Autobiographical Remembering and Hypermnesia: A Comparison of Older and Younger Adults

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This study examined age differences in autobiographical memory and extended findings concerning hypermnesia in laboratory tasks to a real world event, the announcement of the verdict in the O. J. Simpson murder trial. Older and younger adults repeatedly recalled the event in a single session. Interviews were coded for amount and type of accurate information and for errors. The age groups did not differ in ability to recall the gist of the event or in the number of errors made. Younger adults were better at remembering when the event had occurred. Both age groups showed hypermnesia. The results are discussed in terms of the importance of autobiographical memory across the life span and the phenomenon of hypermnesia in everyday memory.

Since Ebbinghaus (1964/1885), most research on memory has made use of experimenter-provided materials and has focused on how memory for those materials decays over time. This focus on memory decay and memory decrements has been especially pronounced in the study of memory in older adults. In contrast, this investigation examines improvement over time in memory for an autobiographical event (i.e., hypermnesia). Hypermnesia occurs when individuals are able to recall more information over repeated sessions even after they have indicated that they can recall nothing further. This memory effect has been demonstrated in a variety of laboratory tasks but has not been examined for autobiographical events. Thus, the first aim of this investigation was to assess whether recall level increases over repeated sessions when individuals recall an autobiographical event. Although research on the effects of aging on memory has increased in the past 10 years, researchers still know little about life span changes in autobiographical memory (for a review, see Cohen, 1998). Thus, our second aim was to examine whether age differences exist in adults' autobiographical memories for an important real-life event and whether older and younger adults differ in the extent to which they display hypermnesia.

Hypermnesia in Autobiographical Memory

Hypermnesia is defined as an increase in the amount of information recalled over repeated recall sessions (Payne, 1987). The typical experimental design for investigating hypermnesia involves presenting participants, typically college students, with verbal or pictorial materials for a limited time with instructions to remember the items. Following this, participants receive an immediate free recall test of limited duration (e.g., 40 slides to be remembered in 7 min). After participants have indicated all of the items they can recall, they are asked to sit quietly and think about the items again, trying to remember more, before the next recall test is given. This recall-think-recall sequence is often repeated such that three recall tests are administered. Between-groups manipulations have included variations in the length of the delay period before recall and variations in the nature of the to-be-remembered (TBR) material.

In experimental studies, hypermnesia has been shown to be a reliable phenomenon across a variety of test materials (e.g., sketches of common objects, poetry, and lists of words) and with varying, though relatively short, retention intervals (minutes, hours, or days; e.g., Erdelyi & Becker, 1974; Erdelyi & Kleinbard, 1978; Shapiro & Erdelyi, 1974; for a review, see Payne, 1987). Although no previous research exists on hypermnesia for autobiographical events, three studies have demonstrated hypermnesia by using videotapes of action sequences as the memory materials. Participants were asked to indicate all of the details they could recall from the videotapes at each recall session, yet they recalled increasingly more details over repeated memory trials (Bornstein, Liebel, & Scarberr, 1998; Dunning & Stern, 1992; Scribner & Safer, 1988).

No undisputed theory exists for why hypermnesia occurs for some materials and not for others, but one factor appears to be the extent to which the materials are encoded as images (Payne, 1987). This imagery hypothesis is based on the finding that hypermnesia is much more common when participants are asked to recall high
imagery stimuli than when asked to recall low imagery stimuli. In a meta-analysis of 172 studies that used repeated testing of the TBR material, Payne (1987) found that pictorial material was more likely than verbal material to show hypermnesia. Specifically, hypermnesia occurred in 95% of cases using pictorial material and in 50% of cases using verbal material.

Mandler (1994) argued that the imagery hypothesis is a special case of the depth of processing hypothesis. He suggested that amount of hypermnesia is a function of the degree of elaboration (organization) of the TBR materials, which results in having a greater number of recall cues and therefore increases the likelihood of increased recall over time. Mandler detailed several reasons why high imagery materials should be viewed as subject to greater elaboration and reclassified the studies reported by Payne (1987) as being ones that either did or did not encourage elaborative processing. Materials or conditions classified as elaborative resulted in hypermnesia in 95% of the studies, whereas nonelaborative materials and conditions resulted in hypermnesia in only 22% of the studies.

The finding that high imagery materials, or any materials that are elaboratively encoded, are more likely to produce hypermnesic effects in the laboratory suggests that real-life situations in which memories are spontaneously encoded as images, and therefore highly elaborated, may be ones in which hypermnesia naturally operates. Personal autobiographical episodes (i.e., "personal memories"); Brewer, 1986) have been shown to be highly imaginatively encoded (Brewer, 1992; Nigro & Neisser, 1983). In fact, imagery is important enough in the encoding of personal life events that imagery vividness is a reliable predictor of whether the event will be recalled years later (White, 1989). Several researchers have argued in favor of linking laboratory findings concerning memory to their everyday usages (Baddeley, 1987; Bruce, 1989). In terms of its everyday function, hypermnesia may be an important phenomenon that indicates the efficient retrieval of information (Bornstein et al., 1998). In other words, at first, a skeletal version of a well-elaborated event may be recalled. Then, if warranted by the situation, as indicated by the individuals' persistent search of memory (Greenwald, 1980), greater amounts of information are recalled (through spreading activation; Mandler, 1994), thereby increasing the richness and detail of the remembered event.

Thus, with a concern for increasing the ecological validity of memory research (Linton, 1986; Neisser, 1978; Rubin, 1996), the first aim of our study was to enhance our understanding of hypermnesia by extending research on this memory effect to a naturalistic context: memory for everyday events. We hypothesized that because these are conditions that should encourage elaboration, hypermnesia would be found in recall of a distant, naturally occurring event that was attended to as part of the participant's life rather than at the request of an experimenter. More specifically, we hypothesized that autobiographical memories that were high in imagery would show higher levels of hypermnesia than those that were low in imagery. That is, imagery level was used as an operationalization of elaboration that could be measured separately from recall level.

