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Adult age differences in unconscious transference: Source confusion or identity blending?

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Eyewitnesses are known often to falsely identify a familiar but innocent bystander when asked to pick out a perpetrator from a lineup. Such unconscious transference errors have been attributed to either identity confusions at encoding or source retrieval errors. Three experiments contrasted younger and older adults in their susceptibility to such misidentifications. Participants saw photographs of perpetrators, then a series of mug shots of innocent bystanders. A week later, they saw lineups containing bystanders (and others containing perpetrators in Experiment 3) and were asked whether any of the perpetrators were present. When younger faces were used as stimuli (Experiments 1 and 3), older adults showed higher rates of transference errors. When older faces were used as stimuli (Experiments 2 and 3), no such age effects in rates of unconscious transference were apparent. In addition, older adults in Experiment 3 showed an own-age bias effect for correct identification of targets. Unconscious transference errors were found to be due to both source retrieval errors and identity confusions, but age-related increases were found only in the latter.

Imagine that a 75-year-old man witnesses a robbery in a local shop. This witness selects the suspect from a police lineup, and later the case goes to trial. At the trial, the defense team provides evidence that the defendant was a regular customer at the shop and argues that the witness had seen the accused there. They also argue that the advanced age of the witness means that he is likely to have made an unconscious transference error that stems from poor memory for an innocent interaction. Is such a line of defense warranted?

The majority of the eyewitness research community certainly believes that unconscious transference errors can occur (Kassin, Ellsworth, & Smith, 1989; Kassin, Tubb, Hosch, & Memon, 2001), although to date, there have been no studies exploring such errors in older adults. We will begin by outlining two theoretical accounts of unconscious transference, before reviewing the likely impact of aging, which is the focus of the present work.

The Identity-Blending Explanation of Unconscious Transference

An unconscious transference error may occur if the witness believes that the perpetrator and the innocent bystander are the same person. This could happen if the two people are seen sequentially, if they resemble one another sufficiently, and if face processing was insufficient to distinguish between them. Ross, Ceci, Dunning, and Toglia (1994a, 1994b) demonstrated a high rate of transference errors in witnesses who watched a video featuring first a male teacher, then a female teacher, then a male thief stealing money from the female teacher's purse. A lineup containing the innocent male teacher and four foils was presented around 5 min after the film. The majority of the witnesses selected the innocent bystander, thus demonstrating unconscious transference. Furthermore, when asked whether the perpetrator had been seen anywhere other than the scene of the crime, most of the witnesses indicated that they had seen the perpetrator teaching earlier. Ross et al. (1994a, 1994b) argued that this effect is a form of memory blending, in which the two memories for perpetrator and innocent bystander are blended together at encoding, even though there may be clear contextual information for each occurrence. The identity-blending account is reminiscent of the work on change blindness. Simons and Levin (1998) constructed a scenario in which stooges asked pedestrians for directions around campus. During the interaction, a stooge swapped places with a second stooge, who continued the conversation. Remarkably, half of the participants did not notice the swap. Interestingly for the work here, older adults were particularly unlikely to detect changes in the younger stooges. Thus, in both lines of research, people do not notice the difference between two individuals seen consecutively but, instead, believe them to be one and the same person.

The Poor Source Retrieval Explanation of Unconscious Transference

An alternative explanation for unconscious transference is that a witness may find one member of the lineup more

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familiar than the others but may not appreciate that the source of this familiarity is inappropriate for the identification decision. Historically, this has been the preferred account of unconscious transference errors. Loftus (1976) demonstrated an unconscious transference effect, using photographic materials. She read out a script describing an altercation, accompanied by photographs of all the characters in the narrative. Subsequently, one of the innocent bystanders appeared in a lineup. Witnesses were more likely than chance to pick this bystander, and Loftus argued that this was due to a misattribution of familiarity at test.

One consequence of the poor source retrieval view is that factors that increase the availability of the contextual details of the original encounter will lead to fewer transference errors. In four field studies, Read, Tollestrup, Hammersley, McFadzen, and Christensen (1990) examined retail staff's memory for customers who had made unusual requests (e.g., asking for a $5 note in return for 20 quarters). The lineups contained bystanders who had made different requests, and no unconscious transference effects were shown at all. Only in a fifth experiment was there any evidence of unconscious transference. However, the conditions of this experiments differed considerably from the previous experiments: The participants were students who had witnessed the bystander and the perpetrator during classes and had not interacted directly with either. The perpetrator and the bystander were similar, but transference was seen only when the remaining lineup members were dissimilar to the perpetrator and was absent if all the lineup members resembled the perpetrator.

Leaving aside the question of whether the conditions that produce unconscious transference are likely to occur in real-world cases, it is clear that Read et al.'s (1990) explanation of the transference errors that do occur stems from poor source monitoring at retrieval. At test, a participant may find one member of the lineup familiar and, perhaps, even recall an association with the crime scene and so make an erroneous identification. This is, therefore, a failure to associate the right contextual source with a memory. This account is henceforth referred to as a the *poor source retrieval* explanation of unconscious transference errors.

Aging and Face Recognition

A number of researchers have examined face recognition ability in older adults, although to date, none has examined unconscious transference errors in the manner described above. Two relevant themes have emerged from this work. One is the possibility of an own-age bias in recognition ability, and the other is the underlying mechanism behind face recognition errors by older adults.

