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## Changing prejudice with evaluative conditioning

**Abstract:** The presented study investigates attitude change using a cross-modal evaluative conditioning (EC) paradigm. EC is a change in evaluative responses towards initially neutral stimulus (CS) due to its repeated pairing with affectively valenced stimulus (US). A positive scent of instant chocolate (US+) was used together with pictures of homeless people (US-) to change affective responses towards neutral names (CS). We show that a classic EC effect, i.e. more negative CS evaluations after its pairing with negative images of the homeless, can be eliminated when a competitive US, i.e. a positive chocolate scent, is present in the environment. Additionally, the study demonstrates chocolate scent selectively increased attitude towards homeless as measured by perceived distance to self and a self-report questionnaire. Moreover, this effect was not mediated by mood changes. We argue that scents can be used to change attitudes towards stigmatized groups.

**Key words:** evaluative conditioning, attitude change, prejudice, odor

### Reducing prejudice towards homeless through US competition in evaluative conditioning

Attitude acquisition and change has long been one of the most important topics in social psychology and social cognition (Petty, Wegener, & Fabrigar, 1997; Gawronski & Bodenhausen, 2006). Attitudes regulate our behaviors not only in social contexts, but also when we consider political, health or consumer choices, among many others. Therefore, understanding attitude formation and change is a key to understanding human behavior in general.

One of the recent proposals concerning the mechanisms of both attitude acquisition and change with a focus on affective responses is evaluative conditioning (EC). EC is a change in evaluation of an initially neutral object (a conditioned stimulus – CS) due to its previous pairing with either positive or negative stimulus (an unconditioned stimulus – US) (see Bar-Anan, De Houwer, & Nosek, 2010; De Houwer, Thomas, & Baeyens, 2001). Evaluative conditioning works virtually for any kind of stimuli both within (Walther, 2002; Balas & Sweklejs, 2012) and between modalities (Wardle, Mitchell, & Lovibond, 2007; Baeyens, Vansteenwegen, Hermans, & Eelen, 2001). More importantly, successful conditioning of evaluative

responses has been shown also for odors. Razran (1954) showed that pairing a negative odor with neutral political slogans decreased the evaluation of the latter. Positive and negative odors have also been shown to either increase or decrease evaluations of faces and goods (e.g. Wrzesniewski, McCauley, & Rozin, 1999; Hermans, Baeyens, Lamote, Spruyt, & Eelen, 2005) as well as abstract paintings (van Reekum, van den Berg, & Frijda, 1999) paired with them. Also, Todrank, Byrnes, Wrzesniewski, and Rozin (1995) showed that odors can change evaluations of neutral humans faces and Stevenson, Boakes, and Wilson (2000) demonstrated that those effects are resistant to extinction. Those studies provided convergent evidence that odors can transfer their affective valence to neutral objects including people.

By definition and for methodological clarity, most of the EC research uses initially neutral stimuli to show attitude formation and change (see Bar-Anan et al., 2010). However, EC may also be considered as one of the basic and simplest mechanisms of changing pre-existing attitudes. The existing literature on US revaluation effect, albeit not using olfactory stimuli, suggests that EC might be involved in changing already formed attitudes by means of modifying the valence of the US that originally conditioned

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the affective response towards a given CS (e.g. Walther, Gawronski, Blank, & Langer, 2009; Baeyens, Eelen, Vandenberg, & Crombez, 1992). However, CSs used in those studies are initially neutral and attitudes towards them are experimentally created (by pairing them with USs).

This leaves the doors open for speculations about real-life attitudes that may be more resistant to change. Only few studies have directly addressed this issue. For example, Olson and Fazio (2006) showed successful reduction of implicit, but not explicit, prejudice towards Black individuals due to their repeated pairing with positive stimuli (words and pictures) which was not accompanied by memory for presented contingencies. Further, the effect appeared durable as it was found to be present two days after acquisition.

In this paper we take this issue a bit further. Namely, we investigate whether odors can influence already formed attitudes. The research so far has never addressed the question of changing prejudice through pairing the attitudinal object with affectively valenced odors. Therefore, we want to close this gap and contribute to the field by showing that scents can shape evaluative responses towards social objects with pre-existing attitudes. We have chosen the group of homeless as one that is negatively evaluated in most Western societies (Toro et al., 2007; Wrzesniewski et al., 1999). Additionally, our pretest data indicated that a negative odor was most frequently associated with homelessness (poverty ranked the second) showing a negative odor as an attitude-relevant feature. Therefore we expected that changing this association (i.e. homeless – negative odor) is most likely to influence how people evaluate the homeless. We decided to use a scent of chocolate as it has been shown to be almost unanimously positively evaluated (Cupchik, Phillips, & Truong, 2005). Therefore, a chocolate scent induces positive affective responses that can be used as an US in context of evaluative conditioning.

