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Memory for faces: the effect of facial appearance and the context in which the face is encountered

Katia Mattarozzi · Alexander Todorov · Maurizio Codispoti

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Abstract We investigated the effects of appearance of emotionally neutral faces and the context in which the faces are encountered on incidental face memory. To approximate real-life situations as closely as possible, faces were embedded in a newspaper article, with a headline that specified an action performed by the person pictured. We found that facial appearance affected memory so that faces perceived as trustworthy or untrustworthy were remembered better than neutral ones. Furthermore, the memory of untrustworthy faces was slightly better than that of trustworthy faces. The emotional context of encoding affected the details of face memory. Faces encountered in a neutral context were more likely to be recognized as only familiar. In contrast, emotionally relevant contexts of encoding, whether pleasant or unpleasant, increased the likelihood of remembering semantic and even episodic details associated with faces. These findings suggest that facial appearance (i.e., perceived trustworthiness) affects face memory. Moreover, the findings support prior evidence that the engagement of emotion processing during memory

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K. Mattarozzi (🖂)

Department of Experimental, Diagnostic and Specialty Medicine, University of Bologna, V.le Berti Pichat, 5, 40127 Bologna, Italy e-mail: katia.mattarozzi@unibo.it

A. Todorov Department of Psychology, Princeton University, Princeton, NJ 08540, USA

M. Codispoti Department of Psychology, University of Bologna, 40127 Bologna, Italy encoding increases the likelihood that events are not only recognized but also remembered.

Introduction

It has been consistently demonstrated that emotion affects memory formation (Blaney, 1986; Bradley, Greenwald, Petry, & Lang, 1992; Talmi, Schimmack, Paterson, & Moscovitch, 2007). In the case of memory of faces, research shows that emotional expressions increase the likelihood that a face will later be remembered (D'Argembeau & Van Der Linden, 2007; Jackson, Wu, Linden, & Raymond, 2009). Here, we investigate whether emotionally neutral faces elicit similar effects. Faces are inherently imbued with affect (Todorov, Said, Engell, & Oosterhof, 2008; Zebrowitz & Montepare, 2008) and differences in the appearance of emotionally neutral faces trigger social inferences relevant to motivation and decision making (Blair, Judd & Chapleau, 2004; Todorov, Mandisodza, Goren, & Hall, 2005; van't Wout & Sanfey, 2008). Importantly, research suggests that faces are automatically evaluated on valence and that this evaluation is best approximated by judgments of trustworthiness (Oosterhof & Todorov, 2008; Todorov, Pakrashi, & Oosterhof, 2009).

This study tests whether the facial properties that lead to social inferences also affect the likelihood that a face would be automatically stored in memory. Consistent with research on the effect of emotion on memory (Bradley et al., 1992; Hamann, 2001), we tested whether both trustworthy- and untrustworthy-looking faces facilitate incidental memory more than faces with a neutral appearance.

In addition, we investigated the effects of the context in which the face is encountered on incidental face memory. Faces, like other objects, most commonly appear within a context containing its own characteristics and information. In keeping with several recent findings (Bell & Bucher, 2010, 2011; Maratos & Rugg, 2001), we expect that successful face recognition would not be affected by the context in which the face is learned. However, there is substantial evidence (Kensinger, 2009; Mather, 2007) indicating that emotion affects the details remembered about an event. Specifically, emotion increases the likelihood that items can be remembered along with source details of the context in which they were learned rather than simply recognized without the recollection of any details of the encounter (i.e., remembering vs. knowing). Therefore, we expected that emotional context would affect the ability to remember semantic or episodic details associated with the face (e.g., "I remember this person and that he did something bad" or "I remember he beat up an old man to steal his wallet").