Bäckman (1991, Experiment 2) examined the face recognition ability of four groups of adults (young, 19–27 years; young–old, 63–70 years; 76-year-olds; and 85-year-olds) in their ability to recognize 60 unfamiliar faces over a 20-min retention interval. The unfamiliar faces were classified as either young or old. Although the two oldest groups showed no effect of face age, there was an own-age bias evident in the two younger groups. For the younger faces, the younger adults outperformed their older counterparts. However, for the older faces, the older adults performed better than the younger adults. Thus, an own-age bias was apparent. Two other studies, however, showed an advantage for younger adults over older adults with younger faces, but no age difference for older faces (Bartlett & Leslie, 1986; Fulton & Bartlett, 1991). Thus, across these studies, the clearest effect is that older adults are poorer than younger adults when recognizing young faces. When recognition of older faces is required, the age differences either favor the old or are absent.

Bartlett and Fulton (1991) explored more closely the nature of the older adults' face recognition impairment. The start point of their study was the observation that older adults' poorer performance is most often seen in false recognition, with hit rate remaining little changed across age. They examined rate of false recognition, using a continuous recognition procedure in which no target was repeated. In addition, the participants were required to indicate whether any face resembled people known to them outside the experiment (familiarity) and also to rate how typical each face was. The target faces were classified as young, middle-aged, and old. The results indicated first that the older adults showed much higher rates of false recognition than did the younger adults, although there was no face age effect. What was of more interest was that although ratings of typicality predicted false recognition for both the young and the old participants, for the older adults, false recognition was also predicted by familiarity. On the basis of this work, Bartlett and Fulton argued that "older individuals tend to make relatively little use of contextual information, relying more heavily on resemblance information, in making recognition and familiar decisions" (p. 236).

It is a relatively small step from Bartlett and Fulton's (1991) work on resemblance to the identity-blending account of unconscious transference. Bartlett and Fulton argued that older adults falsely identify those who resemble someone familiar, because context is not available. The identity-blending account of unconscious transference requires that two separate people be confused at the time of encoding, which in turn requires that they resemble each other sufficiently for this to occur. A clear prediction that follows is that older adults should be more likely to believe that a second person resembles someone seen earlier and, so, later should demonstrate higher levels of unconscious transference and that this effect will be largest for younger faces, since older adults are more likely to misidentify these stimuli.

Aging and Source Retrieval

It is clear that older adults have poorer source retrieval abilities than do younger adults, on a range of tasks, such as fact and source recall (Schacter, Kaszniak, Kihlstrom, & Valdisseri, 1991), item versus associative recognition (Naveh-Benjamin, 2000), and the recollect–know paradigm in recognition memory (Parkin & Walter, 1992; Per-

fect, Williams, & Anderton-Brown, 1995). Several lines of evidence thus converge to suggest that older adults are more likely to base recognition decisions on familiarity only (see Schacter, Norman, & Koutstaal, 1998, for a review), which if applied to a lineup, leads to the prediction of age-related increases in unconscious transference errors.

Both the poor source retrieval account and the identity-blending account of unconscious transference errors therefore make the same prediction: that older adults should show higher rates of unconscious transference errors than do younger adults. However, the underlying causal reason is different. In the source retrieval account, older adults should make more unconscious transference errors whether or not they initially misidentify the bystander. The identity-blending hypothesis requires that the bystander be initially misidentified, and work on face recognition suggests that such errors are more likely for younger faces. Thus, one way of distinguishing the two accounts is to determine whether or not older adults' unconscious transference errors are associated with an initial identity blend.

We addressed these ideas in three experiments. In Experiment 1, we examined transference errors in younger and older adults, using young faces as stimuli. In Experiment 2, older faces were used as stimuli. In Experiment 3, we used a within-subjects design involving both younger and older adults making lineup decisions for younger and older faces. In each of these, we used photographic materials to test our hypotheses. Although this limits the ecological validity of our approach, previous research has indicated that such materials are most likely to induce unconscious transference errors, which is a prerequisite for studying age differences.

EXPERIMENT 1

Method

Participants. Younger volunteers (n = 30) were recruited from the Department of Psychology, University of Bristol. They had a mean age of 22.0 years (SD = 4.2 years). The older adults (n = 51) were part of the University of Bristol, Department of Experimental Psychology's older adult volunteer panel and had a mean age of 71.0 years (SD = 7.1 years).

Procedure. Testing occurred individually over two sessions separated by a week. During the first session, the participants were told that they would see four photographs of people. Each photograph was in black and white, was 150 × 100 mm in size, and showed a single individual in an interior scene. The experimenter read out the following instructions: "I want you to study the photographs carefully, looking at the people and their surroundings. As I show you each photograph I will also tell you some details about the person you are looking at. Please listen carefully to the information I give you and try to remember as much as possible about each person."

The participants saw each person for 10 sec and heard four facts about each person before undertaking another task unrelated to the present experiment. After approximately 30 min, the participants were shown the photographs of people not previously seen before in the session. These photographs are referred to as the mug shots, although they were not presented in the stereotypical police mug shot format; they were black-and-white head-and-shoulder photographic portraits against a plain background, 55 × 70 mm in size. The participants were given 5 sec to study each photograph before they were asked to decide whether they had seen that person before in that day's test session. The participants saw eight mug shots in all, four male and four female.

