Communicating temporal information about autobiographical events

CHRISTOPHER D. B. BURT*

University of Canterbury, Christchurch, New Zealand

Abstract

The communication of temporal information about autobiographical events was investigated by asking 39 pairs of adults to describe to each other a remote autobiographical event. Each member of the participant pairs was then asked to date the event which they had described and also to date the event which was described to them. The date when the event narrator stated their event happened was compared with the date when the listener stated the event happened. Four different temporal communication strategies were identified. It was rare for individuals to communicate temporal information by giving a calendar date. Rather, the narrator gave either a life theme or chronological age, as a cue to when the event happened. The listener appears to use these cues in combination with their autobiographical knowledge, and an estimate of the narrator's age to produce a temporal information communication outcome.

Keywords
temporal, communication, autobiographical, age estimation

1. Introduction

A large number of studies have examined individuals' ability to date past autobiographical events, comparing reported date with a known calendar date. This type of objective comparison of a temporal estimate against a known date makes for easy application of statistics, and provides a clear indication of event dating accuracy. However, this type of memorial assessment perhaps does not match the demands that individuals typically have for temporal information. In

* Correspondence address: Dr Christopher D. B. Burt, Department of Psychology, University of Canterbury, Private Bag 4800, Christchurch, New Zealand. E-mail: Christopher.Burt@Canterbury.ac.nz.

Language and Cognition 3–1 (2011), 121–136
DOI 10.1515/LANGCOG.2011.005
1866–9808/11/0003–0121
© Walter de Gruyter

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

everyday conversations about past events, are individuals actually giving, or are expected to give, a *precise* date for a past experience? If the answer to this question is no, then what language do individuals use to communicate temporal information? Burt (2008) described a model of how individuals might communicate temporal information about when an autobiographical event occurred within a conversation context. This research empirically tests some of the predictions of Burt's temporal communication model.

The temporal communication model covers both the positioning of an event in time and aspects of its duration. In this paper the focus is on the former aspect of the model. In order to explain Burt's model it is useful to briefly outline findings from research work on autobiographical event dating. A significant body of research has examined individuals' ability to position their life events in time, to date their life events. Generally, participants are presented with a description of an event from their past (often taken from a diary or some other personal archival record) and asked for the precise date when the event occurred (e.g. Barclay and Wellman 1986; Bruce and Van Pelt 1989; Burt 1992; Burt et al. 2001; Ferguson and Martin 1983; Friedman 1993; Huttenlocher et al. 1990; Larsen and Thompson 1995; Linton 1975; Rubin and Baddeley 1989; Thompson 1982, 1985a, 1985b; Thompson et al. 1988; Thompson et al. 1996; Wagenaar 1986; White 1982). A precise date is one which includes year, month and day. The consistent finding is that individuals, rather than recalling an event's date from memory, engage in a series of reconstructive steps in order to produce a date response (see Friedman 1993, 2001 for useful reviews).

The first part of 'date' reconstruction often involves using the association between the target event and a life theme to identify a broad temporal band (life time period) within which the event occurred (e.g. the individual knows the event happened when they were at university). Life themes are not so much an autobiographical experience, as they are a super-ordinate label to which are indexed various general events (Burt et al. 2003; Robinson 1992). Following this process, and in order to refine the date estimate, a landmark event may be used (see Shum 1998 for a discussion of landmark events). Landmark events often have considerable life importance, and as such are likely to be celebrated as an anniversary, and have their specific place in time maintained in memory because of this. If the target event can be recalled as having happened just after or just prior to a known landmark event, this will help in refining the date estimate (e.g. the individual knows the event happened before their undergraduate graduation ceremony). Finally, if the target event has a particular logical position within the calendar year (e.g. skiing is more likely in the winter months), this knowledge can also be used in the date reconstruction process.

Burt (2008), in developing his model of temporal information communication, questioned whether such date reconstructive processes would be used when a person, a *narrator*, is describing or discussing a past experience with

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

another person, the *listener*. Figure 1 shows the model. The *context* box on the left is divided into two sections. If the context is such that temporal specificity is required (e.g. when testifying as a witness in court) the date reconstruction processes identified by experimental studies are likely to be undertaken. In contrast, if the context is more routine, as in an everyday conversation, the individual is unlikely to engage in the sequence of reconstructive steps in order to produce precise temporal information (year, month and day) which can be included in the narrative. Rather, it is argued that a co-constructive strategy will be adopted. The link between the context box and the listener characteristic box (shown in Figure 1) is an important determinant here. Co-construction of temporal information (which is explained in more detail below) requires that the listener has life script knowledge which can feed into the process. If this is not the case, for example when having a conversation with an individual from a very different culture, the narrator may (and hence the question mark in Figure 1) revert to a temporal reconstruction approach.