In investigating hypermnesia in the context of autobiographical events, we were also able to examine the relations between repeated recall and confabulation. Few researchers have studied whether hypermnesic effects are partly due to confabulated or reconstructed recall, perhaps because laboratory materials such as word lists and pictures are not particularly subject to confabulation (Dunning & Stern, 1992). In one study, however, Erdelyi (1970) found that hypermnesia was accompanied by a tendency to include more false responses over repeated trials. He suggested that relaxation of the reporting criterion, that is, the "cut-off" at which individuals distinguish true from false items, may occur over repeated trials. A study that examined hypermnesia using a brief videotape depicting a crime also showed a small but significant increase in the error rate (Scrivner & Safer, 1988). This relaxation of reporting criteria may be seen as a case of source monitoring: the processes involved in making attributions about the origins of memories, knowledge, and beliefs (Johnson, Hashtroudi, & Lindsay, 1993).

### Age Differences in Autobiographical Memory

The second aim of this investigation was to examine age differences in autobiographical memory and to discover whether hypermnesia occurs across age groups in memory for life events. Few studies have directly addressed older adults' ability to recall personal autobiographical events, but some research does provide clues as to how memory for life events might function across the life span. Cohen, Conway, and Maylor (1994) studied differences between age groups in the formation of flashbulb memories in response to a significant historical event. Although 90% of the young participants (M = 22.4 years) reported flashbulb memories, only 42% of the older participants (M = 71.6 years) had memories of the event one year later that were accurate and detailed enough to be classified as flashbulb memories. After one year, memory for an emotional autobiographical event differed by age with older adults giving less, and less accurate, detail.

Other researchers also have noted the tendency for older adults to remember information in an integrative or interpretive style as opposed to the more detail-oriented style adopted by the young (for a review, see Holland & Rabbitt, 1990). Adams (1991) and Adams, Labouvie-Vief, Hobart, and Dorosz (1990) reported that older adults recall text in a more interpretive manner than younger adults, focusing on a story's moral, metaphoric, or social-normative meaning. The authors suggested that older adults may be more likely than young adults to rely on previous experience and knowledge when encoding new information. If memory for actual events is similar to memory for meaningful text, then one would expect older adults to be as good as younger adults at recalling the gist of events.

Hashtroudi, Johnson, and Chrosniak (1990) found that older adults (M = 68.7 years) were more likely than younger adults (M = 19.8 years) to focus on feelings when recalling everyday events that they had previously performed in the lab (e.g., packing a picnic lunch). This focus on affect may interfere with older adults' memory for other aspects of the situation and account for

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1 An alternative hypothesis put forward in Payne's (1987) article, the cumulative recall level hypothesis, states that materials that have high recall levels will show hypermnesia if recall asymptote is not reached at the first recall session. This hypothesis is difficult to test with autobiographical materials and will thus not be considered here.

2 Research does exist on the frequency distribution of remembered autobiographical events by individuals of different ages (e.g., Rubin & Schulkind, 1997; Rubin, Wetzler, & Nebes, 1986).
their poorer performance in remembering details. To test this hypothesis, Hashtroudi, Johnson, Vnek, and Ferguson (1994) asked older (M = 70.1 years) and younger adults (M = 19.9 years) to act in a short play together and to focus on either the affective or factual aspects of the play. Affective focus lowered overall recall for both the young and the old participants. In examining autobiographical memory, people’s emotional state, both at the time that information is encoded and during recall, may be important moderators of age differences (Carstensen & Turk-Charles, 1994; Levine, 1997; Levine & Bluck, 1997; Levine & Burgess, 1997).

The pattern of memory deficits seen across a variety of tasks in late adulthood has been reviewed by Burke and Light (1981; see also Light, 1996). They argued that deficits are often related to an inability to remember a specific type of memory detail: contextual information. This decreased ability to recall contextual details may result in a deficit in source monitoring ability, that is, the ability to remember the source or origin of thoughts and memories (Johnson, Hashtroudi, & Lindsay, 1993; for a review, see Schacter, Koutstaal, & Norman, 1997). In keeping with Burke and Light’s (1981) suggestion, Hashtroudi et al. (1990) found that older adults are poor at remembering perceptual and contextual information (e.g., spatial, temporal detail) about situations that they have imagined or have actually experienced in a previous laboratory session. This inability to recall contextual information resulted in a source monitoring deficit 3 weeks later for older adults as compared with younger adults (see also Ferguson, Hashtroudi, & Johnson, 1992; Hashtroudi, Johnson, & Chrosniak, 1989).

In summary, these studies provide largely indirect evidence (because only one study involved actual autobiographical events) for age differences in memory for some types of information about autobiographical events. Older adults have been shown to remember texts and events in a more integrated and less detailed fashion than their younger counterparts (Adams, 1991; Adams et al., 1990; Cohen et al., 1994). Older adults also seem to focus more on feelings during recall of events, and this sometimes (Hashtroudi et al., 1990), but not always (Cohen et al., 1994), interferes with their recall performance. Finally, older adults show deficits in source monitoring. This deficit in source monitoring may be due to a decreased tendency to encode contextual details of events or to use contextual memory characteristics during retrieval (e.g., Burke & Light, 1981).

Hypotheses

Pillemer (1992) suggested that autobiographical memory has a communicative, a self, and a directive function: People use memories to communicate with others, to find meaning and resolve conflicts, and to provide guidance for current and future behavior (see also Cohen, 1998; Nelson, 1993; Robinson & Swanson, 1990). As such, although other memory functions may show declines with age, it might be expected that memory for the gist of autobiographical events would be preserved well into late life (Fitzgerald, 1996) to promote successful aging (Baltes & Baltes, 1990). Successful aging may depend on the ability to maintain a sense of self-coherence and on the ability to plan. Thus, gist recall and hypermnesia over repeated recall attempts may become increasingly important in later life because they allow efficient retrieval of information in individuals who have (by virtue of their years) stored a huge number of personal memories and may have decreased information processing capacity (Craik, 1994; for a review, see Light, 1996). On the basis of these theoretical claims and past research on age differences in memory, we hypothesized that no age differences would be found in memory for the gist of an autobiographical event.