The participants returned for a second session 1 week later. At that second session, the participants were first presented with two photographic lineups, one at a time, each consisting of five faces of the same sex. Each lineup contained one face that had previously been shown as a mug shot. All other photographs in the lineup were in the same format as the mug shot photograph. No perpetrators appeared in the lineups. The participants were reminded that they had been presented with details about individuals in the previous session and were then asked to indicate whether any of those people were in the lineups presented to them. For each lineup, the participants were told that the lineup might or might not contain a target. Having made two lineup decisions, the participants then completed some further tasks that were unrelated to the present experiment.

Results and Discussion

The participants saw two target-absent lineups at the final stage: one consisting entirely of male faces, the other entirely of female faces. The lineups contained innocent bystanders who had previously appeared as mug shots in the previous session. There were, therefore, three classes of responses the participants could make: a correct rejection of the lineup (i.e., stating that no perpetrator was in the lineup), a false identification of a person from the mug shot phase (a transference error), or a false identification of a new lineup member.

The proportion of each kind of error for each age group is shown in Table 1. Clearly, there was a large age effect in the likelihood of each kind of response. Whereas 57% of the younger adults were able to correctly reject both lineups, only 12% of the older adults were able to do so. Conversely, whereas only 23% of the younger adults made one transference error, 55% of the older adults did so, 16% of whom made transference errors on both lineups. No younger adult made two transference errors. On average, the older adults made reliably more transference errors than did the younger adults [$t(79) = 3.23$, $p < .01$].

In order to determine whether there was a specific age-related increase in transference errors, as opposed to an age-related increase in general identification errors, we examined the relative frequency of each kind of error response. The younger adults selected the transference item on 11.7% of the occasions, as compared with a baseline

Table 1
Experiment 1: Proportion of Participants in Each Age Group Who Made Transference Errors and Other Identification Errors Across Two Lineups Involving Younger Faces

Age Group	Other Identification Errors	Transference Errors 0	1	2
Younger adults	0	.57	.10	.00
	1	.10	.13	–
	2	.10	–	–
Older adults	0	.12	.12	.16
	1	.18	.27	–
	2	.16	–	–

Note—Other identification error, false identification of foil in lineup; transference error, false identification of bystander in lineup.

Table 2
Experiment 1: Proportion of Participants in Each Age Group Who Misidentified the Critical Mug Shot in Week 1 and Subsequently Identified That Person in the Lineup in Week 2, Using Young Faces as Stimuli

		Transference Error in Lineup?			
		Male Face		Female Face	
Age Group	Mug Shot Error?	No	Yes	No	Yes
Younger adults	no	.90	.10	.87	.13
	yes	.00	.00	.00	.00
Older adults	no	.57	.20	.57	.27
	yes	.10	.14	.06	.10

Note—Mug shot error, false identification of bystander from mug shots in Week 1; transference error, false identification of bystander in lineup in Week 2.

likelihood of selecting any other foil of 5.4%. The equivalent figures for the older adults were 35.3% for the transference item versus a baseline of 9.6% for selecting any other foil. An estimate of the influence of transference can be gained by subtracting the base rate of foil selections due to misidentification from the rate of transference errors. This produces a mean difference score of 6.3% for the young and 25.7% for the old, which confirms the greater likelihood of transference in the older adults [$t(79) = 2.36$, $p < .03$] and demonstrates that the unconscious transference errors were more than general false positive errors.

During the first test session, the participants were exposed to a number of mug shots and were asked whether any had been seen earlier. Out of eight mug shots, the younger adults claimed to have seen 0.60 (7.5%; $SD = 0.72$), whereas the older adults claimed to have seen 2.71 (33.8%; $SD = 1.42$), which represents a significant age-related increase in errors [$t(79) = 7.56$, $p < .001$]. This raises the question of whether the age increase in mug shot errors was the cause of the age increase in transference errors. Table 2 shows the probability of making a transference error contingent upon having already made the identity confusion for that mug shot in the previous week. Note, however, that the younger adults never identified the critical mug shot in the first session, and thus all their transference errors are attributable to poor source retrieval. For the older adults, selecting a face from the mug shots increased the likelihood of picking out that person from the subsequent lineup ($p < .05$ for the male face and $p < .07$ for the female face, by Fisher's exact test, one-tailed).

This experiment therefore confirmed our expectation of increased rates of unconscious transference error for older adults. However, we reserve discussion on the theoretical implications of these data until we have presented the results obtained using older faces as stimuli. If the poorer performance of the older adults was due to memory impairment associated with old age, this would have little impact on the overall pattern of performance. On the other hand, if the poorer performance of the older adults was due to an out-group effect (that all younger adults "look the same"), they may be expected to do better when judging people of their own age. The reverse arguments apply to the younger group: Their performance may remain unchanged or become impaired, because now all the older faces "look the same."

We also took the opportunity to make some other slight alterations to the methodology used. One concern with the previous experiment was that memory for the target faces might have been very poor. The participants in Experiment 1 might have rejected the lineups not because they successfully judged the source for the transference item, but because they had no memory for the initial perpetrators. For this reason, we increased the initial study time, with the expectation that this would reduce the number of *not in lineup* responses that were due to forgetting. We also increased the time allowed to study the mug shots, because on reflection, it seemed more ecologically valid to allow potential witnesses to scrutinize each mug shot for as long as they deemed necessary.

