2004

Event knowledge and the subjective temporal distance of past events

Travis McTeer
Wilfrid Laurier University

Event Knowledge and the Subjective Temporal Distance of Past Events

By

Travis McTeer

Bachelor of Arts (Honours), Wilfrid Laurier University, 2003

THESIS

Submitted to the Department of Psychology

In partial fulfillment of the requirements for

Master of Arts, Psychology

Wilfrid Laurier University

Your file Votre référence
ISBN: 0-612-96589-9
Our file Notre référence
ISBN: 0-612-96589-9

Abstract

Three studies investigated a proposed relation between memory quality for past events and the subjective temporal distance of those events. The findings support the hypothesis that those events that are remembered more vividly and in greater detail tend to feel closer than more poorly remembered events. Studies 1 and 2 establish a correlational link between memory quality and subjective distance. Study 3 uses an experimental design to demonstrate that an individual's memory quality for a past event can affect his/her rating of the subjective distance of that event. The results are discussed in terms of the associations between feelings of subjective distance and self-esteem maintenance, and between subjective distance and systematic error in objective date estimates for past events.

Acknowledgements

I would like to express my gratitude to everyone who helped me to complete this thesis. In particular, I wish to thank my advisor, and friend, Anne Wilson, and my committee, Roger Buehler and Christian Jordan. I would also like to thank the psychology department faculty and staff for their guidance and support over the past six years. Finally, I want to thank my family for their continuing support in all of my endeavors.

Table of Contents

Event Knowledge and the Subjective Temporal Distance of Past Events

The subjective temporal distance of a past event is the experience of how long one feels it has been since an event occurred. This subjective experience is not the same as objectively knowing the date of a past event, and, in fact, is probably most salient when it conflicts with the actual date. Consider a notable family vacation for example: One may be aware that the trip occurred ten years ago, but may feel as though it was very recent. Colloquially, people often describe this feeling by saying "it seems like yesterday". The experience seems to be quite pervasive – The History Channel even has a show titled: *It Seems Like Yesterday.* While some events will tend to feel more recent, it is also possible for other events to feel more distant than they actually are. This thesis will focus on the question of what causes events to feel more recent or distant than they actually are.

Understanding variations in subjective temporal distance is important for two general reasons. The first is that the subjective distance of an event may be closely tied to other aspects of the way we think and feel about that event. For example feeling subjectively close to a happy event may make a person feel good. Such positive affective outcomes may even *motivate* a person to feel close to such events (e.g., Ross & Wilson, 2003). The second reason is that the subjective distance of some events may impact people's reports of when those events actually occurred, leading people to unintentionally give false reports of the dates of past events. As Skowronski and Thompson (1990) point out, these false reports could have serious consequences, such as allegations of misrepresenting one's self on a job application, or perjury charges as a result of erroneous legal testimony.

Motivational Perspective

One reason that people may feel subjectively close to - or distant from - past events, is that they may be motivated to feel that way. The construct of subjective temporal distance has been extensively investigated in recent years by Wilson and Ross (Wilson & Ross, 2001; Wilson & Ross, 2003; Ross & Wilson, 2002; Ross & Wilson, 2003). The authors have examined how subjective temporal distance, both from past events and past identities (e.g., the high school "me"), affects people's perceptions of those things. Research on *temporal self-appraisal theory* (Ross & Wilson, 2002) indicates that the subjective distance of the past – how distant it feels – is psychologically important and may be linked in a motivated way to self-esteem maintenance. In several studies participants reported feeling subjectively closer to past events that cast a positive light on themselves than past events that reflected negatively upon them (Ross & Wilson, 2002). This pattern was not present when participants recalled acquaintances' positive and negative outcomes. Moreover, the pattern of feeling close to positive events and distant from negative events was stronger among high self-esteem participants than their low self-esteem counterparts, lending credence to a self-esteem maintenance explanation. Ross and Wilson (2003) found that the subjective distance of past events can also impact people's appraisals of their present selves. Feeling close to a positive past event can boost current self-appraisals, and feeling distant from a negative past event reduces the harm that the event incurs on current self-appraisals. Taken together, these findings indicate that in some cases people are motivated to feel that a past event or identity is more recent or more distant, in order to feel good about themselves in the present (Ross & Wilson, 2002; Ross & Wilson, 2003). The inclusion of positive events in one's present

identity, and the relegation of negative events to past identities aids in the formation of positive appraisals of the current self. A limitation of this motivational explanation is that it is only applicable to events that are high in personal relevance, and of a positive or negative valence. Specifically, feelings of subjective recency or distance for events that are neither positive nor negative, or events that are not relevant to one's self-concept, cannot be explained by a desire to see one's self in a positive light. Thus, a more comprehensive explanation is needed to explain all variation in feelings of subjective recency or distance. Whereas a motivational explanation cannot explain all occurrences of variation in the perceived subjective distance of past events, any comprehensive explanation of this phenomenon should be able to account for these findings.

Cognitive/Methodological Perspective

The Reconstructive Approach to Objective Date Estimates

At this point in time, there is relatively little research in the literature dealing with subjective feelings of temporal distance. However, there has been more extensive investigation of a closely related phenomenon: objective date estimates (e.g., Rubin & Baddeley, 1989; Larsen & Thompson, 1995; Kurbat, Shevell, & Rips, 1998; Bradburn, 2000; Gibbons & Thompson, 2001). How does one go about recalling the date of a past event? In some rare cases, memories for events may contain the actual date on which the event occurred, for example, the September 11 terrorist attack. According to Friedman (1993), however, this time stamping is rare. Most of the time people use a reconstructive process to determine when a past event occurred. This process involves reconstructing the event in one's mind, and using the available information to estimate the date on which the event occurred. For example, I can recall being in my 10^{th} grade English class when

the O.J. Simpson verdict was announced, which narrows the date down to a school day between September and June of 1995. As Thompson, Skowronski, and Betz (1993) observe, however, this information is often incomplete, and the type of partial temporal information available affects the pattern of error in people's estimates of event dates. Thompson et al. found that people tend to rely on three types of information when making date estimates: 1) Information about the day of the week (i.e., an event that occurred during one of my soccer games probably happened on a Tuesday since I normally play soccer on Tuesdays); 2) Event sequence information, (i.e., the event "bought a new car" would have to precede "got a scratch on my new car"); 3) Boundary landmarks, which are the beginning and end of the time period within which an event would have to have occurred (i.e., "failing a test" would have to occur during the school year and would thus be bounded by the beginning and end of the school year). Studies of people's date estimates for personal events typically involve participants keeping a diary of events and subsequently being asked to date those events. Thus the events which they are being asked to date necessarily fall within the time period for which they were using the diary. The date on which they started the diary and the date on which they are tested, therefore, become perceptual boundaries for when the events could have occurred.

Errors in Objective Date Estimates

Research on people's estimates of the actual date of past events has revealed that, similar to reports of the subjective distance of a past event, objective date estimates are subject to systematic error. The phenomenon of reporting an objective date estimate (i.e., the day/month/year on which the event occurred) for a past event that is erroneously more recent than the true date of that event is known as forward telescoping, and one that is

erroneously more distant is known as reverse telescoping (e.g., Burt, Kemp, & Conway, 2001). Theoretically it is possible that, in some circumstances, feeling close or distant to an event could lead to telescoping the reported date of that event. In past research McTeer and Wilson (2003) found a correlation between objective and subjective date estimates for past news events. This suggests that there is a relation between these variables; however at the present time it is not known whether this relation is directional.

One of the major problems with telescoping is that it leads to systematic error in date estimates. Survey researchers expect that there will be error in people's date estimates; however, it is assumed that this error is random. With random error, collecting a large sample will usually yield a reliable mean estimate. In contrast, if the error is systematic, as is the case with date telescoping, mean estimates will remain skewed even in large samples. Thus, telescoping of reported dates for past events poses a significant methodological problem for survey research. In a medical setting, for example, inaccurate reports of the dates of interpersonal contact could seriously impede an epidemiological investigation (Skowronski & Thompson, 1990).

Methodological sources of objective dating error. In survey research participants are often asked to report the frequency of a particular type of event within a specific time period (e.g., "In the past year, how many times have you visited the doctor?"). A consequence of specifying such a time period is the construction of perceptual boundaries when recalling past events. The phenomenon of forward telescoping is frequently attributed to these perceptual boundaries (Huttonlocher, Hedges, & Bradburn, 1990). Consider the question "in the past year, how many times have you visited a doctor?". When people are asked to recall events from within a specific reference period, such as

the preceding year, there will tend to be a forward bias among events occurring towards the beginning of the reference period (i.e., among the most temporally distant events). This happens because events towards the beginning of the reference period can only be moved forward. If they are moved backward, they fall outside the reference period and are not reported; thus, only the events which are forward telescoped are reported. In other words, if I went to the doctor 13 months ago, but mistakenly recall it as occurring more recently, only 11 months ago, I will report that visit. On the other hand, if I was at the doctor 11 months ago but mistakenly recall it as occurring 13 months ago, that visit falls outside the requested time period of one year, and hence, will not be reported. Thus, events that I report as having occurred near the beginning of the one year time frame are more likely to be dated erroneously as more recent than they are to be incorrectly more distant. The same is true for events falling towards the end of the reference period (which would be represented by "today" in the case of our example), but in the direction of reverse telescoping. That is, events couldn't have occurred in the future, so if dating error occurs, it will probably be in a backwards direction, reporting the doctors visit as more distant than it actually is. However, the authors point out that since recall accuracy is typically better for more recent events, reverse telescoping as a result of bounding is usually less pronounced.

One way to avoid such occurrences of telescoping is to ask specific questions. Prohaska, Brown, and Belli (1998) found that asking more specific questions resulted in less forward telescoping. Participants were either asked if they had been to the doctor in the past two months, or to estimate the exact date of their last visit to the doctor. Participants who answered the latter, more specific question demonstrated less forward

telescoping. The authors suggest that this finding can be explained by the absence of bounding in the more specific condition, and also suggest that the greater difficulty of the specific question caused participants to engage in a more detailed reconstructive process. In contrast, participants in the less specific condition relied more on a general sense of the elapsed time since the event occurred - in other words, the subjective distance of the event.

Idiosyncratic sources of dating error. Although asking more specific questions may help minimize dating error on a broad level, one must also consider more specific factors that lead to errors in reported dates. On an individual difference level, people demonstrate wide variability in their ability to accurately recall the dates of past events. People who use a calendar frequently, or who are able to specifically date a large number of events (for example an athlete who knows the dates of each of his or her games) are more accurate in their date estimates (Thompson, 1982). Different events may be more or less prone to forward and reverse telescoping as well. Events that are personal, events that are extreme or unusual, and events that are pleasant, tend to be dated more accurately than other events, because memories for these events are more detailed, facilitating a more thorough reconstruction of the event (Betz & Skowronski, 1997). For events that are not remembered as well, on the other hand, it is plausible that participants may rely on the subjective distance of an event, rather than a more detailed reconstructive process, when estimating the objective date of that event, in a manner similar to what they do when they are asked a vague question. In addition, it seems plausible that people may rely on their subjective sense of distance when making date estimates for well-remembered events, if the details of the event memory do not lend themselves well to the

reconstructive process (e.g., a memory that is emotionally vivid but lacking in concrete temporal details).

Memory fluency and systematic dating error. Brown, Rips and Shevell (1985) proposed the *accessibility principle* to explain the telescoping of date estimates for well known and little known events. According to the accessibility principle, the more easily one can recall an event, the more recent that event seems, all else being equal. This would occur because ordinarily one's memory for an event would decay over time, meaning that the most recent events ought to be remembered best. Participants reported a date estimate for several high and low knowledge news events, including the assassination attempt on Ronald Reagan (a well known event) and the assassination attempt on the Pope (a lesser known event). Although the attempt on the Pope's life was the more recent of the two events, it was the lesser known to the American participants, and was reported as having occurred earlier than the Reagan assassination attempt. Brown et al. attributed this dating bias to greater memory clarity for the Reagan event. Intuitively, one would expect that clearer memories would be more likely to feel "just like yesterday", since events from yesterday would ordinarily be remembered most clearly. Thus, it may be that the forward telescoping of the Reagan assassination attempt occurred because that event felt subjectively more recent than the attempt on the Pope's life.

An alternative view. Thompson, Skowronski and Lee (1988) offer a different psychological explanation for forward telescoping. In their study, participants recorded unique personal events in a diary for 12 weeks and were then subsequently asked to estimate the dates of those events. Participants gave both date estimates and memory

ratings for the diary events. The authors found no difference in reported memory quality for events that were telescoped and events that were not. Instead they propose that telescoping occurred as a result of an implicit strategy where people use an estimate of the number of intervening events to determine when a target event occurred. According to this explanation people use the number of events that have occurred since the target event to determine how long ago the event occurred. However, because there is a tendency for memory to decline over time, people begin to forget some of the intervening events, which leads them to believe that fewer intervening events have occurred. As a result, forward telescoping occurs for the resulting date estimates.

The contrast between the findings of these two studies may be due to the different types of events used. Brown et al. used national and international news events that were naturally very memorable, at least to some people. On the other hand, the events used by Thompson et al., were events from the participants' daily lives, many of which were probably not particularly memorable. In addition, all of the events that were used by Thompson et al. had occurred within a span of a few months. It is quite possible that all of the events were remembered fairly well, and consequently, none stood out as being more memorable in a way that would make them seem more recent.

