SURFACE COLOR INFLUENCES
INTERIOR ROOMS' PERCEIVED
SPATIAL LAYOUT

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PREVIOUS STUDIES & MOTIVATION

CEILING AND WALL LUMINANCE INFLUENCE THE PERCEIVED SPATIAL LAYOUT OF GREYSCALE THREE-DIMENSIONAL ROOM SIMULATIONS:

LIGHTER SURFACES ARE JUDGED MORE DISTANT THAN DARKER SURFACES

PERCEIVED HEIGHT

- Perceived height increases with increasing ceiling luminance
  (e.g., von Castell, Hecht, & Oberfeld, 2016; Oberfeld, Hecht, & Gamer, 2010)

PERCEIVED WIDTH AND DEPTH

- Perceived width increases with increasing side-wall luminance
- Perceived depth increases with increasing rear-wall luminance
  (von Castell, Hecht, & Oberfeld, in preparation)

CAN THE LUMINANCE EFFECT BE TRANSFERRED TO CHROMATIC SURFACE COLORS?

DO THE SATURATION AND HUE OF SURFACE COLORS ALSO INFLUENCE THE PERCEIVED LAYOUT OF INTERIOR SPACES?

METHOD

SUBJECTS

- N = 22 (10 women, 12 men)
- Age 19 to 34 years (M_age = 23.95, SD_age = 3.57)

APPARATUS

Oculus Rift DK2
- FOV: horizontal = vertical = 100°
- Virtual eye height: 1.30 m

STIMULI

3D room simulations
- Independent variation of ceiling, luminance, saturation, and hue
- Constant luminance of rear and side walls (M = 25.46 cd m⁻²)
- Variation of ceiling height
- Constant room width (4.50 m) and depth (5.80 m)

DESIGN AND PROCEDURE

Independent variables (IVs)
- Luminance Y (Y, Y+), S
- Saturation S (S, S+), S
- Hue h (Red, Green, Blue)
- Luminance-matched achromatic ceilings (Grey)
- Ceiling height (2.90, 3.00, 3.10 m)

Dependent variable (DV)
- Centimeter ratings of perceived height

Y = S × h × Ceiling height mmANOVA for chromatic ceiling colors
Y = Ceiling height mmANOVA for achromatic ceiling colors

RESULTS

LUMINANCE

Measures of mean height (cm)

SATURATION

Mean height (cm)

HUE

Measures of mean height (cm)

CEILING HEIGHT

- Perceived height increased with increasing ceiling height, both for chromatic (η²_p = .83) and achromatic (η²_p = .76) ceiling colors

LUMINANCE × HUE × CEILING HEIGHT

- Maximum effect of hue on perceived height for medium-high (3.00 m) high-luminance (Y+) ceilings (not illustrated)

CONCLUSION

- First indications that ceiling hue influences the perceived height of interior spaces: subjects judged green ceilings slightly lower than red, blue, and grey ceilings
- Virtually no effect of saturation
- No evidence for an "oppressive" effect of colorful ceilings on perceived height

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