EXPERIMENT 2

Method

Participants. Younger participants ($n = 45$) were recruited from within the Psychology Department of Plymouth University; they had a mean age of 22.4 years ($SD = 3.84$). Older adults ($n = 48$) were recruited via advertising in the local press; they had a mean age of 63.6 years. Each participant was paid £10 for his or her participation over two 1-h sessions.

Procedure. The procedure was the same as that in the previous experiment, with the following alterations. First, the faces of the perpetrators were presented initially for approximately 15 sec each. During the inspection of mug shots, the participants were allowed to scrutinize each shot for as long as they required, rather than for the fixed period of 5 sec in the previous experiment. The lineups presented in the 2nd week were each composed of six faces of the same sex, rather than five.

Because of an administrative error, the participants were permitted to choose more than one face from each lineup, thus introducing the possibility of age bias in making multiple errors. In fact, there was a suggestion that this was the case, with 11 older and 5 younger adults making two identifications in a lineup.[1] For all analyses involving the lineups, only those who made a single choice were included.

Results and Discussion

As in the previous experiment, the final stage contained two perpetrator-absent lineups, each containing an inno-

Table 3
Experiment 2: Proportion of Participants in each Age Group Who Made Transference Errors and Other Identification Errors Across Two Lineups Involving Older Faces

Age Group	Other Identification Errors	Transference Errors 0	1	2
Younger adults	0	.20	.13	.10
	1	.20	.23	–
	2	.15	–	–
Older adults	0	.24	.05	.11
	1	.16	.16	–
	2	.27	–	–

Note—Other identification error, false identification of foil in lineup; transference error, false identification of bystander in lineup; –, no data possible in this cell because the total number of errors exceeded the number of lineups.

cent bystander. There were three classes of response that could therefore be made: correct rejection, transference error, or false identification.

The age differences found in the previous experiment were effectively removed, as can be seen in Table 3. Successful rejection of both lineups was achieved by 24% of the older adults and 20% of the younger adults. There was no age difference in the rate of transference errors [$t(75) = 0.76, p < .46$] or in the rate of other false identifications [$t(75) = .80, p < .43$].

It should be noted that this lack of an age effect on transference errors did not occur because of a lack of a transference effect. Overall, the participants selected the previously seen lineup member on 24.6% of the occasions, as compared with a selection rate for the other foils of 7.9%. This difference is significant [$t(76) = 3.91, p < .001$]. The older adults selected the transference item on 21.6% of the occasions, as compared with a baseline rate for other false identifications of 8.6%. The equivalent figures for the younger adults were 27.5% and 7.3%. As before, an estimate of the rate of transference errors was made by subtracting the rate of false foil identification from the rate of identification of transference items. This produced mean difference scores of 20.2% for the younger adults and 13.0% for the older adults, which do not significantly differ [$t(75) = 0.85, p < .40$]. Thus, although nonsignificant, the effect was such that the older adults were numerically less likely to make a transference error than were the younger adults when older faces were used (the reverse of the nonsignificant difference in the previous experiment).

The older adults were, however, once again more likely to falsely identify one of the mug shots as being familiar to them at the end of Session 1. On average, the older adults claimed to have seen 1.83 (22.9%; $SD = 1.40$) of the mug shots they were presented with, whereas the younger adults claimed to have seen only 1.02 (12.8%; $SD = 1.01$).

Finally, we examined the relationship between initial mug shot identifications and subsequent transference errors. These data are shown in Table 4. The younger adults showed no relation between mug shot identification and subsequent transference errors for the male face ($p = .59$ by Fisher's exact test), but they did for the female face ($p < .001$ by Fisher's exact test). However, as in the previous experiment, the rate of critical mug shot identifications was very low in the young (a total of 8 errors, 5 of which led to a transference error). The older adults made a greater number of critical mug shot errors (22 in total), and mug shot identification showed a reliable association with transference errors for the male face ($p < .001$ by Fisher's exact test) and the female face ($p < .02$ by Fisher's exact test). In total, 16 out of 22 transference errors by the older adults followed a critical mug shot identification.

As compared with Experiment 1, altering the stimuli from younger to older faces had a greater impact upon the performance of the younger adults than upon that of the older adults. The number of younger participants successfully rejecting both lineups dropped from 57% in Experiment 1 to 20% in the present experiment. Successful rejection of both lineups by the older adults was affected less and in the opposite direction, with performance increasing from 12% to 24%. The net result of these two changes meant that there were no age differences in ability to reject the lineups when older faces were used as stimuli. This is a compelling finding, since finding a null effect of age on a memory test is unusual. Consistent with these data, there were also no age differences in this experiment on absolute rate, or proportion, of transference errors. This is not because transference was not observed, however, because as in the previous experiment, the rates of transference errors were reliably higher than those for other identification errors.

Table 4
Experiment 2: Proportion of Participants in Each Age Group Who Misidentified the Critical Mug Shot in Week 1 and Subsequently Identified That Person in the Lineup in Week 2, Using Older Faces as Stimuli

Age Group	Mug Shot Error?	Transference Error in Lineup? Male Face No	Male Face Yes	Female Face No	Female Face Yes
Younger adults	no	.58	.31	.69	.24
	yes	.07	.04	.00	.07
Older adults	no	.54	.13	.42	.25
	yes	.10	.23	.02	.10

Note—Mug shot error, false identification of bystander from mug shots in Week 1; transference error, false identification of bystander in lineup in Week 2.