Finally, in both studies, participants were being asked to report the actual date of the events, not how subjectively close those events felt, hence both studies are only peripherally related to the primary current research question. Participants in the Thompson et al. study had a blank calendar to aid in reconstructing when each event occurred, and all of their events were personal events for which they ought to be highly knowledgeable. Under these conditions it is unlikely that participants would need to turn

to the subjective distance of the events to generate objective date estimates. In contrast, participants in the Brown et al. study were being asked to date events for which they might have very few accessible temporal cues, making it far more likely that they would rely on the subjective distance of the events when generating an objective date estimate. The phenomenon of forward telescoping in people's objective date estimates is a complex one. In the present paper we hope to remove one of the unknown elements from the puzzle by determining some of the antecedents of subjective temporal distance.

Memory Quality

Most consistent with Brown et al. (1985), memory quality is proposed here as the primary factor leading to variation in the subjective temporal distance of past events. McTeer and Wilson (1993) found a strong positive correlation between memory quality for the events and the reported subjective recency of eight different news events. The authors asked people to indicate how recent or distant eight different major news events felt (e.g., the O.J. Simpson verdict, the death of Princess Dianna). They found that across individuals there was considerable variation in how recent the events felt. These ratings of how recent or distant the events felt were closely related to memory quality, but not to the chronological order of the events.

The construct of memory quality is only loosely defined throughout this paper, a circumstance that is both theoretically and methodologically necessary. Theoretically, we feel that memory quality is best understood as a multifaceted and dynamic entity. One's sense of the quality of a given memory is probably based on a collection of cues. These cues would include, for example: the vividness of the memory, how detailed the memory is, both in terms of the minutiae and overall volume, and the ease with which the

memory is retrieved. The influence that each of these cues has on the overall sense of "memory quality" likely depends on the event being remembered. For a highly emotional personal event such as a car accident, for example, memory vividness may account for the sense of memory quality for that event. In contrast, for an event such as navigating the trip to a friend's cottage for the first time, memory quality may be driven by the amount of detail remembered – in this case, directions and landmarks.

From a practical, procedural, point of view, each participant is also likely to make their own idiosyncratic interpretation of what a given memory quality measure item is asking (as is the case with any self report measures). For example, interpretation of the word vividness is likely to vary from person to person, with one person taking it to mean the emotional quality of the memory and another viewing it as the amount of detail or visual imagery associated with the memory. Thus, we have chosen to cast a wide net and included several different measures of memory quality in the following studies.

In this paper we investigate the relation between memory quality and perceptions of the subjective temporal distance of past events. We propose that the quality of a person's memory for a past event will significantly impact the perceived subjective temporal distance of that event, such that events that are better remembered will tend to feel more recent than more poorly remembered events. In Study 1 we tested for a correlational link between the two constructs. In Studies 2 and 3, we wished to establish a causal relation between memory quality and subjective temporal distance. In Study 2 we attempted to manipulate participants' perceptions of their own memory quality for past personal events, in order to alter their perceptions of the subjective temporal distance of those events. In Study 3 we manipulated participants' memories for a past news event.

Participants were primed with details about the event to "refresh" their memories for the event, which should lead the event to feel more recent.

Study 1

Overview

In study 1 we investigated the relation between people's memory quality for past events and their feelings of subjective distance from those past events. We expected to replicate past research that has demonstrated a correlational link between memory quality and subjective temporal distance, such that better memory quality is associated with more recent subjective estimates.

Method

Participants. Participants in the study were 37 first year students at Wilfrid Laurier University (31 females, 6 males). Participant's ages ranged from 18 to 19 years. The data from one of the female participants was excluded from the analyses because it was incomplete.

Procedure. Participants completed a pencil and paper survey in which they were asked to recall, and list details about, several past events. For this study we used events that we believed most undergraduate students would have experienced. The events/time periods consisted of: The first year of high school; their high school prom; July 1 (Canada Day) 2003; the first week of classes of the current term. The actual elapsed time since these events occurred ranged from up to five years (for the first week of ninth grade) to roughly six weeks (for the first week of classes of that term). The events were presented in one of four counterbalanced orders and participants were randomly assigned

to one of the counterbalance conditions. For each event, participants were asked to think back to the event, and list as many details as they could easily remember. In order to evaluate memory quality, participants were asked to rate how well they remembered the event, how vividly they remembered the event, and the amount of detail they remembered about the event using seven point Likert scales (1 = poor memory quality, 7 = good memory quality). To measure perceived subjective distance, we used a subjective distance scale from McTeer and Wilson, (2003). Participants rated how subjectively close or distant the events felt, by placing a slash through two 152mm time lines. The first timeline was anchored by the labels "feels very close" and "feels very distant" and the second was anchored by "feels like yesterday" and "feels like a long time ago". Thus, lower scores on the subjective distance measures indicate that the event feels more recent (see Appendix A for complete questionnaire). We therefore expect negative correlations between our memory quality variables and the subjective distance measure, such that better remembered events feel more recent.

Results

For each of the events, we tested the correlation between the aggregated score of the two subjective distance measures (Chronbach's α ranged α =.91 to α = .97) and the aggregated score of the three memory quality variables (Chronbach's α ranged α =.72 to α = .96). The aggregated correlations were all significant, indicating that better memory quality was associated with more recent subjective distance estimates (see Table 1).

Table 1

Correlations Between Subjective Event Distance and Memory Quality Measures for Four Target Events

	How Vividly Remembered	How Well Remembered	Detail Remembered	Aggregated Correlation
Ninth Grade	-.47**	-.71**	-.57**	-.69**
Prom	-.30	-.60**	-.51**	-.55**
Canada Day	-.83**	-.83**	-.79**	-.84**
First week of class	-.22†	-.54**	-.56**	-.49**

Note. ** indicates significance at the $p<.01$ level, † indicates marginal significance. Aggregated correlations are controlling for actual elapsed time. The n for all correlations is 36.

For each of the events, we also tested the correlation between the aggregated score of the subjective distance measures and each of the individual memory quality variables: how well the event is remembered; how vividly the event is remembered, and how much detail is remembered about the event. For the events "first year of high school" and "July 1 (Canada Day) 2003", all three of the memory quality variables were significantly negatively correlated with the subjective distance of the events, such that better memory quality was associated with more recent subjective distance estimates. For the events "high school prom" and "first week of classes of the current term", subjective distance estimates were significantly negatively correlated with how well the events were remembered and the amount of detail remembered about the events, such that better

memory quality was associated with more recent subjective distance estimates. However, for those two events, subjective distance estimates were not significantly related to reported memory vividness.

It should be noted that the actual date of our target events was not fixed for all four events. The actual date of the first week of classes and July 1 was the same for all participants. The date of the prom would have had some variability, however it usually occurs in the spring preceding entrance to university, and given the ages of the participants it is unlikely that any of them had taken a year off between completing high school and starting University. The first year of ninth grade, however, was potentially subject to considerable variability. Because of changes to the structure of the high school system in Ontario, some students entering university had completed five years of high school, while others had completed only four. To control for this we asked participants to indicate the number of years that had elapsed since they started ninth grade. When we conducted the correlational analysis between subjective time and the aggregated memory quality variables, controlling for elapsed time had no effect on the strength of the correlation.

We also examined the data across events to assess the relation between mean subjective distance, mean memory quality and the chronological order of the events. The chronological order of the events was as follows: First year of high school would have been the most chronologically distant at between four and five years prior to testing (coded as 1 for chronological order correlations). The prom would likely have been the next oldest, occurring roughly four months prior to testing, some time in June (coded as 2). July first would have occurred very shortly after, or possibly just before the Prom,

again roughly four months prior to testing (also coded as 2). The first week of class was the most recent event, occurring less than a month prior to testing (coded as 3).

There was a moderate (non-significant) correlation between chronological order and subjective distance, $r(3) = -.59, p = .41$, suggesting that events that were in fact chronologically more recent did feel somewhat closer in time. More important, there was a very strong (though non-significant) correlation between subjective distance and memory quality, $r(3) = -.83, p = .17$, which was not reduced when chronological order was controlled, partial $r(2) = -.94, p = .22$, suggesting that chronological order could not account for the order of subjective ratings. Finally, the correlation between chronological order and memory quality, $r(3) = .13, p = .87$, was negligible, suggesting that memory quality was not meaningfully affected by the chronological order of the events in this study.

We conducted a within subjects ANOVA on the subjective distance scores for the four target events/time periods. We found a significant effect of the target event on the reported subjective distance scores, $F(3,105) = 10.33, p<.01$. Paired sample t tests revealed that the prom and the first week of school of the current term felt significantly more recent than ninth grade and July 1, 2003 (see Table 2 for means). These findings suggest that the actual elapsed time since an event occurred cannot account for people's reports of how subjectively recent or distant those events feel. That is, people do not necessarily feel that an event is subjectively more distant simply because it happened longer ago. In fact, the prom, which would have occurred roughly four months prior to testing felt just as close as the first week of university (less than a month prior to testing),

and significantly closer than July 1, 2003 which would have occurred at almost the same time as the prom, roughly four months prior to testing.

Table 2

Means for Subjective Time and Memory Scores by Event.

Events	Subjective Time Rating	Self-Reported Memory Quality	Number of Events Listed
Ninth Grade	96.82_a	3.50_a	5.86_a
	(38.10)	(1.14)	(3.04)
Prom	61.05_b	5.51_b	8.75_b
	(31.96)	(1.03)	(2.67)
Canada Day	92.67_a	3.75_a	5.36_a
	(34.06)	(1.80)	(3.26)
First week of class	72.26_b	3.79_a	6.28_a
	(32.63)	(1.29)	(3.13)

Note. Different subscripts within a column indicate significant differences between means. Standard deviations are in parentheses.

We also conducted a within subjects ANOVA on participants' self-reported memory quality scores. We found a significant effect of target event on memory quality score, $F(3,105) = 17.45$, $p<.01$ Paired sample t tests revealed that participants reported significantly better memory quality for the prom than for the other three events (see Table 2 for means). Hence, the event that was most notably more recent than its chronological

order was also the event which felt more vivid, reinforcing the connection between these two constructs.

In addition to the self report measure of memory quality, we used the number of details that participants were able to list from the target event as an indicator of memory quality. We conducted a within subjects ANOVA on the number of details reported for each target event. We found a significant effect of target event on the number of details reported, $F(3,105) = 17.18, p < .01$. Paired samples t tests indicated that participants listed significantly more details for the prom than for the other three events (see Table 2 for means). Consistent with the results of the self reported memory quality ANOVA above, this would seem to suggest that memory quality was highest for the prom.

Discussion

As predicted, the results of Study 1 replicated past research, demonstrating a correlational link between memory quality and subjective temporal distance, such that better remembered events tend to feel more subjectively recent than more poorly remembered events.

The proposed explanation for these findings is that events which are *actually* more distant, tend to feel more distant than more recent events, and are not remembered as well as more recent events. In other words, actual elapsed time could be a third variable, driving the relation between memory quality and subjective distance. The fact that the events July first and the first week of classes were fixed in time makes this an unlikely explanation, at least for those two events, because variation in memory quality and subjective time can't be driven by variation in actual time for these events since there is no such variation when the events are fixed in time.

In addition, an examination of the actual chronological order of the events and the subjective distance scores for the events indicates that these findings cannot be accounted for simply by the chronology of the events. The perceived subjective distance of the events did not necessarily correspond with the elapsed time since the events occurred. Subjective distance ratings for ninth grade and the first week of class were relatively consistent with how long ago they had actually occurred, however, the ratings for July 1, 2003 and the prom were not. Subjective distance ratings for the prom, which would likely have occurred before July first, were not significantly different from the ratings for the first week of class. In fact, the prom was actually rated as feeling more recent than the first week of class, though not significantly. In contrast, ratings for July 1, 2003 did not differ significantly from those for ninth grade, in spite of a difference of several years in actual elapsed time. Similarly, the actual elapsed time since the events occurred did not predict either self-reported memory quality, or the number of details participants reported for the events. Rather, the prom was remembered significantly better than any of the other events. Not all that surprising was the finding that memory quality ratings for the first week of class are quite low, in spite of the fact that participants rated that event as feeling recent. It may be that participants simply rated the event as feeling recent because they knew it actually was recent, rather than because it was well remembered and felt recent. Taken together, the findings of Study 1 suggest that there is a meaningful link between memory quality and perceived subjective distance, independent of actual elapsed time. The correlation between memory quality and subjective distance was particularly strong for the event July 1, 2003. A plausible explanation for this finding comes from a perusal of people's open-ended event descriptions: For many people July 1 did not appear

to be an exceptional day. These people reported low memory quality and presumably also regarded the day to be quite subjectively remote. However, for individuals who actually celebrated July 1, 2003 in a unique or notable way, memory quality would be significantly higher, and presumably be linked to feelings of closeness. In support of this speculation, the standard deviation for Canada Day's memory quality was higher than for any other event. In other words, the larger variation in memory quality for this event is thought to contribute to the strength of the correlations.

One unexpected finding was that vividness and subjective distance were not significantly related for the events "high school prom" and "first week of classes of the current term". For the "prom" event, this could possibly be a case of psychological ceiling effects, as the prom seemed to be a very vivid memory for most people ($M = 5.08$, $SD = 1.65$) on a seven point scale, where higher numbers indicate more vivid memories. This same finding for "the first week of classes", on the other hand, defies any simple explanation.

More important than the failure to find a significant relation between vividness and subjective distance for these two events, however, is the finding that for the other two memory quality variables (how easily remembered, how well remembered) the predicted pattern is present. The inconsistencies in the findings of the present study, therefore, might attest to the rich and multifaceted nature of the memory quality construct. Since untangling the complexities of memory quality is beyond the scope of the present study, the findings of Study 1 support our decision to use multiple measures of memory quality.

