Cultural variation in the correlates of flashbulb memories: An investigation in five countries

Sarah Kulkofsky¹, Qi Wang², Martin A. Conway³, Yubo Hou⁴, Cagla Aydin², Katrin Mueller-Johnson⁵, and Helen Williams³

¹Texas Tech University, Lubbock, TX, USA
²Cornell University, Ithaca, NY, USA
³University of Leeds, Leeds, UK
⁴Peking University, Peking, China
⁵Cambridge University, Cambridge, UK

Flashbulb memory (FBM) refers to the vivid memory for the context of learning about a public news event. Past research has identified a number of factors that influence the formation of FBM, such as the importance of the event, the experience of intense emotions, and the amount of post-event rehearsal. Although such factors may be universal in predicting FBM formation across cultures, they may differentially impact FBM given different cultural belief systems and practices. In the present study we investigated the moderating effect of culture for various predictors of FBM in five countries: China, Germany, Turkey, the UK, and the USA. Results indicated that the effects of national importance and rehearsal of the reception context were consistent across cultures. In contrast, culture moderated the effects of personal importance, emotionality, surprise, and event rehearsal. In all cases the effects of these variables were significantly smaller in the Chinese sample.

Keywords: Flashbulb memory; Culture; Autobiographical memory; Public event memories.

People often retain vivid and long-lasting memories of the circumstances of first learning about a significant public news event, such as where they were, whom they were with, and how they learned the news. Such memories are termed flashbulb memory (FBM), and have been the focus of much research since they were first identified by Brown and Kulik (1977).¹ Research on FBMs has focused on a variety of issues including whether they represent a special memory mechanism (e.g., Christianson, 1989; Conway et al., 1994), whether they are more accurate than typical autobiographical memories (e.g., Neisser & Harsch, 1992; Schmolck, Buffalo, & Squire, 2000), and whether they are more resistant to forgetting than typical autobiographical memories (e.g., Hirst et al., 2009; Schmolck et al., 2000).

One frequent focus of research on FBM is on the factors that influence their formation and maintenance. In their original formulation of FBM, Brown and Kulik (1977) suggested that the importance of the event as well as the amount of surprise and intensity of emotional experience upon hearing the news of the event leads to the formation of FBM. Subsequent research has confirmed that both the importance of the event and the emotions experienced influence FBM
formation (Bohannon, 1988; Conway et al., 1994; Finkenauer et al., 1998; Tinti, Schmidt, Sotgiu, Testa, & Curci, 2009). Utilising structural equation modelling, Tinti et al. (2009) developed a model of FBM formation that suggests importance (both at the personal and societal level) influences the experience of emotions, which, in turn, has both direct effects on memory and indirect effects through increased rehearsal. Interestingly, according to this model the experience of surprise is not an important factor in FBM formation, although other research has found an effect for the amount of surprise experienced (Christianson, 1989; Finkenauer et al., 1998; Rubin & Kozin, 1984).

Although a number of studies have investigated FBM across cultures and countries, for the most part country is used as a means to investigate the importance or consequentiality of the event (e.g., Conway et al., 1994; Curci & Luminet, 2006; Tinti et al., 2009). For example, Tinti et al. (2009) compared memories for the death of Pope John Paul II in Polish, Italian, and Swiss Catholic participants. They expected that the Pope’s death would be most important for the Polish participants, given that Pope John Paul II was Polish and had been involved with the non-violent resistance movement during the fall of Soviet control. Italian participants were expected to have moderate levels of importance given the physical proximity to the Pope. Swiss participants were expected to have the lowest levels of importance, given there were no specific links with the Pope other than being Catholic. In line with these predictions, FBM scores were highest for the Polish participants and lowest for the Swiss.

