Beautiful & Balanced

Using Color Theory in Data Visualization

Laura Fisher • PyConUS • May 16, 2025

Laura Fisher

I'm an Artist and I...

- live in Los Angeles

Laura Fisher

I'm an Artist and I...

- live in Los Angeles
- studied at the University of Michigan

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- paint and draw

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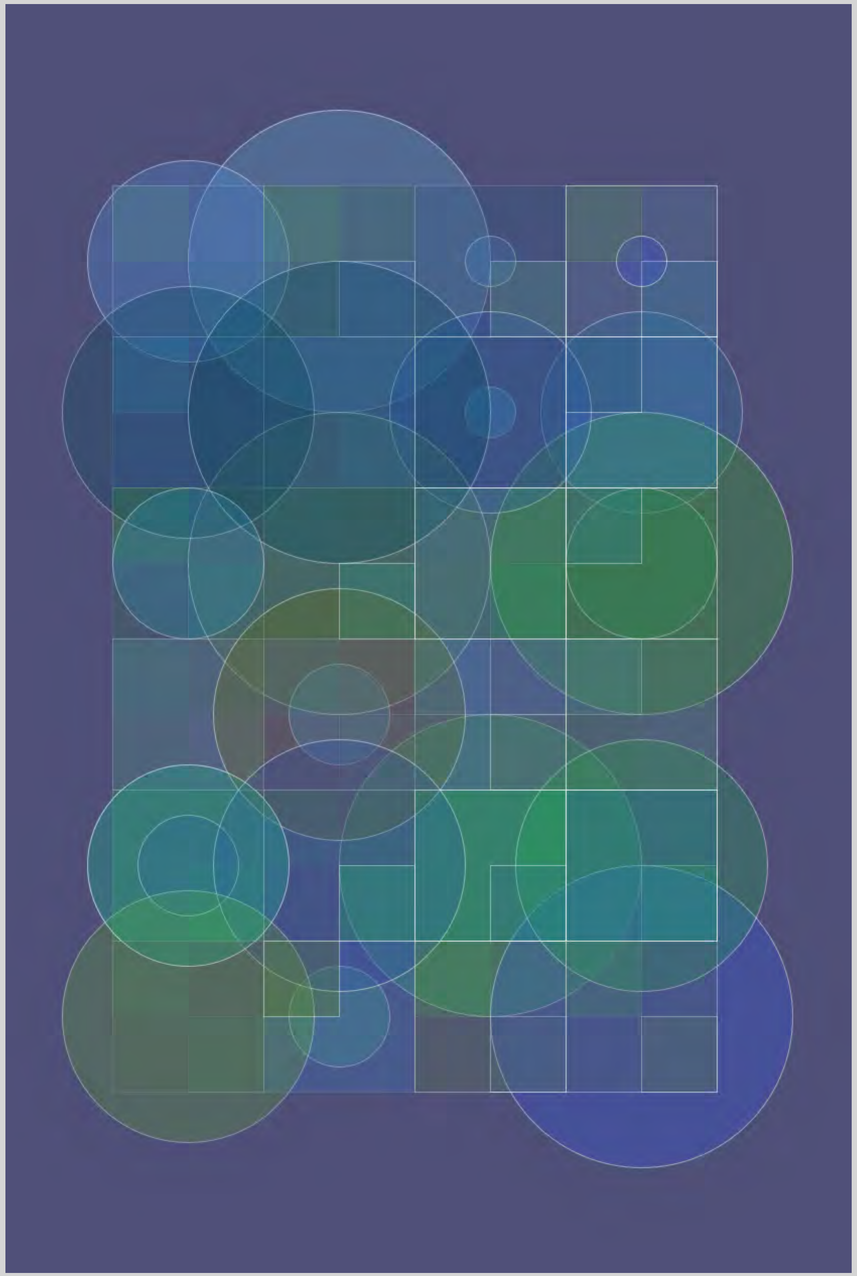
I'm an Artist and I...

- live in Los Angeles
- studied at the University of Michigan
- paint and draw
- make computational art



