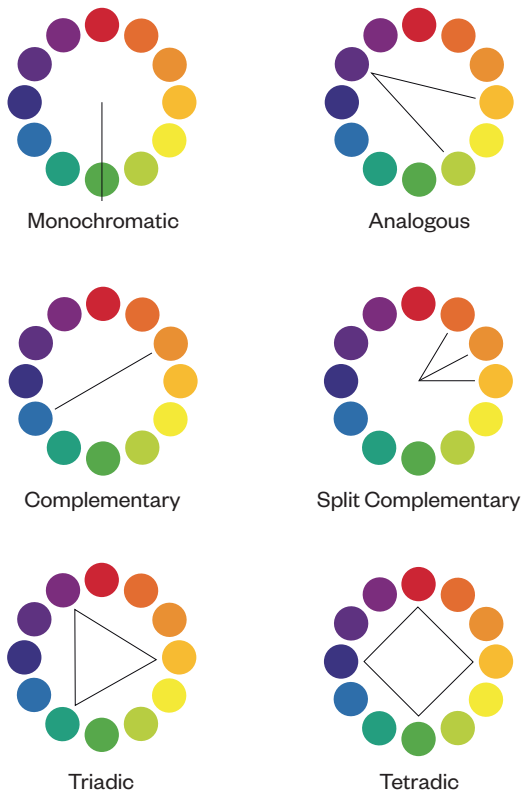


Using the color wheel can help you find balanced and contrasting color combinations, in order to differentiate and emphasize your content.

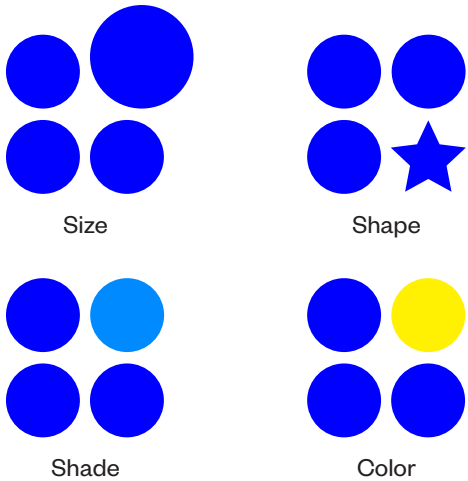


Contrast

a.k.a. using visual cues to emphasize and make clear the informational differences in your work.

Using contrast helps define the relationships between the elements on your page or in your text. The eye groups similar elements together, regardless of their proximity to each other. While contrast methods can be combined to further enhance distinction, they should not be overused in order to avoid viewer confusion.

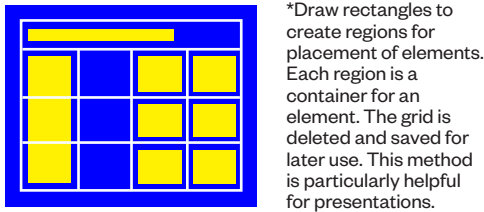
Some of the ways to create and emphasize contrast in your work are:



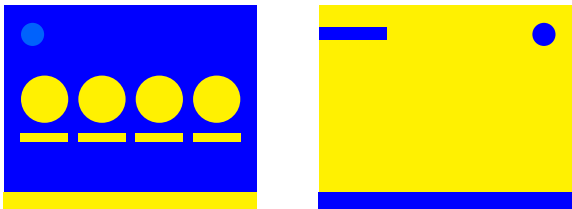
Unity

a.k.a. emphasizing overall structural and visual cohesion in your work.

Visual unity can be achieved by standardizing structure (using a grid), look (graphical style), and theme (big idea). A grid is a structure of lines used to organize content that can be used over multiple slides in order to maintain visual consistency.

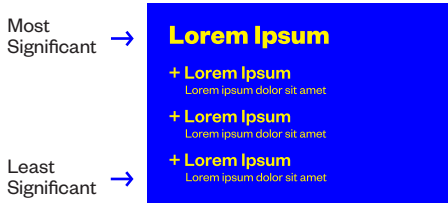


Structure (Grid)*



Hierarchy is also important in text. The size, arrangement, and positioning of different textual elements relative to one another determines their importance.