To summarize, this study investigates the effects of facial appearance (i.e., perceived trustworthiness) and emotional context (pleasant vs. neutral vs. unpleasant) in which the face is encountered on face memory. The first aim is to test whether these factors—appearance and context—affect face recognition. The second aim is to test whether these factors affect source memory for faces. Specifically, we are interested in discovering under what conditions face recognition relies on mere familiarity and under what conditions face recognition is accompanied by the recollection of specific episodic details of the initial encounter.

For these purposes, and to approximate real-life situations as closely as possible, faces were embedded in a newspaper article, with a headline that specified an action performed by the person pictured.

Materials and methods

Participants

Seventy-eight students (39 females) from Princeton University, between 18 and 25 years of age, participated voluntarily for partial course credit.

Stimuli

Faces

Color pictures of real, emotionally neutral faces were selected from the Karolinska faces database (Lundqvist, Flykt & Ohman 1998). These faces were rated on a

number of personality traits provided in the social cognition and social neuroscience lab database (Oosterhof & Todorov, 2008). Eighteen faces were selected as study items. Six of them were perceived as trustworthy (standardized z scores mean \pm SD 0.91 \pm 0.25), six as neutral (standardized z scores mean \pm SD 0.01 \pm 0.55), and six as untrustworthy (standardized z scores mean \pm SD – 1.11 \pm 0.39). Each group consisted of an equal number of males and females. Twenty-one additional faces were selected. Three served for practice trials and the other 18 as fillers for the recognition task. The fillers were matched for gender and trustworthiness level of the study faces.

Context

Faces were embedded in a newspaper layout, with a headline specifying an action performed by the person depicted. Since the literature did not yield any experimental studies containing relevant stimuli for the purposes of this experiment, a pilot study was conducted to select the context headlines for the main experiment (see electronic supplementary material). From these results, we selected six pleasant headlines (valence mean \pm SD 7.14 ± 0.58 : arousal mean \pm SD 6.23 ± 0.41), six neutral headlines (valence mean \pm SD 4.99 ± 0.20 ; arousal mean \pm SD 3.09 ± 0.57) and six unpleasant headlines (valence mean \pm SD 1.95 \pm 0.55: arousal mean \pm SD 6.66 \pm 0.63).

We counterbalanced conditions across materials so that each headline was paired with each face type. Three versions of the task were created and counterbalanced across participants. In each version, the trial presentation order was randomized with the restriction that the same face valence, or a headline with the same valence, did not occur on more than two consecutive trials. The presentation order of the sets was also counterbalanced across participants.

Procedure

Upon arrival to the laboratory, participants read and signed the informed consent. Participants were told that, "[..] a sequence of images will be presented for a short period of time. These pictures represent different events that occurred last year in the U.S. and which were published in the New York Times. To be more precise, the images contain: the headline news and the picture of the person who performed the action described by the news. Imagine you are flipping through a newspaper [..]". Fig. 1 a An example of stimulus display (i.e., highly trustworthy face and unpleasant headline). b Example of the task time course. After the encoding phase, a surprise memory test assessed face memory by asking participants to make old/new judgments on previously seen or unseen faces. If the response was "old", the source memory was assessed by testing memory for (1) the associated news affective valence and (2) the news content with which a face was presented. If the response was "new", the task continued with the next trial



The experiment consisted of an incidental encoding task followed by a 3-step surprise memory test administered 3 min after the encoding task (see Fig. 1), and face trustworthiness rating procedure.

In each task session, stimuli were centrally presented (18 cm high \times 21 cm wide) at the 80 cm viewing distance from the center of a 19-in computer monitor, subtending a visual angle of approximately 12.83° \times 14.95°.

Encoding session

Eighteen images $(800 \times 600 \text{ pixels bitmap})$ depicting a face embedded in a newspaper template with a headline were presented once for 8 s each. Only the headline was readable. To ensure continued attention during the acquisition phase, participants were asked to rate each stimulus in terms of valence and arousal using an implemented electronic version of the Self-Assessment Manikin (SAM) rating system (Lang, 1980).

