



Reports

Eye'm lovin' it! The role of gazing awareness in mimetic desires[☆]Clémentine Bry^{*}, Evelyne Treinen, Olivier Corneille, Vincent Yzerbyt

Université Catholique de Louvain, Belgium

ARTICLE INFO

Article history:

Received 20 August 2010
 Revised 17 January 2011
 Available online 1 April 2011

Keywords:

Mimetic desire
 Awareness
 Joint attention
 Evaluative learning
 Attitude formation dual models
 Effect of attention on affect

ABSTRACT

Recent studies showed that people evaluate objects more favorably when these objects are gazed-at by others, an effect coined as “mimetic desire”. In two studies, we tested whether mimetic desire stems from an automatic form of learning by examining one dimension of automaticity, i.e., people's awareness of the object-gaze association. Participants saw 6 neutral art paintings associated with a female gazing toward two of the paintings, away from two of the paintings, and closing her eyes with respect to the last two paintings. After the exposition phase, participants evaluated the paintings and performed a contingency-awareness test. Importantly, participants' responses on this test were genuinely driven by memory and not by inferences from liking. Results show that participants preferred objects that were gazed-at but only when they were aware of the object-gaze association. Hence, despite the adaptive function of joint attention, its impact on valence acquisition does not seem to qualify as an implicit learning process.

© 2011 Elsevier Inc. All rights reserved.

Paying attention to the other people's orientation of attention has important developmental and adaptive implications (e.g., Tomasello, 1999). Joint attention *requires that two individuals are attending to the same object, based on one individual using the attention cues of the second individual* (Emery, 2000, p.588). This ability appears early in life (e.g., Hood, Willen, & Driver, 1998; Scaife & Bruner, 1975) and is one of the main deficits involved in autism (e.g. Baron-Cohen, Wheelwright, & Jolliffe, 1997; Senju, Yaguchi, Tojo, & Hasegawa, 2003). Of importance, joint attention also has evaluative consequences. Objects that are perceived to be gazed-at by others are evaluated more positively than not-gazed-at objects (e.g., Bayliss, Frischen, Fenske & Tipper, 2007; Bayliss, Paul, Cannon & Tipper, 2006, Exp.1), an effect coined ‘mimetic desire’ by René Girard (1987).

In a recent study, Corneille, Mauduit, Strick, and Holland (2009) provided evidence that mimetic desire may arise rather spontaneously and independently from experimental demands. These authors presented pictures of dogs' heads along with various peppermint brands and relied on an affective priming task as an evaluative measure. The use of dogs' heads combined with peppermint brands minimized the possibility that participants would form reasoned inferences between the dog head orientation and the brand. The use of an affective priming task reduced the risk that participants would

control their evaluative responses in order to match experimental demands. Despite this rather implicit evaluative context, mimetic desire effects were observed: peppermint brands paired with an oriented-toward dog head acquired a more positive valence than not-gazed-at brands.

An important question then arises as to whether these effects may stem from an implicit form of learning or whether some level of consciousness is involved in mimetic desires. The latter question is not only critical in order to better understand the boundary conditions of evaluative effects of joint attention, but also more generally for current models of attitude formation. Current dual models of attitudes posit that implicit attitudes would be formed through an automatic form of associative learning (Gawronski & Bodenhausen, 2006; Rydell, McConnell, Mackie & Strain, 2006). Evaluative conditioning is generally considered the best representative of the latter form of learning. Yet, there is a growing evidence that evaluative conditioning actually depends on goals (Corneille, Yzerbyt, Pleyers, & Mussweiler, 2009; Gast & Rothermund, 2011), resources (Dedonder, Corneille, Yzerbyt & Kuppens, 2010; Field & Moore, 2005; Pleyers, Corneille, Yzerbyt & Luminet, 2009), as well as people's awareness of contingencies between a neutral stimulus and the affective stimulus with which it is paired (e.g., Dawson, Rissling, Schell & Wilco, 2007; Klucken et al., 2009; Lipp & Purkis, 2005; Pleyers, Corneille, Luminet, & Yzerbyt, 2007; Stahl, Unkelbach & Corneille, 2009; Wardle, Mitchell & Lovibond, 2007).

Given the uncertainty regarding the theoretical status of evaluative conditioning in particular, and the possibility of an automatic form of associative learning in general, it is important to critically examine or re-examine the implicit nature of evaluative learning paradigms. This is what we set out to do in two mimetic desire experiments where we examined whether evaluative effects of joint

[☆] Authors' note: This research was supported by a joint research grant (ARC 06/11-337) and a research grant to the second author (CWS/08.335) from the Communauté Française de Belgique. The authors wish to thank Toon Kuppens and Nathalie Lefèvre for their help with statistics.