It is less obvious to what extent accuracy in memory for events, and the details associated with them, should be preserved in later life. The consequences of not recalling specific details, not recalling exactly when an event occurred, or not being completely accurate are usually not as serious as completely forgetting the gist of what happened. In addition, the gist of an event may be brought to mind or shared with others more commonly (i.e., rehearsed more often) than are specific details and dates of events. The research reviewed thus far indicates that older adults may have difficulty recalling details of events. In fact, older adults may compensate for a general decline in information processing by focusing on gist at the expense of recalling detail (Adams, Smith, Nyquist, & Perlmutter, 1997). A phenomenon such as hypermnesia—increased recall of autobiographical information over repeated recall sessions—should be useful to both young and old. Indeed, a laboratory study on aging and hypermnesia showed no age differences in mean recall of words across memory trials (Finkel, Fox, & McGue, 1995). Thus, some degree of hypermnesia is expected in both younger and older adults. The elaboration—imagery hypothesis holds that regardless of the participant’s age, autobiographical memories that are high in imagery should be highly elaborated and thus should show hypermnesia.

Although both age groups are expected to show hypermnesia, we have reviewed some evidence to suggest that older adults may be more prone to confabulate during repeated recall sessions. In other words, if older adults are poor source monitors for internal events, they should be more likely than younger adults to include reasonable, but inaccurate, information in their recall of an event.

The Event

To test these hypotheses, participants were asked to repeatedly recall their experience of the televised reading of the verdict in the O. J. Simpson double murder trial that occurred in Los Angeles, California at 10:04 a.m. on October 2, 1995. The reading of the verdict was filmed by a single courtroom camera, so all television stations aired the same coverage of the actual courtroom proceedings. The entire courtroom coverage lasted 14.5 min. The Simpson verdict was chosen as the to-be-remembered event because it was an involving real-life event and also provided a standard cue (i.e., everyone experienced the same event) for formation of a memory. Crucially, this event provided the opportunity to analyze the accuracy of individuals’ memory because a videotape of the original event was available. The Simpson verdict was also useful because, similar to most autobiographical memories, it was a reasonably distant event, having occurred approxi-
ly 8 months before the beginning of the study. Events produced in the laboratory for later recall (half an hour later, or one day later) often lack this temporal quality of naturally acquired autobiographical memories. Finally, asking people who were highly interested in the trial and its outcome to recall the announcement of the verdict provided the opportunity to study an event that was certainly not neutral (unlike most laboratory events) but was not so emotionally extreme as to be subject to nonnormative cognitive processing (for a review, see Christianson & Safer, 1996).

Method

Participants

Fifty-six younger adults ( = 20 years, SD = 2.0) and 37 older adults ( = 62 years, SD = 8.5) participated in the study. All of the participants had watched the announcement of the verdict in the double murder trial of Mr. Orenthal James (O. J.) Simpson on television at 10:00 a.m. on October 2, 1995. The young adults (35 women and 21 men) were recruited through the participant pool at the University of California, Irvine, and received course credit for their participation. The older adults (30 women and 7 men) were recruited through public advertisements on campus and in the community as well as through seniors’ centers, church groups, libraries, golf courses, and bowling alleys in Irvine and nearby Southern California communities. Older adults were compensated for their participation by being entered in a lottery with a chance to win $100. All individuals were screened to ensure that they were in the appropriate age group (18 to 25 years or over 55 years), were fluent English speakers, and had indeed watched the original verdict announcement. To avoid rehearsal of the to-be-remembered event, the screening also included several irrelevant questions so as to keep the nature of the study hidden until participants were interviewed. Six (2 younger and 4 older) participants were not included in analyses because of inaudible interview tapes. The study was conducted approximately 8 months after the verdict had been announced.

All participants were born in the United States and spoke English as their first language from the time of birth. Whereas approximately half of the younger group were Caucasian (41.1%) and approximately half were Asian American (46.4%), the older group was almost exclusively Caucasian (91.9%). On a 5-point scale, the mean health level was rated as good (5-point Likert-type scale; 1 = poor, 5 = excellent; = 4.20, SD = 0.76). The groups did not differ on self-reported health (young: = 4.22, SD = .68; old: = 4.27, SD = .80). The age groups did differ in education level, and verbal intelligence as measured by the Vocabulary subtest of the Wechsler Adult Intelligence Scale—Revised (WAIS–R; Wechsler, 1981). The scoring of the WAIS was completed by using standard procedures, and two raters reached 83% agreement on a random subsample (16%) of the tests. As is commonly found, older adults’ WAIS–R (Vocabulary) scores ( = 30.73, SD = 4.93) were significantly higher than younger adults’ scores ( = 22.15, SD = 5.04), t(85) = 7.77, p < .001. On average, the older adults had received about one more year of education ( = 15.88, SD = 2.63) than had the younger group ( = 14.55, SD = 1.45), t(85) = 3.07, p < .01. Neither level of education nor WAIS–R scores were associated with memory performance.

Design

The study used a 2 × 3 cross-sectional between-groups, repeated measures design with age (young or old) as the between-subjects variable and memory interview (three interviews) as the within-subjects variable. Number and accuracy of information units recalled during the interviews were the major dependent variables. The study thus used a modified version of the basic hypermnesia design (Erdelyi & Becker, 1974), which involves three successive recall periods divided by intervals during which individuals think about the to-be-remembered material.

Procedure

Individuals were informed that they were participating in a study about how people remember things that happen in their everyday life and how they talk about those memories. The participants were interviewed individually and audiotaped by trained female undergraduate experimenters who were unaware of the study hypotheses and read from standard scripts throughout the interviews. Participants recalled their experience of watching the televised reading of the verdict in the O. J. Simpson trial. They were asked to recall this event three times within a single session that lasted approximately 1 hr. In each interview, individuals described their memory following instructions to remember as much as they possibly could. Participants recalled the event in two parts, as follows: (a) the TV aspect: events that occurred on television immediately before, during, and just after the verdict was announced; and (b) the personal aspect: their personal memories of their own reactions and of what occurred around them immediately before, during, and after the verdict was announced. The order in which participants recalled the televised and personal aspects of the verdict announcement was counterbalanced. Only the results pertaining to memory for the televised aspect of the verdict are presented in this article.