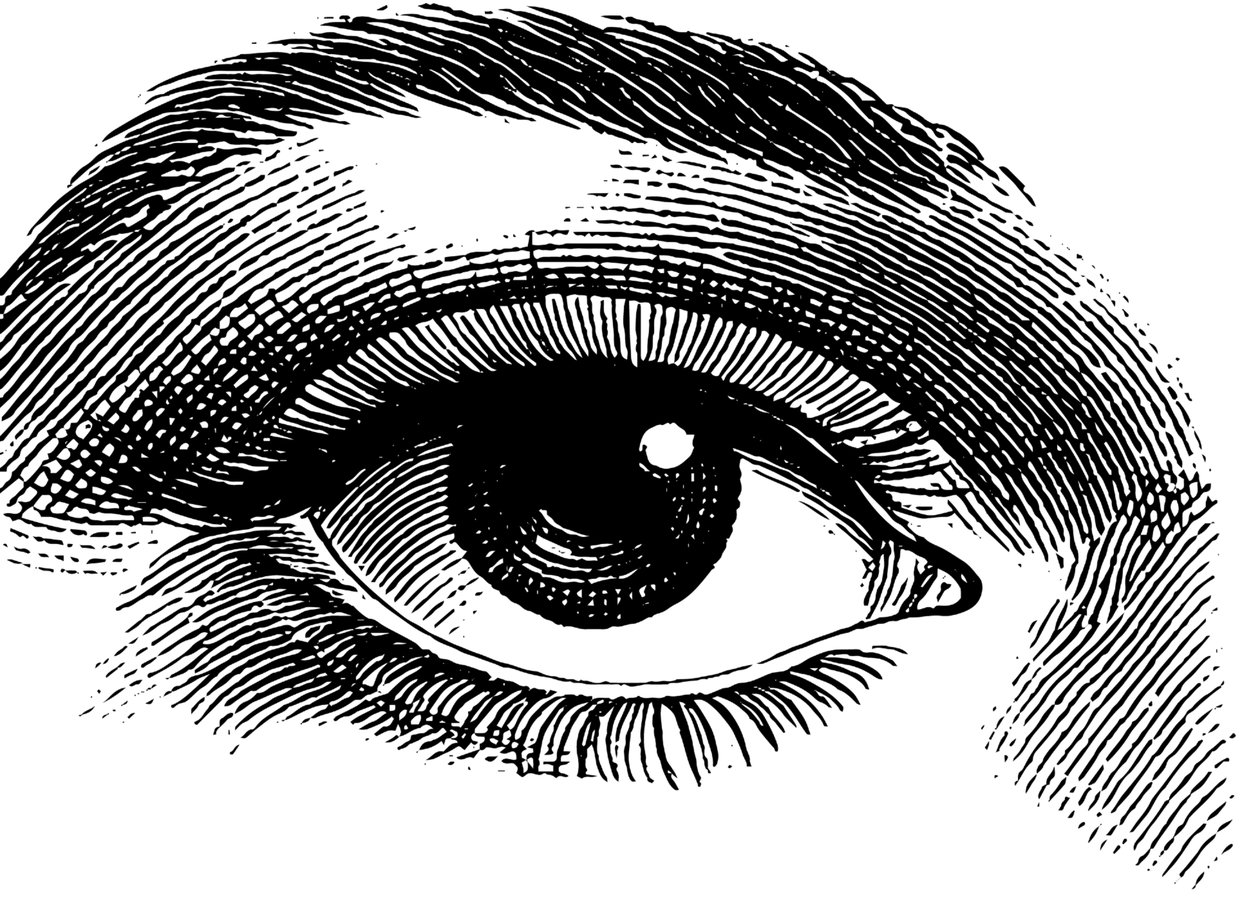
Where to Find Me

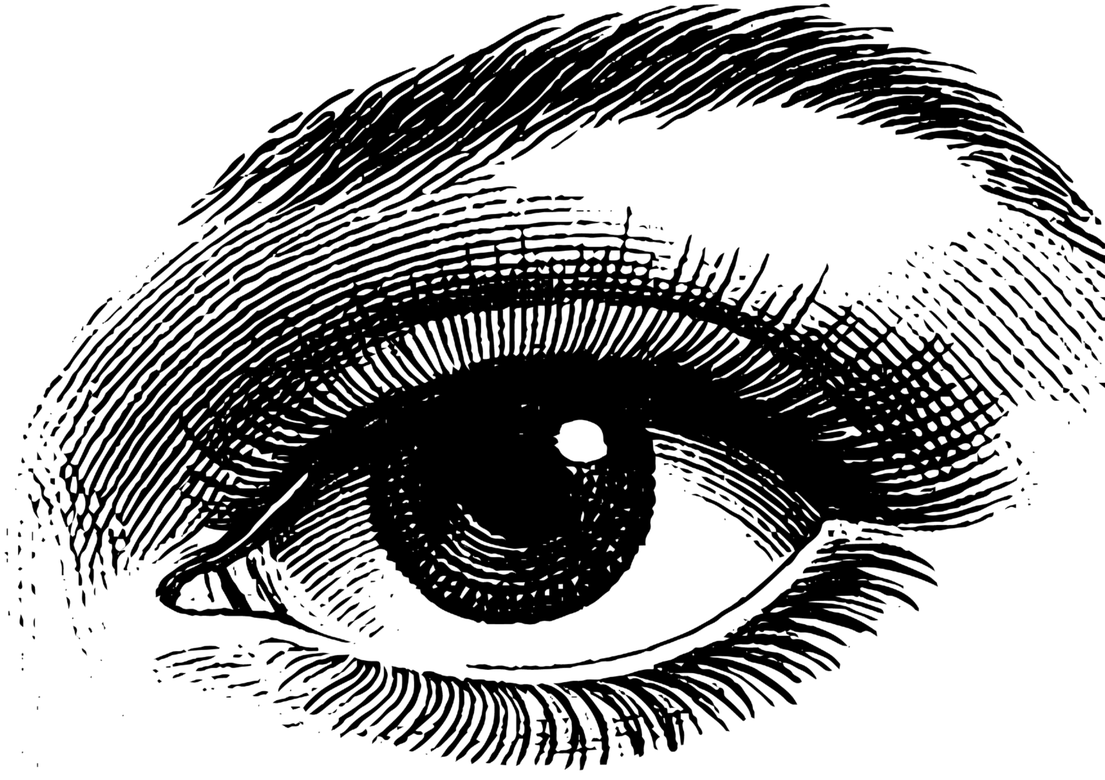
mitten.lol/pycon2025

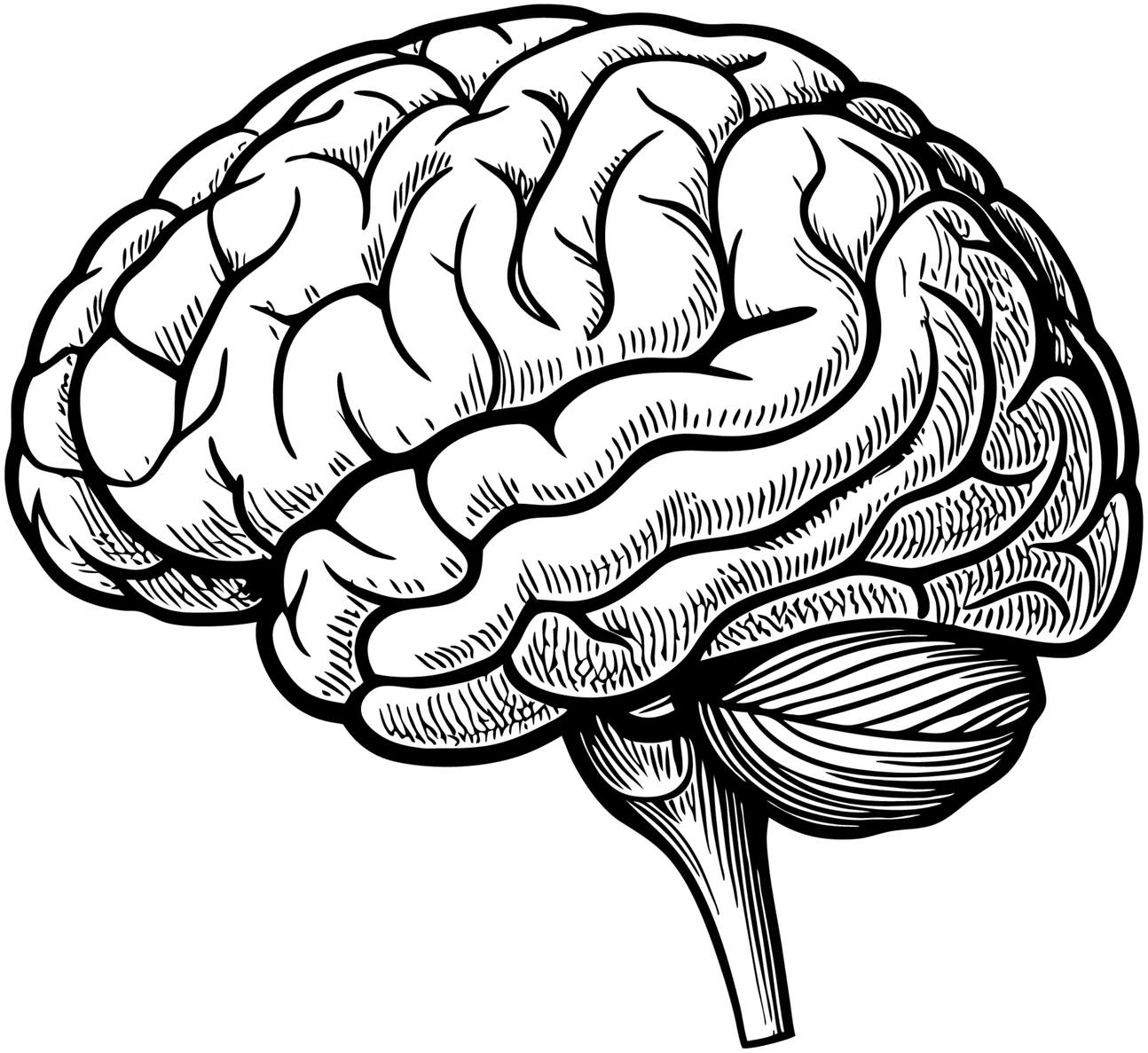
@mitten@social.lol

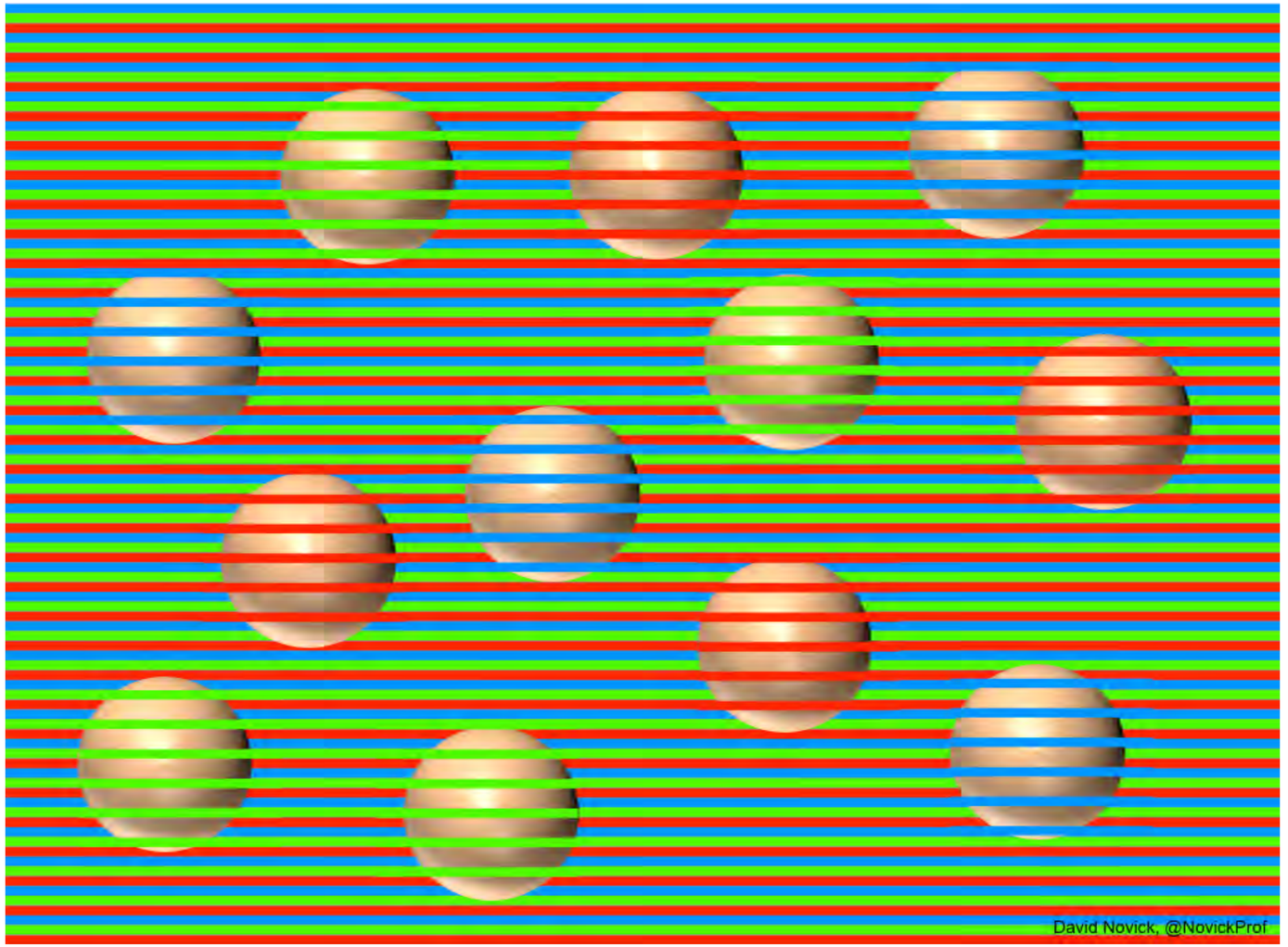
Poster Session: Sunday 10:00a - 1:00p

How Does Color Work?

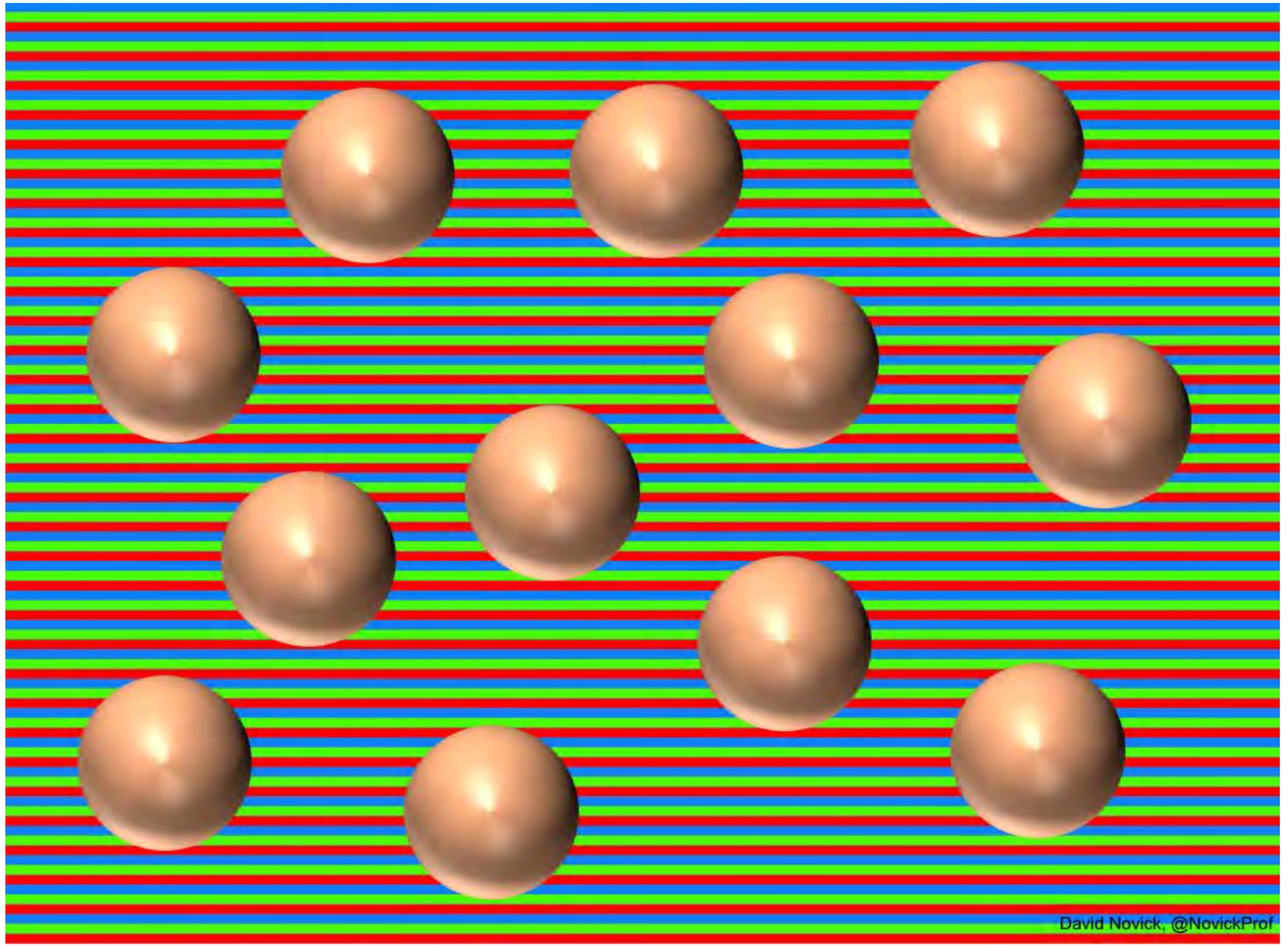








Confetti, by David Novick



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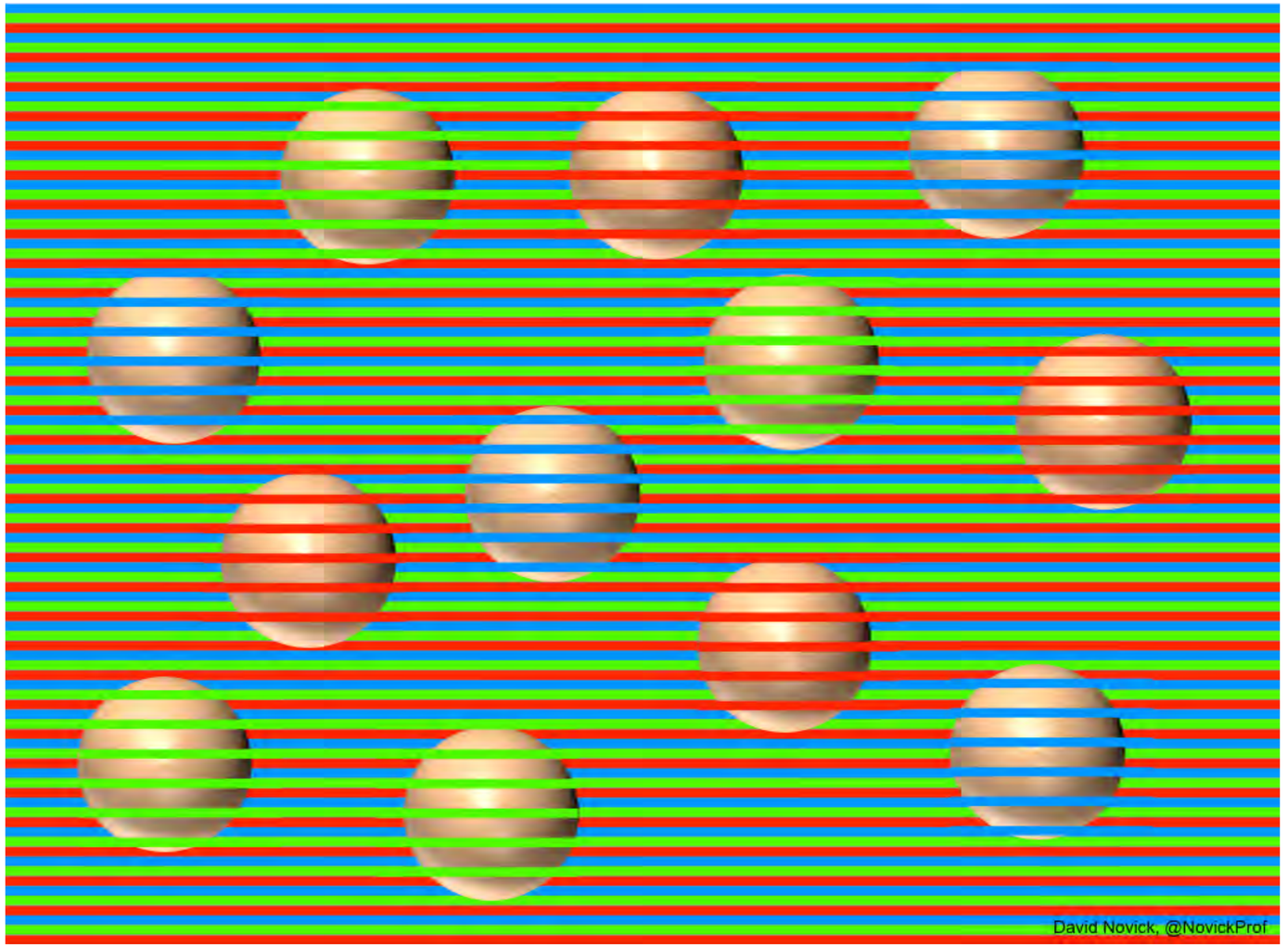
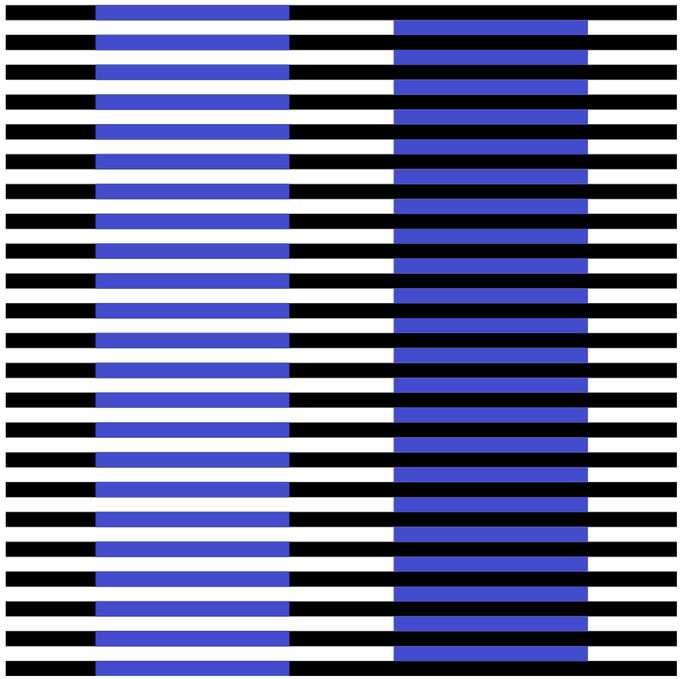


Confetti, by David Novick

Color is all in your head.

