

# User Interface Design & Implementation

## *Visual Structure*

Week 5 – Lecture 12

January – May Term, 2020

# Today's Topics

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- Visual Structure
- Graphics Design
- Color Guidelines

# Today's Topics

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- **Visual Structure**
  - Graphics Design
  - Color Guidelines

# Visual Structure

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- Visual structure refers to the way that the elements are visually displayed
- Describe four principles of Gestalt Psychology (also called Gestalt laws of grouping)
- Explain how those principles apply to good visual design of user interfaces: Use Visual Structure to Reinforce Logical Structure
- Give examples of visual design and explain how they follow the principles of Gestalt Psychology

# Four Gestalt Psychology Principles

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1. Proximity
2. Similarity
3. Common Fate
4. Closure

# Principle #1: Proximity

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- Our eyes/brain logically group together visual elements that are “proximate” (close) to one another.
- Given the following image, do you see
  - Six squares?
  - Three groups of two squares?



More will answer “Three groups of two squares”

# Principle #1: Proximity

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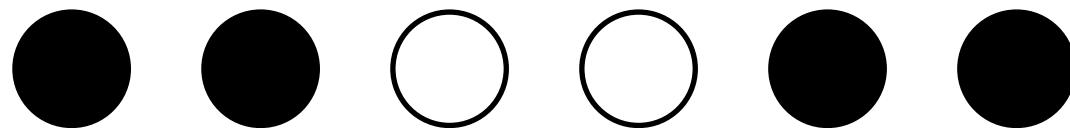
- Items close together appear to have a relationship
- Distance implies no relationship

Time:

Time:

# Principle #2: Similarity

- Our eyes/brain logically group together visual elements that are similar to one another.
- Given the following image, do you see
  - Six circles?
  - Three groups of two circles?



More will answer “Three groups of two circles”

# Principle #2: Similarity

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- Example: Similarity Creates a Typographical Hierarchy

This is a level 1 heading

This is a level 2 heading

This is another level 2 heading

This is a level 3 heading

This is another level 3 heading

This is another level 1 heading

This is another level 2 heading

This is another level 3 heading

# Principle #3: Common Fate

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- Our eyes/brain perceive visual elements that are moving in the same direction as a group.
  - common fate also applies to static elements, e.g., aligned elements perceived as a group.
- What associations do you see here?



# Principle #3: Common Fate

- Our eyes/brain perceive visual elements that are moving in the same direction as a group.
  - common fate also applies to static elements, e.g., aligned elements perceived as a group.
- What associations do you see here?



Boxes are not vertically aligned  
=> do not have common fate  
=> do not seem grouped together



Boxes are vertically aligned  
=> do have common fate  
=> do seem grouped together

# Principle #3: Common Fate

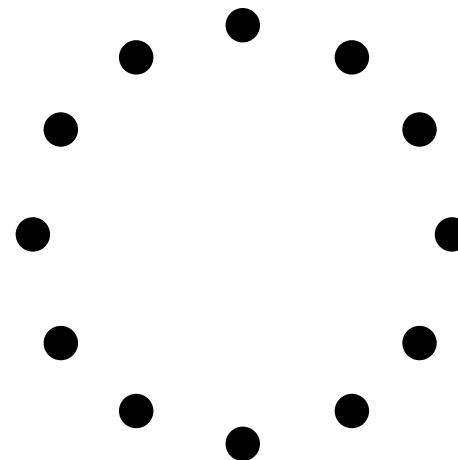
- Grids Provide **Structure** Using Common Fate
  - Grids are (hidden) horizontal and vertical lines
  - Alignment to same grid line creates **logical grouping**

