

# How retellings shape younger and older adults' memories

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The way a story is retold influences the way it is later remembered; after retelling an event in a biased manner, people subsequently remember the event in line with their distorted retelling. This study tested the hypothesis that this should be especially true for older adults. To test this, older and younger adults retold a story to be entertaining, to be accurate, or did not complete an initial retelling. Later, all participants recalled the story as accurately as possible. On this final test, younger adults were unaffected by how they had previously retold the story. In contrast, older adults had better memory for the story's content and structure if they had previously retold the story accurately. Furthermore, for older adults, greater usage of story-telling language during the retelling was associated with lower subsequent recall. In summary, retellings exerted a greater effect on memory in older, compared with younger, adults.

**Keywords:** Aging; Memory distortion; Memory retrieval; Narrative; Storytelling.

People alter their messages as a function of their audience (Bell, 1984; Clark, 1996; Clark & Carlson, 1982; Clark & Murphy, 1982; Krauss & Fussell, 1991). For example, people take into account how much information their audience needs in order to understand their message. Because of this, people provide simpler and clearer messages when speaking to children (e.g., DePaulo & Coleman, 1986), or non-native speakers (e.g., Bortfeld & Brennan, 1997) compared to peers. Similarly, people adjust their messages based on how much their audience wants (rather than needs) to know. For example, because distracted listeners do not provide appropriate feedback, people provide shorter messages when talking to distracted, rather than attentive,

listeners (Pasupathi, Stallworth, & Murdoch, 1998; see also Bavelas, Coates, & Johnson, 2000; Kuhlen & Brennan, 2010).

People also tune their messages to be in line with their audience's attitudes. For instance, in some studies, participants read ambiguous information that could reflect positive (e.g., independent) or negative (e.g., aloof) personality traits of a target person. Participants then describe the target person to a listener who either likes or dislikes the target. Here, participants design their statements to suit their listeners by describing the target positively when the listener likes the target, and negatively when the listener dislikes the target (e.g., Echterhoff, Higgins, & Groll, 2005; Echterhoff, Higgins, Kopietz, & Groll, 2008; Higgins, 1992;

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Higgins & Rholes, 1978; Sedikides, 1990; Todorov, 2002).

Interestingly, audience tuning can affect memory (e.g., Tversky & Marsh, 2000). After describing a target person to a biased audience, speakers later recall the target in line with their biased descriptions (e.g., Echterhoff et al., 2005; Higgins, McCann, & Fondacaro, 1982; Higgins & Rholes, 1978; McCann, Higgins, & Fondacaro, 1991). Furthermore, their own impressions of the target fit their previous descriptions (e.g., Sedikides, 1990; see also McGregor & Holmes, 1999) at least when they have a desire to achieve commonalities with their audience (see Echterhoff, Higgins, & Levine, 2009). That is, people end up remembering and believing what they said, rather than what they experienced (see Marsh, 2007; Pasupathi, 2001).

Similar results occur when examining how other communication goals during a retelling influence subsequent memory. For example, stories told to entertain bear little resemblance to stories told to convey information. When people tell a story to entertain, they use more emotion-related words, and speak in present tense with certainty. In contrast, when telling a story to convey information, people produce verbatim quotations (Wade & Clark, 1993) and include more detailed references to the original event (Dudukovic, Marsh, & Tversky, 2004). Once again, these retelling differences influence subsequent memory. Retelling an event to entertain lowers subsequent veridical memory for that event compared to retelling it to inform (Dudukovic et al., 2004).

In this study, we tested the hypothesis that retellings influence subsequent veridical memory more for older, compared with younger, adults. We predict this because of age differences in story-telling abilities and in interference effects. Later, we briefly outline these two factors.

First, research suggests that healthy older and younger adults differ in how they tell stories. Older adults tell less coherent stories (Pratt, Boyes, Robins, & Manchester, 1989), are more likely to go off-topic (e.g., Arbuckle & Gold, 1993; Gold & Arbuckle, 1995) and are more likely to add evaluative comments (Gould, Trevithick, & Dixon, 1991). Despite this, older adults are often perceived as being “better” storytellers than younger adults (e.g., James, Burke, Austin, & Hulme, 1998; Kemper, Kynette, Rash, O’Brien, & Sprott, 1989; Kemper, Rash, Kynette, & Norman, 1990; Pratt & Robins, 1991). This is especially true when the stories are rated by other older adults and when the content of the story is personal autobiography (Beaudreau, Storandt, & Strube,

2005). This age difference in story quality may be due to the fact that older adults focus on the story gist, whereas younger adults have a more literal, detailed story recall (Adams, Labouvie-Vief, Hobart, & Dorosz, 1990; Adams, Smith, Nyquist, & Perlmutter, 1997; see also Adams, 1991; Gould & Dixon, 1993; Pratt & Robins, 1991).

Older adults may also be perceived as better story-tellers, because they are more likely to tune their retellings to their audiences. In one study, younger and older women learned and then retold stories to either a child or an experimenter. Although both younger and older women reduced the complexity of difficult stories when the audience was a child, this was especially true of older women (Adams, Smith, Pasupathi, & Vitolo, 2002). Similarly, in another study, younger and older adults learned fables and were then asked to either retell them accurately or summarise them. Regardless of retelling instruction, younger adults produced detailed reproductions of the story’s propositional content. In contrast, older adults altered their stories according to the instructions. When trying to be accurate, they produced detailed reproductions of the story’s propositional content. When trying to summarise, they focused on the story’s metaphoric, social-normative and moral underpinnings (Labouvie-Vief, Schell, & Weaverdyck, 1982, as cited in Adams et al., 1990).

Although it is clear that there are age differences in how people tell stories, it is not known how this affects the subsequent recall. Older adults likely have lower story recall due to their more integrative and interpretive styles of encoding and rehearsal (e.g., Adams et al., 1990, 1997). However, this age deficit may be magnified after people retell a story in a biased fashion. This is because whereas younger adults may always retell the story accurately regardless of retelling instructions (e.g., Labouvie-Vief et al., as cited in Adams et al., 1990), older adults may be more likely to change their retellings as a function of the communication goals (Adams et al., 2002).

A second reason why retellings might shape subsequent memory more in older adults is because of age-related increases in retroactive memory interference (at least for difficult memory tasks; e.g., Arenberg, 1967; Ebert & Anderson, 2009; Hedden & Park, 2001, 2003; Winocur & Moscovitch, 1983). In general, older adults are less effective than younger adults in inhibiting information from entering working memory (e.g., Hasher, Lustig, & Zacks, 2007; Hasher & Zacks, 1988; Lustig, Hasher, & Tonev, 2001) and experience more difficulty in

binding and tracking contextual information (e.g., Ferguson, Hashtroudi, & Johnson, 1992; Glisky, Rubin, & Davidson, 2001; Hashtroudi, Johnson, & Chrosniak, 1989; Hashtroudi, Johnson, Vnek, & Ferguson, 1994; Mitchell, Johnson, Raye, Mather, & D'Esposito, 2000). Because of these deficits, they exhibit greater interference effects. Age-related increases in interference should lead retellings to influence subsequent memory more for older than younger adults. As noted earlier, people purposely change the way they retell events as a function of their audience. For example, when retelling a story to entertain, people use different language (e.g., more affective words) and exaggerate details (Dudukovic et al., 2004). Later, if people want to recall the story accurately, they must inhibit the language changes and distortions they previously introduced and also distinguish between how the event initially transpired versus how it was subsequently retold. Because of age-related inhibitory deficits (e.g., Hasher et al., 2007), successfully inhibiting these distortions should be easier for younger than for older adults (at least when people are aware that distortions were introduced during their retelling). Similarly, because of age-related source monitoring difficulties (e.g., Hashtroudi et al., 1989), tracking contextual information in order to determine which events were from the original story and which were later added should be easier for younger, compared with older, adults. Thus, biases introduced during retellings should affect veridical memories more in older adults.