Co-construction of temporal information may offer at least two advantages. First it provides the listener with the opportunity to determine approximate temporal position for an event being described to them. It seems reasonable to expect that a listener may be able to develop a better understanding of an event by knowing approximately when it occurred in the narrator's life by, for example, drawing on their understanding of their own experiences around that time in their life. If a listener can derive some form of enhanced interpretative advantage from knowing temporal information, then narrators are likely to recognise this, and attempt to communicate it. Co-construction also allows a narrator to tell their story (describe the event) as a continuous narrative, rather than pausing as they work through a reconstructive process which would allow a specific date to be inserted into the narrative. No studies which have investigated co-construction in temporal information communication were found. However the concept of 'co-construction', where qualities of the narrator and the listener influence the construction of an event in conversation has been extensively investigated in relation to other aspects of autobiographical recollection (see Pasupathi 2001 for a useful review).

To help explain the co-construction of temporal information (shown in the 3 boxes on the right of Figure 1), consider the following autobiographical event description, "*I met Jane while at University. I was in my first year, and Jane was in her second year, and we were both in the drama club. We had spoken at lectures a few times, and one day I asked her out. . . .*". This event description contains no numerical temporal information (the narrator did not give a date for the event), but it does communicate a lot of temporal information. When would a *listener* think this event happened? To answer this question the listener could engage in two types of reasoning: (1) when do people start university? (typically in New Zealand this is about age 18), and (2) the listener also needs