Larger text has more visual importance than smaller text and is more visually dominant on a page. When arranging text, both text and weight [normal, italic, bold, etc] determine the hierarchical ranking of different textual elements.



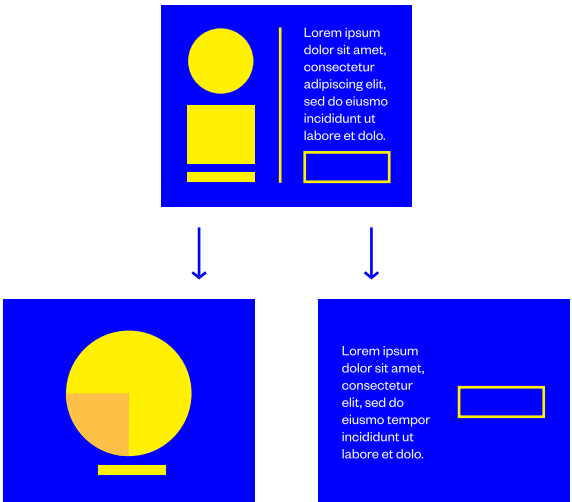
Size & Location Denote Decreasing Importance



Space

a.k.a. using negative space (the empty areas of a visual) to focus the viewer’s attention, show the relationships between elements, and improve overall visual comprehension.

Whitespace is essential, and clutter is a failure of design. If your slide is busy, break it up into several pages when possible.



Break Up Pages With Too Much Information

Continuation

a.k.a. using visual cues to guide a viewer’s eye in a certain direction.

According to the Gestalt Law of Continuity, the human eye will follow the smoothest path when viewing lines, even if variables are changed to prevent it from doing so.

Below, note that the eye will follow the straight line into the curved line first, despite the color shift indicating that you should follow the lines designated by color instead.

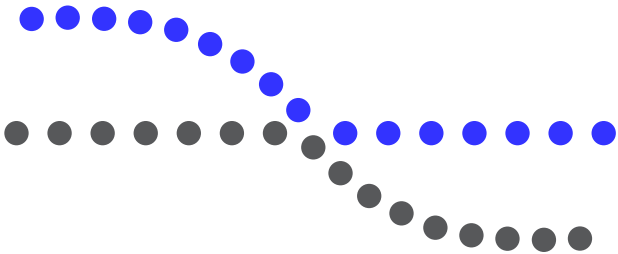




Table of Contents

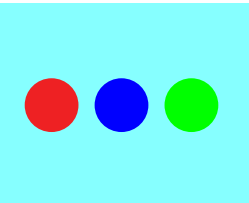
- 3 Contrast
- 4 Hierarchy
- 6 Proximity
- 7 Continuation
- 8 Flow
- 10 Space
- 11 Micro Space
- 12 Unity
- 13 Color

A booklet of essential visual design principles.

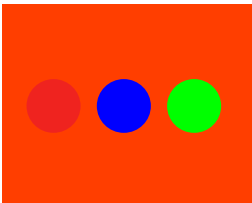
Created by Vassilissa Semouchkina
Want to learn more? Visit www.sciencetoolkit.design

The human eye requires contrast in order to distinguish information. In a majority of cases, black and white backgrounds have the best opportunity for contrast because they lack color.

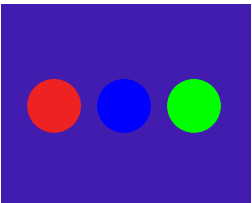
When choosing a color palette, make sure that it contrasts with your background and the other colors you have chosen, and test how it looks on a projector or screen. While colors may seem to have sufficient contrast when first selected, they can still blend in with each other when paired.



Green is Low Contrast



Red is Low Contrast

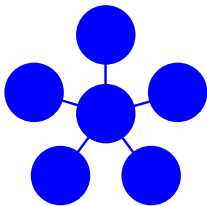


Blue is Low Contrast

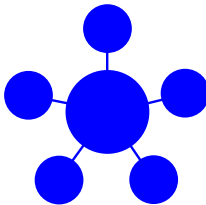
Hierarchy

a.k.a. using visual cues to show the relationships between elements.

