Building User Interfaces

Visual Design

Professor Bilge Mutlu

What we will learn today?

— Elements and principles of design

— Color, type, and images

Elements of Design

Elements of Design

1. Space
2. Line
3. Shape
4. Size
5. Pattern
6. Texture
7. Value

Space[1]

Definition: Space is the canvas on which visual elements are placed.

— Space can be *positive* or *negative*

— *Positive:* where the subject is positioned

— *Negative:* the space surrounding the subject

— Negative space can be used as positive

[1] Image sources: this slide, next slide: left, right

Now data
helps **pinpoint**
more oil.

In Venezuela, IBM deep computing processes seismic data,
helping Tricon Geophysics pinpoint new oil and gas using
40% less energy. **ibm.com**/smarterplanet

IBM

Food is
now **prepared**
for space.

The European Space Agency is using smarter
research to turn 100% of an astronaut's junk
back into food. **ibm.com**/smarterplanet

IBM

6
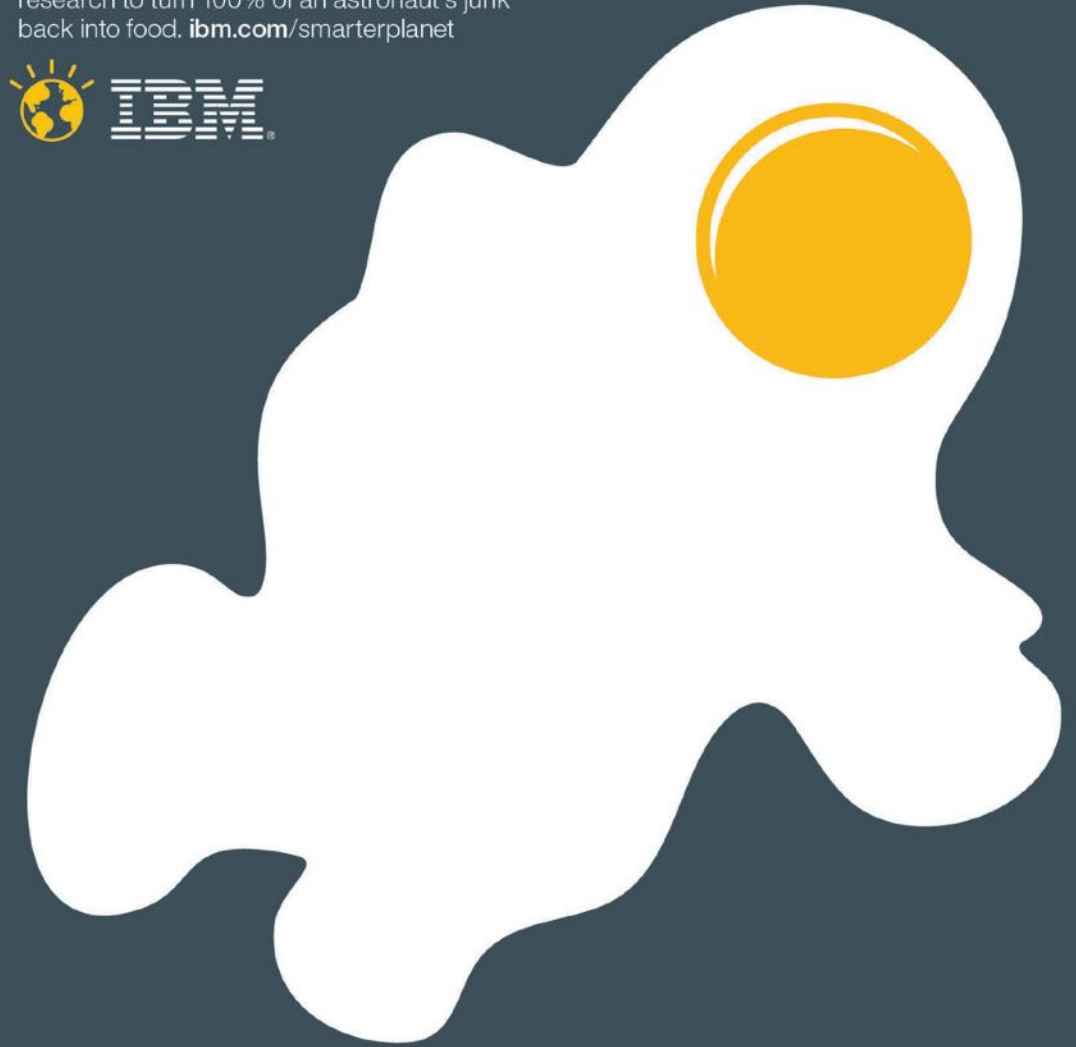
Line[2]

Definition: The most primal design element that can divide space, call attention to, organize, and make up other elements.

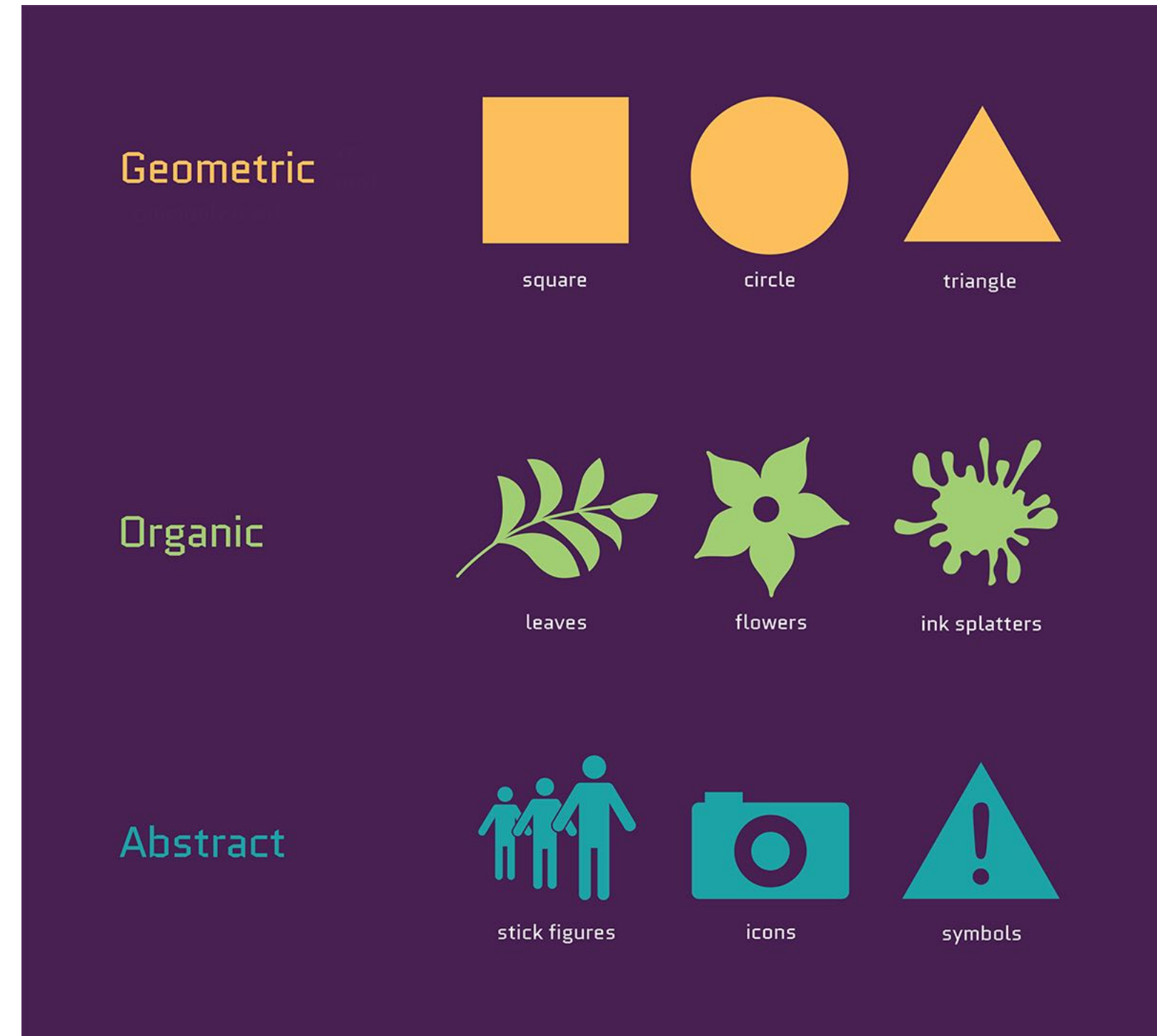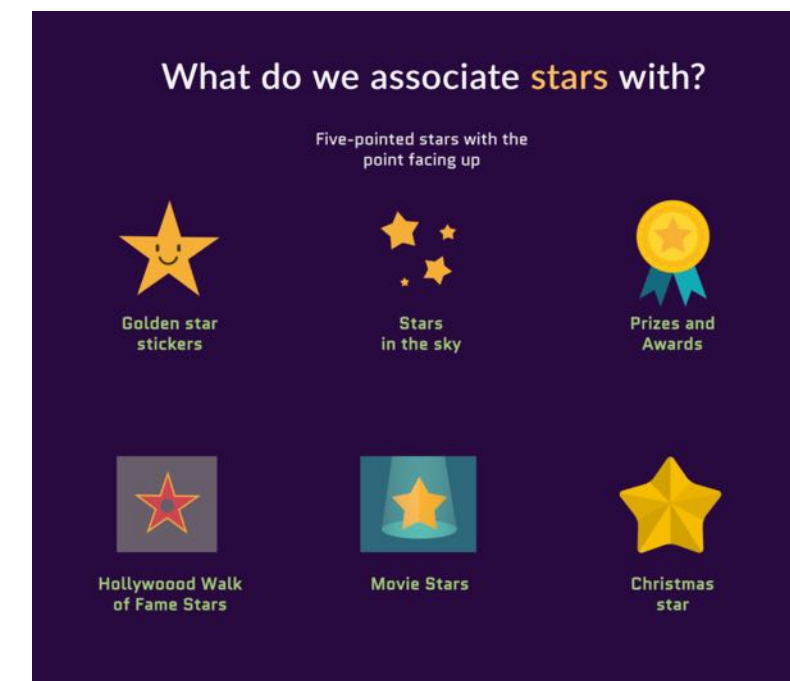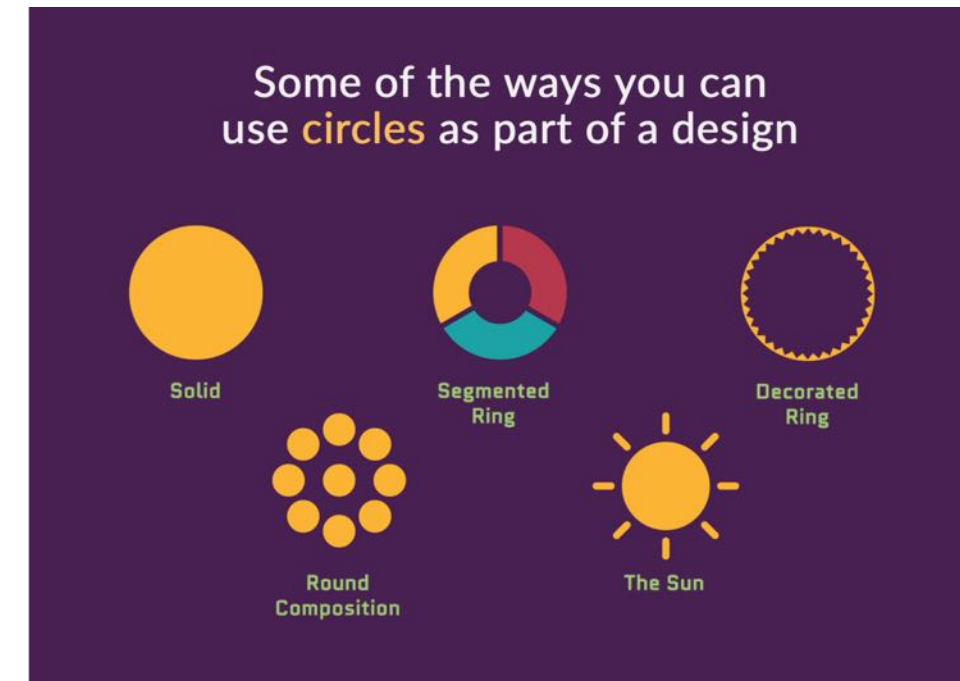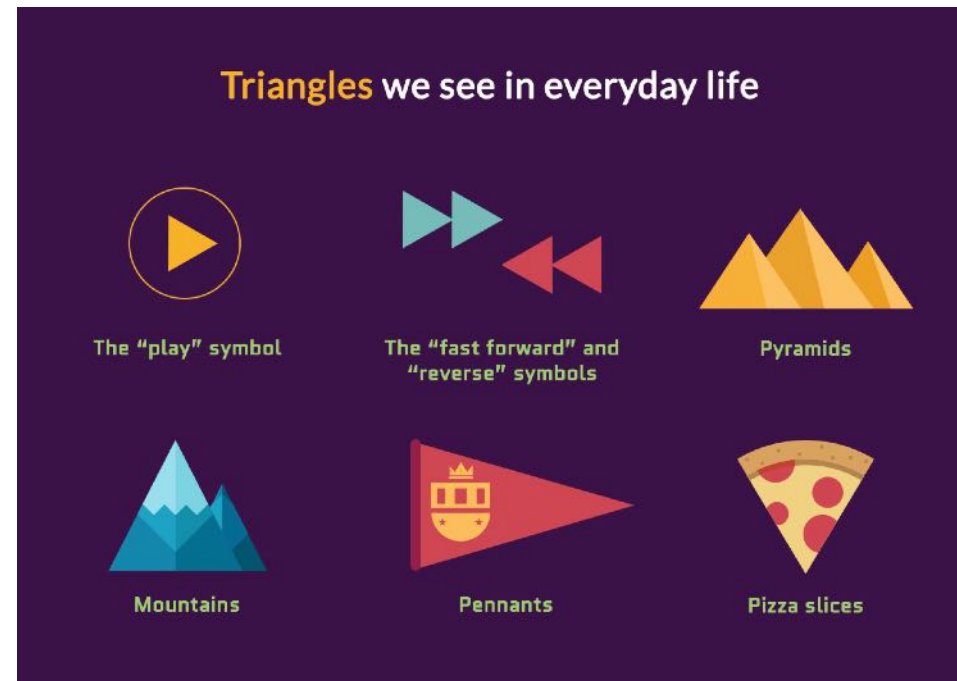| BRUSH PEN BRUSHES	CHARCOAL BRUSHES	MARKER BRUSHES	WATERCOLOR BRUSHES	PENCIL BRUSHES

[2] Image source

Shape[3]

Definition: Space outlined by a contour.

