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The Effects of Happy and Angry Expressions on Identity and Expression Memory for Unfamiliar Faces.

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Abstract

We investigated the influence of happy and angry expressions on memory for new faces. Participants were presented with happy and angry faces in an intentional or incidental learning condition and were later asked to recognize the same faces displaying a neutral expression. They also had to remember what the initial expressions of the faces had been. Remember/know/guess judgements were made both for identity and expression memory. Results showed that faces were better recognized when presented with a happy rather than an angry expression, but only when learning was intentional. This was mainly due to an increase of the "remember" responses for happy faces when encoding was intentional rather than incidental. In contrast, memory for emotional expressions was not different for happy and angry faces whatever the encoding conditions. We interpret these findings according to the social meaning of emotional expressions for the self.

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The human face is a highly significant social stimulus that can be used to identify familiar people and to infer various information about people such as their gender, age, or emotional state. Among all this information, face identity and emotional expression are probably the most salient and important aspects of nonverbal communication in social situations. Current models of face processing generally assume that identity recognition and expression recognition involve independent processes which may be experimentally and neuropsychologically dissociated (Bruce & Young, 1986; Haxby, Hoffman, & Gobbini, 2000; Humphreys, Donnelly, & Riddoch, 1993; Young, 1997). However, recent findings suggest that there may be conditions in which expression and identity processing may interact. For instance, Schweinberger, Burton, and Kelly (1999) explored the relationship between the perception of facial identity and emotion in a speeded classification task that required the participants selectively to attend to one dimension. These authors reasoned that if one dimension (e.g., identity) can be perceived independently of a second dimension (e.g., emotion), classification RTs for the first dimension should be unaffected by task-irrelevant variations in the second dimension. They found that identity classifications were unaffected by irrelevant variations in facial emotion, whereas emotion classifications were slowed by irrelevant variations in facial identity. Thus, there was an asymmetric relationship between identity and expression perception, in which identity was perceived independently of expression, but expression perception was influenced by identity.

Other studies have shown that emotional expression can affect familiar face recognition. Endo, Endo, Kirita, and Maruyama (1992) found that famous people were recognized faster with a happy than with a neutral expression, whereas personally familiar faces were recognized faster with a neutral than with a happy or angry expression. These

authors argued that this may be the case because famous people are more frequently seen with happy expressions in the media, whereas personally familiar people are more frequently observed with a neutral expression. In an unpublished study, Sansone and Chentouf (reported in Sansone & Tiberghien, 1994) observed that unknown faces that had been previously experimentally familiarized were better recognized with a smiling than with a neutral expression. Recently, Baudouin, Gilibert, Sansone, and Tiberghien (2000) reported that not only familiar, but also unfamiliar, faces with a smiling expression were rated as more familiar than the same faces with a neutral expression. Finally, other studies have shown that orientation of attention to faces is influenced by the expression of these faces. In particular, it seems that threatening (angry) faces are detected more efficiently than happy and neutral faces (Fox et al., 2000; Mogg & Bradley, 1999; Öhman, Lundqvist, & Esteves, 2001). Taken together, these findings clearly indicate that the expression displayed by a face can, in some circumstances, influence identity processing.

Despite all the work that has been done in order to determine the effect of emotional expressions on identity perception and on attention to faces, only a few studies have tried to investigate their influence on memory for new faces. As we have already noted, a human face reveals a great deal of information to perceivers that enables to perform such different tasks as to identify a person and to infer his or her age, gender, or emotional state. In the present study, we were interested in the influence of emotional expressions on memory for two kinds of information provided by faces. Firstly, we wanted to investigate if emotional expressions could influence memory for information that enables to recognize a person’s identity. Secondly, we examined if memory for facial expressions themselves could vary according to the type of expression displayed. This issue has received little attention by researchers and yet seems to be worthy of interest because it is probable that remembering emotional expressions of people we encounter is one variable that plays an important role in the retrospective

evaluation of social situations. We first begin by reviewing existing studies which investigated the influence of emotional expressions on either identity or expression memory.