We hypothesize that pairing pictures of the homeless (US-) with neutral names (CS) should decrease CS evaluations (a classic EC effect). However, in experimental group where we introduce a chocolate scent (US+), a negative influence of US- on CS should be counteracted by an additional influence of a positive olfactory stimulus resulting in the reduction, or even reversal, of EC effect produced by pairing pictures of the homeless with names. Secondly, we expect that repeated exposure to homelessness depicted on pictures accompanied by a positive scent of chocolate will lead to an increase in attitude towards homeless measured by a questionnaire and the Psychological Distance Scale.

## Method

### Participants

Forty-four students (27 female and 27 male) from Warsaw University participated in this experiment with no compensation. Their age ranged between 19 and 28 years ( $M = 23.37$ ,  $SD = 2.19$ ). They were randomly assigned to

either experimental (chocolate scent) or control (no scent) group.

### Materials and Procedure

**Stimuli.** Eight pre-tested neutral Polish names (4 male and 4 female) served as CSs. Also, four pictures of the homeless (2 male and 2 female) as well as pictures of averagely attractive by-passers (2 male and 2 female) were used as USs (US1). Pictures were taken from various free photo depositories on the Web. The aroma of chocolate (US2) was diffused in an experimental room by dissolving dark instant chocolate (net weight 30 g) in 200 ml of hot water. One mug with liquid chocolate was prepared approximately every 30 minutes and placed behind the computer screen in such a way that it was impossible to be seen by the participants.

**Attitudes Towards Homeless Questionnaire.** A paper-and-pencil *Attitudes Towards Homeless Questionnaire* (ATHQ) was developed to measure participants' explicit attitudes towards homeless. The ATHQ contained 14 questions with the overall reliability of Cronbach's  $\alpha = .87$ . It contained statements describing individual beliefs about the homeless (for example, *I believe the homeless deserve their fate* or *I am readily supporting homeless people with some money*) and participants had to evaluate to what extent they share those beliefs on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The ATHQ was divided into two equal 7-questions sets – A and B (Cronbach's  $\alpha = .81$  and  $.83$ , respectively) – that were randomly administered before or after the experimental manipulation.

**Psychological Distance Scale.** A *Psychological Distance Scale* (PDS) was used as an assessment of attitudes. On each PDS trial participants had to locate themselves on a scale representing a subjective distance between self and the name displayed above the scale. The scale was represented as a 15 cm black horizontal line located centrally on a computer screen and labeled „*very close*“ on the left end and „*very distant*“ on the right one. The scale was divided into 50 equal segments. Responses were given by clicking on the scale. A DV was a distance in segments between left-hand side and a clicked segment.

**Mood Scale.** To measure mood we adopted an adjective scale from Ohme (1997) that contains 12 positive and 12 negative adjectives describing either positive or negative affective states (e.g. HELPLESS as negative, and SATISFIED as positive). Participants rated how well each of these adjectives described their current emotional state using a 5–point Likert scale. The reliability of the mood measure as assessed with Cronbach's alpha was satisfactory (.92). Because mood was measured twice during the experiment the whole scale was randomly divided into two equal sets 6 positive and 6 negative items. The sets' administration within experiment was randomized.

**Procedure.** Participants were tested individually. After completing a mood scale and the ATHQ in Room 1 they were asked to follow the experimenter to Room 2 where the chocolate scent was diffused for experimental group participants. They were seated in front of a standard PC with a 15-inch display and asked to follow on-screen instructions. Each trial of the conditioning phase started with 1000 ms fixation point followed by a CS–US1 presented together for 1000 ms. CS–US1 pairings were randomly assigned on a participant basis and presented 7 times in a randomized order making altogether 56 trials. Upon presentation completion participants were again guided to Room 1 and instructed to fill in a mood scale, the ATHQ, and the PDS. Next, a post-experimental open-ended questionnaire measuring demand awareness was administered and participants were debriefed, thanked, and dismissed.

## Results

### Awareness Check

A post-experimental questionnaire revealed that three out of 21 participants in the experimental group spontaneously reported detecting chocolate scent in a laboratory room. However, none of them explicitly stated this as a manipulation or linked it to any of the experimental features including hypotheses. Therefore, all results were included in the analyses.