Before the interviews began, participants filled out a background (demographic) questionnaire. Then participants were instructed, “Please tell me everything you can about what happened on TV just before, during, and just after the verdict was announced.” In each of the three successive interviews, participants were presented with three standard probes to recall more about the event. The probes were as follows: (a) “Can you remember anything else about what happened on TV?” (b) “Can you tell me anything more about how the verdict was announced on TV?” and (c) “Okay, do you think that’s everything?”

At the end of each interview, when it was clear that the participant could recall nothing more about the event, he or she remained in the quiet interview room alone for 3 min and was asked to spend all of that time thinking about the event. The participant was told, “Now what I’d like to do is just let you think about this event for awhile. I’m going to leave for a few minutes and I want you to spend all of the time I am away thinking about the event, and try to see if you can remember more about it. When I come back, I’ll ask you about it again.”

When the three memory interviews were finished, participants rated the televised aspect of their memory in terms of their confidence in its accuracy and its completeness. They also rated how hard they had tried to be absolutely accurate during the entire memory interview. Participants then filled out the “Verdict Questionnaire” regarding their interest in the trial and the phenomenology of their reported memories. Last, they were administered the WAIS–R (Vocabulary subscale; Wechsler, 1981).

Materials

Self-ratings of accuracy and completeness of memories. Participants were asked to make metacognitive judgments of their performance by completing two 5-point scales rating the completeness and the accuracy of the memory that they generated. A third question assessed the extent to which people think about the event. In each following instructions to remember as much as they possibly could. Participants recalled the event in two parts, as follows: (a) the TV aspect: events that occurred on television immediately before, during, and just after the verdict was announced; and (b) the personal aspect: their personal memories of their own reactions and of what occurred around them immediately before, during, and after the verdict was announced. The order in which participants recalled the televised and personal aspects of the verdict announcement was counterbalanced. Only the results pertaining to memory for the televised aspect of the verdict are presented in this article.

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which individuals had treated the memory task as if it were an exam to ascertain whether the younger adults, because they were all students, approached the task with a different mental set than did older adults (i.e., "I'm interested in the extent that you felt it was really important to say only things that you really remembered or knew were completely accurate when discussing your memories").

The Verdict Questionnaire. The Verdict Questionnaire consisted of questions about participants’ reactions to the trial and the verdict, and questions about characteristics of their memories. Participants were asked to recall how long ago they thought that the event had occurred in number of months, and they also tried to provide the day, month, and year of the event. Only the number of months measure was used in analyses. The more specific question yielded very little extra information because almost everyone could name the year, and almost no one could name the actual date of the verdict announcement. Participants also stated what they had hoped the verdict would be (guilty, not guilty, or didn't care), how involved they had felt with the trial (5-point scale), how many times they had watched replays of the verdict announcement, and how intensely they had felt specific emotions (surprised, happy, sad, and angry) when the verdict was announced (5-point scales). Participants also rated the vividness of the imagery of their memories for the verdict announcement. Specifically, on 5-point scales, participants indicated the extent to which they could really remember the event as opposed to simply knowing that the event had occurred (Conway & Dewhurst, 1994), how vivid this memory was as compared with other memories, the extent to which they could see the event in their mind, hear the event, feel how they felt at the time of the event, the extent to which the memory was like a narrative, and the extent to which the memory was abstract.

Coding

Number of information units. Each participant’s three memory interviews were transcribed and coded for number of information units, types of information, and number and type of errors. To develop the information units, two coders classified a videotape of the televised verdict announcement into discrete units of measurement after having watched it several times and while referring to a complete transcript of the event. It was decided to classify the units by discrete subevents instead of by time elapsed, as some subevents (e.g., preliminary setting, or jurors brought in) took longer than a minute and others, which were much more central to the event (e.g., Mr. Simpson's mouth, "Thank you" to the jury), took only a few seconds. The first coder identified 35 discrete, chronological subevents of the verdict reading. The first author then condensed these 35 subevents into 20 inclusive subevents.

Coders began each coding session by watching the televised verdict. They then counted how many of the 20 subevents an individual recalled at each of their three interviews. For each of the 20 possible subevents, the participant was assigned 0 (no recall) or 1 (subevent mentioned). For example, if a participant indicated that Mr. Simpson looked arrogant while he stood awaiting the verdict, he or she would be assigned 1 point under the subevent "Mr. Simpson awaits verdict." The subevents were broad enough so that no piece of information that was recalled about the proceedings was left uncoded. Two raters, who were unaware of the gender and age of the participants, coded 10% of the interviews and agreed on 91% of coding decisions regarding the number of subevents, or information units, recalled.

Information type. Following other studies that have coded the content of autobiographical text (Adams et al., 1990b; Stein & Glenn, 1982), the type of information recalled was also coded. Each subevent for which information was recalled was coded as to whether it contained one or more of the following four types of information: setting features, behaviors, emotional reactions, and things that people said or thought. Of course, viewers of the event could not really ascertain what the players in the event actually thought. Because responses were provided in a story-telling narrative format, however, participants recalled things such as, "Well, O. J. was thinking to himself, "This is it!" In order not to miss this type of recalled information, we included things that people thought in a category with things that people actually said. Two raters coded a random subsample (10%) of the interviews for the types of information recalled in each subevent. The percentages of agreement for coding decisions were as follows: setting 97%, behavior 88%, emotional reactions 93%, and thoughts or speech 96%.

Errors. Information units were coded for errors by comparing them with a videotape of the television coverage of the verdict announcement. The coders were very familiar with the short televised segment in which the verdict was read. When a coder thought that an error was present, she checked with a detailed transcript of the verdict proceedings to ascertain whether an error had truly been made before coding it as such. Unusual interpretations of people’s emotional reactions were not coded as errors because the reading of others' emotions is highly subjective. For example, participants described the defendant’s emotional state, while he awaited the verdict, as everything from "arrogant and smirking because he already knew he was getting off" to "turning green because his whole life was going to be decided in the next few minutes."

