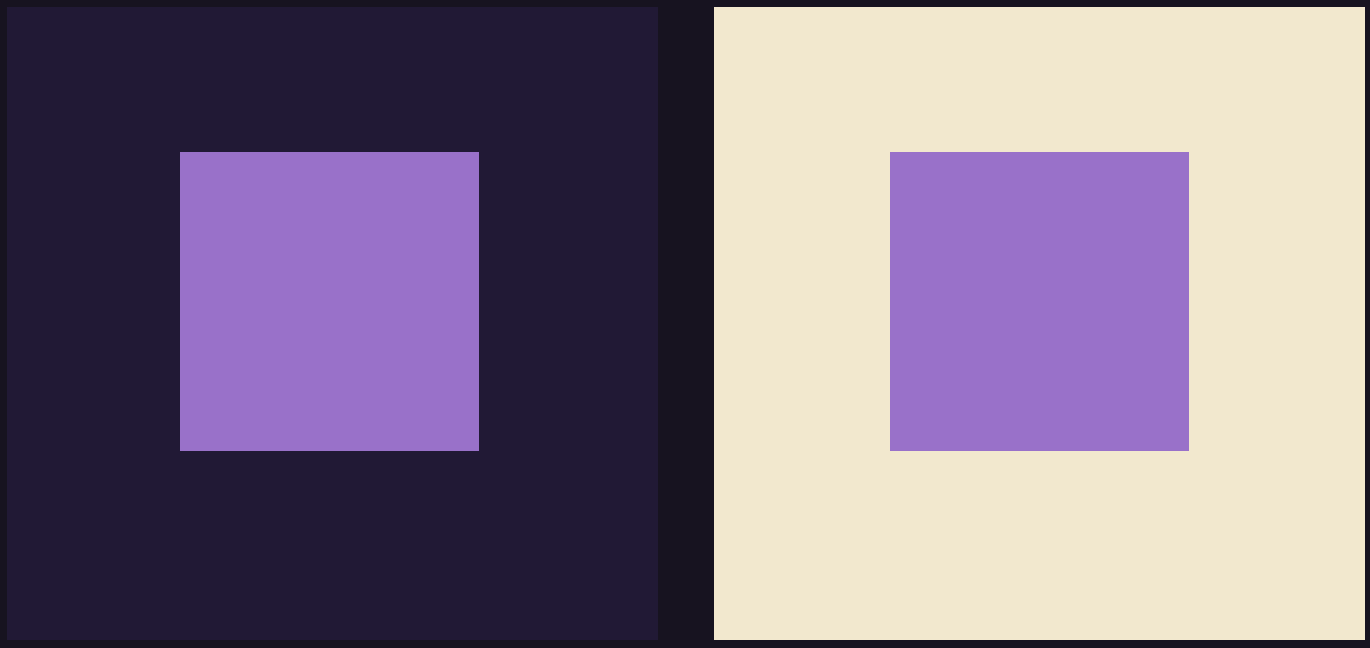
SAHILWHO.ONLINE / FACTORY EXHIBIT 008

COLOUR & CONTEXT

SAME PIXELS. DIFFERENT WORLD.

An interactive field guide to simultaneous colour contrast, colour constancy and the limits of a screen-based experiment.



CENTRE A = CENTRE B = #9971C9

A useful demonstration. Not a diagnostic test or a new scientific study.

Sahil Tayal | 28 October 2026 | sahiltayal.com

READ THIS FIRST

A COLOUR IS NOT A CONTEXT-FREE FACT

A screen can assign two patches exactly the same red, green and blue numbers, yet the patches may look different when surrounded by different fields. The central idea of this field guide is precise: specified pixel equality does not guarantee identical perceived appearance. Colour vision works with relations, adaptation and inferences about scenes. The aim here is not to manufacture amazement. It is to make one small aspect of visual experience easier to investigate.