Notably, the factors that influence FBM are generally considered universal. That is, while the importance or emotional impact of a particular event may vary across cultures, these variables influence the formation of FBMs in the same way regardless of cultural context. However, given different cultural beliefs and practices, we argue that such factors may differentially impact the formation of flashbulb memories across cultures. For example, the importance or consequentiality of an event may be measured both by personal importance as well as national importance. Some events may have little national or international importance, but may have high levels of personal importance and vice versa. For example, while the 2004 Boston Red Sox World Series win was of little consequence from a national or international perspective, for fans of the Boston Red Sox this event may be deemed as highly important, and potentially resulting in the formation of a FBM for these fans. The impact of personal versus national importance on the formation of FBMs may vary across cultural groups. In particular, in highly collectivistic cultures such as China, personal goals and activities are de-emphasised relative to the goals and activities of the collective (Hofstede, 2001; Markus & Kitayama, 1991), and as such, personal importance may be less central in the formation of FBMs when compared with highly individualistic cultures. In contrast, regardless of culture, the national or international importance of an event may increase media coverage and societal dialogue about the event, which likely facilitates the formation and maintenance of FBMs (Hirst et al., 2009; Paez, Bellelli, & Rime, 2009; Wang & Aydin, 2009). Thus it is possible that national importance will have similar effects on FBM across cultures, at least in countries where individuals have ready access to national media.

Additionally, in many East Asian cultures such as China and Japan the experience and expression of intense emotions, particularly negative ones, is viewed as potentially dangerous to ongoing relationships and social harmony. Emotions are therefore expected to be strictly controlled (Matsumoto, 1999; Wang, 2003; Wang & Aydin, 2009). As such, people in these cultures often report experiencing fewer intense emotions and are less likely to think about and share their emotions than people in more individualistic cultures (e.g., Basabe et al., 2002; Luminet et al., 2004). Thus it is possible, as Wang and Aydin (2009) have suggested, that while emotions may serve as a universal mechanism in facilitating FBM formation, there may be cultural variations in the degree to which this mechanism is effective. In support of this hypothesis, recent studies by Curci and Luminet (2006) and Otani et al. (2005) found that the experience of emotions was not associated with FBM performance among Japanese participants.

Finally, rehearsal is often shown to be an important mechanism in the maintenance of FBMs (Brown & Kulik, 1977; Finkenauer et al., 1998; Tinti et al., 2009). Given cognitive theories that support the importance of rehearsal in memory, it is expected that there would be little cultural variation in the degree to which rehearsing the reception context influences the maintenance of FBMs. On the other hand, rehearsal may also focus on the original triggering event.
In cultures that value individuality and independence, rehearsal of the original event may lead to subsequent rehearsal of the reception context, thereby connecting the event to the individual self. For example, when Americans think of the September 11 terrorist attacks, they may frequently think about their own experiences on that day of learning about the attacks. In contrast, in more highly collectivistic cultures such as China, where remembering one’s own personal experiences is often de-emphasised (Kulkofsky, Wang, & Hou, 2010; Wang & Conway, 2004; Wang & Ross, 2007), rehearsing the original event may be much less likely to lead to rehearsal of the reception context. As such, rehearsal of the triggering event may be associated with FBMs of the reception context to a lesser extent in these cultures.

The present study examined these issues by comparing FBMs in five countries: China, Germany, Turkey, the United Kingdom, and the United States. Based on national scores of individualism (Hofstede, 2001), China is characterised as one of the most collectivistic countries in the world, and has much lower levels of individualism than all of the other countries in our sample. Unlike most research on FBM, which asks participants about a single researcher-designated public event, in the present study we examined participant-nominated public events. Using a retrieval fluency task, participants recalled as many public news events that occurred during their lifetime as they could. This method allows the examination of the most readily accessible event memories (Conway & Holmes, 2004; Wang, Conway, & Hou, 2004). To examine whether each of the recalled event was associated with FBM, we then asked participants to complete a memory questionnaire, where for each event they reported their memory of the reception context and rated the frequency of rehearsal of the reception context and event, national and personal importance of the event, intensity of emotions the event caused, and surprise experienced as a result of the event. Research on FBMs use a variety of measures to assess FBM formation, including the amount of detail about the reception context (e.g., how they learned the news, who they were with, what they were doing, etc.), the specificity of the details about the reception context (e.g., 9 am versus “in the morning”), and the consistency of the details in a test–retest paradigm. In the present study the dependent measure is the amount of details about the reception context.  

