What can evaluative learning tell us about implicit learning?

Robert A.P. REUTER & Axel CLEEREMANS

Cognitive Science Research Unit, Université Libre de Bruxelles, Belgium

INTRODUCTION

What is Evaluative Learning?

Evaluative Learning (EL) can be defined (see De Houwer et al., 1997) as the transfer of affective value from one stimulus to another, resulting from their mere contingent (e.g., visual) presentation. Typically, an affectively neutral stimulus (NS) is paired with a (strongly) liked or disliked stimulus (associated stimulus or AS). This "causes" the NS to acquire the same affective valence as the AS it was paired with, while the valence of NSi paired with other NSi remains unchanged. EL has been characterised as a "Contamination by Contact" phenomenon.

What are the advantages of this paradigm for research on Implicit Learning (IL)?

Learning is truly incidental because Ss are not instructed to explicitly learn stimulus pairs. Further, Baeyens et al. (1992) have shown that EL seems not to be influenced by Ss having explicit knowledge of the NS-AS contingencies. Thus, EL appears to be a promising experimental paradigm for the study of IL phenomena in terms of associative learning. In addition, EL involves learning of numerous simple associations of semantically and emotionally relevant stimuli, while other IL paradigms involve a single complex rule (e.g., an artificial grammar) implemented in rather artificial and arbitrary stimuli. EL also seems to be resistant to the general criticism addressed at IL studies on grounds of their failing to meet information and sensitivity criteria. There are actually no correlated rules Ss could rely on; hence direct and indirect measures are likely to reflect the same kind of (associative) knowledge. Contingency awareness can be measured for each stimulus pair and compared to the corresponding evaluative shift.

What is the aim of the present study?

In a previous study (Reuter & Cleeremans, 2000) we had failed at replicating Baeyens et al.'s (1998) ELstudy. We observed no evaluative shifts of NSi at all. This led us to examine EL in the light of a recent alternative account. Field et al. (1999), have indeed shown that evaluative shift depends on perceptual similarity of NSi to exemplars of either positive or negative stimuli rather than on their temporal association. In the present study, we aimed to measure perceptual similarity on an individual and per stimulus pair basis in order to directly assess whether evaluative shifts depend on PERCEIVED similarity between NSi with liked/disliked ASi.

MATERIAL and METHOD

Subjects. 18 students from the ULB participated for a small fee. Each subject was tested individually.

Material. 70 pictures of human faces (35 male and 35 female faces) were used as stimulus material. They varied in content and form (age, colour palette, size, orientation). Stimulus dimensions were set to 276 x 208 pixels.

Procedure. Our experimental procedure was based on EL studies conducted by Baeyens et al. (1988).

Stage 1 - Baseline Assessment: Ss were presented with 70 randomly ordered images of human faces with a rating scale positioned on the right. The scale ranged from -100 (dislike) through 0 (neutral) to +100 (liked), in intervals of 10. Ss were instructed to give their spontaneous affective evaluation (ER1) of the human faces by pointing the mouse cursor at the scores on the scale and then clicking. After giving task instructions, the experimenter left the room, so that Ss would rate the faces unobserved.

Stage 2 - Acquisition: The 6 (2 x 3) pictures that had received the highest and lowest baseline scores were used as Best (B) and Worst (W) stimuli respectively. The 18 pictures that were evaluated closest to 0 were used as Neutral stimuli (NSi). 12 stimulus pairs (6 Neutral-Neutral, 3 Neutral-Liked, 3 Neutral-Disliked) were constructed by randomly assigning an NS to an NS (N1-N2), B (NB-B) or W (NW-W). Each stimulus pair was shown 10 times in random order. Ss were told to attend to the centre of the computer screen were they would see pairs of human faces, sequentially presented, and to evaluate the perceptual similarity of the face pairs on a 7-point Likert scale.

Stage 3 - Post-Acquisition Assessment: Finally, Ss were told to give their current, spontaneous affective evaluation of the whole set of 70 pictures again, using the same response system as in stage 1. This measure is called ER2.

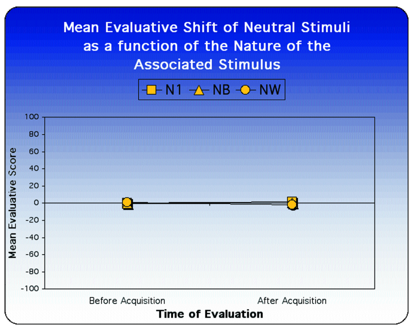
Henceforth, we will use the following labels:

NB: neutral stimuli followed by best stimuli NW: neutral stimuli followed by worst stimuli N1: neutral stimuli followd by neutral stimuli	B: best stimuli following NB W: worst stimuli following NW N2: neutral stimuli following N1 stimuli

RESULTS

For each stimulus Pair Type (NSi associated with W, N2 and B) mean evaluative responses were calculated, i.e., ER1 and ER2. Statistics were computed on mean evaluative shifts (ER2-ER1) by Pair Type (N1, NB and NW). In addition to the analysis of Evaluative Shifts of NSi, we computed the Mean Evaluative Shifts for ASi (N2, B and W) as well.