— *Organic* vs. *inorganic* shapes

Size[4]

Definition: Size, or *scale*, is the relative extent of the design elements such as shapes and lines.

Pattern[5]

Definition: Pattern, or *repetition*, systematic duplication of other design elements such as shapes and lines.
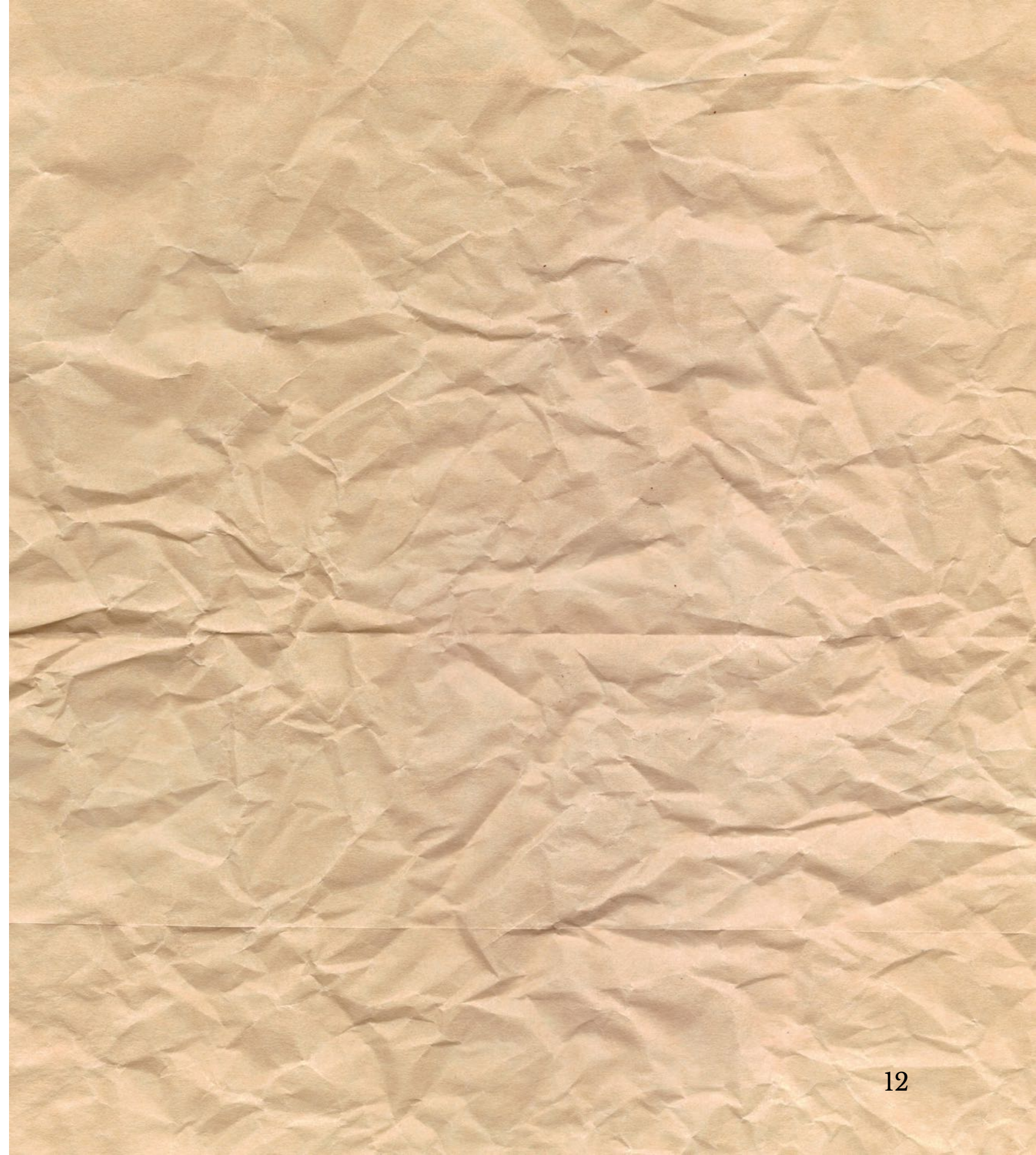

[5] Image source

Texture[6]

Definition: Tactile and visual quality of a shape or space made up of different colors, materials, and different structures.
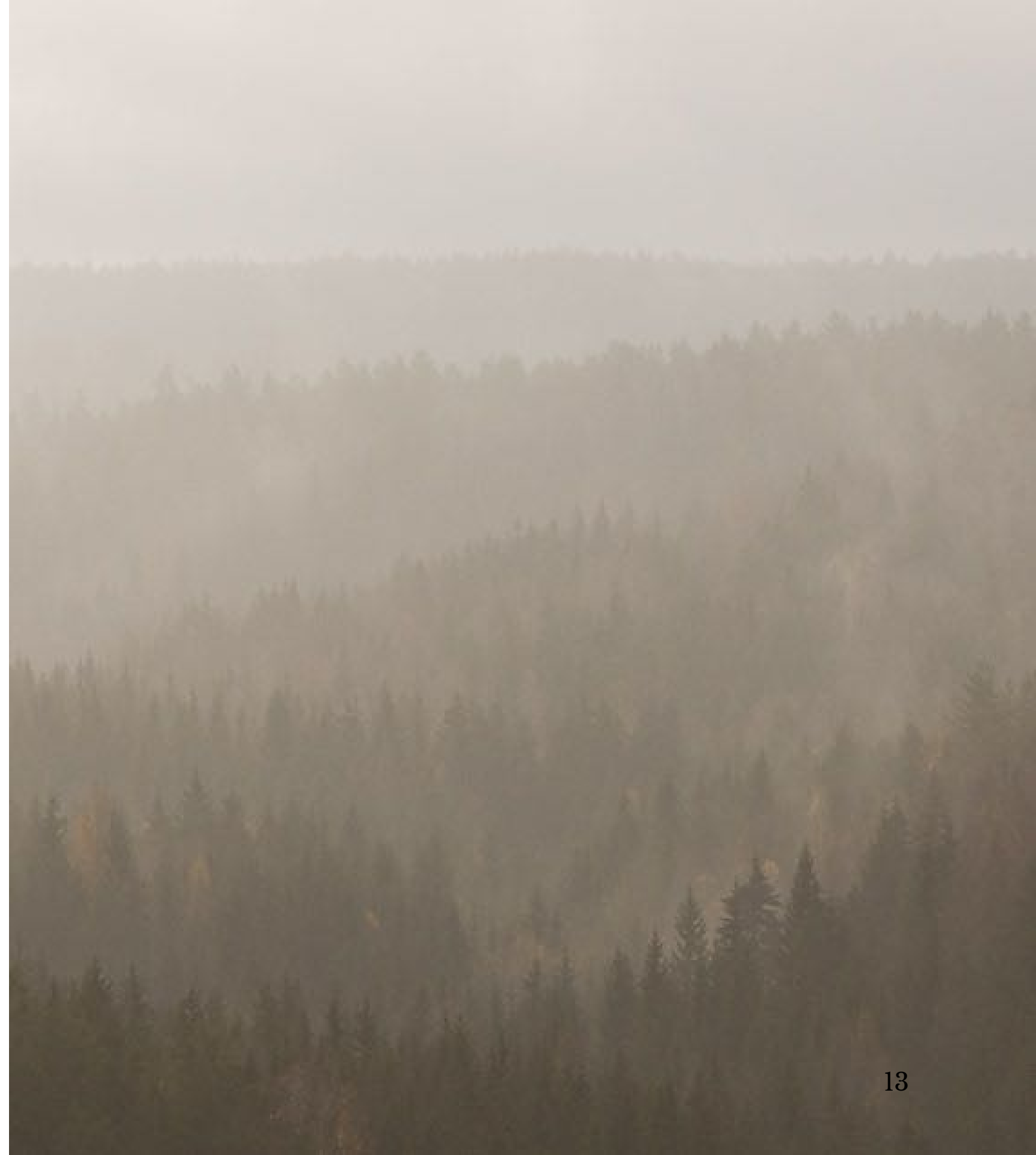
Value[7]

Definition: The intensity in which a design elements is expressed.

[7] Image source

Questions about *Design Elements*?

Principles of Design

Principles of Design

1. Focal Point
2. Contrast
3. Balance
4. Movement
5. Rhythm
6. Perspective
7. Unity

Focal Point[8]

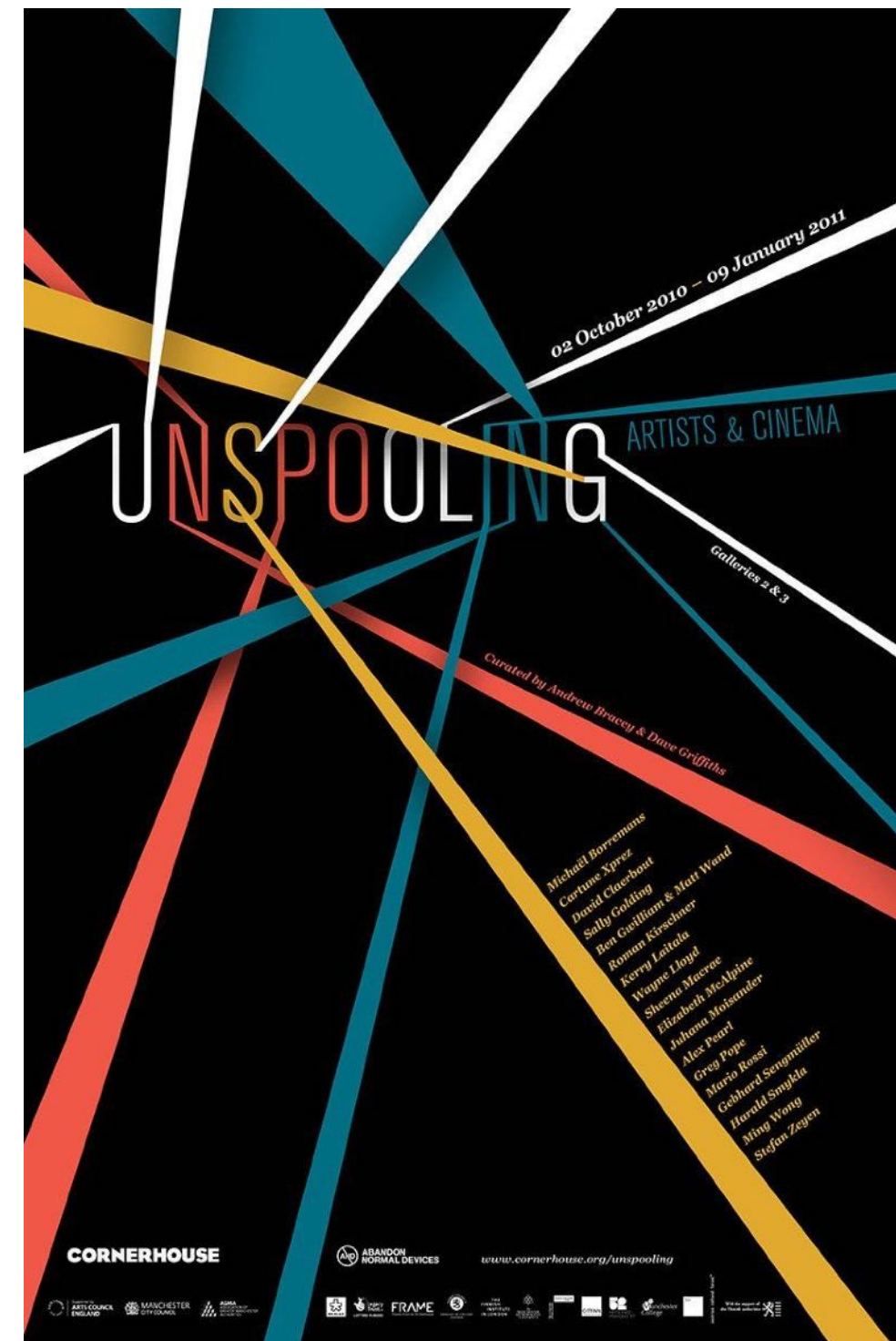**Definition:** Focal point, or the area of visual interest, is where the design directs the attention of the viewer first.

[8] Images sources: this slide, next slide: left, right
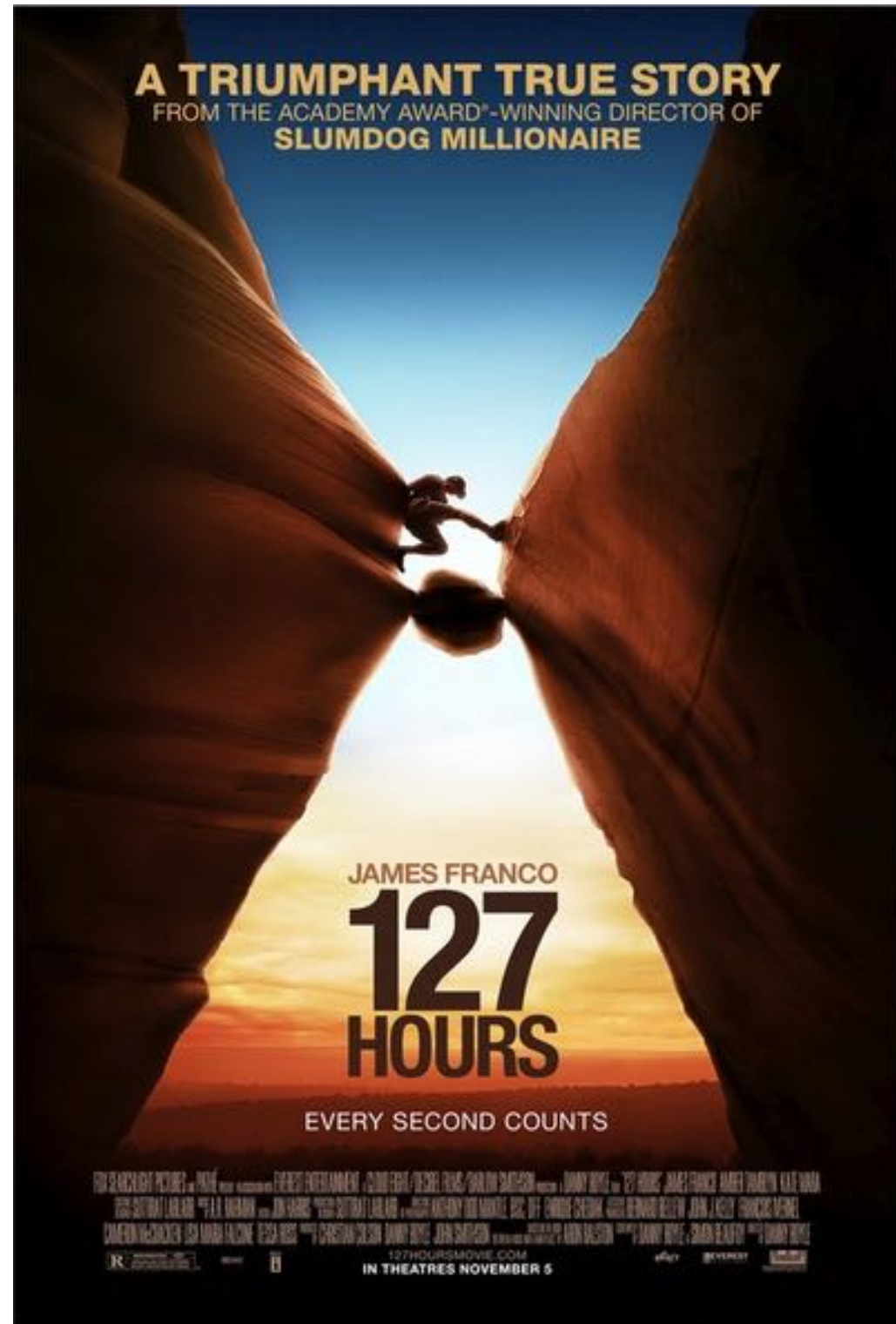
Contrast[9]

Definition: Contrast, or emphasis, is the juxtaposition of design elements that strikingly differ from each other to guide user attention and action.