Regarding the influence of expressions on identity memory, Kottoor (1989) reported an experiment in which participants had to learn photos of individuals with three different expressions (neutral, smile, and pout) and were later asked to recognize the same photos among photos depicting other individuals. Kottoor found that faces with a smiling expression were recognized better than faces with a neutral or pout expression. Memory for emotional expressions themselves was investigated by Cohen-Pager and Brosgole (1992). Participants were asked to learn neutral and smiling faces and the recognition test consisted of pairs of photos which included a photo that had been seen during inspection and either a photo of a different person (two-person condition) or a photo of the same person with a different expression (two-expression condition). It was found that performance was worse in the two-expression condition than in the two-person condition and that memory for neutral expressions was better than memory for smiling expressions. Memory for expressions was also examined more recently by Foa, Gilboa-Schechtman, Amir, and Freshman (2000). In a first experiment, patients with social phobia and control participants learned the names of several faces. They were then presented with photos of the same individuals displaying happy, angry, or neutral expressions and they were asked to name the person on the photo again and also to label his or her emotional expression as happy, angry, or neutral. Finally, they completed a free recall test in which they were asked to write down the names and the expressions of the individuals they had seen previously and a cued recall test in which they were provided with the names of the individuals and were asked to write down the corresponding expressions. It was found that happy expressions were better remembered both in the free and cued recall tasks. In a second experiment, participants were asked to learn photos of individuals displaying neutral, happy, angry, and disgust expressions. They were

then asked to recognize the same photos among photos of the same individuals displaying different emotional expressions. It was found that emotional expressions (angry, happy, disgust) were better recognized than neutral ones and that happy expressions were better recognized than angry expressions.

Existing studies thus suggest that both identity and expression memory are influenced by the expressions displayed by the faces. However, these studies suffer from several weaknesses that pose some problems of interpretation. With regard to identity memory, a first problem is that the same photos were used during inspection and test. As Bruce (1982; see also Bruce & Young, 1986) has pointed out, the recognition of identical photos and the recognition of faces are distinctly different tasks. Presentation of a photo of a face will lead to the generation of a pictorial code (i.e., a description of that particular photo) which may contain details of the lighting, grain and flaws in the photo, as well as capturing the static pose and expression portrayed. A match at the level of pictorial code can subsequently be used to mediate yes/no recognition memory decisions when the same pictures of previously unfamiliar faces are used in presentation and test. In contrast, faces are seldom encountered under identical conditions in everyday life. Therefore, pictorial codes alone cannot subserve the task of recognizing faces despite changes in head angle, expression, lighting, age, etc. Such recognition must rely on memory for the essential structural features of the face rather than on the surface idiosyncrasies of a particular portrait. When considering these issues, one cannot conclude with certainty from the study reported by Kottoor (1989) that identity memory was better for faces that displayed a smiling expression. The smiling advantage found in that study could have occurred either because the smile facilitated memory for structural features of the faces (identity memory), or because it facilitated memory for pictorial details. Still another possibility is that participants simply better recognized smiling expressions compared to neutral or pout expressions. The only way to study the influence of

expressions on memory for structural features of the face that are used to identify a person would be to change the pose (head angle, expression, hairstyle, etc.) of the faces between presentation and test.