Figure 1

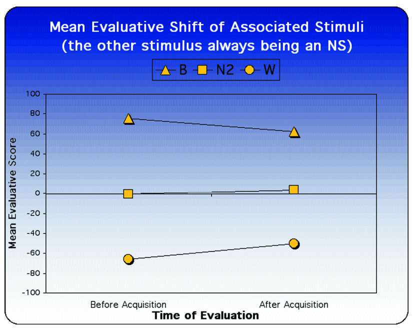


Results in **figure 1** clearly show that no evaluative shift in NSi occurs as a function of the nature of the associated stimulus.

Data in **figure 2** display a pattern of "reduction-to-the mean" for Best and Worst liked stimuli from ER1 to ER2. The slight increase in evaluative valence for NSi (N1 and N2) is likely to reflect a "mere exposure effect" (Zajonc, 1986), i.e., repeated exposure of a stimulus leading to increased liking for it.

Based on Field's (1999) account of evaluative shift resulting from perceptual similarity between NSi and exemplars of the Best and Worst categories, we analysed evaluative shift data as a function of perceptual similarity.

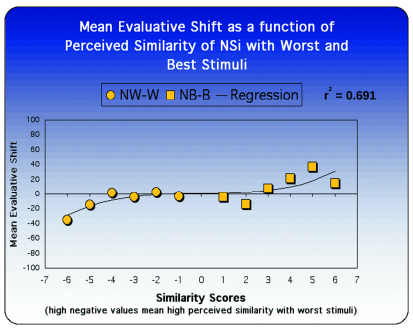
Figure 2



If we merely assume that mean evaluative shift is linked to PS by a monotonically increasing function, it makes sense to recode 1-7 Likert-scale scores into "-7" to "+7" scores, such that PS scores of NSi associated with Worst stimuli are negative while PS scores of NSi associated with Best stimuli are positive. Increasing absolute values of the PS scores reflect the strength of expected evaluative shifts, and their sign reflects the direction of expected shifts. For neutral stimuli PS scores were all set to 0, since similarity between N1 and N2 could not be expected to give rise to consistent evaluative shifts.

Figure 3 separately plots evaluative shifts against perceived similarity for NW, N1 and NB stimuli. Although high mean similarity scores for all types of stimulus pairs are rather infrequent (only 18.1% of |PS| scores are above 4, while 43.5% are below 2), we observe a general tendency for evaluative shifts to be consistently related to perceived similarity of NSi with their associated stimulus (see regression data on figure 3).

Figure 3



DISCUSSION

Our results, in accordance with Field et al.'s (1999), suggest that evaluative learning effects - if they are observed - may be explained as the result of nonassociative artifacts inherent to the stimulus material and the common lack of control for similarity between associated stimuli. Moreover, our measures of the similarity structure of our current stimulus material (high ratings were rather infrequent) may give us a hint at why our previous and present study failed to replicate the classic associative evaluative shift results.

Our data thus sharply contrast with those of Baeyens et al. (1989) concerning the influence of perceptual similarity/dissimilarity on evaluative learning. However, we think that our direct measures of perceived similarity of the associated stimuli and their demonstrable effect on evaluative shifts, taken together with Field et al's (1999) results suggest that evaluative shifts are more likely to correspond to a "generalise - to - close - neighbours" than a "contamination - by - contact" phenomenon. Field et al. (1999) did observe conditioning-like effects with neutral stimuli that, for statistical analysis, were considered to be "coupled" to either positive or negative stimuli by perceptual similarity, while actually never presented together with these very stimuli. Future research is necessary to further distinguish between the proposed opposing hypotheses about the nature of evaluative learning mechanisms. We have shown that measuring similarity of stimulus pairs represents an appropriate but incomplete way to do so. We thus propose to design experimental conditions that go beyond the traditional EL paradigm, where Ss are not asked their own evaluations of stimuli, but rather have to learn a "pretend" person's more-or-less complex criteria for liking/disliking faces. This should enable us to exert better control on similarity-based vs. association-induced learning of evaluative responses to novel items.

CONTACT

Robert Reuter
rreuter@ulb.ac.be

Axel Cleeremans
axcleer@ulb.ac.be

Cognitive Science Research Unit
Université libre de Bruxelles
Belgium

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