The task started with a few practice trials to make the participant familiar with the task. Each trial was preceded by a fixation cross for 1 s.

Memory test

After a 3-min break, participants were asked to look at a series of faces and to decide whether they had seen the face during the first phase of the experiment. An array of 36 faces was shown serially containing all 18 study faces and

18 new faces. The sequence of faces was randomly intermixed, so that no more than three old or new items were shown successively. To maintain the same context of encoding, faces were embedded in a newspaper frame but without headlines and stayed visible until a decision (yes/ no) was made.

To differentiate face recognition with and without context recollection (remembered vs. familiar responses), in the case of a "Yes" response (old face), source memory was assessed by querying memory for (1) the hedonic valence of the context in which the face was presented by means of a four forced choice task (pleasant, unpleasant, not pleasant or unpleasant, just familiar) and (2) the content of the context by asking to write a phrase describing the news.

Trustworthiness rating procedure

As a manipulation check, all faces were again presented immediately after the memory task. Participants had to rate the faces' trustworthiness on a scale ranging from 1 (not at all trustworthy) to 9 (extremely trustworthy).

Data analysis

Consistent with other studies (Awipi & Davachi, 2008; Gardiner & Java, 1993; Tulving, 1983), we categorized trials into several variables based on memory components of the initial presentation: (1) faces successfully recognized (hit rate) as previously presented, regardless of the memory of additional source details; (2) faces later recognized without remembering the correct news valence or content (face only familiar); (3) faces later recognized including memory of news valence but not of news content (face and valence of the news); (4) faces later recognized including memory of both news valence and content (face and content of the news). The news content recall was scored independently by three different native English speakers. Correct recall was scored if the answer was clearly linked to the news associated with the face. In almost all instances, the answers were completely clear. If the answer was vague (e.g., "murder someone"), it was considered an incorrect news response. Inter-rater agreement, as assessed by kappa-coefficient, was 0.94 (i.e., "almost perfect"; Landis & Koch, 1977). The few cases of disagreement between judges were discussed to reach unanimous score.

Results

Manipulation checks

Stimuli subjective rating during encoding phase (see Fig. 2)

Valence Stimuli differed in valence as a function of 1. facial appearance, F(2,154) = 14.73; p < 0.001, $\eta_{\rm p}^2 = 0.16$, regardless of the emotional context. Stimuli containing an untrustworthy face were significantly more negatively valenced relative to other stimuli containing trustworthy, p < 0.001, or neutral faces, p < 0.001. Stimuli containing trustworthy faces were rated as more pleasant, p < 0.05, compared to stimuli with neutral faces. Stimuli also differed in valence rating function of emotional as а context.



Fig. 2 Encoding phase mean pleasure (a) and arousal (b) rating of trials as a function of "facial appearance" and "hedonic content of the context" in which the face was presented. *Error bars* represent

standard error of the mean. **c** The two-dimensional affective space defined by mean pleasure (y-axis) and arousal (x-axis) ratings of the pictures

 $F(2,154) = 392.00; p < 0.001, \eta_p^2 = 0.84$, regardless of facial appearance. Stimuli embedded in an unpleasant context were rated as more negative compared to stimuli associated with pleasant, p < 0.001, or neutral contexts, p < 0.001. Stimuli embedded in pleasant contexts were significantly more positively valenced than neutral ones, p < 0.001.

2. Arousal Stimuli arousal significantly differed only as a function of emotional context, F(2,154) = 120.98; p < 0.001, $\eta_p^2 = 0.61$. Stimuli embedded in unpleasant contexts were rated as more arousing compared to pleasant, p < 0.001, or neutral contexts, p < 0.001. Stimuli embedded in pleasant contexts were rated as significantly more arousing than stimuli in neutral contexts, p < 0.001.

The interaction of facial appearance and context was not significant for both valence and arousal ratings.