One aspect of the data consistent with the previous experiment was the age difference on the mug shot task. Once again, the older adults claimed to find more of the mug shots familiar than did the younger adults, although the effect was smaller than that in the previous experiment. However, the increased mug shot errors did not lead to more transference errors by the older adults. This pattern occurred because although the older adults made more transference errors that could be attributable to identity blending, there was an effect in the opposite direction, seen for the male face, such that the older adults made fewer unconscious transference errors that were due solely to poor source retrieval.

However, there were several methodological differences, other than a change in the stimuli, that prevented a straightforward comparison of Experiments 1 and 2. We explored a number of these differences, but none seemed to explain the differences between the findings of the two experiments. The older adults in Experiment 2 were younger than those in Experiment 1, but restricting the analysis of the second experiment to the group of older adults whose ages matched those in Experiment 1 made no impact. Experiment 2 allowed people to make multiple lineup choices, but whether or not those who had made multiple choices were included in the analysis had no impact on the pattern of findings. Finally, study time was increased across experiments, but the net result was an improvement for the old and a decrement for the young, so a straightforward interpretation was not apparent. Nonetheless, given the differences between the experiments, it seemed prudent to attempt a replication using a within-subjects design. In this final experiment, the participants first saw both older and younger targets, then saw older and younger bystanders, and then returned 1 week later to see lineups involving both younger and older adults. One addition to the previous experiments was that as well as including lineups that contained only a bystander, we also included two lineups that contained the perpetrator, rather than the bystander. This enabled us to test memory for the target events directly, thus providing an estimate of the memory strength that each age group had for the original event. Our expectations were that the previous findings would hold—that (1) the older adults would identify more mug shots than would the younger adults, irrespective of the age of the faces; (2) the older adults would make more transference errors than would the younger adults, irrespective of the age of the faces; and (3) the younger adults would make more transference errors for older faces. In addition, in line with previous research on face recognition, we expected the older adults to be particularly poor at identifying younger perpetrators, but not older perpetrators (Bartlett & Leslie, 1986; Fulton & Bartlett, 1991).

EXPERIMENT 3

Method

Participants. The younger adults (n = 30) were recruited from the University of Plymouth, who participated either as volunteers or for course credit. Their mean age was 20.1 years (SD = 1.6). The older adults were recruited from the same pool of volunteers as that used in Experiment 2, although no participant took part in both experiments. Their mean age was 66.6 years (SD = 5.9). All the volunteers self-reported being in good health and had normal or corrected-to-normal vision. As is commonly found, the older adults outperformed their younger counterparts on a test of vocabulary, as tested by the National Adult Reading Test [$t(58) = 9.18$, $p < .001$]. The older adults were paid £10 for their participation in the two test sessions, whereas the younger adults participated either voluntarily or for partial course credit.

Materials. Four "perpetrator" photographs were taken: an older male (71 years old), an older female (71 years old), a younger male (21 years old), and a younger female (21 years old). These photographs were head-and-shoulder color photographs against a plain background, 40 × 50 mm in size.

For each perpetrator, there was a set of four photographs of innocent bystanders, all of an age similar to that of the perpetrator (mean age for old males, 74 years; old females, 70.5 years; younger males, 21.5; younger females, 20.5 years). In addition, appropriate foils were used to construct lineups for each of the perpetrators. The mean age in each lineup was as follows: older males, 68.3 years, older females, 73.0 years, young males, 20.4 years, younger females, 19.7 years). In each case, the size, pose, and presentation of the photographs were the same as those for the perpetrator photographs.

Procedure. The participants were tested individually in a quiet test laboratory. In Session 1, they were told that they would be shown a series of photographs of different individuals who were guilty of particular crimes. They were told to remember as much as they could about each person they saw. Each of the four suspect photographs was then presented for 20 sec, during which time the experimenter read details of the crime this person had committed. These details were selected so as to be plausible for the age and gender of the suspects (older male, fraud; older female, shoplifting; younger male, car theft; younger female, driving without a license).

There was then a filled interval of 20–25 min, during which the participants completed the National Adult Reading Test, and other psychological tasks not relevant to the present investigation. The participants were then presented with the mug shot photographs, which were presented in a fixed random order with respect to age and gender. They were instructed to look at each photograph and to indicate whether they thought that they had seen any individual earlier in the session. In fact, as in the previous experiments, no photograph corresponded to the earlier suspects.

The follow-up test session occurred 1 week later. The participants were told that they would be tested for their memory of the suspects that they had seen the previous week. The participants were first reminded of the older male they had seen the previous week and the details of his crime. They were told that they would see a six-person photographic lineup and that the suspect might or might not be in the lineup. Their task was to identify which of the six people was the suspect or to indicate that he was not in the lineup. The same procedure was repeated for the younger male, the older female, and the younger female.

In fact, half of the lineups (either younger male and older female or younger female and older male) contained the suspect, whereas the other half contained a bystander from the mug shots in Week 1. Which lineups were used as target present or bystander present was counterbalanced for each age group. Target-present and target-absent lineups were identical, except that they contained either the suspect or the bystander in the same position.

Results

For purposes of comparison with the previous experiments, we will first report the analyses that replicated those used before—namely, the analyses of transference rates,

mug shot identification rates, and their relationship, for younger and older faces only in the lineups containing a bystander but no perpetrator. We will then report the analysis of correct identifications in perpetrator-present lineups.