In summary, the current study examines whether younger and older adults differ in the extent to which retellings affect subsequent memory. Based upon age-related changes in story-telling abilities and retroactive interference, we predict that retellings will lower subsequent veridical memory more for older, compared with younger, adults. To test this, we adapted a paradigm used by Dudukovic et al. (2004). After reading a fictional story, older and younger adults either retold the story to be accurate, to be entertaining or did not engage in an initial retelling. Later, all participants recalled the story as accurately as possible. Based upon Dudukovic et al., we expected that retellings would differ as a function of the speakers' retelling goals. When trying to entertain, people should include more affective words but fewer idea units. Furthermore, we predicted that this may be especially true for older adults, since research suggests that older adults tune their messages to their audiences more than do younger adults (Adams et al., 2002). We also expected that these differences in

retelling style would affect subsequent veridical memory. As in Dudukovic et al., retelling the story to be accurate should lead to subsequently more accurate recall compared with retelling the story to be entertaining or not previously retelling the story. Novel to this study, we expected that this retelling effect would be stronger for older, compared with younger, adults. We predicted this age difference based on the assumptions that older adults would change their retellings more as a function of the retelling instructions and also experience greater retroactive interference.

## METHOD

### Participants

Participants were recruited through the University of Southern California (USC) psychology participant pool and through a list of volunteers recruited via newspaper and online ads, fliers at senior centres and public places, and letters to USC alumni. One-hundred and twenty-eight adults (63 older and 65 younger) participated in the study. Data from five older adults were excluded due to video-recording failures. Data from an additional older adult was excluded due to poor performance (i.e., recall more than 2.5 *SD* below the average older adult's performance in that condition). This left 122 adults [57 older (51% women; 61% Caucasian) and 65 younger (47.7% women; 49% Caucasian)] in subsequent analyses. Of these, 17 older and 23 younger adults were in the accuracy-retelling condition, 20 older and 21 younger adults were in the entertaining-retelling condition, and 20 older and 21 younger adults were in the no-initial-retelling condition. Of this sample, older adults were on an average 70.95 years old (range 60–87 years old) and younger adults were on average 19.62 years old (range 18–26 years old). For more demographic information, see Table 1.<sup>1</sup> Participants were compensated either 1 credit/hr towards their course requirements or \$15/hr.

<sup>1</sup> Participants were randomly assigned to condition; but age of the older adults significantly differed between the three retelling conditions. Older adults randomly assigned to the accuracy retelling condition were significantly younger ( $M = 66.94$  years,  $SD = 4.97$ ) than those assigned to the entertaining retelling ( $M = 71.90$ ,  $SD = 7.19$ ) or no-initial retelling conditions ( $M = 73.40$ ,  $SD = 8.46$ ). Importantly, when looking only at the younger-older adults in this sample (i.e., those 79 or below), which equates age between the three conditions, none of the reported patterns of results change.

**TABLE 1**  
Demographic information and responses to selected questionnaire items differed as a function of age ( $p < .05$ )

	<i>Younger adults</i>		<i>Older adults</i>	
	M	SD	M	SD
Age <sup>a</sup>	19.62	1.42	70.95	7.50
Education (in years completed) <sup>a</sup>	13.62	1.28	15.25	3.46
Self-reported health (1 = very poor; 9 = excellent)	7.49	0.90	7.83	1.05
Self-reported stress <sup>a</sup> (1 = very low; 9 = very high)	5.23	2.00	3.46	2.22
Self-reported stress compared to usual stress levels (1 = much lower; 9 = much higher)	4.98	2.06	4.89	1.38
Vocabulary (WTAR) scores	40.58	4.66	38.45	8.66
Transportability scores	84.95	14.71	86.11	14.04
Self-reported anxiety (Osborne, 2001 scale)	3.18	2.21	3.05	2.52
<i>Self-reported response to selected final questionnaire items (1 = strongly disagree; 7 = strongly agree)</i>				
"I enjoyed reading the story"	5.54	1.08	5.49	1.45
"I could personally relate to the main character of the story"	4.48	1.68	4.82	1.89
"I have experienced similar events to those in the story"	3.25	1.96	3.39	2.02
"I liked the main character of the story"	5.51	1.23	5.30	1.58
"It made me nervous to retell the story"	4.43	1.74	4.18	2.16
"It made me nervous to be videotaped retelling the story" <sup>a</sup>	4.72	1.82	3.56	2.15
"In my everyday life I tell interesting stories"	4.31	1.52	4.44	1.84
"When I tell others about my life experiences, I embellish past events to make them more interesting" <sup>a</sup>	4.35	1.87	3.53	1.86
"The stories I tell in my everyday life make other people laugh"	5.18	1.30	5.02	1.74
"I am a funny person"	4.77	1.36	4.54	1.88

<sup>a</sup>We have denoted items that differed as a function of age.

## Materials

Participants read a 1,479 word story, written and previously used by Dudukovic et al. (2004). This story describes a chaotic night at a bar, and is told from the bartenders' point of view. The story contains 105 idea units (e.g., a woman going into labour or a customer asking for an ashtray) previously defined by Dudukovic et al. (2004).

## Procedure

*Demographics.* At the beginning of the experiment, all participants indicated their age, sex, educational background, and answered health-related questions.

*Story reading and initial retelling.* Participants next read and learned the story described earlier in Materials (presented on paper in 16-point font). They were instructed to read the story twice, at their normal reading speed, and to read carefully, because they would later need to retell the story. Reading times were not recorded.

Immediately afterwards, participants in the entertaining-retelling and in the accuracy-retelling conditions retold the story. Participants in the no-retelling condition did not complete this phase of the experiment. In the entertaining-retelling condition, participants were asked to retell the story in an amusing manner and to imagine that their audience was a group of friends who had never heard the story before and who they would like to amuse. They were further instructed that we would rate the entertainment provided by their retellings and that they did not need to tell the story as it was originally written or use the same words as the story. In contrast, in the accuracy-retelling condition, participants were asked to retell the story in a precise manner and to imagine that their audience was a policeman or lawyer who needed an accurate account of the event. They were further instructed that we would rate the accuracy of their retellings, and that they should tell the story exactly as it was originally written and to use the original wording whenever possible. After providing these instructions, the experimenter left the room and participants retold the story out loud to a video camera. No time limit was imposed.

*Delay*<sup>2</sup>. Participants spent approximately 25 min completing two unrelated experiments, one examining memory for words and one examining visual perception of emotional faces. Participants were aware that these tasks were unrelated to the current experiment.

*Story recall.* All participants were next asked to recall the story as accurately as possible. They were asked to report exactly what happened in the original story, to use the original wording whenever possible and to avoid guessing. After providing these instructions, the experimenter left the room. Participants then recalled the story out loud to a video camera. No time limit was imposed.