Dashboard	Accounts	Customers	Cards	Transactions	Reports	Customer Support	User Management	More	
		Account name	Type	Account number	CCY	Balance	Last Transfer	Trustworthiness	Status
		David Washington — EUR	Private	312036709700	EUR	39090.47	10 Oct 2017	<span>FLAG</span> Sufficient	<span>GREEN</span> Active
		Victoria Padilla — EUR	Private	328254631524	EUR	21194.49	26 Oct 2017	<span>FLAG</span> Sufficient	<span>GREEN</span> Active
		Rachel Foster — USD	Private	220480352306	USD	42925.39	02 Dec 2017	<span>FLAG</span> Sufficient	<span>GREEN</span> Active
		Isabel Wilkins — PLN	Private	004213396244	PLN	45129.07	02 Sep 2017	<span>FLAG</span> Perfect	<span>GREEN</span> Active
		HUA HAI IMP.AND EXP. TRADE CO — USD	Business	327732128333	USD	88338.93	10 Dec 2017	<span>FLAG</span> Perfect	<span>GREEN</span> Active
		Eula Glover — EUR	Private	061061929124	EUR	42557.39	12 Dec 2017	<span>PINK</span> Unsufficient	<span>GREEN</span> Active

# Principle #4: Closure

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- Our eyes/brain logically group together visual elements that approximate a closed shape, to form that closed shape
- Given the following image, do you see
  - Twelve dots?
  - A circle?

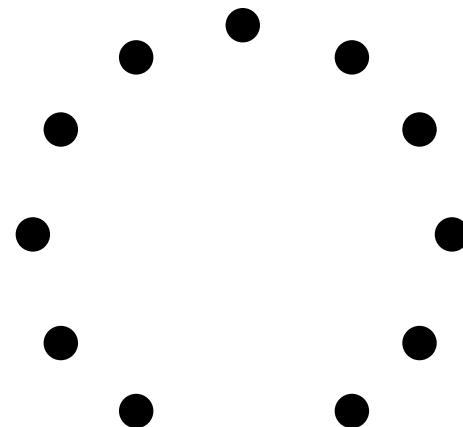


More will answer “A circle”

# Principle #4: Closure

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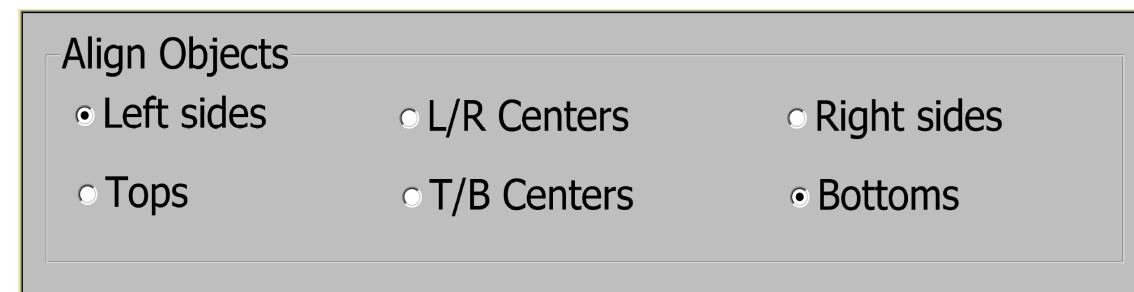
- Our eyes/brain logically group together visual elements that approximate a closed shape, to form that closed shape
- Given the following image, do you see
  - Eleven dots?
  - A circle?