Trustworthiness ratings at the end of the experiment

There was a significant main effect of facial appearance, $F_{(2,154)} = 142.08; p < 0.001, \eta_p^2 = 0.65$, regardless of emotional context. Untrustworthy faces were significantly more negatively rated compared to both trustworthy, (3.33 ± 1.47) vs. 5.92 ± 1.73 ; p < 0.001), or neutral faces, (3.33 ± 1.47) vs. 4.90 \pm 1.50; p < 0.001). Trustworthy faces were rated as more positive compared to neutral faces (5.92 \pm 1.73 vs. 4.90 ± 1.50 ; p < 0.001). Faces also differed in trustworthiness as a function of emotional context, F(2,154) 13.45; $p < 0.001, \eta_p^2 = 0.15$, regardless of facial appearance. Faces embedded in an unpleasant context were rated as more untrustworthy compared to both faces associated with pleasant, $(4.11 \pm 1.57 \text{ vs. } 4.72 \pm 1.57; p < 0.001)$, and neutral contexts, $(4.11 \pm 1.57 \text{ vs. } 4.61 \pm 1.57; p < 0.001)$. Faces embedded in pleasant contexts were not significantly different from faces in neutral contexts.

Memory performance

Participants correctly recognized 65.2 % of the old faces and incorrectly recognized only 7.7 % of the new faces. A *t* test revealed that participants gave significantly more correct responses for new faces than for old ones, t(154) = 11.54; p < 0.001, d = 1.85. Out of the correctly recognized faces, 57.7 % were recognized as only familiar, and 42.3 % were remembered faces (for 21.2 %, participants correctly remembered the associated valence of the news; and for 21.1 % the valence and specific content).

To test whether the type of face and emotional context affected the correct recognition of old faces, we submitted the hit rate to a 3 (Facial appearance: trustworthy vs. neutral vs. untrustworthy) \times 3 (Emotional context:



Fig. 3 Average old/new recognition accuracy in terms of P_r Discrimination Index as a function of "facial appearance". *Error* bars represent standard error of the mean

pleasant vs. neutral vs. unpleasant) repeated measures MANOVA. Only the main effect of facial appearance was significant, F(2,76) = 28.75, p < 0.001, $\eta_p^2 = 0.43$, indicating that memory for trustworthy and untrustworthy faces was better than memory for neutral faces ($p_s < 0.001$). To account for sensitivity of recognition memory responses (i.e., how well a participant distinguishes a new stimulus from an old one), a P_r index (Snodograss & Corwin, 1988) was calculated¹ and then entered into a repeated measures MANOVA with facial appearance as a within-subjects factor. As shown in Fig. 3, the old–new discrimination in terms of P_r was better for both trustworthy and untrustworthy faces than neutral faces ($p_s < 0.001$). Moreover, memory for untrustworthy faces was significantly better than memory for trustworthy faces (p < 0.05).

Even though the "remember" performance was poor, we further tested whether the type of face and emotional context affected the type of memory. We conducted a 3 (facial appearance) × 3 (emotional context) × 3 (type of memory: face familiarity vs. face and valence of news story vs. face and content of news story) repeated measures MANOVA. There was a large significant effect of type of memory, F(2,76) = 69.60, p < 0.001, $\eta_p^2 = 0.65$. Pairwise comparison indicated that participants were more likely to recognize faces as familiar than to recall them along with information relevant to the context ($p_s < 0.001$). Consistent with the analysis of the hit rate, the effect of facial appearance was also significant, F(2,76) = 28.75, p < 0.001, $\eta_p^2 = 0.43$, indicating that memory for

¹ The P_r index was calculated by subtracting the false alarm rate from the hit rate. False alarm rates could not be calculated separately for each emotional context, because the foils did not appear in any encoding context, thus we used the overall false alarm rates for each condition of facial appearance. We report P_r as a sensitive measure because it was favorably evaluated in validation studies (Snodograss & Corwin, 1988) and avoids the problem of undefined values that comes with using d'.

