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BRIEF REPORT

Younger and Older Adults' Associative Memory for Social Information: The Role of Information Importance

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The ability to associate items in memory is critical for social interactions. Older adults show deficits in remembering associative information but can sometimes remember high-value information. In two experiments, younger and older participants studied faces, names, and occupations that were of differing social value. There were no age differences in the recall of important information in Experiment 1, but age differences were present for less important information. In Experiment 2, when younger adults' encoding time was reduced, age differences were largely absent. These findings are considered in light of value-directed strategies when remembering social associative information.

Keywords: cognitive aging, associative memory, social cognition

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During everyday social interactions, we attempt to remember information about people we meet. As we age, we may face situations in which we cannot remember all of the social information in our environment. Older adults often complain about forgetting names (Troyer, Häfliger, Cadieux, & Craik, 2006), and there is evidence that the impairment in face-name binding is a specific subset of an overall age-related associative deficit among older adults (Naveh-Benjamin, Guez, Kilb, & Reedy, 2004; cf. McGillivray & Castel, 2010). Occupation information may be processed more deeply, relative to names, leading to better memory (Cohen, 1990; Fogler, James, & Crandall, 2010). Older adults' prior successful task performance can promote future accuracy (Geraci & Miller, 2013), and older participants tend to become more selective—that is, recalling more high-value items than low—with task experience (Castel, 2007). Festini, Hartley, Tauber, and Rhodes (2013) found that younger adults are sensitive to value when learning face-name pairs, but this has yet to be examined in older adults and with value categories that are more socially relevant. Despite widely documented associative memory deficits (Old & Naveh-Benjamin, 2008), older adults may be able to focus on remembering associations for people they will encounter in the future and for a subset of important individuals that may be most relevant to remember.

In the current study, we use a novel value structure: social information that varies with respect to the likelihood of the participants' future use of it (Anderson & Schooler, 2000). Basing value on the likelihood of future use and utilizing several study-test phases may reduce older adults' associative memory deficits. While younger adults may recruit effective encoding strategies to remember a large quantity of information, older adults' awareness of memory capacity limitations may lead to lower memory accuracy for low-value items but relatively high recall of important information (Castel, 2007). Older age may lead to seeking emotionally meaningful interactions, while goals that focus on acquiring information are perceived as less important (Lang & Carstensen, 2002). If older adults' goals support remembering a person with whom they will interact in future (e.g., their new doctor), they may be able to selectively remember item and associative information about these important people.

Experiment 1

In Experiment 1, we examined the impact of importance on younger and older adults' memory for associative social information. Specifically, we were interested in whether recall would be affected by the likelihood of hypothetically meeting the studied people in the future and whether this would differ between age groups. Participants saw 20 face-name-occupation items and were tested via free recall tests (with restudy periods) and a final cued-recall test.

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Method

Participants. Twenty-four younger adults (20 females) aged 18–21 years (M = 19.78, SD = 1.92) had an educational level of 13.91 years (SD = 1.76); were undergraduates at the University of California, Los Angeles (UCLA); and were given course credit for their participation. Twenty older adults (10 females) aged 61–82 years (M = 69.55, SD = 5.60) had an educational level of 16.09 years (SD = 1.48); were from Los Angeles; were in good health, M = 8.40 (SD = 1.33) on a scale from 1 (*poor health*) to 10 (*excellent health*); and received $10 per hour for their participation.

Materials and procedure. Participants were told to imagine that they were attending a party where they would meet 20 new people and that they had 3 s to view and study each person's face, name, and occupation. Participants were told that personally important people included those with whom there would be a definite future interaction (information about whom would appear in orange text), while broadly important people were those who would be seen again but with whom the participant would not interact (blue text); less important people would not be seen or interacted with again (black text). Participants were to remember as much information as possible, "keeping in mind the likelihood of interacting with that person again."