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

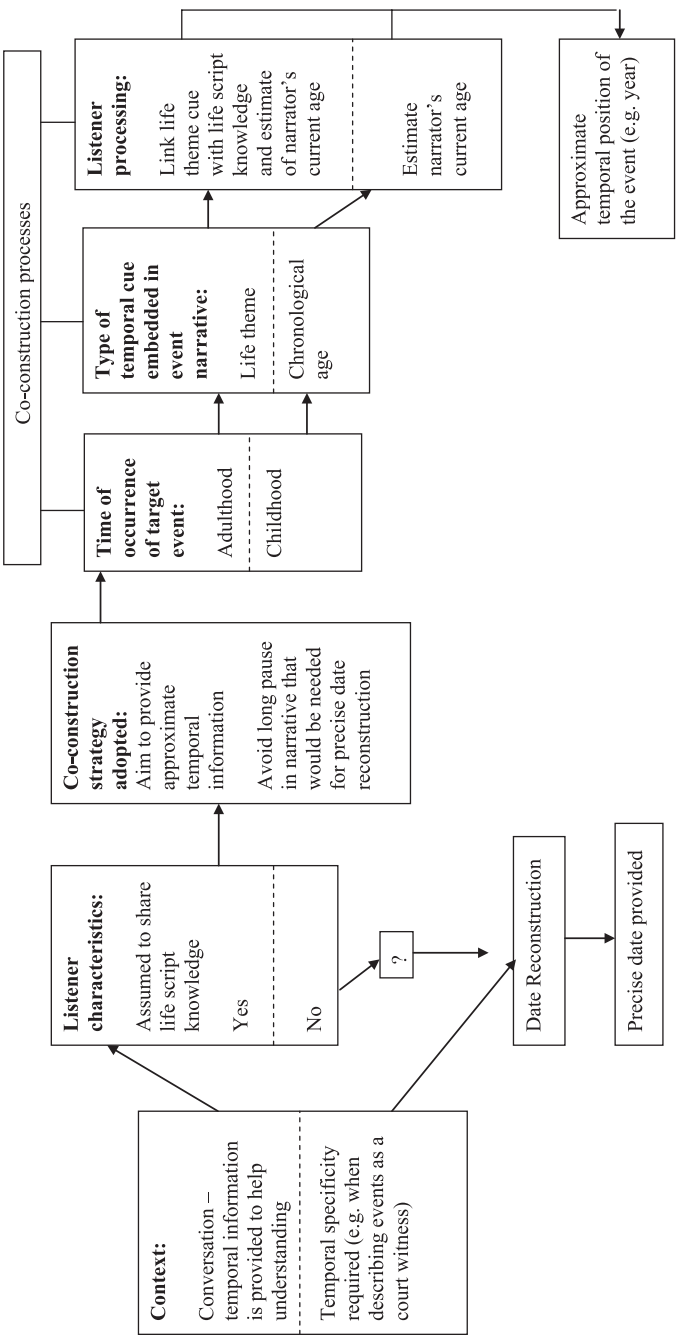

Figure 1. *Temporal communication model.*

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

to estimate 'how old is the person telling me this story'? Let us assume the listener concludes that the event narrator looks to be about 50 years old. Based on these two processes, the listener might conclude that the event happened about 32 years ago, and given that it is currently 2010 that the event happened in 1978. Thus, without actually giving a date for this event (and probably without actually reconstructing the date of the event), the language used by the narrator, and what the listener has concluded have provided a temporal location for the event (albeit an approximate one).

In the example given above, the narrator used a life theme to anchor the target event in time. Using a life theme should allow the listener to place the event in the past if the listener shares the same *life script knowledge*. Berntsen and Rubin have extensively researched life scripts, these being a culturally shared form of autobiographical knowledge relating to the order and timing of major life events across the life decades (see Berntsen and Rubin 2002, 2004; Rubin and Berntsen 2003). By linking a life theme into their autobiographical event account, the narrator is able to imply when the event occurred, without having to give a specific date. As long as the narrator's life has progressed in accordance with their culture's life script, *and* the listener has the relevant life script knowledge, the listener should, in conjunction with their estimate of the narrator's age, gain reasonably accurate temporal information from a life theme. The example above also includes an *idiosyncratic* life theme ('*we were both in the drama club*') which is less useful as a cue to temporal position. This is because an individual can be a member of a drama club at any time in their life. However, because life themes tend to overlap, generally an *idiosyncratic* life theme will have a typical life theme running in parallel (i.e. occurring at the same time). So generally, when it may be important to note an idiosyncratic theme, because the event being described is primarily indexed to it, the narrative might well start by linking the idiosyncratic theme to a typical life theme (e.g. *I met Jane while at University*. . . . .").

One feature of life themes is that they become more frequent across the life span. That is, an individual's life theme experiences increase as they become more independent from their parents and become an adult. This is reflected in findings that a biographical format for remembering and narrating seems to emerge between late childhood and adolescence (Habermas and Bluck 2000). Thus events which occur from the teenage years onwards (in adulthood) are more likely to be associated with a life theme and, as shown in Figure 1, this may be reflected in the temporal communication processes. In contrast, events which occur in childhood may be anchored in time by an age-related statement (e.g. *When I was about 8 we went to* . . .). The model of temporal information communication thus predicts that accounts of autobiographical events which occurred during or after the teenage years will often begin by noting a life theme relationship which isolates the life period during which the

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

event occurred, as in "*I met Jane while at University* . . .". If the account is of an early life event (i.e. childhood years), a chronological age anchor might be used.

The model of temporal information communication suggests that the listener has two key tasks: shown in the right hand box in Figure 1. First they need to comprehend, using their life script knowledge, the temporal implications of the life theme embedded within the narrator's story (e.g. understand that an event which is stated as having happened in the first year of university is likely to have occurred around the age of 18). Secondly, if they need or wish to place the event onto the temporal scale (i.e. give it an approximate date) they need to estimate how old the narrator is now. Only the latter process needs to be used to determine a specific date if the narrator anchors the event with a chronological age cue (e.g. *When I was about 6 we* . . .). No literature could be found which relates age estimation to any aspect of temporal memory or temporal information communication. However, a number of studies have identified a range of variables which are associated with age estimation: speaking rate (e.g. Harnsberger et al. 2008); facial features (e.g. Bruyer et al. 2007; George and Hole 1995; Heness 1991); ethnicity (e.g. Dehon and Brédart 2001). Furthermore, a number of biases in age estimation have been identified. For example, young people are generally more accurate at age estimation than old people (George and Hole 1995); the age of women less than 18 years is overestimated to a larger extent than the age of same-age men (Willner and Rowe 2001). The model of temporal communication predicts that error in age estimation from any cause is likely to be associated with error in temporal information communication.