Fig. 4 Proportion of faces later recognized as a function of facial appearance and type of memory in pleasant context (a), neutral context (b) and unpleasant context (c). Data are expressed as proportions of all successfully recognized faces. *Error bars* represent standard error of the mean



trustworthy and untrustworthy faces was better than memory for neutral faces ($p_s < 0.001$).

More importantly, the interaction of emotional context and type of memory was significant, F(4,74) = 10.70, p < 0.001, $\eta_p^2 = 0.37$, indicating that whereas participants were more likely to recall the valence of the information, F(2,76) = 18.40, p < 0.001, $\eta_p^2 = 0.33$, and the content of the news, F(2,76) = 5.28, p < 0.01, $\eta_p^2 = 0.12$ in emotional contexts, they were more likely to recognize the faces as only familiar in neutral contexts, F(2,76) = 4.03, p < 0.03, $\eta_p^2 = 0.10$, Fig. 4a. Similarly to the analysis of the hit rate, the interaction between facial appearance and emotional context was non-significant.

All these effects were qualified by a significant threeway interaction of face, emotional context, and memory type, F(8,70) = 2.21, p < 0.04, $\eta_p^2 = 0.20$. To understand this three-way interaction, we conducted separate analyses for each type of emotional context. For all three contexts, the main effects of face valence, $F_s(2,76) > 3.05$, $p_{\rm s} < 0.05, \ \eta_{\rm ps}^2 > 0.07$, and type of memory, $F_{\rm s}(2,76) > 17.32, \ p_{\rm s} < 0.001, \ \eta_{\rm ps}^2 > 0.43$, were significant. However, while the interaction of face and type of memory was not significant in the neutral context, it was significant both in the unpleasant context, $F(4,74) = 3.23, \ p < 0.02, \ \eta_{\rm p}^2 = 0.15$, and in the pleasant context, $F(4,74) = 2.92, \ p < 0.03, \ \eta_{\rm p}^2 = 0.14$. As shown in Fig. 4b, pleasant contexts enhanced recall of content information, $F(2,76) = 15.47, \ p < 0.001, \ \eta_{\rm p}^2 = 0.29$, more for both trustworthy and untrustworthy faces than neutral faces ($p_{\rm s} < 0.001$). As shown in Fig. 4c, unpleasant contexts enhanced recall of valence information, $F(2,76) = 5.81, \ p < 0.005, \ \eta_{\rm p}^2 = 0.13$, more for untrustworthy than for trustworthy and neutral faces ($p_{\rm s} < 0.005$).

Discussion

In the present study, we examined the influence of facial appearance and the context in which the face was encountered on incidental face memory. The results suggest that incidental face recognition is affected mainly by character inferences from facial appearance rather than by the emotional context of face encoding. Specifically, an intrinsically relevant face, whether perceived to be trustworthy or untrustworthy, achieves a better memory encoding than a neutral face, regardless of the context in which it is encoded. To our knowledge, this is the first study that provides data concerning an old-new recognition memory advantage of untrustworthy/trustworthy faces over trustworthy-neutral faces. Previous studies that have examined the effect of face trustworthiness on memory used different methods: either the authors selected only faces rated high and low on trustworthiness (or likability) with no neutral baseline (Nash, Bryer, & Schlaghecken, 2010; Suzuki & Suga, 2010; Yamagishi, Shigehito, Mashima, Shimoma, & Kanazawa, 2003) or trustworthiness was derived from acquired information about the face rather than from facial appearance alone (Kroneisen & Bell, 2013; Bell & Bucher, 2010, 2011). The memory advantage for intrinsically relevant faces found in the present study is consistent with research concerning the role of emotion on memory for natural scenes (Bradley et al., 1992), and also with research on the role of explicit emotional expressions on memory for face identity (Bell & Bucher, 2010, 2011; D'Argembeau et al., 2003; Mather & Carstensen, 2003). In line with these studies, the old-new recognition memory advantage of untrustworthy- or trustworthy-looking faces over neutral ones seems to derive from an effect of arousal on memory processes. This finding highlights the importance of character inferences from facial appearance, which affect not only decision making as demonstrated in previous studies (Todorov et al., 2005) but also memory processes.