The studies which investigated expression memory also suffer from several limitations. Firstly, one cannot know for sure from Foa et al. (2000)' s first experiment that performances reflected memory for emotional expressions themselves. Indeed, participants were asked to name each face depicted on the photos and to label the corresponding expression. In these conditions, it is possible that participants recalled the associations between the names and the verbal labels for the expressions rather than the visual aspect of the expressions themselves. Secondly, in the second experiment reported by Foa et al., the individuals depicted on the photos were not presented with all expressions (each model was represented with a neutral and one emotional expression, either happy, angry, or disgust). This made it impossible to look for the effect of particular emotional expressions unconfounded with differences in the memorability of particular people's faces. Finally, and more importantly, Foa et al. as well as Cohen-Pager and Brosgole (1992) used the same photos during inspection and test. As was the case for identity memory, this poses problems of interpretation because it is not clear if memory performances reflected memory for emotional expressions themselves or memory for other pictorial details. Actually, the use of a recognition task may not be the best way to assess expression memory. Indeed, in everyday life, we rarely try to remember what the expression of an individual was in a previous situation by seeing the same expression again and choosing it among distractors. Instead, we more probably try to retrieve and reconstruct a visual representation of what that expression was. Accordingly, recall or cued recall tasks seem to be more appropriate and more ecological to assess expression memory.

The present study was designed to address the methodological problems we discussed above in order to investigate the potential influence of emotional expressions on both identity and expression memory in a more precise way. This was made by changing the expression of the faces between presentation and test. Participants were presented with unfamiliar happy and angry faces and were later asked to recognize neutral faces of the same individuals. When a face was recognized, expression memory was assessed by asking participants to decide whether this face had been presented earlier with a happy or an angry expression. The second purpose of the present study was to examine the influence of encoding activity on both identity and expression memory. Numerous studies have shown that encoding activity plays an important role in face recognition. In particular, recognition performances tend to differ depending on whether learning is intentional or incidental (see Coin & Tiberghien, 1997 for a review). In the present study, we examined if the influence of emotional expressions on identity and expression memory can also be modulated by encoding activity, which was not possible in previous studies because learning was always intentional (Cohen-Pager & Brosgole, 1992; Foa et al., 2000; Kottoor, 1989). To do this, the faces were encoded intentionally by half the participants and incidentally by the other half. Finally, we were interested in qualitative aspects of identity and expression memory (see Gardiner & Richardson-Klavhen, 2000; Wheeler, Stuss, & Tulving, 1997). Indeed, face recognition can be associated with different states of awareness. In many cases, recognition of a face is accompanied by a recollection of something that occurred or something that one experienced (what one thought or felt) when this face was seen previously. In other cases, a face can be recognized because it evokes strong feelings of familiarity but nothing about its prior occurrence can be remembered. States of awareness associated with memory are especially interesting to investigate in the context of the present study because recent findings suggest that the effect of emotion on memory, and especially the comparison of memory for positive

and negative stimuli, is not always reflected in overall recognition scores but may nevertheless be located in qualitative aspects of recognition memory (Dewhurst & Parry, 2000; Ochsner, 2000). Accordingly, we used the remember/know/guess procedure (Gardiner & Richardson-Klavhen, 2000) in order to investigate both identity and expression memory in a more precise way.

Method

Participants

Sixty-four (22 male, 42 female) undergraduate students at the University of Liège volunteered to participate in the experiment. They ranged in age from 18 to 27, their average age being 22. Thirty-two (11 male, 21 female) were allocated at random to each of the two learning conditions.

Materials

The initial pool of stimuli was composed of 129 black-and-white pictures representing 43 individuals with three expressions (neutral, happy, angry). These were taken from four different databases (Beaupré, Cheung, & Hess, 2000; Bégin, Kirouac, & Doré, 1984; Ekman & Friesen, 1976; Martinez & Benavente, 1998). Stimuli with unusual features (e.g., beards, glasses) were not used. All the photos were retouched with Adobe Photoshop software to standardize their frame, size, background colour, and, whenever possible, luminosity and contrast. The pictures were presented to 20 other participants in a pilot study. Each participant was asked to estimate if the face displayed an emotional expression or not and if it did to explain which expression it was. A face was considered to be perceived as angry if the term "angry", "threatening" or a synonym was used; it was considered to be perceived as happy if the term "joy", "happy" or a synonym was used; it was considered to be perceived as neutral if no emotional expression was reported.