This guide accompanies colorandcontext.sahilwho.online. It is also designed to be useful offline. The exercise requires only two identical samples and two surrounding sheets, or the printed illustration below. There is no collection of visitor answers, no diagnosis and no fictional scientific score.

Four concepts to keep separate

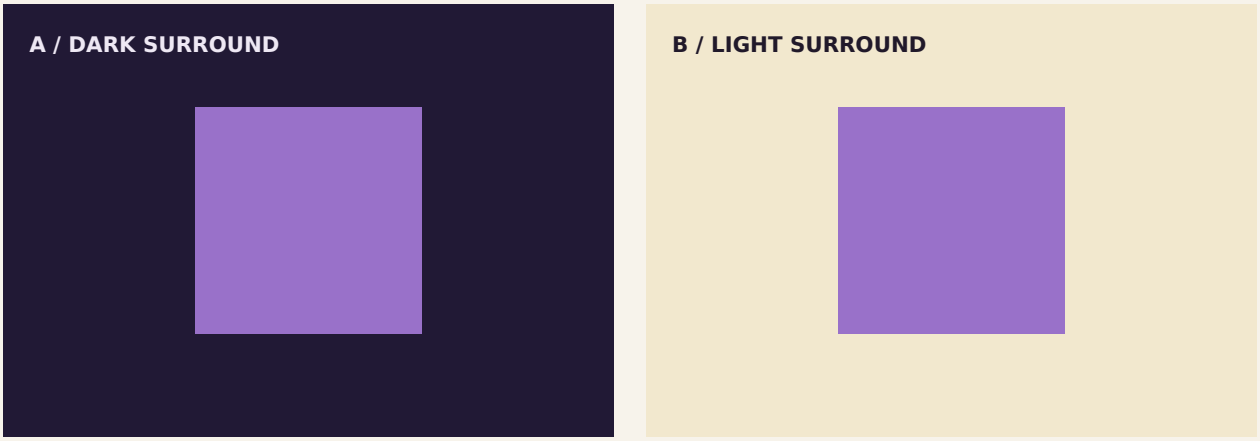
Physical input: The wavelength distribution of light arriving at an eye, and the display properties that help produce it. A hex code specifies an sRGB colour value, but not a guaranteed real-world spectral stimulus.

Colour appearance: The experience of hue, lightness and saturation as seen by a particular person under particular conditions. Appearance can vary even when digital values remain fixed.

Simultaneous contrast / chromatic induction: The effect of one region on the appearance of another region that is present at the same time. Surround colour, boundaries, geometry and adaptation can all affect observed results.

Colour constancy: The usually useful tendency for a surface to retain a relatively stable apparent colour even when the illumination changes. It is not perfect and is not the same thing as a colour-contrast effect.

The central demonstration



The two illustrated centre squares are drawn with the same specified fill (#9971C9), while the surrounds differ. A printed copy may introduce printer and paper variations. For a stronger control, use two cut-outs from the same piece of coloured paper, rather than assuming a printer reproduces identical colours perfectly.

DO THE INVESTIGATION

A PRINT-FRIENDLY EXPERIMENT

Question: Do two identical samples appear identical when their surroundings are different? We are not attempting to measure a universal effect size. We are collecting careful personal observations under a stated set of conditions.

Materials and setup

Use a pair of small coloured paper squares cut from a single sheet. Place one on a dark large sheet and the other on a pale large sheet. A purple or neutral-grey target may be convenient. Alternatively, use the live digital comparator and keep its target colour fixed. Avoid glare if possible; view the two at similar distances. Describe any effect in words, not a numerical “illusion strength”.

Procedure: one change at a time

1. Predict. Before looking for long, write what you expect to happen. Will the samples look equally light? Might one appear more colourful? Do you expect no difference?

2. Observe. View both samples against their separate surrounds. Record a neutral description: “A looks lighter,” “B seems more saturated,” or “I cannot tell a difference.”