All photographs in this experiment were of middle-aged adults of various ethnic groups (10 with neutral expressions, 10 smiling, all photographs in color, half male and half female; Minear & Park, 2004), each of which was presented on a computer screen under the individual's name and occupation. The assignment of names to photographs was randomized within each gender, and the assignment of people to each occupation was also randomized. The high-value and medium-value occupations were always presented with photographs of smiling faces, and the low-value occupations were randomly associated with the remaining photographs of smiling or neutral faces. It is likely that a low percentage of people one meets at a party would be highly important to remember. Prior value-directed remembering tasks (e.g., Castel, Farb, & Craik, 2007) categorize three to four items as "high value" and separate the remaining items into lower value categories. Other experiments examining memory for faces have used, for example, six faces per category (Mealey, Daood, & Krage, 1996) and two faces per category (Castel et al., 2016). Therefore, 3 items were assigned to the "personally important" category, 3 items to the "broadly important" category, and 14 items to the "less important" category. Common occupations (e.g., sales clerk) were randomly assigned to the people with whom the participants would not interact or see again, while the "broadly important" and "personally important" categories included "future television star" and "your new doctor," respectively.

Each face-name-occupation triplet was studied in randomized order for 3 s. Participants then completed an untimed free recall test in which they were to enter information about the people they had just "met" in columns labeled "Name" and "Job" on the computer screen. Each participant completed four study-test phases, with the same information on each list in newly randomized orders. Participants then completed an untimed cued-recall test, in which they saw each photograph and were asked to enter the person's name and occupation. Participants then gave their opinions on a 5-point Likert scale (from 1 = *not important* to 5 = *very important*) of how important it would be to remember a person with each occupation used in the study. This research was approved by the UCLA institutional review board ethics committee.

Results

Free recall tests. The results from the free recall tests are presented in Figure 1. The accuracy of information presented in the less important category was analyzed separately from information presented in the other categories, due to differences in the amount of information in the categories. To investigate possible age or value differences in free recall of personally and broadly important information, a 2(Importance: broad or personal) × 2(Participant age: younger or older) × 4(Test phase) analysis of variance (ANOVA) was conducted, revealing no significant main effect of age, $F(1, 42) = 2.26$, $p = .14$, $\eta_p^2 = .05$. There was a significant main effect of information importance, $F(1, 42) = 7.89$, $p < .01$, $\eta_p^2 = .16$, such that information about personally important people (M = 1.67, SD = 1.18) was remembered significantly more accurately than information about broadly important people (M = 1.39, SD = 1.95). There was a significant main effect of test, $F(3, 126) = 51.95$, $p < .001$, $\eta_p^2 = .55$, such that performance on Test 2 (M = 1.45, SD = 0.82) was more accurate than on Test 1 (M = 0.51, SD = 0.81), $t(43) = 5.37$, $p < .001$. Performance on Test 3 (M = 1.94, SD = 1.12) was more accurate than on Test 2, $t(43) = 3.34$, $p < .01$, and performance on Test 4 (M = 2.22, SD = 1.00) was not significantly different from Test 3, $t(43) = 1.89$, $p = .37$. No other effects were significant, $ps > .29$.

To analyze the recall of less important information, a 2(Participant age: younger or older) × 4(Test phase) ANOVA was conducted and revealed a significant two-way interaction between test and age, $F(3, 126) = 10.88$, $p < .001$, $\eta_p^2 = .21$. Post hoc t tests with Bonferroni corrections indicated that younger adults performed more accurately on Test 2 than on Test 1 (M = 3.79, SD = 2.98 and M = 1.21, SD = 1.79, respectively), $t(23) = 4.08$, $p < .001$; more accurately on Test 3 (M = 6.63, SD = 3.94) than on Test 2, $t(23) = 4.18$, $p < .001$; and as accurately on Test 4 (M = 7.58, SD = 4.98) as on Test 3, $t(23) = 1.46$, $p = .16$. Older adults' performance on Test 2 was more accurate than on Test 1 (M = 1.21, SD = 1.79 and M = 0.80, SD = 1.15, respectively), $t(19) = 2.24$, $p = .04$, and performance on Test 3 (M = 1.80, SD = 1.85) was more accurate than on Test 2, $t(19)$ 2.43, $p = .03$. There was no difference in older adults' performance on Tests 3 and 4 (M = 1.80, SD = 1.85 and M = 1.80, SD = 2.02, respectively), $t(19) < 1$, $p = 1.00$. There was a significant main effect of age, $F(1, 42) = 30.35$, $p < .001$, $\eta_p^2 = .42$, such that younger adults remembered more information associated with people of less importance than older adults did (M = 4.36, SD = 4.36 and M = 1.18, SD = 1.62, respectively).

