Differences in the Way Older and Younger Adults Rate Threat in Faces But Not Situations

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We compared young and healthy older adults’ ability to rate photos of faces and situations (e.g., sporting activities) for the degree of threat they posed. Older adults did not distinguish between more and less dangerous faces to the same extent as younger adults did. In contrast, we found no significant age differences in young and older adults’ ability to distinguish between high- and low-danger situations. The differences between young and older adults on the face task were independent of age differences in older adults’ fluid IQ. We discuss results in relation to differences between young and older adults on emotion-recognition tasks; we also discuss socio-cognitive and neuropsychological (e.g., amygdala) theories of aging.

Recently, older adults’ skill in making social judgments has become a focus of interest in the literature on aging. For instance, one type of social judgment is emotion recognition, with some studies finding different emotion-recognition performance in older adults than in young adults. In particular, different performance has been found in the recognition of anger, sadness, and fear (e.g., Calder et al., 2003; MacPherson, Phillips, & Della Sala, 2002; McDowell, Harrison, & Demaree, 1994; Moreno, Borod, Welkowitz, & Alpert, 1993; Sullivan & Ruffman, 2004a, 2004b).

However, the ability to decode facial emotional expression is only one aspect of social reasoning. Indeed, when we evaluate other people on the basis of their facial appearance, a critical part of this appraisal may concern the degree of threat they pose. To date, there have been no studies that examine age differences in such appraisals in younger versus older healthy adults. Based on findings concerned with emotion-understanding skills, some theories might predict that the ability to appraise others in terms of threat would improve with advancing years. For instance, these theories suggest that, as a result of accumulated life experiences, one’s ability to understand, anticipate, and react to the emotional cues of others improves with age (Magai, 2001). In contrast, recent neuropsychological evidence might predict declines in this domain due to changes in the brain regions that occur with aging and that are associated with social understanding.

Brothers (1990) identified three brain regions related to social understanding: the amygdala, the orbitofrontal cortex, and the superior temporal sulcus. With age, the frontal cortex is the area that shows the largest reduction in volume (Convit et al., 2001), and healthy aging is associated with the deterioration of the frontal lobes earlier and more severely than other brain areas (Lamar & Resnick, 2004). In a number of lesion and neuroimaging studies, the frontal lobes and the medial temporal lobes have been implicated in emotional processing (e.g., Davidson & Irwin, 1999). For instance, patients with damage to the frontal lobes or regions within the medial temporal lobes show deficits in theory of mind reasoning (e.g., Stone, Baron-Cohen, & Knight, 1998), emotion recognition from facial and prosodic information (e.g., Scott et al., 1997), and poorer performance in understanding emotions from stories (Blair & Cipolotti, 2000). Consequently, some researchers (e.g., Calder et al., 2003) have suggested that changes in the frontal cortex with age may underpin elderly persons’ deficits on social reasoning tasks.

In addition, a number of recent studies suggest that worse performance by older adults than by young adults on emotion- and social-understanding tasks may be attributable to changes in the amygdala with age (e.g., Calder et al., 2003; Sullivan & Ruffman, 2004b), with brain-imaging data suggesting age-related reductions in the volume of the amygdala (Mu, Xie, Wen, Weng, & Shuyun, 1999), as well as reduced amygdala activation in older adults when they are processing emotionally laden face stimuli (Gunning-Dixon et al., 2003; Iidaka et al., 2002) or negative stimuli (Mather et al., 2004).

A theory that predicts changes in amygdala function with age is of particular interest to current studies, as the ability to detect threat in faces is also linked to the amygdala (Adolphs, Tranel, & Damasio, 1998; Winston, Strange, O’Doherty, & Dolan, 2002). Hence, the paradigm we use here allows for an indirect test of the effects of aging on this particular brain region. For instance, Adolphs, Tranel, and Damasio (1998) found that adults with bilateral amygdala lesions tended to rate persons depicted in face-only photos as more approachable and more trustworthy. Adolphs, Sears, and Piven (2001) found similar tendencies in children with autism, a disorder in which dysfunction of the amygdala has been implicated (Baron-Cohen et al., 2000).