Once an error was identified, it was coded as either a change error, in which the participant described something that really happened but described it inaccurately, or an add error, in which the participant described a subevent that actually did not happen. A very common example of a change error was to recall that either the judge or the man who was the head of the jury read the verdict. In fact, the foreperson of the jury was a woman in this case. Regardless, the verdict was read by the court clerk, who was also a woman. Add errors included such things as recalling how the jury reacted when the verdict was announced (they were not shown) and describing how the defendant ran over to kiss his mother as soon as he heard the verdict (he remained at the defense table until the courtroom was dismissed). Two raters coded a random subsample (10%) of the interviews for errors and agreed on 88% of the coding decisions.

Results

Preliminary Analyses

We conducted preliminary analyses to identify variables that differed with age and thus should be used as covariates in further analyses of age-related differences in memory. There was no age difference (young: M = 7.33, SD = 7.34; old: M = 9.42, SD = 10.13) in the number of times individuals had watched televised replays of the verdict announcement (M = 8.13, SD = 8.51, range = 0–40), t(85) = 1.11, p = .27. Age differences were found in participants’ level of involvement in the trial and in their reports concerning how hard they tried to be completely accurate during the memory interviews. Using a 5-point scale, older adults reported greater involvement in the trial proceedings in the year before the verdict reading (M = 3.45, SD = .94) than did younger adults (M = 2.54, SD = .79), t(85) = 4.88, p < .001. Although participants reported trying "quite a bit" to be accurate, older adults reported trying somewhat harder (M = 4.51, SD = .76) than did younger adults (M = 4.09, SD = .65), t(85) = 2.76, p < .01. There was a significant age difference between the average length of time from the verdict announcement until the interview, t(85) = 4.77, p < .001. Younger adults (M = 7.37 months, SD = .94) were interviewed closer to the event than were older adults (M = 8.21 months, SD = .49). Note that, if anything,

6 The coding scheme also involved the possible assignment of 2 in cases in which the subevent was highly elaborated. This score was awarded only twice in the coding of the entire data set. As such, it has no effect on the analyses.
this would increase the likelihood of finding age differences, that is, of finding that older adults performed worse than younger adults in the memory interviews. There were no significant correlations between performance on any of the memory measures and level of involvement in the trial (rs range from .13 to .20), effort to be accurate (rs range from -.09 to .05), or how long ago an individual had been interviewed (rs range from -.10 to .04). Because age differences were seen on these variables, however, level of involvement, effort to be accurate, and amount of time between verdict announcement and interview were included as covariates when testing for memory differences between older and younger adults.

No gender or ethnicity differences were found when these variables were included in any of the analyses reported here. Therefore, gender and ethnicity are not included in the reported analyses.

Hypermnnesia for an Autobiographical Event

Following other studies of hypermnnesia (see Payne, 1987), recall of information was measured in two ways. Both used the total number of coded accurate information units. The first measure, absolute recall, is a count of how much information was recalled at each of the three interviews regardless of whether items from previous interviews were repeated again or forgotten. In other words, the amount of information recalled at each of the three interviews is tallied separately and without regard for performance on the other two interviews. As such, across interviews this measure reflects increases in new information relative to the extent of forgetting of old information. The second measure, cumulative recall, measures the amount of information recalled across interviews by "keeping a running tab" of all new information that is recalled. Using this second measure, over repeated interviews, participants' scores get higher if they recall new material regardless of whether some forgetting of old information also occurs on subsequent interviews.7

To examine whether the amount of information recalled increased over the three interviews, repeated measures analyses of covariance (ANCOVAs) were conducted with age group (younger, older) as the between-subjects variable, repeated interviews as the within-subjects variable, and concern with accuracy, trial involvement, and time since the event as covariates. As predicted, a hypermnnesia effect was found for memory for an autobiographical event. Means and standard deviations for both absolute and cumulative recall over the three interviews for each age group are presented in Table 1. The amount of information recalled increased from the first time people were interviewed to the third time, whether this was measured by absolute recall at each time period, F(2, 170) = 9.89, MSE = 2.06, p < .001, or by cumulative recall over the repeated trials, F(2, 170) = 228.68, MSE = 2.19, p < .001. Absolute recall of information increased from the first interview to the second interview, paired t(86) = 3.57, p < .001, but did not increase significantly in the third interview. Using cumulative recall, however, it can be seen that some new information was recalled at each successive interview. Cumulative recall increased from the first interview to the second interview, paired t(86) = 15.87, p < .001, and from the second to the third interview, paired t(86) = 12.11, p < .001. No age differences were found in the extent of increased recall of information over time. Thus, participants in both age groups who reported that they were not able to recall any more about an event were actually able to recall more information at a second interview and able to produce new information even at a third interview.

Hypermnnesia and Error

We also investigated the extent to which hypermnnesia results from an increased recall of erroneous information and whether this might occur differentially for the two age groups. A repeated

7 Absolute recall is the usual method of measuring hypermnnesia. Cumulative recall has been referred to in the literature as reminiscence. The use of this term is avoided here because reminiscence, as now used in the psychological literature and in everyday language, refers to at least one other phenomenon.
measures ANCOVA with age group as the between-subjects variable, repeated interviews as the within-subjects variable, and concern with accuracy, trial involvement, and time since the event as covariates, showed no increase in the absolute number of errors over time for either younger or older participants, F(2, 170) = 1.4, MSE = .48, p > .05. A similar ANCOVA was run, substituting cumulative recall as the dependent variable. The analysis showed that the number of errors did increase significantly when measured cumulatively across time, F(2, 170) = 35.65, MSE = .40, p < .001. The means and standard deviations for absolute number of errors and cumulative number of errors across interviews for each age group are presented in Table 1. However, the ratio of errors to accurate information recalled did not change across the three interviews. Increases in recall of information over interviews was not due to an increased error rate; that is, confabulation was not the reason for hypermnesia in either of the two age groups.