Cued-recall test. Recall of names and occupations was scored separately on the cued-recall test. A 2(Importance: broad or personal) × 2(Participant age: younger or older) × 2(Characteristic: name or occupation) ANOVA revealed a main effect of characteristic on cued-recall performance, $F(1, 42) = 11.64$, $p < .001$, $\eta_p^2 = .22$, such that occupations were recalled more accurately than names (M = 2.38, SD = 0.88 and M = 2.16, SD = 0.96, respectively, see Figure 1). There was no effect of age, $F(1, 42) = 2.67$, $p = .11$, $\eta_p^2 = .06$. There was a significant two-way inter-

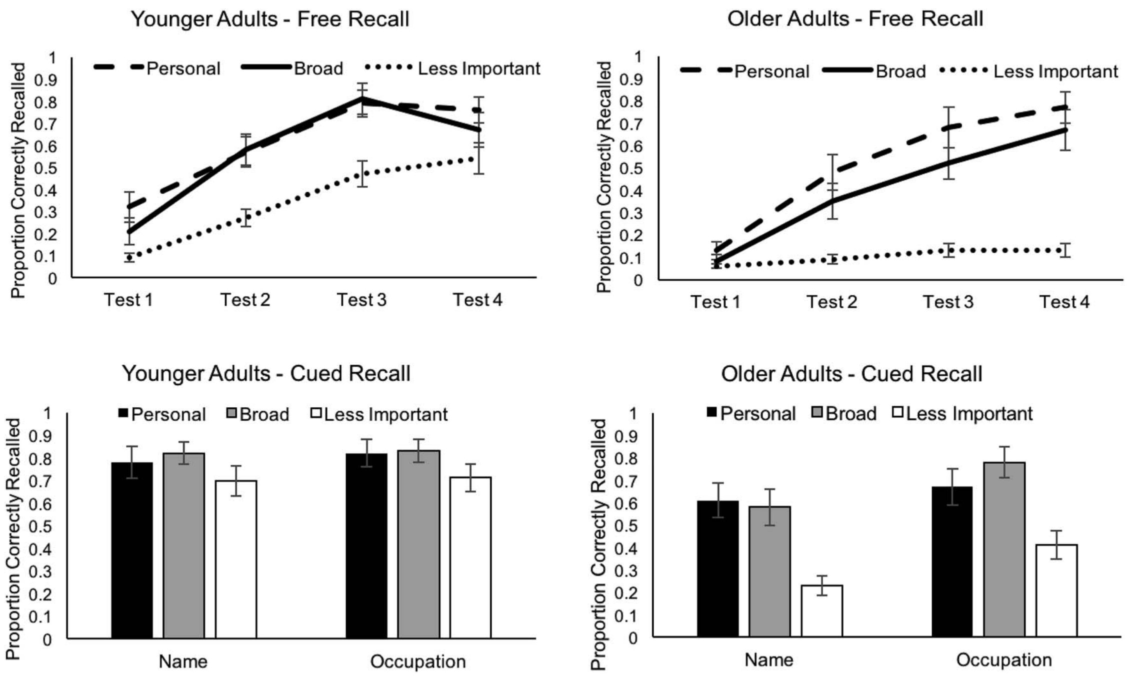

Figure 1. The proportion of personally important, broadly important, and less important information correctly recalled by younger adults and older adults in the four free recall tests (top panel) and final cued-recall test (bottom panel) in Experiment 1. Error bars reflect standard error of the mean.

action between characteristic and age, $F(1, 42) = 4.71$, $p = .04$, $\eta_p^2 = .10$. Post hoc *t* tests with Bonferroni corrections revealed that there were no significant differences in younger adults' recall of names and occupations, $t(23) = 1.07$, $p = .30$. However, older adults recalled occupations significantly more accurately than they recalled names ($M = 2.25$, $SD = 0.75$ and $M = 1.88$, $SD = 0.90$, respectively), $t(19) = 3.29$, $p < .01$. No other effects were significant, $ps > .12$.