More will answer “A circle” – despite the missing dot

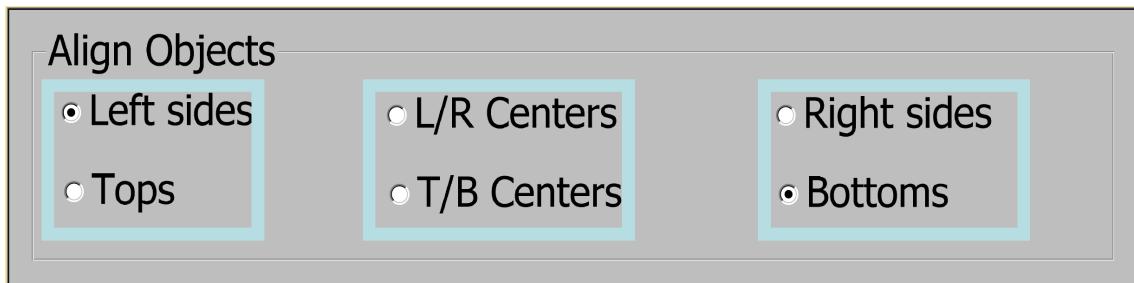
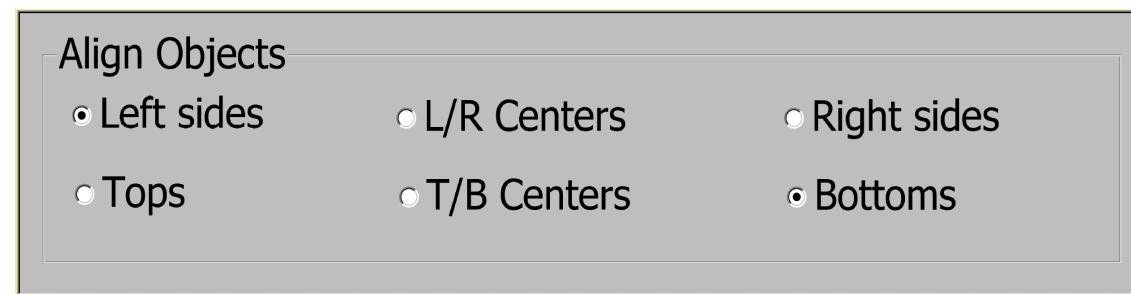
# Which is the Logical Structure?

Logical structure refers to the way information in a document is organized; it defines the hierarchy of information and the relation between different parts of the document.

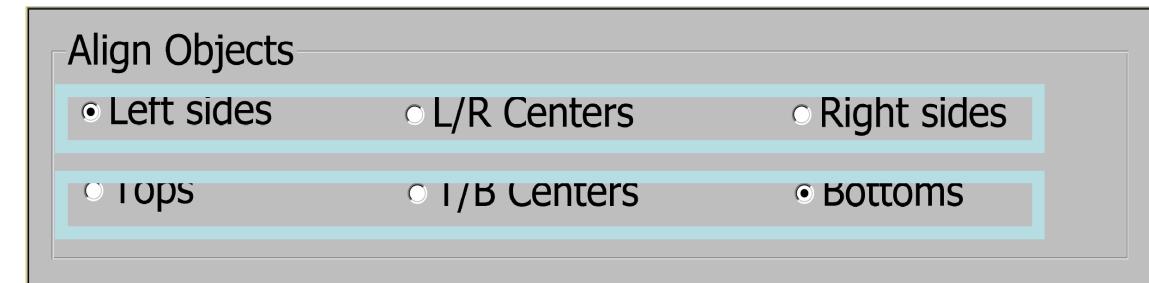


# Which is the Logical Structure?

Logical structure refers to the way information in a document is organized; it defines the hierarchy of information and the relation between different parts of the document.