Three responses were possible in a target-absent lineup: The participants could reject the lineup, select the bystander, or select another foil. Table 5 gives the proportion of each age group that fell into each of these three categories. For the younger faces, 90% of the younger adults and only 33% of the older adults successfully rejected the target-absent lineup. Whereas only 10% of the younger adults made a transference error, 40% of the older adults did so, which is a significant difference in rate of transference [$t(58) = 2.81, p < .01$]. In addition, whereas 27% of the older adults falsely chose a different foil from the lineup of younger faces, no younger adult did so.

For the older faces, the age differences were less marked. Sixty-seven percent of the younger adults successfully rejected the lineup, whereas 50% of the older adults did so. Unconscious transference errors were made by 33% of the younger adults and 43% of the older adults, which does not constitute a significant difference [$t(58) = 0.79$]. No younger adults selected a foil from the lineup of older faces, and only 7% of the older adults did so. Thus, with regard to transference errors, this within-subjects design replicated the previous experiment in demonstrating age differences in transference errors only when younger faces were used as stimuli.

The next analysis explored rates of errors (transference and other false positives) for each face age, by each age group. As in the previous experiments, the rate of identification of bystanders was higher than that for other foils [$F(1,58) = 50.4, p < .001$]. Overall, the older adults made more errors [$F(1,58) = 7.58, p < .008$]. No other effects or interactions were significant [face age, $F(1,58) = 2.56$, $p < .13$; age group × error type, $F(1,58) = 3.31$, $p < .071$; age group × face age, $F(1,58) = 1.47, p < .23$; error type × face age, $F(1,58) = 3.79, p < .056$; age group × face age × error type, $F < 1$]. On average, the younger adults selected the bystander on 21.6% of the occasions, against a baseline probability of selecting any other foil of 1.7%. The equivalent figures for the older adults were 40.0% and 3.5%.

The participants also falsely claimed to have recognized some of the mug shots in the first session. The number of these errors was subject to a 2 (age group) × 2 (face age) analysis of variance (ANOVA). There was a reliable effect of age group [$F(1,58) = 7.85, p < .007$] but no effect of item age and no interaction ($F < 1$ in both cases). On average, the younger adults misidentified 0.43 (2.7%; $SD = 0.15$) of the younger faces and 0.30 (1.9%; $SD = 0.17$) of the older faces in the mug shot phase. In contrast, the older adults misidentified an average of 0.93 (5.8%; $SD = 0.15$) of the younger faces and 0.90 (5.6%; $SD = 0.17$) of the older faces in the mug shot phase. Thus, these data also replicated the previous two experiments, in demonstrating a greater preponderance of mug shot errors by older adults but no effect of the age of the stimuli. However, it should be noted that the absolute level of such errors was much reduced from the previous experiments.

As before, we intended to examine the relationship between mug shot identification and transference errors. However, for the younger adults, there were only four critical mug shot identifications, and so it was not possible to conduct a meaningful analysis. Similarly, the older adults made only 10 such errors; however, 7 of these led to transference errors, suggesting once again an association between critical mug shot identification and transference errors. For comparison with the previous experiments, these data are shown in Table 6.

Correct identification performance in target-present lineups. The number of correct identifications on target-present lineups was subjected to a 2 (age group) × 2 (face age) ANOVA. There was a main effect of face age [$F(1,58) = 12.8, p < .001$] and a marginal effect of age [$F(1,58) = 3.98, p < .051$], which was qualified by a significant age × face age interaction [$F(1,58) = 7.2, p < .01$]. For the younger faces, 73% of the younger adults achieved successful recognition, but only 37% of the older adults did so. For the older faces, 80% of the younger adults and 83.3% of the older adults were successful. Thus, these data replicated the asymmetric pattern previously reported for faces.

Discussion

This experiment was successful in replicating the main patterns observed in the previous two experiments. In line

Table 5
Experiment 3: Proportion of Participants in Each Age Group Who Made a Transference Error or Other Identification Error in Target-Absent Lineups Involving Younger and Older Faces

		Transference Error?			
		Younger Faces		Older Faces	
Age Group	Mug Shot Error?	No	Yes	No	Yes
Younger adults	no	.90	.10	.67	.33
	yes	.00	–	.00	–
Older adults	no	.33	.40	.50	.43
	yes	.27	–	.07	–

Note—Other identification error, false identification of foil in lineup. Transference error, false identification of bystander in lineup; –, no data possible in this cell because the total number of errors exceeded the number of lineups.

Table 6
Experiment 3: Relationship Between Misidentification of the Critical Mug Shot in Week 1 and Subsequent Identification of That Bystander in the Lineup in Week 2, With Younger and Older Faces as Stimuli

		Transference Error in Lineup?			
		Younger Face		Older Face	
Age Group	Mug Shot Error?	No	Yes	No	Yes
Younger adults	no	.87	.10	.63	.27
	yes	.03	.00	.03	.07
Older adults	no	.53	.37	.57	.20
	yes	.07	.03	.03	.20

Note—Mug shot error, false identification of bystander from mug shots in Week 1; transference error, false identification of bystander in lineup in Week 2.

with Experiment 1, the older adults were more likely than their younger counterparts to make transference errors when younger faces were used as stimuli. In line with Experiment 2, the age difference in transference errors was attenuated when older faces were used as stimuli. Although we did not analyze these statistically, comparisons across the first two experiments also held up in the present experiment, which could be analyzed appropriately. In Experiment 1, with younger faces as stimuli, the younger adults' rate of transference errors was 11.7%, and this increased to 33% in Experiment 2, when older faces were the stimuli. In Experiment 3, this increase was also observed, with the younger adults showing a 10% rate of unconscious transference errors for younger faces and a 33% rate for older faces. For the older adults, the rate of transference for Experiment 1 (younger faces) was 35%, and for Experiment 2 (older faces), it was also 35%. In Experiment 3, the rates of unconscious transference errors by the older adults also showed no sensitivity to the age of the stimuli, being 40% for younger faces and 43% for older faces.

