly consistent over a year and a half, the degree of consistency was unrelated to participants' sense of attachment to Michael Jackson. Thus a stronger social bond with Michael Jackson predicted individuals' personal reactions and later confidence in their flashbulb memories, but not the consistency of their memories. One of the remarkable findings of flashbulb memory research is the tendency for rememberers to confidently recall their long-term memories after a public news event, even if memory inaccuracies exist (Talarico & Rubin, 2009). Results of our study help to explain this confidence by providing novel insight into some of the mechanisms involved in people's confidence in their flashbulb memories.

As a secondary research goal we examined participants' forecasts of the persistence of their memories. A greater sense of attachment to the target and more feelings of surprise predicted participants' expectations that their memories would remain consistent over 1–2 years. As predicted, consistency forecasts were more strongly related to downstream judgements of confidence than to the actual consistency of flashbulb memories. We offered this prediction on the assumption that consistency forecasts and downstream confidence both reflect, in part, the

belief that personally significant events are especially memorable (Weaver et al., 2008).

There are several issues and implications related to the present research. For instance, we acknowledge that not all meaningful news events are as unexpected as the death of Michael Jackson, and flashbulb memories have been documented for relatively more expected events (e.g., Collucia, Bianco, & Brandimonte, 2010). However, we suggest that even reasonably expected events can yield some level of surprise, which will vary among individuals and with degree of social bond. Moreover, to predict confidence, the structure of the model does not necessarily need to change for relatively less surprising, important news events (e.g., Curci & Luminet, 2009). It is possible that, depending on the sample and the nature of the event, some associations among factors in the present model, such as surprise, may become weaker or stronger. What is evident in this line of research is that the nature of surprise in flashbulb memories needs to be explored further, such as by examining surprise for positive and negative news events, and by making comparisons between flashbulb memories and feelings of surprise for everyday autobiographical memories (Talarico & Rubin, 2009).

In addition, although the death of Jackson was, on average, surprising, and involved much rehearsal, it did not appear to involve much visceral emotion response. It is possible that people are not good at recalling their visceral responses. It is also possible that this event did not evoke relatively strong bodily responses (e.g., sweating).

However, it appeared that the death of Jackson did lead to a moderate amount of emotional intensity, based on an item that measured this construct, which is comparable to past research (e.g., Curci & Luminet, 2009; Neisser et al., 1996), and consistent with our theorising of a sample that varied in sense of attachment to Jackson.

Over half of the original sample completed both surveys, a level that is comparable to participation rates in past flashbulb memory research (e.g., Curci et al., 2001; Hirst et al., 2009; Schmolck et al., 2000). Those who completed both surveys did not differ in gender or age compared to those who only completed the first survey. We did, however, detect a difference in social bond with Jackson between those who completed only the first survey and those who completed both surveys. It is unclear why this difference emerged. One possibility is that those with a stronger attachment to Jackson might have been drawn to the first survey near the time of Jackson's death, as it gave them the opportunity to reflect on his death. These respondents were perhaps less interested in participating in order to receive gift certificates 18 months later. Regardless of the exact reason, there could be some concern that the final distribution of social bond scores would be highly skewed; however, the distribution retained a reasonable degree of normality.

The present model was designed to test confidence in flashbulb memories, and it is not evident that it would extend to long-term autobiographical memories for important personal events. The contexts and reactions to personal vs. public events can differ in many ways. For example, the degree and nature of memory rehearsal may differ. In addition, retrieval-based cues may be more likely to affect confidence for normal autobiographical memories than for shocking flashbulb memories (Echterhoff & Hirst, 2006). Nonetheless, it may be useful for future research to examine whether the predictors of confidence in flashbulb memories overlap or differ from those for personal autobiographical memories.

Although the current study examined reactions to the death of a lone individual, we believe that the effects of social bond will extend to significant news events involving groups of individuals. Indeed, we believe that our finding that sense of attachment predicts confidence in flashbulb memories shares some consistency with past research involving group differences in confidence (e.g.,

Curci et al., 2001). If, as we suggest, an important factor is the sense of connection or social bond, then an incident (e.g., violence, accident) involving a group of people would similarly produce emotional reactions, rehearsal of flashbulb memories, and subsequent confidence in the accuracy of flashbulb memories, to the extent that people did feel a sense of connection to those involved.

An apparent shortcoming of our model is that flashbulb memories may also occur for the downfall of hated leaders or figures with whom relevant rememberers experience little social bond. Flashbulb memories for these events have yet to receive much research attention. We suggest that the effects predicted by the model will still be obtained in such instances if rememberers experience strong social bonds with target(s) who benefited from or precipitated the downfall (e.g., leading opponents of an unpopular leader). Such possibilities would need to be confirmed empirically.

In conclusion, the overarching purpose of the present study was to gain an increased understanding of people's confidence in their flashbulb memories. Our results show that, although confidence and memory consistency are somewhat related, the two measures are predicted by different variables. Confidence was directly or indirectly related to all of the other measures. In contrast, consistency was related only to confidence and surprise, and rather weakly at that. Our findings suggest that the study of confidence provides a basis for understanding the psychological significance and meaning of flashbulb memories.

Manuscript received 29 November 2011

Manuscript accepted 17 February 2013

First published online 15 March 2013

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