The study reported in this paper tests the predictions of Burt's (2008) model of temporal information communication. Participants were run in pairs, each telling the other about an event from their past. These autobiographical event accounts were recorded, transcribed and coded for temporal information. After the conversational sessions, each participant independently completed a questionnaire in which they were asked to indicate when the event they had described occurred and when they thought the event described to them had occurred. They also gave their age and estimated the other participant's age. As noted above, it was predicted that age anchors would be used by narrators to position very remote events in time (i.e. those which occur in childhood), whereas life themes would be used for events occurring in late adolescence and adulthood. It was predicted that the listeners would use this information in conjunction with their *life script knowledge* and their perception of the narrator's age to give a date for the event which the narrator described to them. Finally, it was predicted that if the narrator's age was underestimated, the listener would date their event too recently. On the other hand, if the narrator's age was overestimated, the listener would date their event too remotely.

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

2. Method

2.1. *Participants*

Thirty-nine pairs of participants (78 individuals) completed the study. Convenience sampling was used to obtain participants, with the only criterion being that they were at least 40 years old. This criterion was applied to ensure that they could justifiably be asked to recall a *remote* event, and that it could have happened during several different life decades. Forty-six participants were female with a mean age of 53.0 years, and 32 were male with a mean age of 54.3 years. Given that conversations about the past can occur with both acquaintances and strangers, data were collected within both these social frameworks. Fifteen of the participant pairs had never met prior to the experiment (i.e. were strangers). The remaining 24 pairs were acquainted (3 were related to each other, 6 were friends, and the remaining 15 pairs were in a relationship), with a mean overall duration of knowing each other of 26.3 years. The sex match of the participant pairs was: 4 were male/male, 11 were female/female, and the remaining 24 were male/female.

2.2. *Materials*

Thirteen cue words were used to help prompt memories (accident, fairground, church, picnic, bicycle, swings, restaurant, boat, holiday, pet, bus, parade, train). There was no particular reason why these words were selected, other than to generally help the participants recall an event from their past. Participants were not restricted to recalling an event which was associated with one of the cue words.

A questionnaire was prepared which each participant completed (independently) after both event description sessions were completed. This questionnaire asked the participant to provide their age and sex, estimate the age of the other member of their pair, and indicate if they knew the other member of the pair prior to the study (and if so for how long they had known each other). Each participant was also asked to give a date for the event they described ("*When did this event occur (e.g. 6th June 1963). . . . . ?*"), and also to give a date for the event which was described to them by the other member of their pair ("*When do you think their event occurred (e.g. 6th June 1963). . . . . ?*").

2.3. *Procedure*

Participant pairs were instructed that the study involved each of them describing an event from their past, as if in a conversation. Thus they were told that it was ok to ask questions or otherwise make comments if they wanted to. One participant was given the list of cue words and asked to: "*Please think of a unique and interesting remote event that you experienced, which the other*

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

person does not know about, and that you are willing to talk about". Once the participant indicated that they had recalled an event, the researcher started the recorder and left the room. The participant was asked to stop the recorder when they were finished, and to signal for the researcher to return. The procedure was then repeated with the other participant. Once both participants had completed the event description phase, they independently completed the study questionnaire. The procedure produced two types of data for each participant: data as a narrator and data as a listener.

3. Results

The participants recorded a total of 78 event descriptions. The recording for each event was transcribed and the number of words counted. The first member of each pair to describe their event used a mean of 307 words (range 32 to 925). Similarly, the mean number of words used by the second narrator was 269 (range 30 to 790). A total of sixteen participants asked questions or made comments during their narrator's event description. However, none of these questions or comments related to temporal issues.

3.1. *Temporal information communication*

In order to determine whether temporal information might have been communicated during the event description process, the participants' questionnaire data were examined. The participants mainly provided just the year of occurrence when asked to date *their* event, with all 78 participants able to provide a year of occurrence for the event they had described. Likewise when playing the role of the listener, the participants generally only indicated year of occurrence when asked when they thought their narrator's event had happened. Overall 72 (92.3%) of the 'listeners' were able to provide a year of occurrence for the event which was described to them. As a description of the frequency with which other temporal information was given: 46 narrators provided month of occurrence for their event and 25 listeners provided this information for their narrator's event, while 10 narrators provided day of occurrence information for their event, as did 5 of the listeners for their narrator's event. Given that all the narrator data, and most of the listener data, included year of occurrence, and that the model of temporal information communication focuses on this level of temporal resolution, the analysis focuses on the year of occurrence data.