A 2(Participant age: younger or older) × 2(Characteristic: name or occupation) ANOVA was used to analyze cued-recall accuracy of less important information and revealed a two-way interaction, $F(1, 42) = 16.66$, $p = .001$, $\eta_p^2 = .28$. Post hoc *t* tests revealed no significant differences in younger adults' recall of names and occupations, $t(23) = 0.53$, $p = .60$, while older adults recalled occupations significantly more accurately than they recalled names ($M = 6.05$, $SD = 3.93$ and $M = 3.30$, $SD = 2.88$, respectively), $t(19) = 5.60$, $p < .001$. There was a significant main effect of age, $F(1, 42) = 19.54$, $p < .001$, such that younger adults outperformed older adults ($M = 9.85$, $SD = 3.76$ and $M = 4.48$, $SD = 3.87$, respectively).

Discussion

Younger and older participants performed equally well in recalling important information, suggesting that a value-sensitive mechanism may reduce associative memory deficits in older adults. Other processes such as social pruning, in which social networks decrease in size as we age but meaningful connections remain and are often strengthened, could also be influential (Charles & Carstensen, 2010). The increase in accuracy throughout the experiment reflects a beneficial effect of repeated testing (and/or of restudying) on memory for associative social information for both younger and older adults (Geraci & Miller, 2013; Meyer & Logan, 2013). Finally, both age groups' ratings of importance were similar to the experimenter-designated categories (see online supplementary materials for analyses).

Older adults' memory deficits may be attributed to general slowing of encoding operations (Salthouse, 1996). When younger adults have insufficient time to encode associative information, their performance is expected to be less accurate, although value-directed remembering strategies may still be implemented (cf. Middlebrooks, Murayama, & Castel, 2016). It may be that when younger adults have reduced time to encode information, they behave like older adults, an issue we examine in Experiment 2.

Experiment 2

In Experiment 1, younger adults performed better than older adults in the recall of low-value information, but age differences were not present in the recall of high-value information. In Experiment 2, we sought to increase the difficulty of the encoding phase by allowing younger participants less study time, perhaps similar to older adults' general slowing (Salthouse, 1996). Younger adults' memory for face-name associations is impaired under divided attention (Naveh-Benjamin et al., 2004), but younger participants may use a shorter encoding time to focus on important information (cf. Middlebrooks et al., 2016). We hypothesized that younger adults would engage in selective memory strategies, which would lead to fewer low-value items recalled (possibly at a level more comparable to older adults with a 3-s study time), while recall of high-value items would be equal to that of older adults with a 3-s encoding time.

Method

Participants. Twenty-four younger adults (22 females) aged 18–24 years ($M = 20.00$, $SD = 1.41$) with an educational level of 13.16 years ($SD = 1.24$) were undergraduates at UCLA and were recruited as in Experiment 1. Twenty older adults (11 females) aged 59–88 years ($M = 77.24$, $SD = 7.39$) with an educational level of 17.20 years ($SD = 1.85$) were recruited as in Experiment 1 and were in good self-reported health ($M = 8.00$, $SD = 1.25$). None participated in Experiment 1.

Materials and procedure. The materials and procedure were identical to Experiment 1, except that younger adults were given 1 s to study each item during the four study cycles. Older adults studied each item for 3 s. The research was approved by the UCLA institutional review board ethics committee.

Results

Free recall tests. The results are presented in Figure 2. A 2(Importance: broad or personal) × 2(Age: younger or older) × 4(Test number) ANOVA was conducted to assess performance on the free recall tests. There was no significant main effect of age, $F(1, 42) = 2.62$, $p = .11$, $\eta_p^2 = .06$. There was a main effect of importance, $F(1, 42) = 7.18$, $p = .01$, $\eta_p^2 = .15$, such that personally important information was remembered more accurately than broadly important information ($M = 1.67$, $SD = 1.18$ and $M = 1.39$, $SD = 1.19$, respectively). There was a significant main effect of test, $F(3, 126) = 38.87$, $p < .001$, $\eta_p^2 = .48$, such that performance was more accurate on Test 2 ($M = 1.45$, $SD = 1.06$) than on Test 1 ($M = 0.51$, $SD = 0.82$), $t(43) = 6.37$, $p < .001$, and on Test 3 ($M = 1.94$, $SD = 1.12$) than on Test 2, $t(43) = 3.34$, $p < .01$, but there was no difference between Tests 3 and 4 ($M = 2.22$, $SD = 0.99$), $t(43) = 1.89$, $p = .37$. No other effects were significant, $ps > .61$.