Study 2

Event Knowledge as a Temporal Index

A plausible theoretical explanation for the link between memory quality and subjective distance is that memory quality may act as a sort of index for sorting past events into a rough temporal order. This is a similar rationale to that proposed by Brown et al. (1985) to explain their *accessibility principle*. Since memory quality tends to decline over time, more recent events should, on average, be remembered better than more distant events. As a result, people may use memory quality to derive a subjective sense of how recent a past event feels. Most of the time this heuristic ought to be fairly reliable; however, if an event is remembered unusually well, it would feel subjectively more recent than it ought to based on chronology alone.

The notion of monitoring one's own cognitive processing of a target stimulus in order to assess some quality of that target is not a novel one. For example, there is evidence that people implicitly judge the familiarity of a stimulus by the fluency with which it is perceived (Kelly & Jacoby, 1998). In other words, if someone were to look at a picture of a horse, the easier it is to identify that picture as a horse, the more familiar it will feel. This occurs because things we have seen before (things that ought to be familiar) are easier to perceive than those we are seeing for the first time. In a similar – though more overt – vein, people commonly use the availability heuristic when estimating the probability of an event, basing their judgments on the accessibility of examples in memory (Tversky & Kahneman, 1974). For example, if I can recall seeing 25 red Miatas driving around, and only one green one, I will conclude that most Miatas are probably red. In a similar manner, people may monitor their own memory quality for

a past event when assessing how recent or distant that event feels. In order to test this proposed causal relation between memory quality and subjective distance it is necessary to manipulate memory quality.

Overview

In Study 2 (a and b) we attempted to manipulate participants' *perceived* memory quality for past time periods. In other words, we hoped to alter the way the participants viewed their own memory quality for a target event, rather than actually manipulating the true quality of the memory. Manipulating perceived memory quality has the advantage of allowing us to use the personal experiences from study one as the target events, but differs slightly from manipulating actual memory quality, which would require us to manipulate things like a participant's actual knowledge of an event, or how vividly they can actually recall the event. Because we are using naturally occurring, personal events, we have no way of manipulating the participants' actual memory quality, which would entail, for example, priming them with details of the event. Since we don't have any information about the target events a manipulation of actual memory quality is not possible.

The perceived memory quality manipulation procedure is intended to make people feel that they have either a good memory or a poor memory for a past time period, based on the ease with which they are able to retrieve details about that time period. In past research (Winkielman, Schwarz, & Belli, 1998) the difficulty of a memory task in which people recall events from their childhood has been shown to affect how well people believe they remember their early childhood. Participants were asked to recall either a large number of events (12) which they found quite difficult, or a small number

of events (4) which was quite easy. Participants were asked to briefly describe either these 4 or 12 events from their early childhood. They then indicated whether they believed there were large gaps in their memory of early childhood by selecting either a "yes", "no" or "maybe" response. As a manipulation check participants rated the difficulty of the event recall task using a Likert scale ranging from "very easy" to "very difficult". Participants who completed a difficult memory task, recalling 12 events from their childhood, actually reported *poorer* memory ratings for that time period than participants who completed an easy memory task and reported only 4 events. This occurred in spite of the fact that the participants in the difficult condition actually remembered more events than those in the easy condition.

In Study 2 we used the procedure from Winkielman et al. (1998) to attempt to alter people's perceptions of their memory for more recent time periods. The time periods we chose to use were the two events from study one that demonstrated the strongest link between memory quality and subjective distance: Ninth grade and July 1, 2003. In Study 2a we asked participants to recall events from the first week of ninth grade. This differs slightly from Study 1, where we asked participants to recall events from the first year of ninth grade. In Study 2 we reduced the time frame to only the first week of ninth grade because most literature on dating past events deals with single events, occurring on one specific day. We reasoned that while a span of one week is not directly comparable to a single day, it is considerably closer than a span of one year.

In Study 2b we asked participants to recall events from July 1 (Canada Day) 2003, which was also one of the target events in Study 1. In both studies a and b participants were assigned to either an easy condition in which they were asked to recall a

small number of events/details from the target time period, or to a hard condition in which they were asked to recall a large number of events/details from the target time period. We hypothesized that participants in the easy conditions would feel that they remembered the target event better than those in the hard conditions, and thus, would rate the target time period as feeling subjectively more recent than participants in the hard conditions.

Study 2a

Method

Participants. Participants in the study were 54 undergraduate students at Wilfrid Laurier University. Data from three participants was excluded from the analyses because they were over the age of 20, which was the age limit we chose to control the amount of variance in the elapsed time since the target event. Participants included in the analysis (43 females, 7 males) ranged in age from 17 to 20 ($M = 18.38$).

Procedure. Participants completed a pencil and paper questionnaire in which they were asked to recall and list details about the first week of ninth grade. Participants were randomly assigned to one of two experimental conditions. In the easy condition participants were asked to list four events from the target time period and in the hard condition participants were asked to list 12 events. Participants then completed two measures of perceived memory quality taken from Winkielman et al. (1998). For the first measure participants chose either a "yes", "no", or "maybe" response to the question of whether there were large gaps in their memory of the time period. For the second measure, participants were asked to rate how difficult the event recalling task was, using a seven-point Likert-scale, ranging from very easy (1) to very difficult (7). Participants

then reported how subjectively recent the first week of ninth grade felt, using the two item subjective distance scale described in Study 1 ($\alpha = .82$). To assess participants' memory quality, we asked participants to rate how well they remembered the first week of ninth grade, how vividly they remembered the first week of ninth grade, and how much detail they remembered about ninth grade using seven-point Likert scales (1 = poor memory quality, 7 = good memory quality). These scores were aggregated for our analyses ($\alpha = .90$). Participants also indicated their age, gender, and the number of years that had elapsed since ninth grade (see Appendix B for complete questionnaire).

Results

As a manipulation check, we conducted a one way ANOVA to test the effect of the experimental condition on perceived difficulty of the event recalling task. We did not find a significant effect, $F(1,48) = .22, p = ns.$

As a further manipulation check, we conducted a one way ANOVA to test the effect of the experimental condition on reported memory quality. We did not find a significant effect, $F(1,48) = 1.70, p = .20$

We conducted a one way ANOVA to test the effect of perceived memory quality on the reported subjective distance of the target event. We did not find a significant effect of the experimental condition on subjective distance scores, $F(1,48) = .10, p = ns.$ The reported subjective distance of the first week of ninth grade did not differ significantly between participants in the difficult condition ($M = 88.44$, $SD = 32.09$) and those in the easy condition ($M = 85.63$, $SD = 29.39$)[1].

[1] When elapsed time since starting ninth grade was included as a covariate in the ANOVAs it was not significant, and did not change the pattern of the results.

Since the manipulation did not appear to have been successful, we examined the correlation between reported task difficulty and the subjective distance of the event collapsed across conditions, controlling for actual elapsed time since the target event occurred. There was a significant relation, such that the more difficult participants found the event recalling task, the more subjectively distant they rated the target event, controlling for actual elapsed time, partial $r(49)= .50, p <.01$.

We also examined the relation between subjective time and memory quality (the aggregated memory quality scales) controlling for actual elapsed time. As in study 1, we found a significant relation such that better memory quality was associated with more recent subjective estimates, partial $r(49) = -.39, p <.01$.

Finally, we examined the relation between reported task difficulty and reported memory quality. We found a significant relation, such that less task difficulty was associated with greater reported memory quality, $r(49) = -.65, p <.01$.

Study 2b

Method

Participants. Participants in the study were 40 undergraduate students at Wilfrid Laurier University. Data from one participant was excluded from the analyses because that person was over the age of 20. Participants included in the analysis (33 females, 6 males) ranged from 17 to 20 years of age ($M = 18.74$).

Procedure. The procedure for Study 2b was essentially the same as the previous study. In Study 2b participants were asked to recall events from July 1 (Canada Day) 2003. In this study, participants in the hard condition were asked to recall 12 events from

the target time period. In the easy condition, however, participants were only asked to recall 3. We hoped that by reducing the number we might strengthen the effect of the manipulation. In Study 2b we also used slightly more specific instructions for reporting events. We clarified that each of the events that the participants reported should be events that they specifically remember, rather than scripted events that they know must have occurred. We also asked that the events be distinct and non-overlapping, for example, if driving to school was one of the events listed, they should not list, as other events, things that occurred during the drive. Following the event recalling task participants were asked to respond to the two task difficulty questions described above, as well as the two item subjective distance measure used in study 2a (α = .86). In addition, in the present study we asked participants to report how well they remembered the event, how vividly they remembered the event and how much detail they remembered about the event, all using seven point Likert scales (1 = poor memory quality, 7 = good memory quality) (see Appendix C for complete questionnaire).

Results

As a manipulation check, we conducted a one way ANOVA to test the effect of the experimental condition on perceived difficulty of the event recalling task. We did not find a significant effect, $F(1,37) = 1.38, p = .25$.

As a further manipulation check, we conducted a one way ANOVA to test the effect of the experimental condition on reported memory quality. We did not find a significant effect, $F(1,37) = .42, p = n.s.$

We conducted a one way ANOVA to test the effect of perceived memory quality on the reported subjective distance of the target event. We did not find a significant

effect of the experimental condition on subjective distance scores, $F(1,37) = .24, p = ns.$ The reported subjective distance of July 1 did not differ significantly between participants in the difficult condition ($M = 81.86$, $SD = 33.75$) and those in the easy condition ($M = 86.82$, $SD = 27.91$).

As in study 2a, we examined the correlation between reported task difficulty and the subjective distance of the event. There was a significant relation, such that the more difficult participants found the task, the more subjectively distant they rated the target event, $r(37) = .50, p < .01$.

We also examined the relation between subjective time and memory quality (the aggregated memory quality measures, $\alpha = .93$). As expected, we found a significant relation such that better memory quality was associated with more recent subjective estimates, $r(37) = -.61, p < .01$.

Finally, we examined the relation between reported task difficulty and reported memory quality. We found a significant relation, such that less task difficulty was associated with greater reported memory quality, $r(37) = -.89, p < .01$.

Discussion

Contrary to our predictions, the perceived memory quality manipulation did not have a significant effect on participants' subjective distance ratings for the target event in either Study 2a or 2b. We found a negative relation between task difficulty and reported memory quality; however, in both studies the manipulation check revealed that the manipulation was unsuccessful in affecting the participants' perceptions of either task difficulty or memory quality, which would account for our null findings. It seems that the manipulation was not strong enough to overcome people's sense of the actual quality

of their memories for the target events. Considerable variability was present in both memory quality scores (scores ranged from 1 to 6.3 on a seven point scale) and task difficulty ratings (scores ranged from 1 to 7 on a seven point scale), however the manipulation did not have a large enough effect on the direction of this variation. It seems that some people just remembered the target time period much better than others. While we were not able to identify a causal relation in either of these studies, the correlational analyses assessing the relation between memory quality and subjective distance indicated that better memory quality for an event is associated with that event feeling more recent, providing further support for the link between these two variables.

One reason that the perceived memory quality manipulation failed to work in our studies, despite having worked in past research, may be the target time period. The manipulation has been used successfully to manipulate people's perceptions of their memories for early childhood (Winkielman et al., 1998; Belli, Winkielman, Read, Schwarz, & Lynn, 1998). In contrast, our target time periods were much shorter in duration and much more recent. It seems quite possible that the manipulation is simply not strong enough for these more recent and specific time periods.

Study 3

Overview of Study Three

In study three we attempted to manipulate participants' actual memory quality by enhancing their memories for a target event. This is a different approach than the one we used in Study 2a and b, where we simply tried to manipulate participants' perceptions of their memory quality, without affecting the actual memory quality. Also, instead of using personal experiences as the target event, we used a news event: the Columbia shuttle

disaster. News events have a disadvantage relative to personal experiences because some participants may not have been aware of them, or may confuse them with other events. On the other hand, by using a news event as the target event, we control the event itself, so that, in contrast to a personal event, everyone at least had the potential to share the same experience of the event. Moreover, using news events give us access to the details of the event, which allows us to use those details to manipulate participants' memory quality for the event, something we were unable to do when using idiosyncratic personal events.

Manipulating memory quality. In order to manipulate memory quality in the present study, we decided to "refresh" the memories of some of our participants. Our hope was that by providing participants with a reminder of some of the details of the event, we could boost their memory quality. Some participants were given information about the target event to refresh their memories, while other participants were not. We hypothesized that individuals with high memory quality would rate the target event as feeling subjectively more recent than participants with low memory quality.

Informational diagnosticity and objective dating error. Another benefit of using a news event as our target event is that we were able to assess the accuracy of participants' estimates of the actual date of the event. As a secondary research question, we investigated the effects of the memory quality manipulation on participants' objective date estimates. We decided to vary the type of information we gave to the participants because we hoped to assess the effects of the diagnosticity of the information (how useful the information is for determining the actual date of the event) on the accuracy of participants' objective date estimates. We expected that giving participants more

diagnostic information would result in more accurate objective date estimates. In contrast, we believed that giving people information that did not help them to reconstruct the event would have no effect, or could even lead to less accurate objective date estimates if the information made the event feel more recent than it was but did not assist in reconstructing when it actually occurred. We were interested in this question because one of the reasons for looking at the memory quality/subjective distance link was the potential influence it could have on forward telescoping of objective date estimates.