Final stimulus selection included faces of 24 individuals (12 male and 12 female) for which the three expressions were perceived as angry, happy, and neutral by at least 75 % of the subjects. Two Sets (A and B) of 12 individuals (6 male and 6 female) were prepared. Whenever possible, photos in Sets A and B were matched for physical similarity (e.g., hair size and colour, complexion) and for origin (database).

Six happy faces (three male, three female) and six angry faces were presented during the inspection phase. The use of Sets A and B as studied or nonstudied items was counterbalanced across participants. Also, within each set, each face was seen with a happy expression by half the participants and with an angry expression by the other half. This made it possible to look for the effect of face expression unconfounded with differences in the memorability of particular people's faces. Stimuli were placed in a pseudorandom but fixed order such that no more than two faces with the same expression occurred in succession. To counterbalance for order effects, the photos were presented in one order for half the participants and in the reverse order for the other half.

Two test lists were constructed using the 24 neutral faces. Stimuli were placed in a pseudorandom but fixed order such that no more than three "old" or "new" faces, and no more than two "old" faces with the same expression at study should occur in succession. The second list presented the photos in an order that was the reverse of the first list.

Procedure

Participants were tested individually. Each face was shown to the participants for 5 s on a computer screen approximately 60 cm in front of them. Participants in the incidental learning condition were asked to give orally an estimation of the age of each individual depicted on the photos. They were not informed that a memory test would follow. Participants in the intentional learning condition were asked to look carefully at the faces in order to be able to recognize them later. No mention was made of the emotional expression of the faces.

After a 5-min retention interval, participants were presented with the recognition test. They were told that they would be shown a series of faces some of which represented people they had been shown initially, though the expression of the faces had changed (all the faces were neutral). When each face appeared they had to decide whether they had seen it before. Furthermore, they had to report whether their recognition was of the remember (R), the know (K) or the guess (G) variety. Participants received detailed instructions about the distinction between R, K, and G responses. These instructions were adapted from those used by Gardiner and colleagues (see Gardiner, Ramponi, & Richardson-Klavehn, 1998). Briefly, participants were told that an R response should be given to any face which, at the time it was recognized, brought back to mind something they had consciously experienced (e.g., an association, a thought, a feeling, etc.) at the time it was presented. In contrast, they were asked to make a K response if the face felt familiar but they were unable to recollect details of its prior exposure. Finally, they were asked to make a G response if they were unsure whether or not the face had been presented in the study phase.

Participants were also asked to remember the initial emotional expression of the faces they claimed to recognize. They were told that some of the faces they had seen in the study phase had a happy expression and other faces an angry expression. When they classified a face as “old”, they were asked to decide whether this face had a happy or angry expression when they saw it in the study phase, and they also had to classify their responses according to the R/K/G paradigm. They were asked to make an R response if they could consciously recall seeing the expression of the face, if they could remember what the expression looked like. They were asked to make a K response if they believed that the face had the expression but they could not consciously recollect what the expression looked like. They were asked to make a G response if they had no idea of the expression and they had guessed. Participants were asked to repeat the instructions concerning the R/K/G classification for identity and for

emotional expression of the faces and were asked to explain the rationale for some of their responses to ensure that they had understood the classification correctly. All the responses were made orally and each face remained on the screen until participants indicated their responses. Participants then pressed the space bar to go on to the next trial. Therefore, the decision time participants had to make their judgments was not limited.

Results

Identity recognition

The influence of emotional expressions and encoding activity on identity recognition was examined by analyzing the hit scores as a function of expression type (happy vs. angry) and learning condition (incidental vs. intentional). We also examined the relationship between these two factors and states of awareness associated with recognition by analyzing R, K, and G responses. Table 1 shows the mean proportions of R, K, and G responses for identity recognition as a function of learning condition and expression type.

(Table 1 about here)

Inspecting Table 1, there appears to be an overall tendency to better recognize faces that were previously seen with a happy expression than faces previously seen with an angry expression, but only in the intentional learning condition. This tendency seems to be mainly due to differences in R responses.