Free recall of information associated with less important people was analyzed using a 2(Age group) × 4(Test number) ANOVA, revealing, critically, no main effect of age, $F(1, 42) = 1.39$, $p = .25$, $\eta_p^2 = .03$, such that older and younger adults were equally accurate in recalling low-value information. There was also a marginally significant two-way interaction, $F(3, 126) = 2.33$, $p = .07$, $\eta_p^2 = .05$. Post hoc t tests with Bonferroni corrections indicated that younger adults' performance increased at each test. Performance on Test 2 ($M = 1.25$, $SD = 1.51$) was more accurate than on Test 1 ($M = 0.25$, $SD = 0.74$), $t(23) = 4.44$, $p < .001$. Performance on Test 3 ($M = 2.41$, $SD = 3.32$) was more accurate than on Test 2, $t(23) = 2.75$, $p = .01$, and performance on Test 4 ($M = 3.46$, $SD = 4.00$) was more accurate than on Test 3, $t(23) = 2.83$, $p = .01$. Older adults' performance on Test 2 ($M = 0.95$, $SD = 1.54$) was more accurate than on Test 1 ($M = 0.25$, $SD = 0.55$), $t(19) = 2.41$, $p = .03$, and performance on Test 2 was more accurate than on Test 3 ($M = 1.55$, $SD = 1.82$), $t(19) = 2.45$, $p = .02$, but there was no difference in older adults' performance on Tests 3 and 4 ($M = 1.85$, $SD = 2.62$), $t(19) = 0.75$, $p = .46$.

Cued-recall test. For the final cued-recall test, a 2(Importance: broad or personal) × 2(Age: young or old) × 2(Characteristic: name or occupation) ANOVA was conducted and revealed a three-way interaction, $F(1, 42) = 4.75$, $p = .04$, $\eta_p^2 = .10$ (see Figure 2). There was no significant main effect of age, $F < 1$, $p = .76$. Among older adults, there was a main effect of characteristic, $F(1, 19) = 8.24$, $p = .01$, $\eta_p^2 = .30$, such that names were recalled less accurately than occupations ($M = 1.35$, $SD = 1.53$ and $M =$