The main question of interest was the degree to which a variety of factors that are found to be important to FBM in prior research would be related to the amount of FBM details recalled across cultures. We hypothesised that the effects of national importance and rehearsal of the reception context would be similar across cultures. In contrast, we predicted that culture would moderate the effects of personal importance, intensity of emotions, surprise, and rehearsal of the triggering event. Specifically, we expected that for the Chinese, which is a highly collectivistic culture, these variables would be less-powerful predictors of FBMs.

**METHOD**

**Participants**

Participants were 274 adults, including 61 Chinese (n = 32 male), 65 German (n = 26 male), 48 Turkish (n = 21 male), 50 British (n = 23 male), and 50 American (n = 21 male) participants. Participants were between the ages of 32 and 65 years old and the mean age was similar across cultures (M = 47.05 for Chinese, M = 54.97 for German, M = 52.44 for Turkish, M = 52.43 for British, and M = 50.45 for American). Participants were recruited primarily from middle-class communities in their respective countries. Participants received a small gift for their participation.

**Measures and procedures**

Participants were first given 5 minutes to recall as many memories as they could of public events occurring in their lifetime. They were restricted to events that were at least 1 year old, and on the rare occasions participants did not follow these instructions, that event was excluded. Participants were asked to respond quickly with
the first memory coming to mind, write a short phrase about the memory, then move on to the next memory. Following the retrieval fluency task participants were asked to complete a memory questionnaire for each recalled event. The questionnaire first asked them to date the event. They were then asked whether they recalled the circumstances of first hearing the news of the event. If they indicated that they did, they were asked five questions representing canonical categories for flashbulb memories: (1) where they were when they first learned the events, (2) what time of day it was, (3) how they learned about it, (4) what they were doing at that time, and (5) whom they were with. They were asked to put “cannot remember” if they did not recall the requested information. Participants’ responses were scored as 1 when participants recalled the requested information and as 0 when no information was recalled. These FBM scores were then summed up for each event, with a possible range of 0 to 5. Participants who reported they did not recall the circumstances of hearing the news received a FBM score of 0 for the event.

Following the FBM questions, participants were asked to make a series of ratings on a 1–7 Likert-type scale: (1) How nationally or internationally important was the event; (2) How personally important was the event; (3) How intense was the participant’s emotional reaction to the event; (4) How surprising was the event; (5) How many times had the participant thought about the event itself; (6) How many times had the participant talked about the event itself; (7) How many times had the participant thought about the circumstances of learning the news of the event; (8) How many times had the participant talked about the circumstances of learning the news of the event. Ratings of the frequency of thinking and talking about the reception context were only made by participants who indicated that they could remember the reception context. All other ratings were made by all participants, regardless of whether they could remember the reception context. The survey and instructions were constructed in English and then translated and back-translated into Mandarin Chinese, German, and Turkish by bilingual research assistants.

Participants were tested alone or in small groups by a native researcher in each country. The procedure took 30–60 minutes to complete.

RESULTS

Analysis plan

We first present descriptive analyses reporting cultural variation in the total number of events recalled, FBM score, and ratings. We then follow these with analyses of the moderating effects of culture on national importance, personal importance, emotionality, surprise, thinking about the original event, talking about the original event, thinking about the reception context, and talking about the reception context on FBM score. Preliminary analyses showed that the ratings were all significantly correlated with each other (rs range .28–.83), which would potentially lead to issues of collinearity if investigated in a single model. Each rating was therefore examined separately in relation to FBM score. For most analyses (except total number of memories reported), the analyses were at the level of the event rather than the subject. Therefore, a hierarchical linear modelling (HLM) approach was used, with participant treated as a random factor.

Descriptive results

Participants reported between 1 and 38 events during the retrieval fluency task, for an overall total of 2618 events. A one-way analysis of variance (ANOVA) was conducted to examine whether cultures differed in the total number of events reported. The results indicated that culture influenced the total number of events reported, $F(4, 275) = 17.93, p < .001$. British participants reported the greatest number of events ($M = 14.76, SD = 6.44$), followed by Americans ($M = 12.26, SD = 4.37$), Germans ($M = 9.06, SD = 3.99$), Turkish ($M = 6.50, SD = 2.25$), and lastly Chinese ($M = 5.99, SD = 3.27$). Follow-up pairwise $t$-tests utilising a Bonferroni correction ($p < .005$) showed that all between-group differences were significant except that between Turkish and Chinese participants. Participants reported that they remembered the reception context (i.e., FBM) for approximately one-half of the reported events ($n = 1300$).