Separate 2 (learning condition: incidental vs. intentional) X 2 (expression type: happy vs. angry) analyses of variance (ANOVAs) performed on the hit scores, and on the R, K, and G responses confirmed these observations. With an alpha level of .05, there was no significant effect of learning condition either on the hit scores, $F(1, 62) = 1.58$, $p = .21$, or on R, K, and G responses, Fs < 1. Similarly, there was no significant effect of expression type either on the hit scores, $F(1, 62) = 1.60$, $p = .21$, or on R, K, and G responses, Fs < 1. However, the learning condition X expression type interaction was significant for the hit scores, $F(1, 62) =$

5.90, p = .018. A series of planned comparisons revealed that there were significantly more hits for faces that had been seen with a happy expression than for faces that had been seen with an angry expression in the intentional learning condition, F(1, 62) = 6.82, p = .01, but not in the incidental learning condition, F < 1. Also, there were more hits in the intentional condition than in the incidental condition for happy faces, F(1, 62) = 6.37, p = .01, but not for angry faces, F < 1.

These differences were mainly due to the R responses. Indeed, the condition X expression interaction was significant for the R responses, F(1, 62) = 5.21, p = .026, but not for the K and G responses, Fs < 1. Planned comparisons revealed that the number of R responses was not different for happy and angry faces in the incidental learning condition, F(1, 62) = 2.06, p = .16. Inspection of mean proportions in Table 1 indicates that there was a tendency to make more R responses for happy than for angry faces in the intentional learning condition, however this difference failed to reach statistical significance, F(1, 62) = 3.22, p = .078. Also, the intentional learning condition tended to produce more R responses than the incidental condition for happy faces, F(1, 62) = 3.90, p = .052, but not for angry faces, F < 1.

Memory for emotional expressions

Memory for emotional expressions was assessed by determining the probability that a participant correctly recalled expression conditionalized upon correct identity recognition. For each participant, proportions of correct and incorrect responses for expression memory were calculated separately for each type of expression (happy vs. angry). This was made by dividing the number of correct or incorrect R, K, and G responses for each type of expression by the number of correct identity recognition (hits) for that type of expression. Table 2 shows mean proportions of R, K, and G responses for expression memory as a function of learning condition and expression type.

(Table 2 about here)

Separate 2 (learning condition: incidental vs. intentional) X 2 (expression type: happy vs. angry) ANOVAs were performed on proportions of total correct responses, and on proportions of correct R, K, and G responses. There were no significant effects either on total correct responses or on correct R, K, and G responses (all p s > .153), nor did ANOVAs performed on incorrect R, K, and G responses reveal any significant effect (all p s > .151).

We also wondered if the tendency to report more R responses for identity recognition of happy faces when learning was intentional was related to a better memory for the expression of these faces. In order to explore this possibility, we computed, for each participant, and for each type of expression, the proportions of correct and incorrect responses for expression memory of faces that had received an R response for identity recognition. Data from three participants (all in the incidental learning condition) were omitted because they had no R responses for identity recognition either for happy or angry faces. Table 3 shows the mean proportions as a function of learning condition and expression type.

(Table 3 about here)

Separate 2 (learning condition: incidental vs. intentional) X 2 (expression type: happy vs. angry) ANOVAs were performed on proportions of total correct responses and on proportions of correct R, K, and G responses. The only significant effect was one of learning condition for total correct responses, $F(1, 59) = 5.34$, $p = .02$.