^{*} Corresponding author.

E-mail address: clementine.bry@univ-savoie.fr (C. Bry).

attention would arise independently of participants' awareness of object-gaze associations.

There are two reasons why mimetic desire may be insensitive to participants' gazing-awareness. First, mimetic desire may represent a special case of evaluative conditioning (EC, for short) that occurs implicitly. What makes the mimetic desires paradigm so special is that a head orientation is not intrinsically positive or negative. Rather, evaluative effects stem from the *relation* between the head orientation (to the left, the right, or straight ahead) and the location of the object. For instance, a head looking at the left will elicit negative evaluations if the object is located at its right but positive evaluations if the object is located at its left. In sharp contrast, EC paradigms involve pairing a neutral object (the CS) with another stimulus that has *intrinsic* valence (the US). This is such a critical paradigmatic difference that one may rightly question whether the mimetic desire paradigm belongs to EC effects. Several authors have argued that EC corresponds to an effect that may emerge implicitly or not, depending on the paradigm that is used for producing it (e.g., De Houwer, Baeyens & Field, 2005). Given the aforementioned specificities of the mimetic desire paradigm, it seems important to follow upon these authors' suggestion.

Another reason why mimetic desires may occur implicitly relates to the idea that perceived gazing may activate the approach–avoidance motivational system (Adams & Kleck, 2003). Hietanen, Leppänen, Peltola, Linna-aho and Ruuhiala (2008) showed that seeing direct and averted gaze activates in the observer approach–avoidance motivational brain systems, respectively. There may be no need to consciously tag the target gaze as positive or negative since it would be automatically encoded as an approach or avoidance state. The approach motivational state (echoed in the observer) may trigger an incentive salience (“cue-triggered wanting”) toward the object (Berridge & Robinson, 2003). Of note, several authors have proposed to draw a neurological distinction between the liking and wanting systems (e.g., Robinson & Berridge, 1993) however wanting and liking are usually subjectively confounded: people think they will like what they want. Although mimetic desire studies typically rely on evaluative measures, one may reason that they involve a strong “wanting” component considering their reliance on perceived approach–avoidance tendencies. As a matter of fact, Kawakami, Phillips, Steele and Dovidio (2007) reported evidence suggesting that approach–avoidance manipulations may have unconscious evaluative effects by relying on a subliminal procedure. More generally, the concept of mimetic desires that was proposed by René Girard relies on the broad notion that people (but also primates) automatically *want* to possess things that they perceive are being approached by others, resulting in interpersonal conflicts.

Overview

In two experiments, participants were exposed to a female face that closed her eyes or turned her attention toward or away from six neutral paintings. We measured painting liking and gazing memory. We expected to find mimetic desire effects in that objects would be preferred when paired with gazing-at faces. Crucially, we examined whether this effect would be moderated by participants' awareness of the gaze orientation and whether mimetic desire would occur in the absence of gazing-awareness.

Experiment 1

Participants and design

A total of 71 students from the Catholic University of Louvain ($M_{age} = 19.55$, $SD = .93$) participated for course credit. Each participant was confronted with a female target that either gazed toward paintings by Mark Rothko, gazed away from them, or closed her eyes.

We excluded male participants¹ ($N = 8$) as we wanted to secure the intragroup nature of the procedure (all gazing targets were females) and because males display weaker reflexive shifts of attention than women (Bayliss, di Pellegrino, & Tipper, 2005), leaving the sample with 63 participants.

Procedure

Exposure task

Participants were welcomed to the lab by a female experimenter and seated in front of a computer screen. They learned that they would be exposed to videos and asked to carefully watch the screen. A pilot study involving 34 students allowed selecting 6 out of the 15 paintings of Marc Rothko, which were deemed neutral in liking. The exposure task consisted in 36 trials of 6 s each, presented in a random order. In each trial, one of the four female targets (whose identity was counterbalanced across participants) appeared on one (left or right) side of the screen posing a neutral face. After 1 s, one of the six paintings appeared on the other side of the screen. During the next second, the target switched her attention toward/away the painting or closed her eyes. She then gazed at or away from the painting or kept her eyes closed for two additional seconds, at which time the painting disappeared. The target then took 2 s to return to the initial neutral orientation. This timing gave the impression that the target's shift of attention was triggered by the painting appearance.

Each painting was presented six times in a random order, three times on the left and three times on the right side of the screen and was always associated with the same attention orientation within-participants. However, specific associations between paintings and gazing were counterbalanced across participants.