[9] Image sources: this slide, next slide: left, right
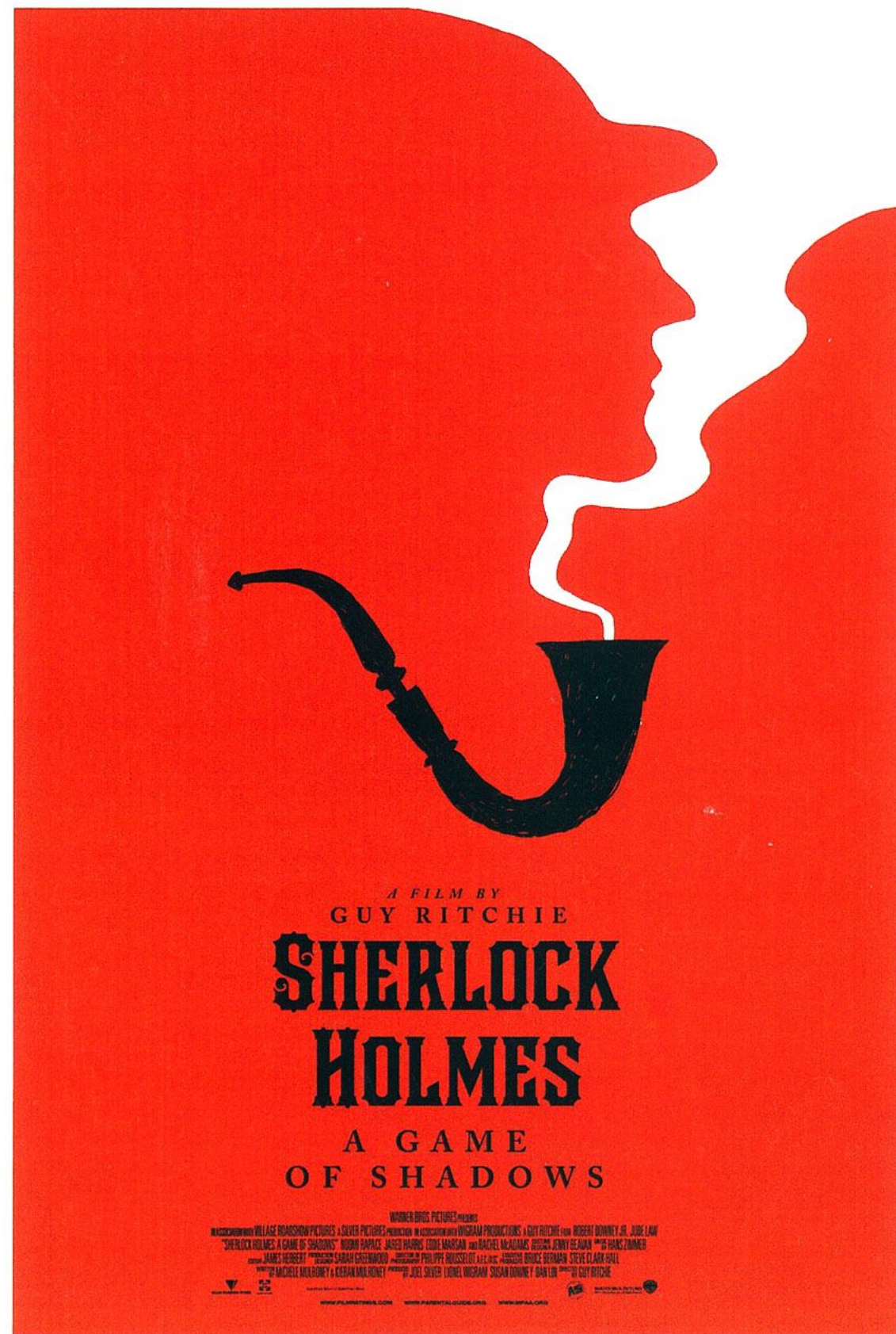
Balance[10]

Definition: The organization of design elements on a canvas to provide a sense of visual balance or imbalance.

Pro Tip: Balance can be achieved through *symmetry* or *asymmetry*.

[10] Image source

Movement[11]

Definition: The organization of design elements in a way that suggests a particular flow on the canvas to direct the user's attention in a particular pattern.

[11] Image source
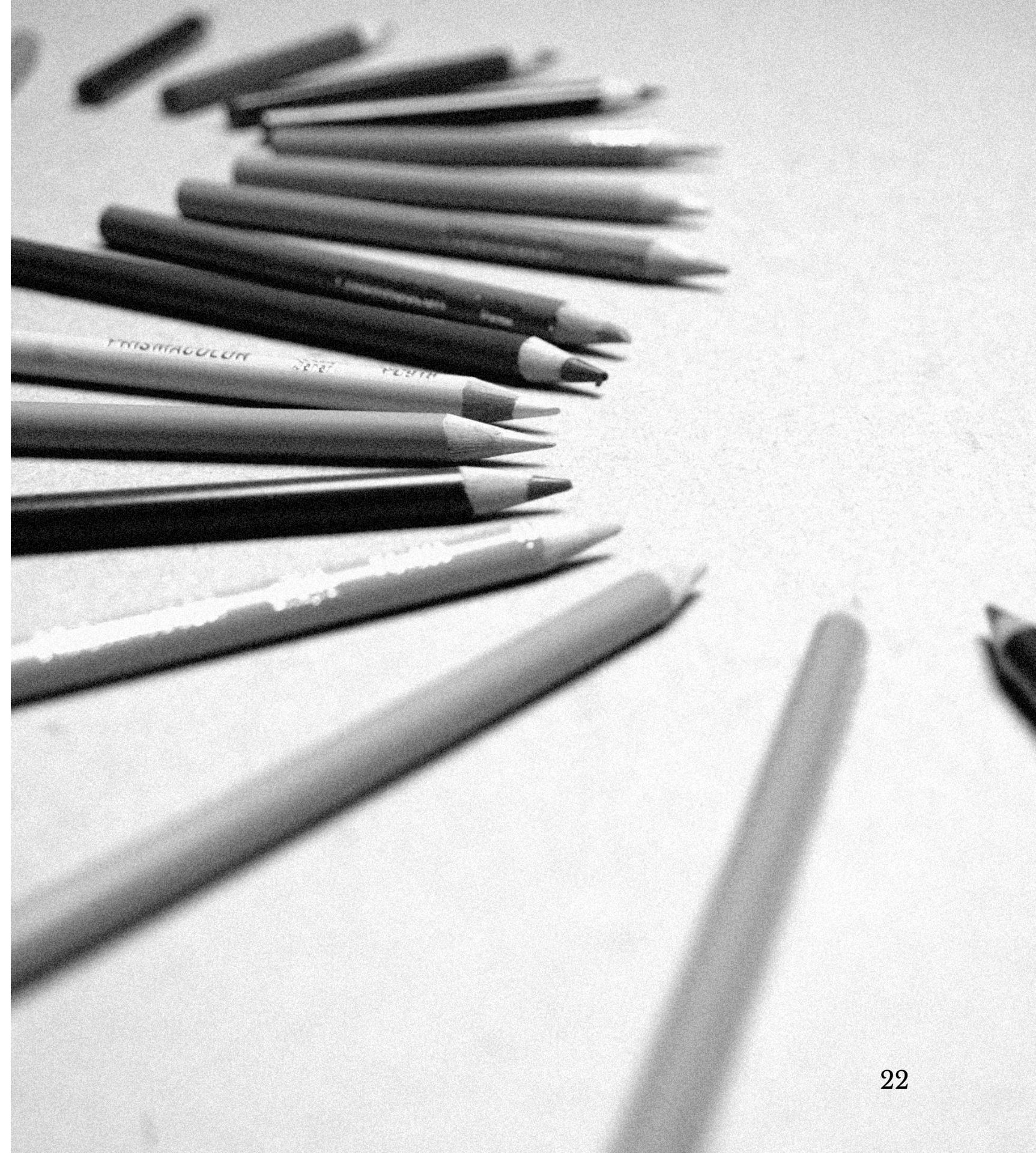
Rhythm[12]

Definition: Patterned use of design elements in a way that communicates movement or order.

[12] Image source

Perspective[13]

Definition: Creating a sense of horizon and movement along the depth axis of canvas.