*Final questionnaires.* As a measure of vocabulary abilities, participants completed the Wechsler Test of Adult Reading (Wechsler, 2001). Participants then completed an abbreviated 18-question version of the Transportability Scale (Dal Cin, Zanna, & Fong, 2004), which assesses the degree to which people generally become “transported” into narratives (e.g., “*I can easily envision the events in the story*”). Participants also provided their opinions about each stage of the experiment (see Appendix) and indicated how anxious they had felt during the retellings using eight items from Osborne (2001).

As seen in Table 1, there were no significant differences as a function of age, retelling condition, or interaction between these factors, in transportability scores, anxiety levels [on the Osborne (2001) scale], or in the extent to which participants personally related to the story, had experienced similar events to those in the story, or enjoyed reading the story. Only two age differences emerged on the final questionnaires. First, although there were no age differences in anxiety about retelling the story, younger adults felt more nervous about being videotaped than did older adults,  $F(1, 116) = 11.38$ ,  $MSE = 3.90$ ,  $p = .001$ . Second, older adults liked one of the story characters (“Ms. Make-up”, a middle-aged bar patron) more than younger adults,  $F(1, 116) = 13.13$ ,  $MSE = 2.85$ ,  $p < .001$ . There were no age differences in the extent to which participants

liked the other story characters. Individual differences on these questionnaires were unrelated to the reported results and are not discussed further.

## RESULTS

### Scoring

*Global assessments of the videos.* An independent rater (J. F.) observed each of the 203 videotaped retellings (81 from initial retellings and 122 from final recalls) and provided three global assessments of each. First, he rated the global accuracy of the retelling on a 1 (least accurate) to 5 (most accurate) scale. Next, he rated the global entertainment value on a 1 (least entertaining) to 5 (most entertaining) scale. Finally, he rated the participant’s overall engagement in providing the retelling on a 1 (least engaged) to 5 (most engaged) scale. To determine inter-rater reliability, an additional rater (the first author) independently coded 40% of the total transcriptions (i.e., 82 randomly selected retellings). Raters were blind to retelling condition and also to whether the video was from the initial story retelling or the final recall. However, given that these ratings were made from the videotaped retellings, raters were not blind to participant age. Inter-rater reliability was good, with interclass correlations of  $ICC = .72$  for the accuracy ratings,  $ICC = .81$  for the entertaining ratings, and  $ICC = .76$  for the engagement ratings.

*Linguistic content analyses.* Transcriptions of the 203 videotaped retellings were analysed using the Linguistic Inquiry and Word Count (LIWS2007) programme (Pennebaker, Booth, & Francis, 2007). The LIWC2007 calculates the number of words that come from a variety of pre-determined social, emotional, linguistic and cognitive categories.

*Recall content analyses.* The transcribed content of the retellings was further analysed in three ways. First, an independent rater (the first author) determined the extent to which each transcribed retelling included annotative elaborations from the participant and “moral-of-the-story” statements. Annotative elaborations were statements conveying evaluations of the story or participants’ personal thoughts about their own performance (e.g., “*I thought it was a fun story*”; “*I think I did pretty good for 60!*”). Moral-of-the-story statements

<sup>2</sup> In the current study, we used only one retelling and a 25-minute delay, rather than the multiple retellings and 4-day delay employed by Dudukovic et al. (2004). These methodological changes were made to avoid floor effects in older adults’ recall. Furthermore, other research suggests that younger adults’ recall can be affected by a single biased retelling (e.g., Tversky & Marsh, 2000).

were pieces of advice, or generalisations about the world, based on the story events (e.g., “*even when you are the good guy, things do happen, but don’t let that deter you from being nice or helping people*”). A second rater (M. J.) independently coded 40% of the total transcriptions. Raters were blind to retelling condition, age (except when participants made explicit comments about their age as in the earlier example), and also to whether the video was from the initial story retelling or the final recall. Within the initial coding scheme, we allowed for the possibility that participants would make multiple annotative elaborations and moral-of-the-story statements. However, only two participants were rated as having made multiple annotative elaborations and no participant was rated as having made multiple moral-of-the-story statements. Thus, these two measures were reduced to binary distinctions for the following analyses. Inter-rater reliability was good with 93.8% agreement for the moral-of-the-story ratings and 82.7% agreement for the interjection of personal assessments ratings.

As a second step in analysing recall content, for each of the 203 transcribed videotapes, an independent rater (J. S.) calculated how many of the story’s 105 idea units (defined by Dudukovic et al., 2004) were present. A second rater (G. S.) independently coded 40% of the total transcriptions. Raters were blind to whether transcriptions corresponded to an initial story retelling or a final recall, to retelling condition, and to participant age. Correspondence between the two raters was high,  $r = .97$ .

Finally, within the former analysis, the raters also noted the temporal order of the recalled idea units within each transcription. That is, for each of the original story’s 105 idea units, the raters (J. S. and G. S.) coded not only *if* it was present, but also *when* it had appeared within the transcribed retelling. For example, in the original story, the 17th idea unit is that the bartender makes martinis. Immediately after this, a female patron asks a male patron to stop winking at her (idea 18). The male patron explains that he cannot because of an eye fungus that causes him to continually wink (idea 19). The female patron then threatens to have him kicked out of the bar (idea 20). Assume that a participant included all four of these ideas in her retelling, but (1) thought the bartender made the martinis after the interaction between the bar patrons, and (2) had not recalled anything prior to this. In this case, it would be noted that idea units 1 to 16 of the original story were absent. It would also be noted that ideas 18 to 20 from the original

story were the 1st to 3rd ideas recalled by this participant, whereas idea 17 from the original story was the 4th idea recalled by the participant. To operationalise the extent to which participants maintained or distorted the story’s original organisational structure, for each participant, we calculated the correlation between the order of the ideas in the retelling and the order of those same ideas in the original story. In this example, this would be the correlation between the series {17, 18, 19, 20} and {4, 1, 2, 3}. Higher correlations indicate a greater adherence to the original story structure.

## Initial retellings

Initial retelling performance as a function of retelling condition and age is presented in Table 2. In analysing this data, we sought to answer three questions:

- (1) How did communication goals affect initial retelling performance? To answer this, within a series of 2 (Age: Younger vs. Older)  $\times$  2 (Retelling condition: Accuracy vs. Entertaining) ANOVAs, we first report the main effects of retelling condition on performance.
- (2) Did older and younger adults differ in how they completed their retellings? To answer this, we next report the main effects of age on performance from the prior analyses.
- (3) Were older adults more likely than younger adults to tune their retellings to their audience? To answer this, we report interactions between age and retelling condition on performance.

