

The Contextual Effect of Colour Preference on the Perception of Emotionally Ambiguous Faces



Doğa Gülhan
Cognitive Science Program
doga.gulhan@boun.edu.tr



Didem Alaşan
Department of Psychology
didem.alashan@boun.edu.tr



İnci Ayhan, Ph.D.
Assistant Professor
Department of Psychology
inci.ayhan@boun.edu.tr

INTRODUCTION

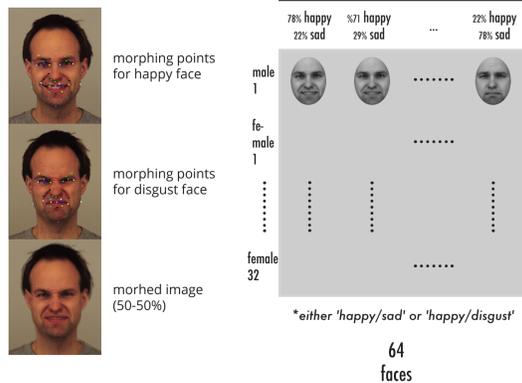
- **Ecological Valence Theory (EVT): Preference judgments on colours** are determined on the basis of the affective responses to objects strongly **associated** with particular colours in nature.
- According to EVT, colour preference is evolutionarily adaptive. It is also influenced by the individual past experiences, thus subject to change through time.
- **Colours associated with 'beneficial' objects** are more likely to be preferred than colours associated with 'harmful' objects, thus colours may be decoded as **'approach' or 'avoid' signals**.
- **Face** as a highly specialized visual object category might show such an emotional association with information carried by the background colour.
- A face might be **interpreted differently** according to the accompanied background colour due to possible contextual information provided by the observer's colour preference.
- We hypothesised that when emotionally ambiguous faces are observed on different background colours, the ones presented on the **observer's most favourable colours** will be more likely to be reported as having a **positive expression** than the ones presented on unfavourable colour backgrounds.

STUDY 1

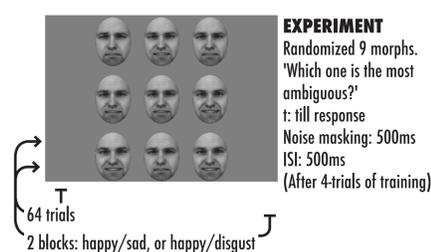
- We created an **emotionally ambiguous dataset of morphed faces** by combining two opponent emotional faces, using KDEF² images and Morpheus-Photo Morpher Software³. We asked subjects which of a set of faces has the most ambiguous expression.
- Whereas we expected a difference between **the physical ambiguity point** (i.e. %50-%50) and **the perceived ambiguity point** for our face stimuli consisting of one active (i.e. happy) and one passive (i.e. sad) emotion components, we expected no difference between the physical and perceived ambiguity points when the ambiguous face was composed of two active or two passive emotional expressions.
- 28 Participants (27 right-handed; 20 females), $M_{age} = 22.96$, $SD_{age} = 2.06$.

Method

Stimulus Set 1



Overview of Experiment 1



Results



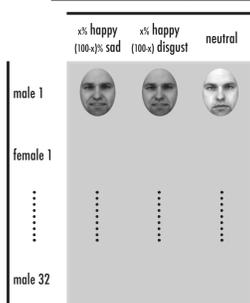
- Two corrected one sample t-tests were conducted.
- **Sad/happy morphs' subjective ambiguity points were biased towards the positive expression** (i.e. happy), $M = +13.87\%$, $SEM = 1.64$; $p < .001$.
- **Disgust/happy morphs' subjective ambiguity points showed no difference** with respect to physical ambiguity point, $M = -2.00\%$, $SEM = 1.36$; $p > .05$.

STUDY 2

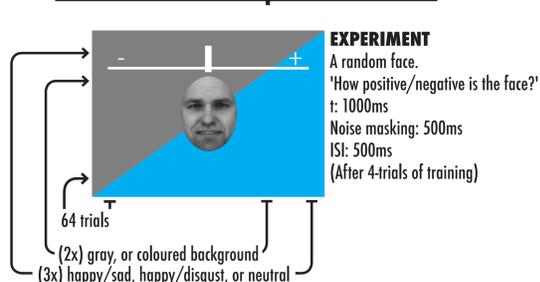
- **Main hypothesis:** Emotionally ambiguous faces with most favourable background colours will be perceived as more positive than their counterparts on the isoluminant gray background, whereas those on the least favourable background colours will be perceived as more negative than their counterparts on the isoluminant gray background.
- Participants rated faces on a continuous scale from positive to negative.
- Participants also gave a liking score for colours, again on a continuous scale (at the very end of the experiment).
- 44 Participants (35 right-handed, 1 ambidextrous; 22 females), $M_{age} = 21.66$, $SD_{age} = 2.26$.