As this is, to our knowledge, the first study to compare younger and older adults’ recognition of threat in faces, it was an open-ended question as to whether there would be age-related differences. On the one hand, some theories predict stability or improvement in social understanding with age. On the other hand, neuropsychological evidence predicts declines in the brain regions associated with social judgments. A further interest of the current study was whether differences in the way older and younger counterparts rate threat or danger are
related to more general cognitive differences (i.e., worse fluid intelligence), that is, those processes associated with greater mental effort, novelty, and information complexity (Phillips & Forshaw, 1998; Salthouse, 1991, 1996). In contrast, research indicates that crystallized abilities (i.e., those processes that rely on previously acquired expertise) tend to be unimpaired (Salthouse, 2000).

If there are differences in the way older adults rate threat, these differences may be related to differences in cognitive functions. However, studies concerned with emotion recognition from facial displays in older adults indicate that age-specific differences are at least partially independent of differences in crystallized and fluid abilities (Phillips, Mac Lean, & Allen, 2002; Sullivan & Ruffman, 2004a, 2004b). For this reason, we expected a similar finding when older adults assess the degree of threat posed by faces. This makes sense because declines in fluid intelligence and working memory seem to be due to changes in the dorsolateral prefrontal cortex (Levy & Goldman-Rakic, 2000) rather than the social brain.

Previous research examining threat understanding in individuals with bilateral amygdala lesions or autism has examined only threat recognition in faces. In the present study, we compared understanding of threat in face versus nonface situations, in the belief that this comparison would provide insight into whether age differences are specific to faces. Our prediction was that differences between young adults and old adults would be more pronounced on the face-rating task.

That is, although the amygdala is involved when one is processing fearful and threatening scenes such as attacks, explosions, and mutilations (Hariri, Tessitore, Mattay, Fera, & Weinberger, 2002), there should be less amygdala involvement when one is viewing the nonface situations we used. First, Hariri and associates showed that fearful and threatening faces lead to significantly more amygdala activation than fearful and threatening scenes. Second, our scenes (e.g., animals, extreme sports) were not fear or threat inducing in and of themselves, unlike the scenes in the International Affective Picture System used by Hariri. For these reasons, relatively good performance on the situational tasks would be expected from an amygdala-theory perspective of aging.

Because it would have been inappropriate to label the situations as “unapproachable” or “untrustworthy” as in the study by Adolphs and colleagues (1998), we asked participants to rate all face and situation pictures for their “dangerousness.” We reasoned that ratings of a person’s dangerousness would tap similar insights to approachability ratings, because both tap an understanding of the degree of threat posed in a photograph.

Finally, we grouped stimuli into low, medium, and high danger on the basis of pilot testing with both young and older adults. This would enable us to examine the consistency in ratings by young adults in the pilot versus the main study, and by older adults over both studies. Our interest was in whether older adults in the main study would be less likely to differentiate high- and low-danger faces when using categories obtained in pilot testing with both young adults and older adults. Such a result would suggest that (a) there is limited consistency between older adults’ ratings in the pilot test and the main study, and (b) older adults’ lack of differentiation of faces is not simply a function of their being normed on young adults.

**Methods**

**Participants**

The participants were 39 young adults (16 male, 23 female; $M = 21$ years; range = 18–34 years; $SD = 4.53$ years), and 40 healthy older adults (17 male, 23 female; $M = 69$ years; range $= 60–84$ years; $SD = 6.47$ years). All of the older participants were recruited through the Alumni Society at the university, and all were educated to at least the level of a Bachelor’s degree. The younger participants were made up of undergraduates. All participants spoke English as their first language, and the majority were from a White, middle-class background. None of the older adults had suffered from strokes or had a history of psychological disorders such as depression as measured by the Geriatric Depression Scale (Brink et al., 1982), and all had normal or corrected to normal vision as tested with Snellen’s 3 Metre Visual Acuity Chart.