Color is all in your

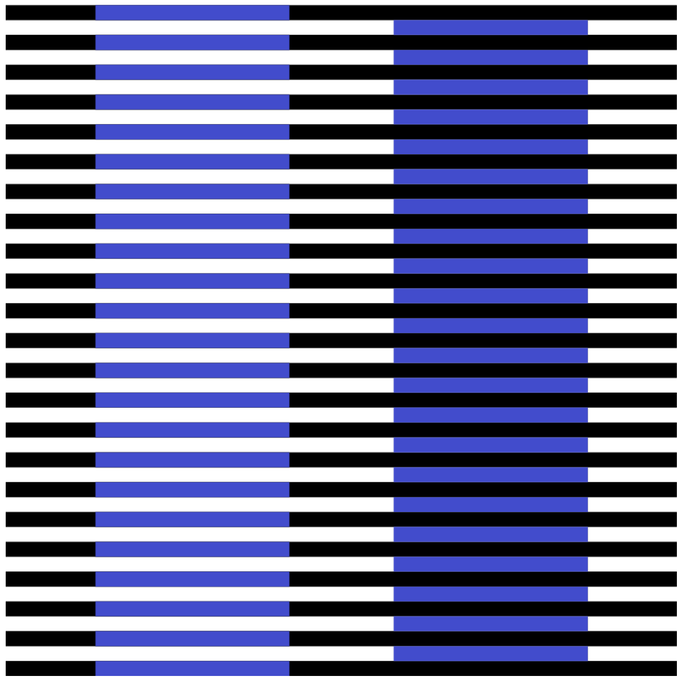
Color is Contextual

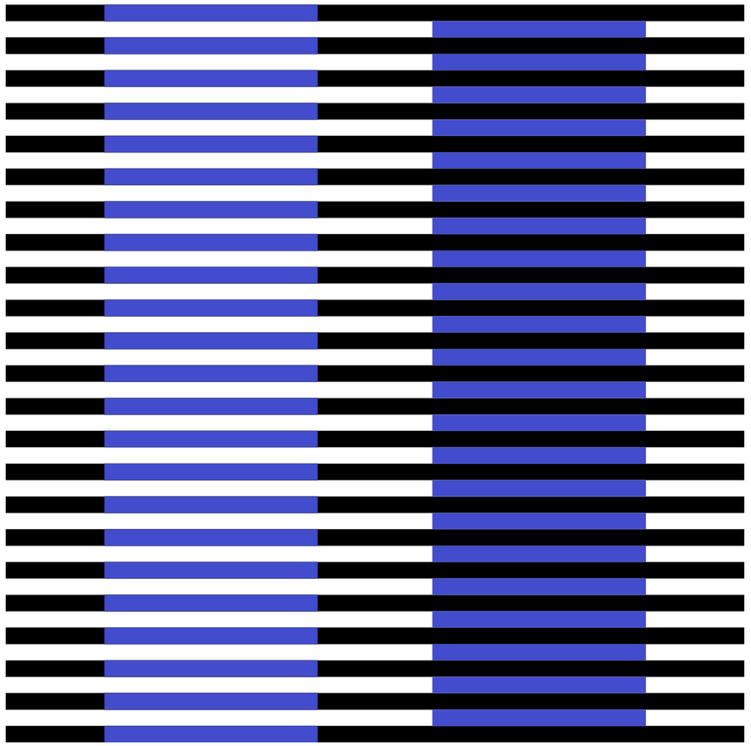


Color is Contextual

Color is Contextual

Munker White Illusion





Perception of a color depends on the adjacent colors.

Josef Albers

Artist and Educator

- A pioneer in Color Theory

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- Taught at Bauhaus School, Black Mountain College, and Yale University

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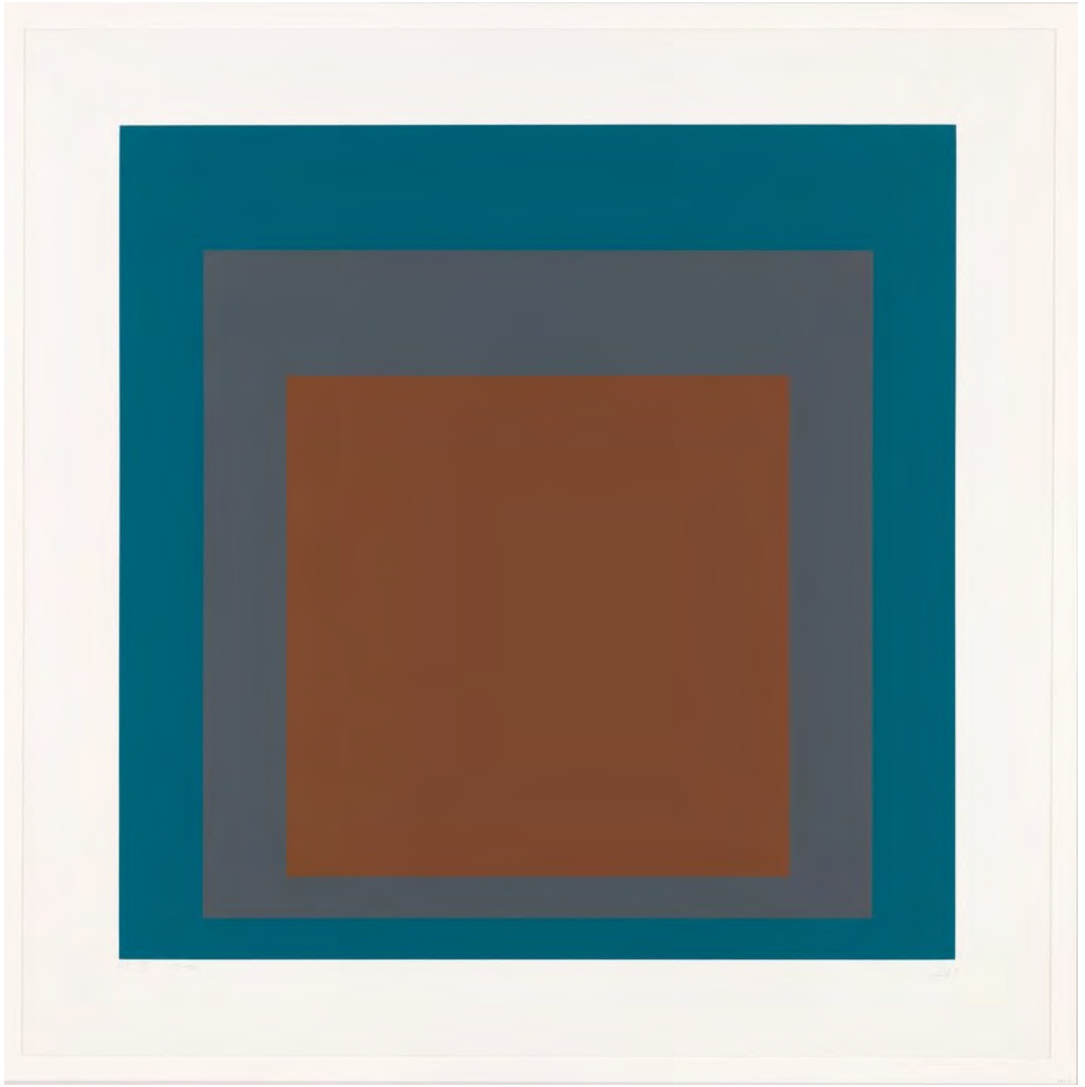
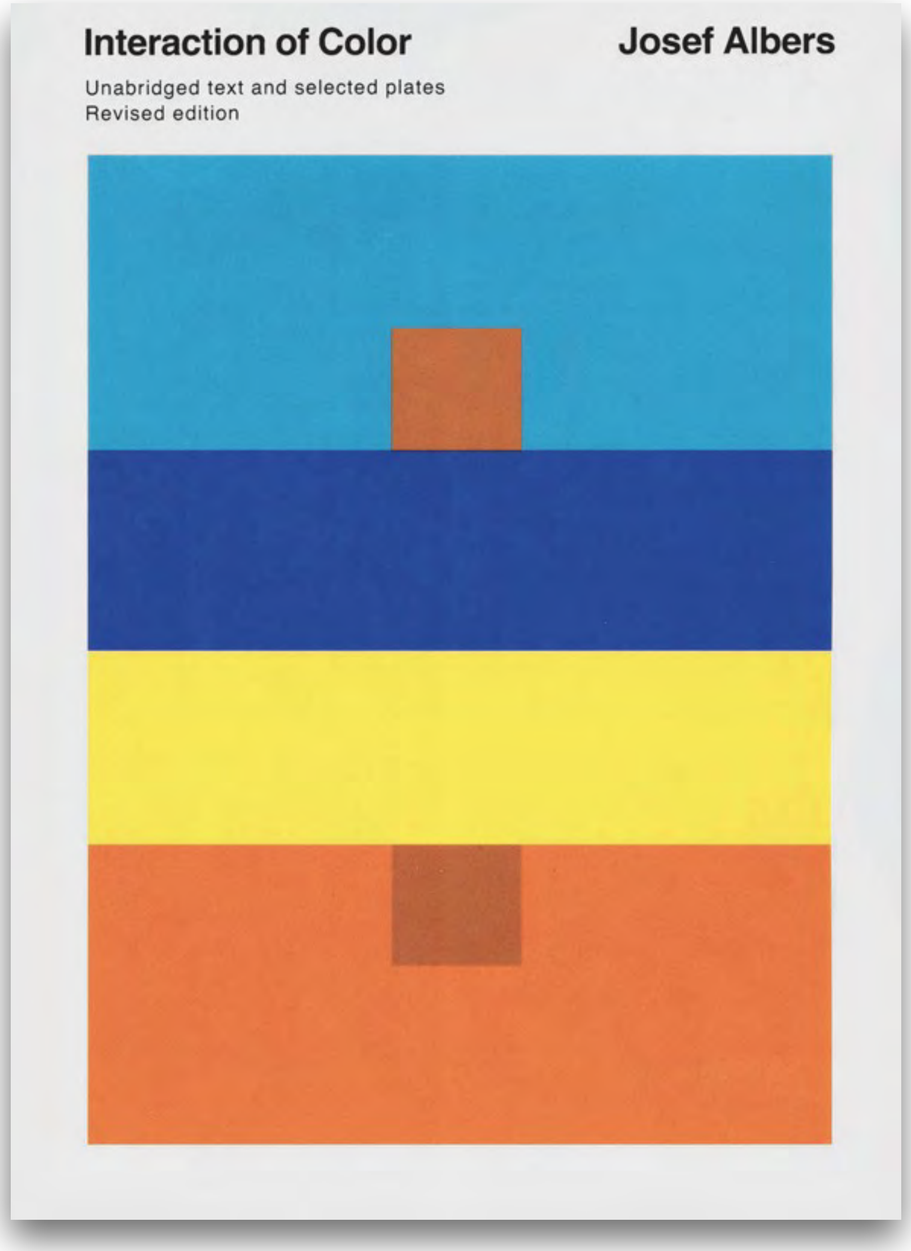
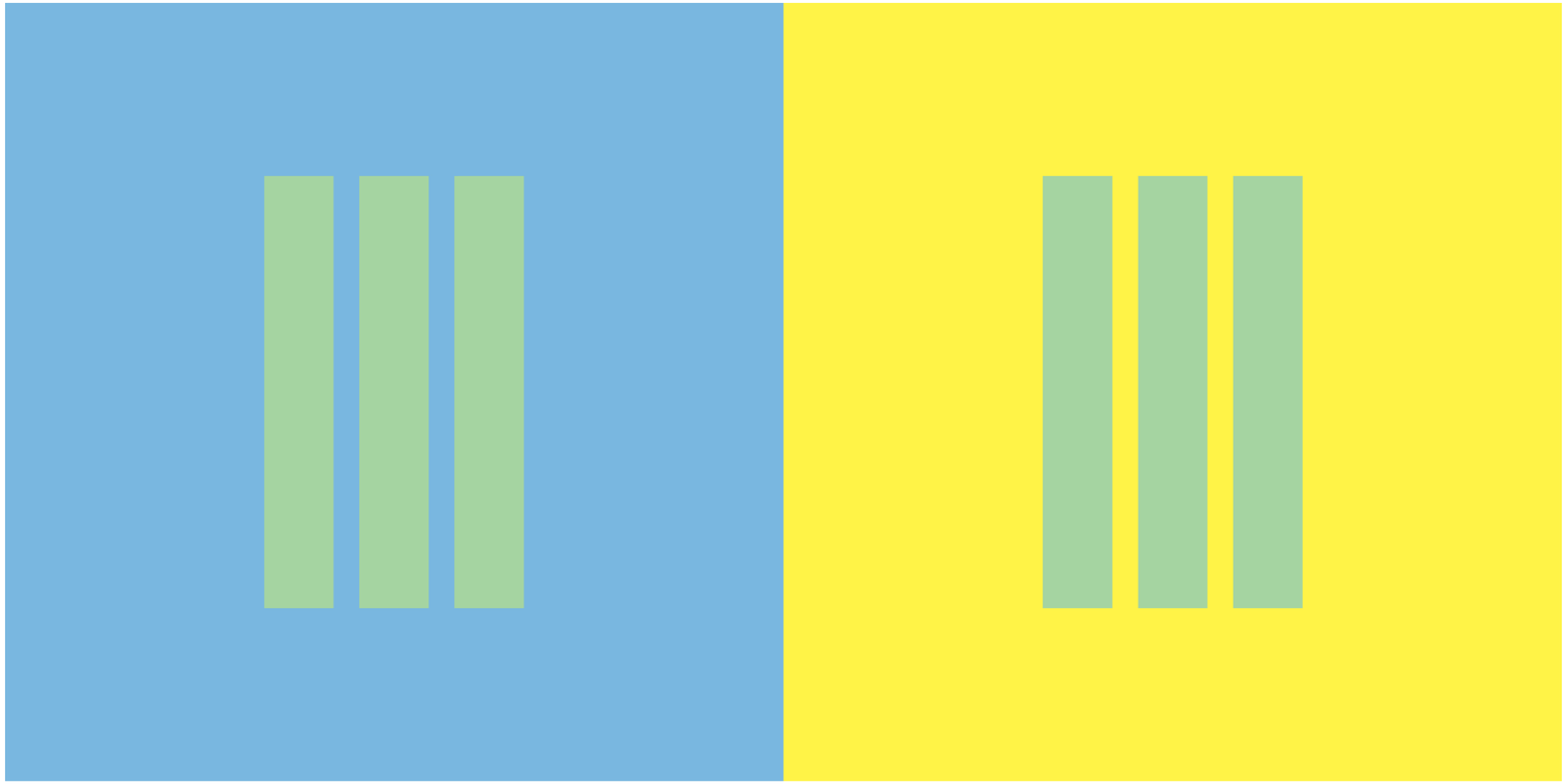