Table 1 displays the means and standard deviations for FBM score (i.e., the number of canonical details about the reception context each participant recalled) and each of the rating variables as a function of culture. There were
significant effects of culture for all variables (see Table 1 for Fs). Turkish participants had the highest FBM score, while Chinese participants had the lowest. Scores for German, British, and American participants did not differ from one another (p > 0.005). The pattern of ratings across the various dimensions was generally consistent. Pairwise t-tests utilising a Bonferroni correction revealed German and Turkish participants had the highest scores and, with the exception of talking about the event, were not significantly different from each other. British participants always had the lowest ratings (for think about the event, they were not significantly lower than Chinese or US participants). Ratings of US and Chinese participants were in the middle and never significantly differed from each other.

**Culture as a moderator of predictors**

For every rating, a Culture × Rating HLM model was conducted predicting FBM score. The moderating effect of culture is evidenced by the significant interaction term. Significant interactions were followed up with planned contrasts of the parameter estimates for each culture. Missing data lead to slight differences in the degrees of freedom across variables. Table 2 presents the parameter estimates for each of the eight predictor variables for each culture.

**National importance.** The effect of national importance was significant, F(1, 2294) = 41.45, p < .001; events with higher ratings of national importance had higher FBM scores. The culture × national importance interaction was not significant, F(4, 2294) = 2.29, p = ns.

**Personal importance.** The effect of personal importance was significant, F(1, 2296) = 196.78, p < .001, which was qualified by a significant culture × personal importance interaction, F(4, 2296) = 9.23, p < .001. When the model was run separately for each culture, events with higher ratings of personal importance had higher FBM scores for all groups except China. Planned contrasts comparing the parameter estimates across cultures revealed that the parameter estimate for China was significantly smaller than that for all other groups (all ps < .01). Additionally, the

**TABLE 1**

<table>
<thead>
<tr>
<th>Variable</th>
<th>China (M, SD)</th>
<th>Germany (M, SD)</th>
<th>Turkey (M, SD)</th>
<th>UK (M, SD)</th>
<th>US (M, SD)</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBM Score</td>
<td>1.51 (2.34),a</td>
<td>2.32 (2.31),b</td>
<td>2.94 (2.33),c</td>
<td>2.31 (2.33),b</td>
<td>2.06 (2.33),b</td>
<td>17.86***</td>
</tr>
<tr>
<td>National Importance</td>
<td>5.72 (1.90),a</td>
<td>5.83 (2.05),ab</td>
<td>6.20 (1.88),b</td>
<td>5.48 (2.44),a</td>
<td>5.73 (2.27),a</td>
<td>6.77***</td>
</tr>
<tr>
<td>Personal Importance</td>
<td>3.47 (2.18),a</td>
<td>4.16 (2.31),bc</td>
<td>4.54 (2.15),c</td>
<td>3.00 (2.70),d</td>
<td>3.88 (2.52),b</td>
<td>30.69***</td>
</tr>
<tr>
<td>Emotion</td>
<td>4.93 (2.06),b</td>
<td>5.02 (2.19),bc</td>
<td>5.42 (2.03),c</td>
<td>4.17 (2.56),b</td>
<td>4.63 (2.39),c</td>
<td>20.90***</td>
</tr>
<tr>
<td>Surprise</td>
<td>4.87 (2.19),ab</td>
<td>5.12 (2.26),bc</td>
<td>5.55 (2.16),c</td>
<td>4.44 (2.53),d</td>
<td>4.68 (2.38),c</td>
<td>15.62***</td>
</tr>
<tr>
<td>Think About Event</td>
<td>3.87 (1.88),a</td>
<td>4.64 (1.98),b</td>
<td>4.63 (1.85),b</td>
<td>3.59 (2.31),a</td>
<td>3.84 (2.15),a</td>
<td>29.57***</td>
</tr>
<tr>
<td>Think About Reception</td>
<td>4.34 (1.93),ab</td>
<td>4.72 (2.06),a</td>
<td>4.65 (1.95),a</td>
<td>3.83 (2.33),b</td>
<td>4.39 (2.17),c</td>
<td>8.34***</td>
</tr>
<tr>
<td>Talk About Event</td>
<td>3.80 (1.95),a</td>
<td>4.47 (2.04),bc</td>
<td>4.70 (1.96),c</td>
<td>3.02 (2.28),d</td>
<td>3.98 (2.14),ab</td>
<td>28.02***</td>
</tr>
</tbody>
</table>

***p < .001.

Means in the same row with different subscripts are significantly different at the p < .005 level. For all Fs numerator df = 4 and denominator df = 273. FBM Score theoretical range = 0–5. All ratings theoretical range = 1–7.