**Materials**

To examine participants’ ratings of danger in faces, we took 30 black-and-white photographs from a set of 100 pictures used in previous research by Adolphs and colleagues (1998). Their participants had rated these photos for their approachability. We chose the 10 faces that 46 young adults in the Adolphs study had rated as the most approachable, the 10 they had rated as the most unapproachable, and 10 faces midway on the scale of threat (see Figure 1). In order to check the categorization of faces into low-, medium-, and high-threat groups, we then pilot tested these 30 pictures on a group of 12 young adults ($M = 33$ years; range $= 20–42$ years, $SD = 5.12$ years), and a group of 13 older adults ($M = 71$ years; range $= 63–85$ years, $SD = 7.63$ years). Pilot participants pressed a space bar on a keyboard to reveal each new photo on a computer monitor, and they used paper and pencil to rate each face (and situation) on a scale of −3 (not dangerous) to +3 (dangerous). Younger adults’ ratings of individual face items clustered into the same three categories as identified by Adolphs and colleagues. In contrast, older adults’ ratings of 10 (of 30) face items placed these items in categories that were different from those obtained by the young adults in that study. In the following paragraphs, we use the categories identified by both young and older adults when we examine the performance of participants in our study.

The final set of photographs featured 13 women and 17 men. All photos were of Caucasian people, except for three Asian individuals (one each in the low-, medium-, and high-danger groups), and one Black individual (in the low-danger group). Table 1 lists the age and gender distribution for each danger group, and whether individuals were smiling. We estimated ages; we considered young adults to be 18 to 30 years of age, middle-aged adults to be 31 to 55 years of age, and old adults to be 56 years of age and older. The typical low-danger individual was young, female, and smiling, whereas the typical high-danger individual was middle-aged, male, and not smiling. Medium-danger individuals were typically middle-aged adults, whereas photos of older adults were evenly split between danger groups. The bias linking a smiling female with low
danger and an unsmiling male with high danger provide the stimuli with ecological validity.

The pictures for the situation task were also black-and-white photos and were selected from a larger set of 47 pictures. The situation pictures included different activities (e.g., rally car driving vs windsurfing), different animals (e.g., tiger vs kittens), and different environmental conditions (e.g., storm clouds vs nonstorm clouds). Faces were not present in the photos depicting situations.

Initially, we chose 30 of these pictures, which were then given to the same group of 12 younger adults and 13 older adults as were the face pictures. On the basis of the pilot adults’ coding, we identified the 10 situations rated as most dangerous, the 10 least dangerous, and the 10 that fell midway on the
danger scale (see Figure 1). The ratings of younger adults in the pilot study clustered into the same three categories as the adults in the main study for 24 of 30 items. For the older adults, this figure was 22 of 30 items.

We took the fluid intelligence measure from the Culture Fair Intelligence Test (Catell & Catell, 1959). This task is commonly used as a measure of fluid intelligence (Duncan, Burgess, & Emshie, 1995; Rouraux & Juhel, 1995; Sullivan & Ruffman, 2004a, 2004b; Tan, Tan, & Atatuerk, 1998), and it includes four types of spatial problems (series completion, odd-man-out problems, matrices, and topology). For the crystallized intelligence measure, we used the Vocabulary subtest of the Wechsler Adult Intelligence Scale—Revised (Wechsler, 1981). This task requires participants to define, without time limits, 35 words. Because of experimenter error, only 28 of the older adults in the main study for 24 of 30 items. For the older adults, this figure was 22 of 30 items.

Table 1. Characteristics of Face Photos

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Procedure

We presented face and situation photos separately, and we randomized items within each task and presented them one at a time on a computer monitor. As in the pilot testing, participants pressed a space bar to reveal each new photo and used paper and pencil to rate each face and situation on a scale of −3 (not dangerous) to +3 (dangerous). Participants could view photos for as long as they pleased. We gave the face and situation tasks as a block, and we counterbalanced the order of tasks within the block. We also counterbalanced the order of the fluid intelligence task, crystallized intelligence task, and face and situation block.