*How communication goals affect initial retelling performance.* Did participants (regardless of age) vary their retellings as a function of the retelling instructions? To answer this, we first analysed participants’ self-report data (see Table 2). As expected, in a series of 2 (Age)  $\times$  2 (Retelling condition) ANOVAs, participants in the accuracy-retelling condition self-reported, trying harder than participants in the entertaining-retelling condition to make their initial retellings accurate,  $F(1, 77) = 33.54$ ,  $MSE = 1.71$ ,  $p < .001$ ,  $\eta_p^2 = .30$ . Conversely, participants in the entertaining condition self-reported, trying harder than participants in the accuracy condition to make their retellings entertaining,  $F(1, 77) = 13.89$ ,  $MSE = 2.81$ ,  $p < .001$ ,

**TABLE 2**  
Average performance on the initial retelling task as a function of retelling condition and participant age

	<i>Accuracy-retelling condition</i>		<i>Entertainment-retelling condition</i>	
	<i>Younger</i>	<i>Older</i>	<i>Younger</i>	<i>Older</i>
<i>Self-report data</i>				
Tried to be entertaining <sup>a</sup>	3.52 (1.83)	3.88 (1.76)	5.00 (1.34)	5.20 (1.74)
Tried to be accurate <sup>a</sup>	6.39 (.66)	6.35 (.70)	4.81 (1.47)	4.55 (1.93)
Purposely changed details <sup>b</sup>	1.48 (.99)	2.59 (1.80)	2.33 (1.59)	3.15 (2.08)
Purposely added new events <sup>a</sup>	1.57 (1.08)	2.00 (1.58)	3.81 (2.16)	2.80 (1.67)
<i>Global assessments</i>				
Retelling was entertaining <sup>a</sup>	2.43 (.66)	3.06 (1.25)	3.48 (1.03)	3.30 (1.30)
Retelling was accurate <sup>a</sup>	3.35 (.83)	3.18 (.81)	2.90 (.83)	2.60 (1.05)
Participant was engaged	3.04 (.82)	3.59 (.80)	3.48 (1.03)	3.25 (0.97)
<i>Retelling content</i>				
Interjection of personal thoughts <sup>a, b</sup>	.13 (.34)	.35 (.49)	.33 (.48)	.55 (.51)
Moral-of-the-story statements <sup>a, b, c</sup>	.00 (.00)	.00 (.00)	.00 (.00)	.25 (.44)
Proportion of idea units included <sup>a</sup>	.43 (.12)	.42 (.09)	.35 (.13)	.32 (.15)
Temporal order of story <sup>a, b</sup>	.97 (.03)	.94 (.05)	.94 (.08)	.89 (.14)

Numbers in parentheses represent standard deviations. The self-report data show responses to four questions: “When I first retold the story, I tried to be as accurate as possible,” “When I first retold the story, I tried to be as entertaining as possible,” “When I first retold the story, I purposely added events that were not in the story, but that made it more interesting,” and “When I first retold the story, I purposely changed small details about the story to make it more interesting.” These questions were answered on a 1 (strongly disagree) to 7 (strongly agree) scale. The global assessments report the extent to which an independent rater found the videotaped retellings to be accurate (1 = least accurate, 5 = most accurate), and entertaining (1 = least entertaining, 5 = most entertaining). It also includes the independent rater’s assessment of how engaged the participant was in providing the retelling (1 = least engaged, 5 = most engaged). The retelling content analyses report the proportion of participants who interjected personal thoughts or a moral-of-the-story statement into their retellings. It also includes the proportion of idea units included in the original story, as well as the correlation between the order of the idea units in the retelling versus in the original story. Higher correlations indicate a greater adherence to the story’s original structure. We have denoted categories in which performance differed ( $p \leq .05$ ) as a function of retelling condition as follows:

<sup>a</sup>As a function of retelling condition.

<sup>b</sup>As a function of age.

<sup>c</sup>When there was an interaction between retelling condition and age.

$\eta_p^2 = .15$ . Participants in the entertaining condition were also marginally more likely to self-report adding new events, and significantly more likely to self-report changing story details to make the story more interesting [ $F(1, 77) = 3.73$ ,  $MSE = 2.69$ ,  $p = .06$ ,  $\eta_p^2 = .05$  and  $F(1, 77) = 16.83$ ,  $MSE = 2.75$ ,  $p < .001$ ,  $\eta_p^2 = .18$ ].

These self-reports matched our objective ratings (see Table 2). As described earlier, a rater viewed each of the videotaped retellings and assessed their global accuracy, entertainment and participant engagement. In a series of 2 (Age)  $\times$  2 (Retelling condition) ANOVAs, participants in the accuracy condition were rated as having more accurate retellings than participants in the entertaining condition,  $F(1, 77) = 6.64$ ,  $MSE = 0.78$ ,  $p = .01$ ,  $\eta_p^2 = .08$ . Conversely, participants in the entertaining condition were rated as having more entertaining retellings than participants in the accuracy condition,  $F(1, 77) = 7.20$ ,  $MSE = 1.14$ ,  $p = .01$ ,  $\eta_p^2 = .09$ . Furthermore, participants in the two conditions did not differ in overall

engagement,  $F < 1$ . Thus, across retelling conditions, participants were equally engaged in providing the retellings, but these retellings differed according to our manipulation.

Having established that the retellings differed in their global entertainment and accuracy levels, we next examined whether they also differed in language use. Described earlier, this was assessed using the LIWC2007 programme (Pennebaker et al., 2007; see Table 3). Here, we used a Bonferroni-adjusted alpha level of  $p = .005$  to correct for multiple comparisons. Within a series of 2 (Age)  $\times$  2 (Retelling condition) ANOVAs, we observed language differences as a function of retelling condition. Although the retelling groups did not differ in the total number of words used,  $F < 1$ , retellings told to entertain contained more profanity,  $F(1, 77) = 10.18$ ,  $MSE = 0.03$ ,  $p = .002$ ,  $\eta_p^2 = .12$ , affective words,  $F(1, 77) = 12.47$ ,  $MSE = 0.99$ ,  $p = .001$ ,  $\eta_p^2 = .14$ , and filler words,  $F(1, 77) = 16.01$ ,  $MSE = 1.14$ ,  $p < .001$ ,  $\eta_p^2 = .17$ . Stories told to entertain were also told with more certainty,

TABLE 3

Linguistic content of the initial retellings as a function of retelling perspective and participant age (as determined by the LIWS2007; Pennebaker et al., 2007)

	<i>Accuracy-retelling condition</i>		<i>Entertaining-retelling condition</i>	
	<i>Younger</i>	<i>Older</i>	<i>Younger</i>	<i>Older</i>
Word count	868.48 (304.08)	886.77 (347.63)	809.05 (333.97)	850.40 (410.26)
Past tense <sup>b</sup>	5.99 (3.05)	9.31 (3.12)	6.17 (3.40)	8.72 (2.76)
Present tense <sup>b</sup>	6.66 (2.90)	5.15 (2.80)	6.97 (2.74)	5.93 (2.48)
Future tense	0.27 (0.23)	0.38 (0.31)	0.27 (0.20)	0.42 (0.43)
Profanity <sup>a, b</sup>	0.04 (0.11)	0.01 (0.03)	0.21 (0.24)	0.07 (0.17)
Affective words <sup>a, b</sup>	2.82 (1.02)	2.30 (0.61)	3.82 (1.18)	2.87 (1.01)
Positive emotion <sup>a</sup>	0.98 (0.44)	0.78 (0.40)	1.46 (0.80)	1.24 (0.64)
Negative emotion <sup>a, b</sup>	1.84 (1.10)	1.54 (0.57)	2.53 (0.96)	1.65 (0.56)
Certainty <sup>a</sup>	0.93 (0.37)	0.75 (0.38)	1.34 (0.56)	1.21 (0.62)
Perception <sup>a, b</sup>	2.94 (1.19)	3.51 (1.12)	2.14 (0.95)	3.27 (1.25)
Fillers <sup>a, b, c</sup>	0.55 (0.55)	0.35 (0.45)	2.09 (1.84)	0.71 (0.74)

Numbers in parentheses represent standard deviations. Word count is reported in total words, but all other numbers represent the percentage of the total story length coming from a variety of social, emotional, linguistic, and cognitive categories. We have denoted categories in which language differed (at a non-corrected value of  $p < .05$ ) as follows:

<sup>a</sup>As a function of retelling condition.