To manipulate diagnosticity, the high memory quality manipulation was broken down into three "information-type" conditions in which we varied the type of information provided. The high memory quality group consisted of an abstract, middle, and concrete condition. The groups were intended to vary the amount of information provided that would serve a diagnostic function – that is, that would provide participants with cues to help them determine the correct date of the event. In the *abstract* condition, no factual details about the incident were provided, so the information did not give any indication of the actual date of the event. Participants were only given information about the emotional reactions that occurred in response to the target event (e.g. "Throughout the United States and elsewhere, flags were flown at half mast in recognition of the tragedy."). In the *middle* condition participants were given factual information about the incident (e.g. "The shuttle was traveling at around 22,000 km/h when it broke up.") but none that provided clues about when the event occurred. In the *concrete* condition participants were given factual details (e.g. "It occurred in the winter time.") that could be useful for reconstructing the actual date of the event. In all three groups, the information provided was intended to feel like remembered information rather than newly learned information.

In the low memory quality condition (control) the participants were not provided with any information about the event, hence they could only draw upon the memory for the event that they had prior to the study. We expected that participants in the control condition would probably make less accurate objective date estimates than those in the concrete condition. Since the middle condition and abstract condition did not provide participants with specific information to help participants date the event, we believed that there was the potential for participants in those conditions to make less accurate objective time estimates because the memory manipulation may have made the event feel more recent than it actually was.[2]

While participants in the experimental conditions read the information about the Columbia shuttle disaster, participants in the control condition were given information about Rudolph the red nosed reindeer (neutral information) to read.

Informational diagnosticity and subjective time. While we did not have any specific predictions about the effect of varying the type of information on how recent or distant the event would feel, we did feel that the different types of refreshing information might lead to different levels of memory quality and thus, different estimates of subjective time. The middle condition contained information that we felt was most likely to be familiar to participants. For the middle condition we tried to include information about the event that was most frequently reported at the time of the event. Consequently, we expected that this condition should enhance participants' memories and cause the event to feel more recent. The abstract condition contained more emotional information,

[2] Not all of the high memory quality conditions contain the same amount of information. The abstract and the middle conditions both have eight pieces of information, while the concrete condition has 12. This was necessary because we wanted the concrete condition to include all the vivid information from the middle condition as well as specific concrete details that would help to temporally locate the event.

which could refresh participants' memories if the event was emotional for them, however, the fact that the information included in the abstract condition dealt more with the aftermath of the event, and reactions to the event than the event itself, and the lack of specific details about the event in that condition may have also made it *less* effective for enhancing memory quality. In the concrete condition, participants were provided with the same information as participants in the middle condition, which we believed should serve to refresh participants' memories of the event. In addition, however, the concrete condition included more specific details. Expectations for this condition were unclear: On the one hand, it seemed likely that these additional details would help to refresh participants' memories, but on the other hand, by including that much specific information we also ran the risk that this condition would include a larger proportion of unfamiliar information that would feel like it was newly learned information rather than remembered information.

Naturally occurring memory quality. Given our expectation that increasing a person's memory quality would lead the event to feel more recent, we were also interested in factors that might lead to greater memory quality in everyday life. To investigate this, we included measures that might contribute to how well an event is remembered over time: how personally important the event is/was to the participant, and the extent to which they have thought about or discussed the event since it occurred (exposure). It seems plausible that people may have better memory for events that they consider important, as they likely were more attentive to such events. Similarly, frequent exposure, either in the form of media coverage, conversations or simply being reminded of the event, could lead to a more detailed memory for a given event. For example,

Kogura, Hatta, Kawakami, Kawaguchi and Makino (2001) found that when asked about past news events, participants were better able to recall proper names, and were more accurate in their objective date estimates, for events that they felt had been given frequent exposure by the media.

Method

Participants. Participants in the study were 80 undergraduate students at Wilfrid Laurier University. Data from six participants were excluded from the analyses because they were incomplete.

Procedure. As a cover story, participants were invited to participate in a study on *informational familiarity*, which was vaguely described as the informational equivalent to recognizing a familiar face. The participants were told that in the study they would be rating the familiarity of various pieces of information that are generally common knowledge. The study used a questionnaire design in which participants were first given a paragraph to read. The paragraph was either information about the Columbia shuttle disaster (high knowledge conditions), or a filler paragraph of neutral information about Rudolph the red nosed reindeer (low knowledge condition). At the bottom of the page participants in both conditions were asked to rate how "familiar" the information seemed to them. This served the dual purpose of supporting the cover story and, in the high knowledge condition, determining roughly how much of the information the participants felt was new (i.e., was never known in the first place). We were interested in this because newly learned information may have a different effect (or no effect) on feelings of subjective temporal distance compared to information that the participants learned at the time of the event, forgot, and were then reminded about during the study, especially

since participants had only a few minutes following the manipulation to incorporate the information into their schema for the event. In order to give the information some time to be absorbed, participants then completed a brief filler task that also reinforced the cover story. The filler task consisted of reading information about various film roles that Tom Cruise has played, and rating the familiarity of that information. Next, participants were asked to write out as many distinct details about the target event as they could remember (for participants in the low knowledge condition this was described as a new section, whereas for participants in the high knowledge condition it was simply described as a continuation of the topic). At the bottom of the page, participants were asked to read their own list of information and rate the familiarity of the information they provided in order to keep the procedure consistent. This section served as a manipulation check, with the number of items listed acting as a measure of memory quality. The responses were transcribed and coded into two categories: information that was provided in the manipulation or information that was generated by the participants themselves. In the next section participants answered a series of questions about the target event, including the main dependent variable: The subjective temporal distance of the event. Subjective distance was measured using the same two item measure as in Studies 1 and 2. To assess memory quality, participants rated how much detail they remembered about the event and how vividly they recalled it, using seven point Likert scales (1 = poor memory quality, 7 = good memory quality). In addition, participants rated two variables that may influence naturally occurring memory quality: the importance of the target event, and how much they have thought about or discussed the target event since it occurred (exposure). With the exception of the subjective distance measure, all ratings used a seven-point Likert

scale. Participants were also asked to give an estimation of the actual date of the event, allowing us to test whether or not the knowledge manipulation, or the different diagnosticity levels described earlier, had an effect on people's objective date estimates (see Appendix D for complete questionnaire).

Results

Manipulation check. To determine if we were successful in manipulating memory quality we conducted a one way ANOVA to test for an effect of the memory quality manipulation on the aggregated memory quality measures ($\alpha = .78$). We found a significant effect of the manipulation on memory quality, $F(3,70) = 2.94$, $p = .04$. Post hoc analysis of the group means revealed that only the middle condition ($M = 3.83$, $SD = .99$) and the control condition ($M = 2.56$, $SD = 1.61$) differed significantly. The abstract condition ($M = 2.86$, $SD = 1.41$) and the concrete condition ($M = 2.81$, $SD = 1.45$) did not differ significantly from any of the conditions (see Table 3).

Table 3

Means for Main Study 3 Dependent Measures, Broken Down by Experimental Condition.

	Abstract	Middle	Concrete	Control
Memory quality	2.86_{ab}	3.83_{a}	2.81_{ab}	2.56_{b}
	(1.41)	(.99)	(1.45)	(1.61)
Event details	3.79_{bc}	5.71_{a}	5.50_{ab}	3.11_{c}
	(1.93)	(1.59)	(2.48)	(2.32)
Familiarity	4.33_{b}	5.05_{a}	4.11_{b}	N/A
	(1.28)	(1.32)	(1.88)	
Subjective distance	104.53_{ab}	93.35_{a}	108.11_{ab}	121.53_{b}
	(28.98)	(27.25)	(19.46)	(24.69)

Note. Different subscripts within a row indicate significant differences between means Standard deviations are in parentheses.

Event details. As an additional measure of memory quality, participants listed as many details about the target event as they could remember. We expected that participants in the high memory quality conditions would be able to list more information than participants in the low memory quality control condition. However, this measure is confounded by the fact that participants in the concrete condition were given more information than participants in the other conditions, so interpreting the data must be done cautiously. We conducted an ANOVA testing the effect of manipulation condition on number of events listed. We found that the manipulation condition had a significant

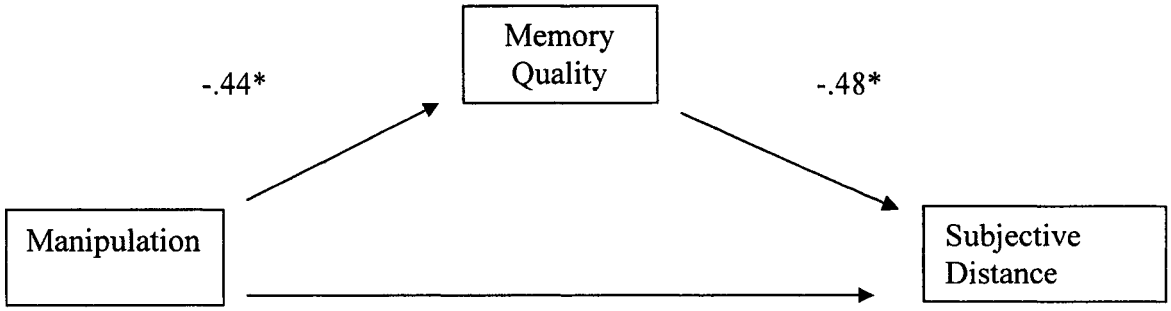
effect, $F(3,70) = 7.06$, $p < .01$. Post-hoc analyses shows that the middle condition ($M = 5.71$, $SD = 1.59$) differed from control ($M = 3.11$, $SD = 2.32$) and abstract conditions ($M = 3.79$, $SD = 1.93$), but did not differ significantly from the concrete condition ($M = 5.50$, $SD = 2.48$). These findings do not necessarily mean that the concrete condition was as effective at refreshing memories as the middle condition, since participants in the concrete condition were given more information during the manipulation. It is also interesting that while participants in the concrete condition were able to report as many events as those in the middle condition, their self reported memory quality scores were not as high as those in the middle condition (see Table 3).

Familiarity. The success of our manipulation was contingent on providing people with information to which they had already been exposed, thereby "refreshing" their memories for the event, rather than giving them new information. For the abstract and concrete conditions in particular, we were forced to include more obscure information in order to control the type of information being provided. We used the familiarity ratings of the information on the Columbia disaster as an indicator of whether the information provided was new or old. For the three high memory quality conditions, we conducted a one way ANOVA testing the effects of the experimental condition on participants' familiarity ratings of the Columbia information. The analysis did not reveal a significant effect of the manipulation condition on the familiarity ratings, $F(2,53) = 2.03$, $p = .14$. However, among the experimental conditions, a planned contrast of the middle condition ($M = 5.05$, $SD = 1.32$) vs. the abstract condition ($M = 4.33$, $SD = 1.28$) and concrete condition ($M = 4.11$, $SD = 1.88$) revealed a significant difference, $p = .05$ (see Table 3).

Primary research question. We conducted a one way ANOVA to test for an effect of the knowledge manipulation on the aggregated temporal distance score (α =.84). We found a significant effect of the manipulation, $F(3,70) = 3.95$, $p = .01$. Planned contrasts revealed that the mean for the low memory quality control condition differed significantly from the means of the high memory quality experimental conditions, $p < .01$. However, post-hoc analyses indicated that only the middle condition ($M = 93.35$, $SD = 27.25$) and the control condition ($M = 121.53$, $SD = 24.69$) were significantly different. The abstract condition ($M = 104.53$, $SD = 28.98$) and the concrete condition ($M = 108.11$, $SD = 19.46$) did not differ significantly from any other conditions. Given these results it seems likely that the concrete and abstract manipulation conditions were not effective, possibly because they were experienced by participants as providing primarily new information rather than refreshing participants' memories (see Table 3).

Mediation. We tested the hypothesis that the effects of our manipulation on subjective temporal distance were mediated by memory quality. We used the procedure for testing mediation outlined in Baron and Kenny (1986). Because the manipulation only appeared to have been successful for the "middle" high memory quality condition, we used only that group and the control group in the mediation analysis. We conducted a series of regression analyses to determine if our manipulation was a significant predictor of memory quality, if memory quality was a significant predictor of subjective time estimates, and if the effect of the manipulation on subjective time estimates became non-significant when memory quality was included in the model. The memory quality manipulation significantly predicted memory quality scores, $b = -.44$, $t(62) = -2.96$, $p < .01$. Memory quality significantly predicted subjective distance scores, $b = -.48$, $t(62) =$

-4.48, p <.01. The manipulation significantly predicted subjective distance scores, b = .49, $t(62) = 3.33$, p <.01, however that relation became marginally significant when memory quality was included in the model, b = .27, t(62) = 1.9, p = .07. The results were consistent with partial mediation, Goodman test statistic of the indirect effect, $Z = 2.21$, p = .03. These results are consistent with partial mediation because the path between the manipulation and subjective distance did not drop to zero when memory quality was included in the model, but rather, remained marginal. Hence, memory quality at least partly accounted for the relation between the memory quality manipulation and the estimates of subjective distance (see Figure 1).



$Z = 2.21$, $p = .03$

Note: * indicates significance at the p <.05 level

Figure 1. The relation between the experimental manipulation and subjective distance scores is partially mediated by memory quality.

Objective date accuracy. We conducted a one way ANOVA to test for an effect of the knowledge manipulation on accuracy of participants' objective date estimates. Accuracy was measured as the number of days difference between the actual

date of the event and the estimated date of the event. In all four conditions participants made estimates that were on average more temporally distant than the actual date of the event thus, when interpreting the group means, larger numbers represent estimates in the more distant past (and therefore, less accurate estimates). We found a marginal effect of the manipulation on objective date accuracy, $F(3,62) = 2.59, p = .06$. A planned contrast of the three high versus the low (control) memory quality conditions did not reveal a significant difference, $p = .14$. Date estimates ranged from late 2003 to as far back as 1980. The mean response on the event knowledge item was 2.9 on a seven point scale, indicating that participants had a generally poor knowledge of the event, which may explain the range of the estimated dates. We also found a significant negative correlation between objective and subjective estimates of time, $r(65) = -.52, p<.01$, such that people who reported the event feeling more recent estimated it as having occurred more recently. Since participants always reported subjective estimates before they gave their objective estimates, this suggests that people may have been relying in part on how recent or distant the event felt when estimating when it occurred.