**TABLE 2**

<table>
<thead>
<tr>
<th>Variable</th>
<th>China</th>
<th>Germany</th>
<th>Turkey</th>
<th>UK</th>
<th>US</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>National Importance</td>
<td>.07</td>
<td>.14</td>
<td>.25</td>
<td>.19</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>Personal Importance</td>
<td>.06,a</td>
<td>.26,b</td>
<td>.39,bc</td>
<td>.26,a</td>
<td>.43,c</td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td>.15,a</td>
<td>.34,b</td>
<td>.54,c</td>
<td>.32,d</td>
<td>.42,ce</td>
<td></td>
</tr>
<tr>
<td>Surprise</td>
<td>.20,b</td>
<td>.26,ab</td>
<td>.38,b</td>
<td>.20,a</td>
<td>.33,b</td>
<td></td>
</tr>
<tr>
<td>Think About Event</td>
<td>.10,a</td>
<td>.32,b</td>
<td>.43,c</td>
<td>.39,b</td>
<td>.38,c</td>
<td></td>
</tr>
<tr>
<td>Talk About Event</td>
<td>.10,a</td>
<td>.23,ab</td>
<td>.35,b</td>
<td>.31,b</td>
<td>.34,c</td>
<td></td>
</tr>
<tr>
<td>Think About Reception</td>
<td>.02</td>
<td>.10</td>
<td>.01</td>
<td>.07</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>Talk About Reception</td>
<td>.01</td>
<td>.03</td>
<td>.02</td>
<td>.07</td>
<td>.07</td>
<td></td>
</tr>
</tbody>
</table>

Values in the same row that do not share subscripts differ at p < .05 in the contrast analyses. Culture did not moderate the effects of national importance, think about the reception context, and talk about the reception context, and thus contrast analyses were not conducted for these variables.
parameter estimate for the US was significantly larger than those for Germany and the UK ($p < .001$).

**Emotional intensity.** The effect of emotional intensity on FBM score was significant, $F(1, 2301) = 283.31$, $p < .001$, qualified by a culture $\times$ emotional intensity interaction, $F(1, 2301) = 7.28$, $p < .001$. When the model was run separately for each culture, events with higher ratings of emotional intensity had higher FBM scores for all groups. Planned contrasts of the parameter estimates revealed that the parameter estimate for China was significantly smaller than that for all other groups (all $ps < .01$). In addition, the estimate for Turkey was greater than the estimates for Germany and the UK ($ps < .01$) and the estimate for the USA was greater than the estimate for the UK ($p < .05$).

**Surprise.** The effect of surprise was significant, $F(1, 2295) = 174.50$, $p < .001$, which was qualified by a significant culture $\times$ surprise interaction, $F(4, 2295) = 3.34$, $p < .01$. When the model was run separately for each culture, events with higher ratings of surprise had higher FBM scores for all groups. Planned contrasts of the parameter estimates revealed that the estimates for the U.S. and Turkey were significantly greater than the estimates for China and the UK (all $ps < .05$).

**Think about triggering event.** The effect of ratings of the frequency of thinking about the triggering event was significant, $F(1, 2306) = 265.54$, $p < .001$, which was qualified by a culture $\times$ think about event interaction, $F(4, 2306) = 6.73$, $p < .001$. When the model was run separately for each culture, triggering events that were thought about more frequently had higher FBM scores for all groups except China. Planned contrasts of the parameter estimates revealed that the estimate for China was significantly smaller than all other groups (all $ps < .001$).