Results

Danger Rating Tasks

There were 3 participants (2 young and 1 old) whose mean rating on the low-, medium-, or high-threat faces or situations was more than 3 SD outside the mean. We eliminated these outliers from further analyses. There were no effects for task order.

Young Adult Norms

First we examined danger ratings based on the high-, medium- and low-threat groupings obtained by the 12 younger adults when rating faces and situations in the pilot study. Danger scores are shown in Figures 2a and 2b. We examined danger ratings with a 2 (group) × 2 (task: faces vs situations) × 3 (danger level: low danger vs medium danger vs high danger) analysis of variance, with ratings as the dependent variable. In all analyses, where we violated sphericity assumptions, we applied Greenhouse–Geisser corrected p values. There was a main effect for task, F(1, 74) = 294.73, p < .001, MSe = 307.49, ηp² = .80, indicating higher danger ratings on the situations, and a main effect for level, F(2, 148) = 1039.31, p < .001, MSe = 309.86, ηp² = .93, indicating higher scores on the higher danger items. The main effect for group was not significant, F(1, 74) = 0, p = 1.00, MSe = 0.01, ηp² = 0. The Danger level × Group interaction was significant, F(2, 148) = 4.28, p < .05, MSe = 1.61, ηp² = .06. The Task × Danger level interaction was significant, F(2, 148) = 28.31, p < .001, MSe = 9.23, ηp² = .28. Finally, and most importantly, the three-way interaction was significant, F(2, 148) = 4.69, p < .05, MSe = 1.53, ηp² = .06.

Given the significant three-way interaction, we examined danger ratings for the situations with a 2 (group) × 3 (level: low danger vs medium vs high) analysis of variance, with rating as the dependent variable. For situations, there was a main effect for level, F(2, 148) = 711.28, p < .001, MSe = 201.79, ηp² = .91, which was due to higher danger ratings on high-danger than low-danger items, t = −34.14, p < .001, on high-danger than medium-danger items, t = −20.89, p < .001, and on medium-danger than low-danger items, t = −19.41, p < .001. The main effect for group approached significance, F(1, 74) = 3.37,

![Figure 2](https://academic.oup.com/psychsocgerontology/article/61/4/P187/603659)
p < .08, MSE = 3.84, $\eta^2_p = .04$. The Group × Level interaction did not approach significance, $F(2, 148) = 0.00, p = 1.00$, $MSE = 0.00, \eta^2_p = 0$, indicating no difference in the extent to which younger and older adults differentiated between situations.

We examined danger ratings for the faces with a 2 (group) × 3 (level: low danger vs medium vs high) analysis of variance, with rating as the dependent variable. For faces, there was a main effect for level, $F(2, 148) = 418.78, p < .001, MSE = 195.66, \eta^2_p = .85$, indicating higher scores on the higher danger items. The main effect for group was not significant, $F(1, 74) = 1.73, p = .19, MSE = 3.45, \eta^2_p = .02$, but the Group × Level interaction was, $F(2, 148) = 7.95, p < .01, MSE = 3.72, \eta^2_p = .10$. In comparison with younger adults, older adults did not differentiate as much between high- and low-danger faces, $F(1, 74) = 4.90, p < .05, MSE = 265.56, \eta^2_p = .06$; there was a marginal effect for high- and medium-danger faces, $F(1, 74) = 3.49, p < .07, MSE = 104.13, \eta^2_p = .05$, and a marginal effect for medium- and low-danger faces, $F(1, 74) = 2.49, p = .09, MSE = 37.11, \eta^2_p = .03$.

Then, using a one-way analysis of variance with one factor, danger level, we then checked whether older adults possessed at least some ability to differentiate high- and low-danger faces. The effect for danger level was significant, $F(2, 76) = 143.45, p < .001, MSE = 91.31, \eta^2_p = .80$, indicating that they were well above chance when differentiating more from less dangerous faces. Thus, the older adults were clearly able to differentiate faces, but the Group × Level interaction described herein indicates they did so differently than young adults.