Exploratory analysis. We suggested earlier that event importance and exposure may be factors that influence memory quality and consequently, subjective temporal distance. We can do a preliminary examination of these hypotheses using the data collected here. First, we conducted a set of one way ANOVAs to test for an effect of the memory quality manipulation on event importance and event exposure to examine whether the manipulation influenced these variables. As expected we found null results for both, suggesting that having one's memory quality enhanced does not lead to perceptions of greater event importance or exposure. Next we examined the correlations

between event importance and exposure ratings, and memory quality ratings. We found that both event importance, $r(72) = .48, p < .01$ and event exposure, $r(72) = .42, p < .01$, significantly predicted memory quality. As event importance and event exposure increased, so did memory quality. We also examined the relation between event importance and exposure and subjective distance scores. Both event importance, $r(72) = -.54, p < .01$ and exposure, $r(72) = -.28, p = .02$, were significantly related to subjective distance, such that greater importance and exposure was associated with more recent subjective distance ratings.

Discussion

Consistent with our hypothesis, we found that memory quality had a significant effect on the reported subjective distance of our target event. Participants whose memories were refreshed by the manipulation reported the target event as feeling significantly closer than participants in the control group. This evidence supports our theory of directional relation between memory quality and subjective distance. That is, it appears that people use memory quality as a sort of index by which they can estimate approximately how recent or distant a past event subjectively feels. This is similar to the accessibility principle proposed by Brown et al. (1985) to explain forward telescoping of objective date estimates. For example, if I wanted to rate how recent my last holiday feels, I would call to mind memories of that event, and compare the quality of those memories to a memory quality index that represents the typical decay of event memories. If I remember the event well then it will fall towards the more recent end of the index or alternatively if I remember it poorly it will fall towards the more distant end of the scale. Thus, if I remember my holiday especially well it ought to fall on the recent end of the

scale, and be reported as feeling quite recent. Although there was a significant difference between the experimental conditions and the control condition, it appears that this difference was driven primarily by the middle experimental condition. The memory quality manipulation did not appear to have worked well in either the abstract or concrete conditions. We believe that this may have occurred because these latter two conditions contained information to which the participants had not been exposed prior to the study. Instead of refreshing participants' memories of the event these conditions may have even had the effect of making them feel that there was a lot about the event that they didn't remember. Consistent with this explanation, the familiarity ratings for the abstract and concrete conditions were significantly lower than those for the middle condition.

Manipulating the diagnosticity of the information did not have any clear effect on the accuracy of people's objective date estimates. This is probably due in part to the huge variance in the reported dates. It is worth noting that for all four conditions, the actual date of the event was reversed telescoped. Since the event was only about one year old, this finding is consistent with the bounding explanation of telescoping (Huttonlocher, Hedges, & Bradburn, 1990). That is, the target event was quite close to the present, which represents a temporal boundary of when the event could have happened. Thus, theoretically, potential dating error is limited to one year in the more recent direction, and relatively unlimited in the more distant direction. What is interesting is that participants in the middle experimental condition reported the event as feeling most recent and also dated the event as having occurred most recently (which in this case also meant most accurately). Participants in the other conditions dated the event as being more distant and also rated it as being subjectively more distant. It is possible

that since participants knew relatively little about the event they were using the perceived subjective distance of the event to help generate a date estimate. A likely explanation is that participants in the middle experimental group had their memories of the event refreshed, which lead them to feel that the event was more recent. Participants in the other conditions, however, did not have their memories refreshed. Those in the concrete condition were given some information that could have served as temporal anchors; however this information was clearly not sufficient. Since participants knew relatively little about the event, they were probably forced to rely more on their sense of the subjective distance of the event, which would have caused them to reverse telescope the date. They may also have been more likely to confuse the Columbia disaster with the Challenger disaster of 1986 in the conditions where they were not reminded clearly of the event in question. In fact, one participant reported that there was a teacher on board the shuttle, which was true of the Challenger but not the Columbia. This suggests that these results could be in part an artifact of the event used (because of the potential for it to be confused with another much more remote event), hence further research using a variety of events must be done before any conclusions can be drawn.

The findings of our exploratory analysis were also consistent with our expectations. Both the importance of the event and exposure to the event were strong predictors of memory quality. We expected that event importance and exposure would affect memory quality, and thus, subjective time; because the importance of an event could affect encoding and both are factors which we felt would lead to rehearsal of the event. In day to day life, greater event importance and exposure are probably common sources of bias in an individual's subjective feeling of time. Using the "memories fade

over time" heuristic ought to yield fairly accurate results most of the time, the exception being when memory quality is significantly influenced by factors other than the passage of time. It is easy to imagine how personal importance and/or repeated exposure could affect memory quality. For example, the September 11 terrorist attack was probably more important to a New Yorker or someone who lost a loved one than to someone who was not directly affected by the event. A New Yorker may have attended to and encoded the event more deeply, and probably would be more likely to be exposed to news stories and other reminders of the event. Those people for whom the event was important or those who received greater exposure to the event are likely to have better memory quality for the event since they would have spent more time thinking about and rehearsing the details. This in turn ought to make that event feel more subjectively recent. In the case of a tragedy like September 11, some people may actually try to avoid exposure to event reminders, such as memorials and magazine articles, simply because it makes the unpleasant event feel subjectively closer.

General Discussion

The studies presented here provide compelling evidence for our proposed causal link between memory quality and subjective distance. It appears that people use memory quality, perhaps as a sort of heuristic, when assessing how recent or distant a past event subjectively feels. The better an event is remembered; the more recent it seems to feel. The construct of memory quality appears to be composed of several related dimensions, including the vividness of the memory and the amount of detail remembered about an event. Both the importance of the event and the frequency with which a person is exposed to an event are likely to be factors affecting memory quality, and thus subjective

distance, in a natural setting. This is consistent with many anecdotal reports of events that feel recent, such as weddings or vacations. One's wedding is likely to be an event that has major personal importance, and it is commemorated on a yearly basis. A vacation or trip to somewhere exotic is likely to be rehearsed when showing pictures or relating one's adventures to friends.

It seems likely that the quality of a person's memory for a past event is subject to interplay between individual differences and characteristics of the event itself. As was mentioned earlier, some events lend themselves more to vivid details, such as colours and sounds (e.g., attending a concert), whereas other event memories may be composed more of semantic details (e.g., the details/directions of a road trip). At the same time, some people may recall some types of memories better than others (e.g., one might be good at remembering emotional details, but not at remembering semantic details). Given the potential for this interaction, it may be difficult to predict how well a particular event will be remembered by a particular person. This is certainly an area that warrants further investigation.

Subjective time and esteem maintenance. The link between memory quality and subjective distance is important because manipulating the subjective distance of past events could be useful for affect regulation and esteem maintenance. The findings of the present study suggest that maintaining vivid, detailed memories of past events can reduce the subjective distance of those events. Thus, rehearsing past positive events may be an effective way of keeping them feeling close. Temporal self-appraisal theory is useful in predicting how subjective distance may be skewed for events that are high in personal relevance. It makes intuitive sense that (with non dysphoric individuals at least)

individuals are likely to spend more time reflecting on positive events than negative ones, which ought to strengthen the memories for those events. Walker, Vogl and Thompson (1997) found that in a diary study of autobiographical events, participants rated positive events as more memorable than negative events, following a one year retention interval. The researchers also found that affective intensity faded faster for negative events than for positive events. Dysphoria acts as a moderator of this effect, however. Walker et al.(2003) found that depressed individuals do not have this positive bias in their recall of past events. While none of the studies presented in this paper were intended to test the valence of affect associated with the target events, it is worth noting that in Study 1 the prom, which was likely a very positive experience for most people, was rated as being remembered best, and was the most recently biased in subjective distance scores.

For the purposes of esteem maintenance and affect regulation the potential for keeping positive events feeling close is beneficial in two ways: Reflecting on positive events should lead to positive affect, but also by keeping positive events subjectively close they ought to be incorporated into the self concept to a greater extent, thereby helping to maintain high self-esteem (Ross & Wilson, 2003). The causal link between memory quality and subjective distance, suggested by our findings, could be utilized as a tool for individuals with esteem trouble. For example, recording and re-reading a detailed journal of positive events in one's life may help to keep those events feeling close and integrated into one's present identity.

The findings of the present investigation may be especially pertinent for aging adults who are experiencing a decline in episodic memory, such as those suffering from Alzheimer's disease. As memories of past achievements and other positive events

degrade, those events may feel more and more distant, and consequently, less and less included in the current self. Thus, the degradation of episodic memory may interfere with a beneficial self-esteem maintenance mechanism. One way to combat this loss of positive aspects of one's identity may be to reminisce about the past. It has been suggested that such reminiscing may be beneficial to the well-being of older individuals (Butler, 1980)

Subjective time and date telescoping. Another benefit to identifying factors that affect the subjective temporal distance of past events is that it helps to identify events that are particularly vulnerable to forward telescoping. Forward telescoping results in inaccurate questionnaire responses making it an important methodological problem for survey research, and therefore worth investigating. For example, an epidemiologist studying the spread of a disease could find his or her research seriously compromised by systematic errors in people's reports of when key interpersonal contact occurred. To this end, however, the present study only provides a small piece of a much larger puzzle. If the goal is to identify specific events that may be telescoped, one must first determine when memory quality and feelings of subjective distance will influence objective date estimates. It seems plausible that the poorer the participant's memory quality for an event, the more likely they are to reverse telescope that event. In other words, they are more likely to estimate a date as being more distant than it really is. Although our manipulation did not have a significant effect on people's objective date estimates, the objective date estimates of the Columbia shuttle disaster, reported in Study 3, are at least consistent with this view, in that the event was not well known, and participants frequently estimated the date as being far more distant than it actually was. For well

remembered events the story is likely to be more complicated. One would expect that if the event knowledge helps an individual to remember where he or she was when the event occurred, or to place it chronologically in some other way, the result would be increased accuracy in a report of the actual date, even though the event may feel "just like yesterday". On the other hand, if the event information simply makes the event memory more detailed, without providing temporal cues to help to determine when it occurred, it seems reasonable to expect that the result would be forward telescoping in the reported date estimate. In other words, the diagnosticity of the memory quality would determine whether subjective and objective time converge or diverge. We were unable to test this prediction in the present study, however, because the target event was not well remembered.

In order to identify events prone to telescoping, it is also necessary to identify events for which people are likely to have good memories or poor memories. In the present study we made a preliminary investigation of two possible antecedents of memory quality: event importance and event exposure. Our findings suggest that both of these factors play a role in determining how well an event will be remembered, likely because they strengthen encoding of the memory through rehearsal.

Another factor that might warrant further investigation, as suggested by Ross and Wilson (2002), is personal relevance. Events that are more relevant to one's identity may be better remembered, *if* they are positive, since negative events are likely to be distanced for esteem maintenance reasons. Memories may be abnormally strong for other reasons as well. For example one may have extremely vivid flashbulb memories that result from an intense experience (Conway et al., 1994). Future research to this end could involve

generating vivid, memorable experiences and more mundane experiences in a lab setting and testing memory quality and subjective distance after a retention interval.

It makes intuitive sense that people may rely on subjective distance to help them make objective date estimates when they know relatively little about the target event. Insufficient knowledge would make reconstruction difficult or impossible, leaving a person with only his or her subjective sense of time on which to rely. However, in addition to memory quality, there may also be other factors that lead people to rely on feelings of subjective distance. Cognitive load, for example, affects people's ability to retrieve autobiographical memories (Goddard, Dritschel, & Burton, 1998), which is likely to impede the reconstructive process normally used for estimating objective dates. Under conditions of cognitive load, then, it is possible that people may rely on the more automatic, less cognitively demanding feelings of subjective distance when making an objective date estimate. A person's level of motivation may have similar effects. Someone who is highly motivated to make an accurate date estimate may be more likely to use the more mentally taxing reconstructive process, where as a person lacking such motivation may be content to rely on the easier, more automatic subjective sense of time. Another interesting question one could raise is if and when people would use objective date knowledge to formulate subjective distance estimates. Perhaps if the date of an event is especially well known, it might actually be easier to base one's subjective estimates on that known objective date.