Although faces with positive and negative facial appearance are better memorized than neutral ones, untrustworthy faces seem to be more likely to lead to memory enhancement. These results provide a reasonable foundation for more detailed future studies. Interestingly, research exploring the role of emotional expression on face memory has led to contradictory findings regarding a memory advantage for positive or negative faces (Wang, 2012; Jackson et al., 2009; Barclay, 2008; D'Argembeau & Van der Linden, 2007). Some studies, many of which are based on prisoner dilemma games, also show better memory for cheaters compared to cooperators (Mealey, Daood, & Krage, 1996; Oda, 1997; Yamagishi et al., 2003). Currently, it remains unclear whether there is a true effect of valence. The divergent findings could be due to difficulty in equating the arousal of positive and negative faces, or may reflect methodological differences (e.g., task vs. stimuli used). However, psychophysiological studies examining the effect of valence and arousal on information processing suggest that threatening faces are subject to a more elaborate perceptual analysis compared to friendly and neutral faces (Mogg & Bradley, 1999; Schupp et al., 2004). Although the depth of elaboration of the face during encoding and the subsequent memory performance must be determined more directly in future studies, we may reasonably assume that, regarding immediate recall, the slight memory advantage obtained in this study may be attributed to a more effective perceptual processing of untrustworthy faces than trustworthy ones.

As noted above, our findings suggest that when a face is briefly encountered, its intrinsic properties (i.e., facial appearance), rather than the emotional context, are the predominant factor affecting implicit memory encoding. As in recent studies (Bell, Buchner, Erdfelder, et al., 2012; Bell, Buchner, Kroneisen, et al., 2012; Erk, Martin, & Walter, 2005; Maratos & Rugg, 2001), faces associated with an emotional context seem not to acquire a high priority for memory elaboration compared to faces associated with an irrelevant neutral context.

However, the pattern of results suggests that emotional context may be a critical factor when it comes to remembering episodic details. Although the results should be interpreted with considerable caution due to the poor "remember" performance, the available data suggest some interesting considerations that warrant future investigation. Specifically, emotional context and facial appearance interact and affect the type of memory associated with the face. When faces are associated with neutral contexts, the likelihood of recognizing a face as only familiar is significantly higher. In contrast, an emotionally relevant context of encoding, whether pleasant or unpleasant, significantly increases the likelihood of remembering semantic details (i.e., emotional valence of the news, "I remember this person and that he did something bad") or even episodic details (i.e., "I remember he helped elderly people") about the face.

Moreover, when faces are learned in a non-neutral context (pleasant or unpleasant), the type of memory changes as a function of facial appearance. Specifically, negative affect derived from the context in which the face was learned seems to favor untrustworthy face memory and its association with an unpleasant sensation, but with no other specific details. This effect does not occur with trustworthy or neutral faces embedded in unpleasant contexts. In keeping with recent findings by Staresina, Gray, & Davachi (2009), this semantic congruency effect on memory for the study items and associated source details suggests an interesting relationship between semantic and episodic memory already postulated by Tulving & Markowitsch (1998).