A significant positive correlation was found between the year which the narrator stated their event occurred and the year which the listener stated they thought the event had occurred ($r = .85$, $n = 72$, $p < .01$). A similar result was found when this correlation was computed separately for the acquainted participants ($r = .76$, $n = 47$, $p < .01$), and the stranger participants ($r = .94$, $n = 25$,

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

$p < .01$). Clearly these results suggest that approximate temporal position in terms of year of occurrence may have been communicated between the participant pairs. It is unlikely that the observed degree of consistency would have been achieved if the listeners were simply guessing.

Absolute dating accuracy was calculated (absolute dating error = year given by narrator minus year given by listener and ignored the sign of the answer), and its relationship to the length of participant pair acquaintance time was examined. It is worth noting that in this case, absolute error is relative to the date given by the narrator, rather than an objective calendar date taken from some record. Absolute date error was not significantly correlated with the length of time the participants had known each other ($r = .13$, $n = 72$). Furthermore, comparison of the absolute dating error between the stranger and acquainted participants indicated no significant difference: stranger $M = 4.7$, SD = 5.0 years, acquaintance $M = 3.7$, SD = 8.2 years, $F(1, 71) = .31$, $p = .57$. These results suggest that the majority of the participants followed the study instructions, as they were asked to describe a unique and interesting event which the other person did not know about (if the acquainted pairs were describing events already known to each other, it might be expected that this would reduce error).

3.2. *Event description temporal markers*

The transcripts of the event recordings were examined to determine what language the narrators had used to communicate temporal information. Table 1 shows a breakdown of the temporal markers which were identified in the event descriptions, the number of event descriptions which contained each category of temporal marker, and for each category the mean year the narrator gave, the mean year the listener gave, the correlation between the narrators' and listeners' year estimate, the mean temporal marker percentage score (defined below), mean age of occurrence in years, and mean relationship length in years. Only one event description contained more than one temporal cue ("*At boarding school, when I was about 17* . . .") and this was coded as an age cue. To determine if the relationship between the participant pairs influenced the temporal communication strategy, the time a narrator had known their listener (relationship length) was compared across the 5 temporal communication strategies, and found not to vary significantly ($F(4, 72) = 1.13$, $p = .35$).

Inspection of Table 1 indicates that 10 event descriptions (12.6%) included a calendar date to indicate when the event happened. In all cases this was just the year (e.g. "*It was maybe in 2000* . . . .", "*It was about, must have been about 1993* . . ."). This finding is consistent with the prediction that the inclusion of a calendar date within an event narrative is rather rare. In fact, a precise calendar date (year, month and day) was never given in a narrator's event description. Inspection of the 10 event narratives which included a date indicated

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

Table 1. *Mean year estimates, percentage position scores, age of occurrence in years, and length of relationship in years (including standard deviations shown in brackets), and the correlations between estimated dates across the temporal communication categories.*

Temporal communication category	n =	Mean narrator year estimate	Mean listener year estimate	Correlation between narrator and listener year	Mean temporal marker percentage position score	Mean age of occurrence	Mean length of relationship between participant pair
Age at event	38	1964	1964	.95**	14.4 (22.1)	9.1 (4.1)	19.1 (19.4)
Life theme	20	1971	1969	.74**	8.9 (6.7)	17.0 (13.3)	16.6 (20.7)
Calendar date	10	1982	1986	.83**	14.1 (29.6)	32.9 (19.4)	13.4 (23.4)
Distance from present	4	1993	1999	.94	1.9 (1.1)	30.7 (7.9)	0
No temporal marker	6	1983	1980	.79	–	32.8 (13.4)	26.4 (25.9)

Note: $^{**}p < .01$

that this strategy was not associated with a particular type of event. The dominant strategy for communicating temporal information was for the narrator to give their age at the time when the event happened, with 48.1% ($n = 38$) of the event descriptions containing this information (e.g. "*This was when I was 6 years old . . .*", "*I would have been probably about 7 . . .*"). Eleven of the event descriptions which included age information gave a range (e.g. ". . . *probably, I don't know, 9, 10, 11, something like that . . .*"), with the remaining 27 giving a precise age. The average age given as a temporal marker was 9.6 years ($SD = 3.8$, range 3 to 18). Note that where an age range was given, the youngest age was used to calculate the mean.

