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Externalising the autobiographical self: sharing personal memories online facilitated memory retention

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\begin{abstract}
Internet technology provides a new means of recalling and sharing personal memories in the digital age. What is the mnemonic consequence of posting personal memories online? Theories of transactive memory and autobiographical memory would make contrasting predictions. In the present study, college students completed a daily diary for a week, listing at the end of each day all the events that happened to them on that day. They also reported whether they posted any of the events online. Participants received a surprise memory test after the completion of the diary recording and then another test a week later. At both tests, events posted online were significantly more likely than those not posted online to be recalled. It appears that sharing memories online may provide unique opportunities for rehearsal and meaning-making that facilitate memory retention.
\end{abstract}

The autobiographical self is constructed in the process of recalling, evaluating, and sharing with others memories of personal experiences from an individual’s life (Conway & Pleydell-Pearce, 2000; Nelson & Fivush, 2004; Wang, 2013a). It is critical for identity and psychological well-being, especially during adolescence and emerging adulthood when identity is being formed (Habermas & Bluck, 2000; McAdams, 2001). In recent years, with the rapid development of Internet technology and the rise of Web 2.0 (O’Reilly, 2005), people can appropriate the Internet as an effective medium to recall and share personal experiences publicly, online, in a variety of social media (Bell & Gemmell, 2010). Yet little is known about the mnemonic consequence of externalising the autobiographical self. How does posting personal events online affect subsequent memory for these events? Two divergent predictions can be drawn from the current literature.

On the one hand, the Internet and social media provide a virtual storage that has become part of what Wegner (1986) calls a “transactive memory system” that outsources our memory. Although traditional diaries also serve similar purposes for recording personal experiences, the seemingly endless capacity of the Internet and the motivation of creating content and broadcasting personal opinions and experiences make social media an impeccable form of transactive memory for the autobiographical self in the digital age (Lee, Im, & Taylor, 2008; Lenhart & Fox, 2006). This virtual extension of our personal memories may ease our memory load and indulge a technology dependency. Research by Sparrow, Liu, and Wegner (2011) has shown that when people believe that they have future access to information – as they often do with information they can look up online, they have reduced recall of the information itself. Accordingly, many of our life details may no longer need to be internally stored and retrieved if we know that we can later refer to our online journals to locate the information. As a result, personal events that are posted online may become less likely to be remembered than those that are not posted.

On the other hand, posting personal events online affords opportunities for rehearsal and meaning-making (Wang, 2013a). The process of writing about one’s experiences in the public sphere, often sustained by subsequent social feedback, may allow people to reflect on the experiences and their personal relevance. Consequently, events that are reflected upon and go “meta” in online posts are likely to become well integrated into the autobiographical knowledge base and effectively stored for long-term retention. This is in line with the autobiographical memory literature that highlights the contribution of rehearsal and social sharing to remembering personal experiences (Conway & Pleydell-Pearce, 2000; Nelson & Fivush, 2004; Pillemer, 1998; Wang, 2013a). Furthermore, the rich textual and visual representations in the cyber space and the very act of posting can serve as effective cues to facilitate retention and recall of memories (Stevens, Abowd, Truong, & Vollmer, 2003). Thus, personal events that are posted
online may be more likely to be remembered over time than those that are not posted.

The present study set out to test these two predictions in a sample of young adults. A diary method was used where participants completed a daily diary for a week, listing at the end of each day all the events that had happened to them on that day (Wang, 2009). They also reported whether they had posted any of the events online. At the end of the week, participants received a surprise memory test for the events that they had recorded, and then another surprise memory test a week later. Participants’ recalls of the posted and un-posted events at the two tests were examined. Whereas the transactive memory theory (Wegner, 1986) would predict better recall of events that were not posted online, autobiographical memory theories (Conway & Pleydell-Pearce, 2000; Nelson & Fivush, 2004; Wang, 2013a) would predict better recall of events that were posted online. Notably, people may selectively post online events that are particularly important or meaningful to them. To eliminate possible confound, participants were asked to rate the personal importance and emotional intensity of each event when they recorded the events in their diaries, which were later taken into consideration in analysis.

Method

Participants

A total of 66 undergraduate students (46 females; mean age = 20.80 years) at Cornell University participated in the study, including 37 European Americans and 29 East Asians (19 Chinese and 10 Koreans). Participants gave informed consent and each received $20. Additional 12 participants dropped out at an early stage of the study and were excluded.

Procedure

Participants were told that the purpose of this research was to look at what people remembered about their daily experiences. They were asked to complete a daily diary for a period of one week. They were instructed to list at the end of each day all the events that happened to them during that day and briefly describe each event in two or three sentences. It was emphasised to them that the events must be single, specific episodes that contained unique aspects (e.g., going to the library to get a book, having an argument with roommate), and that they should not include general descriptions of daily routines (e.g., “I woke up, had breakfast, went to my 9:20 class”). In addition, for each recorded event, participants were asked whether they posted the event online on any social media site (e.g., Facebook, Twitter, blogs), and whether the event was pleasant or unpleasant. They were further asked to rate on five-point scales the personal importance (1 = not important, 5 = very important) and emotional intensity of the event (1 = no emotion, 5 = very intense). Thus, the question concerning online posting was embedded among other questions to eliminate any possible suggestive influence. Participants completed and submitted their daily diaries via Qualtrics each day, and they were not able to revisit their diaries once submitted.