Discussion

In the present study, we examined the influence of emotional expressions on both identity and expression memory for new faces that were encoded either intentionally or incidentally. With regard to identity memory, we found that neutral faces were better recognized when they had been previously presented with a happy rather than an angry expression in the intentional learning condition. On the other hand, the superiority for happy faces disappeared when learning was incidental. These results clearly indicate that emotional

expressions can, in some circumstances, affect identity memory for new faces and thus provide further evidence that identity and expression processing may interact in certain tasks. Concerning expression memory, it was found that memory performances were not different for happy and angry expressions whatever the encoding condition. It was also found that expression memory for faces that had received an R response for identity recognition was overall better when encoding was intentional rather than incidental but was not different for happy and angry faces. These results suggest that the tendency for happy faces to be better remembered when encoding was intentional was not due to a better memory for emotional expressions of these faces. Further studies will be needed to see if this later finding could be replicated but it nevertheless suggests that there may be circumstances in which emotional expression affects identity memory without influencing expression memory itself.

The finding that identity memory was better when faces were presented with a happy rather than an angry expression in the intentional, but not in the incidental, learning condition requires further discussion. A first potential explanation could focus on purely physical characteristics of the stimuli without reference to the social meaning provided by emotional expressions. It has been found that a change in expression between study and test reduces recognition performance (Bruce, 1982). One could argue that recognition of angry faces was more difficult than recognition of happy faces because the amount of physical changes between angry and neutral faces was greater than the amount of changes between happy and neutral faces. Although this explanation cannot be completely ruled out by the present results, it is not clear why the amount of physical changes would have influenced recognition performance in the intentional, but not in the incidental, learning condition. Accordingly, we propose another explanation that takes into account the social meaning of emotional expressions for the self.

To begin, it is worth noting that the superior memory for happy compared to angry faces in the intentional learning condition was mainly due to differences in proportions of R responses. Similarly, the superior memory performances for happy faces in the intentional compared to the incidental learning condition was due to an increase of the R rather than the K or G responses. It has been found that the degree of elaboration and attention at study affected the proportion of R but not K responses. For instance, when attentional resources are engaged in a concurrent task during face presentation, the R component of recognition memory tends to be reduced while the proportion of K responses remains unaffected (Parkin, Gardiner, & Rosser, 1995). Similarly, intentional learning engages a greater degree of conscious elaboration at study than incidental learning and thereby enhances R but does not affect K responses (see Gardiner & Richardson-Klavhen, 2000). In the present study, the increase of R responses when learning was intentional rather than incidental was found for happy but not for angry faces. Therefore, strategic efforts to process the faces at study enhanced remembering happy but not angry faces. This finding could reflect a tendency to predominantly focus on and a greater willingness to elaborate happy faces and/or a tendency to avoid elaboration of angry faces at study. This interpretation is consistent with the numerous studies that have shown that most people tend to preferentially process positive rather than negative social information that is self-relevant such as feedbacks provided by other people (see Baumeister, 1998 for a review). Facial expressions of emotions are indeed highly significant social stimuli that play an important role in the regulation of social interactions by providing feedbacks about attitudes, intentions, and emotional states. A happy expression denotes approval and satisfaction with our current behaviors or attitudes whereas an angry expression denotes disapproval. It is therefore possible that the meaning of emotional expressions for the self causes them to be processed differently at study. If this is the case, variables that have been shown to influence the processing of social stimuli should

modulate the influence that emotional expressions have on memory. This is what we found in another study in which we explored the influence of social anxiety on memory for faces and emotional expressions (D'Argembeau, Van der Linden, Etienne, & Comblain, 2001). A large pool of subjects were screened with a social anxiety scale and participants high and low in social anxiety were compared with regard to identity and expression memory using the same procedure as the one reported in the present study. In an intentional learning condition, it was found that participants low in social anxiety reported more R responses for happy faces than for angry faces both for identity and expression memory, whereas this was not the case for participants high in social anxiety. Therefore, the influence of emotional expressions on identity and expression memory was modulated by social anxiety. These findings are consistent with the proposition that the meaning of emotional expressions for the self can explain the present findings.