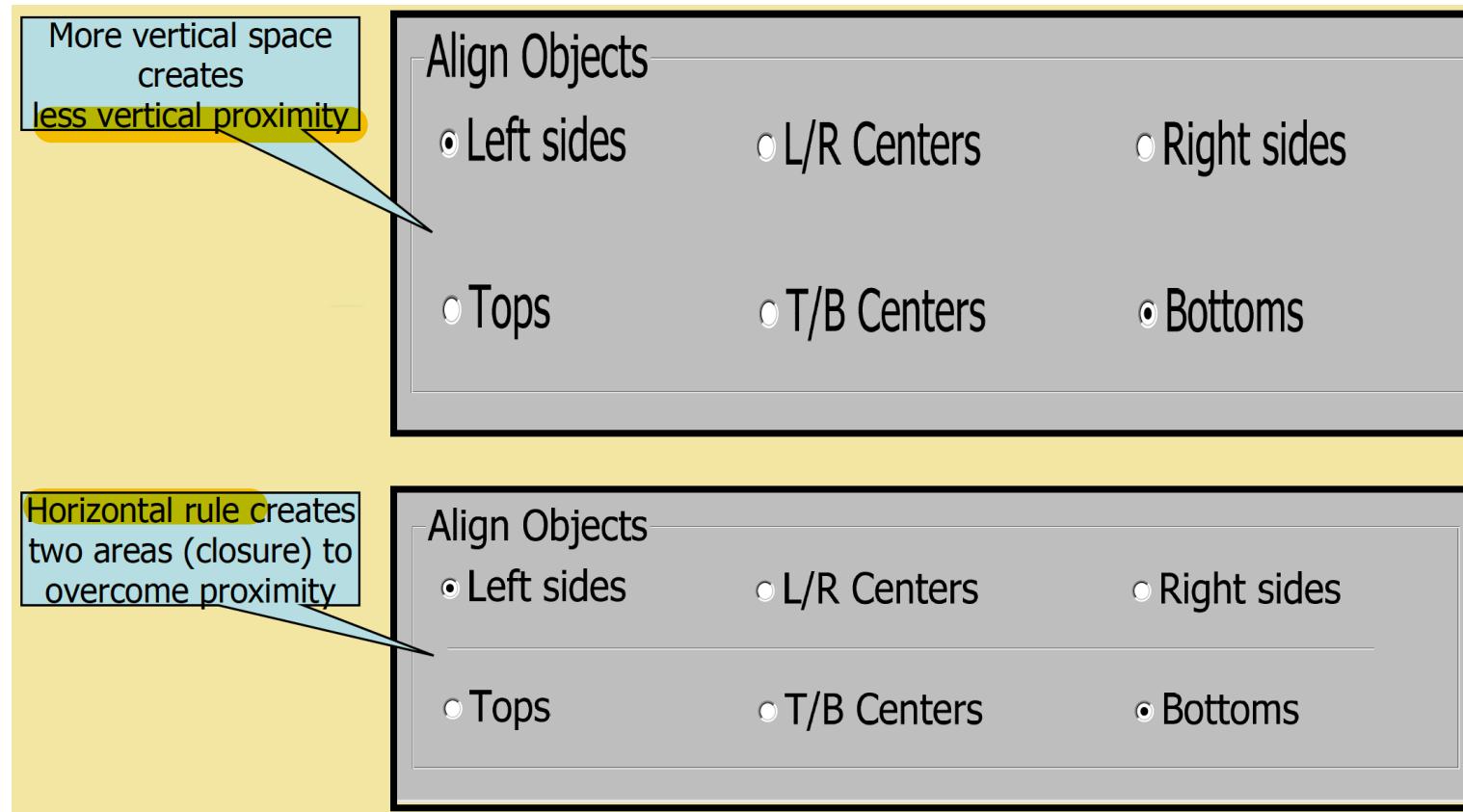
Logical structure 1



Logical structure 2

# Reinforce Logical Structure

- Use visual structure to reinforce the underlying logical structure



# Combining Principles: Menu Example

No visual structure  
to reinforce logical  
structure

**Rotate X**  
**Rotate Y**  
**Rotate Z**  
**Zoom In**  
**Zoom Out**

Grouping created by

- Proximity within clusters
- Visual separation between clusters

**Rotate X**  
**Rotate Y**  
**Rotate Z**  
  
**Zoom In**  
**Zoom Out**

Hierarchy created by

- Indentation (common fate)

**Rotate**  
  **X**  
  **Y**  
  **Z**  
  
**Zoom**  
  **In**  
  **Out**

# Combining Principles: Typographical Hierarchy

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- Stronger Typographical Hierarchy by combining **similarity** + **common fate**