Evaluative task

After the exposure task, participants were told the female target had received one of the paintings as a reward for her participation and informed which of the six paintings it was. We measured feelings toward the target with a feeling thermometer measure and a trust game, in order to explore the possibility that the target would be disliked upon learning that she received a gazed-at painting as a gift. This possibility follows from Girard's suggestion (1987) that mimetic desire leads to interpersonal conflicts, since people compete to possess the desired object. However, the target liking measure failed to confirm this conjecture. Also, the gift manipulation did not influence the painting preference and will thus not be discussed further.

Next, participants completed a painting preference task². They were presented with the 15 (i.e., $6 \times 5/2$) pairs of paintings and asked to indicate which painting they preferred in each pair. The pairs were presented twice and in a random order. We computed the total number of times each painting was chosen over another (ranging from 0 to 10).

Awareness task

Finally, participants performed an item-based contingency-awareness test (Pleyers et al., 2007). For each painting, they indicated whether the target (1) systematically gazed at it, (2) systematically gazed away from it, (3) systematically closed her eyes when presented with it, (4) had no systematic gazing behavior related to it, or (5) if they did not remember what happened. We considered contingency awareness when participants correctly recalled the gaze associated with the painting and

¹ Results were similar with and without male participants but since we could not strictly test a gender effect, we chose to discard them for all analyses.

² After the preference comparison task, participants also ranked the paintings from their favorite to their least favorite. Results are similar to the preference task but because of non-independence of data, we will not discuss them further.

contingency-unawareness when participants gave incorrect answers or when they said they did not remember the associated gaze³.

Finally, participants answered a funneled debriefing questionnaire about the purpose of the study and what had led their paintings' evaluation, before being thoroughly debriefed, rewarded, and thanked.

Results

Most participants mentioned that the experiment aimed at influencing their evaluation of the paintings. However, when asked to mention what had driven their evaluation, all answers were related to colors and frames. Only three participants evoked the gaze as a possible influence, but only after their own tastes for colors and frame would impact their evaluation. Results are identical with and without these three participants so we included them in all analyses.

Painting preference

We used multi-level analyses. The multi-level approach is more adequate than ANOVA because it allows to examining item-based effects while controlling for intra-subjects correlations and random effects of image. Conceptually, these analyses correspond to averaging across within-subjects regressions.

We submitted the number of times each painting was chosen in the paired presentations to a multi-level analysis with gazing condition (gazed at, gazed away from, neutral), contingency awareness (aware vs. unaware), and their interaction as fixed effects and painting (from 1 to 6) as a random effect. We found a significant effect of gazing, $F(2, 367) = 5.91, p < .01$, and a marginal effect of awareness, $F(1, 367) = 3.78, p < .06$. More importantly, these effects were qualified by the predicted interaction: $F(2, 367) = 3.83, p < .03$ (see Fig. 1).

To probe this interaction, we first analyzed the effect of gazing condition for “gazing-aware” and “gazing-unaware” paintings separately, by means of a multilevel analysis with gazing as fixed effect and painting as random effect with Bonferonni-corrected mean comparisons. For gazing-aware paintings, the gazing condition effect was significant, $F(2, 113) = 7.41, p < .01$. Gazed-at paintings ($M = 6.70, SE = .75$) were chosen more often than neutral paintings ($M = 4.99, SE = .75$), $p < .02$, and more often than gazed-away paintings ($M = 4.43, SE = .78$), $p < .01$. The latter conditions did not differ significantly. In contrast, for gazing-unaware paintings, the effect of gazing condition was not significant, $F(2, 250) < 1, ns$ ($M_{\text{gazed-at}} = 4.91, SE = .67$; $M_{\text{closed-eyes}} = 4.75, SE = .67$; $M_{\text{gazed-away}} = 4.69, SE = .66$).

Next, we analyzed the effect of gazing-awareness in each gazing condition separately. For gazed-at paintings, the gazing-awareness effect was significant, $F(1, 121) = 12.76, p = .001$. Aware gazed-at paintings were chosen more often than unaware gazed-at paintings. For gazed-away and neutral paintings, there was no effect of contingency awareness, $F(1, 119) < 1, ns$ and $F(1, 120) < 1, ns$, respectively.