[13] Image sources: <u>this slide</u>, next slide: <u>left</u>, <u>right</u>
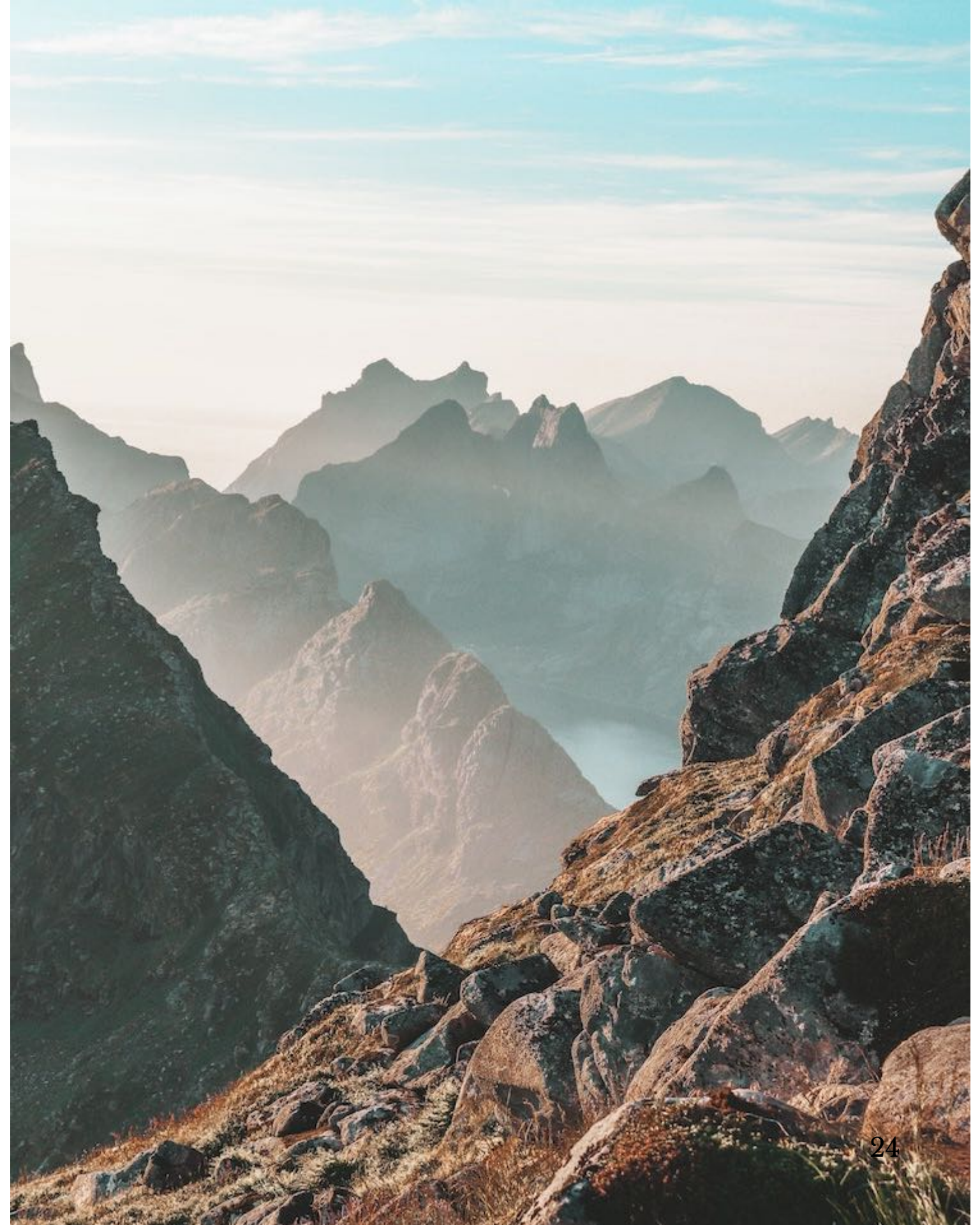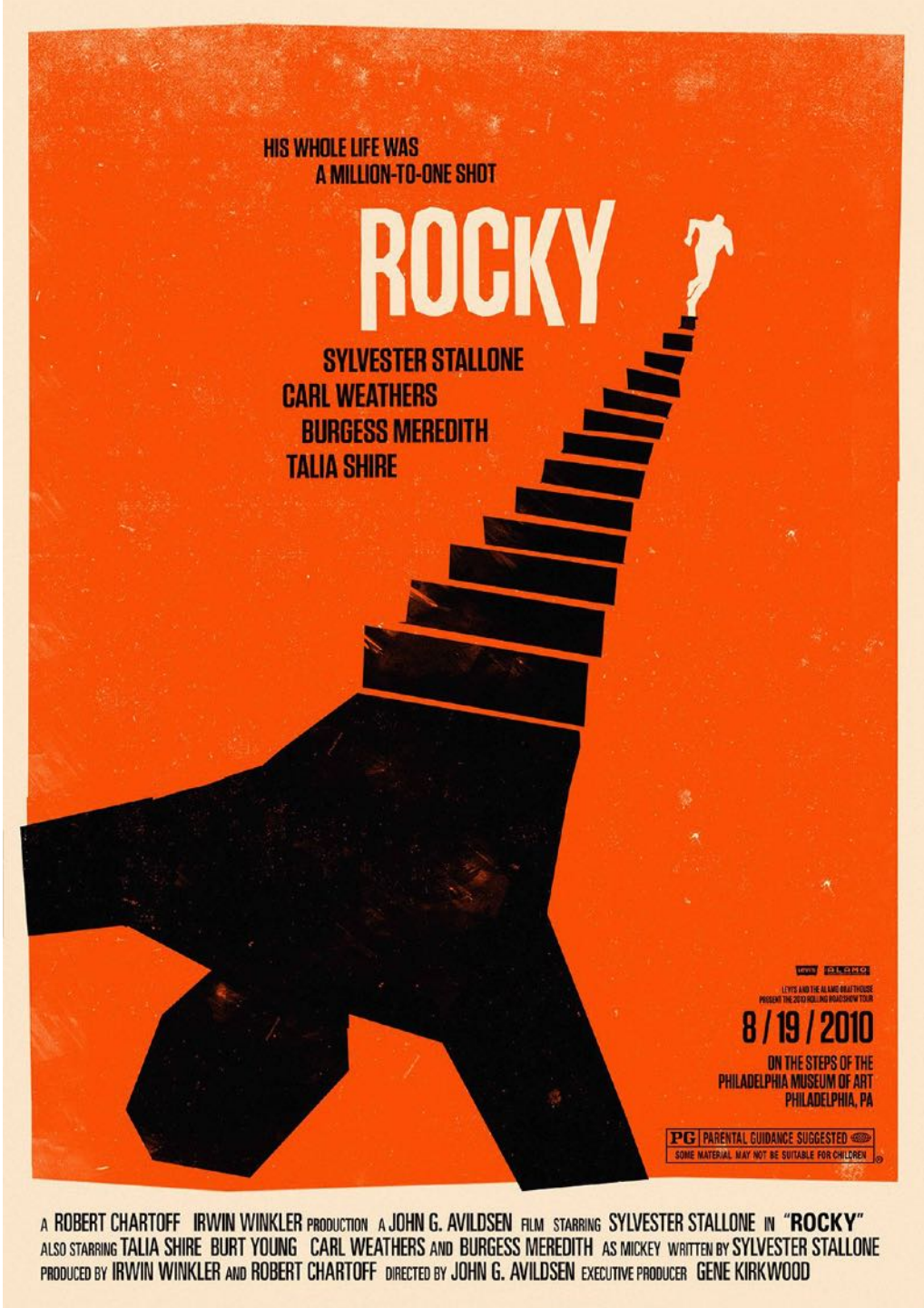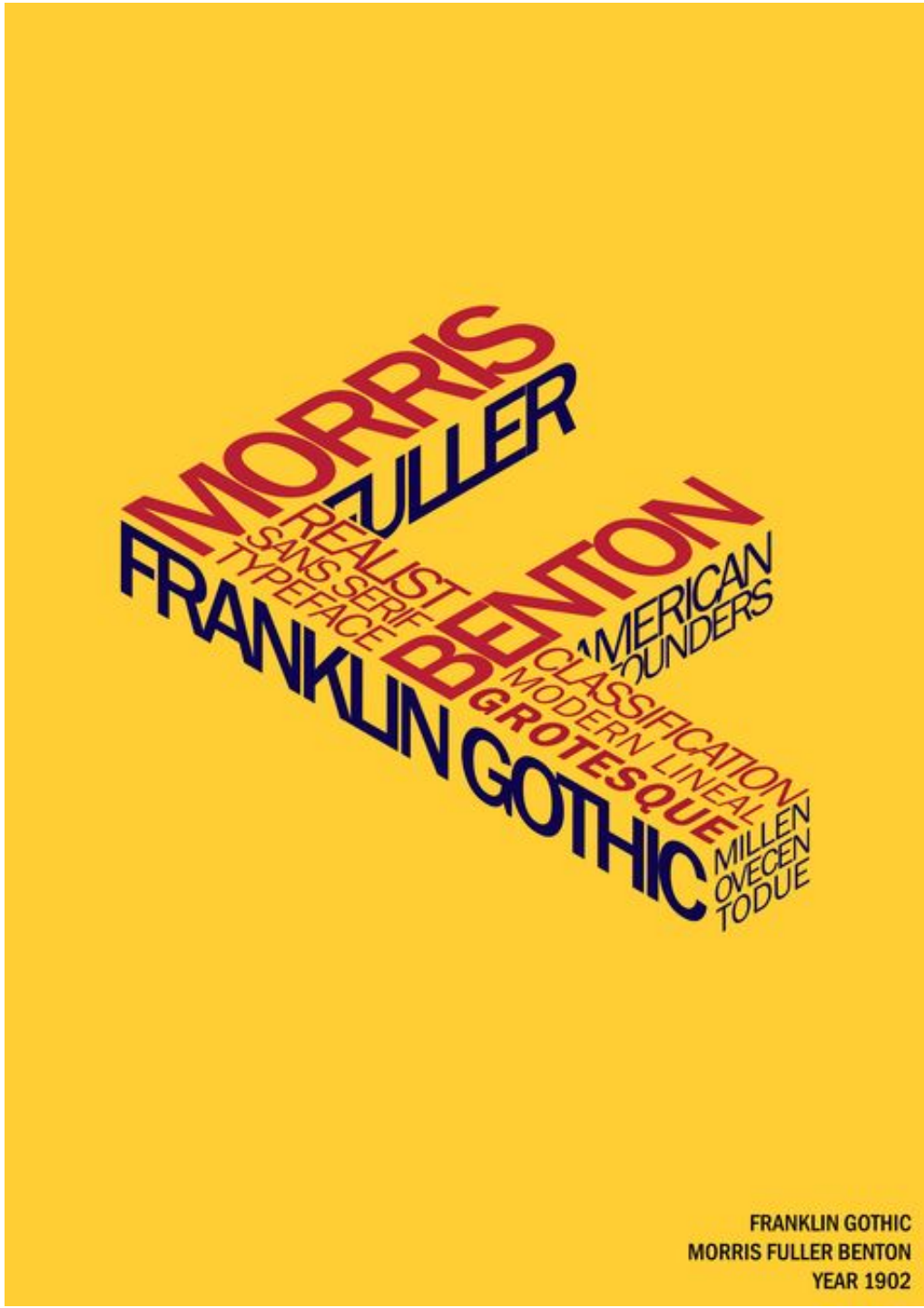
Unity[14]

Definition: Unity reflects the holistic consistency in the use of design elements.

[14] Image sources: this slide, next slide: left, right
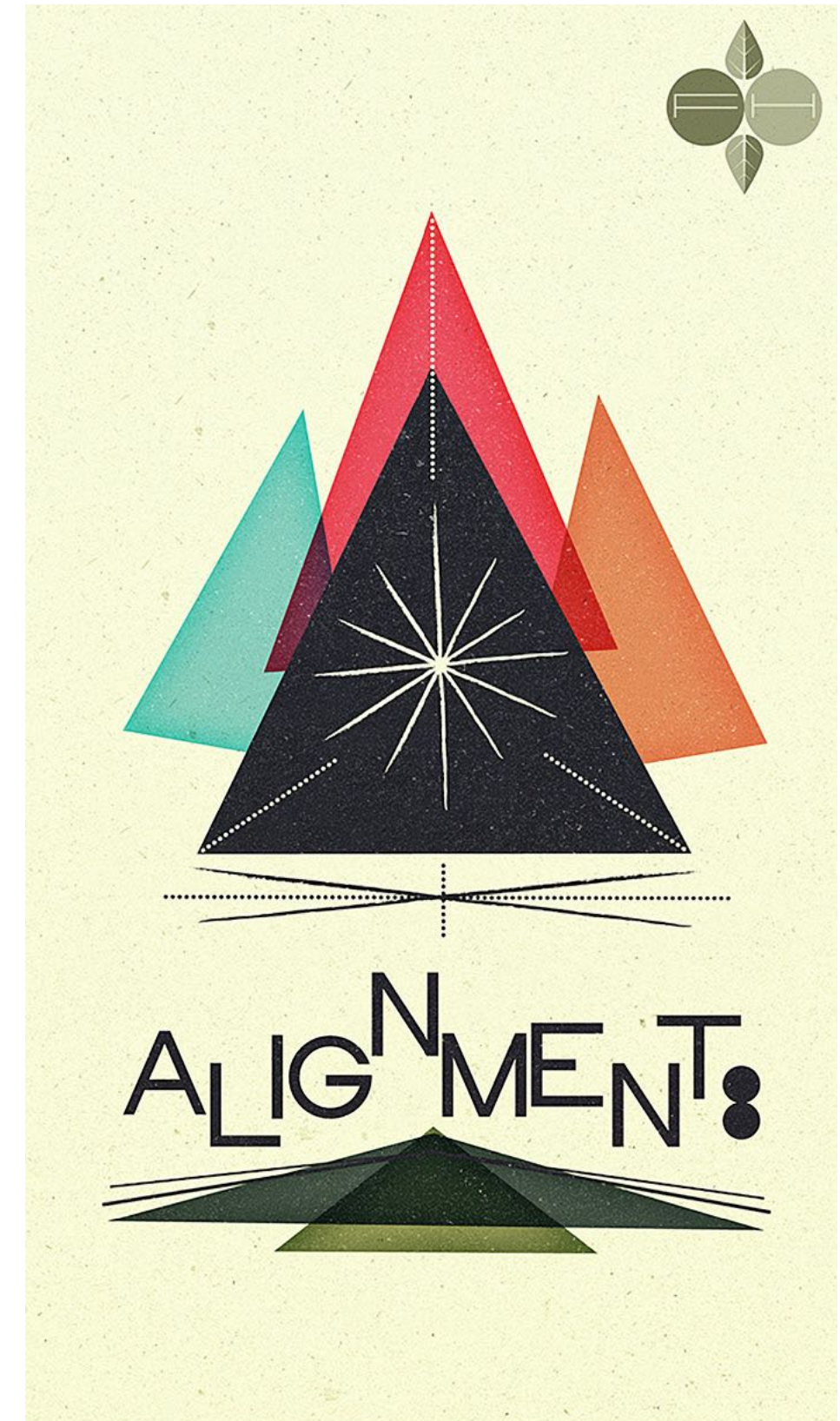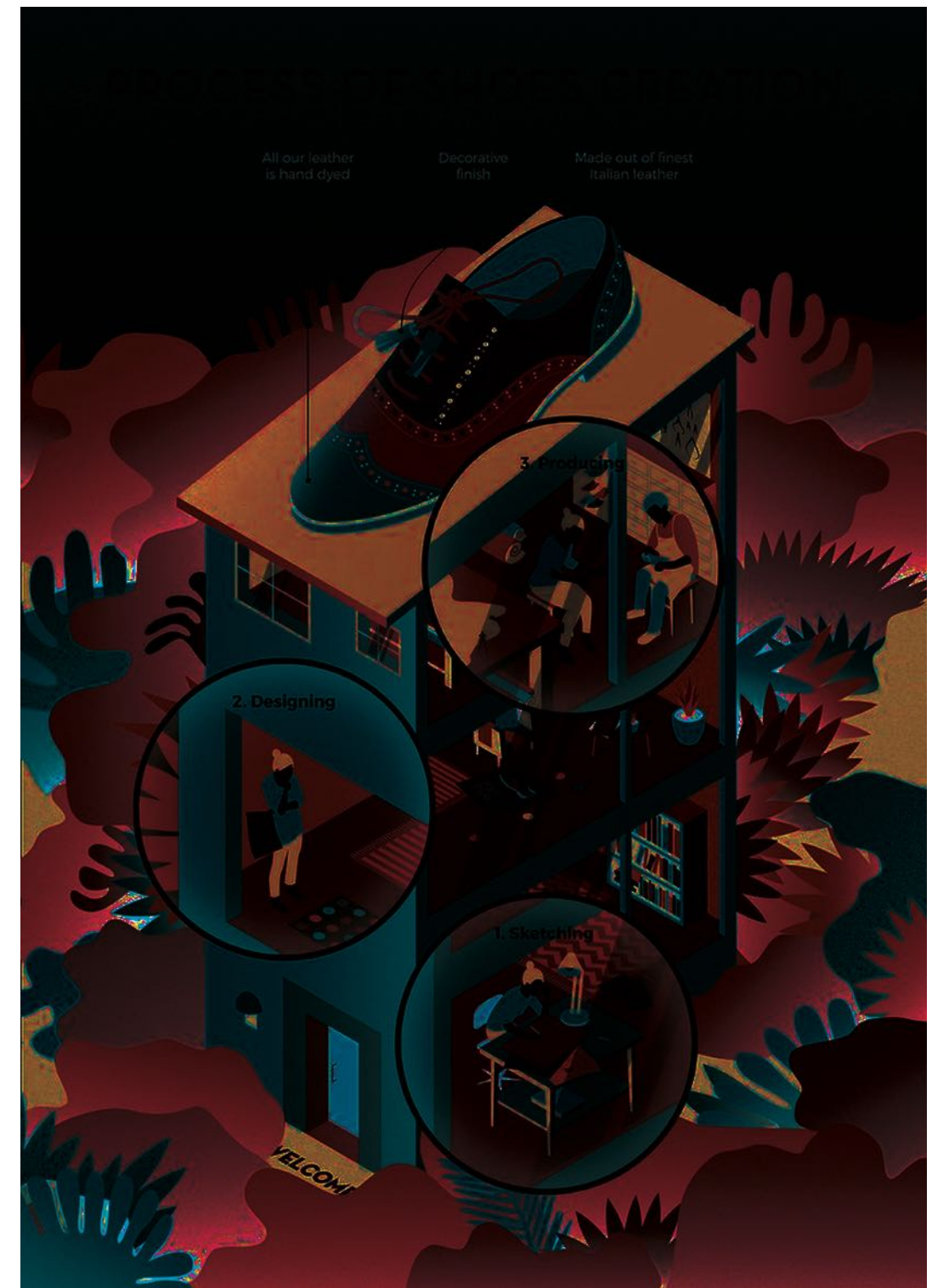
Quiz 1

Complete the Canvas quiz.

