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Evaluative conditioning leads to differences in the social evaluation of prototypical faces

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ABSTRACT

The majority of social psychological studies using evaluative conditioning have focused on how change is triggered in emotional dispositions to human faces. Our aim was to test whether non-social affective information are transferred from individual faces to composites. We created composites of individual faces which were preceded by pictures with either positive or negative content. We found that the composite made from faces conditioned with high valence images was judged as the more trustworthy. This suggests that in the evaluative conditioning task the valence values of the images that have no social meaning are associated to faces, then transferred to other facial stimuli which share traits with the previously presented faces. Evaluative conditioning, in this way, leads to the emergence of social judgments. Therefore we propose that associative learning and generalization mediate the formation of face-prototypes, a mechanism which may play a central role in the evaluation of unknown faces.

1. Introduction

Evaluative conditioning (EC) has been extensively used to study how the pairing of various types of objects with valenced stimuli changes emotional dispositions and attitudes to such objects, including human faces. The validity of the EC-paradigm has also been demonstrated in social psychological experiments, wherein it was used mainly to explore the nature of attitudinal changes (see Walther, Nagengast, & Trasselli, 2005). In this regard, it has been suggested that the evaluative judgments of an individual are transferred to another person by means of evaluative learning, through a chain of associations (e.g., Baeyens, Eelen, Crombez, & Van den Bergh, 1992). A collection of experiments showed that even partial overlap of facial features—that is physical similarity—can mediate the transfer of valance from known to unknown faces (Andersen & Baum, 1994; Andersen & Chen, 2002; Berk & Andersen, 2000; DeBruine, Jones, Little, & Perrett, 2008; Gawronski & Quinn, 2013; Günaydin, Zayas, Selcuk, & Hazan, 2012; Gyuris, Kocsor, & Bereczkei, submitted; Kocsor, Gyuris, & Bereczkei, 2013; Kocsor, Rezneki, Juhász, & Bereczkei, 2011; Kocsor, Saxton, Láng, & Bereczkei, 2016; Kraus & Chen, 2010; Verosky & Todorov, 2010, 2013). Though the methodology and the theoretical starting points of these experiments were diverse, all aimed at exploring how the evaluation of faces influences the valence (i.e., trustworthiness, attractiveness etc.) of novel, physically resembling faces. In some of these studies (e.g., Gawronski & Quinn, 2013) the type of unconditioned stimuli (US) was a behavioral description, and the associations with the faces used as conditioned stimuli (CS), were acquired in an experimental setting. In other studies (e.g., Kocsor et al., 2016) the negative and positive associations with a face (CS) formed during naturally occurring real life events and the valence values were calculated by measuring the quality of the relationship of the experimental subjects to these personally significant people.

Besides associative learning, we consider generalization as a crucial cognitive process in person perception and in impression formation in particular. Similar to the case of formation of associations, researchers took different approaches to study the generalization of attitudes to people. Some studies tried to capture the generalization of learned attributes of faces by manipulating the resemblance of the used stimuli in various degrees, implicitly assuming that the transfer of valence happens via detection of similarity (e.g., Verosky & Todorov, 2010, 2013). Other studies used composite images to ascertain how formation of associations affects the appeal of facial prototypes. In an experimental setting, using neutral and aversive sounds, Jones and his colleagues (Jones, Debruine, Little, & Feinberg, 2007) demonstrated that the evaluation of composite faces can be influenced by presenting neutral and aversive sounds along with the individual images of which the composites were made. In a similar vein, Kocsor and Bereczkei (2016) paired behavioral descriptions with individual faces, and found that the composite image made from the faces with positive behavioral descriptions was

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rated as more trustworthy than the negative composite. The authors also proposed that the generalization of behavioral information results in the formation of facial prototypes. As prototypes are abstracted from multiple examples of a given category (Perrett et al., 2002), these prototypical faces reflect the average of physical traits which characterize people who show a certain socially relevant behavior.