Memory test: inference vs. recall

One may wonder whether gazing-awareness was based on actual memory or on inferences derived from the final evaluation of the paintings (e.g., I like this painting, so it must have been looked at). If the latter applies, participants should have based their memory

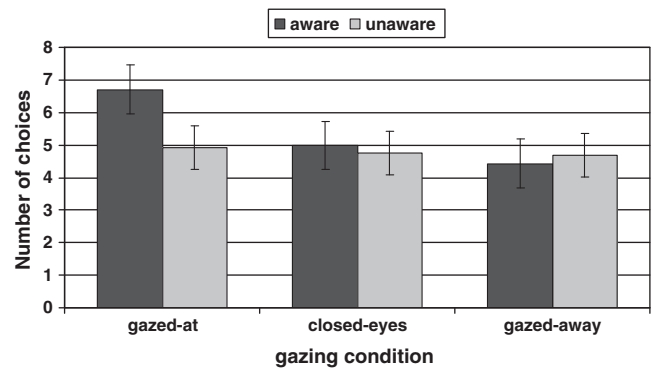


Fig. 1. Number of picture choices as a function of gazing condition and contingency-awareness.

answers on their evaluation (i.e., the number of times they chose the painting over another). Liking a painting should go hand in hand with a gazed-at answer and vice versa.

When the gazing manipulation and the painting evaluation are consistent (participants liked paintings that were gazed-at and disliked paintings that were gazed-away), both evaluation and gazing condition would suggest the same memory answer. In that case, one cannot distinguish between the contribution of evaluation and the contribution of gazing condition in memory answers. In other words, both choice and gazing are possible and consistent influences on memory answers. However, when painting evaluation and the gazing manipulation are inconsistent (participants disliked paintings that were gazed-at and liked paintings that were gazed-away), evaluation and gazing condition would not suggest the same memory answer. In that case, if memory answers are based on inferences from evaluation, then painting evaluation should predict memory answers. In contrast, if memory answers are based on actual gazing, evaluation should predict memory answers much less or even not at all, among inconsistent choice-gaze paintings.

We computed a categorical evaluation variable according to which paintings chosen at least 5 times (out of 10) were considered as liked (coded 1) whereas paintings chosen less than 5 times were considered as disliked (coded -1). We also computed a categorical consistency variable. When paintings were gazed-at and liked or gazed-away and disliked, they were considered as consistent (coded 1) whereas when paintings were gazed-at and disliked or gazed-away and liked, they were considered as inconsistent (coded -1). Paintings assigned to the closed-eyes condition were discarded since we cannot predict specifically if liking or disliking is consistent or not the closed-eyes gaze. Finally, we considered memory answers as a continuous variable ranging from 1 to -1 . Specifically, answers could vary from the “most gazed-at” answer (i.e., “systematically gazed-at” in the awareness test, given a value of 1) to the least “gazed-at” answer (i.e., “systematically gazed-away” in the awareness test, given a value of -1); with the other answers falling in the middle (given a value of 0). In line with the above rationale, we expected to find an interaction effect of evaluation and consistency on memory answers.

We conducted a multiple regression⁴ with the memory answers as criterion and evaluation, consistency, and their interaction as predictors.

³ For the sake of simplicity, we decided to consider two awareness categories (aware vs. unaware). In a previous version of this paper, we considered three awareness categories (correct, incorrect, and forgotten), and results were similar. Also, in the previous version, the “no systematic gaze” answer was considered as incorrect, even though it may reflect the interaction of two phenomena: a difference in meta-memory and a difference in social desirability. Indeed, this answer may be given when people believe that there is no systematic gaze, or when they know that they do not remember but do not want to admit it. Given this ambiguity, we discarded this option in Experiment 2 although results in Experiment 1 hold without the paintings associated to this category answer.

⁴ We also submitted the memory answers categories (gazed-at; gazed-away; others) to a multinomial logistic regression. The results of this analysis were similar to those obtained with the linear regression. For the sake of simplicity, we only reported the results from the linear regression, as readers are likely more familiar with this technique.

We found a main effect of evaluation, $t(374) = 4.98, p < .001$. More importantly, the interaction between evaluation and consistency was significant, $t(374) = 2.85, p < .01$, confirming that participants' memory answers were not simply based on inferences from evaluation. For consistent paintings, we found the expected main effect of evaluation, $t(374) = 4.90, p < .001$. For inconsistent paintings, the main effect of evaluation was not significant, $t(374) = 1.78, ns$.

Discussion

Experiment 1 extends previous research by showing that joint attention influences painting evaluation (Bayliss et al., 2006; Corneille, Mauduit, et al., 2009; Corneille, Yzerbyt, et al., 2009) but that this effect is moderated by gazing-awareness. Participants preferred gazed-at paintings when they were aware of the associated gaze. Close examination of the memory answers confirmed that they were based on participants' actual memory of the manipulation and not on inferences from evaluation.

In Experiment 2, we sought to replicate these findings while addressing some limitations of Experiment 1. First, we used a more sensitive memory test, with recognition instead of free recall. Second, we took direct evaluative ratings of the paintings instead of using a preference comparison task. We expected to replicate the results of Experiment 1, providing further evidence of the role of gazing-awareness in the emergence of mimetic desire.