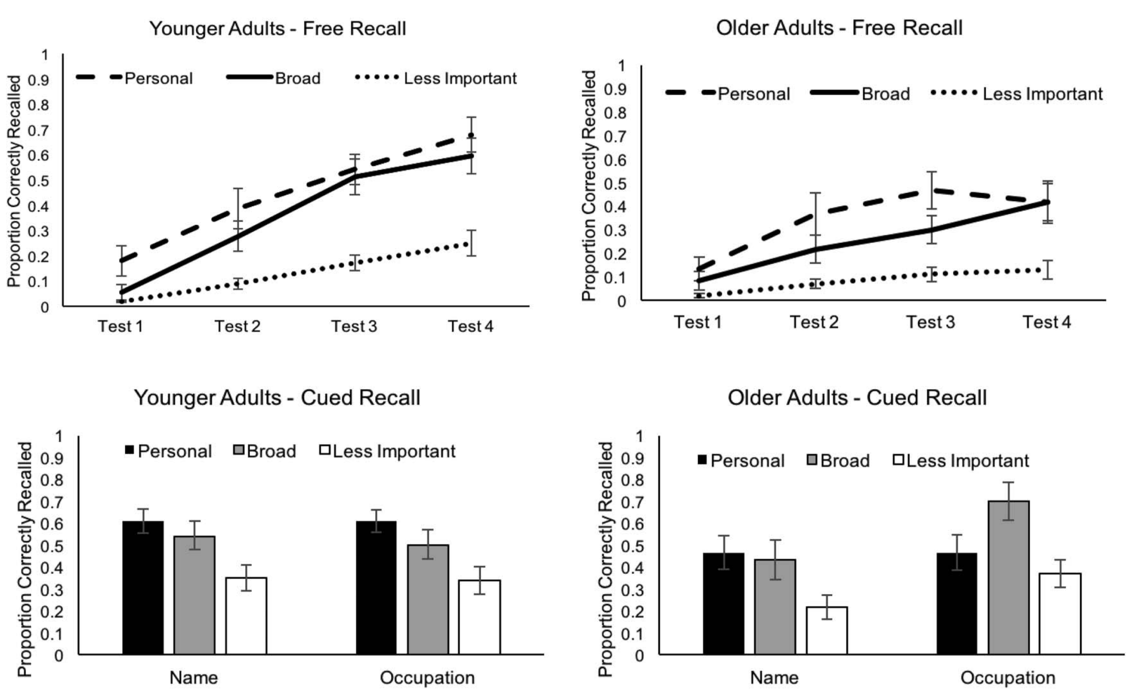

Figure 2. The proportion of personally important, broadly important, and less important information correctly recalled by younger adults and older adults in the four free recall tests (top panel) and final cued-recall test (bottom panel) in Experiment 2. Error bars reflect standard error of the mean.

1.90, $SD = 1.46$, respectively), but there was no main effect of importance, $F < 1$, $p = .68$. Among younger adults, there was no significant two-way interaction, and there were no significant main effects of importance or characteristic, all ps $> .21$.

For cued recall of items in the "less important" category, a 2(Age: young or old) × 2(Characteristic: name or occupation) ANOVA revealed no main effect of age, $F < 1$, $p = .55$. There was a significant two-way interaction, $F(1, 42) = 7.62$, $p = .01$, $\eta_p^2 = .15$, and a significant main effect of characteristic, $F(1, 42) = 6.04$, $p = .02$, $\eta_p^2 = .13$, such that occupations were remembered more accurately than names ($M = 4.98$, $SD = 4.25$ and $M = 3.96$, $SD = 3.84$, respectively). Post hoc t tests with Bonferroni corrections revealed no differences among younger adults, $p = .80$, while older adults recalled occupations more accurately than names ($M = 5.20$, $SD = 3.99$ and $M = 3.05$, $SD = 3.49$, respectively), $t(19) = 3.15$, $p < .01$.

Discussion

Given very limited study time, younger adults still remember important information (cf. Middlebrooks et al., 2016), much like older adults. Unlike older adults, on the final cued-recall test, younger participants remembered information about personally and broadly important people equally, perhaps due to lack of time during study to distinguish among personal, broad, and less important information.

For proper comparison, we collected an additional sample of 20 younger adults, also undergraduate students at UCLA, who had 3 s to encode each item. Younger adults in Experiment 2 were significantly less accurate than the comparison group in the free recall of personally and broadly important information, $F(1, 42) = 7.34$, $p < .01$, $\eta_p^2 = .15$, $M = 1.21$ ($SD = 1.14$) and $M = 1.76$ ($SD = 1.14$) respectively. There were no significant differences in the free recall of less important information, $F(1, 42) = 1.54$, $p = .22$, $\eta_p^2 = .04$. On the cued-recall test, younger adults in Experiment 2 were significantly less accurate in recalling personally and broadly important information, $F(1, 42) = 35.20$, $p < .001$, $\eta_p^2 = .46$, $M = 1.70$ ($SD = 0.67$) and $M = 2.70$ ($SD = 0.39$), respectively, a pattern that was also present in cued recall of less important information, $F(1, 42) = 9.39$, $p < .01$, $\eta_p^2 = .18$, $M = 8.38$ ($SD = 3.58$) and $M = 4.81$ ($SD = 4.06$), respectively. Participants' ratings were similar to the given categories, and younger adults rated items as slightly more important than older adults (see online supplementary materials).

General Discussion

This study examined how younger and older adults remember important social information. Older adults often complain about remembering proper names (Troyer et al., 2006), perhaps related to deficits in associative memory (Naveh-Benjamin, 2000). We investigated whether this deficit is reduced for important social information. As expected, performance improved with repeated study and testing (Geraci & Miller, 2013). Both groups remembered high-value information, but younger adults remembered more low-value information than older adults when given 3 s to study each item. Older adults, and to some extent younger adults, remembered occupations more accurately than names (Cohen, 1990). Participants' opinions of importance generally mapped on to the experimenter-designated categories. Taken together, these experiments provide novel insight regarding memory for associative social information. Younger adults were able to remember social information, even when it was not important. In contrast, older adults were able to more selectively remember important information—here, demonstrated not by point value (e.g., Castel, Benjamin, Craik, & Watkins, 2002) but by the likelihood of a potential future use in a social interaction.