**Talk about triggering event.** The effect of ratings of the frequency of talking about the triggering event was significant, $F(1, 2307) = 158.37$, $p < .001$, which was qualified by a culture $\times$ talk about event interaction, $F(4, 2307) = 3.91$, $p < .01$. When the model was run separately for each culture, triggering events that were talked about more frequently had higher FBM scores for all groups except China. Planned contrasts of the parameter estimates revealed that the estimate for China was significantly smaller than all other groups except Germany (all $ps < .01$).

**Think about reception context.** Ratings of the frequency of thinking about the reception context were only examined for those participants who reported that they remembered the reception context. The effect of thinking about the reception context was significant, $F(1, 1037) = 15.78$, $p < .001$; events where the reception context was thought about more frequently had higher FBM scores. The interaction with culture was not significant.

**Talk about reception context.** Ratings of the frequency of talking about the reception context were only examined for those participants who reported that they remembered the reception context. The effect of talking about the reception context was significant, $F(1, 1037) = 9.08$, $p < .01$; events where the reception context was talked about more frequently had higher FBM scores. The interaction with culture was not significant.

**DISCUSSION**

The goal of this study was to investigate the degree to which culture acts as a moderator of variables commonly associated with FBMs. It was hypothesised that in highly collectivistic cultures like China, personal importance and emotion intensity would play less of a role in predicting FBM performance, compared with more individualistic cultures that place greater emphasis on individuals’ personal involvement and emotional experiences. Furthermore, because focusing on individuals’ own experiences is often de-emphasised in the Chinese context, it was hypothesised that the rehearsal of the triggering event would be less likely to help Chinese participants remember the reception context of the event (i.e., FBM details) compared with participants from other cultures. In contrast, it was hypothesised that national importance and rehearsal of the reception context would be similarly associated with FBM formation across cultures. Our results supported these hypotheses. Culture did not moderate the effects of national importance or thinking about or talking about the reception context. However, culture did moderate the effects of personal importance, emotional intensity, surprise, and thinking about and talking about the original triggering event. In all cases the effects of these variables were reduced for Chinese participants. For the Chinese, personal importance and rehearsing the triggering event were not significantly
associated with FBM performance as they were in other cultures; and while emotional intensity and surprise were significantly associated with performance the effect was much smaller than in other cultures.

Interestingly, while UK and US participants reported a greater number of events than the other cultural groups, they also tended to report events that were on average less consequential or important than those reported by German and Turkish participants. The difference may simply due to the fact that because UK and US participants recalled many events, some of the events were deemed unimportant. It may also suggest different memory search strategies across cultures, such that German and Turkish participants used more stringent criteria in their memory search. It would be informative to investigate these issues in future research.

Our findings shed important new light on the current understanding of FBM. With empirical studies mostly focusing on Western samples, the factors of personal importance of the event, intense emotions experienced upon learning the event, and rehearsal of the event both publicly and privately have generally been found to be significant contributors to FBM (e.g., Conway et al., 1994; Finkenauer et al., 1998; Tinti et al., 2009). However, given different cultural value systems and mnemonic practices (see Wang & Ross, 2007, for a review), these factors appear to manifest differently on remembering across cultures. In particular, in cultural contexts such as China, where remembering personal experiences is de-emphasised and where individuals are encouraged to control their feelings and emotions, the effects of these factors appear to be attenuated.

REFERENCES


*Cognition*, 16, 81–95.

Memory distortions develop over time: Recollections of the O. J. Simpson trial verdict after 15 and 

Tinti, C., Schmidt, S., Sotgiu, I., Testa, S., & Curci, A. 
(2009). The role of importance/consequentiality 
appraisal in flashbulb memory formation: The case 
of the death of Pope John Paul II. *Applied Cognitive 

Wang, Q. (2003). Emotion situation knowledge in 
American and Chinese preschool children and 

flashbulb memory. In O. Luminet & A. Curci 
(Eds.), *Flashbulb memories: New issues and new 

keep: Autobiographical memory in American and 
Chinese middle-ages adults. *Journal of Personality*, 
72, 911–938.

amnesia: A cross-cultural investigation. *Cognitive 
Sciences*, 1(1), 123–135.

Wang, Q., Conway, M. A., Kulkofsky, S., Hou, Y., 
public events in five countries. *Cognitive Sciences*, 4, 
111–120.