The data from this experiment also replicated the previous two experiments regarding the performance of younger and older adults on the mug shot task in the first session. In the present experiment, the older adults showed a higher tendency to misidentify faces of all ages, and there was no effect of age of face or any interaction. This fits with the presence of an age effect in both the previous experiments. This pattern held, despite the fact that, overall, the number of false identifications of mug shots fell considerably.

A consequence of the fall in mug shot identifications was that critical mug shot identifications fell also, which made analysis of the relationship between mug shot identification and unconscious transference errors problematic. Although the data were in line with the previous experiments (9 of the 14 transference errors that were made were associated with previous mug shot misidentifications), it is difficult to draw firm conclusions on the basis of these data.

Finally, this experiment also contained two target-present lineups that were not employed in the previous experiments. Here, the data were in line with the face recognition studies discussed earlier (Bartlett & Leslie, 1986; Fulton & Bartlett, 1991), in showing poorer face recognition ability in older adults when younger faces were used as stimuli but no age effect when older faces were used as stimuli.

This is an interesting pattern for a number of reasons. Foremost is that the lack of age differences in the recognition of older faces rules out simplistic accounts of the presence of age differences for younger faces. If the older adults had simply been poorer at face recognition for both kinds of face, it would have been relatively easy to explain this away in terms of the poorer visual acuity in the old, in terms of poorer education, health, intelligence, or speed of processing, or in terms of any number of such factors that might apply to all cognitive measures. However, it is hard to explain the interaction that was obtained in such terms. It is also worth noting that the differential pattern for age cannot be explained away in terms of task complexity (Perfect & Maylor, 2000), since the pattern for the young was for equal performance across the two kinds of stimuli.

A second aspect of the data that is also interesting, which also rules out simplistic accounts of the data in terms of cohort effects, is the apparent contradiction between the unconscious transference data and the target identification data. To recap, the older adults showed poorer performance when identifying younger perpetrators, but no age bias in their unconscious transference errors. In contrast, the younger adults showed no age bias in their identifications, yet showed an age bias in their transference errors. This pattern is not consistent with a simplistic view that older adults are poorer at all aspects of memory.

GENERAL DISCUSSION

If we had conducted only the first of these experiments, we might have concluded that older adults are likely to make more transference errors. There would have been little difficulty integrating such a claim with the large literature on age-related decline in memory performance. However, Experiments 2 and 3 did not show the same pattern. Instead, when older faces were used as stimuli, the age differences in rates of transference error were removed. However, this was not because the older adults' performance was improved by using older faces but, rather,

because the younger adult's performance decreased when older faces were used.

The differential pattern seen in the transference errors was not matched in the errors made on the mug shot tasks. In all three experiments, the older adults were more likely to make false positive errors on the mug shot task, irrespective of the age of the faces in the mug shots. Thus, the mug shot task appeared to resemble other standard recognition tasks on which older adults show inflated false positive rates (see Schacter et al., 1998, for a review). This contrast, together with the direct comparison between the transference errors and other false positive errors on the lineup, suggests that the identification of the transference item reflects more than simply increased false positives by older adults.

Of course, further evidence would be required to verify the generality of the effects observed here before we would advocate making strong claims about older witnesses. As we pointed out in the introduction, prior to this work, there had been no studies of unconscious transference errors in older adults. Clearly, the present work is lacking in ecological validity. Our materials were all static photographs, rather than live events. As such, the original encoding events may have been rather indistinct, therefore inflating the likelihood of obtaining transference errors, as compared with the real world (cf. Read et al., 1990). Similarly, our use of a mug shot test phase, although useful for our theoretical purposes, may not transfer well to real-world cases in which participants see bystanders in other ways, not requiring judgments about familiarity.

One aspect of our design is particularly open to criticism regarding ecological validity. The mug shot photographs that were in the lineup were the same images as those shown during the mug shot phase in the first session. Although these photographs consisted of head-and-shoulder shots against a plain background, devoid of identifying clothing, it nonetheless remains the case that selection of the bystanders in the lineups could represent picture identification, rather than person identification. That is, the bystander could have been selected because of a particular detail in the picture that looked familiar, such as the expression or the hairstyle. If our focus had been on absolute levels of transference rates, this would have been a serious concern. However, our focus was on the interaction between the age of the participants and the age of the people in the lineups. Given that the rates of transference errors across the experiments were altered by both factors, in a manner that was consistent across the three experiments, it is hard to see how one could explain this if the participants were relying on familiarity with a particular feature of a particular image. For instance, imagine that one bystander in Experiment 1 had a particularly distinctive expression, which triggered familiarity and, hence, transference errors in the subsequent lineup. Why should this expression be more distinctive for older adults than for younger adults? And why, in Experiment 3, which used different photographs, was the same age-specific pattern seen, with older adults once again showing more transference errors for younger faces? Why were such age effects absent for older faces in Experiments 2 and 3? It is hard to construct an account based on picture identification. On the other hand, given the regularity in the data, it is much more plausible to argue that these age biases were due to the manner in which the age groups processed the faces for different ages. Thus, although we acknowledge that the repeated use of the same photographs at exposure and test may have altered the overall rate of unconscious transference errors, we do not believe that it can explain the interaction between the age of the participants and the age of the stimuli.