As indicated in Table 1, 20 event descriptions (25.5%) provided a life theme marker. Six of these life themes were related to schooling (e.g. ". . . *when I started Form 1 . . .*", "*when I was at high school . . .*"), while the others covered a wide range of life themes. Four event descriptions used a distance from the present marker (e.g. ". . . *happened more than 10 years ago, could be up to 14 years ago . . .*"). Finally, no temporal cue could be identified in 6 of the event descriptions. Interestingly, inspection of the correlations between narrator date and listener date (shown in Table 1) for these 6 events suggests that temporal information was communicated. However, the pairs to which these data belong had known each other on average for 26.4 years, and it may be that they related events which were already know to each other. In other words, they may not have complied with the study instructions.

To compare the age of occurrence for the events which included an age temporal marker with those which used a life theme, age of event occurrence was calculated. The following formula was used to work out the *age of occurrence* for each event: 2008 (the year the data were collected) minus the narrator's year estimate and subtract the answer from the narrator's age. Table 1 shows the mean age of occurrence for each temporal communication category. Comparison of the age of occurrence for the 38 events which included an age cue with the 20 events which used a life theme indicated a significant difference ($F(1, 56) = 11.46$, $p < .01$, $\eta^2 = .170$). Inspection of the means shown in Table 1 indicates that this finding is consistent with the prediction that age provides a temporal cue for events which occur in the first decade of life (childhood), whereas life themes are used for later life events. To determine where in the event description the temporal marker was used, the number of words from the beginning of the narrative until the first word of the temporal marker were counted ($M = 29.0$, range 2 to 293, $Mdn = 15$). This number was divided by the total number of words in the narrative. This produced a *temporal marker percentage position score*, where a smaller score indicated that the temporal marker was closer to the beginning of the narrative. Table 1 shows the mean temporal marker percentage position score for each temporal communication category. Comparison of the temporal marker percentage position scores for

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

the 38 events that used an age marker with those for the 20 events which used a life theme indicated no significant difference ($F(1, 56) = 1.17$, $p = .28$). Despite the lack of significant difference, the very small mean and low standard for the life theme percentage position scores does suggest that such information is quite frequently given in the opening statement of an event narrative.

3.3. *Temporal communication error patterns*

The use of age or a life theme as a temporal marker should provide sufficient information for the listener to date the event, but only if the listener correctly estimates the narrator's current age. To determine if this type of reasoning was reflected in the data, the relationship between date estimates and age estimates was examined for the event descriptions which used either age or a life theme as a temporal cue, and which were given a date by the listener ($n = 54$). Overall, actual and estimated age was significantly correlated ($r = .45$, $p < .01$, $n = 54$). Clearly the participants showed some ability to estimate each other's age (note that none of the event descriptions included any statement relating to the narrator's current age). The absolute age estimation error was calculated (narrator age minus listener age estimate and ignore answer sign) and correlated with the absolute date estimate error ($r = .58$, $p < .01$, $n = 54$). This significant relationship between the absolute accuracy of the temporal communication process and how accurately the 'listener' was able to estimate the narrator's current age is consistent with the study prediction.

Because both date and age can be either underestimated or overestimated, it was possible to examine the predicted relationship between the two variables (estimates) in terms of the sign of the error. If the temporal marker and estimated age had been combined in order to produce a date estimate, it should be possible to show the predicted error patterns: when the listener underestimates the age of the narrator, they should date the event too recently (overestimate the date), and when they overestimate the narrator's age, they should date the event too remotely (underestimate the date). Signed dating error and signed age estimation error were negatively correlated ($r = -.64$, $p < .01$, $n = 54$). This relationship was found for both the acquainted participant pairs ($r = -.78$, $p < .01$, $n = 39$) and the stranger participant pairs ($r = -.49$, $p = .058$, $n = 15$). The negative correlations indicate that underestimation of age was associated with dating events too recently, while overestimation of age was associated with dating events too remotely.

4. Discussion

The results are generally consistent with the predictions on how temporal information about autobiographical events may be communicated within a con-

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

versational context. The identification of 4 different types of temporal marker (age, life theme, calendar date, and distance from the present) is consistent with the results of Habermas and de Silveira's (2008) analysis of life narratives, and their analysis also found that the use of calendar date was rare. Providing a calendar date was both relatively rare and often noted as approximate or lacking certainty (e.g. "*It was maybe in 2000 . . . .*", "*It was about, must have been about 1993 . . .*"). This is perhaps not surprising, given that research on event dating has shown that the generation of a date often requires considerable reconstructive effort (e.g. Friedman 1993, 2001). Perhaps individuals do not feel the need to interrupt a conversation to work through the steps necessary to construct a precise calendar date. The expressed lack of certainty when the narrator gave a numerical temporal value (date or distance from the present) may also explain why the correlations between the narrator date and listener date were not larger when temporal information was communicated in this manner. With both these strategies the narrator tended to express a lack of certainty, and this may have been associated with the narrator changing their mind when dating their event in the questionnaire, and/or made it difficult for the listener to be certain about the date they were given.