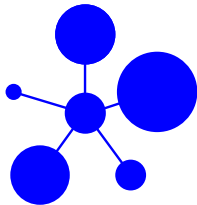
Changing the size and proximity of objects shifts a viewer's perception of their relative importance. What story are you trying to tell through the placement of the various elements in your visuals?



Elements Are Equal



Parent Dominates



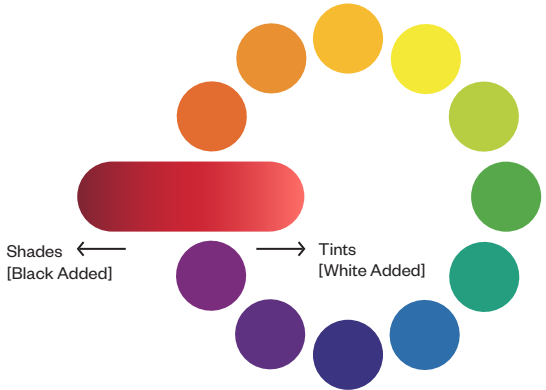
Child Dominates

Color

a.k.a. what sets the tone and establishes what your audience should expect.

When choosing a color scheme for your work, consider your audience, your industry, and, if applicable, who you are.

Understanding the color wheel can help you choose a successful palette. The color wheel has 3 primary colors (red, yellow, blue), and the blending of those colors creates the full color wheel.



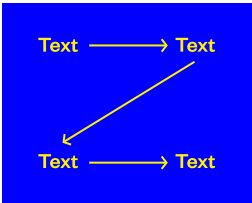
Flow

a.k.a. curating an informational order that determines how a viewer will process your content.

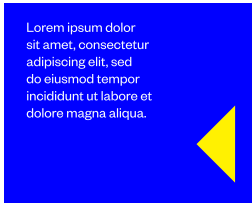
While western reading patterns typically run from left to right and top to bottom (a Z-shape), there are alternative ways to show informational flow.

The positioning of different elements in your visual can be used to direct a viewer's gaze—it can help keep a viewer on the page and target them to a different area of content or lead them off of spread entirely.

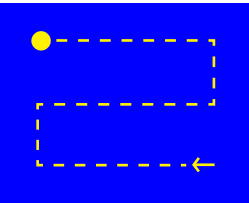
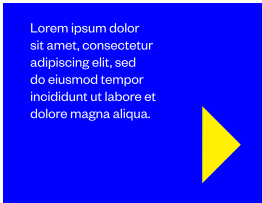
Elements can be clustered in ways that help direct how a viewer should navigate your visual. Clustering elements around a horizontal gap indicates horizontal flow, while a vertical gap indicates vertical flow.



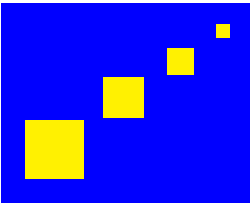
Standard Flow



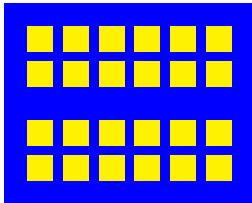
Element Direction Can Redirect Flow



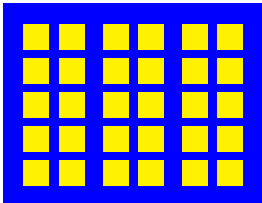
Arrow Flow



Perspective Flow



Horizontal Flow



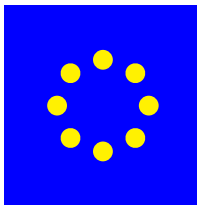
Vertical Flow

Proximity

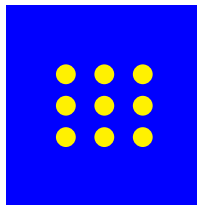
a.k.a. deriving meaning from the location and placement of elements.

Taking care to position the elements in your designs intentionally helps prevent the viewer from making unintended conclusions and helps clarify your narrative.