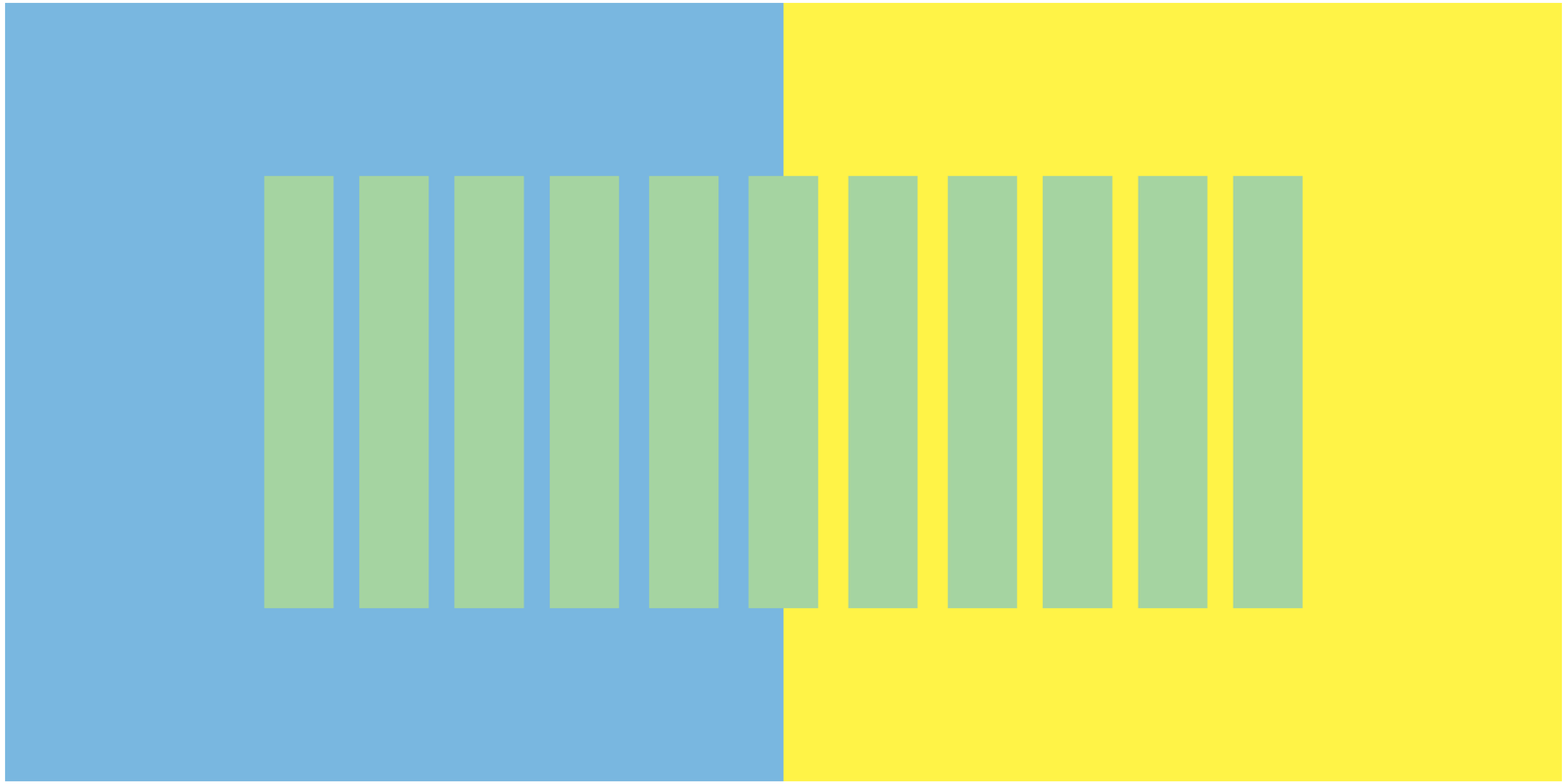
Josef Albers

Artist and Educator

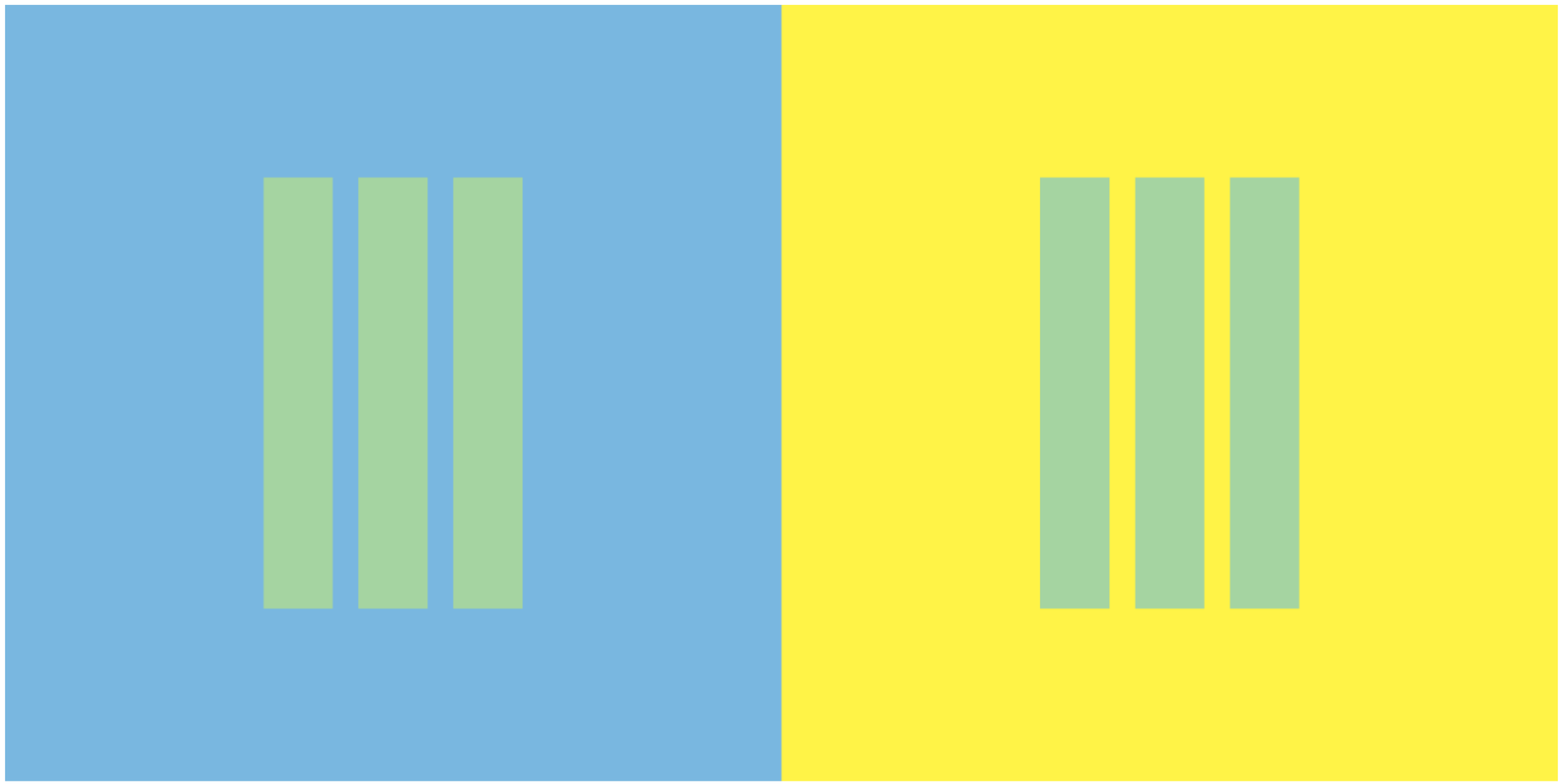
- A pioneer in Color Theory
- Taught at Bauhaus School, Black Mountain College, and Yale University
- Homage to the Square
- Interaction of Color

