Aesthetic Preference for Color Combinations

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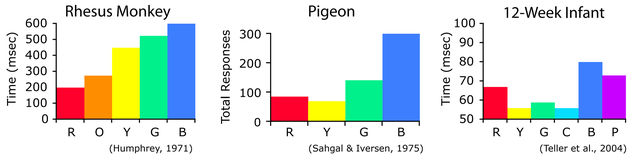
Background on Color Aesthetics

Single Colors:

Preferences are systematic, but species dependent



Color Combinations:

Color theory in art proposes two types of harmony*

Analogous Harmony

Harmony of Contrast

*Note: **Chevreul (1838) uses** harmony and preference interchangeably

Research Questions

- Can preference for color combinations be predicted by combining preferences for the component colors?
- If not, can preference for combinations be predicted by ratings of color harmony, as color theory in art suggests?
- Are there systematic individual differences in preference, and, if so, can they be predicted by personality factors?

General Methods

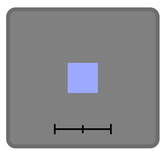
Massive Repeated Measures (MRM) Design:

28 participants
19 female
9 male

32 experiments: BFI, preference, harmony, similarity, color composition, emotional & musical associations, semantic differential, etc.

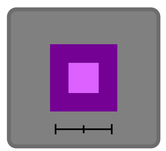
Experimental Tasks:

Single Color Ratings



Response:
Line mark rating scale
(-200 to +200)

Color Pair Ratings



Preference, Composition (R/G, B/Y, L/D)

Preference, Harmony, Similarity

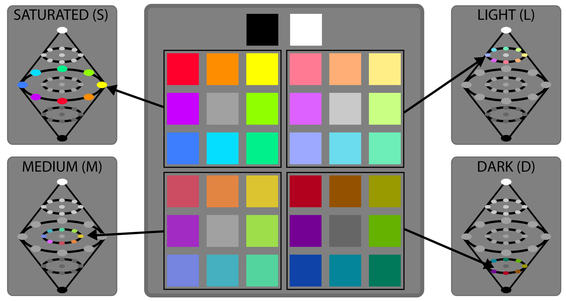
Our Colors: The Palmer Lab 37...

4 unique hues:
red (R)
yellow (Y)
green (G)
blue (B)

4 angle bisectors:
orange (O)
chartreuse (H)
cyan (C)
purple (P)

3 lightness levels
2 saturation levels

Five achromatic colors

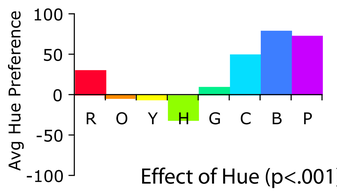


Munsell colors specified in CIE 1931 values through the Munsell Renotation Table (Wyzecki & Stiles, 1967)

Preference for Single Colors

Preference for colors by hue, and variations with saturation and brightness

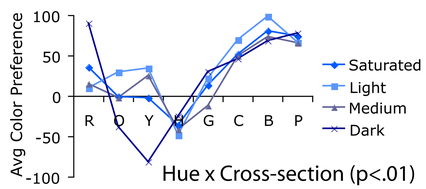
Preference for Hue
(averaged across cross-sections)



Effect of Hue (p<.001)

Y/B ratings explain 75% of hue variance

Preference for Colors
(separated by cross-section)



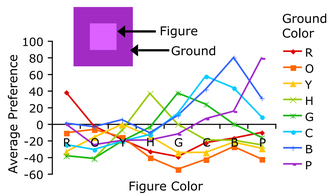
Hue x Cross-section (p<.01)

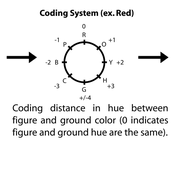
Y/B and R/G ratings explain 53% of hue x cross-section variance

Preference for Combinations

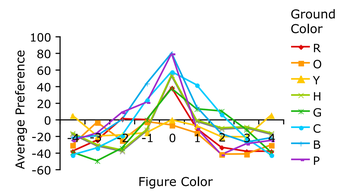
Preferences for combinations are largely determined by hue similarity

Raw Preference Data





Peak-shifted Preference Data



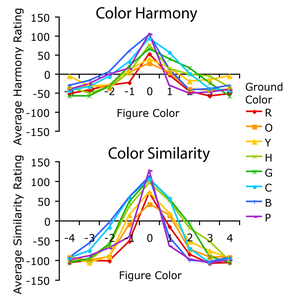
Model 1: Predicting color combination preference from components

$$Pref(F, G) = k + b_F Pref(F) + b_G Pref(G)$$

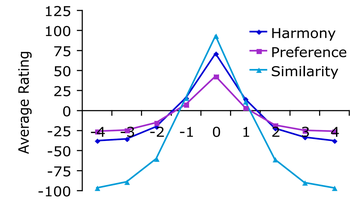
Component figure and ground colors explain only 20% of variance

Color Harmony

Color harmony is a function of color similarity



Harmony, Preference and Similarity Ratings for Pairs Averaged over Hue



Model 2: Predicting combination preference from components and harmony

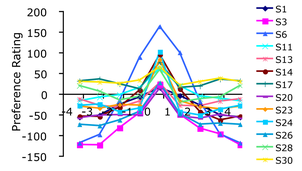
$$Pref(F, G) = k + b_F Pref(F) + b_G Pref(G) + b_H Harmony(F, G)$$

Component colors and Harmony explain 68% of variance
(48% more than component colors alone)

Individual Differences

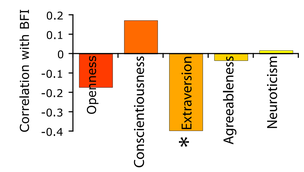
Personality is related to preference for harmonious combinations

Individuals' Preferences for Pairs



Generally, people prefer harmonious combinations, but to different degrees (r ranges from -.04 to .74).

Harmony/Preference correlation correlated with BFI



Individuals who scored highly on **extraversion** liked harmonious combinations **less**

Conclusions

Preference for Single Colors
Color preferences are partially explained by colorimetric variables and are consistent with infants' preferences (Teller, et al. 2004) and pigeons' preferences (Sahgal & Iversen, 1975)

Preference for Combinations
Preferences for component colors alone explain 20% of the variance.
The relational variable of harmony explains an additional 48% of the variance.

Color Harmony
Perceived harmony is closely related to perceived similarity, particularly in hue.
No evidence for harmony of contrast in hue, contradicting Chevreul (1839).

References:

Chevreul, M. E. (1839). Birren, F. ed. (1967). *The principles of harmony and contrast of colors.* New York, NY: Van Nostrand Reinhold.
Humphrey, N. K., 1971. Color and brightness preferences in monkeys. *Nature*, 229, 615-617.
Sahgal, A. & Iversen, S. D. (1975). Color preferences in the pigeon: A behavioural and psychopharmacological study. *Psychopharmoacologia*, 43, 175-179.
Teller, D. Y., Civan, A. & Bronson-Castain, K. (2004). Infants' spontaneous color preferences are not due to adult-like brightness variations. *Visual Neuroscience* 21, 397-401.
Wyszecki, G. & Stiles, W. S. (1967). Color science: Concepts and methods, quantitative data *and formulas*. New York, NY: John Wiley.