Our theoretical aim was to distinguish between identity-blending and poor source retrieval accounts of unconscious transference errors. Two lines of evidence were used to distinguish these two accounts. One was the relationship between the decision at the mug shot stage and subsequent transference errors at the lineup. Only the identity-blending hypothesis requires that the original mug shot be identified during the mug shot phase. The other was whether or not the older adults would show an own-age bias in transference errors, since the identity-blending hypothesis predicts that older adults should misidentify younger adults more. However, addressing these theoretical points across the experiments raises problems—in part, because mug shot misidentifications were relatively infrequent in Experiments 2 and 3. Nevertheless, as can be seen in Table 7, which collates the data across the three experiments, some tentative conclusions can be drawn.

Several aspects of these data stand out. First, is the difference in the rates of mug shot identifications across the

Table 7
Frequency With Which Misidentification of Mug Shots in Week 1 Was Followed With Transference Errors in Week 2, for Experiments 1–3 Combined

		Transference Error?			
		Younger Faces		Older Faces	
Age Group	Mug Shot Error?	No	Yes	No	Yes
Younger adults	no	79	10	76	33
	yes	1	0	4	7
Older adults	no	74	35	73	24
	yes	10	13	7	22

Note—Mug shot error, false identification of bystander from mug shots in Week 1; transference error, false identification of bystander in lineup in Week 2.

two groups. The younger adults misidentified a critical mug shot only on 12 occasions out of a possible 210 (5.7%), whereas the older adults did so on 52 out of 258 (20.2%). However, having misidentified a mug shot, the probability of the participant's going on to misidentify a perpetrator was relatively age invariant. The younger adults identified the same bystander on 7 out of 12 occasions (58.3%), whereas the older adults did so on 35 out of 52 occasions (67.3%). Finally, for the younger adults, a total of 50 transference errors were made, of which 7 (14%) followed a mug shot error. In contrast, for the older adults, 35 out of 94 (37%) transference errors followed a mug shot error.

There are a number of points about this pattern. First, it is clear that the majority of transference errors do not follow a mug shot error, and so, this gives support to the idea that poor source retrieval can lead to transference errors. However, contrary to the source retrieval account, there was no clear evidence of an age-related increase in transference errors in the absence of mug shot errors. Rather, the greatest age-related increase in transference errors was associated with the prior misidentification of a mug shot.

Thus, this aspect of the data is clearly in support of an identity-blending hypothesis: Older adults make more mug shot errors, and this leads them to make more transference errors. However, the identity-blending hypothesis also suggests that older adults should be particularly susceptible to making transference errors for younger faces, but this was not so, since 49% of the older adults' transference errors involved older faces. Consistent with this, the age effect on the mug shot errors was also age invariant across the three experiments.

This particular effect was surprising, given the clear replication of the asymmetric own-age effect in the target-present lineups in Experiment 3. In the absence of a relevant mug shot and bystander, the older adults were less likely to identify a younger face than to identify an older one, whereas the younger adults showed no such age sensitivity. Note that this is opposite to the age effects on transference errors reported here. Across all the present experiments, the older adults showed age invariance in both mug shot errors and transference errors, whereas the younger adults showed more mug shot errors and transference errors with older faces.

It is hard to explain this pattern of findings. As was discussed above, a simple general factor that declines with age is untenable, because this would lead to the prediction that older adults should be worse at all tests of memory for faces, and this was not found. Likewise, an own-age bias factor, akin to the own-race effect (e.g., Chance & Goldstein, 1994), would lead to own-age effects being seen on all measures. Even with a combination of these two assumptions, it would be a struggle to explain the pattern here, since the two different age groups showed differential own-age biases on two different tasks. In the same vein, it is hard to explain this pattern in terms of differential rates of forgetting for the two kinds of faces. If older adults forget younger faces more rapidly, this would explain why they did so poorly when attempting to identify young perpetrators but would not explain why they did not show an age bias in the mug shot or transference errors. If younger adults forget older faces more rapidly, this would explain why they made more mug shot and transference errors for older faces but would not explain why they showed no such bias in correct recognition of the perpetrators.

Thus, this pattern remains a theoretical puzzle. However, we believe that this pattern was not an experimental artifact, since the two pieces of the puzzle are well established. The own-age effect in transference errors that was restricted to younger adults was seen across the three experiments here. Similarly, the own-age effect for identification that was restricted to older adults replicated the pattern reported elsewhere (Bartlett & Leslie, 1986; Fulton & Bartlett, 1991). Thus, with regard to face recognition ability, we have two puzzle pieces that stubbornly refuse to fit together, yet which tantalizingly suggest a rich and complex picture of how face recognition ability changes across the adult life span.

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NOTE

1. Including these participants in the analyses did not alter the pattern of results (see the Results and Discussion for Experiment 2). For clarity, we report only the data where single choices were made.

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