Elaboration–Imagery Hypothesis

The elaboration–imagery hypothesis states that high imagery materials, or those that are encoded with imagery, are more likely to be highly elaborated and will show hypermnesia more than other materials. To test this hypothesis, we constructed an index of participants’ memory clarity, and the sample was divided into high (n = 42) and low (n = 45) imagery groups by a median split on this index. The memory clarity index was constructed from items on the Verdict Questionnaire, using the mean rating for each participant of all the (highly intercorrelated) items related to imagery clarity. These items included ratings for overall vividness; the intensity with which memory was experienced as visual, affective, auditory, and not experienced as narrative or as abstract; and the extent of remembering versus knowing. Factor analysis showed that 53% of the variance in these ratings was explained by a single factor with an eigenvalue of 3.72. An ANCOVA with the memory clarity index as the dependent variable, age group as the between-subjects variable, and concern with accuracy, trial involvement, and time since the event as covariates, showed no differences between the age groups in terms of their rating of memory clarity, F(1, 82) = 11.26, MSE = .27, p = .001 (young: M = 2.92, SD = .54; old: M = 3.31, SD = .55).

Having created this index and examined possible age effects in memory clarity, we then tested the elaboration–imagery hypothesis. We conducted a repeated measures ANCOVA with absolute recall as the dependent variable, imagery level (high, low) and age group (young, old) as the between-subjects variables, and repeated interviews as the within-subjects variable. Concern with accuracy, trial involvement, and time since the event were used as covariates. The results showed a difference between the two imagery groups, F(1, 80) = 5.34, MSE = 15.75, p < .05, and a main effect for repeated interviews, F(2, 166) = 9.48, MSE = 2.09, p < .001. There were no main effects or interactions for age, and there was no Imagery Level × Interview interaction. To more specifically examine the two imagery groups, we did, however, conduct follow-up ANCOVAs separately for each imagery group. These ANCOVAs used age as a between-subjects variable, and concern with accuracy, trial involvement, and time since the event as covariates. Analyses demonstrated that both the high imagery group, F(2, 80) = 4.42, MSE = 2.09, p < .05, and the low imagery group, F(2, 86) = 5.51, MSE = 2.08, p < .01, showed the hypermnesia effect. Means for absolute recall levels of the high
and low imagery groups are presented in Table 2.

Findings concerning the elaboration–imagery hypothesis indicate that even those who reported low imagery levels showed hypermnesia. This is not surprising given that the low imagery materials that do not show hypermnesic effects in the laboratory are very low imagery (e.g., nonsense syllables).

Overall Amount, Type, and Accuracy of Information Recalled

The analyses presented earlier that tested for age differences in hypermnesia did not show a main effect for age. Thus, the two age groups did not differ significantly in the amount of information recalled. As seen in Table 1, there is no difference between the amount recalled (either absolute or cumulative recall level) by the two age groups either at the initial recall session or at the final recall session. We followed up these analyses to examine whether there may be age differences in recall of only certain types of information.

Paired t-tests showed that all participants recalled feelings (M = 3.74, SD = 1.96) and behaviors (M = 3.63, SD = 2.01) better than setting features (M = 2.02, SD = 1.37); feeling versus setting: t(86) = 7.41, p < .001; behavior versus setting: t(86) = 6.16, p < .001. Feelings, behaviors, and setting features were all recalled better than what individuals had thought or said during the verdict announcement (M = .86, SD = .94), setting versus thinking: t(86) = 6.77, p < .001. This pattern of results could reflect that, to make sense of the verdict announcement while they watched it, individuals largely focused on what the central figures in the courtroom did and on the emotions that they expressed. Older adults were no more likely to focus on feelings (young: M = 3.67, SD = 1.88; old: M = 3.85, SD = 2.09), behaviors (young: M = 3.54, SD = 2.10; old: M = 3.79, SD = 1.87), setting features (young: M = 2.02, SD = 1.43; old: M = 2.03, SD = 1.29), or what individuals had thought or said (young: M = .85, SD = .92; old: M = .88, SD = .99).

As reported in the hypermnesia section, and as seen in Table 1, there were also no age differences in amount of error either at the initial interview or after repeated interviews for either absolute or cumulative error level. The following analyses identified whether the two possible types of errors occurred to different extents and whether this varied by age. Over all interviews (cumulative error),

Table 2

<table>
<thead>
<tr>
<th>Interview</th>
<th>Low imagery (n = 45)</th>
<th>High imagery (n = 42)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>1</td>
<td>4.98</td>
<td>2.78</td>
</tr>
<tr>
<td>2</td>
<td>5.70</td>
<td>2.61</td>
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<tr>
<td>3</td>
<td>5.75</td>
<td>2.53</td>
</tr>
<tr>
<td>Total</td>
<td>5.48</td>
<td>2.64</td>
</tr>
</tbody>
</table>

Note. Main effects for interview and for imagery level are significant at p < .05. The Interview × Imagery Level interaction is not significant.
Older and younger adults repeatedly recalled an event that had occurred approximately 8 months before the study. The event was the televised reading of the verdict in a highly charged murder case in which the defendant was a national hero. We investigated whether hypermnesia, previously demonstrated only in laboratory studies, occurs in recall of an autobiographical event. In addition, we conducted a correlational analysis. Results showed no significant relation between the length of time since the event and the amount of error made in recalling how long ago the event had occurred, r(87) = -.11, p = .30.

**Emotional Reactions to the Verdict**

Participants rated how surprised, happy, angry, and sad they had felt when they first heard the verdict announced. ANCOVAs were conducted, 2 X 2 (Age Group X Desired Verdict), with level of involvement in the trial and time since the event as covariates, for each of the reported emotions. Fifteen individuals were not included in these analyses because they reported that they did not know what they hoped the verdict outcome would be. As would be expected, those who hoped for a guilty verdict (the verdict was, in fact, an acquittal) were more surprised, happy, angry, and sad than those who had hoped for an acquittal. There were no main effects for age and no Age X Hoped For Verdict interactions. Means for each emotion by desired verdict and by age are presented in Table 3.