<sup>b</sup>As a function of age.

<sup>c</sup>When there was an interaction between retelling condition and age.

$F(1, 77) = 15.18$ ,  $MSE = 0.25$ ,  $p < .001$ ,  $\eta_p^2 = .17$ , but with a tendency to include fewer references to perceptual details,  $F(1, 77) = 4.17$ ,  $MSE = 1.29$ ,  $p = .045$ ,  $\eta_p^2 = .05$  (although this did not reach our adjusted level of significance).<sup>3</sup> Thus, replicating Dudukovic et al. (2004) we observed a “language of story-telling,” when trying to entertain people tell stories with more affective content and certainty.

Retelling instructions also affected the content of the stories (see Table 2). Participants in the entertaining-retelling condition were more likely to interject annotative elaborations (i.e., personal thoughts/opinions) into the retellings,  $F(1, 77) = 3.83$ ,  $MSE = .21$ ,  $p = .05$ ,  $\eta_p^2 = .05$ . Furthermore, whereas 13% of participants in the entertaining-retelling condition included moral-of-the-story statements, no participants from the accuracy-retelling condition did this,  $F(1, 77) = 6.42$ ,  $MSE = .05$ ,  $p = .01$ ,  $\eta_p^2 = .08$ .

Content of the stories also varied as a function of retelling instructions when examining the

<sup>3</sup>Stories in the accuracy retelling condition contained more perception related words than stories in the entertaining retelling condition. This may have been driven by the specific retelling instructions used. Within the accuracy retelling condition, participants were asked to imagine that their audience was a police officer or a lawyer—i.e., an individual who likely cares about the perceptual details of the environments in which the events took place. It is unknown whether this trend would also emerge when people try to tell stories accurately to friends, or to other audiences.

amount of information included (see Table 2). Within a 2 (Age)  $\times$  2 (Retelling condition) ANOVA, there was a main effect of retelling condition,  $F(1, 77) = 9.75$ ,  $MSE = 0.02$ ,  $p = .003$ ,  $\eta_p^2 = .11$ . Replicating Dudukovic et al. (2004), participants who retold the story to be accurate included a greater proportion of the idea units than those who retold the story to entertain. A similar effect emerged when examining organisational structure of the retellings. Participants who retold the story to be accurate followed the original story’s organisational structure more closely than those who those who retold the story to entertain,  $F(1, 77) = 5.45$ ,  $MSE = .01$ ,  $p = .02$ ,  $\eta_p^2 = .07$ .

In summary, people intended to retell the stories in line with the retelling condition manipulation and an observer who was blind to assigned retelling condition rated them as being successful at this. We also observed differences in the language-use, content and organisation as function of retelling perspective. When trying to entertain, people’s stories were told with more certainty, more affective language, and more personal interjections, but with fewer idea units, and more distortion of the story’s structure.

*How age affects initial retelling performance.* Having established that retellings varied as a function of retelling instructions, we next tested whether they also varied as a function of age. No age differences emerged in participants’ self-reports of whether

they tried to be accurate or entertaining, or in the global assessments of the accuracy, entertainment, or participant engagement in providing the retellings. However, there were age differences in language usage (as analysed via the LIWC using a Bonferroni-adjusted alpha of .005). Younger and older adults did not differ in total number of words used,  $F < 1$  (even after controlling for vocabulary scores; see also Beaudreau et al., 2005; Pasupathi, Henry, & Carstensen, 2002). However, consistent with previous research (e.g., Barbieri, 2008), compared with younger adults, older adults were more likely to tell their stories in past tense,  $F(1, 77) = 18.04$ ,  $MSE = 9.57$ ,  $p < .001$ ,  $\eta_p^2 = .19$ , used fewer filler words,  $F(1, 77) = 11.04$ ,  $MSE = 1.14$ ,  $p = .001$ ,  $\eta_p^2 = .13$  (see also Beaudreau et al., 2005), and had a non-significant tendency to include less profanity,  $F(1, 77) = 6.28$ ,  $MSE = 0.03$ ,  $p = .01$ ,  $\eta_p^2 = .08$ . Older adults also told stories with more perceptual details,  $F(1, 77) = 11.16$ ,  $MSE = 1.29$ ,  $p = .001$ ,  $\eta_p^2 = .13$ , and fewer negative affective words,  $F(1, 77) = 9.49$ ,  $MSE = 0.73$ ,  $p = .003$ ,  $\eta_p^2 = .11$  (see also Pasupathi et al., 2002). Of note, these linguistic differences are likely due to cohort, rather than to age, differences. For example, previous research has shown that there are cohort differences not only in the type of filler words people use (e.g., *well* vs. *like*), but also in the degree to which people use them (e.g., Barbieri, 2008).

There were also age differences in the content of the retellings (see Table 2). Extending prior findings that older adults are more likely to go off-topic (e.g., Arbuckle & Gold, 1993), and replicating prior findings that older adults are more likely to insert annotative elaborations (e.g., Gould et al., 1991), here, older adults were more likely to interject their personal opinions (i.e., annotative elaborations) into their retellings,  $F(1, 77) = 4.61$ ,  $MSE = .209$ ,  $p = .035$ ,  $\eta_p^2 = .06$ . Older adults were also more likely to include moral-of-the-story statements,  $F(1, 77) = 6.42$ ,  $MSE = .05$ ,  $p = .01$ ,  $\eta_p^2 = .08$ . This is similar to prior research showing that older adults focus on the story's gist (e.g., Adams et al., 1990, 1997), and moral underpinnings (Narvaez, Radvansky, Lynchard, & Copeland, 2011), and tend to include evaluative endings (Kemper et al., 1989). Finally, although there was no significant age difference in terms of the quantity of information included in the initial retelling,  $F < 1$ , there was an age difference in the tendency to follow the original story structure. Younger adults followed the story's original organisation during their retellings better than older adults,  $F(1, 77) = 3.96$ ,  $MSE = .01$ ,  $p = .05$ ,  $\eta_p^2 = .05$ . This

is similar to previous research showing that older adults sometimes tell less coherent stories than younger adults (e.g., Juncos-Rabadán, Pereiro, & Rodriguez, 2005; Pratt et al., 1989).

In summary, as in previous research, we found age/cohort differences in how people tell stories. In addition to age differences in language use, older adults were more likely to go off-topic by interjecting their personal opinions and were less likely to follow the story's original structure. Furthermore, compared with younger adults, older adults were more likely to focus on the story gist by providing moral-of-the-story statements.

*How communication goals and age interact to affect initial retelling performance.* Were older adults more likely than younger adults to tune their retellings as a function of their communication goals? Despite the fact that this has been observed in previous studies (e.g., Adams et al., 2002), overall, there was little support for this. In almost all of the earlier analyses, there were no significant interactions between age and retelling condition. Overall, retellings told to entertain differed from retellings told to be accurate in the same ways across the two age groups. Furthermore, within the three significant interactions that did emerge, in two cases, it was actually the younger adults who showed greater audience tuning effects. More specifically, although people were more likely to use filler words when trying to entertain, this was especially true of younger adults,  $F(1,77) = 6.15$ ,  $MSE = 1.14$ ,  $p = .02$ ,  $\eta_p^2 = .07$ . Similarly, although people were more likely to self-report adding new events when trying to entertain, this was especially true for younger adults,  $F(1, 77) = 3.79$ ,  $MSE = 2.69$ ,  $p = .055$ ,  $\eta_p^2 = .05$  (although this just failed to reach significance).

