

20 Color and Factor of 7

Friday, March 12, 2021 9:51 PM

Today:

Magic Factor of 7
Color

Magic Factor of 7

Here is some advice I got from Larry Talbot, my PhD advisor:

"In research, tasks will take you 7 times longer than you think they should"

You may think that you are a reasonably good project planner, that things may take longer than you plan by a factor of 2 or 3, but a factor of 7? Really? Why?

Everyone acknowledges the difficulty of planning when there are many unknowns.

Used in project planning and risk assessment. You must consider

- **Known knowns:** things we know we know. You can make reasonable estimates of time regarding these issues. For example, how long it will take to order a material you need, or carry out an assembly step you have done before.
- **Known unknowns:** things we know that we don't know. For example you may know that you will need to learn to use a 3D printer for your projects. 'How to use a 3D printer' is a known unknown.
- **Unknown unknowns.** Things you have no way to predict for.
 - ◆ Examples from previous years: A family emergency. A catastrophic laser cutter failure that will take months to repair. A nationwide shortage and backorder of a widget you need. Your friend who was going to help you with 3D printing falls in love and has no more time for you, and there are no more workshops offered this semester.
 - ◆ Example for last spring: Coronavirus.

This is a type of epistemology, knowledge about knowledge. "Epistemology is the investigation of what distinguishes justified belief from opinion." <https://www.google.com/search?q=epistemology&ie=utf-8&oe=utf-8>

Very topical given recent controversies around national news!

Rabbit holes, anybody?

There is a fourth category sometimes added: unknown knowns, things we deny knowing.

"Unknown unknowns" was made famous in 2002 by Donald Rumsfeld during the Iraqi War w.r.t WMDs, but has been used by NASA and others since the 1950's.

https://en.wikipedia.org/wiki/There_are_known_knowns

For time management and planning, some use a time order-of-magnitude safety factor:

if it should take 1 second, it will take 1 minute

if it should take 1 minute, it will take 1 hour

If it should take 1 hour, it will take 1 day

and etc, for days, weeks, months, years.

Factors of 60, 60, 24, 7, 30 etc. Perhaps excessive.

This may work, but I have found the Magic Factor of 7 to be remarkably accurate for doing anything new, in research or design.

Color

The Black Effect is no excuse for racism. Instead, we should all be aware of a potential unconscious/implicit biases, and guard against being influenced by them.

<https://implicit.harvard.edu/implicit/takeatest.html>

Red effects

Increases attractiveness of humans, but suppresses high level cognition.

Only wear red on weekends, unless negotiating.

Nomenclature

Digital, photoshop

Pantone <https://en.wikipedia.org/wiki/Pantone>

Additive/subtractive physics

Other aesthetics of color

Texts

Page from Universal Principles of Design

Color

Color is used in design to attract attention, group elements, indicate meaning, and enhance aesthetics.

Color can make designs more visually interesting and aesthetic, and can reinforce the organization and meaning of elements in a design. If applied improperly, however, color can seriously harm the form and function of a design. The following guidelines address common issues regarding the use of color.¹

Number of Colors

Use color conservatively. Limit the palette to what the eye can process at one glance (about five colors depending on the complexity of the design). Do not use color as the only means to impart information since a significant portion of the population has limited color vision.

Color Combinations

Achieve aesthetic color combinations by using adjacent colors on the color wheel (analogous), opposing colors on the color wheel (complementary), colors at the corners of a symmetrical polygon circumscribed in the color wheel (triadic and quadratic), or color combinations found in nature. Use warmer colors for foreground elements, and cooler colors for background elements. Light gray is a safe color to use for grouping elements without competing with other colors.

Saturation

Use saturated colors (pure hues) when attracting attention is the priority. Use desaturated colors when performance and efficiency are the priority. Generally, desaturated, bright colors are perceived as friendly and professional; desaturated, dark colors are perceived as serious and professional; and saturated colors are perceived as more exciting and dynamic. Exercise caution when combining saturated colors, as they can visually interfere with one another and increase eye fatigue.