Upon the completion of the 7-day diary recording, participants received a surprise memory test (week 1 test). They were asked to recall as many events as they could that they recorded in their diaries in the previous week and give a brief written account of each event. Then, a week later, participants received another surprise memory test where they were again asked to recall as many events as they could that they recorded in their diaries during the week of the diary recording (week 2 test). Participants submitted their responses via Qualtrics at both time points.

Each event included in the initial diary recording was coded as either recalled (1) or not recalled (0) at week 1 and week 2 memory tests, respectively. This was done by comparing the memory descriptions in the diaries and the recall tests, following the method used in previous research (Talarico & Rubin, 2007; Wang, 2013b). The coding focused on the consistency in the gist of the events, whereby participants used the same or similar words to refer to the “main action” or central focus of a past episode (e.g., recording “going out with friends” initially and recalling “going out with a bunch of people” later). Events that were recalled in gist would be scored 1 and those that were not recalled or recalled incorrectly in gist would be scored 0. Two trained research assistants, both blind to the hypotheses, independently coded 50% of the data for reliability check. The inter-coder reliability r (Rosenthal & Rosnow, 1991) was .91 for week 1 test and .92 for week 2 test. One assistant then coded the rest of the data.

Results

Participants’ ethnicity and gender showed no effect in preliminary analyses and were therefore not considered further. The main analyses focus on the influence of online status of events on subsequent recalls. Some participants did not answer all questions, so the degrees of freedom varied slightly across tests. Verification confirmed that participants followed the instruction to focus on specific instead of routine aspects of their daily events in their diary recording.

A total of 1614 events were initially recoded in participants’ diaries across 7 days, among which 98 (6%) were reported as having been posted online (M = 1.48 per participant, median = 1, SD = 2.11, range = 0–9). There was no significant difference in the average number of events posted online across the 7 days of diary recording. Because the online status pertained to individual memories, all subsequent analyses focused on memory rather than participant as the unit of analysis. First, to examine
the characteristics of the online events compared with offline events in terms of personal importance, a mixed model analysis was conducted using SAS PROC MIXED program (Singer, 1998), with online status being a fixed within-subject factor and subject being a random factor. As expected, events posted online \((M = 3.49, \ SD = 1.26)\) were rated as significantly more important than those not posted \((M = 3.08, \ SD = 1.17)\), \(F(1, 1531) = 5.75, \ p = .02, \Delta R^2 = .02\). A similar analysis on emotional intensity further showed that events posted online \((M = 2.97, \ SD = 1.30)\) were rated as more emotionally intense than those not posted \((M = 2.44, \ SD = 1.12)\), \(F(1, 1523) = 23.08, \ p < .0001, \Delta R^2 = .07\). The majority of both online (80%) and offline events (77%) were pleasant so that there was no significant difference in valence.

Subsequent analyses focused on the likelihood of events being recalled at each time point as a function of online status. We conducted generalised linear mixed model (GLMM) analyses using the SAS PROC GLIMMIX program, with online status being a fixed within-subject factor and subject being a random factor. The GLIMMIX procedure estimates the parameters by applying pseudo-likelihood techniques and produces \(F\) statistics in the output (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2006; Wolfinger & O’Connell, 1993). Consistent with the predictions, events having been posted online were significantly more likely to be recalled at both week 1, \(F(1, 1548) = 6.70, \ p = .01, \ 95\% \ CI [-1.11, -0.15]\), and week 2 tests, \(F(1, 1548) = 7.03, \ p = .008, \ 95\% \ CI [-1.18, -0.18]\), compared with those not posted online (see Figure 1).

To partial out the possible confounding effects of personal importance and emotional intensity on memory recall, personal importance and emotional intensity ratings were included in the above models as covariates. Online status continued to significantly predict the likelihood of an event being recalled at both week 1, \(F(1, 1515) = 6.77, \ p = .009, \ 95\% \ CI [-1.12, -0.16]\), and week 2 tests, \(F(1, 1515) = 6.22, \ p = .01, \ 95\% \ CI [-1.16, -0.14]\). In addition, events that were of greater personal importance were more likely to be recalled at week 1 test at marginal significance, \(F(1, 1515) = 3.00, \ p = .08, \ 95\% \ CI [-0.01, 0.23]\), and at week 2 test, \(F(1, 1515) = 9.24, \ p = .002, \ 95\% \ CI [0.08, 0.35]\). Emotional intensity had no significant effect on memory recall after controlling for the effects of online status and personal importance. This suggests that, in the current sample, the effect of emotional intensity on memory recall might be mediated by the personal importance or online status of memory.