3. Control. Bring the samples next to each other on one neutral background, or enable the online bridge. If they look more similar, the surround was plausibly relevant. It is not proof of a unique neural mechanism.

4. Reverse. Swap the backgrounds while keeping the two central samples unchanged. Does the apparent relationship change direction? If not, note it.

5. Vary one condition. Try a ring pattern, a warmer field, a shorter viewing period, or another viewing distance. Do not change several features at once if you wish to discuss causal explanations.

6. Compare explanations. Could local contrast help explain the result? Could apparent lighting or a sense of shadow matter? Which controlled observation might help separate the accounts?

Observation log

Target description / hex	Surround A	Surround B
_____	_____	_____
Device / room light	Viewing distance	Pattern / duration
_____	_____	_____

Describe what you saw, including uncertainty.

WHY CONTEXT MATTERS

FOUR MECHANISMS, NOT ONE MAGIC TRICK

1 / Spatial relationships

A visual region is interpreted alongside neighbouring regions. A mid-grey area placed inside a dark region may appear lighter than the same area placed inside a bright region. Chromatic surrounds can likewise change the apparent hue or saturation of a centre colour. The effects depend on geometry, intensity, surround configuration, viewing state and other conditions. Krauskopf and colleagues (1986) tested candidate mechanisms of simultaneous chromatic induction and found evidence pointing beyond very simple accounts limited to independent receptor responses.

2 / Adaptation

The visual system adapts to its environment. Recent exposure to a given distribution of stimuli can alter the subsequent appearance of colour, brightness and other visual attributes. Adaptation is not inherently a visual error: it can help a perceptual system adjust to different environments. Webster (2015) reviews how these processes operate across levels and timescales. Our simple comparator cannot cleanly isolate adaptation from other influences; careful scientific protocols would be needed for that.

3 / Constancy and illumination

Real surfaces do not emit fixed RGB values into the eye. Light reflected from an object is affected by the light illuminating it. We nevertheless often recognize a white shirt as white under changing illumination. That stability is termed colour constancy and is neither exact nor unconditional. Reviews by Foster (2011) and Hurlbert (2007) describe the challenge; Delahunt and Brainard (2004) studied constancy when reflected illumination varies. A picture of a shadow can invite the observer to consider which information belongs to material colour and which belongs to lighting.

4 / Scene interpretation and competing models

Accounts of colour appearance can emphasize local spatial interactions or higher-level interpretation of light, material and geometry. The alternatives are not always exclusive. Adelson’s checker-shadow illusion is a famous case in which scene cues shape lightness judgments. The dress photograph discussed by Lafer-Sousa, Hermann and Conway (2015) illustrates different reported colour categories for one image; later research has examined the relationship between illumination assumptions and spatial filtering. This field guide does not select one single universal explanation for all such cases.

A useful distinction about numbers

The online comparator computes a contrast ratio using sRGB relative luminances: $(L_{lighter} + 0.05) / (L_{darker} + 0.05)$. This ratio can help describe lightness contrast between a target and its flat background. It is not a measured perceptual difference, a diagnosis, a colour-vision ability score or a predictor that one specific person must experience an illusion. W3C uses related contrast calculations for web accessibility assessment, where ordinary text typically needs at least 4.5:1 contrast at WCAG AA level, subject to defined exceptions.

OBSERVATION VERSUS INFERENCE

TWO DOCUMENTED CASES

Case A / The checker-shadow illusion

Edward H. Adelson introduced a celebrated image in 1995 featuring a checkerboard and a cast shadow. Two squares in the image have equal grey levels, yet many viewers experience them as having different lightness. That scene suggests a useful distinction: a physical image value and a perceived interpretation of surface reflectance are not equivalent. The checker-shadow is primarily about lightness, not an all-purpose model for every chromatic effect. Its original explanation and proof are available from MIT's Perceptual Science Group. [5]

Case B / #TheDress

A photograph widely circulated in 2015 elicited blue-black and white-gold reports. Lafer-Sousa, Hermann and Conway documented striking variation between observers, while subsequent analyses considered roles for inferred illumination and properties of spatial filtering. The example shows that one image can be ambiguous about its scene. It does not mean that two people who report different colours have different moral character, intelligence or honesty. [6, 10]

Questions for a research-minded monkey

Observation: What can you verify independently of perception? In the comparator, both centre elements share an identical CSS colour value. In the physical experiment, both pieces come from one sheet of paper.