Questions about *Design Principles?*

This all sounds good. But how do we actually use these?

Some Strategies

— Create *cheat sheets*, and *checklists*

— Analyze existing designs using these tools to build visual analysis skills

— *Practice* designing using the principles

   — *Pro Tip:* Your canvas should have no elements that do not follow an overall principle

In-class Design Exercise 1

Analyze an existing page using the design elements and principles

— What elements, principles can you see in use?

— What problems do you see that can be addressed using design principles?

Make a copy of the <u>Google Drawings template</u>, annotate, and submit a PDF within 24 hours as *Quiz 4*.

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Breaking News

Big Ten announces football returning Oct. 23-24

Colten Bartholomew | Wisconsin State Journal

Daily COVID-19 testing, cardiac screening after positive tests are keys to conference's plan.

LOCAL EDUCATION

Lake Mills Area School District stops in-person school, activities for rest of week due to COVID-19

Jeff Richgels | 42 min ago

The COVID-19 pandemic continues to affect the start of school, with the Lake Mills Area School District the latest to halt in-person school an...

LOCAL GOVERNMENT

As COVID-19 cases surge, Gov. Tony Evers doesn't rule out extending mask order, other actions

Mitchell Schmidt | Wisconsin State Journal | 47 min ago

Evers said he is exploring the possibility of extending his statewide mask order, which is slated to expire Sept. 28.

UW-Madison threatens 'more drastic action' as experts say COVID-19 outbreak impacting broader community

David Wahlberg | Wisconsin State Journal | 2 hrs ago

UW-Madison threatened "more drastic action" Tuesday if quarantines in two large dorms don't greatly reduce COVID-19 infections, as health experts said a campus coronavirus outbreak is putting the general public at risk with flu season nearing.

Open "https://www.googleadservices.com/pagead/aclk?sa=L&ai=CRFHH6RxiX777OomT1QbG94WoDu_clN9em6yLil8M95ff...ctivity%26utm_term%3D%26gclid%3DEAIaIQobChMI_pPEre3t6wIVlUnVCh3GewHlEAEYASAAEgJPq_D_BwE" in a new tab

Consider the *last* product you purchased online. Design a product page with the following elements:

— Product photo

— Product description, reviews, similar items

— Action buttons: choose color, add to cart, add to wishlist

Make a copy of the template, place elements & annotate with your decisions, and submit a PDF as *Quiz 4*.

[15] Image sources: this slide, elements/principles: first, second

The Elements of Design
(the tools to make art)

Line		Horizontal, vertical, diagonal, straight, curved, dotted, broken thick, thin.
Shape		2D (two dimensional)/ flat Geometric (square, circle, oval, triangle) Organic (all other shapes)
Form		3D (three dimensional), Geometric (cube, sphere, cone), Organic (all other forms such as: people, animals, tables, chairs, etc).
Colour		Refers to the wavelengths of light. Refers to hue (name), value (lightness/darkness), intensity (saturation, or amount of pigment), and temperature (warm and cool). Relates to tint, tone and shade.
Value		The lightness or darkness of an image (or part of an image).
Texture		The feel, appearance, thickness, or stickiness of a surface (for example: smooth, rough, silky, furry).
Space		The area around, within, or between images or parts of an image (relates to perspective). Positive and negative space.

The Principles of Design
(how to use the tools to make art)

Pattern		A regular arrangement of alternated or repeated elements (shapes, lines, colours) or motifs.
Contrast		The juxtaposition of different elements of design (for example: rough and smooth textures, dark and light values) in order to highlight their differences and/or create visual interest, or a focal point.
Emphasis		Special attention/importance given to one part of a work of art (for example, a dark shape in a light composition). Emphasis can be acheived through placement, contrast, colour, size, repetition... Relates to focal point.
Balance		A feeling of balance results when the elements of design are arranged symmetrically or asymmetrically to create the impression of equality in weight or importance.
Scale		The relationship between objects with respect to size, number, and so on, including the relation between parts of a whole.
Harmony		The arrangement of elements to give the viewer the feeling that all the parts of the piece form a coherent whole.
Rhythm/ Movement		The use of recurring elements to direct the eye through the image; the way the elements are organized to lead the eye to the focal area. The eye can be directed, for example, along edges and by means of shape and colour.
Unity		All parts of an image work together to be seen as a whole.
Variety		Using different elements in an image to create visual interest.

LINE

A **line** is a mark between two points. There are various types of lines, from straight to squiggly to curved and more. Lines can be used for a wide range of purposes: stressing a word or phrase, connecting content to one another, creating patterns and much more.

COLOR

Color is used to generate emotions, define importance, create visual interest and more. CMYK (cyan/magenta/yellow/black) is **subtractive**; RGB (red/green/blue) is **additive**.

Some colors are **warm** and **active** (orange, red); some are cool and **passive** (blue, purple).

There are various **color types** (primary to analogous) and **relationships** (monochromatic to triad) worth learning more about as well.

TEXTURE

Texture relates the to surface of an object; the look or feel of it. Concrete has a rough texture; drywall has a smooth and subtle texture. Using texture in design is a great way to add depth and visual interest. Printed material has actual, textile texture while screen material has implied texture.

SHAPE

Height + width = shape. We all learned basic shapes in grade school - triangles, squares, circles and rectangles. Odd or lesser seen shapes can be used to attract attention.
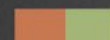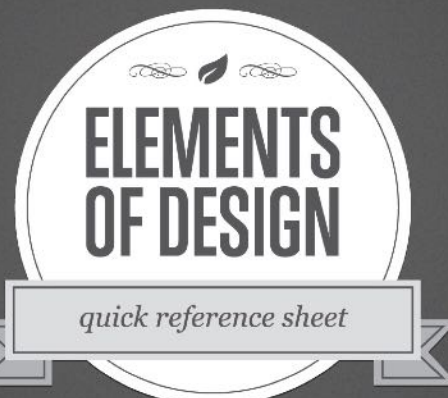
There are three basic types of shape: **geometric** (triangles, squares, circles etc), **natural** (leaves, animals, trees, people), and **abstracted** (icons, stylizations, graphic representations etc).

ELEMENTS OF DESIGN

quick reference sheet

SIZE

Size is how small or large something is: a small shirt vs. an extra large shirt, for example. Use size to define importance, create visual interest in a design (via contrasting sizes), attract attention and more.

VALUE:

Value is how light or how dark an area looks. A gradient, shown above, is a great way to visualize value – everything from dark to white, all the shades in-between, has a value. Use value to create depth and light; to create a pattern; to lead the eye; or to emphasize.

SPACE

Space is the area around or between elements in a design. It can be used to separate or group information. Use it effectively to: give the eye a rest; define importance; lead the eye through a design and more.

CONTRAST

COLOR

TONE/VALUE

SIZE/SHAPE

DIRECTION

Unique elements in a design should stand apart from one another. One way to do this is to use contrast. Good contrast in a design – which can be achieved using elements like color, tone, size, and more – allows the viewer's eye to flow naturally.

To the left, you can see 4 ways to create contrast in your design.

ALIGNMENT

Proper alignment in a design means that every element in it is visually connected to another element. Alignment allows for cohesiveness; nothing feels out of place or disconnected when alignment has been handled well.

PRINCIPLES of DESIGN

quick reference poster

REPETITION

Repetition breeds cohesiveness in a design. Once a design pattern has been established – for example, a dotted border or a specific typographic styling – repeat this pattern to establish consistency.

The short version?

Establish a style for each element in a design and use it on similar elements.

PROX IMITY

Proximity allows for visual unity in a design. If two elements are related to each other, they should be placed in close proximity to one another. Doing so minimizes visual clutter, emphasizes organization, and increases viewer comprehension.

Imagine how ridiculous it would be if the proximity icons on this graphic were located on the other side of this document.

Quiz 2

Complete the <u>Canvas quiz</u>.

Key Components for UX Design

Key Components for UX Design

We will focus on *type*, *color*, and *images*.

Type

Definition: Printed letters and characters of language.

Associated Concepts

— A **font** is the style in which type is created.

— A **typeface** is a font family that includes fonts of different variations that follow the same style.
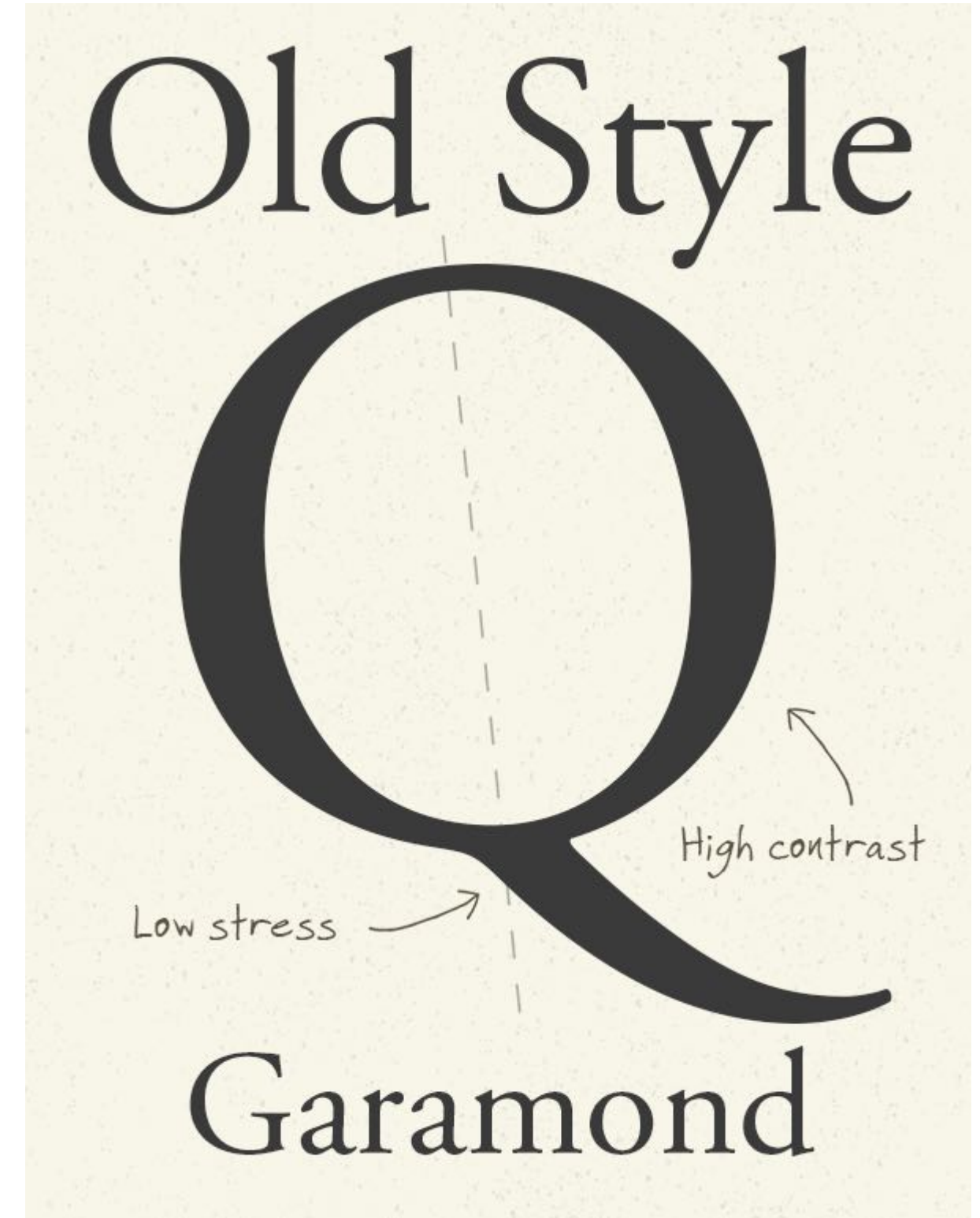
— A **glyph** is a particular character.

Categories of Typefaces

1. Old style
2. Modern
3. Slab serif
4. Sans serif
5. Script
6. Decorative

Old-style fonts

Definition: Old-style fonts have "serifs" at the tips of a glyph that taper closer to the tip.
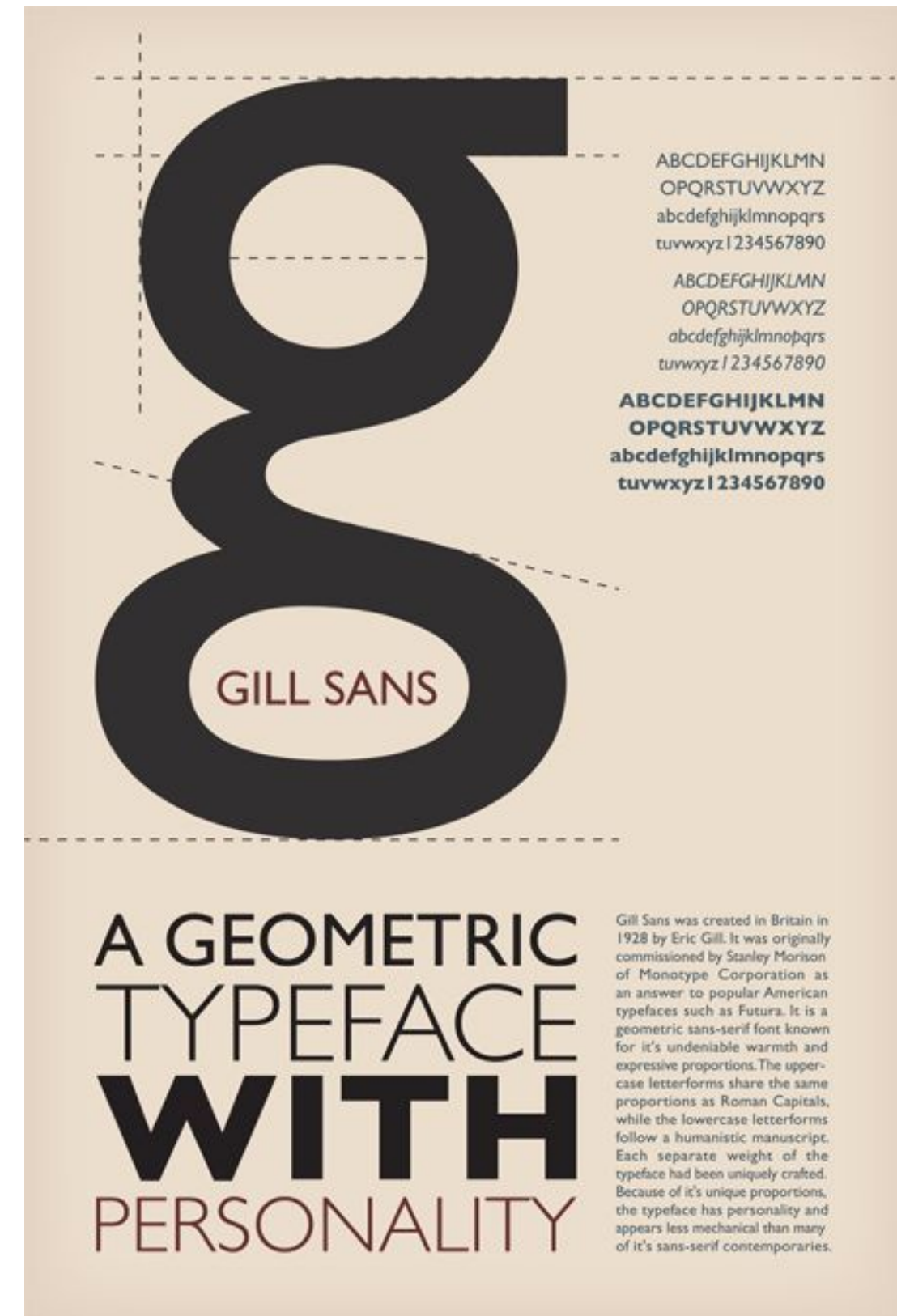
Modern & slab-serif fonts

Definition: Modern and slab-serif fonts have very thin or very thick serifs.