### Mood

A 2 (Mood Measurement: before vs. after manipulation) x 2 (Group: experimental vs. control) mixed-design ANOVA revealed main effect of mood measurement,  $F(1, 42) = 8.78, p < .01, \eta^2 = .17$ . The average mood decreased after the study ( $M = 3.45$ ) compared to before manipulation ( $M = 3.65$ ). At the same time, both main effect of group,  $F(1, 42) = .81, p = .37, \eta^2 = .02$ , and the interaction between Measurement and Group,  $F(1, 42) = 1.13, p = .29, \eta^2 = .03$ , failed to reach statistical significance. Mood did not correlate significantly with neither measurement of attitudes. Also, there were no significant correlations between attitude measures (all  $ps > .05$ ) therefore we report them separately.

### Attitudes Towards Homeless Questionnaire

A similar analysis in a 2 (Questionnaire Measurement: before vs. after conditioning) x 2 (Group: experimental vs. control) mixed-design ANOVA did not show neither main effect of group,  $F(1, 41) = .87, p = .36, \eta^2 = .02$ , nor main effect of the measurement,  $F(1, 41) = 2.36, p = .14, \eta^2 = .05$ . However, as predicted, both factors interacted significantly,  $F(1, 41) = 8.18, p < .01, \eta^2 = .17$  (see Figure 1). It occurs that the difference between control and experimental group was not significant before conditioning,  $F(1, 41) = .21, p = .65, \eta^2 = .01$  ( $M_{\text{cont}} = 4.40$  and  $M_{\text{exp}} = 4.31$ ), whereas it reached statistical significance after conditioning,  $F(1, 41) = 3.89, p < .05, \eta^2 = .11$  ( $M_{\text{cont}} = 4.28$  and  $M_{\text{exp}} = 4.73$ ). Additionally, the attitude did not change after conditioning in a control group,  $F(1, 20) = 1.49, p = .24, \eta^2 = .09$ , as compared with its measurement before the conditioning. However, the attitude did increase in an experimental group,  $F(1, 21) = 7.11, p < .05, \eta^2 = .25$ .

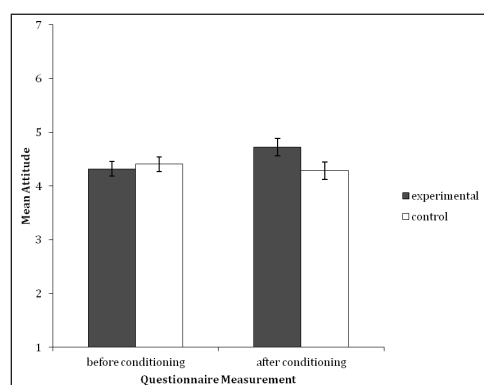


Figure 1. Mean attitude measured with the Attitude Towards Homeless Questionnaire as a function of group and time of measurement. Whiskers represent standard error.

### Psychological Distance Scale

We analyzed mean distances between self and conditioned names in a 2 (US Picture: homeless vs. average) x 2 (Group: experimental vs. control) mixed-design ANOVA. It yielded a significant effect of US picture,  $F(1, 42) = 8.58, p < .01, \eta^2 = .17$ . Participants estimated their personal distance towards names paired with pictures of homeless people as further ( $M = 16.51$ ) than names paired with standard pictures ( $M = 13.07$ ). Although the effect of group was not significant,  $F(1, 42) = 1.08, p = .30, \eta^2 = .03$ , there was a predicted significant interaction between the factors,  $F(1, 42) = 11.26, p < .01, \eta^2 = .21$  (see Figure 2). Further analyses revealed that the experimental group estimated the distance towards names presented with pictures of homeless significantly shorter ( $M = 13.76$ ) than the controls ( $M = 19.26$ ),  $F(1, 42) = 9.96, p < .01, \eta^2 = .19$ . However, the above difference failed to reach statistical significance in case of names paired with pictures of average by-passers,  $F(1, 42) = 1.34, p = .25, \eta^2 = .03$  ( $M_{\text{cont}} = 11.88$  and  $M_{\text{exp}} = 14.26$ ). Additionally, within group comparisons showed a significantly greater distance from names paired with homeless people than names associated with average individuals in a control group,  $F(1, 21) = 27.45, p < .001, \eta^2 = .57$ , but not in an experimental group,  $F(1, 21) = .07, p = .79, \eta^2 = .003$ .