**Discussion**

Sharing personal memories online facilitated memory retention. The present study is the first to examine the mnemonic consequences of online social media for personal experiences. The findings shed critical new light on memory theories and have important implications for the construction of the autobiographical self in the digital age.

Contrary to the prediction according to the transactive memory theory (Wegner, 1986), posting personal memories online did not result in outsourcing the memories to an external storage and in turn, reduced recall. Instead, consistent with autobiographical memory theories (Conway & Pleydell-Pearce, 2000; Nelson & Fivush, 2004; Pillemer, 1998; Wang, 2013a), events that were shared online were more likely than those not shared online to be remembered overtime, independent of the characteristics of the events.

Sharing personal memories in online social media may afford two mnemonic advantages. First of all, social media provides an additional and easy-access outlet for people to retrieve their personal memories in the public sphere. Sharing memories can now be done anytime and...
anywhere and does not require the physical presence of others. Memory researchers have long emphasised that memory retrieval, particularly through linguistic reinstatement, directly contributes to the long-term retention of past events (Nelson & Fivush, 2004; Pillemer, 1998; Tulving, 1991). There has been ample evidence to show that personal experiences that are rehearsed, especially in social contexts, tend to be better retained than those not rehearsed (Barnier, Hung, & Conway, 2004; Stone, Barnier, Sutton, & Hirst, 2013; Wang, Bui, & Song, 2015). Although events not posted online may also be rehearsed and shared, posting memories online provides additional opportunities for people to rehearse their memories with others and further facilitates long-term retention.

Furthermore, social media also serves as an essential tool for meaning-making in the construction of the autobiographical self in the digital age (Lenhart & Fox, 2006; Wang, 2013a). Unlike practical knowledge that we can toss around to a physical or cyber location known to us and forget about the information itself until next time when we need it and then retrieve it from the location (Jiang, Hou, & Wang, 2016; Sparrow et al., 2011), memories of personal experiences constitute who we are. They would not make up our autobiographical self unless we remember them and make sense out of them in relation to our personality (Conway & Pleydell-Pearce, 2000; Habermas & Bluck, 2000; McAdams, 2001). Sharing personal experiences online may facilitate meaning-making by allowing us to reflect on the experiences during the very act of writing and posting. This entails an active process of constructing and expressing our autobiographical self that is further supported by the interactive context of social media (Wang, 2013a). Indeed, when people are asked to recall memories for online posting, their memories are more detailed and self-revealing than those when they are asked to recall memories for a private diary (Wang, Blenis, Ng, & Gonzalez, 2015). The online meaning-making process may, in turn, render the memories for the posted events more memorable and lasting.

As expected, events posted online appeared to be selective such that they were more personally important and emotionally intense than those not posted online. Given that events with greater personal importance are generally better remembered than those that are of little or no personal importance (Conway & Pleydell-Pearce, 2000; Singer & Salovey, 1993; Thompson, Skowronski, Larsen, & Betz, 1996), and that emotion facilitates memory consolidation and formation (Christianson & Safer, 1996; McGaugh, 2003), events posted online might be more memorable in the first place than those not posted online. Nevertheless, online status continued to predict memory recall at both time points after controlling for personal importance and emotional intensity. This suggests that the facilitative effect of sharing memories online is above and beyond the influence of the mnemonic characteristics of the memory events.

The present study takes a naturalistic approach to examining the mnemonic consequences of sharing personal memories online. In spite of its strength in ecological validity, there are limitations. Among the 1614 events initially recoded in diaries, only 98 (6%) were reported as having been posted online. Although this may reflect the actual situation in real life in which people selectively post online a small proportion of their daily experiences, it limited the power of the present study. Future studies should implement designs to more efficiently tackle online memories. In addition, participants in our study were asked to record their daily events and their online status at the end of the day, shortly after the events took place. Although their self-reports were likely to be generally accurate, future studies should benefit from including an assessment of accuracy. Furthermore, while the current study used a mix-model design focusing on memory as the unit of analysis, future studies should also examine individual differences such as motivations and habits to post events online that may have implications for personal remembering. Finally, whereas the current findings shed light on the mnemonic effects of sharing personal memories in online social media, further studies are needed to delineate the exact processes underlying the effects (e.g., additional rehearsals, effective retrieval cues, and social facilitation from public sharing). Future research may use experimental manipulations to test the quality, content, and long-term retention of personal memories posted online, compared with memories not posted online as well as those rehearsed in other outlets (e.g., diaries), and to examine individual and group correlates of sharing memories online in the construction of the autobiographical self.

In sum, findings from the present study suggest that sharing personal memories online facilitates memory retention. Instead of serving as an external memory storage to ease memory burden, social media afford an essential outlet unique to the Internet era for retrieving and sharing personal memories and may further have important mnemonic consequences. This work is the first step towards a better understanding of the autobiographical self in the Internet era where the virtual externalisation of personal memories has become commonplace.

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