Experiment 2

Participants and design

A total of 93 psychology students from the Catholic University of Louvain ($M_{age} = 19.62, SD = 1.68$) participated in the experiment for course credit. Again, we excluded males ($N = 16$), leaving a final sample of 77 female participants. The design was the same as in Experiment 1, with the exception that we left out the gift manipulation and target evaluation measures, which did not result in significant outcomes in Experiment 1.

Material and procedure

Participants first completed the same exposure task as in Experiment 1, although each association was presented 8 times instead of 6. Participants then evaluated⁵ how much they liked each picture separately on a 7-point scale ranging from 1 (=not at all) to 7 (=very much). Next, they performed a recognition test of gazing. For each painting, we displayed the three possible associations of painting and face orientation (toward, away and neutral) with both right and left screen locations (see Appendix for an example). Participants had to indicate for each painting which association had been presented during the exposure phase by pressing keys 1 (i.e., the person was always looking toward the picture), 2 (i.e., the person was always closing her eyes), 3 (i.e. the person was always looking in the opposite direction of the picture) or 4 if they did not remember. At the end of the experiment, they answered the same funneled debriefing questionnaire as in Experiment 1, were rewarded, and thanked.

⁵ Before the evaluative ratings, participants completed an affective priming task. However, it was not influenced by any of our variables so it will not be discussed further.

Results

Again, most participants thought the exposure task was designed to influence their explicit evaluation but mentioned that their evaluation was based on colors and frames. None mentioned gazing as a possible source of liking.

Explicit liking

We conducted the same multi-level analysis on liking as in Experiment 1. Only the interaction between gazing condition and gazing-awareness was significant, $F(2, 452) = 9.07, p < .001$ (See Fig. 2). Follow-up analyses of the interaction revealed that for gazing-aware paintings, the gazing effect was significant, $F(2, 244) = 7.18, p < .001$. Specifically, gazed-at paintings ($M = 4.63, SE = .32$) were liked more than neutral ones ($M = 3.85, SE = .33$), $p < .01$, and more than gazed-away paintings ($M = 3.73, SE = .33$), $p < .01$. The latter conditions did not differ. Among gazing-unaware paintings, the omnibus gazing effect was marginal, $F(2, 204) = 2.85, p = .06$. However, none of the means differed significantly, all $ps > .10$ ($M_{gazed-at} = 3.76, SE = .28$; $M_{gazed-away} = 4.33, SE = .26$; $M_{neutral} = 4.36, SE = .27$), and the pattern was in the opposite direction.

We also probed the interaction for each gazing condition. Among gazed-at-paintings, the gazing-awareness effect was significant, $F(1, 149) = 9.72, p < .001$. Aware gazed-at paintings were liked more than unaware gazed-at ones, $p < .001$. For paintings associated with closed eyes, the awareness effect was also significant, $F(1, 148) = 4.16, p < .05$. Aware closed-eyes-paintings were liked less than unaware closed-eyes-paintings. For gazed-away paintings, the awareness effect was also significant, $F(1, 151) = 4.53, p < .04$. Aware gazed-away paintings were liked less than unaware gazed-away ones.

Awareness test: inferences vs. recall

Again, we tested whether participants' memory answers were based on inferences or actual memory, following the same procedure as in Experiment 1. Our liking measure was split into liked and disliked paintings (liked paintings were rated above 4). Memory answers (gazed away = -1; neutral or omitted = 0, gazed-at = 1) were regressed on liking, feeling-gaze consistency, and their interaction. Like in Experiment 1, this analysis revealed the presence of a main effect of liking, $t(461) = 6.28, p < .001$, and a significant interaction between liking and consistency, $t(461) = 7.86, p < .001$. The interaction decomposition confirmed the presence of a significant main effect of liking for consistent feeling-gaze paintings, $t(461) = 8.66, p < .001$, but not for inconsistent feeling-gaze paintings, $t(461) = -1.37, p = .17$.

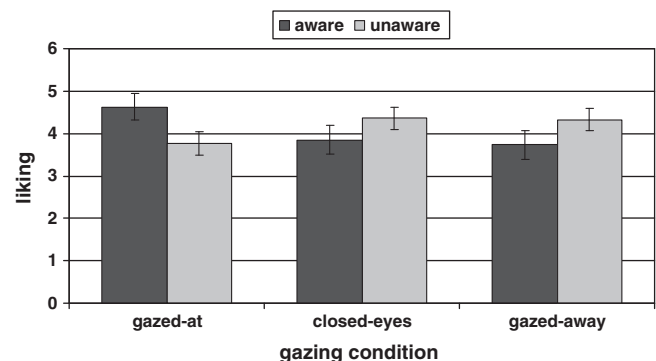


Fig. 2. Picture evaluation as a function of gazing condition and contingency-awareness.

