# Smelling how to feel: Does ambient odor affect How we evaluate emotional stimuli?

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## BACKGROUND

- Olfaction is strongly related to affective processing

  - Odor-evoked memories carry a particularly strong affective component, as compared to other sensory modalities (Herz, Eliassen, Beland, & Souza 2004).

  - The presence of pleasant or unpleasant ambient odor can influence self-reported mood ratings (Knasko 1992; 1995)

  - Odors have been shown to influence people's preferences for people (Todrank, Byrnes, Wrzesniewski, & Rozin, 1995), as well as commercial products (Bone & Ellen, 1999; Bone & Jantrania, 1992).

- Crossmodal neural connectivity occurs between vision and olfaction, with odor modulating attentional processing of visual cues (Seigneuric, Durand, Jiang, Baudouin, & Schaal, 2010).

- No study, to our knowledge, examined how olfaction could impact affective evaluation of visual stimuli, nor considered the relationship between odor's impact on mood and affective evaluation.

- Thus, the purpose of this study is to investigate whether the presence of a pleasant or unpleasant odor can affect self-reported mood as well as affective ratings of emotionally-charged visual stimuli.

  - We hypothesize that self-reported mood and ratings of images will change depending on the odor presented, and that the changes image ratings are mediated by changes in mood.

  - Sex effects will also be considered, as there is evidence of sexual dimorphism in olfaction for humans (Doty & Cameron, 2009).
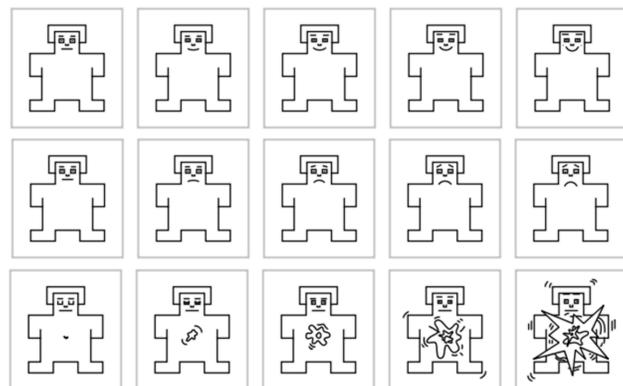


**Figure 1.** Self-Assessment Manikins (SAM) for pleasantness (top), unpleasantness (middle), and arousal (bottom)

## METHODS

**Sample**
- Participants are recruited from the student population at the University of Dayton using SONA. A total of 160 participants will be recruited. Data collection is ongoing.

**Materials & Measures**
- **International Affective Picture System** (IAPS; Lang, Bradley, & Cuthbert, 2008): participants are presented with a total of 60 images that have been previously rated as having positive, negative, or neutral emotional valence. Each participant are presented with the same images, evenly divided between positive, negative, and neutral images, in a random order **(Figure 2, bottom right)**.

- **Ambient Odor:** During the experiment, participants are either exposed to a pleasant odor (sweet orange essential oil), an unpleasant odor (clove oil), or no odor (control). Odor is delivered via diffuser.

- **Self-Assessment Manikins** (SAM; Bradley & Lang, 1994): Ratings of pleasantness, unpleasantness, and intensity for the images and odor manipulation are assessed using three five-point unipolar pictorial representation scales **(Figure 1, bottom left)**.

- **Positive and Negative Affect Schedule** (PANAS; Watson, Clark, & Tellegen, 1988): Participants complete this scale as part of the pre-experiment survey and the experimental session, which is designed to assess current emotional state. Both the positive affect scales and negative affect scales have been found to have good consistency (PA: $\alpha$ = .89, NA: $\alpha$ = .85), as well as decent test-retest reliability (PA: $\alpha$ = .54, NA: $\alpha$ = .45).

- **Affective Impact of Odor Scale** (AIO; Wrzesniewski, McCauley, and Rozin, 1999): How much participant's liking of new things are affected by odor are rated using this scale. Each item has participants rate how often odors impact their liking and disliking of new foods, places, products, and people on a four-point scale. This scale was found to have acceptable internal reliability ($\alpha$ = .73).

**Procedure**
- Participants are initially asked to complete a demographic questionnaire, the PANAS, and the AIO.

- Once they have completed all questionnaires, participants complete a computer task where they are presented with 30 IAPS images and rate each image for pleasantness, unpleasantness, and intensity.

## METHODS (CONT.)

**Procedure (cont.)**
- Upon completing the first computer task, participants are asked to relocate to another room. This room is prepared with one of the ambient odors or no odor, depending on condition.

- While in this room, participants complete a distraction task and the PANAS again.

- Next, they will complete a second computer task where they will rate 60 IAPS images for pleasantness, unpleasantness, and intensity. 30 of these images are new, while 30 are the same images presented during the first computer task.

- Once all images have been presented, participants are asked if they noticed an odor in the room. They will then rate the odor for pleasantness, unpleasantness, and intensity (if applicable).

## POTENTIAL IMPACT

- This would be the first study, to our knowledge, to examine the relationship between olfaction, mood, and affective evaluation of visual stimuli.

- This could identity a potential pathway through which odor is able to influence our affective evaluation of visual stimuli.

- Findings could help to elucidate the complex relationship between vision, olfaction, and affective processing.

- The methodology has the potential to be extended to clinical populations, as differential olfactory deficits have been recognized in populations such as schizophrenia, depression, dementia, and a number of neurodegenerative disorders (Atanasova et al., 2008).

  - This carries with it the implication that olfactory deficits could contribute to related deficits in neuropsychological processes.



**Figure 2.** Examples of images rated as having positive, neutral, and negative valence from IAPS