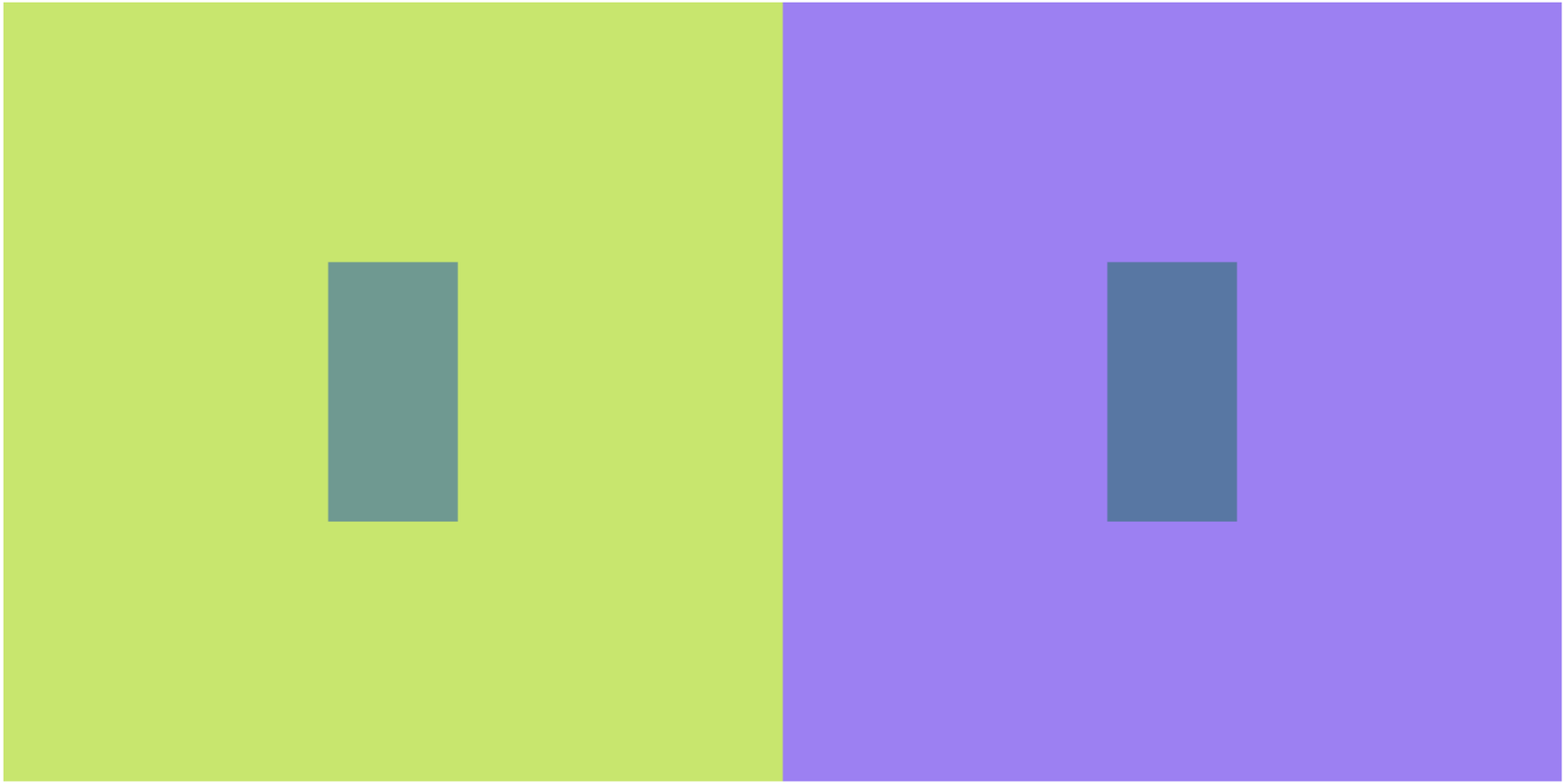


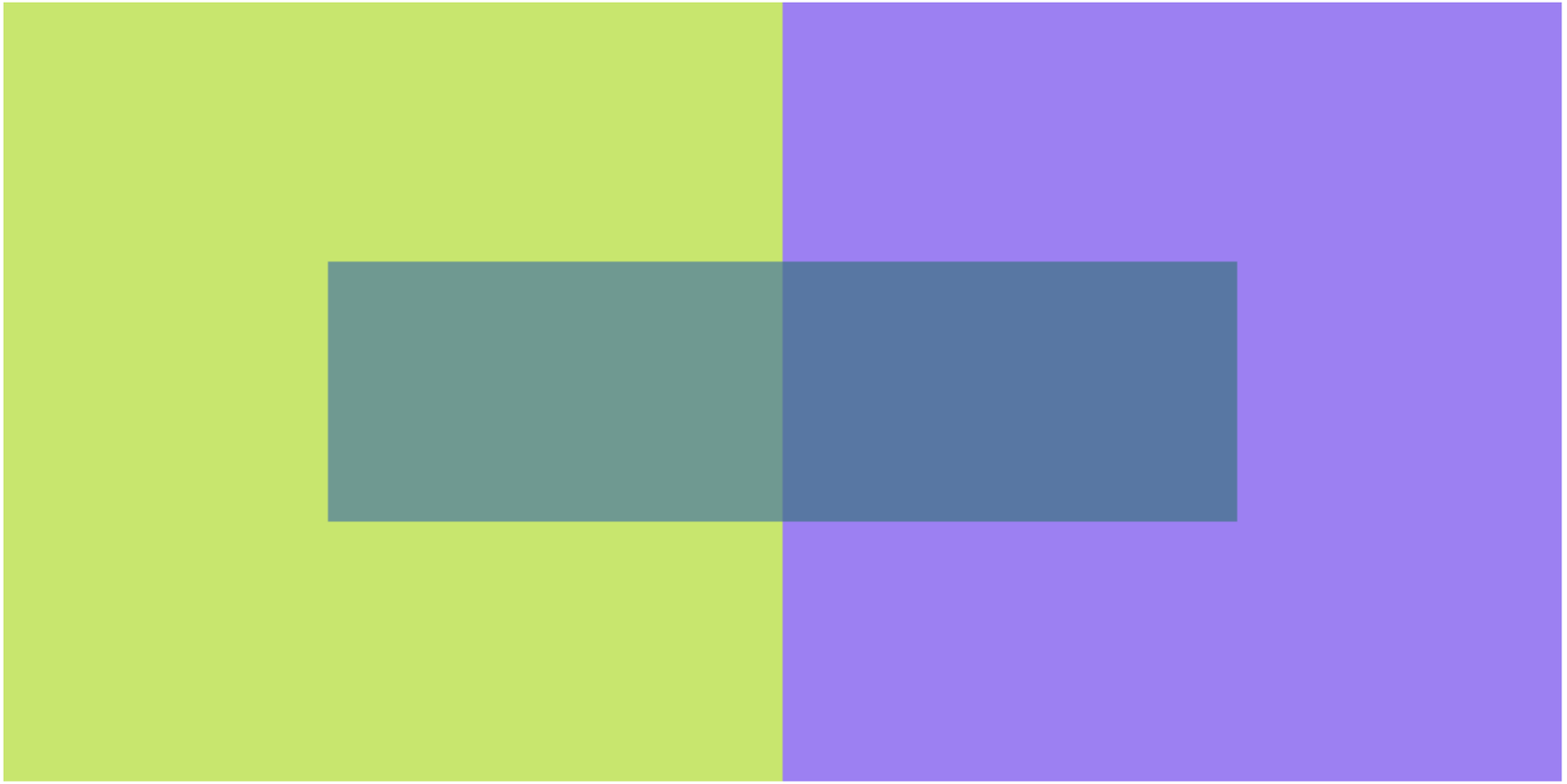




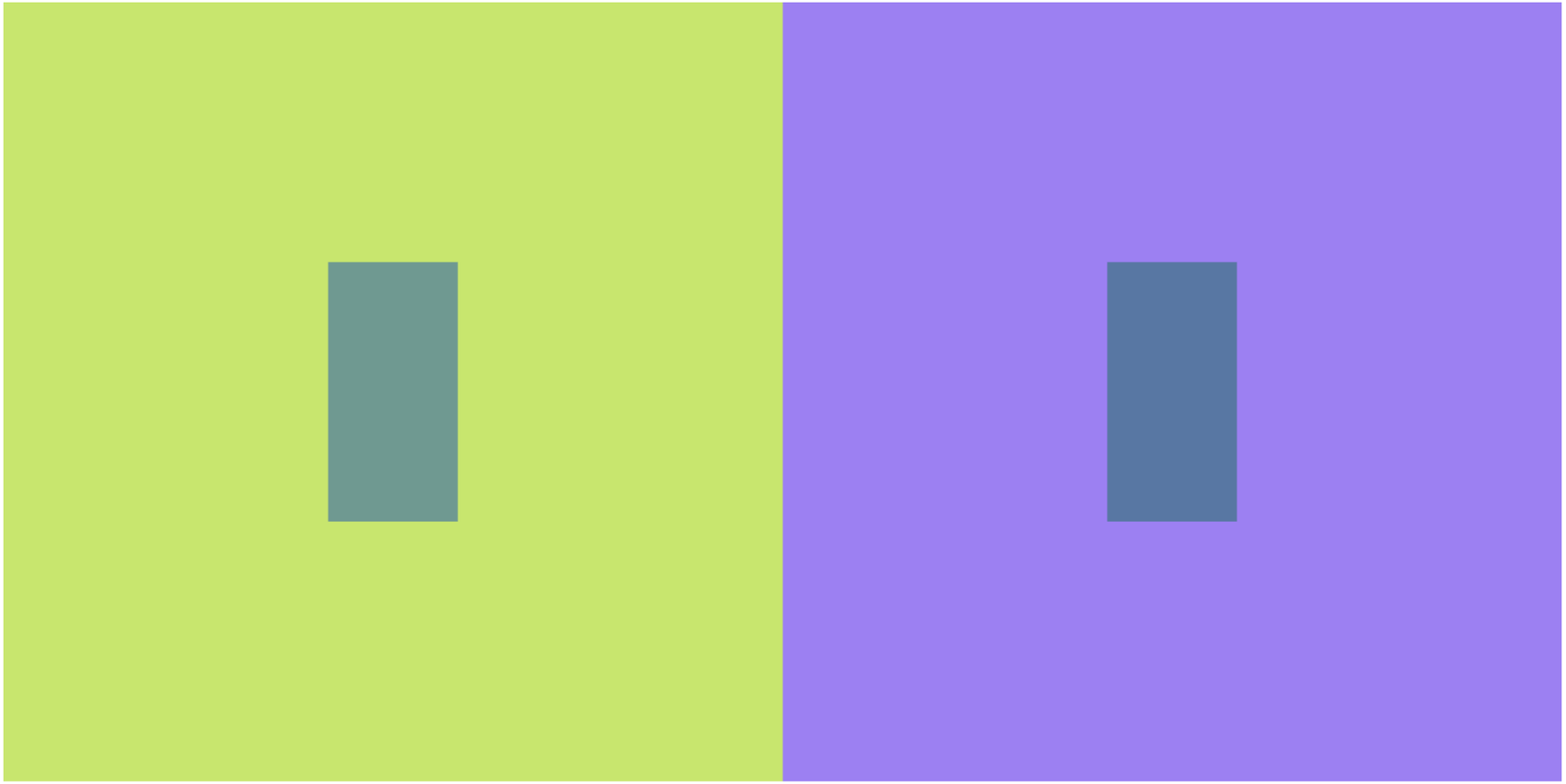
One Color Looking Like Two Colors







Two Colors Looking Like One Color



Why Color Choices Matter in Data Visualization

Information should not be displayed in a way that distorts or misrepresents the underlying data.

Edward Tufte, statistician, writer, and artist

In order to use color effectively, it is necessary to recognize that color deceives continually.