However, there was also one way in which older adults were more likely than younger adults to have altered their retellings as a function of the retelling instructions. As noted earlier, people were more likely to include moral-of-the-story statements when trying to entertain. However, this was only true of older adults,  $F(1, 77) = 6.42$ ,  $MSE = .05$ ,  $p = .01$ ,  $\eta_p^2 = .08$ . Whereas 25% of older adults included these statements when trying to entertain, no older adult did this when trying to be accurate. In contrast, younger adults never included these statements, regardless of their communication goals. This conceptually replicates the finding that older, but not younger, adults emphasise the story's moral underpinnings when trying to summarise a story rather than tell it accurately (Labouvie-Vief et al., 1982, as cited in Adams et al., 1990).

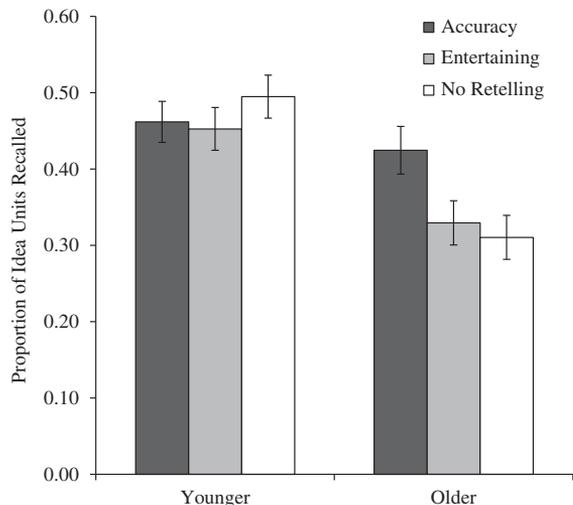
In summary, our results do not replicate previous conclusions (e.g., Adams et al., 2002) that there are age differences in the *extent* to which people tune messages to their audiences. Rather, our results suggest that there may be age differences in *how* people do this. When trying to entertain, younger adults were more likely to add story events and change some aspects of their language. In contrast, older adults were more likely to focus on the story's moral underpinnings.

## Final recall

This study's primary purpose was to test whether retellings affect subsequent recall more for older, compared with younger, adults. Before addressing this, we first describe the language used in the final recollections. As noted earlier, language use was analysed using the LIWC programme (and a Bonferroni-corrected alpha level of .005). In contrast to the earlier retellings, in a series of 2 (Age: Younger vs. Older)  $\times$  3 (Retelling condition: Accuracy vs. Entertaining vs. No initial retelling) ANOVAs there was only one significant effect of retelling condition; the final recall contained more words conveying certainty when participants previously told the story to entertain,  $F(2, 116) = 7.48$ ,  $MSE = 0.15$ ,  $p = .001$ ,  $\eta_p^2 = .11$ . This did not significantly interact with age,  $F(2, 116) = 2.33$ ,  $MSE = 0.15$ ,  $p = .10$ ,  $\eta_p^2 = .04$ . Furthermore, within the broader set of analyses there were no significant interactions between retelling condition and age. Thus, the language of storytelling that emerged on the initial retellings was largely abolished during final recall for both younger and older adults.<sup>4</sup>

We next turned to this study's primary purpose: Did the initial retellings affect subsequent recall,

<sup>4</sup> Although linguistic differences as a function of retelling condition disappeared, linguistic differences as a function of age remained. Older adults were more likely to tell their stories in past tense and used fewer filler words, fewer negative emotion words and fewer positive emotion words (a numeric trend that was present during the initial retellings). There was also a numeric trend for older adults to use more perception-related words (although this did not reach significance after correcting for multiple comparisons). Novel to the final recollections, the age difference in profanity use disappeared,  $F < 1$ . This is likely because people used profanity in the initial retellings to entertain and hence did not use it frequently during their final recalls. Furthermore, in contrast to the initial retellings, older adults used fewer words than younger adults to complete their retellings,  $F(1, 116) = 7.81$ ,  $MSE = 90205.50$ ,  $p = .006$ ,  $\eta_p^2 = .06$  (although this did not reach our adjusted level of statistical significance).



**Figure 1.** Total number of idea units included during the final recall as a function of retelling condition and participant age. Error bars represent  $\pm SE$  mean.

and did this vary with age? To answer this, we conducted a 2 (Age)  $\times$  3 (Retelling condition) ANOVA on the number of idea units in the final recall (see Figure 1). Here there was a main effect of age; older adults recalled less (.36) than younger adults (.47),  $F(1, 116) = 23.97$ ,  $MSE = 0.02$ ,  $p < .001$ ,  $\eta_p^2 = .17$ . Furthermore, although there was no main effect of retelling condition,  $F(1, 116) = 1.79$ ,  $MSE = 0.02$ ,  $p = .17$ ,  $\eta_p^2 = .03$ , there was a significant interaction between age and retelling condition,  $F(1, 116) = 3.28$ ,  $MSE = 0.02$ ,  $p = .04$ ,  $\eta_p^2 = .05$ . Because of this, we next examined younger and older adults separately.

Looking first at younger adults, results revealed no effect of retelling condition (Accuracy vs. Entertaining vs. No-initial retelling) on subsequent veridical recall,  $F < 1$ . Thus, contrary to Dudukovic et al. (2004), younger adults who retold the story to be accurate (.46) subsequently had no better recall than those who retold the story to be entertaining (.45),  $F < 1$ , or who did not retell the story (.50),  $F < 1$ . Furthermore, recall did not differ between younger adults who told the story to be entertaining and those who did not retell the story earlier,  $F(1, 40) = 1.07$ ,  $MSE = 0.02$ ,  $p = .31$ .

A different pattern emerged when examining the older adults' performance. As shown in Figure 1, here there was a significant, and large, effect of retelling condition on subsequent veridical recall,  $F(1, 54) = 4.34$ ,  $MSE = 0.02$ ,  $p = .018$ ,  $\eta_p^2 = .14$ . Older adults who previously retold the story to be accurate (.43) had subsequently higher recall than

those who retold the story to entertain (.33),  $F(1, 35) = 5.02$ ,  $MSE = 0.02$ ,  $p = .03$ ,  $\eta_p^2 = .13$ , or who did not provide an initial retelling (.31),  $F(1, 35) = 11.04$ ,  $MSE = 0.01$ ,  $p = .002$ ,  $\eta_p^2 = .24$ . Participants who retold the story to entertain did not differ in recall from those who did not initially retell the story,  $F < 1$ .

Thus, retellings affected subsequent recall for older adults but not for younger adults. Although we did not systematically test this effect's underlying mechanisms, we propose that it is best explained by age-related increases in interference. As shown in the retelling analyses, people strategically changed their retellings as a function of their communication goals. In order to entertain, people used different language, decreased the amount of information they included and altered the story's structure. Later, when people needed to recall the story accurately, they had to inhibit these changes, distinguish between the original story and how they retold it, and update the way they retold the story. Analyses suggested younger adults were more adept at doing this. For example, when looking at story content, in a 2 (Age: Younger vs. Older)  $\times$  2 (Retelling condition: Accuracy vs. Entertaining)  $\times$  2 (Time: Initial Retelling vs. Final Recall) ANOVA on the proportion of idea units recalled, there was a marginally significant interaction between age, retelling condition and time,  $F(1, 77) = 3.34$ ,  $MSE = 0.003$ ,  $p = .07$ ,  $\eta_p^2 = .04$ , which was a small effect. In general, younger adults increased the number of idea units they recalled over time,  $F(1, 42) = 31.32$ ,  $MSE = 0.003$ ,  $p < .001$ ,  $\eta_p^2 = .43$ ; however, this was especially true in the entertaining-retelling condition,  $F(1, 42) = 7.45$ ,  $MSE = 0.003$ ,  $p = .009$ ,  $\eta_p^2 = .15$ . This suggests that younger adults in the entertaining condition could differentiate between the original story and their prior retelling (which omitted details), and hence update their stories appropriately. In contrast, older adults did not do this. For older adults, there were no significant effect of time and no interaction between retelling condition and time, both  $F_s < 1$ . This is also consistent with research showing that in contrast to younger adults, older adults do not always show increases in recall performance across multiple memory tests (e.g., Henkel, 2007, 2008).