Processing level. Another issue that ought to be addressed in future research is the level at which memory quality is processed when making subjective distance estimates; that is, in a very general sense, implicit or explicit. We have, thus far,

discussed the use of memory quality as a temporal index without specifying the level at which it is processed. Given the intangible, "gut feeling" nature of subjective distance, it seems quite likely that the effect of memory quality on feelings of subjective distance occurs on a more implicit level. Perhaps a more practical question is whether the effect will remain intact when the actual process is scrutinized. In other words, if I realize that a past event feels more recent because I remember it better, will I still feel the same way about that event as if I didn't know why it felt recent? For example, will a past positive event that feels recent still make feel good about my current self if I know *why* it feels recent? There is reason to believe that it might not. Kelley and Jacoby (1998) manipulated participants' feelings of familiarity for a stimulus by altering participant's perceptual fluency for the stimulus, either above or below their level of consciousness. Familiarity was then measured using an old / new judgment task in which participants reported whether they had seen the stimulus in an earlier phase of the experiment. In the first condition, fluency was manipulated subconsciously by priming the stimulus through very brief, subconscious exposure, or by altering the perceptual clarity of the stimulus, essentially making it easier or more difficult to see, below the participant's level of conscious awareness. These manipulations had the effect of making the stimulus feel familiar and consequently, increasing participants' responses of "old". In a second condition, conscious awareness of the manipulation by the participants, however, actually resulted in a decrease in "old" responses because the participants could attribute the feeling of familiarity to the manipulation. Although the present study does not address the question of the level at which memory quality affects feelings of subjective distance, this would be an interesting direction for future research. One way to address the question

would be to assess the effects of the salience of memory quality on the link between memory quality and subjective distance. Forcing people to consciously reflect on their memory quality when making subjective time estimates could reveal whether explicit processing of the information facilitates or impedes the connection between memory quality and subjective time estimates.

Research on subjective temporal distance is still only just beginning to uncover the role that this construct plays in human cognition. Understanding the antecedents of subjective temporal distance should help to guide future investigation of the interplay between subjective temporal distance, self-esteem maintenance, objective date error as well as a potentially wide variety of other phenomena.

References

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182.

Belli, R. F., Winkielman, P., Read, J. D., Schwarz, N., & Lynn, S. J. (1998). Recalling more childhood events leads to judgments of poorer memory: Implications for the recovered/false memory debate. *Psychonomic Bulletin & Review, 5,* 318-323.

Betz, A. L., & Skowronski, J. J. (1997). Self-events and other-events: Temporal dating and event memory. *Memory & Cognition, 25,* 701-714.

Bradburn, N. M. (2000). Temporal representation and event dating. In A. A. Stone & J. S. Turkkan (Eds.), *The science of self-report: Implications for research and practice* (pp. 49-61). Mahwah, NJ: Lawrence Erlbaum Associates.

Brown, N. R., Rips, L. J. & Shevell, S. K., (1985). The subjective dates of natural events in very-long term memory. *Cognitive Psychology, 17,* 139-177.

Burt, C. D., Kemp, S., & Conway, M. (2001). What happens if you retest autobiographical memory 10 years on? *Memory & Cognition, 29,* 127 – 136.

Butler, R. N. (1980). The life review: An unrecognized bonanza. *International Journal of Aging and Human Development, 12,* 35-38.

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

Friedman, W. J. (1993). Memory for the time of past events. *Psychological Bulletin, 113,* 44-66.

Gibbons, J. A., & Thompson, C. P. (2001). Using a calendar in event dating. *Applied Cognitive Psychology, 15*, 33-44.

Goddard, L., Dritschel, B., & Burton, A. (1998). Gender differences in the dual-task effects on autobiographical memory retrieval during social problem solving. *British Journal of Psychology, 89,* 611-627.

Huttenlocher, J., Hedges, L. V., & Bradburn, N. M. (1990). Reports of elapsed time: Bounding and rounding processes in estimation. *Journal of Experimental Psychology: Learning Memory and Cognition, 2,* 196-213.

Kelley, C. M., & Jacoby, L. L. (1998). Subjective reports and process dissociation: fluency, knowing, and feeling. Acta Psychologica, 98, 127-140.

Kogure, T., Hatta, T., Kawakami, A., Kawaguchi, J., & Makino, T. (2001). Characteristics of proper names and temporal memory of social news events. *Memory, 9,* 103 – 116.

Kurbat, M. A., Shevell, S. K., & Rips, L. R. (1998). A years memories: The calendar effect in autobiographical recall. *Memory & Cognition, 26,* 532 – 552.

Larsen, S. F., & Thompson, C. P. (1995). Reconstructive memory in the dating of personal and public news events. *Memory & Cognition, 23,* 780 – 790.

McTeer, T. P., & Wilson, A. E. (2003). Dissociation between estimates of calendar time and subjective temporal distance. Poster presented at the American Psychological Association Annual Convention, Toronto, Ontario, Canada.

Prohaska, V., Brown, N. R., & Belli, R. F. (1998). Forward telescoping: The question matters. *Memory, 6,* 455-465.

Ross, M., & Wilson, A. E. (2003). Autobiographical memory and conceptions of self: getting better all the time. *Psychological Science, 12,* 66-69.

Ross, M., & Wilson, A. E. (2002). It feels like yesterday: Self-esteem, valence of personal past experiences, and judgments of subjective distance. *Journal of Personality and Social Psychology, 82,* 792-803.

Rubin, D. C., & Baddeley, A. D. (1989). Telescoping is not time compression: A model of the dating of autobiographical events. *Memory & Cognition, 17,* 653 – 661.

Sobel, M. E. (1982). Asymptotic intervals for indirect effects in structural equations models. In S. Leinhart (Ed.), *Sociological methodology 1982* (pp.290-312). San Francisco: Jossey-Bass.

Thompson, C. P., Skowronski, J. J., & Lee, D. J. (1988). Telescoping in dating naturally occurring events. *Memory & Cognition, 16,* 461 - 468.

Thompson, C. P., Skowronski, J. J., & Betz, A. L. (1993). The use of partial temporal information in dating personal events. *Memory & Cognition, 21,* 352-360.

Tversky, A., & Kahneman, D. (1974). Judgement under uncertainty: Heuristics and biases. *Science, 185,* 1124-1130.

Walker, W. R., Skowronski, J. J., Gibbons, J. A., Vogl, R. J., & Thompson, C. P. (2003). On the emotions accompanying autobiographical memories: Dysphoria disrupts the fading affect bias. *Cognition and Emotion, 17,* 703 – 723.

Walker, W. R., Vogl, R. J. & Thompson, C. P. (1997). Autobiographical memory: Unpleasantness fades faster than pleasantness over time. *Applied Cognitive Psychology, 11,* 399 - 413.

Wilson, A. E., & Ross, M. (2003). The identity function of autobiographical memory: Time is on our side. Invited paper in *Memory: Special Issue Exploring the Functions of Autobiographical Memory, 11,* 137-149.

Wilson, A. E., & Ross, M. (2001). From chump to champ: People's appraisals of their earlier and current selves. *Journal of Personality and Social Psychology, 80*, 572-584.

Winkielman, P., Schwarz, N., & Belli, R. F. (1998). The role of ease of retrieval and attribution in memory judgments: Judging your memory as worse despite recalling more events. *Psychological Science, 9,* 124-126.

Appendix A. Study 1 Questionnaire

For the present study, we would like you to recall personal events from your past. These events should be ***very specific*** and ***clear***.

You will be asked to think about several time periods. For each of theses times please recall and ***briefly describe*** as many events as you can ***easily*** remember. We don't want you to rack your brains trying to recall events, ***just list those events that stand out clearly in your mind***.

After listing the events you will be asked several follow-up questions about your memory for that time period.

If for any of the time periods you can't remember any events, just leave that section blank and proceed to the follow up questions.

If that particular time period doesn't apply to you, please write N/A, skip the follow up questions, and proceed to the next time period section.

The time period that we would like you to recall is the ***first year of high school***. Please recall and ***briefly describe*** as many events as you can ***easily*** remember. Keep in mind, we don't want you to rack your brains trying to recall events, just list those events that stand out clearly in your mind.

Event 1 _____

_____

Event 2 _____

_____

Event 3 _____

_____

Event 4 _____

_____

Event 5 _____

_____

Event 6 _____

_____

Event 7 _____

_____

Event 8 _____

_____

Event 9 _____

_____

Event 10 _____

_____

Event 11 _____

_____

Event 12 _____

_____

1. Regarding your memory for the first year of high school, are there large parts of that time period that you can't remember?

Yes _____

No _____ (please check one)

Unsure _____

2. Thinking back to the task where you had to recall personal events, how difficult was this task for you?

1 2 3 4 5 6 7

Very easy Very difficult

3. Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about your first year of high school . Place a mark through the lines below at the points that best indicate how far away that time *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

4. How well do you remember the first year of high school?

1 2 3 4 5 6 7

Very poorly — Very well

5. How vivid is your memory of the first year of high school?

1 2 3 4 5 6 7

Not vivid at all — Very vivid

6. How much detail do you remember about the first year of high school?

1 2 3 4 5 6 7

Very little detail — A lot of detail

The time period that we would like you to recall is ***July 1 (Canada Day) 2003***. Please recall and ***briefly describe*** as many events as you can ***easily*** remember. Keep in mind, we don't want you to rack your brains trying to recall events, just list those events that stand out clearly in your mind.

Event 1 _____

_____

Event 2 _____

_____

Event 3 _____

_____

Event 4 _____

_____

Event 5 _____

_____

Event 6 _____

_____

Event 7 _____

_____

Event 8 _____

_____

Event 9 _____

_____

Event 10 _____

_____

Event 11 _____

_____

Event 12 _____

_____

1. Regarding your memory for July 1 (Canada Day) 2003, are there large parts of that time period that you can't remember?

Yes _____

No _____ (please check one)

Unsure _____

2. Thinking back to the task where you had to recall personal events, how difficult was this task for you?

1 2 3 4 5 6 7

Very easy Very difficult

3. Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about July 1 (Canada Day) 2003. Place a mark through the lines below at the points that best indicate how far away that time *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

4. How well do you remember July 1 (Canada Day) 2003?

1 2 3 4 5 6 7

Very poorly — Very well

5. How vivid is your memory of July 1 (Canada Day) 2003?

1 2 3 4 5 6 7

Not vivid at all — Very vivid

6. How much detail do you remember about July 1 (Canada Day) 2003?

1 2 3 4 5 6 7

Very little detail — A lot of detail

The time period that we would like you to recall is ***the day of your high school Prom***. Please recall and ***briefly describe*** as many events as you can ***easily*** remember. Keep in mind, we don't want you to rack your brains trying to recall events, just list those events that stand out clearly in your mind.

Event 1 _____

_____

Event 2 _____

_____

Event 3 _____

_____

Event 4 _____

_____

Event 5 _____

_____

Event 6 _____

_____

Event 7 _____

_____

Event 8 _____

_____

Event 9 _____

_____

Event 10 _____

_____

Event 11 _____

_____

Event 12 _____

_____

1. Regarding your memory for the day of your high school Prom, are there large parts of that time period that you can't remember?

Yes _____

No _____ (please check one)

Unsure _____

2. Thinking back to the task where you had to recall personal events, how difficult was this task for you?

1 2 3 4 5 6 7

Very easy Very difficult

3. Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about the day of your high school Prom. Place a mark through the lines below at the points that best indicate how far away that time *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

4. How well do you remember the day of your high school Prom?

1 2 3 4 5 6 7

Very poorly — Very well

5. How vivid is your memory for the day of your high school Prom?

1 2 3 4 5 6 7

Not vivid at all — Very vivid

6. How much detail do you remember about the day of your high school Prom?

1 2 3 4 5 6 7

Very little detail — A lot of detail

The time period that we would like you to recall is ***the first week of classes this year***. Please recall and ***briefly describe*** as many events as you can ***easily*** remember. Keep in mind, we don't want you to rack your brains trying to recall events, just list those events that stand out clearly in your mind.

Event 1 _____

_____

Event 2 _____

_____

Event 3 _____

_____

Event 4 _____

_____

Event 5 _____

_____

Event 6 _____

_____

Event 7 _____

_____

Event 8 _____

_____

Event 9 _____

_____

Event 10 _____

_____

Event 11 _____

_____

Event 12 _____

_____

1. Regarding your memory for the first week of classes this year, are there large parts of that time period that you can't remember?

Yes _____

No _____ (please check one)

Unsure _____

2. Thinking back to the task where you had to recall personal events, how difficult was this task for you?

1 2 3 4 5 6 7

Very easy Very difficult

3. Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about the first week of classes this year. Place a mark through the lines below at the points that best indicate how far away that time *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

4. How well do you remember the first week of classes this year?

1 2 3 4 5 6 7

Very poorly — Very well

5. How vivid is your memory for the first week of classes this year?

1 2 3 4 5 6 7

Not vivid at all — Very vivid

6. How much detail do you remember about the first week of classes this year?

1 2 3 4 5 6 7

Very little detail — A lot of detail

Age _____

Gender M / F (please circle one)

How many years ago did you start 9th grade? _____

What year of University are you currently in? _____

Thank you very much for participating in this study, your help is greatly appreciated!

Appendix B. Study 2a Questionnaire

For the present study, we would like you to recall personal events from your past. These events should be ***very specific*** and ***clearly remembered***.

The time period that we would like you to recall is the ***first week of 9th grade***. Please recall **4** ***specific events*** that you experienced in the first week of 9th grade, and provide a short description of what happened.

Event 1 _____

_____

Event 2 _____

_____

Event 3 _____

_____

Event 4 _____

_____

1. Regarding your memory for the first week of 9th grade, are there large parts of that time period that you can't remember?

Yes _____

No _____ (please check one)

Unsure _____

2. Thinking back to the task where you had to recall personal events, how difficult was this task for you?

1 2 3 4 5 6 7

Very easy Very difficult

3. Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about your first week of 9th grade. Place a mark through the lines below at the points that best indicate how far away that time *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

4. Age _____

5. Gender M / F (please circle one)

6. In what year did you start 9th grade? _____

7. What year of University are you currently in? _____

Thank you very much for participating in this study, your help is greatly appreciated!

For the present study, we would like you to recall personal events from your past. These events should be ***very specific*** and ***clearly remembered.***
The time period that we would like you to recall is the ***first week of 9th grade.*** Please recall **12** ***specific events*** that you experienced in the first week of 9th grade, and provide a short description of what happened.