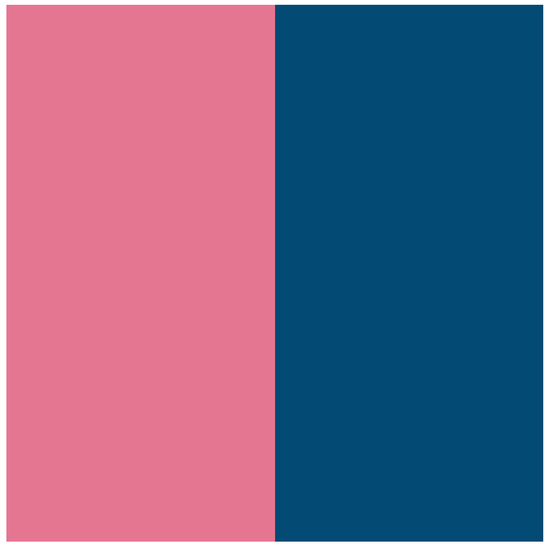
Josef Albers, artist and educator

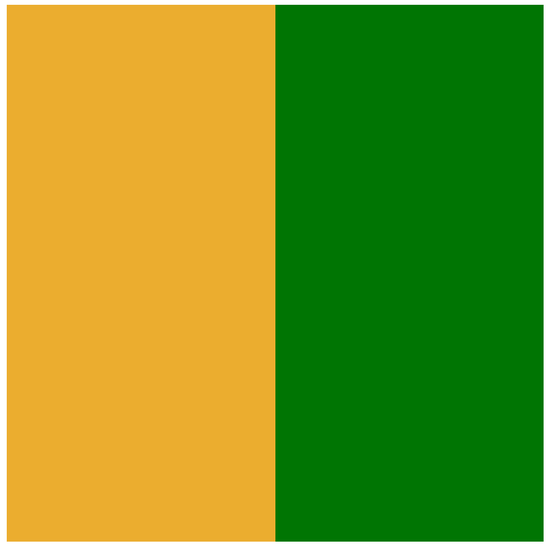
Influential Factors

Color Weight

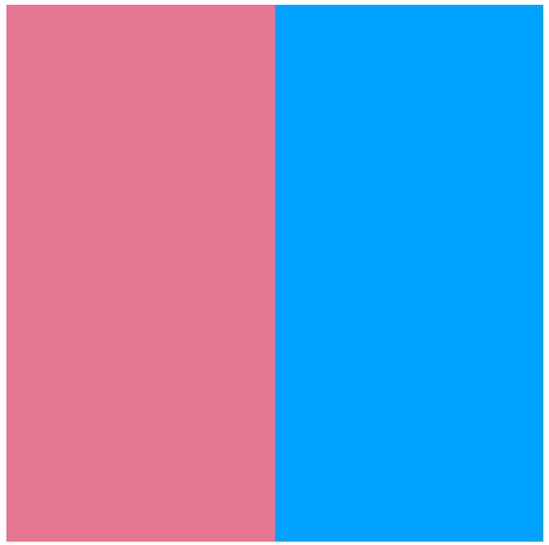
Color Temperature

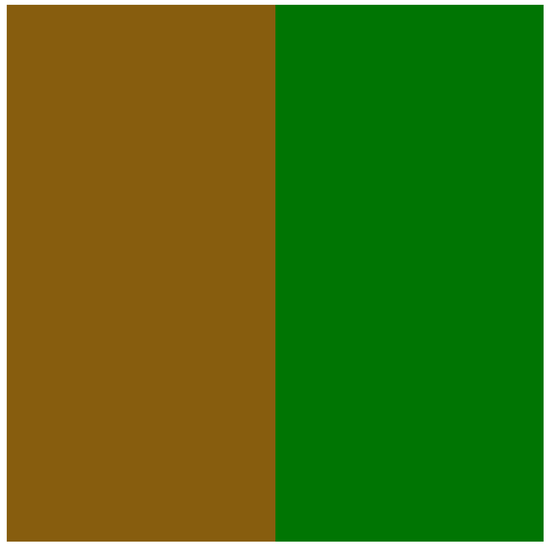
Color Weight



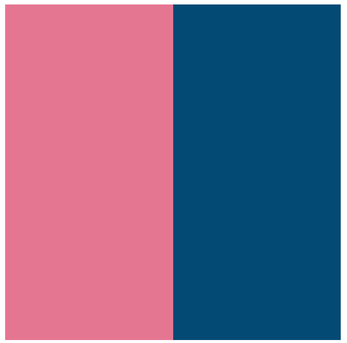


Color Weight

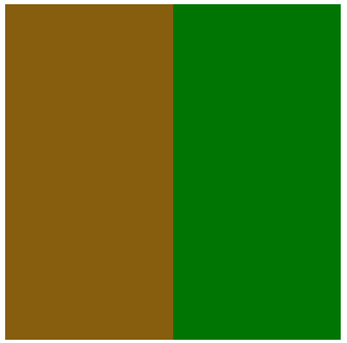




Color Weight



high contrast = uneven weight



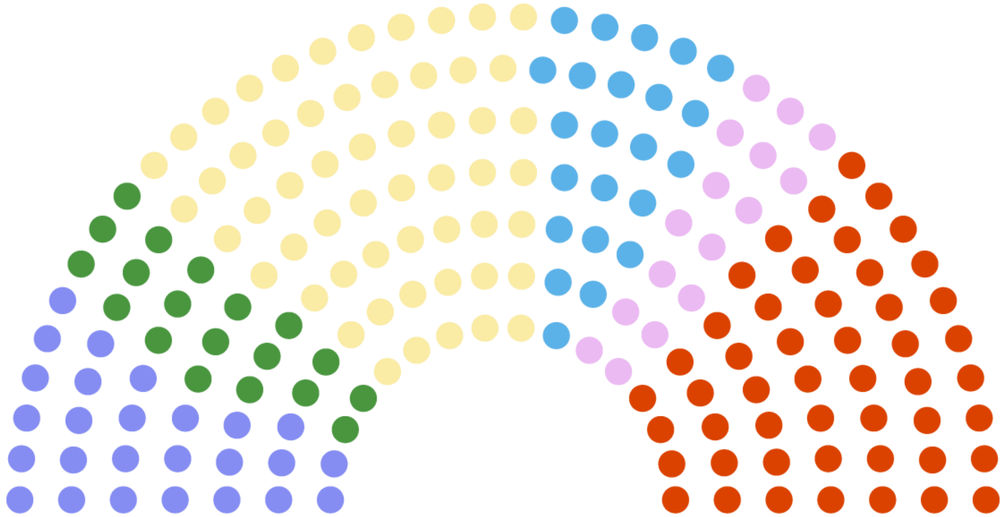
low contrast = even weight

Produceland Parliament

Banana Party

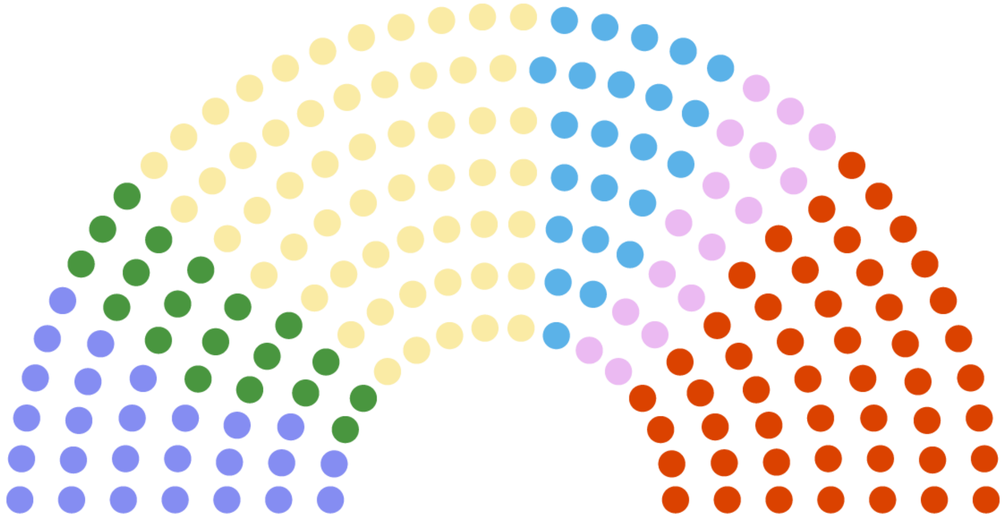
Tomato Party

Produceland Parliament



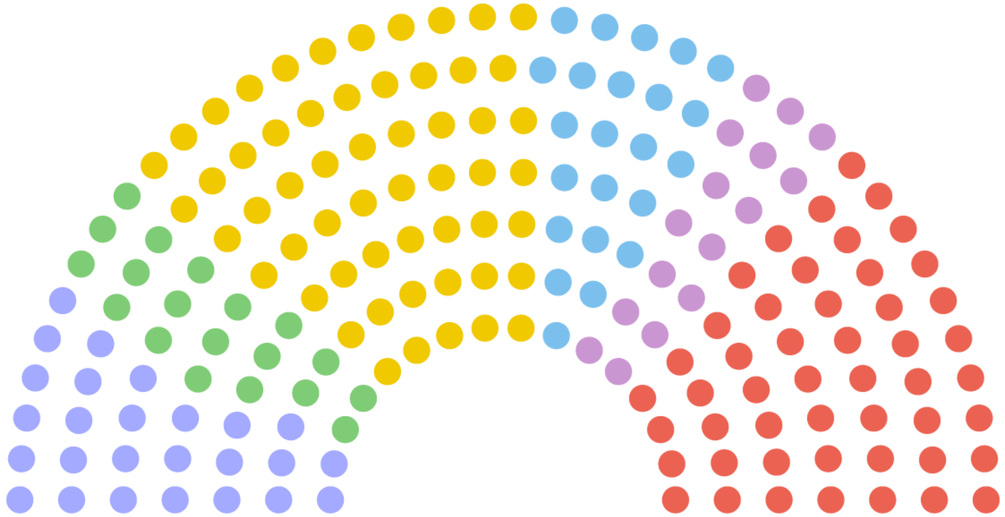
Produceland Parliament

Banana: 56

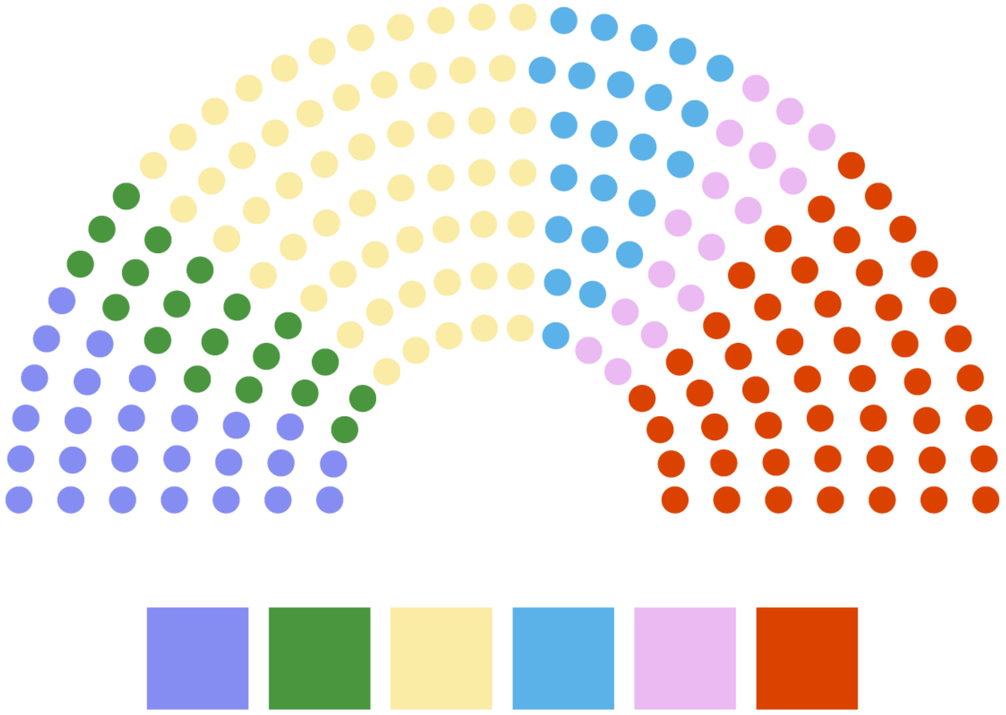


Tomato: 49

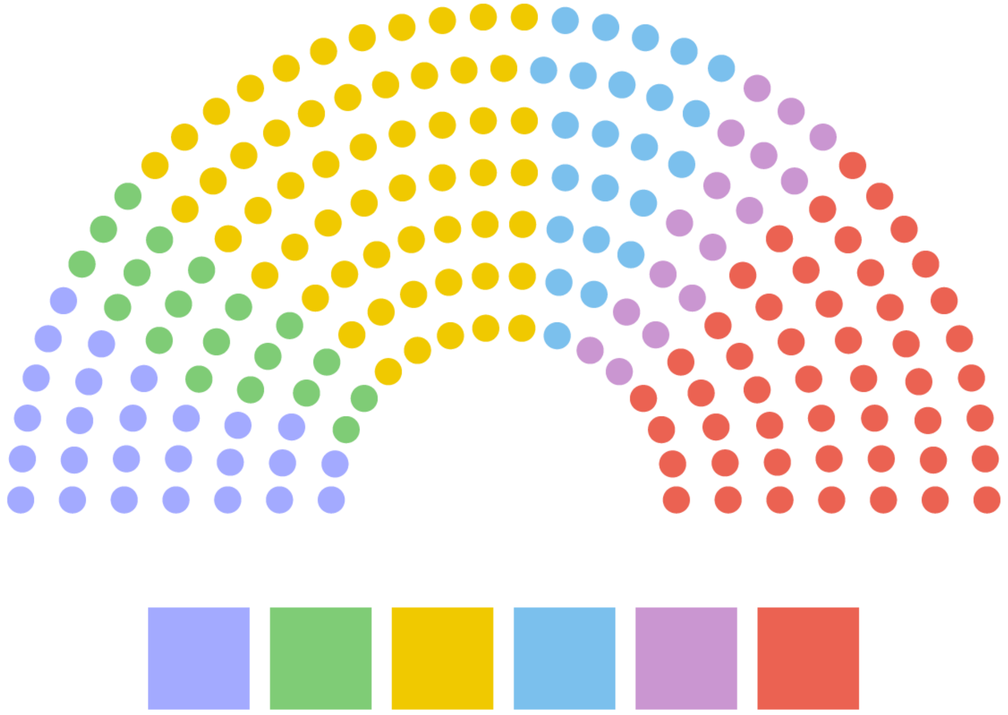
Produceland Parliament



Produceland Parliament



less balanced

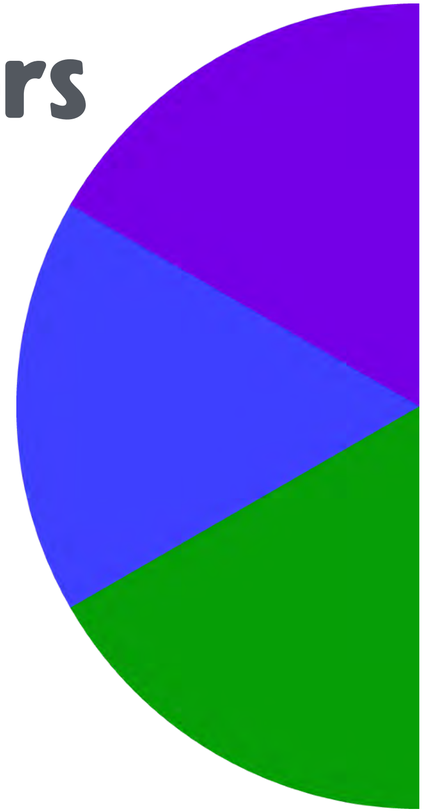


more balanced

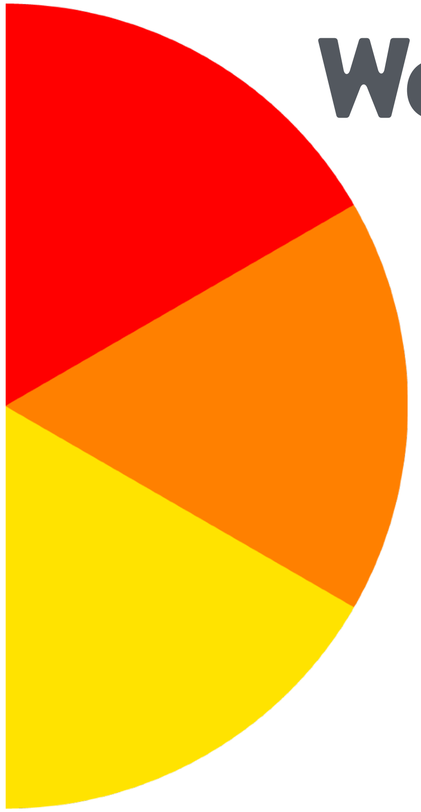
Color Temperature

Color Temperature

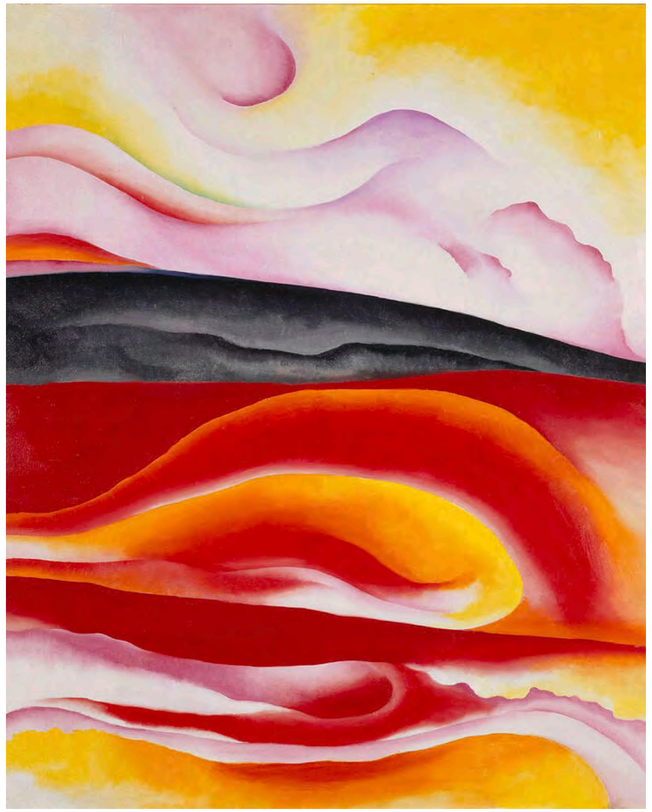
Cool Colors



Warm Colors

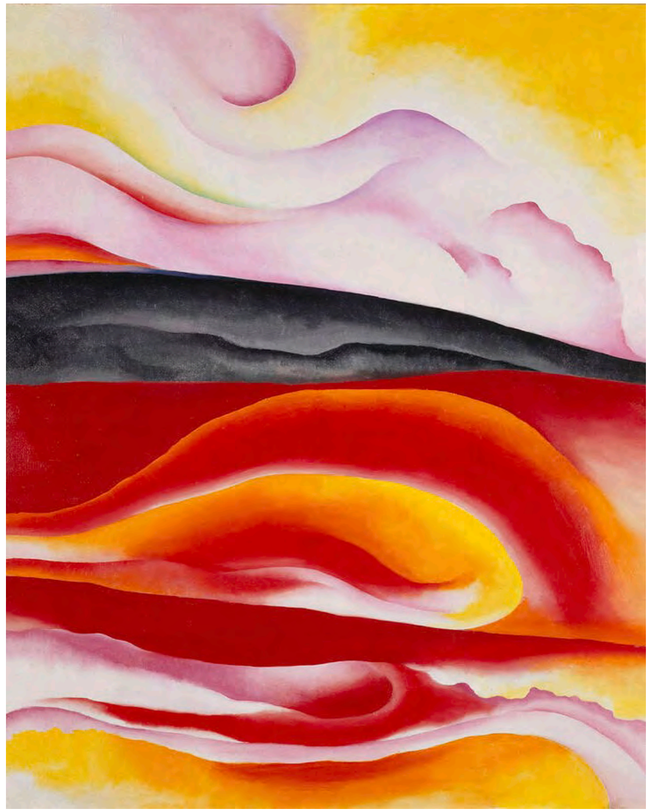


Color Temperature



Color Temperature

Georgia O'Keeffe, Abstraction Blue



Georgia O'Keeffe, Red, Yellow and Black Streak

Faux Town

Faux Town

Faux Town

Choosing a Color Palette

Conventional Advice

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Palettes used by graphic designers are, by necessity, unbalanced.

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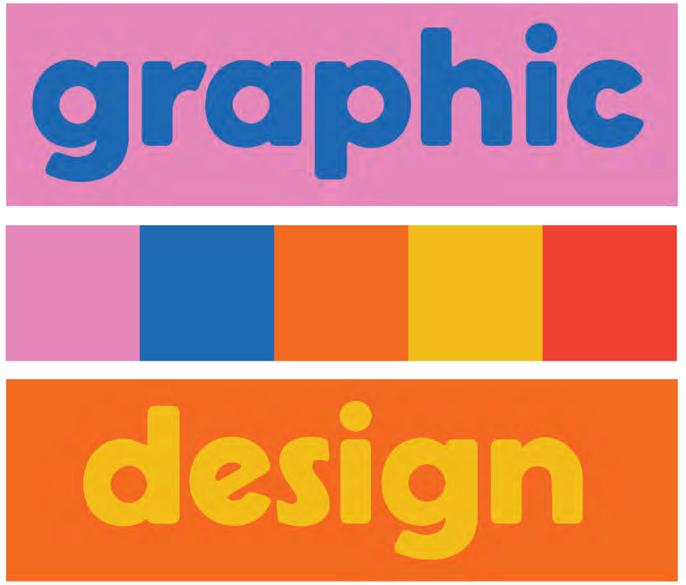