Being aware of the fact that it is still unsettled what particular cognitive mechanisms are behind face prototype formation, our intention was to test the hypothesis that generalization is one of its means. In cognitive psychological terms, it was implicitly assumed in all of the aforementioned experiments that the affective valence of a face (CS) acquired through conditioning had been generalized to perceptually similar faces. Therefore, our aim was to test the change in the social evaluation of composite faces after an evaluative conditioning task. Though we used an EC paradigm, our goal was not to test the change in the valence of the CS itself. Instead, we focused on the possible social outcome of this conditioning. We aimed at revealing how the valence of USs shape the preference for facial traits shared by both formerly seen faces and composite faces.

In the experiment, individual facial stimuli were preceded by perithreshold images with different values of valence. The subjects were asked to rate the trustworthiness of the composite faces which were made from two subsets of individual facial images. The hypothesis was that the composite which was made of faces previously associated with USs with positive content would be rated on average as more trustworthy than the one made of faces paired with USs with negative content.

2. Methods

2.1. Participants

The data were collected during three semesters by undergraduate students enrolled to a psychology research course. Of the 172 subjects (age: $M = 30.808$, $SD = 13.805$, 18–78 years) participating in the experiment, 63 were male (age: $M = 32.460$, $SD = 13.300$, 18–59 years) and 108 female (age: $M = 29.853$, $SD = 14.060$, 18–78 years). With respect to the sex of the stimuli, 112 subjects (73 females) viewed male faces while 60 (36 females) viewed female faces. The data were collected in two turns by two independent experimenters (64 and 54 subjects, respectively). The procedures were identical except the evaluation phase (see the Procedure section).

2.2. Stimuli

From an image pool collected for a previous experiment, ten male and ten female faces with average attractiveness were retrieved. For the preliminary assessment of the individual faces 30 volunteers (between 20 and 24 years, 15 females) were recruited, to whom altogether 80 individual facial images were presented. They were asked to rate these from 1 (not attractive at all) to 5 (very attractive). The images which were the closest to the mean score of their sex, were chosen as averagely attractive. The age of the individuals on the photos falls between 19 and 24.

Both male and female pictures were randomly divided into two subsets. Of the five images in the subsets, four composite faces (two male, two female Figs. 1–2) were made using *Psychomorph*. The resulting composites reflect an average of the facial features of the individual images of which they were made (see Tiddeman, Burt, & Perrett, 2001; Tiddeman, Stirrat, & Perrett, 2005 for a detailed description of the method).

Two image types were chosen from the International Affective Picture System (IAPS) (Lang, Bradley, & Cuthbert, 2008): color images with arousal (intensity) values above 6 and with valence (pleasantness) values either above 6 or below 4. As these were intended to be used as unconditioned stimuli with possibly moderate social relevance, only those images which depicted no faces—or, at least, the facial features were unrecognizable—were deemed appropriate (see Appendix A, Figs 5 and 6). Altogether 10 pictures were selected, 5 for each valance category.

Fig. 1. Composite male faces, each made of five individual facial images. Note that the two sets of faces were randomly assigned to positive and negative pictures, thus the eventual difference in the a priori trustworthiness of the composites did not influence the results.

2.3. Procedure

The experiment consisted of two phases. The *attentional phase* had three blocks. In the first block, a fixation cross appeared for 2000 ms, followed, firstly, by one of the IAPS images (US) for 200 ms and, secondly, by one of the individual facial images (CS) for 2000 ms. With these presentation times we wanted to ensure that the images used for conditioning are clearly above the threshold necessary for conscious processing, but subtle enough not to turn the participants attention away from the facial images. Each face/IAPS pairs were shown in the above mentioned sequence. The presentation of the US and the CS were then repeated twice in the following two blocks. The US images were randomly assigned to one of the individual faces, but the US/CS pairings remained unchanged during all presentations. The order of the pairs were randomized within the blocks. To ensure that eventual differences in the trustworthiness of the stimuli faces would not influence the results, the images in the first face set were preceded by unpleasant (low valence) images for approximately half of the subjects (n = 89), while the other half saw the same faces with pleasant (high valence)

Fig. 2. Composite female faces, each made of five individual facial images. Note that the assignment of the image subsets was made randomly.