Discussion

Experiment 2 replicates the joint attention effect on liking only for gazing-aware stimuli. Using a recognition awareness test as a way to improve sensitivity, we again found that participants' memory answers were not based on inferences. As a matter of fact, there was no systematic bias in participants' memory answers toward their evaluation of paintings.

Interestingly, we found two additional effects: awareness of gaze-away and of closed-eyes decreased liking of paintings. To our knowledge, this is the first evidence that the perception of others' (negative) attention (i.e., gazed-away or closed-eyes attention) has a negative effect on liking.

General discussion

The aim of these two studies was to examine whether mimetic desire occurs in an implicit manner (i.e., independent of gazing-awareness). In both studies, participants were exposed to a target that closed her eyes or oriented her attention toward or away from a series of paintings. We assessed paintings' evaluation with different measures and measured gazing-awareness with a free recall task in Experiment 1 and with a recognition task in Experiment 2. Mimetic desire emerged for gazed-at-objects, but only when participants were aware of the associated gaze orientation. Object evaluation was measured with a comparative preference task in Experiment 1 and with a rating task in Experiment 2. Mimetic desire consistently emerged for gazed-at objects on both measures (i.e., gazed-at painting were chosen more often and evaluated more positively), but only when participants were aware of the gaze-toward orientation associated to the object.

Both awareness tests seemed to address actual memory and not inferences from evaluation. Indeed, when paintings' evaluation was *not* consistent with the actual gazing behavior, participants did not manifest a memory bias toward their feeling for images. In other words, they did not base their recall or recognition answers on their evaluation of the paintings (e.g., "I like this image, so it must have been gazed at"). These memory tests are thus reliable tools allowing to examining the role of awareness in evaluative effects of joint attention (see also Stahl et al., 2009 in the more specific context of evaluative conditioning).

Interestingly, Experiment 2 revealed the presence of reversed mimetic desire effects. When paintings were gazed-away or associated with closed-eyes and participants were aware of these associations, paintings were liked less than gaze-unaware paintings. That such reversed evaluative effects were observed only in Experiment 2 may suggest that they are more difficult to trigger than positive mimetic desire. Indeed, in Experiment 2 participants were exposed eight times to each association, instead of six in Experiment 1. It is possible that leading people to not like something requires more of a push than leading them to like something.

The gazing effect on mimetic desire echoes the social proof effect. Indeed, we often imitate others' behavior, notably in ambiguous situations (Cialdini, 1993). Others' behavior informs us of appropriate actions, but also of valuable actions. Social proof can be seen as a heuristic at the service of decision making. The moderation effect of gazing awareness on mimetic desire found in this series of studies reinforces the latter idea. Interestingly, in social proof effects, people observe the same behavior in several other persons. Here, participants' evaluation was based on the behavior of only one other person presented several times. Rao, Greve, and Davis (2001) showed that the social proof effect can lead to disappointment, post-decision regrets and abandon in the course of action. Would it be the same with mimetic desire effects? Future research on mimetic desire could thus

benefit from the models of information cascades and test how mimetic desire evolves with time.

The present experiments extend previous research on joint attention and also add to recent work questioning automatic associative learning in attitudes formation (e.g., Shanks, Rowland, & Ranger, 2005; De Houwer, 2009; Mitchell, De Houwer & Lovibond, 2009). More specifically, the present findings suggest that evaluative learning effects observed in mimetic desire paradigms may require that participants pay at least some minimal attention to the gazing in order for this information to be successfully encoded in memory and influence their evaluations. Admittedly, the gazing-awareness measure considered here had a strong memory component and the analyses for the role of gazing-awareness were correlational, precluding strong conclusions about the causal role of gazing-awareness in the evaluative effect.

Regarding the first concern (i.e., reconstructive memory), we found no evidence that our memory measure was contaminated by evaluative biases. As to the second concern (i.e., the correlational nature of the evidence), it would be more convincing to directly manipulate participants' gazing-awareness, for instance by reducing their attentional resources at encoding through the completion of a secondary task. Such strategy has been followed in recent EC research, and actually showed lower awareness and lower EC in conditions of reduced attention (Dedonder et al., 2010; Pleyers et al., 2009), thereby supporting the idea of resource-dependent and conscious processing of CS-US pairings in EC. Yet, such procedure remains ultimately correlational as well, as it is very difficult to secure perfect control over awareness at the item level. In this sense, using subliminal gazing presentations may be an option, although one that also comes with its own problems (e.g., Hollander, 1960).

