the messenger of experience

form

and color

2.744 product design
the messenger of experience
form and color!

I’ll always find you
the messenger of experience

form

and color

2.744 product design
but first…

a mini quiz!

list 4 steps/levels in a systematic form-giving process

list 3 types of transition or “corner” types, and what qualities they convey
part 1
form-giving process

structure
what it is
topology
proportions
directionality

surface
feeling
corner treatments types evoke different feelings

details/color
consistent use of treatments form a style or brand

graphics
working in clay gets your hands dirty
surfaces
form-giving process

precise, structured, dangerous
utility, practical, unrefined
sophisticated, fluid, inviting

C^0 positional continuity
C^1 tangent continuity (first derivative)
C^2 curvature continuity (second derivative)
surfaces
form-giving process

dangerous + inviting

hybrid forms
precise + sophisticated

precise + unrefined
surfaces
form-giving process
form/corner treatment vocabulary
form-giving process
surface

rectangle exercise

the feeling
form-giving process
expressive rectangles
form-giving process
expressive rectangles
form-giving process
expressive rectangles

young (carla)
young (yan)

young
old
sad
happy
calm
angry
form-giving process
expressive rectangles

young
old
sad
happy
calm
angry

old (wen)
sad (carmen)
form-giving process
expressive rectangles

angry (david)
calm (blair)

young
old
sad
happy
calm
angry
part 2
form-giving process

structure    surface    details/color    graphics
form-giving process
details
sympathetic to the overall structure and surface

proportions/grid
flow and direction
surface corner vocabulary
form-giving process

details

organize elements

grouping

proximity

similarity

continuation

common region

connectedness

closure
form-giving process

add variety and predictability

rhythm between or within groups

details

- number
- arrangement
- dimension
- shape
- color

between or within groups
form-giving process
details/color
visible electromagnetic spectrum

wavelength (nm)
form-giving process
details/color

our sensors

sensitivity

rod vision

cone vision

wavelength (nm)

400 500 600 700
form-giving process
details/color

sensors: dark adaptation
resolution of night vision < 20/200

rodopsin

rod/cone adaptation

color adaptation

minutes in dark

sensitivity

low

high

cones

rods

10 50

10 50
light sensitivity ranges over 9 orders of magnitude!

but we can only sense across 3 orders at a time

at any time, $10^6$ levels of our range are either black or white
form-giving process
details/color
cone pigments

Diagram:
- Absorption vs. wavelength (nm)
- Wavelength range: 400 to 700 nm
- Absorption peaks indicate the colors each type of cone pigment can absorb:
  - Short: blue
  - Medium: yellow
  - Long: red
form-giving process
details/color

object color/reflectance
fruits and vegetables

reflectance

wavelength (nm)

reflectance

wavelength (nm)

reflectance

wavelength (nm)

reflectance

wavelength (nm)
form-giving process
details/color

object color/reflectance

<table>
<thead>
<tr>
<th>Wavelength (nm)</th>
<th>Reflectance</th>
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<tbody>
<tr>
<td>400</td>
<td></td>
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<tr>
<td>500</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td></td>
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- white bond
- 20% gray card
- black paper
form-giving process
details/color

color and light source

<table>
<thead>
<tr>
<th>wavelength (nm)</th>
<th>intensity</th>
</tr>
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<tbody>
<tr>
<td>400</td>
<td>tungsten</td>
</tr>
<tr>
<td>500</td>
<td>sun</td>
</tr>
<tr>
<td>600</td>
<td></td>
</tr>
<tr>
<td>700</td>
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reflectance

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<td>600</td>
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</tr>
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</table>
form-giving process
details/color

simultaneous contrast  color and context
form-giving process
details/color

simultaneous contrast  color and context
and so the take-home design message is…?

our perception of color depends on many things
light source, light levels, surrounding context, adaptation

test in use conditions
**form-giving process**

details/color

**color wheel** (circa 1700)

your tool for understanding what goes with what
form-giving process
details/color

basic color wheel
warm and cool
form-giving process
details/color

all contain red

basic color wheel
colors in common
form-giving process

details/color

basic color wheel
colors in common

all contain blue
form-giving process

details/color

basic color wheel
colors in common

all contain yellow
form-giving process
details/color

basic color wheel
your tool for understanding what goes with what

this is pure hue
form-giving process
details/color

- primary
- secondary
- tertiary
- analogous
- contrasting
- complementary

color dimensions

- lightness/value
- hue
- saturation/purity (blend to center)

Wavelength (nm)
form-giving process
details/color

color dimensions
paint speak
tint (add white)
shade (add black)
form-giving process
details/color

color schemes
one point

vivid focus, often used in products
form-giving process
details/color

color schemes
contrasting or harsh

strong patterns, children’s products
form-giving process
details/color

color schemes
similar

quiet, calm, homey
form-giving process
details/color

color schemes
separation

accents differences or tones down
details/
color

form-giving process
color schemes
primary
secondary
tertiary
contrasting
contrasting
complementary
analogous
separation

accents differences or tones down
form-giving process
details/color

color and emotions
warm palette

intense, danger, secure
form-giving process

details/color

color and emotions
cool palette

calm, relaxed, unprovocative
form-giving process
details/color

color and emotions
mixed emotions

unsetting (a ralph color scheme)
form-giving process
details/color
color and emotions
value and saturation
tranquil, weak, inexpensive
form-giving process
details/color

color blindness
design considerations

monochromatism: 0.001% of population

protanopia: 1% males, 0.02% females (red/green)

dueteranopia: 1% males, 0.01% females (red/green)

tritanopia: 0.002% males, 0.001% females (blue/yellow)

value (lightness) based schemes
form-giving process
details/color

**color setting process**

i) product goals, image, function

ii) value/lightness, temperature

iii) background color (receding)

iv) accents (color scheme)

v) limit your pallet (typically 3 or fewer)
form-giving process

color challenge

give feeling/emotion through color

<table>
<thead>
<tr>
<th>Feeling</th>
<th>Number</th>
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<tbody>
<tr>
<td>angry</td>
<td>1</td>
</tr>
<tr>
<td>young</td>
<td>2</td>
</tr>
<tr>
<td>old</td>
<td>3</td>
</tr>
<tr>
<td>mysterious</td>
<td>4</td>
</tr>
<tr>
<td>happy</td>
<td>5</td>
</tr>
<tr>
<td>sad</td>
<td>6</td>
</tr>
<tr>
<td>calm</td>
<td>7</td>
</tr>
</tbody>
</table>

look inside your name card
download exercise file and references
set color palette
use only colors in palette
only change colors

name feeling_username.png
150 dpi
e-mail 2744ta@mit.edu file
a structured approach
form-giving process

structure  surface  details/color  graphics

laptop/software you are comfortable using for graphic/text editing
(ppt, keynote, illustrator, photoshop, etc)
learn how to put text on a baseline