However, presenting untrustworthy faces may induce a tendency towards guessing that the face was associated with an unpleasant context. Therefore, it is possible that memory for news valence, in contrast to memory for news content,

was influenced by guessing biases as several studies have suggested (Bell, Buchner, Erdfelder, et al., 2012; Bell, Buchner, Kroneisen, et al., 2012; Nash, Bryer, & Schlaghecken, 2010). We note though that in our study untrustworthy-looking faces (old and new) were not more often misclassified as being associated with a negative context than being associated with a positive one. In principle, when comparing source memory for different types of context, it is best to use multinomial source memory models (Bayen, Murnane, & Erdfelder 1996). However, the implementation of these models to the present experimental paradigm [i.e., characterized by (a) several conditions (3 facial appearance \times 3 emotional context); (b) few stimuli for each condition; and (b) 4 response options (pleasant, unpleasant, neutral and just familiar)] creates several problems in interpreting both the parameters to be entered into the model and the results. We included "just familiar" as a response option to reduce as much as possible the probability of guessing by participants rather than to force them to choose from three source response options (pleasant, neutral, unpleasant). However, this does not change the fact that the correct responses analyzed here confound item memory, source memory, and various types of (item and source) guessing processes. This is a limitation that must be considered when drawing conclusions regarding source memory. Although they represent rather indirect evidence, the trustworthiness ratings at the end of the experiment could be considered as consistent with the hypothesis for enhanced memory of an affectively congruent news valence for untrustworthy faces presented in a negative context. In particular, the trustworthiness rating could be interpreted as reflecting "implicit" memory for the emotional contexts. Specifically, these results seem to suggest that negative contexts had a stronger and longer lasting influence than positive contexts, which is consistent with many previous findings (Bell, Buchner, Kroneisen, & Giang, 2012; Suzuki & Suga, 2010).

Previous studies that have examined context memory for untrustworthy- and trustworthy-looking faces (Bell, Buchner, Kroneisen, & Giang, 2012; Kroneisen & Bell, 2013; Suzuki, Honma, & Suga, 2013; Suzuki & Suga, 2010) show that memory is best for inconsistent information, and particularly high for trustworthy-looking cheaters. The authors have argued that this memory bias may have an adaptive function because it may be important to remember information that helps to correct a maladaptive behavior tendency (cooperating with a trustworthy-looking cheater). The results from the present study seem to be inconsistent with these previous studies. However, there are a number of methodological differences between the present study and the previous ones. A potentially important difference is that in previous studies participants saw the face first and were required to evaluate the trustworthiness of the person (e.g., by making a decision whether or not to trust that person in a social-dilemma game). Then the inconsistent context information was given (e.g., the trustworthy-looking stimulus person made an uncooperative decision in the trust game). Thus, it is likely that the procedure of the previous studies required participants to build up an expectation about the stimulus person's character based on facial appearance, and the violation of this expectation resulted in a memory benefit. The results of the present study may differ from previous studies because the newspaper headlines and the faces were shown simultaneously. Thus, participants failed to build up an expectation about the stimulus person before reading the headline. As a consequence, there was no expectation that could be violated and no memory advantage for the unexpected context information. The present study suggests that when faces and context information are processed simultaneously, and participants do not have prior expectations about the trustworthiness of the stimulus persons, memory for details associated with the face seems to be primarily determined by the emotional content.

Conclusion

Taken together, these results suggest that faces by virtue of their intrinsic affective meaning inferred from their appearance affect incidental memory encoding, regardless of other affective information available from the scenes in which they were encountered. It seems that the memory system is sensitive to faces capable of activating motivational systems, even when devoid of any explicit emotional expression. Consistent with studies on the effect of emotion on memory accuracy (Doerksen & Shimamura, 2001; D'Argembeau & Van der Linden, 2004; Kensinger, 2009; Schaefer, Pottage, & Rickart, 2011), our findings, with the caution due to the poor "remember performance" obtained, support the hypothesis that the engagement of emotion processing during memory encoding increases the likelihood that the events are not only recognized but also remembered. In this case, when faces are encoded in an emotionally relevant context, it is important to remember the face not only as simply familiar but also to remember details from the initial encounter of the face.

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Psychology Section, Department of Clinical Neuroscience, Karolinska Hospital, S-171-176 Stockholm, Sweden

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