Symbolism

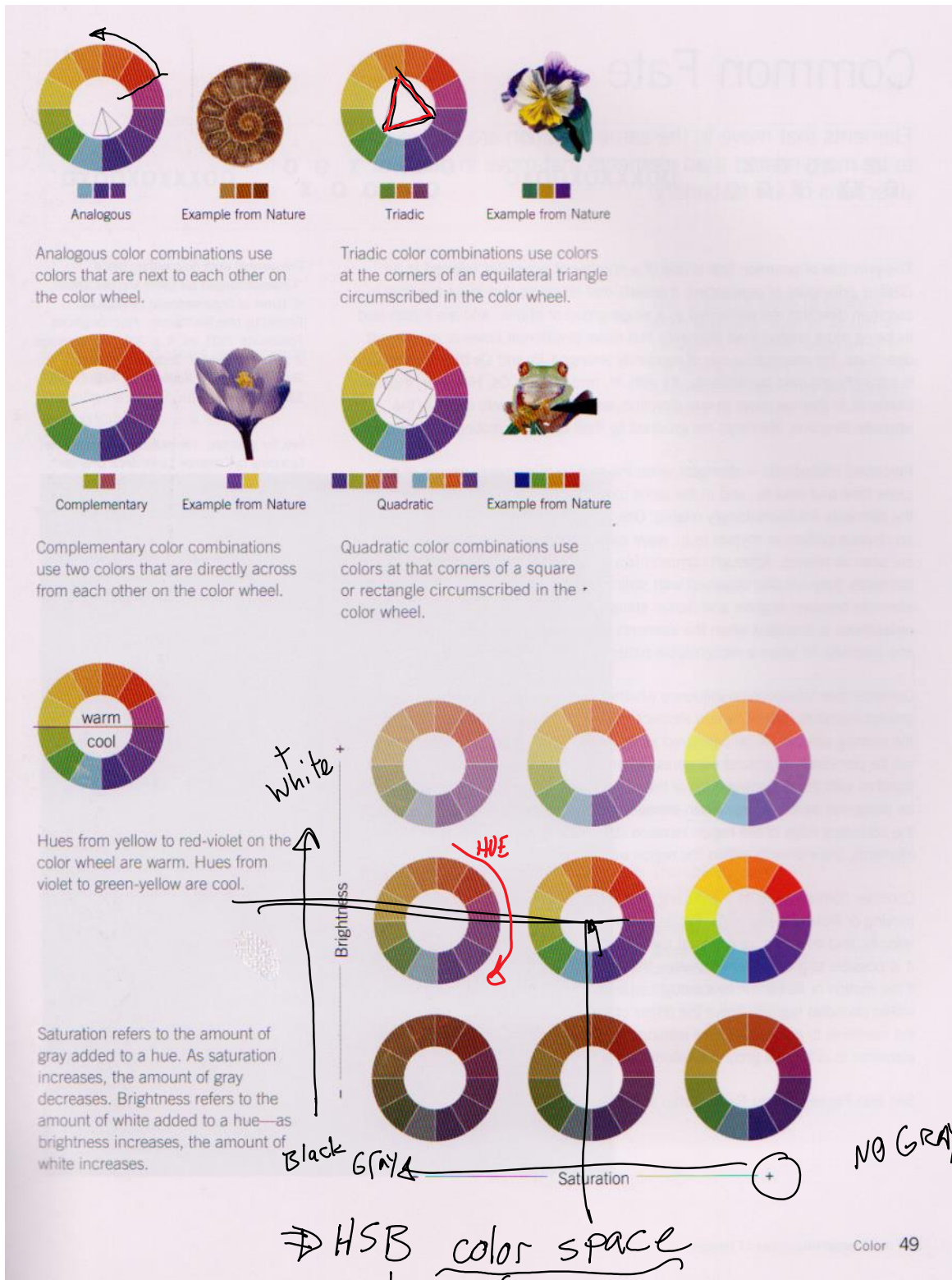
There is no substantive evidence supporting general effects of color on emotion or mood. Similarly, there is no universal symbolism for different colors—different cultures attach different meanings to colors. Therefore, verify the meaning of colors and color combinations for a particular target audience prior to use.²

See also Expectation Effect, Highlighting, Interference Effects, Similarity, and Uniform Connectedness.

¹ A nice treatment of color theory is *Interaction of Color* by Josef Albers, Yale University Press, 1963. For a more applied treatment, see *The Art of Color: The Subjective Experience and Objective Rationale of Color* by Johannes Itten, John Wiley & Sons, 1997; and *Human-Computer Interaction* by Jenny Preece, et al., Addison Wesley, 1994.

² It is reasonable to assume that dark colors will make people sleepy, light colors will make people lively, and irritating colors will make people irritated. Otherwise, the only observable influence of color on behavior is its ability to lead people to repaint walls unnecessarily. For those determined to try to calm drunks and win football games through the application of color, see *The Power of Color* by Morton Walker, Avery Publishing, 1991.