Event 1 _____

_____

Event 2 _____

_____

Event 3 _____

_____

Event 4 _____

_____

Event 5 _____

_____

Event 6 _____

_____

Event 7 _____

_____

Event 8 _____

_____

Event 9 _____

_____

Event 10 _____

_____

Event 11 _____

_____

Event 12 _____

_____

1. Regarding your memory for the first week of 9th grade, are there large parts of that time period that you can't remember?

Yes _____

No _____ (please check one)

Unsure _____

2. Thinking back to the task where you had to recall personal events, how difficult was this task for you?

1 2 3 4 5 6 7

Very easy Very difficult

3. Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about your first week of 9th grade. Place a mark through the lines below at the points that best indicate how far away that time *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

4. Age _____

5. Gender M / F (please circle one)

6. In what year did you start 9th grade? _____

7. What year of University are you currently in? _____

Thank you very much for participating in this study, your help is greatly appreciated!

Appendix C. Study 2b Questionnaire

For the present study, we would like you to recall personal events from ***July 1, 2003 (Canada Day)***. These events should be ***very specific*** and ***clear***. For an event to count as specific and clear, you should be able to remember specific ***details***. For each event that you report, we would like you to include the following:

1. ***Who*** was present/involved.
2. ***Where*** you were when the event occurred.
3. ***What*** you did/what happened.

For the purposes of confidentiality, please only use people's first initial when reporting names.

You should also have an ***actual, conscious memory*** of experiencing the specific event, not simply *know* that the event occurred. For example, a person could "know" that they drove to school this morning, but not actually remember the drive. Don't report "scripted" events (eg. "I know I usually would do X", or "I probably did Y next"). Instead, report memories you can specifically recall. For example, if you actually remember driving to school, you might remember specifics like where you had to stop at a red light, what song was on the radio, or other specific details.

We would also like you to report events that are distinct and non-overlapping. For example, if you were to report driving to school as one of your events, then you shouldn't list things that happened during the drive as additional events.

After listing the events you will be asked several follow-up questions about your memory for July 1, 2003.

The time period that we would like you to recall is ***July 1 (Canada Day) 2003***. Please recall and ***briefly describe*** 3 events from that day. If you are unable to remember 3 events please remember as many as you can (up to the maximum), however, keep in mind that it is more important that you are able to remember the details (***who/where/what***) of all the events that you report.

Event 1 _____

_____

Event 2 _____

_____

Event 3 _____

_____

1. Regarding your memory for July 1 (Canada Day) 2003, are there large parts of that time period that you can't remember?

Yes _____

No _____ (please check one)

Unsure _____

2. Thinking back to the task where you had to recall personal events, how difficult was this task for you?

1 2 3 4 5 6 7

Very easy Very difficult

3. Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about July 1 (Canada Day) 2003. Place a mark through the lines below at the points that best indicate how far away that time *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

4. How well do you remember July 1 (Canada Day) 2003?

1 2 3 4 5 6 7

Very poorly — Very well

5. How vivid is your memory of July 1 (Canada Day) 2003?

1 2 3 4 5 6 7

Not vivid at all — Very vivid

6. How much detail do you remember about July 1 (Canada Day) 2003?

1 2 3 4 5 6 7

Very little detail — A lot of detail

Age _____

Gender M / F (please circle one)

What year of University are you currently in? _____

Thank you very much for participating in this study, your help is greatly appreciated!

For the present study, we would like you to recall personal events from ***July 1, 2003 (Canada Day)***. These events should be ***very specific*** and ***clear***. For an event to count as specific and clear, you should be able to remember specific ***details***. For each event that you report, we would like you to include the following:

1. ***Who*** was present/involved.
2. ***Where*** you were when the event occurred.
3. ***What*** you did/what happened.

For the purposes of confidentiality, please only use people's first initial when reporting names.

You should also have an ***actual, conscious memory*** of experiencing the specific event, not simply *know* that the event occurred. For example, a person could "know" that they drove to school this morning, but not actually remember the drive. Don't report "scripted" events (eg. "I know I usually would do X", or "I probably did Y next"). Instead, report memories you can specifically recall. For example, if you actually remember driving to school, you might remember specifics like where you had to stop at a red light, what song was on the radio, or other specific details.

We would also like you to report events that are distinct and non-overlapping. For example, if you were to report driving to school as one of your events, then you shouldn't list things that happened during the drive as additional events.

After listing the events you will be asked several follow-up questions about your memory for July 1, 2003.

The time period that we would like you to recall is ***July 1 (Canada Day) 2003***. Please recall and ***briefly describe*** 12 events from that day. If you are unable to remember 12 events please remember as many as you can (up to the maximum), however, keep in mind that it is more important that you are able to report the details (***who/where/what***) of all the events that you report.

Event 1 _____

_____

Event 2 _____

_____

Event 3 _____

_____

Event 4 _____

_____

Event 5 _____

_____

Event 6 _____

_____

Event 7 _____

_____

Event 8 _____

_____

Event 9 _____

_____

Event 10 _____

_____

Event 11 _____

_____

Event 12 _____

_____

1. Regarding your memory for July 1 (Canada Day) 2003, are there large parts of that time period that you can't remember?

Yes _____

No _____ (please check one)

Unsure _____

2. Thinking back to the task where you had to recall personal events, how difficult was this task for you?

1 2 3 4 5 6 7

Very easy Very difficult

3. Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about July 1 (Canada Day) 2003. Place a mark through the lines below at the points that best indicate how far away that time *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

4. How well do you remember July 1 (Canada Day) 2003?

1 2 3 4 5 6 7

Very poorly — Very well

5. How vivid is your memory of July 1 (Canada Day) 2003?

1 2 3 4 5 6 7

Not vivid at all — Very vivid

6. How much detail do you remember about July 1 (Canada Day) 2003?

1 2 3 4 5 6 7

Very little detail — A lot of detail

Age _____

Gender M / F (please circle one)

What year of University are you currently in? _____

Thank you very much for participating in this study, your help is greatly appreciated!

Appendix D. Study 3 Questionnaire

In this questionnaire you will be presented with, or asked to generate, information related to different topics that many students will have been exposed to. We will then be asking you to rate the familiarity of the information, as well as some other scales that may be related to familiarity. ***If you come across a topic you have never heard of*** *(this means the whole topic, not simply some of the information about the topic)*, please simply write "I have never heard of this topic" and continue on to the next section.
We ask that you ***read each page carefully*** and respond to all of the questions as honestly as possible. Please ***complete each page in order***, and once you have finished that page ***do not go back and change any of your answers***.

In this first section you will be asked to look over information related to the Columbia shuttle disaster.

-The US space shuttle Columbia broke up and disintegrated while re-entering the atmosphere
-NASA officials vowed they would find the cause of the disaster so their colleagues' sacrifice would not be in vain.
-The president gave a solemn address, announcing that the shuttle had been lost and that there were no survivors.
-Government leaders around the world extended deep condolences over the tragic loss of US space shuttle Columbia.
-The UN Secretary-General, who was deeply saddened by the accident, said that the loss of the space shuttle was a loss to all humankind.
- According to the president of his old alma mater, Shuttle Commander Rick Husband was a "true American hero" who braved the risks of space flight in the name of science.
-Throughout the United States and elsewhere, flags were flown at half mast in recognition of the tragedy.
-Although there was much speculation on the cause of the tragedy, NASA scientists announced that it would require a long investigation before they could determine what happened.

Take a minute to reflect on the information you have just viewed. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

In this section you will be provided with information about lead roles played by Tom Cruise. Again, please read the following information carefully.

-In *Top Gun*, Cruise plays a hot shot pilot, 'Maverick' Mitchell. In the film his friend and co-pilot 'Goose' dies when their plane crashes in a training exercise.
-In *Days of Thunder* Cruise plays Cole Trickle, a NASCAR driver, opposite Nicole Kidman, whom he later married.
-In *A Few Good Men* Cruise plays the role of military lawyer Daniel Kaffee, opposite a hard nosed general played by Jack Nicholson.
-In the highly sexual *Eyes Wide Shut*, Director Stanley Kubrick's last film before his death, Cruise plays Dr. William Harford opposite his wife, Nicole Kidman.
-Cruise Takes the role of Jerry Maguire in the movie of the same name, about a sports agent who grows a conscience over night.
-In *Rain Man*, Cruise plays Charlie Babbit, who travels across the country with his Autistic brother Raymond, played by Dustin Hoffman.

Take a minute to reflect on the information you have just viewed. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

In this next section you will once again be dealing with information related to the Columbia space shuttle disaster.

Think back to the Columbia shuttle disaster. In the space provided below, list as many details as you can remember about this event (including those from your own memories as well as any that you may have learned in the previous section). Please take your time and try to list all of the information that you know about this event.

Take a minute to read over the list of information you have generated. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about Columbia shuttle disaster. Place a mark through the lines below at the points that best indicate how far away that event *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

How much do you currently know about the Columbia shuttle disaster event today?

1----------2----------3----------4----------5----------6----------7
next to nothing quite a lot

How vividly or clearly do you remember this event?

1----------2----------3----------4----------5----------6----------7
very vague and fuzzy very vivid and clear

How frequently have you thought about or discussed the Columbia shuttle disaster since it occurred?

1----------2----------3----------4----------5----------6----------7
never very frequently

How important is this event to you, personally?

1----------2----------3----------4----------5----------6----------7
not at all important extremely important

Please estimate the approximate date on which you think the Columbia shuttle disaster occurred. We realize that you probably won't know the exact date of this event, but try to make your "best guess" about the exact date. _____/ _____/ _____
day **month** **year**

As you went through the process of estimating the date of the Columbia shuttle disaster, you may have thought about various things or used different strategies to help you generate a date. Please write down any things you thought about to help you generate the date of the event.

_____

_____

_____

_____

_____

_____

For each of the following pieces of information, please report whether:

A. I remembered this information before reading it.
B. I had head this information at some point but forgotten it until I read it today
C. I had never heard this information before today.

By writing the corresponding letter in the blank spaces provided

1. ____-The US space shuttle Columbia broke up and disintegrated while re-entering the atmosphere
2. ____-NASA officials vowed they would find the cause of the disaster so their colleagues' sacrifice would not be in vain.
3. ____-The president gave a solemn address, announcing that the shuttle had been lost and that there were no survivors.
4. ____-Government leaders around the world extended deep condolences over the tragic loss of US space shuttle Columbia.
5. ____-The UN Secretary-General, who was deeply saddened by the accident, said that the loss of the space shuttle was a loss to all humankind.
6. ____- According to the president of his old alma mater, Shuttle Commander Rick Husband was a "true American hero" who braved the risks of space flight in the name of science.
7. ____-Throughout the United States and elsewhere, flags were flown at half mast in recognition of the tragedy.
8. ____-Although there was much speculation on the cause of the tragedy, NASA scientists announced that it would require a long investigation before they could determine what happened.
9. ____-The shuttle broke up and disintegrated while re-entering the atmosphere.
10. ____-The shuttle carried a crew of 7, including the first Israeli astronaut.
11. ____-The crew was on the radio with mission control acknowledging a sensor failure when communication was lost.
12. ____-The shuttle was traveling around 22,000 km/h when it broke up.
13. ____-Debris from the shuttle left a glowing white streak across the sky.
14. ____-Pieces of debris from the shuttle landed over a wide area of rural Texas, people were asked not to touch or move the wreckage.
15. ____-There was speculation that the shuttle may have been damaged during take-of.
16. ____-US president George Bush was rushed back from Camp David to Washington in a high speed motorcade.
17. ____-The break up occurred at 9:00am EST.
18. ____-It occurred in the winter time.
19. ____-The event occurred on a Saturday morning and many people were home watching news coverage of the tragedy.
20. ____-There was the familiar speculation at the time of the incident that terrorism might be to blame.

In this questionnaire you will be presented with, or asked to generate, information related to different topics that many students will have been exposed to. We will then be asking you to rate the familiarity of the information, as well as some other scales that may be related to familiarity. ***If you come across a topic you have never heard of*** *(this means the whole topic, not simply some of the information about the topic)*, please simply write "I have never heard of this topic" and continue on to the next section.
We ask that you ***read each page carefully*** and respond to all of the questions as honestly as possible. Please ***complete each page in order***, and once you have finished that page ***do not go back and change any of your answers***.

In this first section you will be asked to look over information related to the Columbia shuttle disaster.

-The shuttle broke up and disintegrated while re-entering the atmosphere.
-The shuttle carried a crew of 7, including the first Israeli astronaut.
-The crew was on the radio with mission control acknowledging a sensor failure when communication was lost.
-The shuttle was traveling around 22,000 km/h when it broke up.
-Debris from the shuttle left a glowing white streak across the sky.
-Pieces of debris from the shuttle landed over a wide area of rural Texas, people were asked not to touch or move the wreckage.
-There was speculation that the shuttle may have been damaged during take-of.
-US president George Bush was rushed back from Camp David to Washington in a high speed motorcade.

Take a minute to reflect on the information you have just viewed. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

In this section you will be provided with information about lead roles played by Tom Cruise. Again, please read the following information carefully.

-In *Top Gun*, Cruise plays a hot shot pilot, 'Maverick' Mitchell. In the film h is friend and co-pilot 'Goose' dies when their plane crashes in a training exercise.
-In *Days of Thunder* Cruise plays Cole Trickle, a NASCAR driver, opposite Nicole Kidman, whom he later married.
-In *A Few Good Men* Cruise plays the role of military lawyer Daniel Kaffee, opposite a hard nosed general played by Jack Nicholson.
-In the highly sexual *Eyes Wide Shut*, Director Stanley Kubrick's last film before his death, Cruise plays Dr. William Harford opposite his wife, Nicole Kidman.
-Cruise Takes the role of Jerry Maguire in the movie of the same name, about a sports agent who grows a conscience over night.
-In *Rain Man*, Cruise plays Charlie Babbit, who travels across the country with his Autistic brother Raymond, played by Dustin Hoffman.