### Older Adult Norms

Next we examined danger ratings based on the high-, medium-, and low-threat groupings obtained by the 13 older adults when rating faces and situations in the pilot study. Danger scores are shown in Figures 3a and 3b. We examined danger ratings with a 2 (group) × 2 (task: faces vs situations) × 3 (danger level: low danger vs medium danger vs high danger) analysis of variance, with ratings as the dependent variable. There was a main effect for task, $F(1, 74) = 294.73, p < .001, MSE = 50748.97, \eta^2_p = .80$, indicating higher danger ratings on the situations, and a main effect for level, $F(2, 148) = 983.54, p < .001, MSE = 25776.70, \eta^2_p = .93$, indicating higher ratings on the higher danger items. The main effect for group was not significant, $F(1, 74) = 0, p = 1.00, MSE = 0.53, \eta^2_p = 0$. The Danger level × Group interaction approached significance, $F(2, 148) = 2.98, p < .07, MSE = 97.86, \eta^2_p = .04$. The Task × Danger level interaction was significant, $F(2, 148) = 26.12, MSE = 922.55, \eta^2_p = .26$. Finally, as before, the three-way interaction was significant, $F(2, 148) = 3.10, p < .05, MSE = 100.94, \eta^2_p = .04$.

Given the significant three-way interaction, we again examined danger ratings for the faces with a 2 (group) × 3 (level: low danger vs medium vs high) analysis of variance, with rating as the dependent variable. For situations, there was a main effect for level, $F(2, 148) = 616.89, p < .001, MSE = 15703.80, \eta^2_p = .89$, which was due to higher danger ratings on high-danger than low-danger items, $t = 33.20, p < .001$, on high-danger than medium-danger items, $t = 19.39, p < .001$, and on medium-danger than low-danger items, $t = 18.13, p < .001$. The main effect for group approached significance, $F(1, 74) = 3.37, p < .08, MSE = 383.93, \eta^2_p = .04$, with a trend toward higher danger ratings for older adults. The Group × Level interaction did not approach significance, $F(2, 148) = 0.12, p = .65, MSE = 10.72, \eta^2_p = .01$, indicating no difference in the extent to which younger and older adults differentiated between situations.

We examined danger ratings for the faces with a 2 (group) × 3 (level: low danger vs medium vs high) analysis of variance, with rating as the dependent variable. For faces, there was a main effect for level, $F(2, 148) = 374.55, p < .001, MSE = 12354.97, \eta^2_p = .84$, indicating higher scores on the higher danger items. The main effect for group was not significant, $F(1, 74) = 1.73, p = .19, MSE = 344.75, \eta^2_p = .02$, but the Group × Level interaction was, $F(2, 148) = 4.11, p < .05, MSE = 200.84, \eta^2_p = .05$, indicating the older adults’ danger ratings did not differentiate between the faces as much as the younger adults’ ratings did.

### Factors Affecting Threat Ratings

Faces differed primarily in age, gender, and the presence of smiling (facial expression). We examined correlations between face characteristics and young and older adults’ ratings of faces to determine whether young and older adults make similar use of these characteristics. First, we computed the mean danger rating across all participants in each age group for each face. That is, for each age group, we ranked each of the 30 faces from most to least dangerous, and characterized it according to its age (young, middle-aged, or old adult), gender (male
or female), and expression (smiling or not smiling). We then computed partial correlations. That is, we examined the correlation between (a) age and face rank (most to least dangerous), having partialled out gender and facial expression, (b) gender and face rank, having partialled out age and facial expression, and (c) facial expression and face rank, having partialled out age and gender (see Table 2). Both age groups used primarily gender (with female adults rated as less threatening), and then smiling (rated as less threatening). Age was not a significant correlate of face rank in either age group. It is important that the partial correlations were very similar in each age group. In sum, young and old adults used the same characteristics to rate faces, even though there were differences in the extent to which young and older adults distinguished threat in the present study.