Method

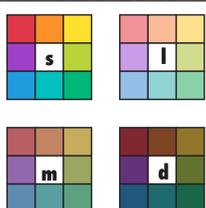
Stimulus Set 2A



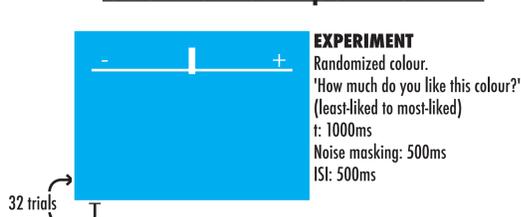
Overview of Experiment 2A



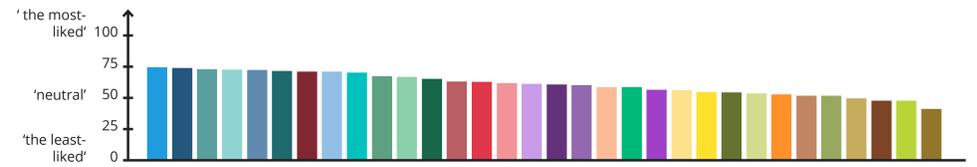
Stimulus Set 2B



Overview of Experiment 2B

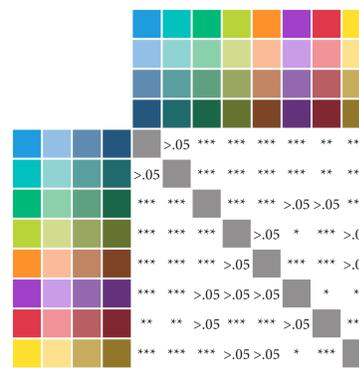


Results



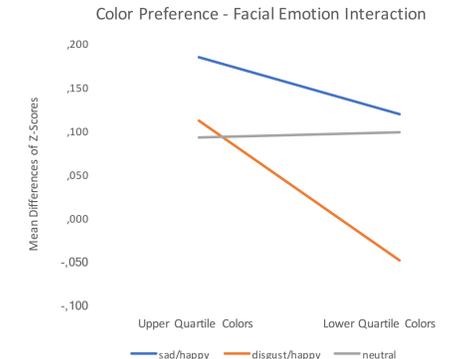
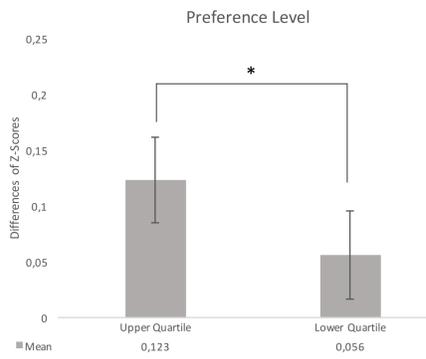
In terms of colour rankings, a two way ANOVA results showed that

- a significant main effect of hue, $F(7, 43) = 19.371$, $p < .001$,
- as well as an interaction effect between hue and brightness/saturation $F(21, 43) = 4.118$, $p = .002$,
- however the main effect of brightness/saturation was insignificant, $F(3, 43) = .790$, $p > .05$.



Correlational matrix which shows the significant differences among hues. *, **, and *** indicate $p < .05$, $p < .01$, and $p < .001$ respectively.

- A three-way mixed ANOVA were conducted: preference level (2) x facial emotion (3) x face gender (2).
- All datapoints for the data analysis were first converted into z-scores, in order to overcome score variances due to participants' rating strategies (i.e. individual differences).



- **The main effect of the colour preference was significant**, $F(1, 42) = 7.229$, $p = .01$.

- This effect was mediated by neither colour hue, nor saturation/brightness level, as indexed by non-significant results of ANOVAs.

- **The interaction between the colour preference and the facial emotion was also significant**, $F(2, 41) = 3.386$, $p = .044$.

- Disgust is an emotion more likely to be expressed toward an external stimulus so might be more prone to the contextual influences (as opposed to sadness).

CONTROL EXPERIMENTS

- **Ishihara Colour Deficiency Task** showed that none of the participants have any form of colour deficiency.
- **Liebowitz Social Anxiety Scale (LSAS)** showed that none of the participants' scores was within the range of 'high-anxiety', which might have resulted in a bias towards negative scores.
- **Emotion Recognition Task** showed that all participants are able to recognise emotions from rapidly presented faces. No outlier score of the task was observed.
- In order to extract out a potential bias towards luminance, control conditions were introduced, consisting of **isoluminant grays corresponding to each individual colour**.

CONCLUSIONS

- Our results support our 1st main hypothesis, that the **perceived ambiguity point differs in comparison to the physical ambiguity point of face morphs**, especially when morphs are consisted of one active and one passive emotion.
- Our results also support the 2nd main hypothesis, that **the favourable colours have a positive effect on the perception of ambiguous faces**, while negative ones show the opposite effect.
- **Hue** (but not brightness/saturation) of the colour is the main significant factor that determines the **colour preference**.
- There was a trend that this effect was mainly dominated by male faces (Data not shown here), and disgust/happy morphs.

REFERENCES

- ¹ Palmer, S. E., & Schloss, K. B. (2010). An ecological valence theory of human color preference. *Proceedings of the National Academy of Sciences*, 107(19), 8877-8882.
² Lundqvist, D., Flykt, A., & Ohman, A. (1998). The Karolinska Directed Emotional Faces - KDEF. CD ROM from Department of Clinical Neuroscience, Psychology section, Karolinska Institutet.
³ Morpheus Software, LLC, Santa Barbara, Calif, USA

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