**Discussion**

Older and younger adults repeatedly recalled an event that had occurred approximately 8 months before the study. The event was the televised reading of the verdict in a highly charged murder case in which the defendant was a national hero. We investigated whether hypermnesia, previously demonstrated only in laboratory studies, occurs in recall of an autobiographical event. In addition,}

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**Note.** None of the emotional states differ by age. All of the emotional states differ by desired outcome at p < .05.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Desired outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger²</td>
<td>Older³</td>
</tr>
<tr>
<td>Guilty⁴</td>
<td>Not guilty⁵</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Younger M</th>
<th>Younger SD</th>
<th>Older M</th>
<th>Older SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surprise</td>
<td>3.64</td>
<td>1.26</td>
<td>3.60</td>
<td>1.56</td>
</tr>
<tr>
<td>Sadness</td>
<td>2.69</td>
<td>1.23</td>
<td>3.45</td>
<td>1.52</td>
</tr>
<tr>
<td>Anger</td>
<td>2.80</td>
<td>1.30</td>
<td>3.27</td>
<td>1.60</td>
</tr>
<tr>
<td>Happiness</td>
<td>1.64</td>
<td>1.11</td>
<td>1.45</td>
<td>1.09</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Guilty M</th>
<th>Guilty SD</th>
<th>Not guilty M</th>
<th>Not guilty SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Surprise</td>
<td>3.98</td>
<td>1.20</td>
<td>2.93</td>
<td>1.39</td>
</tr>
<tr>
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<td>3.45</td>
<td>1.24</td>
<td>2.00</td>
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</tr>
<tr>
<td>Anger</td>
<td>3.58</td>
<td>1.19</td>
<td>1.93</td>
<td>1.28</td>
</tr>
<tr>
<td>Happiness</td>
<td>1.10</td>
<td>0.30</td>
<td>3.33</td>
<td>1.40</td>
</tr>
</tbody>
</table>

Note. None of the emotional states differ by age. All of the emotional states differ by desired outcome at p < .05.

*² n = 53. ³ n = 33. ⁴ n = 57. ⁵ n = 15.

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8 The covariate concerning individuals' effort to be accurate, included in analyses of the memory data, was not included in this analysis or in the analysis of emotions because the effort ratings pertained specifically to the information produced during the memory interviews.
we examined how well older and younger participants were able to recall the event, what types of information they recalled, and how often they made errors.

**Hypermnesia in Everyday Memory**

Both older and younger adults showed hypermnesia over the repeated interviews in which they recalled the event. All interviews ended with participants telling the interviewer that they could not remember anything else. Thus, as far as can be ascertained, they had exhausted their memory for the event at that time. After a short pause in which they were asked to think about the event, participants were, however, able to recall the event more fully. As such, hypermnesia was demonstrated in memory for a real-world event.

The hypermnesia effect occurred for those individuals who described their memory of the verdict announcement as more highly imaginal as well as for those who described their memory as less imaginal. Thus, it is unclear whether the elaboration–imagery hypothesis was supported. Clear support for the hypothesis would be found only if the high imagery group showed significantly more hypermnesia. One reason for the lack of discrepancy between the two imagery groups, however, may be that the imagery level in both groups was quite high. The nature of this politically charged emotional event may have led to relatively high levels of elaborative processing for all participants. Without a truly low imagery, or no imagery, group with whom to compare these patterns, it seems unfounded to reject this hypothesis.

There was an increase between only the first and second interviews in terms of the absolute or overall amount of information remembered but an increase between all three interviews in the addition of new information. In other words, although participants recalled new information at the third interview, they "forgot" enough previously mentioned material that, on balance, they showed no overall increase between the second and third interviews. Considering that the interviews all occurred within roughly 1 hr, the use of the term "forgot" is a rather implausible one. It seems unlikely that individuals had actually forgotten things that they had recalled for 8 months and reported only several minutes before. Instead, our interpretation of this finding is in line with Conway's (1992, 1996) model of the organization of autobiographical memory. He argued that autobiographical memories are not simply traces that are retrieved and described but rather that memories are reconstructed from event-specific knowledge at the time that they are needed and, as such, the exact form in which they are remembered is guided by the social and situational context in which they are recalled. Thus, even in this situation, in which the social and situational constraints remained fairly constant, individuals reformulated memories slightly differently (including some new information, or leaving out previously recalled information) across the three interviews. For example, participants' tendency to leave out previously recalled information at the third interview may have been partly due to the unnatural procedure of telling the same memory to the same person three times in a short period. In this way, the social context may have affected what was recalled, or at least what was reported, even under repeated probing.

Although the ability to recall new information was apparent across trials, it was also clear that this new information was accurate. Neither younger nor older adults responded to situational demands to remember more by generating more false information. Although older adults have been shown to be more prone to producing false recognition in word lists and picture sequences (Koutstaal & Schacter, 1997), our study did not find that older adults were more likely than younger adults to introduce inaccurate information into their accounts of an important event. At least in situations in which individuals are trying to be accurate (as reported by both the young and old participants in this study), hypermnesia does not seem to depend on the inclusion of confabulated information.

In summary, this research shows that hypermnesia occurs when people attempt to recall a significant autobiographical event. Furthermore, increased confabulation does not effectively explain hypermnesia for an autobiographical memory, as increased recall with repeated testing did not result from the inclusion of an increasing number of errors. Taken together, these results suggest that some amount of information is initially recalled; however, if the search continues, thereby increasing the demand for retrieval, enhanced recall levels may be attained by drawing on a well-elaborated memory for further information.

**Autobiographical Memory Across the Life Span**

Researchers have argued that autobiographical memory serves at least three important functions: self definitional, social, and directive (Baddeley, 1987; Hyman & Faries, 1992; Neisser, 1986; Pillemere, 1992; Robinson & Swanson, 1990). Given the importance of these functions across the life span, it is not surprising to find, as we did in this study, that older adults and younger adults do not differ in the level of completeness and accuracy with which they recall the gist of an autobiographical event. Although participants, regardless of age, made errors when recalling the event, these errors were mostly minor ones in which some aspect of the event was recalled somewhat differently than it had occurred.