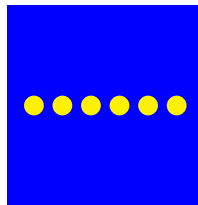
The proximity of visual elements relative to each other communicates their relationship:



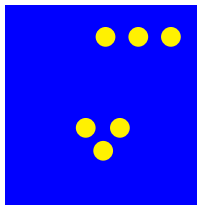
Unite / Fragment



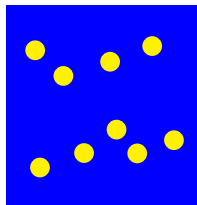
Order / Chaos



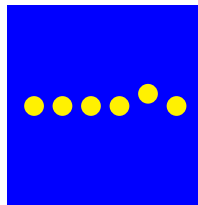
Equal / Unequal



Unite / Fragment



Order / Chaos

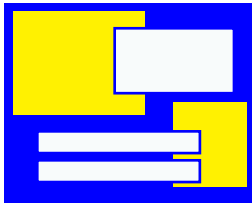


Equal / Unequal

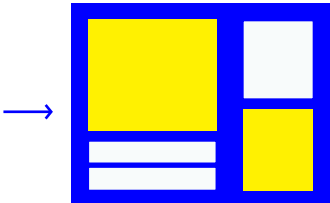
Micro Space

a.k.a. making adjustments to the small spaces between design elements can directly impact content legibility.

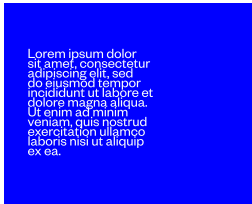
Take care to preserve small-scale negative space. Refining the small spaces between visual elements can help improve legibility as well as distinguish and highlight the different sections of your content.



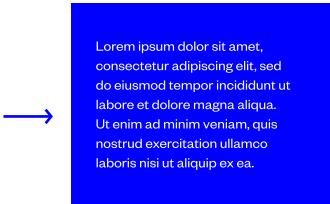
Unrefined Figure



Adjusted Figure



Unrefined Text

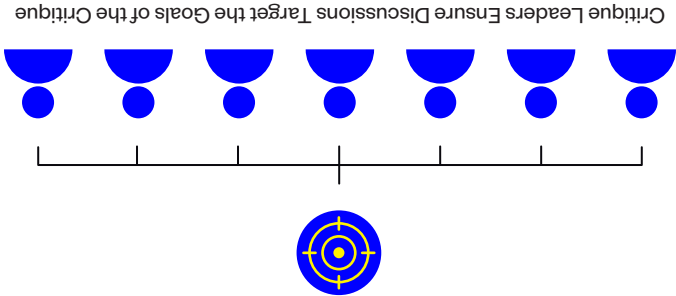


Adjusted Text

Before Critique

Before beginning a critique, have participants prepare all relevant materials and be ready to engage in discussion. A **critique leader** should be chosen to help direct conversations and keep them on track–this role can rotate each session. In addition, participants should be given a consistent format for displaying their designs–for example, should they be printed? Or displayed digitally?

Participants should consider and record their critique goals before the session. They should be ready to discuss both the goals as well as their overall project background, in order to give more context to the work.

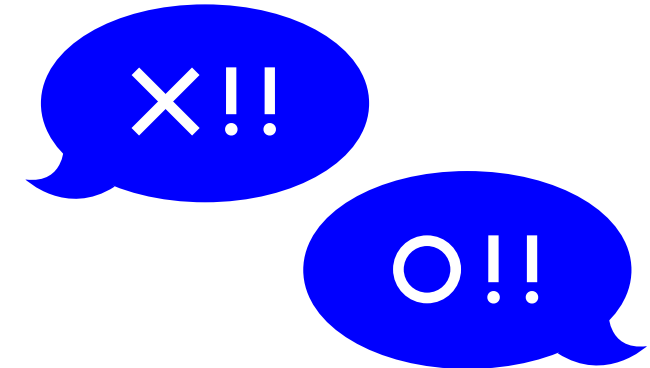


Critique Goals

Be sure to set personal and group goals for critique sessions. For example, if working on a series of figures for a publication, what should the group keep in mind when reviewing visuals? The audience? The journal requirements? In terms of personal goals, what might need to be changed to make a specific figure flow better, or show the meaning more clearly? This information also helps critiquers focus their feedback.

Before a critique begins, **participants should evaluate their own work**. Participants should come to the session prepared with the following information:

- Name of the Design Being Reviewed
- The Goal of the Design
- The Target Audience
- How the Visual Will Be Presented
- Constraints That Can't Be Changed



Why Is This Important?