Girl-Boy Pink-Blue preferences are from cultural training. Pink used to be boy color before 1930s; from diluted blood (red was male color)

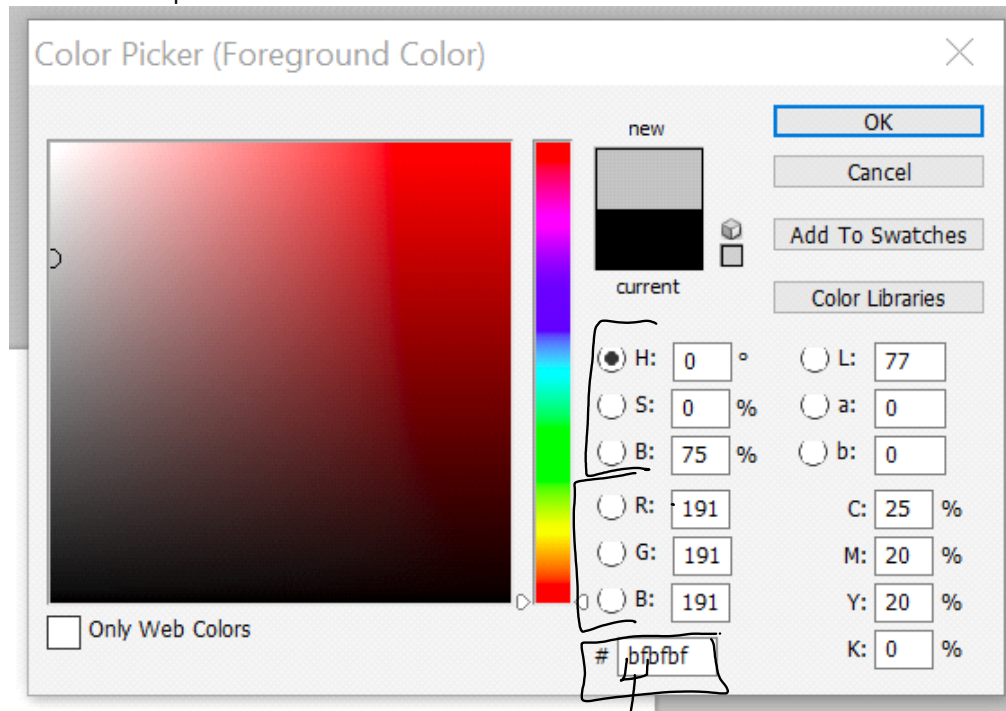


Color Nomenclature

Color space = method of defining a specific color.
 Gamut = Range of colors that can be produced by a technology
 Matching across devices, technologies = color management
 From Photoshop:

Hue
 Saturation
 Brightness

SRGB



4 color spaces;
 HSB, RGB,
 LAB, CMYK

Printing
 Cyan
 Magenta
 Yellow
 black

RGB
 in
 hexadecimal

2 bytes per
 4 color spaces
 0 - 9 A B C D E F

00 FF
 0 - 255
 dark * Fully
 turned
 on

R G B
 F F F F F F
 White

<http://colorizer.org/>

Shows conversion between many color spaces. Also shows complementary, triad, square etc. pairings