A question which can be asked is whether these results question the value of research on autobiographical event dating. It could be argued that asking individuals to give dates for a list of events lacks ecological validity, as it is perhaps a rather rare activity in everyday life. On the other hand, the date reconstructive processes that such research has identified are similar to those which the participants in this study used—they were simply used in a rather different way. Rather than interrupting a conversation to work out a precise date and then telling the listener, the narrator seems to give the listener enough information to allow them to construct the date themselves. In effect, they move the constructive burden to the listener. This strategy may allow the narrator to focus on retrieving the event details, while the listener can (if they wish) engage in processes which help them understand the event, including its temporal position.

The placement of the temporal cue very early in the narrative implies that it has a degree of importance. Arguably the temporal cue may help the listener understand the event as they may be able to draw on their own experience to comprehend the event which is being described to them. For example, the life theme cue ". . . *when I started Form 1 . . .*" has both a temporal value and an information value, in that the listener can perhaps draw on their own experiences around this time of their life to comprehend the narrator's story. Furthermore, the very early introduction of the temporal cue in a narrative may facilitate a judgement of an event's temporal 'appropriateness'. The appropriateness of an event may well be judged on when in life it occurs and the narrator may wish to establish this 'appropriateness' early in the conversation.

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

The shift in the temporal communication strategy use from age for early life events to life themes for later life events appears consistent with theorising about the development of autobiographical memory. Events which occur early in life may simply not be associated with any unique life theme which would be useful for temporal information communication. Most people are living with their parents at this time of their life, and their life is a reflection of their parents' lives. As the individual moves into the second and third decade of life, they begin to create their own life themes (albeit generally consistent with those of their culture's life script). Once these life themes are established, they may be the preferred type of temporal marker for communication. These results are also consistent with Rubin and Berntsen's (2003) suggestions that most life scripts have age norms which fall into late adolescence and young adulthood.

While it seems clear that a listener's estimation of the narrator's age can influence their estimation of the date when a narrator's event occurred, the process may not have actually resulted in an error in the temporal communication process. If we assume that the narrator has the objective of communicating when in their life they experienced an event, and as discussed above its appropriateness, their communication attempt was perhaps reasonably successful (e.g. ". . . *when I started Form 1* . . ." is a clear cue to when in a person's life an event occurred). On the other hand, if the narrator wants to communicate 'when' in calendar time an event occurred (the actual year), their attempt is subject to error relating to whether they look their age or not. If for some reason their age is difficult to accurately estimate, their temporal communication strategy may be corrupted.

Future research might be able to compare the temporal communication strategies used by individuals who feel they look their age, with a group who feel they look either younger or older than they are to determine if this self-awareness influences the language they use to describe the temporal aspects of their past experiences. Furthermore, and as shown in Figure 1, it is predicted that the language used to communicate temporal information about autobiographical events may be influenced by characteristics of the listener. For example, a life theme cue may not have as much communication value when conversing with someone from a culture which has a different life script, and if the narrator understands this they may modify their language selection.

References

Barclay, C. R. & H. M. Wellman. 1986. Accuracies and inaccuracies in autobiographical memories. *Journal of Memory and Language* 2. 93–103.

Berntsen, D. & D. C. Rubin. 2002. Emotionally charged memories across the lifespan: The recall of happy, sad, traumatic, and involuntary memories. *Psychology and Aging* 17. 636–652.

Berntsen, D. & D. C. Rubin. 2004. Cultural life scripts structure recall from autobiographical memory. *Memory and Cognition* 3. 427–442.