Sans-serif fonts

Definition: Sans-serif fonts lack the serif at the tips of the glyphs, and their strokes follow uniform weight.

Script fonts

Definition: Script fonts simulate cursive writing where glyphs connect with each other at the downstroke.

Decorative fonts

Definition: Decorative fonts are designed specifically to convey a particular context or elicit a particular feeling, e.g., "gothic."

Font parameters

— **Style variations:** bold, italic, oblique

— **Caps:** all caps, small caps

— **Weight:** extra light, light, medium, bold

Muller™ Styles Overview
Weights

Hairline & Hairline Italic

Antimon

Thin & Thin Italic

Beryllium

UltraLight & UltraLight Italic

Californium

Light & Light Italic

Sauerstoff

Regular & Italic

Dysprosium

Medium & Medium Italic

Unununium

Bold & Bold Italic

Quecksilber

ExtraBold & ExtraBold Italic

Kohlenstoff

Black & Black Italic

Wolfram
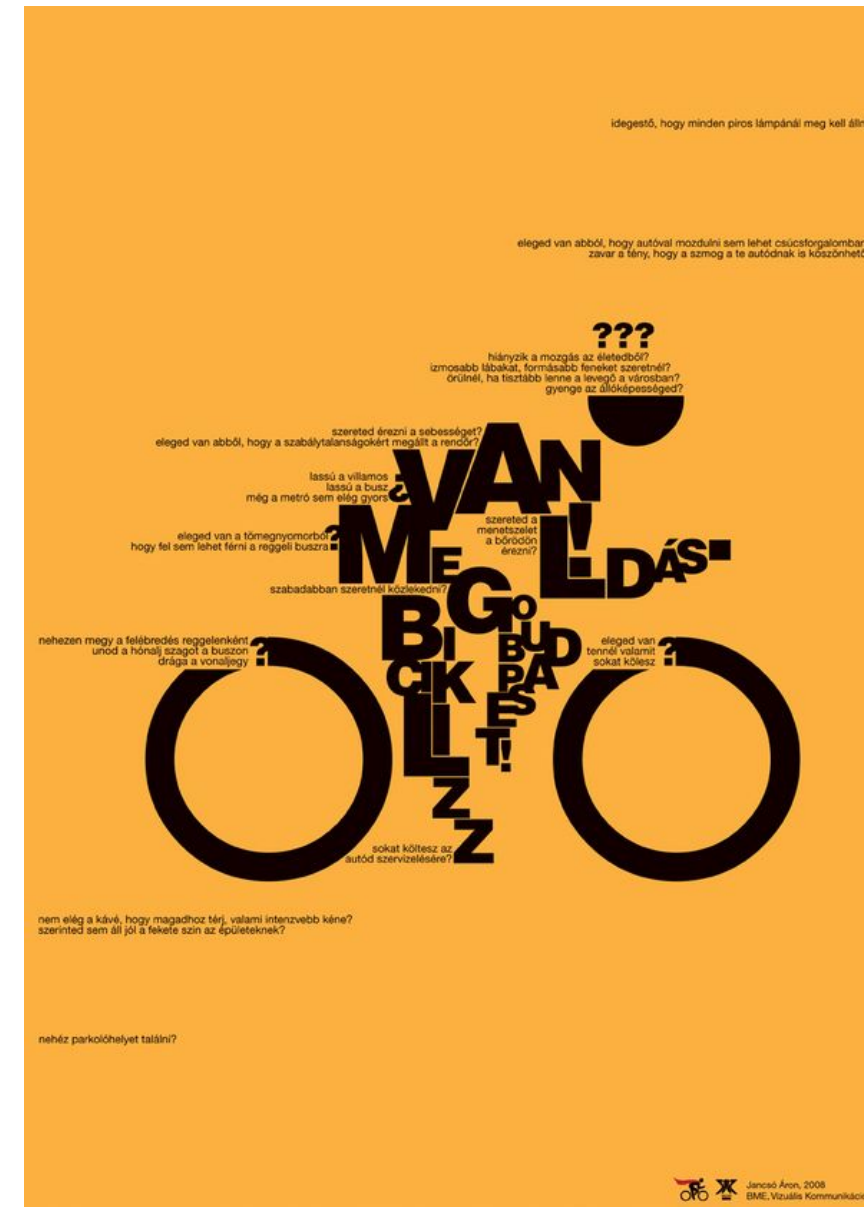
Heavy & Heavy Italic

Seaborgium

Pro Tip: Type alone can be used to achieve design principles, such as *hierarchy* and *movement*.

Pro tip: For good typography, become familiar with *leading, tracking, kerning, widows, orphans, rags, rivers.*

Questions about *Type*?

Color

Definition: Human visual perception of light reflecting from an object.

— Creates emphasis

— Organizes content

— Evokes emotion

COLORS CONVEY Emotions

BLUE	TURQUOISE	GREEN	YELLOW
(+) TRANQUILITY, SECURITY, INTEGRITY, PEACE, LOYALTY, TRUST, INTELLIGENCE	SPIRITUAL, HEALING, PROTECTION, SOPHISTICATED	FRESHNESS, ENVIRONMENT, NEW, MONEY, FERTILITY, HEALING, EARTH	BRIGHT, SUNNY, ENERGETIC, WARM, HAPPY, PERKY, JOY, INTELLECT
(−) COLDNESS, FEAR, MASCULINITY	ENVY, FEMININITY	ENVY, JEALOUSY, GUILT	IRRESPONSIBLE, UNSTABLE

PURPLE	PINK	RED	ORANGE
(+) ROYALTY, NOBILITY, SPIRITUALITY, LUXURY, AMBITION, WEALTH	HEALTHY, HAPPY, FEMININE, SWEET, COMPASSION, PLAYFUL	LOVE, PASSION, ENERGY, POWER, STRENGTH, HEAT, DESIRE	COURAGE, CONFIDENCE, FRIENDLINESS, SUCCESS
(−) MYSTERY, MOODINESS	WEAK, FEMININITY, IMMATURITY	ANGER, DANGER, WARNING	IGNORANCE, SLUGGISHNESS

BROWN	TAN	GOLD	SILVER
(+) FRIENDLY, EARTH, OUTDOORS, LONGEVITY, CONSERVATIVE	DEPENDABLE, FLEXIBLE, CRISP, CONSERVATIVE	WEALTH, WISDOM, PROSPERITY, VALUABLE, TRADITIONAL	GLAMOROUS, HIGH TECH, GRACEFUL, SLEEK
(−) DOGMATIC, CONSERVATIVE	DULL, BORING, CONSERVATIVE	EGOTISTICAL, SELF-RIGHTEOUS	INDECISIVE, DULL, NON-COMMITTAL

WHITE	GRAY	BLACK
(+) GOODNESS, INNOCENCE, PURITY, FRESH, EASY, CLEAN	SECURITY, RELIABILITY, INTELLIGENCE, SOLID	PROTECTION, ELEGANCE, DRAMATIC, CLASSY, FORMALITY
(−) ISOLATION, PRISTINE, EMPTINESS	GLOOMY, SAD, CONSERVATIVE	DEATH, EVIL, MYSTERY

CoSchedule

A	Western / American	F	Asian
B	Japanese	G	Eastern European
C	Hindu	H	Muslim
D	Native American	I	African
E	Chinese	J	South American

|			
1	Anger	43	Holiness
2	Art / Creativity	44	Illness
3	Authority	45	Insight
4	Bad Luck	46	Intelligence
5	Balance	47	Intuition
6	Beauty	48	Religion
7	Calm	49	Jealousy
8	Celebration	50	Joy
9	Children	51	Learning
10	Cold	52	Life
11	Compassion	53	Love
12	Courage	54	Loyalty
13	Cowardice	55	Luxury
14	Cruelty	56	Marriage
15	Danger	57	Modesty
16	Death	58	Money
17	Decadence	59	Mourning
18	Deceit	60	Mystery
19	Desire	61	Nature
20	Earthy	62	Passion
21	Energy	63	Peace
22	Erotic	64	Penance
23	Eternity	65	Power
24	Evil	66	Personal power
25	Excitement	67	Purity
26	Family	68	Radicalism
27	Femininity	69	Rational
28	Fertility	70	Reliable
29	Flamboyance	71	Repels Evil
30	Freedom	72	Respect
31	Friendly	73	Royalty
32	Fun	74	Self-cultivation
33	God	75	Strength
34	Gods	76	Style
35	Good Luck	77	Success
36	Gratitude	78	Trouble
37	Growth	79	Truce
38	Happiness	80	Trust
39	Healing	81	Unhappiness
40	Healthy	82	Virtue
41	Heat	83	Warmth
42	Heaven	84	Wisdom