As a further note of caution, the present experiments found positive evidence that gazing-awareness moderates mimetic desire effects; found positive evidence that mimetic desire effects are observed under conditions of gazing-awareness, and failed to obtain positive evidence that mimetic desire effects may be observed under conditions of gazing-unawareness. The latter possibility might however be supported in studies with considerably more power (e.g., in meta-analytic studies). At this point, we may only conclude that we were unable to find supportive evidence for unconscious mimetic desires. We are admittedly unable to provide positive evidence that unaware mimetic desires are never to be found.

Finally, the present results also advance knowledge about the influence of attention processes on affects. Many studies have examined the influence of affective factors on attention (for a review, see Vuilleumier, Armony, & Dolan, 2003). For instance, previous research showed that emotional stimuli (especially negative) attract and hold attention more than non-emotional or neutral stimuli (e.g., Mogg & Bradley, 1999; Öhman, Lundqvist, & Esteves, 2001). Yet, only a very few studies have dealt with the reversed relation. Fenske and Raymond (2006) were interested in the bidirectional relation between attention and affect. They showed that participants asked to ignore or inhibit certain stimuli during a selective attention task subsequently devalued these stimuli. They proposed that the mental representation first encoded about the ignored stimulus includes the attentional inhibition state. Thus, when encountering the ignored stimulus again, the associated inhibition state is reactivated and leads to devaluating the stimulus. Our results extend these findings by showing that not only our own attentional states but also others' attentional states would be encoded with the stimulus and later retrieved to form affective judgments.

In a nutshell, both negative and positive affects can arise from attention, supporting the idea of bidirectional relation between affect and attention. Future studies should help understand the underlying mechanisms of attention effects on affect.

Appendix A

Item example from the recognition memory test used in Experiment 2.