Design critiques help provide insights and perspectives a user might not be able to come up with on their own through targeted discourse. Practicing design critique helps a user build critical skills in identifying and proposing solutions to visual problems.

What Is Design Critique?

Design critiques are dedicated sessions in which participants gather to evaluate design ideas and identify future directions or changes. Scientists already practice a form of critique during lab group meetings, when researchers share drafts of papers and practice presentation slides. Critiques are similar group feedback sessions, but are focused on visual communication. This feedback helps identify how modifying a visual might help it better meet its objectives.

During Critique

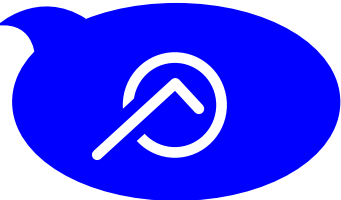
- When getting feedback:
1. **Solicit feedback.**
 2. **Actively seek constructive criticism–look to identify any weaknesses in your work.**
 3. **Consider and take note of all comments, even if you disagree with them.**
 4. **Avoid getting defensive–keep an open mind.**
 5. **Embrace receiving feedback.**
- When giving feedback:
1. **Be respectful.**
 2. **Discuss all relevant problems and don't be afraid to repeat a comment–this reaffirms that there is a noticeable issue.**
 3. **Adopt a continuous learning mindset–know that the quality of a critiquer's comments will improve with practice.**
 4. **Tailor feedback to meet the goals of the person being critiqued.**
 5. **Don't sugarcoat constructive comments.**

After Critique

After a critique concludes, make sure that everyone knows about and is able to attend the next critique. Critique relies on a shared understanding and agreement, so it is best if the same critique group can convene. Encourage participants to implement the feedback they received by updating their visuals for the next session. Participants should evaluate all feedback received against their goals and determine if implementing certain suggestions would help the visual communicate better, or not.

Discuss the successes and shortcomings of the concluded critique session in order to determine what could be improved or changed for next time. Have the critique leader record and take note of these comments for the group to consider.

Following a series of critiques, a figure should appear easier to understand and more refined than its initial version.



While learning visual design principles is helpful for understanding the essential basics of design, critique helps participants advance their understanding and utilization of these principles. Critique is arguably the most powerful tool for improving visual designs, as it provides the opportunity to receive and practice giving critical visual feedback.

Use this booklet to help initiate and get the most use out of design critiques.

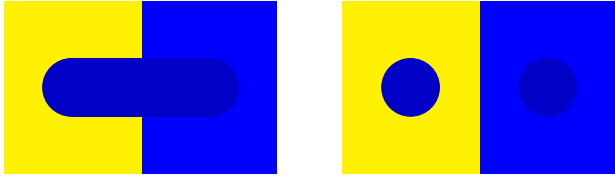
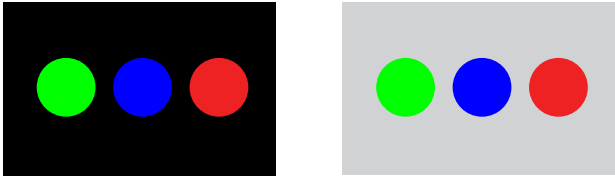
The Little Book of Design Critique for Scientists

004
Researcher's Toolkit for Visual Design and Critique

Contrast

Contrast refers to an object's difference in color and brightness compared to its surroundings or background. Ensure that your colors have enough contrast to be easily distinguished from one another—colors that originally appear different may be difficult to differentiate depending on their value and saturation.

Simultaneous contrast occurs when a single color is perceived to change when seen against different colored backgrounds.



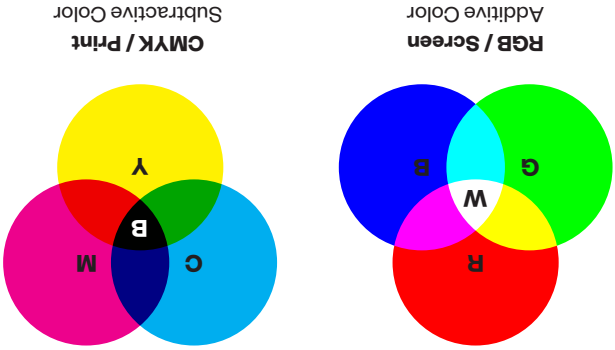
CMYK & RGB

CMYK and RGB are digital color models.