Finally, it is worth noting that the present results may seem inconsistent with other recent studies about the influence of emotion on memory. Indeed, it has been found that recognition of negative words or pictures was more often accompanied by R responses than recognition of positive words or pictures (Dewhurst & Parry, 2000; Ochsner, 2000). However, emotional pictures and words that were used in those studies may have a different emotional meaning than emotional expressions because they do not in themselves provide social feedbacks to the self as is the case for faces with emotional expressions. Consistent with this proposed role of the self-relevance of stimuli, a recent study has found that memory for verbal positive stimuli was better than memory for negative stimuli, but only when the encoded information was of relevance to the self (Sedikides & Green, 2000).

In conclusion, the present study provides further evidence that identity and expression processing may interact in some circumstances. We found that intentional learning of the identity of new faces was facilitated when the faces displayed a happy rather than an angry

expression although memory for emotional expressions themselves was not better for happy faces. We argue that the social meaning of emotional expressions for the self can explain this facilitating effect of happy expressions on identity memory.

References

Baudouin, J-Y., Gilibert, D., Sansone, S., & Tiberghien, G. (2000). When the smile is a cue to familiarity. Memory, 8, 285-292.

Baumeister, R. F. (1998). The self. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), Handbook of social psychology (4th ed., vol. 1, pp. 680-740). New-York: McGraw-hill.

Beaupré, M., Cheung, N., & Hess, U. (2000, october). La reconnaissance des expressions émotionnelles faciales par des décodeurs africains, asiatiques, et caucasiens. Poster presented at the XXIIIe Congrès annuel de la Société Québécoise pour la Recherche en Psychologie, Hull, Qc.

Bégin, C., Kirouac, G., & Doré, F. (1984). Collection de stimuli faciaux émotionnels élaborée à partir du FACS. Unpublished document.

Bruce, V. (1982). Changing faces: Visual and non-visual coding processes in face recognition. British Journal of Psychology, 73, 105-116.

Bruce, V., & Young, A. (1986). Understanding face recognition. British Journal of Psychology, 77, 305-327.

Cohen-Pager, D., & Brosgole, L. (1992). The recognition of faces and expressions. Bulletin of the Psychonomic Society, 30, 191-193.

Coin, C., & Tiberghien, G. (1997). Encoding activity and face recognition. Memory, 5, 545-568.

D'Argembeau, A., Van der Linden, M., Etienne, A-M., & Comblain, C. (2001). Identity and expression memory for happy and angry faces in social anxiety. Manuscript submitted for publication.

Dewhurst, S. A., & Parry, L. A. (2000). Emotionality, distinctiveness, and recollective experience. European Journal of Cognitive Psychology, 12, 541-551.

Ekman, P., & Friesen, W. V. (1976). Pictures of facial affect. Palo Alto, CA: Consulting Psychologists Press.

Endo, N., Endo, M., Kirita, T., & Maruyama, K. (1992). The effects of expression on face recognition. Tohoku Psychologica Folia, 52, 37-44.

Foa, E. B., Gilboa-Schechtman, E., Amir, N., & Freshman, M. (2000). Memory bias in generalized social phobia: Remembering negative emotional expressions. Journal of Anxiety disorders, 14, 501-519.

Fox, E., Lester, V., Russo, R., Bowles, R. J., Pichler, A., & Dutton, K. (2000). Facial expressions of emotion: Are angry faces detected more efficiently? Cognition and Emotion, 14, 61-92.

Gardiner, J. M., Ramponi, C., & Richardson-Klavhen, A. (1998). Experiences of remembering, knowing, and guessing. Consciousness and Cognition, 7, 1-26.

Gardiner, J. M., & Richardson-Klavehn, A. (2000). Remembering and knowing. In E. Tulving & F. I. M. Craik (Eds.), The oxford handbook of memory (pp. 229-244). Oxford: Oxford University Press.

Haxby, J. V., Hoffman, E. A., & Gobbini, M. I. (2000). The distributed human neural system for face perception. Trends in Cognitive Sciences, 4, 223-233.

Humphreys, G. W., Donnelly, N., & Riddoch, M. J. (1993). Expression is computed separately from facial identity, and it is computed separately for moving and static faces: Neuropsychological evidence. Neuropsychologia, 31, 173-181.