Grey
Yellow
Silver
Gold

The Color Wheel

— *Primary*, *secondary*, *tertiary* colors

— *Tints*, *hue*, shades

— *Complementary* colors

— *Warm*, *cool* colors

The basic colors

TUBIKSTUDIO.COM

Shades

Hue

Tints
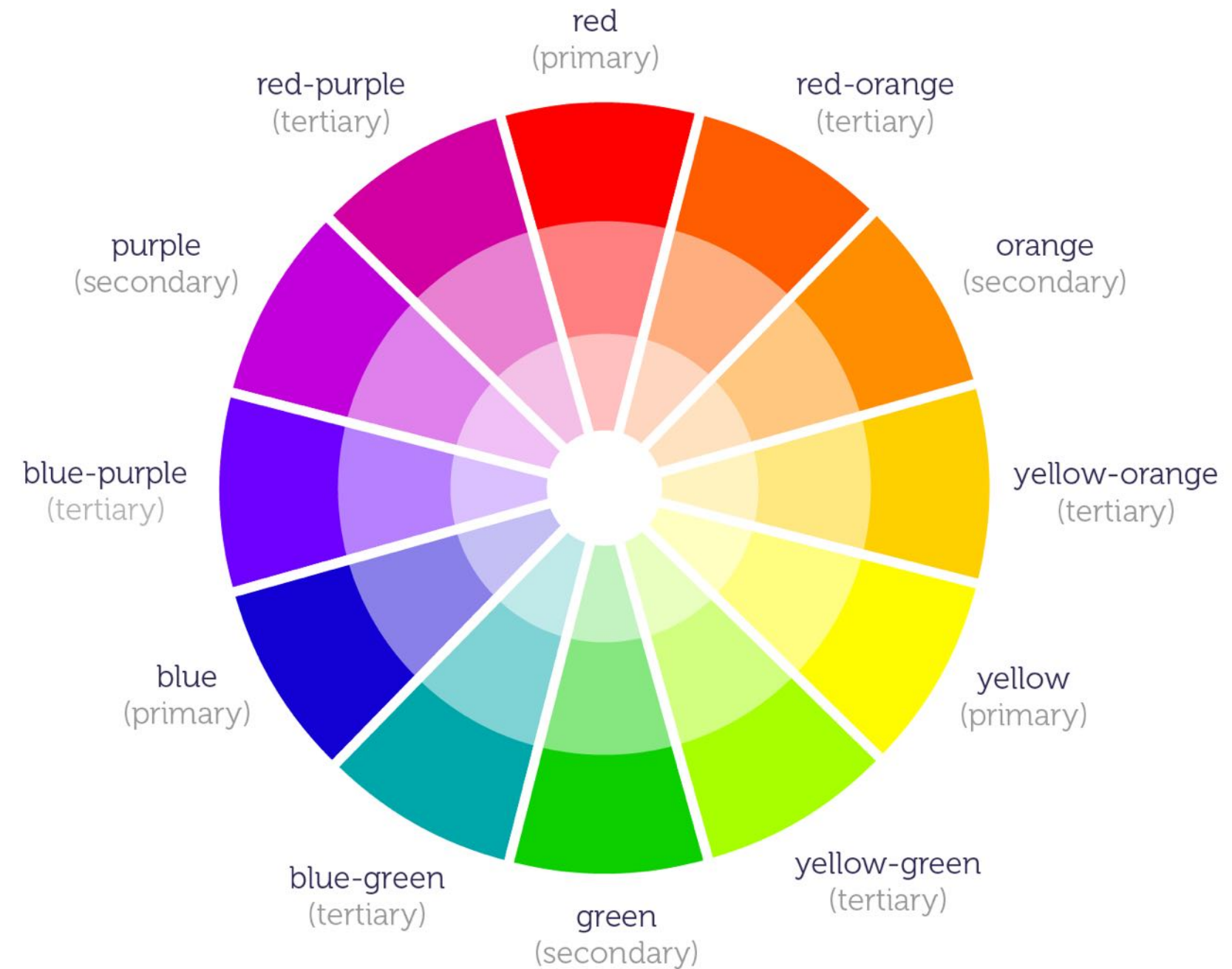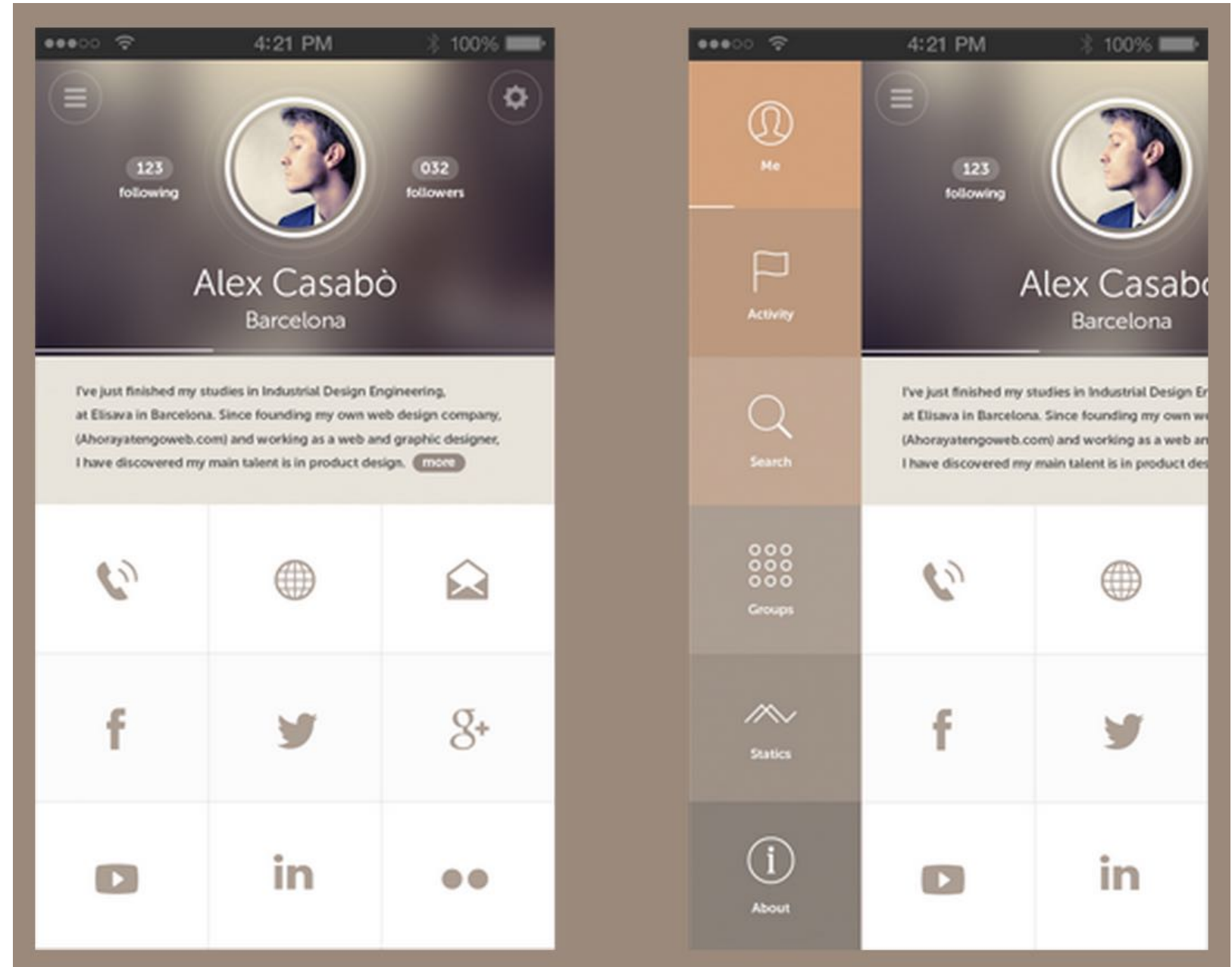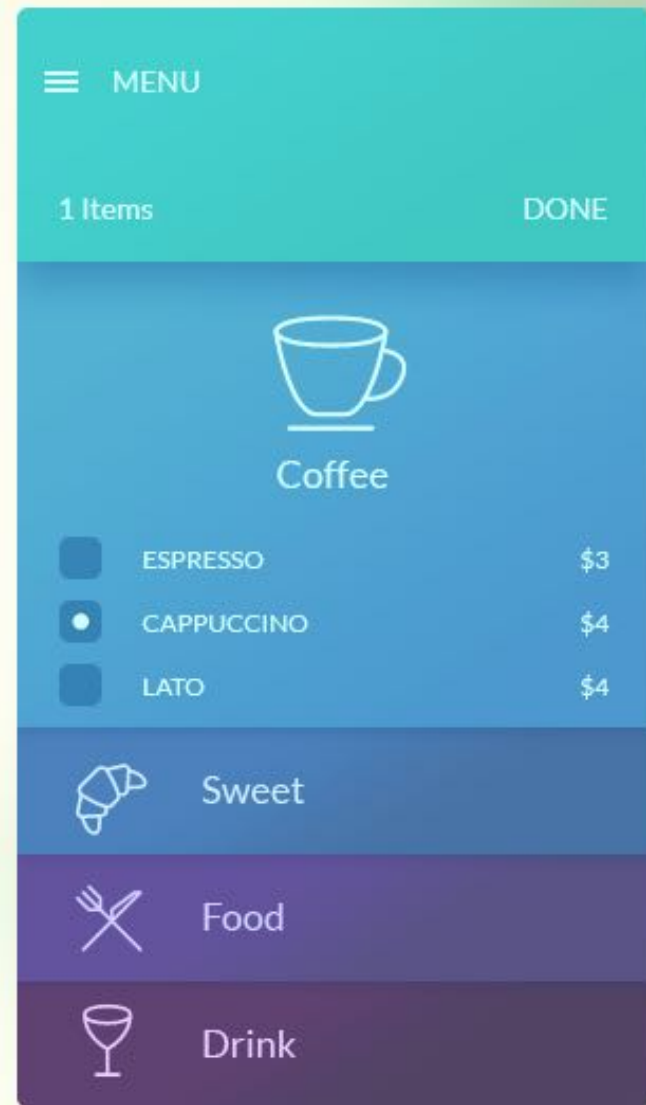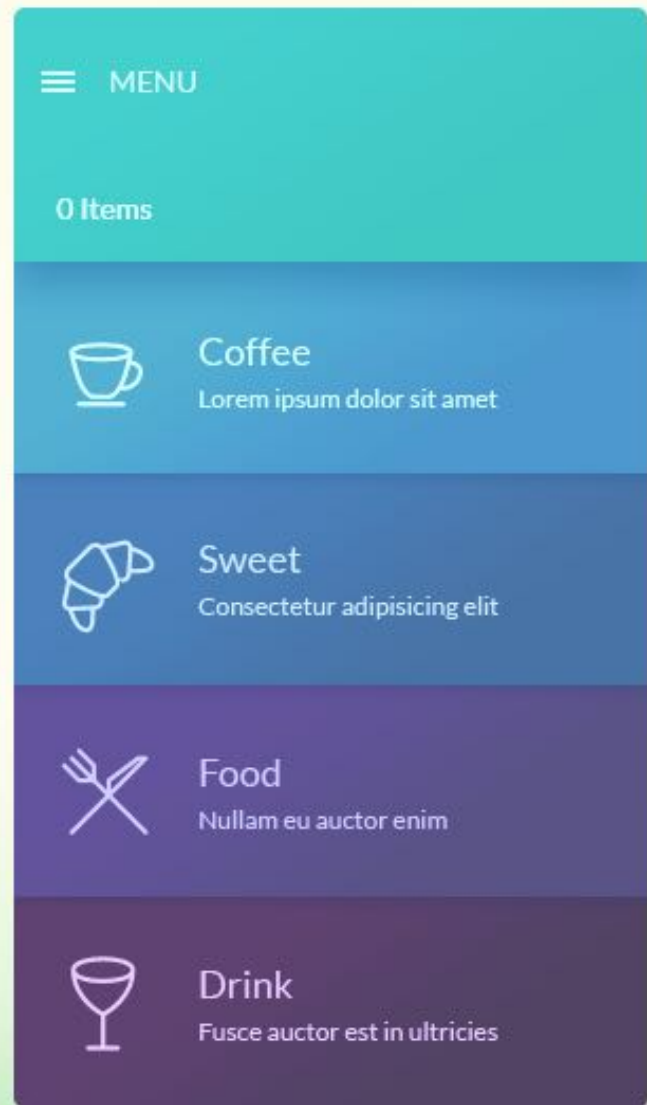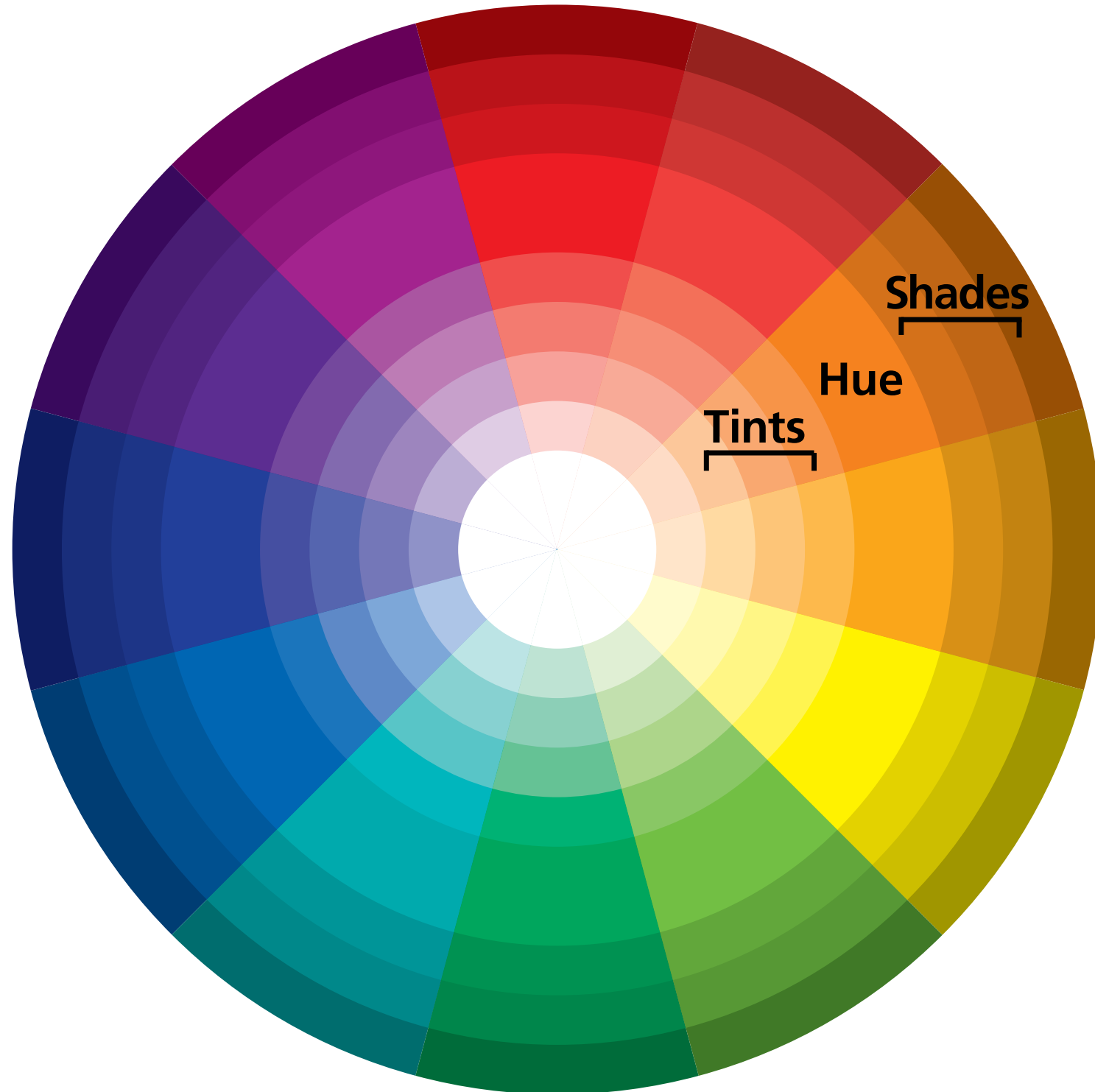
Hue