References

- Adams, R. B., Jr., & Kleck, R. E. (2003). Perceived gaze direction and the processing of facial displays of emotion. *Psychological Science*, *14*, 644–647.
- Baron-Cohen, S., Wheelwright, S., & Jolliffe, T. (1997). Is there a “language of the eyes”? Evidence from normal adults, and adults with autism or Asperger syndrome. *Visual Cognition*, *4*, 311–331.
- Bayliss, A. P., di Pellegrino, G., & Tipper, S. P. (2005). Sex differences in eye gaze and symbolic cueing of attention. *The Quarterly Journal of Experimental Psychology Section A*, *58*, 631–650.
- Bayliss, A. P., Frischen, A., Fenske, M. J., & Tipper, S. P. (2007). Affective evaluations of objects are influenced by observed gaze direction and emotional expression. *Cognition*, *104*, 644–653.
- Bayliss, A. P., Paul, M. A., Cannon, P. R., & Tipper, S. P. (2006). Gaze cueing and affective judgments of objects: I like what you look at. *Psychonomic Bulletin & Review*, *13*, 1061–1066.
- Berridge, K. C., & Robinson, T. E. (2003). Parsing reward. *Trends in Neurosciences*, *26*, 507–513.
- Cialdini, R. B. (1993). *Influence: Science and practice*. New York, NY, US: HarperCollins College Publishers.
- Corneille, O., Mauduit, S., Strick, M., & Holland, R. (2009). Liking products by the head of a dog: Perceived orientation of attention induces valence acquisition. *Journal of Experimental Social Psychology*, *45*, 234–237.
- Corneille, O., Yzerbyt, V., Pleyers, G., & Mussweiler, T. (2009). Beyond awareness and resources: Evaluative conditioning may be sensitive to processing goals. *Journal of Experimental Social Psychology*, *45*, 279–282.
- Dawson, M. E., Rissling, A. J., Schell, A. M., & Wilco, R. (2007). Under what conditions can human affective conditioning occur without contingency awareness? Test of the evaluative conditioning paradigm. *Emotion*, *7*, 755–766.
- De Houwer, J. (2009). The propositional approach to associative learning as an alternative for association formation models. *Learning & Behavior*, *37*, 1–20.
- De Houwer, J., Baeyens, F., & Field, A. P. (2005). Associative learning of likes and dislikes: Some current controversies and possible ways forward. *Cognition & Emotion*, *19*, 161–174.
- Dedonder, J., Corneille, O., Yzerbyt, V., & Kuppens, T. (2010). Evaluative conditioning of high-novelty stimuli does not seem to be based on an automatic form of associative learning. *Journal of Experimental Social Psychology*, *46*, 1118–1121.
- Emery, N. J. (2000). The eyes have it: The neuroethology, function and evolution of social gaze. *Neuroscience & Biobehavioral Reviews*, *24*, 581–604.
- Fenske, M. J., & Raymond, J. E. (2006). Affective influences of selective attention. *Current Directions in Psychological Science*, *15*, 312–316.
- Field, A. P., & Moore, A. C. (2005). Dissociating the effects of attention and contingency awareness on evaluative conditioning effects in the visual paradigm. *Cognition & Emotion*, *19*, 217–243.
- Gast, A., & Rothermund, K. (2011). What you see is what will change: Evaluative conditioning effects depend on a focus on valence. *Cognition & Emotion*, *25*, 89–110.
- Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin*, *132*, 692–731.
- Girard, R. (1987). *Things hidden since then foundation of the world*. : Stanford University Press.
- Hietanen, J. K., Leppänen, J. M., Peltola, M. J., Linna-aho, K., & Ruuhiala, H. J. (2008). Seeing direct and averted gaze activates the approach-avoidance motivational brain systems. *Neuropsychologia*, *46*, 2423–2430.
- Hollander, H. E. (1960). The effect of subliminal stimuli upon perceptual discrimination. *Dissertation Abstracts*, *20*, 4445.
- Hood, B. M., Willen, J. D., & Driver, J. (1998). Adult's eyes trigger shifts of visual attention in human infants. *Psychological Science*, *9*, 131–134.
- Kawakami, K., Phills, C. E., Steele, J. R., & Dovidio, J. F. (2007). (Close) Distance makes the heart grow fonder: Improving implicit racial attitudes and interracial interactions through approach behaviors. *Journal of Personality and Social Psychology*, *92*, 957–971.
- Klucken, T., Kagerer, S., Schweckendiek, J., Tabbert, K., Vaitl, D., & Stark, R. (2009). Neural electrodermal and behavioral response patterns in contingency aware and unaware subjects during a picture-picture conditioning paradigm. *Neuroscience*, *158*, 721–731.
- Lipp, O. V., & Purkis, H. M. (2005). No support for dual process accounts of human affective learning in simple Pavlovian conditioning. *Cognition and Emotion*, *19*, 269–282.
- Mitchell, C. J., De Houwer, J., & Lovibond, P. F. (2009). The propositional nature of human associative learning. *Behavioral and Brain Sciences*, *32*, 183–198.
- 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.
- 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.
- Pleyers, G., Corneille, O., Luminet, O., & Yzerbyt, V. (2007). Aware and (Dis) liking: Item-based analyses reveal that valence acquisition via evaluative conditioning emerges only when there is contingency awareness. *Journal of Experimental Psychology: Learning Memory & Cognition*, *33*, 130–144.
- Pleyers, G., Corneille, O., Yzerbyt, V., & Luminet, O. (2009). Evaluative conditioning may incur attentional costs. *Journal of Experimental Psychology: Animal Behavior Processes*, *35*, 279–285.
- Rao, H., Greve, H. R., & Davis, G. F. (2001). Fool's gold: Social proof in the initiation and abandonment of coverage by Wall Street analysts. *Administrative Science Quarterly*, *46*, 502–526.
- Robinson, T. E., & Berridge, K. C. (1993). The neural basis of drug craving: An incentive-sensitization theory of addiction. *Brain Research Reviews*, *18*, 247–291.
- Rydell, R. J., McConnell, A. R., Mackie, D. M., & Strain, L. M. (2006). Of two minds: Forming and changing valence-inconsistent implicit and explicit attitudes. *Psychological Science*, *17*, 954–958.
- Scaife, M., & Bruner, J. S. (1975). The capacity for joint visual attention in the infant. *Nature*, *253*, 265–266.

- Senju, A., Yaguchi, K., Tojo, Y., & Hasegawa, T. (2003). Eye contact does not facilitate detection in children with autism. *Cognition*, 89, 43–51.
- Shanks, D. R., Rowland, L. A., & Ranger, M. S. (2005). Attentional load and implicit sequence learning. *Psychological Research*, 69, 369–382.
- Stahl, C., Unkelbach, C., & Corneille, O. (2009). On the respective contributions of awareness of US valence and US identity in attitude formation through evaluative conditioning. *Journal of Personality and Social Psychology*, 97, 404–420.
- Tomasello, M. (1999). The human adaption for culture. *Annual Review of Anthropology*, 28, 509–529.
- Vuilleumier, P., Armony, J., & Dolan, R. (2003). Reciprocal links between emotion and attention. In R. S. J. Frackowiak (Ed.), *Human brain function* (pp. 419–444). San Diego: Academic Press.
- Wardle, S., Mitchell, C., & Lovibond, P. (2007). Flavor evaluative conditioning and contingency awareness. *Learning & Behavior*, 35, 233–241.