Interpretation: What did you experience? The answer may be subjective, partial or unstable. Try wording such as "On this screen, under this lamp, A looked darker to me."

Mechanism: Which explanation fits? Consider local contrast, inferred illumination, adaptation, and the geometry of the scene. Do not treat the first plausible explanation as established fact.

Limitations: Would the effect survive another monitor, a changed room light, a physical sample, an alternate viewing period or additional observers? What design would help answer that question?

Avoid these tempting overclaims

"I see the correct colour and other people are wrong." The demonstration specifies digital values, not a privileged visual report. "This proves the brain invents reality." That is rhetoric, not a scientific conclusion. "A person's colour judgement reveals their personality." This exhibit supplies no such evidence. "An accessibility contrast ratio measures how dramatic the illusion is." It does not. Preserve the distinction between a verified value and an inferred experience.

DESIGN & DISCUSSION

TAKE THE IDEA SOMEWHERE USEFUL

Application / The interface you actually ship

Consider a digital service with a warning button, a muted caption and a bright background image. A palette can look harmonious in an isolated swatch sheet but become visually confusing in the finished layout. Local surrounds, visual hierarchy and the distribution of high-contrast elements alter perceived emphasis. A design decision should account for context as well as individual colour values. Accessibility requires more than a mood board: use adequate text contrast, visible keyboard focus, meaningful text labels and alternatives that do not encode meaning in colour alone. The W3C describes 4.5:1 for standard-sized text and 3:1 for large text at WCAG AA, with exceptions and separate rules for non-text content.

Application / Describing what is hard to describe

People use categories such as purple, mauve, blue and grey to communicate colour. The borders of these labels are not simply properties of wavelengths. Research on colour naming considers perceptual constraints together with linguistic and communicative influences. Regier, Kay and Khetarpal (2007) offer one model of why category systems can be useful and patterned. That literature is not equivalent to the claim that words alone determine every person’s visual experience.

Five discussion prompts

1. If the two centre swatches are exactly equal, what would count as evidence that context changed their apparent colour?
2. Which part of your report is an observation, and which part proposes a mechanism?
3. Why is a display with a perfectly calculated hex value not automatically a calibrated visual stimulus?
4. What makes an optical illusion a demonstration of a useful perceptual system rather than simply a malfunction?
5. Can an attractive colour palette still be inaccessible? Give a specific example.

Experiment protocol for a small workshop

Give each participant the same pair of target cards and the same two surrounding sheets. Ask them to record an individual prediction before group discussion. Let them compare privately first, then use neutral, non-judgmental language to report what they see. Switch the surrounds, ask for a second record, and discuss alternative explanations. Avoid reporting percentages or effects as population findings: a casual workshop is not a controlled, representative experiment.

Final reflection

The exhibit’s deeper question is methodological: when your senses suggest a conclusion, what part of the situation have you held constant? A measured value and an experienced quality can both matter without being interchangeable. Change one condition, look carefully, and let the evidence update the story.

READ FURTHER

SOURCE NOTES & NEXT DOORS

All ten source links below were checked against the relevant institutional or bibliographic websites during the 28 October 2026 build. These research sources support the educational explanations; this website itself does not report new data. Some journal full texts may require access through a library.

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Walk back into the universe

Colour & Context Lab — colorandcontext.sahilwho.online

Return to the Sahilverse — sahiltayal.com

Write to Sahil — sahil@sahiltayal.com (subject: Colour & Context Lab — Question)

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