Past research on aging and memory suggests that older adults show relative deficits in memory on tasks that are effortful (as opposed to automatic) and lack external support (provided by the experimenter or the task itself; for reviews, see Bäckman, Mantyla, & Herlitz, 1990; Craik & Jennings, 1992). The open-ended recall of the verdict announcement in the O. J. Simpson murder trial may at first seem like an effortful task that lacks external support and therefore one in which age differences in overall amount recalled might have been expected. There is, however, some difficulty in examining this naturally acquired memory in the same light as memories of laboratory episodes. Is recall of a meaningful, somewhat distant, life event effortful or automatic? What level of external support is needed to recall information that one encoded because of personal interest? Thus, autobiographical memory researchers are faced with the challenge of taking the useful concepts developed in basic cognitive aging research and applying them to the study of everyday memory. At the same time, a recent review of the literature on aging and memory noted that many studies take an isolationist approach, with the assumption that memory can be studied in isolation from other aspects of cognitive and social functioning (Zacks, Hasher, & Li, in press). The life span study of autobiographical memory offers, and possibly even demands, the investigation of memory in relation to other cognitive and non-cognitive (e.g., affective, motivational, and social) factors.
In keeping with the research of Cohen (1998; Cohen et al., 1994) and Adams and her colleagues (Adams, 1991; Adams et al., 1990, 1997), older adults performed well in recalling the gist of an event but did not perform as well as younger adults in recalling when the event had occurred. Both older and younger adults overestimated how long ago the event had occurred, but older adults' estimations were far worse. This may be interpreted as yet another sign of older adults' inability to recall details of events. However, the data of an event may not be recorded as a "time tag" attached to the autobiographical memory (e.g., Tulving, 1972). As such, it may be inappropriate to view the dating of the event as part of, a detail of, the memory of the televised verdict announcement. Instead, researchers have suggested that recalling the context of an event is necessary to accurately reconstruct the timing of the event (Friedman, 1993; Larsen & Conway, 1997), sometimes through the use of landmark events that occurred during that same period (for a review, see Shum, 1998). In this case, individuals may have needed to remember their personal context at the time they viewed the verdict announcement to reconstruct when it happened. If younger adults have more landmark events in their lives, this may be one explanation for their ability to estimate the date of the event more accurately than older adults (D. C. Rubin, personal communication, December 2, 1998). Although there is no evidence that younger adults have a greater number of linear landmarks (specific unique landmarks that do not recur), it seems plausible that the young adults in this study may have had more cyclical landmarks (daily, weekly, and annual routines) because they were university students. There are also individual differences in the ways that individuals incorporate landmarks into strategies for reconstruction of the timing of autobiographical events (Thompson, Skowronski, Larsen, & Betz, 1996), but it is not known whether older and younger adults use such strategies differentially.

Although remembering the timing of some events may be adaptive, it is not obvious that recalling the exact dates or timing of distant events is especially important to serving the functions of autobiographical memory outlined here. Certainly, memory for the dates of certain life events (e.g., medical history) or social events (e.g., birth dates of children) are useful, but it may be that prospective memory for specific dates is more crucial. Thus, although older adults in this study greatly exaggerated how long ago the event had occurred, it is hard to imagine how this deficit would constitute a serious problem in terms of everyday functioning. Bruce (1989) has cautioned researchers to be wary of labelling changes as deficits until a change in memory performance can be linked to an inability to perform a particular task in everyday life.

In understanding age differences, and in this case age continuities, in memory for events, affect has been thought to play a role. Although some research has shown that older adults focus more on affect during recall of an event performed in the laboratory, and that this compromises their ability to recall other types of information (Hashtroudi et al., 1990), this was not true in recall of this naturally acquired, meaningful event. In our investigation, the verdict announcement may have been attended to and encoded because of its affective significance. Indeed, affect was the most highly recalled type of information about the verdict announcement, perhaps because the verdict announcement was a very highly charged sociopolitical event in Southern California (Cowan & Fairchild, 1997). Younger and older adults were equally likely to focus on affect in their recall interviews. If focus on affect disrupts ability to recall other types of information, it did so uniformly across age groups in this study.

In summary, in keeping with a functional account of autobiographical memory, we found no age differences in memory for the gist of an autobiographical event, although the date that the event had occurred was remembered more accurately by younger than by older adults. Hypotheses based on laboratory research—that older adults' memory completeness might suffer through a focus on affect, and that accuracy might suffer through an inability to recall contextual details—were not upheld in this study of memory for a meaningful life event.

Conclusion

Older and younger adults do not differ in their ability to recall the gist of an autobiographical event, although younger adults were better at dating the event. If this finding is upheld in other research, it will be compatible with the notion that at least some functions of autobiographical memory are important across the life span (Cohen, 1998). Our sample of older adults could be classified as young-old. As suggested by other research in which young-old and old-old (Neugarten, 1975) participants differ (e.g., memory for activities; Cregger & Rogers, 1998), further research might test the limits of these findings with an older sample of older adults.

Both older and younger adults' recall of the event showed hypermnnesia: Individuals' ability to completely and accurately recall the event increased over repeated interviews. Thus, if autobiographical memory plays an important role in, for example, maintenance of self-definition (Bluck & Levine, 1998) or the expression of self in social relationships (Hyman & Faries, 1992), hypermnnesia may be a phenomenon that has positive consequences for fulfilling these functions. The combination of autobiographical memory with hypermnnesia is evident in several everyday contexts in which personal memories are recalled. In the psychotherapeutic context, individuals recall new information over repeated sessions. In social situations, particularly for intergenerational transfer of information, individuals tell and retell stories. In guiding our own behavior, we may repeatedly recall the way that some previous event unfolded so as to guide our present behavior or plan for some future event. The construction and reconstruction of basically accurate memories may play a powerful role in a variety of contexts and across the life span.

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