A similar pattern emerged when examining organisation of the retellings. For younger adults, adherence to the original story structure increased from the initial retelling to the final recall,  $F(1, 42) = 11.81$ ,  $MSE = .001$ ,  $p = .001$ ,  $\eta_p^2 = .22$ ; however, this increase was marginally greater for younger

adults in the entertaining-retelling condition (Initial retelling: .94, Final recall: .97) than for younger adults in the accuracy-retelling condition (Initial retelling: .97, Final recall: .98),  $F(1, 42) = 3.29$ ,  $MSE = .001$ ,  $p = .08$ ,  $\eta_p^2 = .07$ . In contrast, for older adults, there were no significant effect of time and no interaction between retelling condition and time on story organisation, all  $F_s < 1$ . Thus, distortion of the story structure in the entertaining retellings was maintained by older adults but not by younger adults.<sup>5</sup> This is similar to previous results suggesting that whereas younger adults improve the cohesion of a story with multiple retellings, older adults do not (Saling, Laroo, & Saling, 2012). Furthermore, this could suggest that younger adults were better able to differentiate between the original story's structure and the distortion of that structure introduced to entertain, and hence update their stories appropriately.

Clearer evidence suggesting that age-related increases in interference can explain these results is found when examining how language use during the retellings related to subsequent recall. Based upon the linguistic differences reported earlier, for each participant, we calculated the amount of "story-telling language" used during the initial retelling. We operationalised this as the total number of affective, profanity, certainty and filler words used minus the total number of perception-related words. This measure of story-telling language tracks the usage of words that are mostly uninformative in terms of story content, and thus are words that should be removed when retelling the story accurately. For example, the following description is high in story-telling language usage:

The crazy old lady who wears too much make-up is, like, bitching, and wants to start this fight with the intoxicated girl, cause she's obviously angry

<sup>5</sup>Numerically, the same pattern emerged when examining how the organisation of the initial retellings compared to the organisation of the final recall (rather than comparing how the organisation of each retelling compared to the original story). For younger adults, there was high consistency between the organisation of their initial retelling and the organisation of their final recall. This was numerically more true for younger adults in the accuracy retelling condition (.97) compared to younger adults in the entertaining retelling condition (.95). In contrast, older adults had less consistency in their two retellings, and this did not depend upon their retelling condition (accuracy retelling condition: .92; entertaining retelling condition: .93). Note that one older adult from the entertaining condition who only had a correlation of .05 between the two retellings was removed from this analysis.

that her new suit's broken. I mean not broken, but like messed up, and then she wants someone to pay for it.

In contrast, the following description of the same event is low in story-telling language usage:

The woman in the white suit claimed that I had spilled some of the drink on her white suit, and the suit came from Ann Taylor, and she spent 350 dollars on the suit, and it was going to be mandatory that I give her the money.

The extent to which participants used story-telling language is therefore an index of the amount of interference they needed to overcome when completing the final recall, in which participants were asked to report exactly what happened in the original story, to use the original wording whenever possible and to avoid guessing. In other words, higher use of story-telling language means that there were more changes that needed to be made between their initial and final retellings, and thus more possible sources of interference.

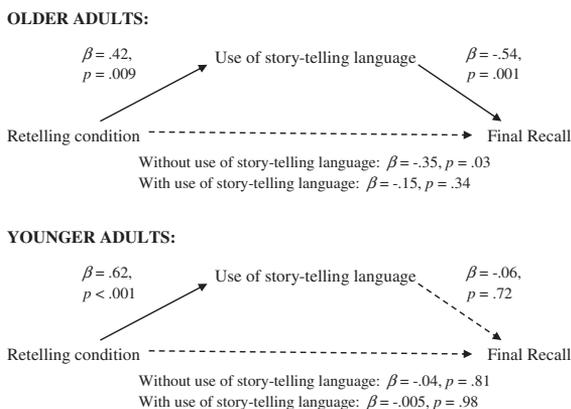
We tested whether use of story-telling language mediated the relationship between retelling condition and subsequent final recall using the procedure delineated by Baron and Kenny (1986). Looking first at older adults, in separate regression analyses, we found that retelling perspective was significantly related to both final recall and story-telling language usage (see Figure 2). We then conducted another regression analysis where retelling perspective and story-telling language usage were simultaneously entered as predictors of final recall. Here, story-telling language usage

predicted final recall; however, there was no longer a significant relationship between retelling perspective and final recall. Furthermore, the reduction in the relationship between retelling perspective and final recall was significant, Sobel test  $Z = -2.05$ ,  $p = .04$  (after converting variables to z-scores). In contrast, this relationship did not exist for younger adults. Although retelling perspective was related to story-telling language usage, it was unrelated to final recall. There was also no relationship between story-telling language usage and final recall. Thus, the way older adults initially retold the stories can account for subsequent recall differences. Older adults who experienced greater interference, as indexed by greater use of story-telling language, had lower subsequent recall.

## DISCUSSION

When people recall past events, they often have communication goals other than being accurate. Indeed, it has been argued that when people retell a story, they are “unlikely to care very much whether the story they retell is the same, detail by detail, as the story they originally heard” (Gauld & Stephenson, 1967, p. 40). Consistent with this, there is a trade-off in retellings between accuracy and entertainment goals. When retellings are told to be accurate, entertaining goals are low. Conversely, when retellings are told to be entertaining, accuracy goals are low (Kulkofsky, 2007, as cited in Kulkofsky, Principe, Debaran & Stouch, 2011). This trade-off may be important in real-world contexts where retellings often are told to be entertaining. In a daily-diary study, about 40% of stories were retold to entertain others. Furthermore, people admitted that 42% of their retellings deserved the label of “inaccurate,” and that over one-third of the retellings labelled “accurate” were distorted in some way (Marsh & Tversky, 2004). Thus, distorting the past during retellings is a common practice.

However, these distortions have memorial consequences. People can come to remember the past in line with their selective rehearsals (for a review, see Marsh, 2007). In the current study, we tested the hypothesis that this is especially true for older, compared with younger, adults. Results were consistent with this. For both age groups, stories told to entertain included less information and more distortion of the original story's organisational structure than stories told to be accurate.



**Figure 2.** Story-telling language usage mediates of the effect of retelling condition on final recall for older adults, but not for younger adults. The dashed arrow indicates a path that was not statistically significant in the full model.

However, this only affected subsequent recall performance for older adults. Older adults who retold the story to entertain subsequently had lower recall than those who retold the story to be accurate.