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

Bruce, D. & M. Van Pelt. 1989. Memories of a bicycle tour. *Applied Cognitive Psychology* 3. 137–156.
Bruyer, R., S. Mejias & S. Doublet. 2007. Effect of face familiarity on age decision. *Acta Psychologica* 124. 159–176.
Burt, C. D. B. 1992. Retrieval characteristics of autobiographical memories: event and date information. *Applied Cognitive Psychology* 6. 389–404.
Burt, C. D. B. 2008. Time, language and autobiographical memory. *Language Learning* 58. 123–141.
Burt, C. D. B., S. Kemp & M. A. Conway. 2001. What happens if you retest autobiographical memory after 10 years? *Memory and Cognition* 29. 127–136.
Burt, C. D. B., S. Kemp & M. A. Conway. 2003. Themes, events, and episodes in autobiographical memory. *Memory and Cognition* 31. 317–325.
Dehon, H. & S. Brédart. 2001. An 'other-race' effect in age estimation from faces. *Perception* 30. 1107–1113.
Ferguson, R. P. & P. Martin. 1983. Long-term temporal estimation in humans. *Perception and Psychophysics* 33. 585–592.
Friedman, W. J. 1993. Memory for the time of past events. *Psychological Bulletin* 113. 44–66.
Friedman, W. J. 2001. Memory process underlying humans' chronological sense of the past. In C. Hoerl & T. McCormack (eds.), *Time and memory: Issues in philosophy and psychology*, 139–167. Oxford: Oxford University Press.
George, P. A. & G. J. Hole. 1995. Factors influencing the accuracy of age estimates of unfamiliar faces. *Perception* 24. 1059–1073.
Habermas, T. & S. Bluck. 2000. Getting a life: The emergence of the life story in adolescence. *Psychological Bulletin* 126. 748–769.
Habermas, T. & C. de Silveira. 2008. The development of global coherence in life narratives across adolescence: Temporal, causal, and thematic aspects. *Developmental Psychology* 44. 707–721.
Harnsberger, J. D., R. Shrivastav, W. S. Brown Jr., H. Rothman & H. Hollien. 2008. Speaking rate and fundamental frequency as speech cues to perceived age. *Journal of Voice* 22. 58–69.
Heness, R. 1991. Perceiving age and attractiveness in facial photographs. *Journal of Applied Psychology* 21. 933–946.
Huttenlocher, J., L. V. Hedges & N. M. Bradburn. 1990. Reports of elapsed time: Bounding and rounding processes in estimation. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 16. 196–213.
Larsen, S. F. & C. P. Thompson. 1995. Reconstructive memory in the dating of personal and public events. *Memory and Cognition* 23. 780–790.
Linton, M. 1975. Memory for real world events. In D. A. Norman & D. E. Rumelhart (eds.), *Explorations in cognition,* 376–404. San Francisco: Freeman.
Pasupathi, M. 2001. The social construction of the personal past and its implications for adult development. *Psychological Bulletin* 5. 651–672.
Robinson, J. A. 1992. First experience memories: Contexts and functions in personal histories. In M. A. Conway, D. C. Rubin, H. Spinnler & W. A. Wagenaar (eds.), *Theoretical perspectives on autobiographical memory,* 223–239. Dordrecht, The Netherlands: Kluwer Academic Press.
Rubin, D. C. & A. D. Baddeley. 1989. Telescoping is not time compression: A model of the dating of autobiographical events. *Memory and Cognition* 17. 653–661.
Rubin, D. C. & D. Berntsen. 2003. Life scripts help to maintain autobiographical memories of highly positive, but not highly negative events. *Memory and Cognition* 31. 1–14.
Shum, M. S. 1998. The role of temporal landmarks in autobiographical memory processes. *Psychological Bulletin* 124. 423–442.
Thompson, C. P. 1982. Memory for unique personal events: The room-mate study. *Memory and Cognition* 10. 324–332.

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press

Thompson, C. P. 1985a. Memory for unique personal events: Effects of pleasantness. *Motivation and Emotion* 9. 277–289.
Thompson, C. P. 1985b. Memory for unique personal events: Some implications of the self-schema. *Human Learning: Journal of Practical Research and Applications* 4. 267–280.
Thompson, C. P., J. J. Skowronski, S. F. Larsen & L. Betz. 1996. *Autobiographical memory: Remembering what and remembering when*. New Jersey: Erlbaum.
Thompson, C. P., J. J. Skowronski & D. J. Lee. 1988. Telescoping in dating naturally occurring events. *Memory and Cognition* 16. 461–468.
Wagenaar, W. A. 1986. My memory: A study of autobiographical memory over six years. *Cognitive Psychology* 18. 225–252.
White, R. T. 1982. Memory for personal events. *Human Learning* 1. 177–183.
Willner, P. & G. Rowe. 2001. Alcohol servers' estimates of young people's ages. *Drugs: Education, Prevention and Policy* 8. 375–383.

https://doi.org/10.1515/langcog.2011.005 Published online by Cambridge University Press