Better Advice

Start with a Designer Palette

and make it balanced

Adjusting Color Pairs

Adjusting Color Pairs

Four Strategies for Balancing Your Color Palette

1. Use an Intuitive Color Space

OKLCH or HSL

Hue Chroma Lightness

1. Use an Intuitive Color Space

⚠ OKLCH or HSL ⚠

2. Use a Contrast Checker in Reverse

Contrast ratio: 1.05

Contrast ratio: 1.12

3. Go Grayscale

original

balanced

4. Shush the Loudmouths

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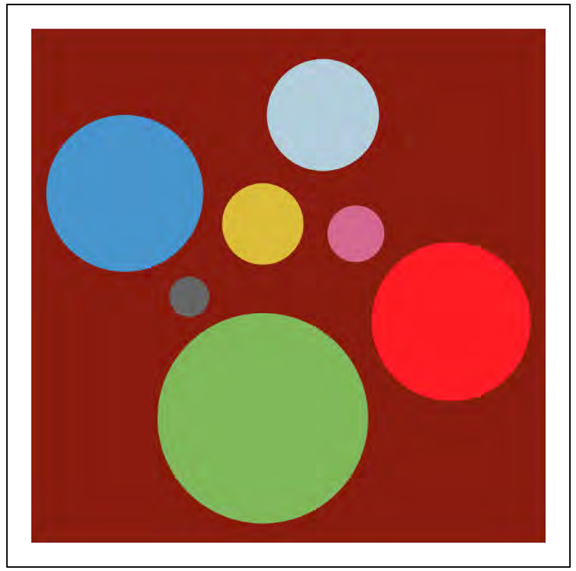
- Desaturate them

4. Shush the Loudmouths

- Desaturate them
- Saturate other colors

4. Shush the Loudmouths



- Desaturate them
- Saturate other colors
- Change the background to counter their influence

Cautions & Caveats

Cautions & Caveats

- Restricted Color Choice

Cautions & Caveats

- Restricted Color Choice
- Accessibility

Cautions & Caveats

- Restricted Color Choice
- Accessibility
- Ethics

Cautions & Caveats

- Restricted Color Choice
- Accessibility
- Ethics
- Practice

Learning More

Learning More

Physical Resources

- Interaction of Color
  by Josef Albers

Learning More

Physical Resources

- Interaction of Color
  by Josef Albers
- Interacting with Color
  by Fritz Horstman

Learning More

Physical Resources

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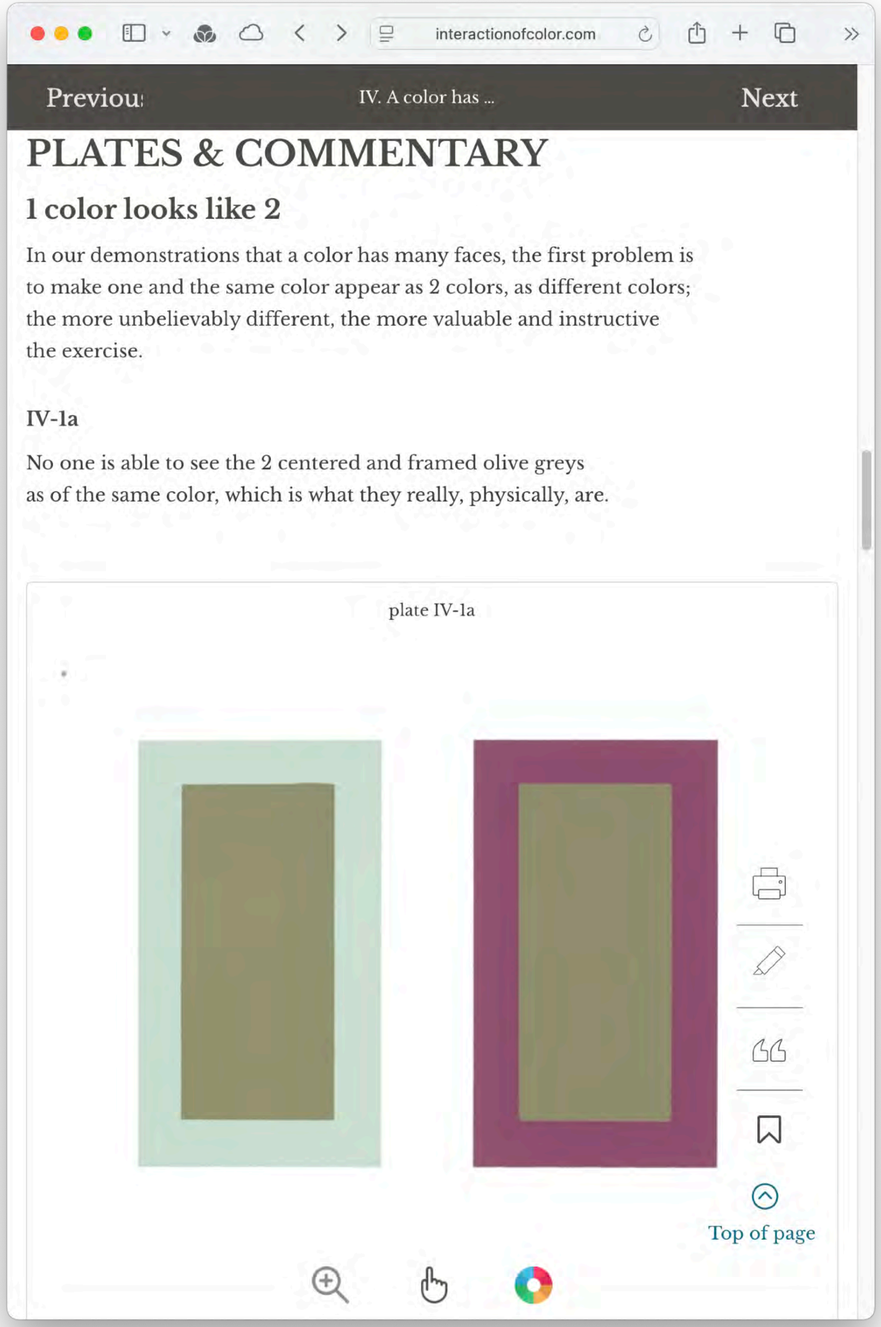
  by Josef Albers
- Interacting with Color
  by Fritz Horstman
- Color-aid Paper