CMYK refers to the four ink plates used in most color printing: cyan, magenta, yellow, and black. CMYK colors are subtractive, meaning that colors get darker as you blend them together.

RGB refers to red, green and blue lights that are added together to reproduce a wide array of colors on computers, phones, and other electronic devices. RGB colors are additive, meaning that they grow brighter as you blend them together.

Because RGB colors are meant for digital display, the colors of visual designed with this color model might appear significantly different when printed, as they will be converted to CMYK.



Color Harmony Rules

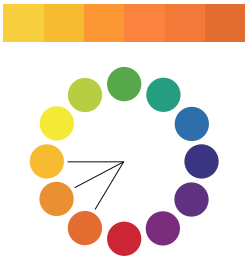
Color harmony refers to a set of theoretical properties which certain aesthetically pleasing color combinations have.

Using a color wheel makes it easy to identify and make use of the relationships between colors. Understanding color relationships can help you create effective, harmonious, and contrasting color schemes.

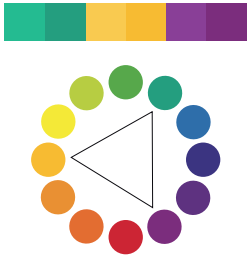
While there are others, some of the basic and most commonly used color schemes are as follows:



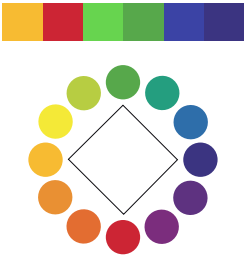
Monochromatic
Derived from a single hue and extended



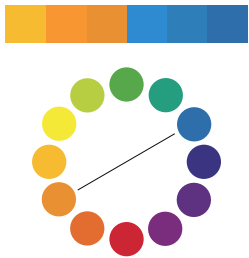
Analogous
Derived from three hues that are next to each other



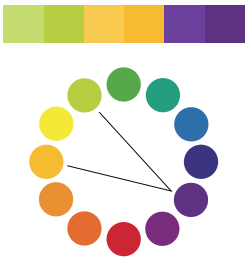
Triadic
Derived from evenly spaced colors around the color wheel



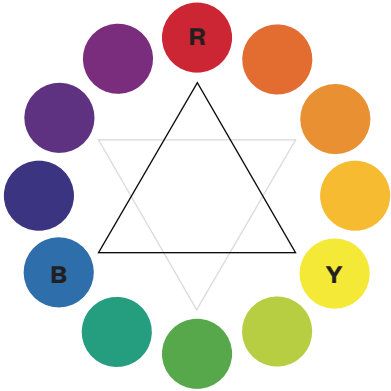
Tetradic
Derived from two sets of complementary colors



Complementary
Derived from two opposite colors on the color wheel



Split Complementary
Derived from two colors next to a complementary color



Color Wheel
△ Primary Colors
▽ Secondary Colors

Color wheels help show the relationships between colors. Using the color wheel can help create effective, harmonious, and contrasting color combinations.

The color wheel has three **primary colors** (red, yellow, blue), and the blending of these colors creates the full color spectrum. Blending primary colors together creates the **secondary colors** (purple, green, orange), as well as other colors.

Color Wheel

The Little Book of Color Theory for Scientists

Color is one of the most crucial components of a visual composition. Color sets the tone and emotional quality of your work and helps establish what the audience should expect. Too little color can leave your work feeling dry and lifeless, while too much can interfere with the legibility of your content and cause your visual to feel overwhelming.

Use this booklet when considering how to approach and better utilize color in your scientific visuals.

003
Researcher's Toolkit for Visual Design and Critique

Hue/Value/Saturation

Hue refers to a true color – consider pure red, blue, yellow, etc. Hue does not determine whether a color is dark or light.

Value is the relative lightness or darkness of a color. A color's value is changed by adding white or black to a hue—however, the hue itself is held constant.

Saturation refers to the amount of pigment in a color—a saturated color will look bright, while a desaturated color will appear dull.



Hue



Value



Saturation