Selective remembering may have been encouraged in the present task, but being tested on all of the faces should also make participants attend to most of the information. Presenting more items may lead to more selective remembering (see also Castel et al., 2016; Mealey et al., 1996), although the small number of important items in this study was chosen to reflect that only a small number of people we meet at a party will be highly important to remember later. The relatively small sample sizes in this study, although similar to previous work, could be increased in future research. Given $n = 44$ for each experiment and an effect size f between moderate and high (.35), our post hoc power to detect differences in the free recall of personally and broadly important information was .86, which is sufficient (Cohen, 1992). A Bayesian analysis of the null effects yielded a small Bayes factor (the collapsed data from all participants with 3 s to study were 2.14 times more likely to fit the null model than the alternative), so future research is needed to determine the boundary conditions of when older adults remember important social information.

Some faces presented in the current study were smiling; others were not. Paired-samples t tests were conducted to examine whether expression affected free recall of less important information. The only group significantly affected by expression were the older adults in Experiment 2, who recalled information about 17.08% of the smiling faces ($SD = 24.10$) and 6.13% of the neutral faces ($SD = 8.48$), $t(19) = 2.36$, $p = .03$. This may be related to older adults in Experiment 2 being significantly older than those in Experiment 1, $t(38) = 3.96$, $p < .001$, as effects of positive emotion on memory strengthen into older age (Mather & Carstensen, 2005).

Overall, these results inform how people of all ages remember important information (Castel, Murayama, Friedman, McGillivray, & Link, 2013) and how the future need to use information is related to its memorability (Anderson & Schooler, 2000). These findings also relate to conditions where older adults remember source information (May, Rahhal, Berry, & Leighton, 2005; Rahhal, May, & Hasher, 2002) and impressions formed about others (Cassidy & Gutchess, 2012). Age equivalences in this study may be explained by the benefits of testing across multiple lists, the consideration of future social interaction, and the use of value-directed memory strategies. These processes may also include socioemotional factors and/or cognitive strategies that could be influenced by information importance and memory deficits that accompany cognitive aging.

References

Anderson, J. R., & Schooler, L. J. (2000). The adaptive nature of memory. In E. Tulving & F. I. M. Craik (Eds.), *Handbook of memory* (pp. 557–570). New York, NY: Oxford University Press.

Cassidy, B. S., & Gutchess, A. H. (2012). Social relevance enhances memory for impressions in older adults. *Memory, 20,* 332–345. http://dx.doi.org/10.1080/09658211.2012.660956

Castel, A. D. (2007). The adaptive and strategic use of memory by older adults: Evaluative processing and value-directed remembering. *Psychology of Learning and Motivation, 48,* 225–270. http://dx.doi.org/10.1016/S0079-7421(07)48006-9

Castel, A. D., Benjamin, A. S., Craik, F. I., & Watkins, M. J. (2002). The effects of aging on selectivity and control in short-term recall. *Memory & Cognition, 30,* 1078–1085. http://dx.doi.org/10.3758/BF03194325

Castel, A. D., Farb, N. A., & Craik, F. I. (2007). Memory for general and specific value information in younger and older adults: Measuring the limits of strategic control. *Memory & Cognition, 35,* 689–700. http://dx.doi.org/10.3758/BF03193307

Castel, A. D., Friedman, M. C., McGillivray, S., Flores, C. C., Murayama, K., Kerr, T., & Drolet, A. (2016). I owe you: Age-related similarities and differences in associative memory for gains and losses. *Aging, Neuropsychology, and Cognition, 23,* 549–565. http://dx.doi.org/10.1080/13825585.2015.1130214

Castel, A. D., Murayama, K., Friedman, M. C., McGillivray, S., & Link, I. (2013). Selecting valuable information to remember: Age-related differences and similarities in self-regulated learning. *Psychology and Aging, 28,* 232–242. http://dx.doi.org/10.1037/a0030678

Charles, S. T., & Carstensen, L. L. (2010). Social and emotional aging. *Annual Review of Psychology, 61,* 383–409. http://dx.doi.org/10.1146/annurev.psych.093008.100448