Take a minute to reflect on the information you have just viewed. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

In this next section you will once again be dealing with information related to the Columbia space shuttle disaster.

Think back to the Columbia shuttle disaster. In the space provided below, list as many details as you can remember about this event (including those from your own memories as well as any that you may have learned in the previous section). Please take your time and try to list all of the information that you know about this event.

Take a minute to read over the list of information you have generated. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about Columbia shuttle disaster. Place a mark through the lines below at the points that best indicate how far away that event *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

How much do you currently know about the Columbia shuttle disaster event today?

1----------2----------3----------4----------5----------6----------7
next to nothing quite a lot

How vividly or clearly do you remember this event?

1----------2----------3----------4----------5----------6----------7
very vague and fuzzy very vivid and clear

How frequently have you thought about or discussed the Columbia shuttle disaster since it occurred?

1----------2----------3----------4----------5----------6----------7
never very frequently

How important is this event to you, personally?

1----------2----------3----------4----------5----------6----------7
not at all important extremely important

Please estimate the approximate date on which you think the Columbia shuttle disaster occurred. We realize that you probably won't know the exact date of this event, but try to make your "best guess" about the exact date. _____/ _____/ _____
day **month** **year**

As you went through the process of estimating the date of the Columbia shuttle disaster, you may have thought about various things or used different strategies to help you generate a date. Please write down any things you thought about to help you generate the date of the event.

_____

_____

_____

_____

_____

_____

For each of the following pieces of information, please report whether:

A. I remembered this information before reading it.
B. I had head this information at some point but forgotten it until I read it today
C. I had never heard this information before today.

By writing the corresponding letter in the blank spaces provided

1. ____-The US space shuttle Columbia broke up and disintegrated while re-entering the atmosphere
2. ____-NASA officials vowed they would find the cause of the disaster so their colleagues' sacrifice would not be in vain.
3. ____-The president gave a solemn address, announcing that the shuttle had been lost and that there were no survivors.
4. ____-Government leaders around the world extended deep condolences over the tragic loss of US space shuttle Columbia.
5. ____-The UN Secretary-General, who was deeply saddened by the accident, said that the loss of the space shuttle was a loss to all humankind.
6. ____- According to the president of his old alma mater, Shuttle Commander Rick Husband was a "true American hero" who braved the risks of space flight in the name of science.
7. ____-Throughout the United States and elsewhere, flags were flown at half mast in recognition of the tragedy.
8. ____-Although there was much speculation on the cause of the tragedy, NASA scientists announced that it would require a long investigation before they could determine what happened.
9. ____-The shuttle broke up and disintegrated while re-entering the atmosphere.
10. ____-The shuttle carried a crew of 7, including the first Israeli astronaut.
11. ____-The crew was on the radio with mission control acknowledging a sensor failure when communication was lost.
12. ____-The shuttle was traveling around 22,000 km/h when it broke up.
13. ____-Debris from the shuttle left a glowing white streak across the sky.
14. ____-Pieces of debris from the shuttle landed over a wide area of rural Texas, people were asked not to touch or move the wreckage.
15. ____-There was speculation that the shuttle may have been damaged during take-of.
16. ____-US president George Bush was rushed back from Camp David to Washington in a high speed motorcade.
17. ____-The break up occurred at 9:00am EST.
18. ____-It occurred in the winter time.
19. ____-The event occurred on a Saturday morning and many people were home watching news coverage of the tragedy.
20. ____-There was the familiar speculation at the time of the incident that terrorism might be to blame.

In this questionnaire you will be presented with, or asked to generate, information related to different topics that many students will have been exposed to. We will then be asking you to rate the familiarity of the information, as well as some other scales that may be related to familiarity. ***If you come across a topic you have never heard of*** *(this means the whole topic, not simply some of the information about the topic)*, please simply write "I have never heard of this topic" and continue on to the next section.
We ask that you ***read each page carefully*** and respond to all of the questions as honestly as possible. Please ***complete each page in order***, and once you have finished that page ***do not go back and change any of your answers***.

In this first section you will be asked to look over information related to the Columbia shuttle disaster.

-The shuttle broke up and disintegrated while re-entering the atmosphere.
-The shuttle carried a crew of 7, including the first Israeli astronaut.
-The crew was on the radio with mission control acknowledging a sensor failure when communication was lost.
-The shuttle was traveling around 22,000 km/h when it broke up.
-Debris from the shuttle left a glowing white streak across the sky.
-Pieces of debris from the shuttle landed over a wide area of rural Texas, people were asked not to touch or move the wreckage.
-There was speculation that the shuttle may have been damaged during take-of.
-US president George Bush was rushed back from Camp David to Washington in a high speed motorcade.
- The break up occurred at 9:00am EST.
- It occurred in the winter time.
- The event occurred on a Saturday morning and many people were home watching news coverage of the tragedy.
- There was the familiar speculation at the time of the incident that terrorism might be to blame.

Take a minute to reflect on the information you have just viewed. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

In this section you will be provided with information about lead roles played by Tom Cruise. Again, please read the following information carefully.

-In *Top Gun*, Cruise plays a hot shot pilot, 'Maverick' Mitchell. In the film his friend and co-pilot 'Goose' dies when their plane crashes in a training exercise.
-In *Days of Thunder* Cruise plays Cole Trickle, a NASCAR driver, opposite Nicole Kidman, whom he later married.
-In *A Few Good Men* Cruise plays the role of military lawyer Daniel Kaffee, opposite a hard nosed general played by Jack Nicholson.
-In the highly sexual *Eyes Wide Shut*, Director Stanley Kubrick's last film before his death, Cruise plays Dr. William Harford opposite his wife, Nicole Kidman.
-Cruise Takes the role of Jerry Maguire in the movie of the same name, about a sports agent who grows a conscience over night.
-In *Rain Man*, Cruise plays Charlie Babbit, who travels across the country with his Autistic brother Raymond, played by Dustin Hoffman.

Take a minute to reflect on the information you have just viewed. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

In this next section you will once again be dealing with information related to the Columbia space shuttle disaster.

Think back to the Columbia shuttle disaster. In the space provided below, list as many details as you can remember about this event (including those from your own memories as well as any that you may have learned in the previous section). Please take your time and try to list all of the information that you know about this event.

Take a minute to read over the list of information you have generated. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about Columbia shuttle disaster. Place a mark through the lines below at the points that best indicate how far away that event *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

How much do you currently know about the Columbia shuttle disaster event today?

1----------2----------3----------4----------5----------6----------7
next to nothing quite a lot

How vividly or clearly do you remember this event?

1----------2----------3----------4----------5----------6----------7
very vague and fuzzy very vivid and clear

How frequently have you thought about or discussed the Columbia shuttle disaster since it occurred?

1----------2----------3----------4----------5----------6----------7
never very frequently

How important is this event to you, personally?

1----------2----------3----------4----------5----------6----------7
not at all important extremely important

Please estimate the approximate date on which you think the Columbia shuttle disaster occurred. We realize that you probably won't know the exact date of this event, but try to make your "best guess" about the exact date. _____/ _____/ _____
day **month** **year**

As you went through the process of estimating the date of the Columbia shuttle disaster, you may have thought about various things or used different strategies to help you generate a date. Please write down any things you thought about to help you generate the date of the event.

_____

_____

_____

_____

_____

_____

_____

For each of the following pieces of information, please report whether:

A. I remembered this information before reading it.
B. I had head this information at some point but forgotten it until I read it today
C. I had never heard this information before today.

By writing the corresponding letter in the blank spaces provided

1. ____-The US space shuttle Columbia broke up and disintegrated while re-entering the atmosphere
2. ____-NASA officials vowed they would find the cause of the disaster so their colleagues' sacrifice would not be in vain.
3. ____-The president gave a solemn address, announcing that the shuttle had been lost and that there were no survivors.
4. ____-Government leaders around the world extended deep condolences over the tragic loss of US space shuttle Columbia.
5. ____-The UN Secretary-General, who was deeply saddened by the accident, said that the loss of the space shuttle was a loss to all humankind.
6. ____- According to the president of his old alma mater, Shuttle Commander Rick Husband was a "true American hero" who braved the risks of space flight in the name of science.
7. ____-Throughout the United States and elsewhere, flags were flown at half mast in recognition of the tragedy.
8. ____-Although there was much speculation on the cause of the tragedy, NASA scientists announced that it would require a long investigation before they could determine what happened.
9. ____-The shuttle broke up and disintegrated while re-entering the atmosphere.
10. ____-The shuttle carried a crew of 7, including the first Israeli astronaut.
11. ____-The crew was on the radio with mission control acknowledging a sensor failure when communication was lost.
12. ____-The shuttle was traveling around 22,000 km/h when it broke up.
13. ____-Debris from the shuttle left a glowing white streak across the sky.
14. ____-Pieces of debris from the shuttle landed over a wide area of rural Texas, people were asked not to touch or move the wreckage.
15. ____-There was speculation that the shuttle may have been damaged during take-of.
16. ____-US president George Bush was rushed back from Camp David to Washington in a high speed motorcade.
17. ____-The break up occurred at 9:00am EST.
18. ____-It occurred in the winter time.
19. ____-The event occurred on a Saturday morning and many people were home watching news coverage of the tragedy.
20. ____-There was the familiar speculation at the time of the incident that terrorism might be to blame.

In this questionnaire you will be presented with, or asked to generate, information related to different topics that many students will have been exposed to. We will then be asking you to rate the familiarity of the information, as well as some other scales that may be related to familiarity. ***If you come across a topic you have never heard of*** *(this means the whole topic, not simply some of the information about the topic)*, please simply write "I have never heard of this topic" and continue on to the next section.
We ask that you ***read each page carefully*** and respond to all of the questions as honestly as possible. Please ***complete each page in order***, and once you have finished that page ***do not go back and change any of your answers***.

In this first section you will be asked to look over information related to Rudolph the red nosed reindeer.

-Rudolph the red nosed reindeer was originally created as a promotional gimmick for Montgomery Ward Stores in 1939.
-The story of Rudolph was made into a popular Christmas special where he travels to an island of misfit toys.
-The special is narrated by a banjo strumming snowman with the voice of Burl Ives.
-Rudolph the red nosed reindeer is also a popular Christmas song.
-The song was originally recorded by Gene Autry, but has since been performed by countless other singers and is a mainstay of most Christmas music albums.
-Besides Rudolph, Santa had eight other reindeer to pull his sleigh.
-Rudolph was initially teased by the other reindeer.
-Rudolph gains acceptance when his glowing nose saves the day, allowing Santa to navigate through heavy fog on Christmas Eve.

Take a minute to reflect on the information you have just viewed. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

In this section you will be provided with information about lead roles played by Tom Cruise. Again, please read the following information carefully.

-In *Top Gun*, Cruise plays a hot shot pilot, 'Maverick' Mitchell. In the film his friend and co-pilot 'Goose' dies when their plane crashes in a training exercise.
-In *Days of Thunder* Cruise plays Cole Trickle, a NASCAR driver, opposite Nicole Kidman, whom he later married.
-In *A Few Good Men* Cruise plays the role of military lawyer Daniel Kaffee, opposite a hard nosed general played by Jack Nicholson.
-In the highly sexual *Eyes Wide Shut*, Director Stanley Kubrick's last film before his death, Cruise plays Dr. William Harford opposite his wife, Nicole Kidman.
-Cruise Takes the role of Jerry Maguire in the movie of the same name, about a sports agent who grows a conscience over night.
-In *Rain Man*, Cruise plays Charlie Babbit, who travels across the country with his Autistic brother Raymond, played by Dustin Hoffman.

Take a minute to reflect on the information you have just viewed. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

In this next section you will be dealing with information related to the Columbia space shuttle disaster.

Think back to the Columbia shuttle disaster. In the space provided below, list as many details as you can remember about this event. Please take your time and try to list all of the information that you know about this event.

Take a minute to read over the list of information you have generated. On the scale below please indicate how familiar this information feels (please circle one of the numbers).

1----------2----------3----------4----------5----------6----------7
Not at all familiar Very familiar

Sometimes points in time tend to *feel* closer or further away, regardless of how long ago they actually occurred. Think about Columbia shuttle disaster. Place a mark through the lines below at the points that best indicate how far away that event *feels* to you now.

Feels very close — Feels very distant

Feels like yesterday — Feels like a long time ago

How much do you currently know about the Columbia shuttle disaster event today?

1----------2----------3----------4----------5----------6----------7
next to nothing quite a lot

How vividly or clearly do you remember this event?

1----------2----------3----------4----------5----------6----------7
very vague and fuzzy very vivid and clear

How frequently have you thought about or discussed the Columbia shuttle disaster since it occurred?

1----------2----------3----------4----------5----------6----------7
never very frequently

How important is this event to you, personally?

1----------2----------3----------4----------5----------6----------7
not at all important extremely important

Please estimate the approximate date on which you think the Columbia shuttle disaster occurred. We realize that you probably won't know the exact date of this event, but try to make your "best guess" about the exact date. _____/ _____/ _____
day **month** **year**

As you went through the process of estimating the date of the Columbia shuttle disaster, you may have thought about various things or used different strategies to help you generate a date. Please write down any things you thought about to help you generate the date of the event.

_____

_____

_____

_____

_____

_____