Another site for choosing palettes, from Olivia: <https://coolors.co/>

Adobe Color - similar

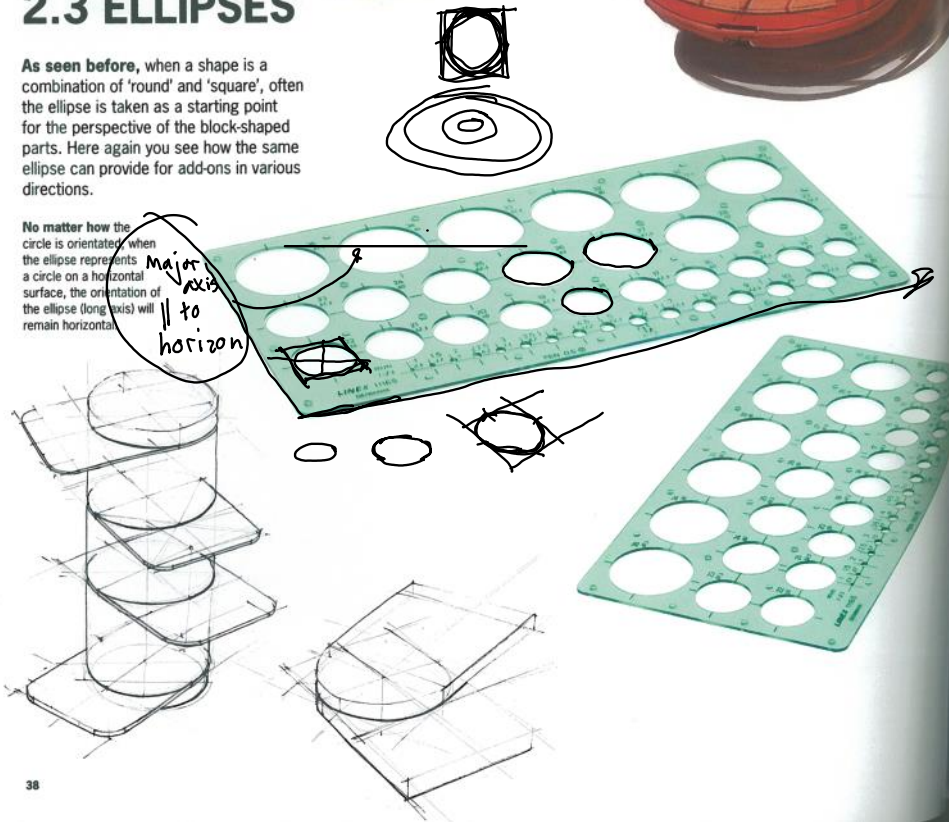
Ellipses

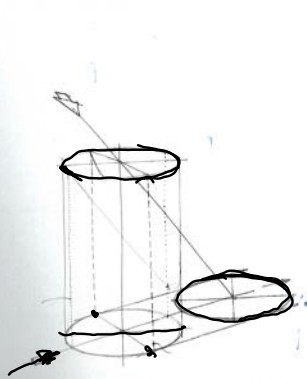


2.3 ELLIPSES

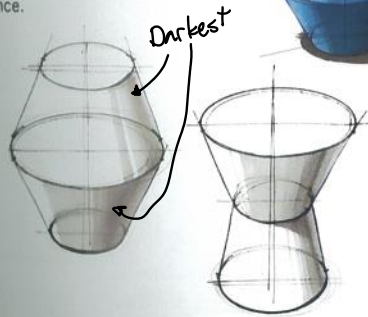
As seen before, when a shape is a combination of 'round' and 'square', often the ellipse is taken as a starting point for the perspective of the block-shaped parts. Here again you see how the same ellipse can provide for add-ons in various directions.

No matter how the circle is orientated, when the ellipse represents a circle on a horizontal surface, the orientation of the ellipse (long axis) will remain horizontal.



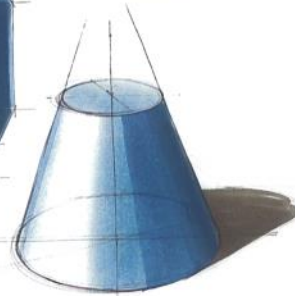
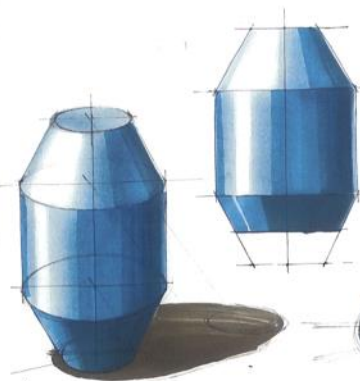
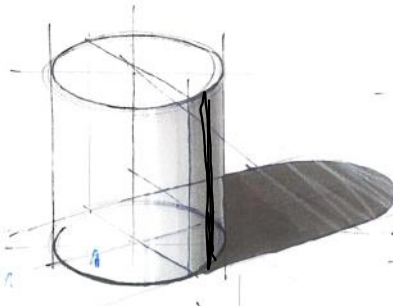


The cast shadow of a cylinder consists of a projection of its top surface on the ground, using the 2 lines that describe the light direction, connected to the cylinder itself with tangents. It is here that the shading of the cylinder starts. This shading does not have its darkest part at the outline of the shape, but a little 'inside' it. This is caused by ambient light and reflection. It is this effect that gives a shape its round appearance.

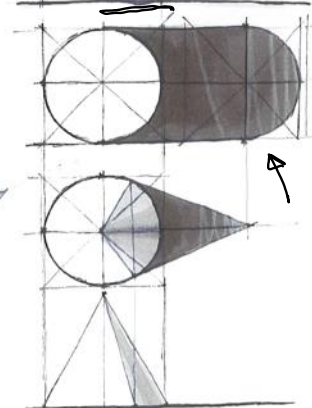


Tip

A conical shape pointed upwards or downwards will have a very different shading from that of a cylinder. When these shapes are simply combined, without a smooth rounding transition, the shading of that object will have drastic 'jumps'.



darkest
reflected light



Watch out for errors like shading parallel to the outline of the cone, shading without difference between reversed cone shapes or wrongly connecting shadings of cones and cylinder.