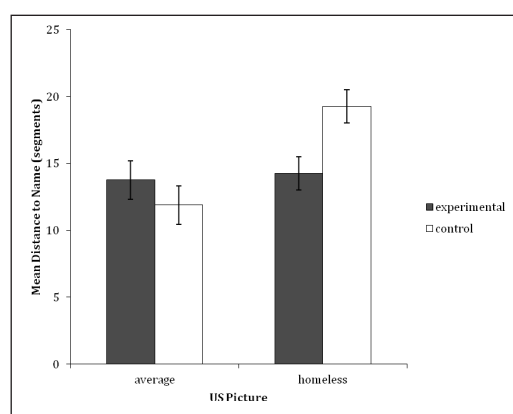


Figure 2. Mean distance to conditioned names (CSs) as a function of US picture (average vs. homeless) and group. Whiskers represent standard error.

## Discussion

In this paper we show, using two different measures, that attitude towards homeless can be changed using a positive scent of chocolate. Additionally, we demonstrate that this effect cannot be attributed to mood changes. More importantly, our study shows that the expected EC effect (i.e. more negative evaluations of names repeatedly presented with images of homeless) can be counteracted by a positive affect associated with chocolate scent (US+). Namely, the distance between self and the names representing homeless increased indicating more negative evaluations in a control group, whereas it did not change when a positive scent of chocolate was present. We also demonstrated that the presence of chocolate scent made participants' reported attitudes towards homeless more positive. Therefore, our study extends previous reports showing counterconditioning of prejudice only on implicit measures (Olson & Fazio, 2006).

One criticism of this study would address demand characteristics. Namely, the results might have been affected by demand awareness. Firstly, only 3 (out of 21) participants have spontaneously reported detecting the chocolate smell. Nevertheless, none of them related this scent to any experimental variables or hypotheses. Therefore, being aware of chocolate odor can be ruled out as potential confound to the results. Secondly, even if participants were aware of the US manipulation – i.e., presenting some names with homeless pictures, whereas some others with neutral pictures – this would result in more negative evaluations of the former CSs as a demand effect. As there was no difference, we may conclude that either there were no demand effects associated with US manipulation, or that possible demand effects were nevertheless overridden by the presence of chocolate scent.

One could also argue that more positive attitude after conditioning can be attributed to mere exposure of the pictures depicting homelessness (see Zajonc, 2000). If this was true we should observe increased attitudes in control group as well. As such an increase was absent, we argue that this was indeed a positive scent of chocolate that specifically increased evaluations of the homeless.

Yet another alternative explanation refers to an implicit misattribution of affect account of evaluative conditioning (Jones, Fazio, & Olson, 2009). This account assumes that an affective response elicited by the US is implicitly attributed to a given CS. In our case, there are two sources of affective responses: the pictures of the homeless and a chocolate odor. If they are both implicitly attributed to a CS they should cancelled each other out in case of names presented with both affective sources (i.e. chocolate scent and homeless picture), but increase the evaluation of names presented with neutral pictures. It was not the case since the impact of scent on names evaluations worked selectively for names associated with the homeless leaving the other names unaffected. Thus, we can rule out implicit misattribution of affect account as well.

We argue that the selective impact of chocolate scent on attitudes towards homeless can be attributed to

match between participant's beliefs about homeless and the modality of manipulation. They were activated twice – when participants filled in a questionnaire measuring their attitude towards homeless and during the presentations of pictures depicting them. The activated beliefs likely included those addressing olfactory sensations because the concept of homeless is strongly associated with a negative odor. The manipulation that addressed the same modality (i.e., olfaction) was effective as the activated association between bad smell and homelessness was confronted with the experience of a positive scent of chocolate. As the structure of beliefs and associations changed due to the presence of a positive scent, this increased evaluations of the target group. Therefore, we argue that effective changes of prejudice requires deliberate interventions in the structure of associations behind negative evaluations of prejudiced groups or individuals.