Kottoor, T. M. (1989). Recognition of faces by adults. Psychological Studies, 34, 102-105.

Martinez, A. M, & Benavente, R. (1998). The AR Face Database. CVC Technical Report #24, http://rvl1.ecn.purdue.edu/~aleix/aleix_face_DB.html.

Mogg, K., & Bradley, B. P. (1999). Orienting of attention to threatening facial expressions presented under conditions of restricted awareness. Cognition and Emotion, 13, 713-740.

Ochsner, K. N. (2000). Are affective events richly recollected or simply familiar? The experience and process of recognizing feelings past. Journal of Experimental Psychology: General, 129, 242-261.

Öhman, A., Lundqvist, D., & Esteves, F. (2001). The face in the crowd revisited: A threat advantage with schematic stimuli. Journal of Personality and Social Psychology, 80, 381-396.

Parkin, A. J., Gardiner, J. M., & Rosser, R. (1995). Functional aspects of recollective experience in face recognition. Consciousness and Cognition, 4, 387-398.

Sansone, S., & Tiberghien, G. (1994). Traitement de l'expression faciale et reconnaissance des visages: Indépendance ou interaction? Psychologie Française, 39, 327-344.

Schweinberger, S. R., Burton, A. M., & Kelly, S. W. (1999). Asymmetric dependencies in perceiving identity and emotion: Experiments with morphed faces. Perception and Psychophysics, 61, 1102-1115.

Sedikides, C., & Green, J. D. (2000). On the self-protective nature of inconsistency-negativity management: Using the person memory paradigm to examine self-referent memory. Journal of Personality and Social Psychology, 79, 906-922.

Wheeler, M. A., Stuss, D. T., & Tulving, E. (1997). Toward a theory of episodic memory: The frontal lobes and autonoetic consciousness. Psychological Bulletin, 121, 331-354.

Young, A. W. (1997). Finding the mind's construction in the face. The Psychologist, 10, 447-452.

Table 1

Mean Proportions of R, K, and G Responses for Identity Recognition as a Function of Learning Condition and Expression Type

	Incidental learning			Intentional learning		
Response	Happy	Angry	False alarms	Happy	Angry	False alarms
R	.41	.47	.03	.52	.44	.03
K	.24	.21	.10	.23	.22	.09
G	.04	.04	.03	.05	.04	.05
Total	.69	.72	.16	.80	.70	.17

Table 2

Mean Proportions of R, K, and G Responses for Expression Memory as a Function of Learning Condition and Expression Type

	Incidental learning				Intentional learning			
	Hits		Errors		Hits		Errors	
Response	Happy	Angry	Happy	Angry	Happy	Angry	Happy	Angry
R	.26	.31	.04	.09	.27	.31	.06	.07
K	.16	.14	.10	.08	.19	.17	.08	.06
G	.20	.16	.24	.22	.23	.20	.17	.19
Total	.62	.61	.38	.39	.69	.68	.31	.32

Note: The proportions were calculated by dividing the number of correct or incorrect R, K, and G responses for each type of expression by the number of correct identity recognition (hits) for that type of expression.

Table 3

Mean Proportions of R, K, and G Responses for Expression Memory for Faces that Received an R Response for Identity Recognition

	Incidental learning				Intentional learning			
	Hits		Errors		Hits		Errors	
Response	Happy	Angry	Happy	Angry	Happy	Angry	Happy	Angry
R	.42	.46	.05	.14	.43	.54	.10	.11
K	.12	.16	.13	.03	.23	.15	.07	.03
G	.15	.05	.12	.15	.11	.12	.06	.04
Total	.69	.67	.30	.32	.77	.81	.23	.18

Note: The proportions were calculated by dividing the number of correct and incorrect R, K, and G responses for expression memory of faces that had received a correct R response for identity recognition by the number of correct R responses for identity recognition.