**Fluid and Crystallized Intelligence**

As we expected, the young adults were superior on the fluid intelligence task, *t*(65) = 9.02, *p* < .001 (young adults, *M* = 28.61, *SD* = 4.47; older adults, *M* = 19.13, *SD* = 4.08). In addition, the older adults were better on the crystallized intelligence task, *t*(65) = −6.27, *p* < .001 (young adults, *M* = 51.46, *SD* = 11.32; older adults, *M* = 63.74, *SD* = 3.99). Thus, these participants displayed the typical cognitive profile. We checked whether the face-rating difference between young and older adults was independent of group differences in fluid intelligence, using a 2 (group) × 3 (level) analysis of covariance, with danger rating on the face task as the dependent variable and fluid intelligence as the covariate. When examining the categories obtained in the pilot study with young adults, we found that the Group × Level interaction was still significant, *F*(2, 62) = 3.71, *p* < .05, *η*² = .11, indicating that young and older adults’ differences in rating danger in faces were independent of their differences in fluid intelligence. The same was true when we examined the categories obtained in the pilot study with older adults, *F*(2, 62) = 5.13, *p* < .01, *η*² = .14.

**DISCUSSION**

In this study we compared differences in younger and older adults’ ratings of threat in faces and situations. One perspective predicted stability or improvement in emotion understanding with age and at least equal performance between younger and older adults (Magai, 2001). In partial support of this perspective, older adults were well above chance when differentiating more and less dangerous faces. Nevertheless, compared with young adults, they were still different in how they differentiated danger faces (see the subsequent discussion). The neuropsychological perspective predicts older adults will be worse on a range of tasks tapping social understanding. In line with this perspective, and independent of differences in fluid intelligence, older adults were different than young adults in how they differentiated between high- and low-danger faces. This was true whether we used the categories obtained in the pilot study with young adults or the categories obtained in the pilot study with older adults, demonstrating that it is not simply who the stimuli are normed on that determines differences between young adults and old adults.

It is important that, although the older adults were different from young adults in how they differentiated danger faces, there were no differences between the two age groups when they were differentiating between more and less dangerous situations. Indeed, whether we used the categories obtained in the pilot study with young adults or the pilot study with older adults, the *F* value in the Group × Task interaction was about 0, indicating that older adults were very similar to younger adults in distinguishing more and less dangerous situations. This is a striking contrast in performance, indicating that differences between older and younger adults stem from rating threat in faces rather than a general difference in rating threat per se.

Our findings leave open the question as to what accounts for these differences between older and younger adults’ ratings. One possible explanation, drawing on the sociocognitive perspective, is that adults of different ages are oriented to different threat cues. The socioemotional selectivity theory (SST) focuses on the psychological processes that may be responsible for changes in social behavior with age (Carstensen, 1992, 1995). SST argues that older adults are predisposed to pay attention to positive emotion stimuli and less attention to negative stimuli. SST could potentially explain one of our findings for the face stimuli, in that older adults tended not to give such negative ratings to individuals who looked dangerous. However, it would leave unexplained why older adults did tend to give more negative ratings to dangerous-looking situations than did young adults. Further, it is not clear how SST would explain that older adults differentiated less between negative and positive faces than they did between negative and positive situations. One might expect that a tendency to pay less attention to negative stimuli should result in equivalent patterns across the two types of stimuli. In fact, opposite to what we obtained, one might expect older adults’ ratings of situations to be even more different from young adults’ given that they rated situations more negatively (as more dangerous) than they did faces.

The differences between younger and older adults are reminiscent of the age-related differences on emotion-recognition tasks. Older adults’ emotion-recognition deficits are relatively subtle, but these individuals tend as a group to be consistently less likely to identify fear, anger, and sadness faces on between 50% and 82% of studies (Sullivan & Ruffman, 2004b). In the present study, participants used gender and smiling when identifying threat. In emotion-recognition studies, older adults have been as likely as young adults to identify happiness, so it would seem that older adults should be able to identify smiling individuals at least as happy. It therefore seems likely that there are sometimes subtle signs that indicate threat that might be assessed differently by young and older adults.