It is important to note that final recall for older adults in the entertaining-retelling condition was still no worse than for older adults who did not retell the story initially. Thus, whereas retelling to be entertaining has costs compared to retelling to be accurate, these costs may be offset by the benefits of rehearsing the story information. This result has implications for when testing will benefit memory. Research has now clearly shown that repeated testing enhances long-term retention more than repeated study (Karpicke & Roediger, 2007; Roediger & Karpicke, 2006a, 2006b). However, the current results suggest that testing benefits may not occur when the retrieval practice goal is something other than accuracy.

The fact that retellings influence older adults' subsequent memory more than younger adults' subsequent memory was predicted for two reasons. First, based upon previous research (e.g., Adams et al., 2002), we hypothesised that older adults would tune their messages more than younger adults as a function of their communication goals, and hence would be more affected by their retellings. No evidence was found for this. The story-telling language people used to entertain differed from the language used to be accurate in the same ways across the two age groups. More generally, our results suggest that older and younger adults were equally likely to vary their retellings as a function of their communication goals. This contradicts previous conclusions that older adults are more likely to accommodate their audience in their retellings (e.g., Adams et al., 2002). However, the discrepancy between the current results and previous findings can be resolved if we instead conclude that older and younger adults do not differ in the extent to which they change their messages as a function of their communication goals, but rather differ in how they achieve their communication goals. For example, replicating prior research (Labouvie-Vief et al., 1982, as cited in Adams et al., 1990), in the current study, older (but not younger) adults achieved their goal of entertaining by focusing on the story's moral underpinnings. In contrast, younger adults were more likely to achieve their goal of entertaining by adding story details and changing aspects of their language. This is similar to the finding that younger adults tune their language use

as a function of their audience more than older adults (Horton & Spieler, 2007). Thus, previous studies concluding that older adults tune their messages more than younger adults may have inadvertently only assessed variables used by older adults to achieve their communication goals (e.g., the tendency to focus on the moral underpinnings) and not variables used by younger adults (e.g., the tendency to add new details). Future research is needed to investigate this by testing for age differences in how people accomplish retelling goals across a broader array of narratives.

Given that age differences in the extent to which people tune their retellings cannot explain our effects, we next examined the role of age-related increases in retroactive interference. Some evidence was found for this mechanism. For example, only younger adults were able to revert from their initial retellings to more closely follow the original story, both in terms of the number of ideas they included and in terms of their distortion of the story's organisational structure. Furthermore, for older adults, the amount of story-telling language used during the retellings mediated the relationship between retelling condition and final recall. As noted earlier, story-telling language is largely uninformative, and extraneous, to the idea units of the story (e.g., profanity, filler words). Furthermore, this type of language should be removed in the final retelling, in which participants were asked to report exactly what happened in the original story and to use the original wording whenever possible. The extent to which participants used story-telling language is thus one index of the amount of interference they experienced. Consistent with the notion that older adults have a harder time overcoming interference, increase in use of story-telling language during the retelling was predictive of lower subsequent recall for older, but not younger, adults.

Regardless of why retellings affected memory in older adults, this pattern of final recall results replicates those reported by Dudukovic et al. (2004) in younger adults. The fact that we did not observe these effects in younger adults is likely due to methodological differences. In Dudukovic et al., younger adults retold the story three times, across three different days, with the final recall occurring four days after encoding. In contrast, here, younger and older adults retold the story once, and the final recall occurred about 25 min after encoding. Taken together, these results suggest that entertaining retellings exert a systematic effect on memory, which older adults are more

susceptible to. In this paradigm, retellings influenced younger adults' recall after multiple retellings and a longer delay, but not after a single retelling and a short delay. In contrast, for older adults, retellings influenced recall after only one retelling and a short delay.

There are limitations of this study that future research should address. First, research is needed where adults of different ages complete multiple retellings over longer delays. This would establish whether older adults are more affected by retellings than younger adults even when both age groups display retelling effects. Second, although we speculate that retellings exerted differential effects on older and younger adults because of age-related increases in interference, this should be tested more specifically. For example, if older adults are less able to differentiate between the original story and how it was retold, then age differences in how retellings affect memory should be especially apparent on source memory tests. The interference mechanism also leads to another interesting possibility. In previous research, when participants received false suggestions about what happened in a video, they had more false memories of the suggested events if they had focused on details (rather than gist) when initially reviewing the event (Lane, Mather, Villa, & Morita, 2001). Due to their difficulties in resolving interference from the false suggestions incorporated in their initial reviews of the event, detail-focused telling may make older adults even more susceptible to false suggestions.

A third limitation of the current study is that there was no actual audience. Rather, participants were asked to imagine telling the stories to particular audiences (either a police officer or a group of friends). As noted earlier, within this paradigm, we did not replicate prior research suggesting that older adults are more likely than younger adults to tune their messages to their audience (e.g., Adams et al., 2002). However, it is possible that this effect would have emerged if a real audience had been used. This is because older adults place more emphasis on social factors in laboratory settings than do younger adults (e.g., Altgassen, Kliegel, Brandimonte, & Filippello, 2010; Lang & Carstensen, 2002). Future research should examine whether age differences in the extent to which people tune their messages varies as a function of the type, and physical presence, of the audience.

Finally, in this study, we used a story about a bartender. Although younger and older adults

equally related to this story, it is important to note that this story was written "in an amusing manner in order to ensure that it was a series of events that people would want to retell in real life" (Dudukovic et al., 2004, p. 128). Thus, it is a story that is easy to retell in an entertaining fashion. It is an open question whether age differences will emerge in the ability to make a more uninteresting story entertaining, and how this will subsequently affect memory.

In summary, social factors shape memory (e.g., Barber, Rajaram, & Aron, 2010; Fivush, 1998; Gabbert, Memon, & Allan, 2003; Hyman, 1994; Loftus & Palmer, 1974; Pasupathi et al., 1998; Roediger, Meade, & Bergman, 2001; Weldon & Bellinger, 1997; Wells & Bradfield, 1998). One way this occurs is by influencing how people retell the past as a function of their social-communication goals. When describing events to friends, people may try to entertain, and in doing so include fewer idea units and more distortions. When describing the same event to a police officer, people likely try to be accurate. Importantly, people, and especially older adults, later remember the past in line with these retellings. Thus, retelling an event to entertain comes with greater memorial costs for older, compared with younger, adults.

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## APPENDIX

**These are the final questionnaire items answered by all participants. Each question was answered on a 1 (strongly disagree) to 7 (strongly agree) scale.**

- (1) I enjoyed reading the story.
- (2) I could personally relate to the main character of the story.
- (3) I have experienced similar events to those in the story.
- (4) I liked the main character of the story.
- (5) I liked the character "Mr. Winker/Mr. Letchfield."
- (6) I liked the character "Ms. Make-up."
- (7) I liked the character "Miss. Intoxicated."
- (8) I liked the character "Mrs. Pregnant."
- (9) It made me nervous to retell the story.
- (10) It made me nervous to be videotaped retelling the story.
- (11) When I first retold the story, I tried to be as accurate as possible.
- (12) When I first retold the story, I tried to be as entertaining as possible.
- (13) When I first retold the story, I purposely added events that were not in the story, but that made it more interesting.
- (14) When I first retold the story, I purposely changed small details about the story to make it more interesting.
- (15) In my everyday life, I tell interesting stories.
- (16) When I tell others about my life experiences, I embellish details about past events to make them more interesting.
- (17) The stories I tell in my everyday life make other people laugh.
- (18) I am a funny person.