Cohen, G. (1990). Why is it difficult to put names to faces? *British Journal of Psychology, 81,* 287–297. http://dx.doi.org/10.1111/j.2044-8295.1990.tb02362.x

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112,* 155–159. http://dx.doi.org/10.1037/0033-2909.112.1.155

Festini, S. B., Hartley, A. A., Tauber, S. K., & Rhodes, M. G. (2013). Assigned value improves memory of proper names. *Memory, 21,* 657–667. http://dx.doi.org/10.1080/09658211.2012.747613

Fogler, K. A., James, L. E., & Crandall, E. A. (2010). How name descriptiveness impacts proper name learning in young and older adults. *Aging, Neuropsychology, and Cognition, 17,* 505–518. http://dx.doi.org/10.1080/13825580903477245

Geraci, L., & Miller, T. M. (2013). Improving older adults' memory performance using prior task success. *Psychology and Aging, 28,* 340–345. http://dx.doi.org/10.1037/a0030332

Lang, F. R., & Carstensen, L. L. (2002). Time counts: Future time perspective, goals, and social relationships. *Psychology and Aging, 17,* 125–139. http://dx.doi.org/10.1037/0882-7974.17.1.125

Mather, M., & Carstensen, L. L. (2005). Aging and motivated cognition: The positivity effect in attention and memory. *Trends in Cognitive Sciences, 9,* 496–502. http://dx.doi.org/10.1016/j.tics.2005.08.005

May, C. P., Rahhal, T., Berry, E. M., & Leighton, E. A. (2005). Aging, source memory, and emotion. *Psychology and Aging, 20,* 571–578. http://dx.doi.org/10.1037/0882-7974.20.4.571

McGillivray, S., & Castel, A. D. (2010). Memory for age-face associations in younger and older adults: The role of generation and schematic support. *Psychology and Aging, 25,* 822–832. http://dx.doi.org/10.1037/a0021044

Mealey, L., Daood, C., & Krage, M. (1996). Enhanced memory for faces of cheaters. *Ethology & Sociobiology, 17,* 119–128. http://dx.doi.org/10.1016/0162-3095(95)00131-X

Meyer, A. N., & Logan, J. M. (2013). Taking the testing effect beyond the college freshman: Benefits for lifelong learning. *Psychology and Aging, 28,* 142–147. http://dx.doi.org/10.1037/a0030890

Middlebrooks, C. D., Murayama, K., & Castel, A. D. (2016). The value in rushing: Memory and selectivity when short on time. *Acta Psychologica, 170,* 1–9. http://dx.doi.org/10.1016/j.actpsy.2016.06.001

Minear, M., & Park, D. C. (2004). A lifespan database of adult facial stimuli. *Behavior Research Methods, Instruments & Computers, 36,* 630–633. http://dx.doi.org/10.3758/BF03206543

Naveh-Benjamin, M. (2000). Adult age differences in memory performance: Tests of an associative deficit hypothesis. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 26,* 1170–1187. http://dx.doi.org/10.1037/0278-7393.26.5.1170

Naveh-Benjamin, M., Guez, J., Kilb, A., & Reedy, S. (2004). The associative memory deficit of older adults: Further support using face-name associations. *Psychology and Aging, 19,* 541–546. http://dx.doi.org/10.1037/0882-7974.19.3.541

Old, S. R., & Naveh-Benjamin, M. (2008). Differential effects of age on item and associative measures of memory: A meta-analysis. *Psychology and Aging, 23,* 104–118.

Rahhal, T. A., May, C. P., & Hasher, L. (2002). Truth and character: Sources that older adults can remember. *Psychological Science, 13,* 101–105. http://dx.doi.org/10.1111/1467-9280.00419

Salthouse, T. A. (1996). The processing-speed theory of adult age differences in cognition. *Psychological Review, 103,* 403–428. http://dx.doi.org/10.1037/0033-295X.103.3.403

Troyer, A. K., Häfliger, A., Cadieux, M. J., & Craik, F. I. M. (2006). Name and face learning in older adults: Effects of level of processing, self-generation, and intention to learn. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 61,* 67–74. http://dx.doi.org/10.1093/geronb/61.2.P67

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