Another interpretation is that older adults might be identical to young adults in recognizing the possibility of threat in faces,
but they are not as confident as young adults when rating faces as high-threat or low-threat. (Although no general lack of confidence is present given ratings of situations, practically speaking, a lack of confidence in face ratings might have similar implications to an outright failure to notice threat if it caused a lack of defensive action in the face of threat.)

It is important to note that the differences we obtained might not reflect “worse” performance by older adults at all but merely differences. Nevertheless, there is at least some reason for thinking the differences might reflect genuinely worse performance. We obtained the differences on face stimuli whether we used the categories based on young adults in the pilot study, or those based on older adults in the pilot study. If we obtained differences only when we used young adult norms, it would be easy to claim that older adults simply use different norms, and it would be unclear which group was correct. That we obtained differences even when we used the older adults’ norms suggests older adults may be genuinely worse, and not just different, at differentiating faces for dangerousness. Nevertheless, a lack of consistency does not necessitate a lack of competence. It is possible, for instance, that younger adults are consistently wrong. Only future research using photographs of objectively dangerous and nondangerous persons can decide between these possibilities.

The difference between young and older adults in rating danger in faces cannot be attributed to age-related changes in general cognitive functioning. If so, we would have expected older adults to also be different from younger adults when rating threat in situations, and we would have expected age differences on the face task to be mediated by fluid intelligence. In this way, our results are consistent with studies finding that emotion-recognition differences between younger and older adults are also independent of group differences in fluid intelligence (Phillips et al., 2002; Sullivan & Ruffman, 2004a, 2004b).

An important question is whether brain changes can help explain why older adults are different on social understanding tasks. The ability to rate threat in faces is linked specifically with the amygdala, because amygdala-lesioned adults are impaired when rating threat in faces. One might speculate, then, that there are changes in the amygdala with aging; indeed, recall that there is a reduction in the volume of the amygdala with age and reduced amygdala activation in old adults compared with young adults when both groups are viewing emotion faces. This is in keeping with others who have argued that older adults’ pattern of impairments recognizing anger, fear, and sadness might reflect change in the amygdala with age (Calder et al., 2003; Sullivan & Ruffman, 2004a, 2004b).

At the same time, stronger evidence would be provided by, for instance, neuroimaging data demonstrating that elderly individuals experience reduced amygdala activation when assessing threat in faces or viewing particularly threatening faces. Further, it is not clear that the amygdala would be the only brain region associated with social understanding that might undergo age-related decline. For instance, anger recognition is linked to the orbitofrontal cortex in addition to the amygdala (Blair & Cipolotti, 2000; Blair, Morris, Frith, Perrett, & Dolan, 1999), and differences in older adults’ recognition of anger are consistent with decline in this region as well (Sullivan & Ruffman, 2004a, 2004b).

Several avenues for future research follow from our findings. First, the faces in our study were generally rated as not very dangerous, yet the largest differences between young adults and old ones were present for the most dangerous faces. It is possible that young–old differences would be even larger if more dangerous faces were used. Second, we examined primarily conscious decisions about threat. It is possible that, in real life, decisions about threat are based on both conscious and unconscious processes, and it is conceivable that unconscious understanding of threat is not different in older adults. Third, it is of interest to know whether older adults generally rate the emotional significance of faces differently in comparison with nonfacial scenes, even when rating aspects other than threat (e.g., the extent of anger, fear, or sadness present).

In conclusion, we found that healthy elderly individuals do not distinguish between high- and low-danger faces to the same extent as do young adults, although there was no difference in the way the two groups distinguished between high- and low-danger situations. A neuropsychological perspective would speculate that these age-related differences may be a result of change in the amygdala, although definitive support for this claim must await the results of further research. At the very least, our results indicate age-specific differences in this critical aspect of the appraisal of others.

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References