Learning More

Digital Resources

- Yale "Interaction of Color" interactionofcolor.com



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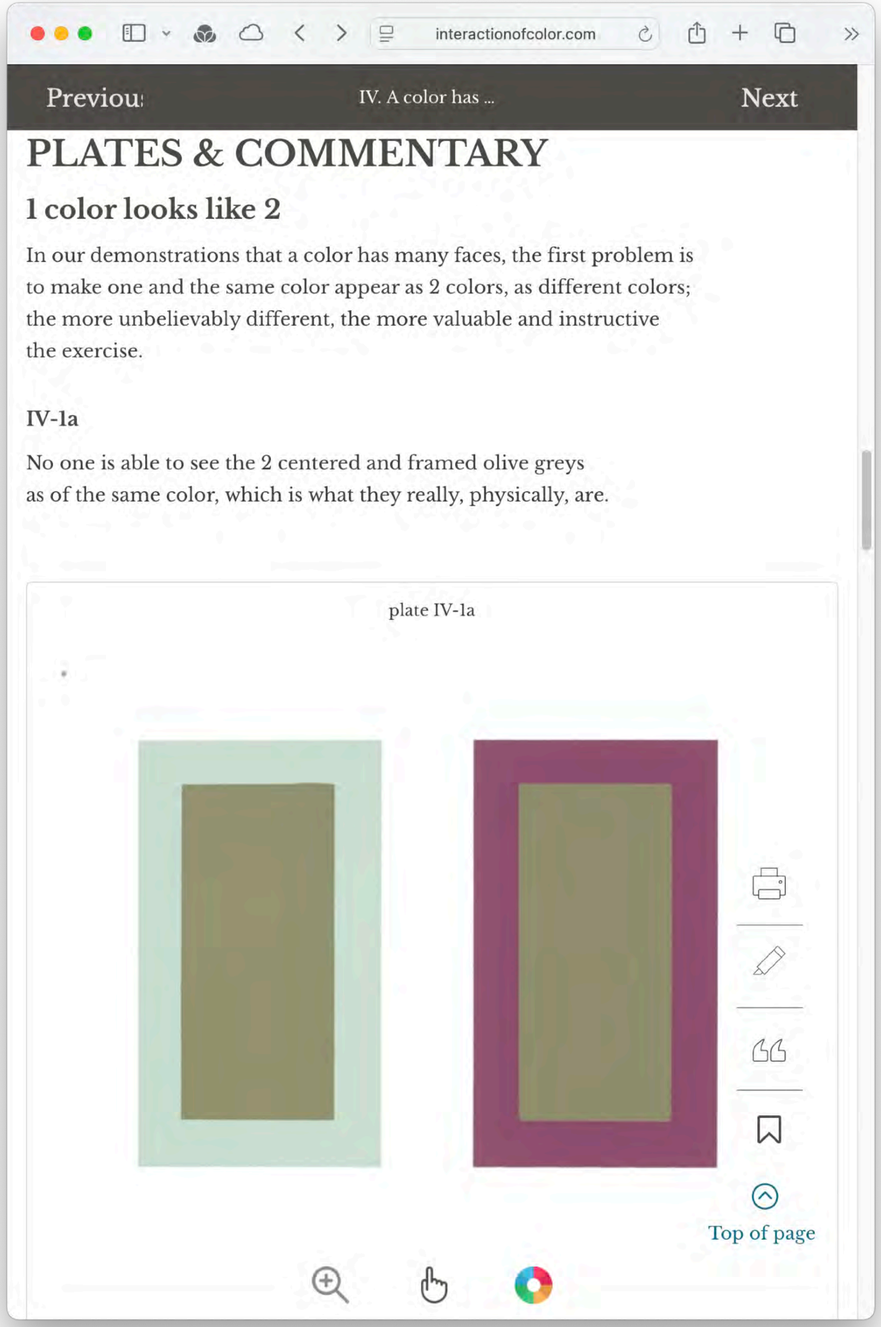

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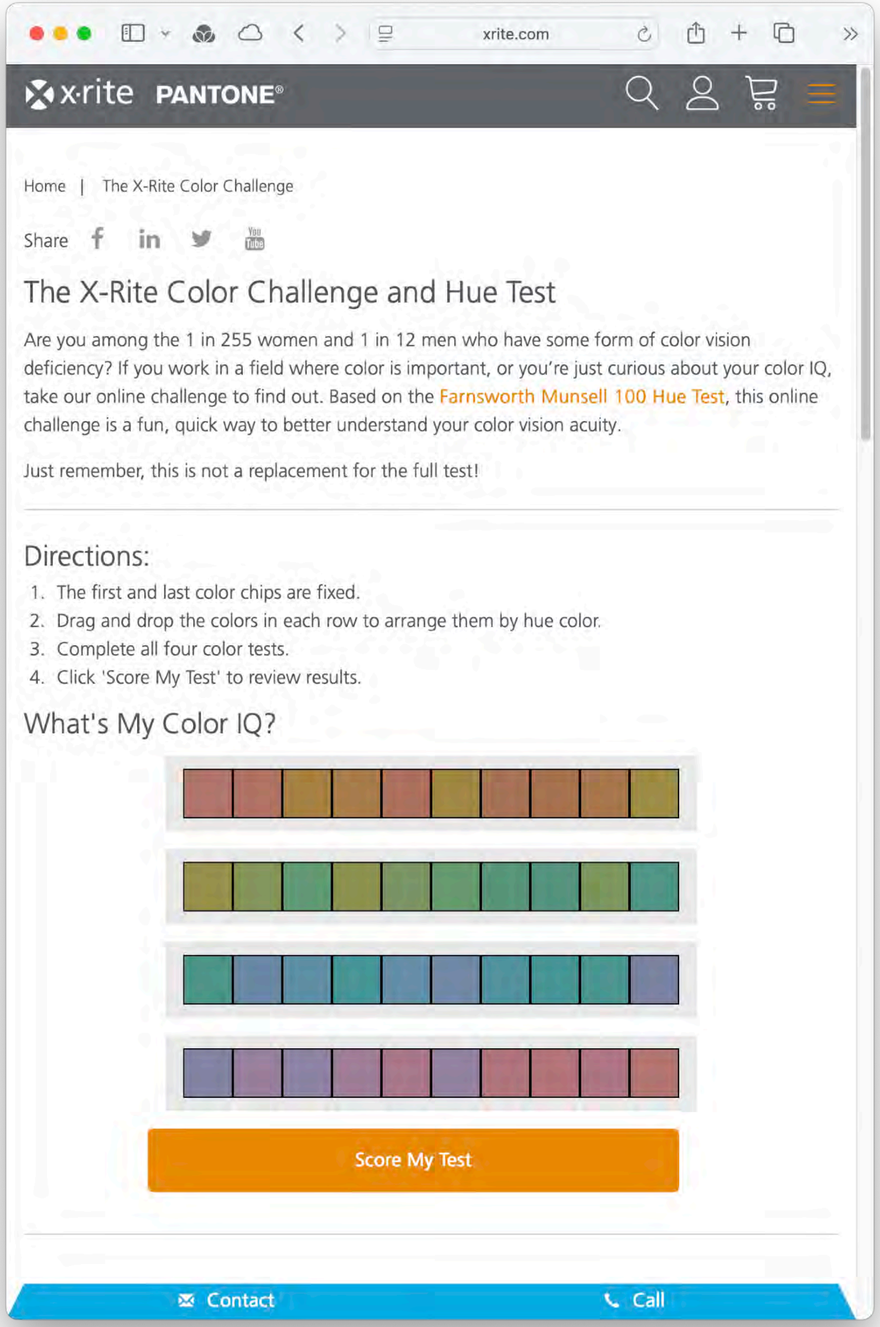
  - Color IQ Hue Test www.xrite.com/hue-test



Learning More

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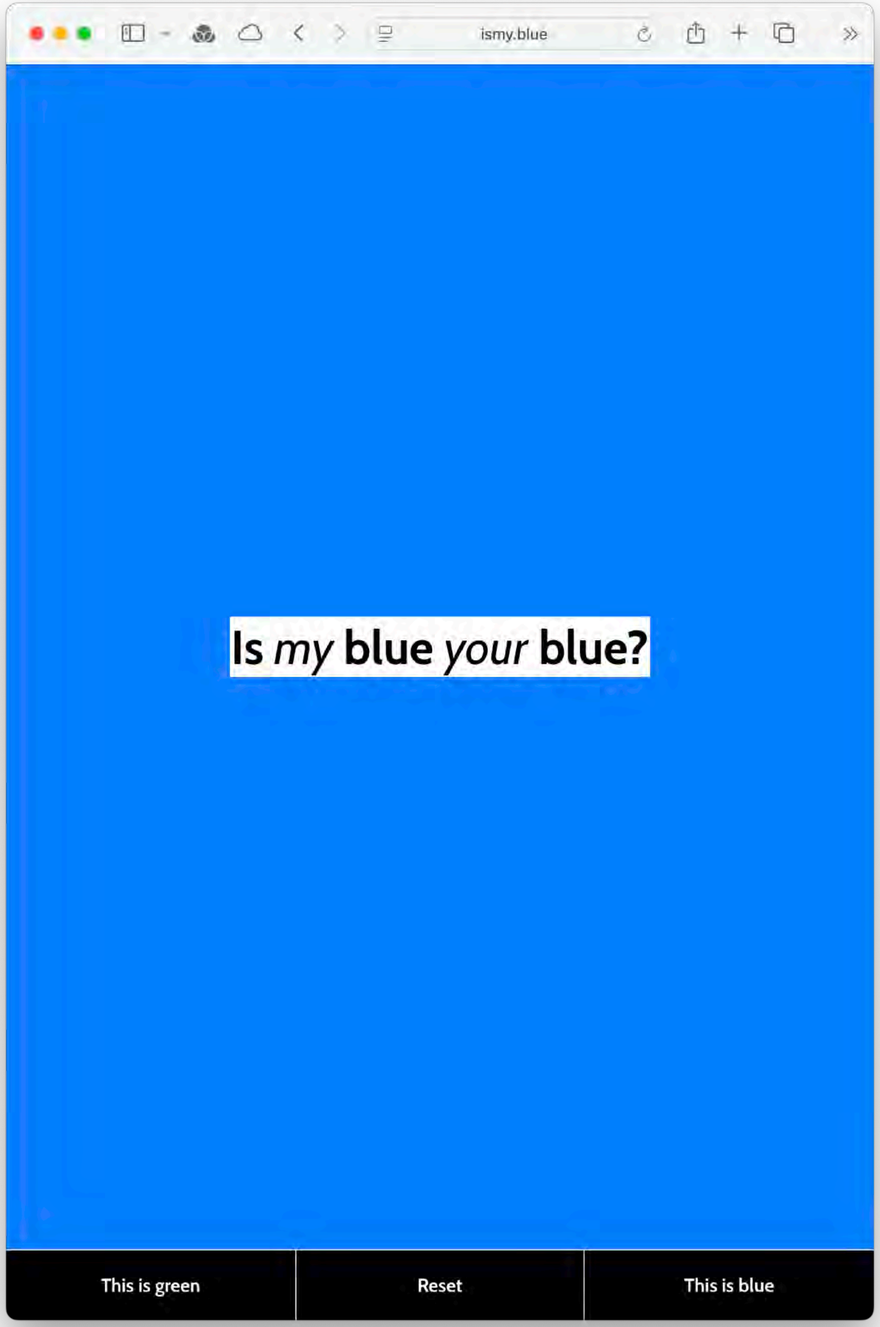
  - Color IQ Hue Test www.xrite.com/hue-test
  - Is My Blue Your Blue ismy.blue



Final Thoughts

The commonality between **science** and **art** is in trying to see profoundly: to develop strategies of seeing and showing.

Edward Tufte, statistician, writer, and artist

Thank You!

https://mitten.lol

@mitten@social.lol

Poster Session: Sunday 10:00a - 1:00p