Low   High

Saturation

Light   Dark

Value

Color Palettes

1. Analogous
2. Complementary
3. Split Complementary
4. Triadic
5. Monochromatic
6. Achromatic

UNDERSTANDING
COLOR THEORY

COLOR HARMONIES

COMPLEMENTARY COLORS

ANALOGOUS COLORS

TRIADIC COLORS

SPLIT-COMPLEMENTARY COLORS

TETRADIC COLORS

WWW.SARAHRENAECLARK.COM

ANALOGOUS

COMPLEMENTARY

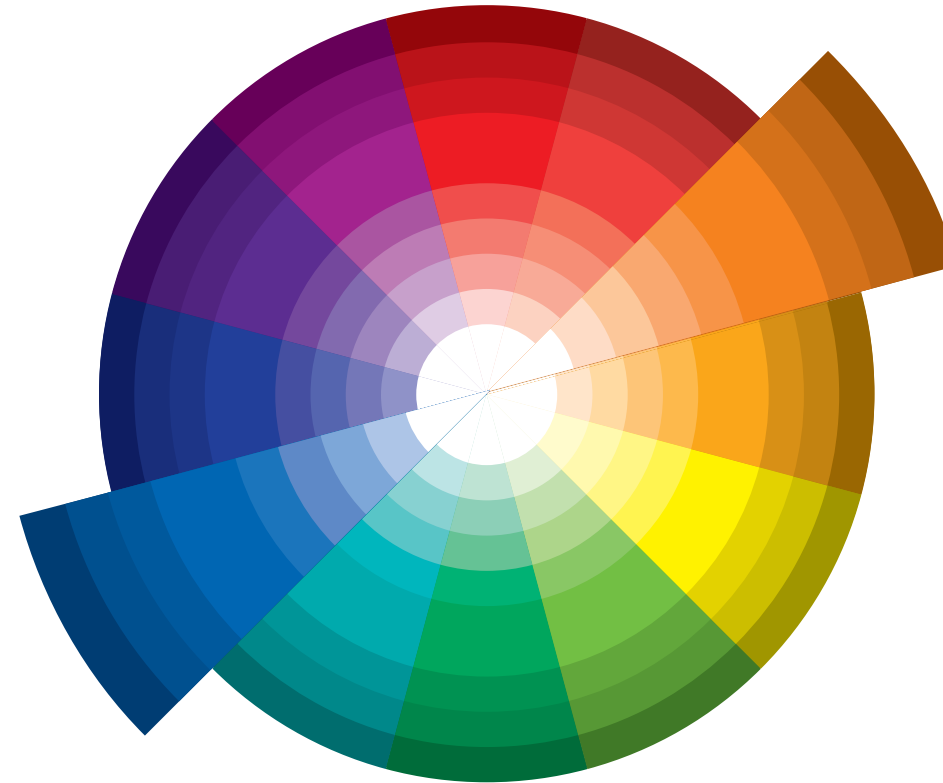# SPLIT-COMPLEMENTARY

ANALOGOUS
#1b75bb #00a9ac #8ccfb6
#adc5e6 #00888a #00888a

COMPLEMENTARY
#1b75bb #fcc69a #c06615
#004f8f #1b75bb #f5821f

SPLIT-COMPLEMENTARY
#004f8f #fcb94c #bb302d
#7da7d8 #ffd9a1 #f58d76
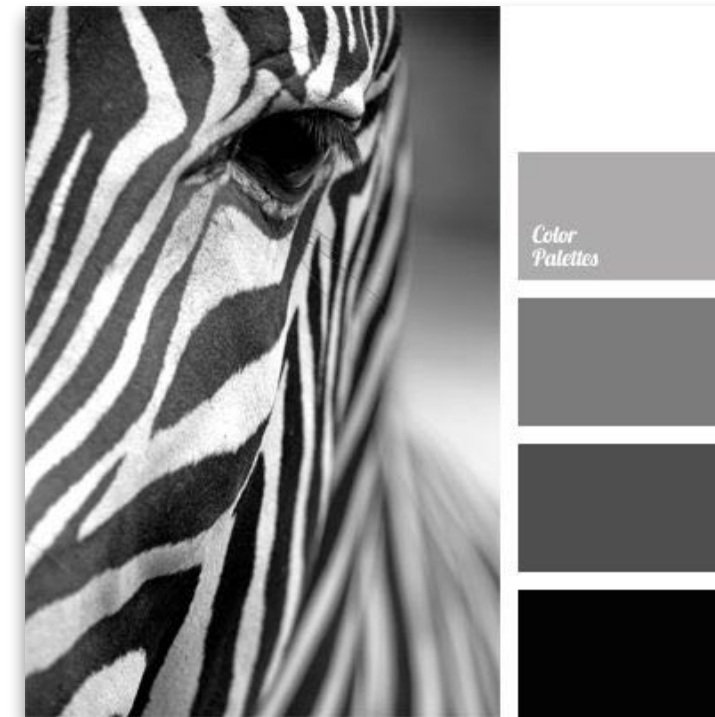
TRIADIC

#f5821f #5c2d91 #65c194

#f79447 #bbaed5 #009252

MONOCHROMATIC

ACHROMATIC

Color Vision Deficiencies

— Affects 8% of males, 0.5% of females

— Consider alternatives
  - *Intensity* vs. *hue* for emphasis
  - *Size* of colored elements
  - *Proximity* of similar colors

— Use <u>*tools*</u> to check designs

normal

protanomaly
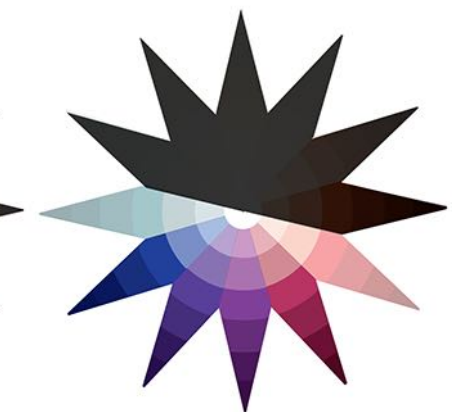red weakness: red, orange, yellow
shift in hue towards green

1%   0.03%

deuteranomaly
green weakness: yellow, green,
orange shift toward red

5%   0.35%

protanopia
severe deficiency in red spectrum

1%   0.01%

deuteranopia
severe deficiency in green spectrum

1%   0.01%
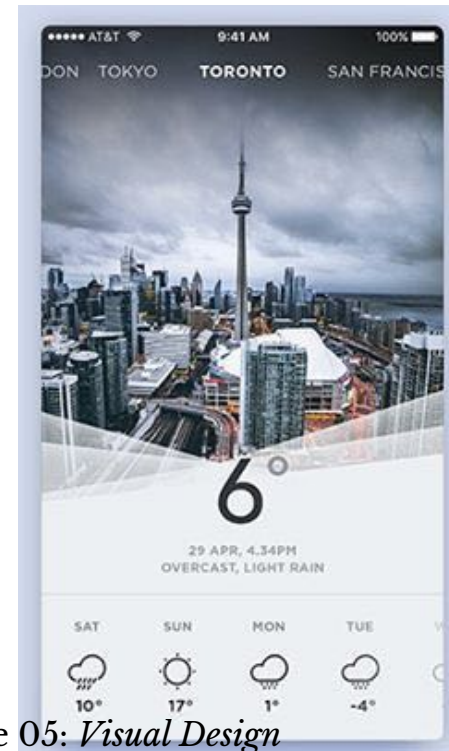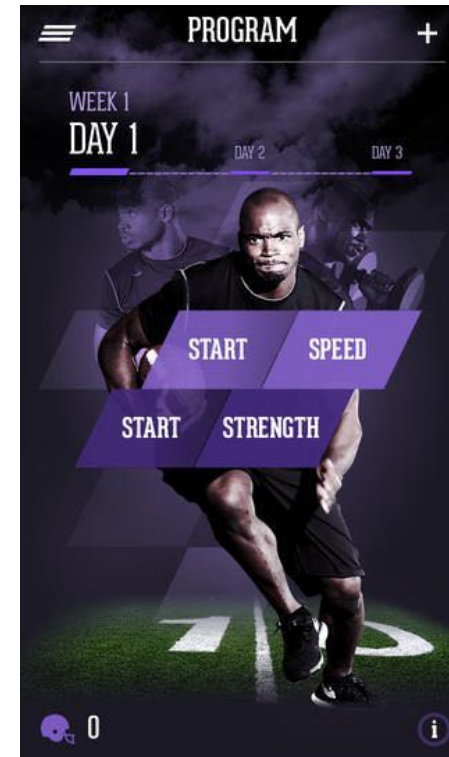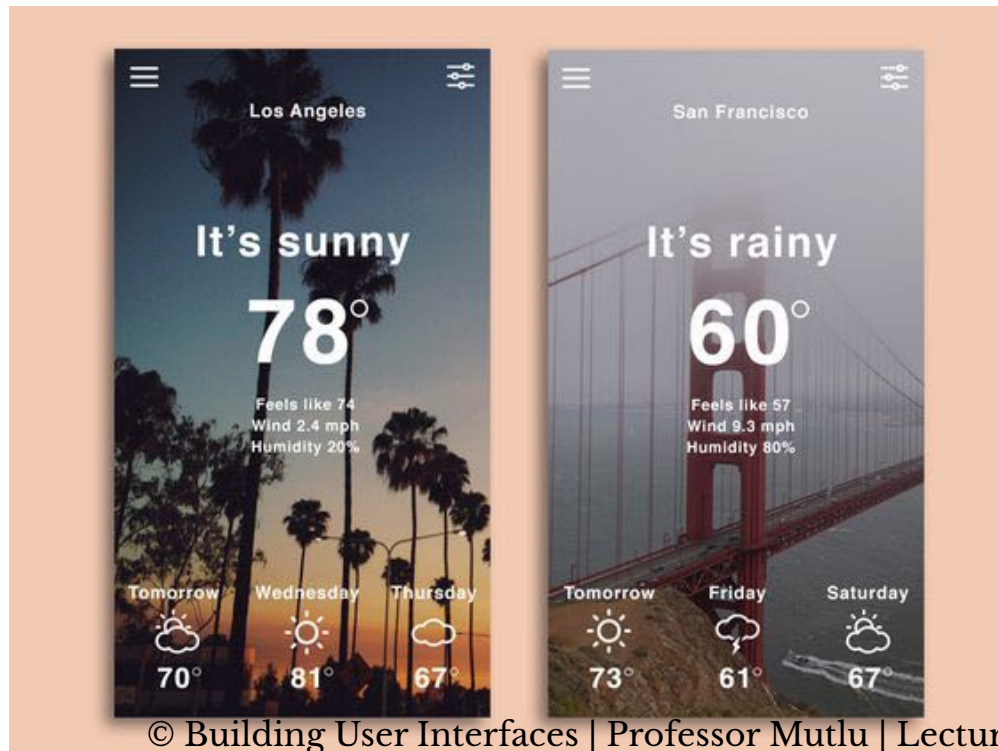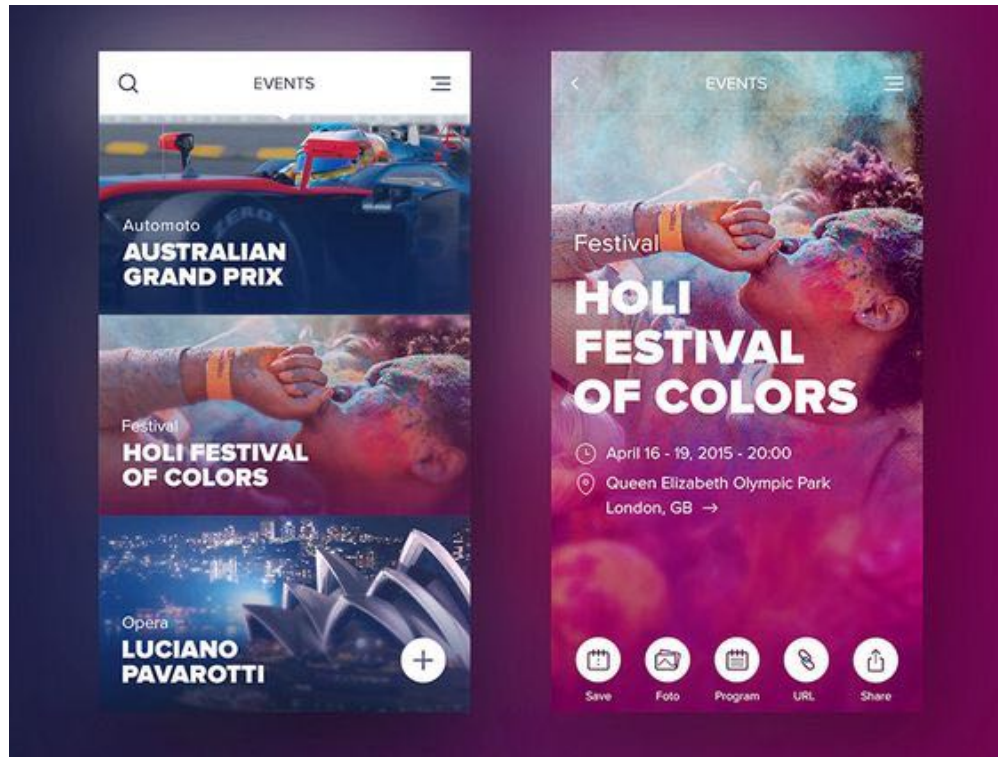
Questions about *Color*?

Images

Definition: Photographs, illustrations, three-dimensional art, silhouettes, icons, dingbats, infographics, and simpler shapes that convey rich information or context.

TABLE 5.1. Graphic types to use for varied goals.

| Instructional or Communication Purpose	Consider These Graphic Types
Depict concrete objects	Photograph 3-D graphic Illustration Clip art (particularly in diagrams and as game elements)
Tell a story or provide a scenario	Sequence of photographs Sequence of illustrations Timeline
Persuade an audience	Sequence of photos or illustrations to tell a story Photographs that evoke emotions Visualization of statistics and data
Explain unfamiliar or complex concepts and theories	Visual metaphor Diagram showing connections
Demonstrate a procedure	Show the steps in a sequence of photos or illustrations Flow chart Series of screen captures for software simulation
Explain a process	Diagram the stages or operations of the process Icons or simple illustrations to represent each component
Point out something specific	Arrow or pointed shape Highlight Outline of a circle
Depict components of a system	Illustrated object with labels Diagram of the structure
Make comparisons	Bar graph Pictograph Line graph with multiple lines Table (when specific values are important)
Demonstrate trends in data	Line graph Scatter plot
Organization of information	Various chart types (hierarchical, radial, etc.) Concept map
Demonstrate motion without animation	Show object moving along a path Illustrations with motion lines Illustrations with arrows or dashed lines depicting movement
History or changes over time	Timeline (these don't have to be arrows) Sequence of photos or illustrations

RASTER GRAPHICS

VECTOR GRAPHICS

◀More Realistic   Less Realistic▶
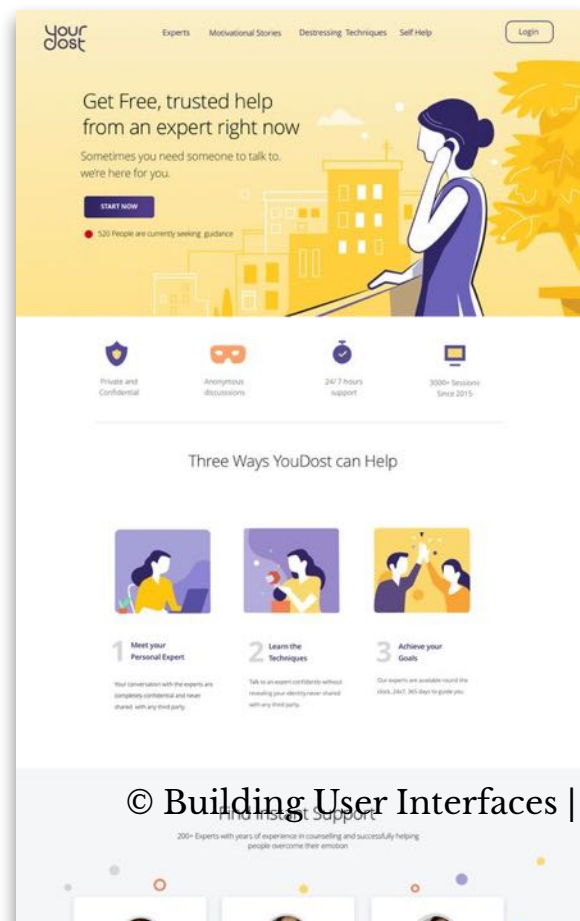
Questions about *Images*?

Quiz 3

Complete the Canvas quiz.

Quiz 4

Complete the <u>Canvas quiz</u>.