## References

- Baeyens, F., Eelen, P., Vandenberg, O., & Crombez, G. (1992). The content of learning in human evaluative conditioning - acquired valence is sensitive to us-revaluation. *Learning and Motivation, 23*(2), 200-224. doi: 10.1016/0023-9690(92)90018-h
- Baeyens, F., Vansteenwegen, D., Hermans, D., & Eelen, P. (2001). Human evaluative flavor-taste conditioning: Conditions of learning and underlying processes. *Psychologica Belgica, 41*(4), 169-186.
- Balas, R., & Sweklej, J. (2012). Evaluative conditioning may occur with and without contingency awareness. *Psychological Research, 76*(3), 304-310. doi: 10.1007/s00426-011-0336-5
- Bar-Anan, Y., De Houwer, J., & Nosek, B. (2010). Evaluative conditioning and conscious knowledge of contingencies: A correlational investigation with large samples. *The Quarterly Journal of Experimental Psychology, 63*(12), 2313-2335. doi: 10.1080/17470211003802442
- Cupchik, G. C., Phillips, K., & Truong, H. (2005). Sensitivity to the cognitive and affective qualities of odours. *Cognition & Emotion, 19*(1), 121-131. doi: 10.1080/0269993044100011
- De Houwer, J., Thomas, S., & Baeyens, F. (2001). Associative learning of likes and dislikes: A review of 25 years of research on human evaluative conditioning. *Psychological Bulletin, 127*(6), 853-869. doi: 10.1037/0033-2909.127.6.853
- Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin, 132*(5), 692-731. doi: 10.1037/0033-2909.132.5.692
- Hermans, D., Baeyens, F., Lamote, S., Spruyt, A., & Eelen, P. (2005). Affective priming as an indirect measure of food preferences acquired through odor conditioning. *Experimental Psychology, 52*(3), 180-186. doi: 10.1027/1618-3169.52.3.180
- Jones, C. R., Fazio, R. H., & Olson, M. A. (2009). Implicit misattribution as a mechanism underlying evaluative conditioning. *Journal of Personality and Social Psychology, 96*(5), 933-948. doi: 10.1037/a0014747
- Ohme, R. K. (1997). Social comparison of misfortune: Companions in misery phenomenon. *Polish Psychological Bulletin, 28*(2), 189-201.
- Olson, M. A., & Fazio, R. H. (2006). Reducing automatically activated racial prejudice through implicit evaluative conditioning. *Personality and Social Psychology Bulletin, 32*(4), 421-433. doi: 10.1177/0146167205284004
- Petty, R. E., Wegener, D. T., & Fabrigar, L. R. (1997). Attitudes and attitude change. *Annual Review of Psychology, 48*, 609-647. doi: 10.1146/annurev.psych.48.1.609
- Razran, G. (1954). The conditioned evocation of attitudes (cognitive conditioning?). *Journal of Experimental Psychology, 48*(4), 278-282.
- Stevenson, R. J., Boakes, R. A., & Wilson, J. P. (2000). Resistance to extinction of conditioned odor perceptions: Evaluative conditioning is not unique. *Journal of Experimental Psychology-Learning Memory and Cognition, 26*(2), 423-440. doi: 10.1037/0278-7393.26.2.423

- Todrank, J., Byrnes, D., Wrzesniewski, A., & Rozin, P. (1995). Odors can change preferences for people in photographs: A cross-modal evaluative conditioning study with olfactory USs and visual CSs. *Learning & Motivation, 26*, 116-140.
- Toro, P. A., Tompsett, C. J., Lombardo, S., Philippot, P., Nachtergaeel, H., Galand, B., . . . Harvey, K. (2007). Homelessness in Europe and the United States: A comparison of prevalence and public opinion. *Journal of Social Issues, 63*(3), 505-524. doi: 10.1111/j.1540-4560.2007.00521.x
- van Reekum, C. M., van den Berg, H., & Frijda, N. H. (1999). Cross-modal preference acquisition: Evaluative conditioning of pictures by affective olfactory and auditory cues. *Cognition & Emotion, 13*(6), 831-836.
- Walther, E. (2002). Guilty by mere association: Evaluative conditioning and the spreading attitude effect. *Journal of Personality and Social Psychology, 82*(6), 919-934. doi: 10.1037//0022-3514.82.6.919
- Walther, E., Gawronski, B., Blank, H., & Langer, T. (2009). Changing likes and dislikes through the back door: The us-revaluation effect. *Cognition & Emotion, 23*(5), 889-917. doi: 10.1080/02699930802212423
- Wardle, S. G., Mitchell, C. J., & Lovibond, P. F. (2007). Flavor evaluative conditioning and contingency awareness. *Learning & Behavior, 35*(4), 233-241. doi: 10.3758/bf03206429
- Wrzesniewski, A., McCauley, C., & Rozin, P. (1999). Odor and affect: Individual differences in the impact of odor on liking for places, things and people. *Chemical Senses, 24*(6), 713-721. doi: 10.1093/chemse/24.6.713
- Zajonc, R. B. (2000). Feeling and thinking: Closing the debate over the independence of affect. In J. Forgas (Ed.), *Feeling and thinking: The role of affect in social cognition* (pp. 31-58). New York: Cambridge University Press.