This is a level 1 heading

This is a level 2 heading

This is another level 2 heading

This is a level 3 heading

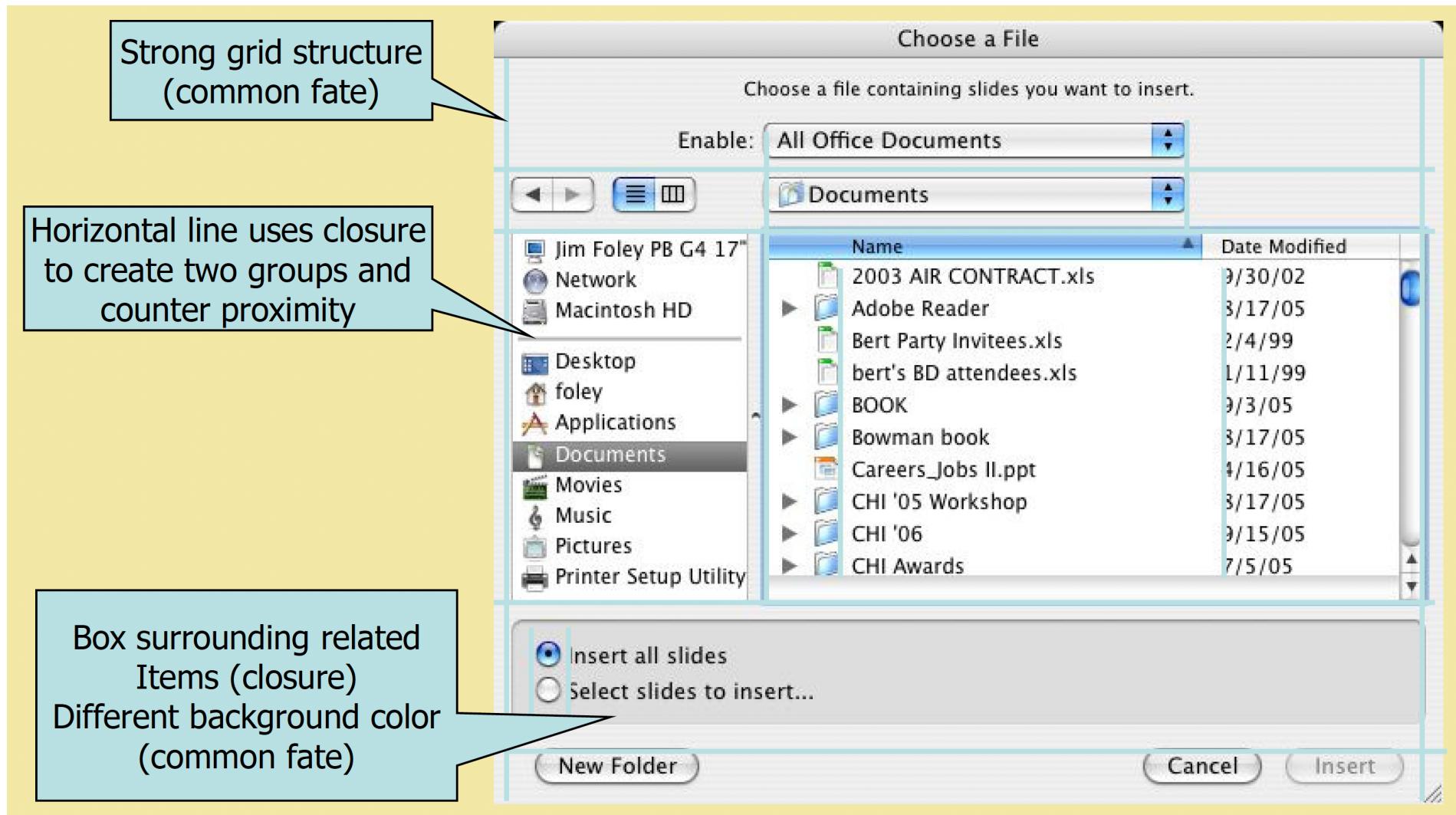
This is another level 3 heading

This is another level 1 heading

This is another level 2 heading

This is another level 3 heading

# Combining Principles: Dialogue Box



# Today's Topics

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- Visual Structure
- **Graphics Design**
- Color Guidelines

# Graphics Design

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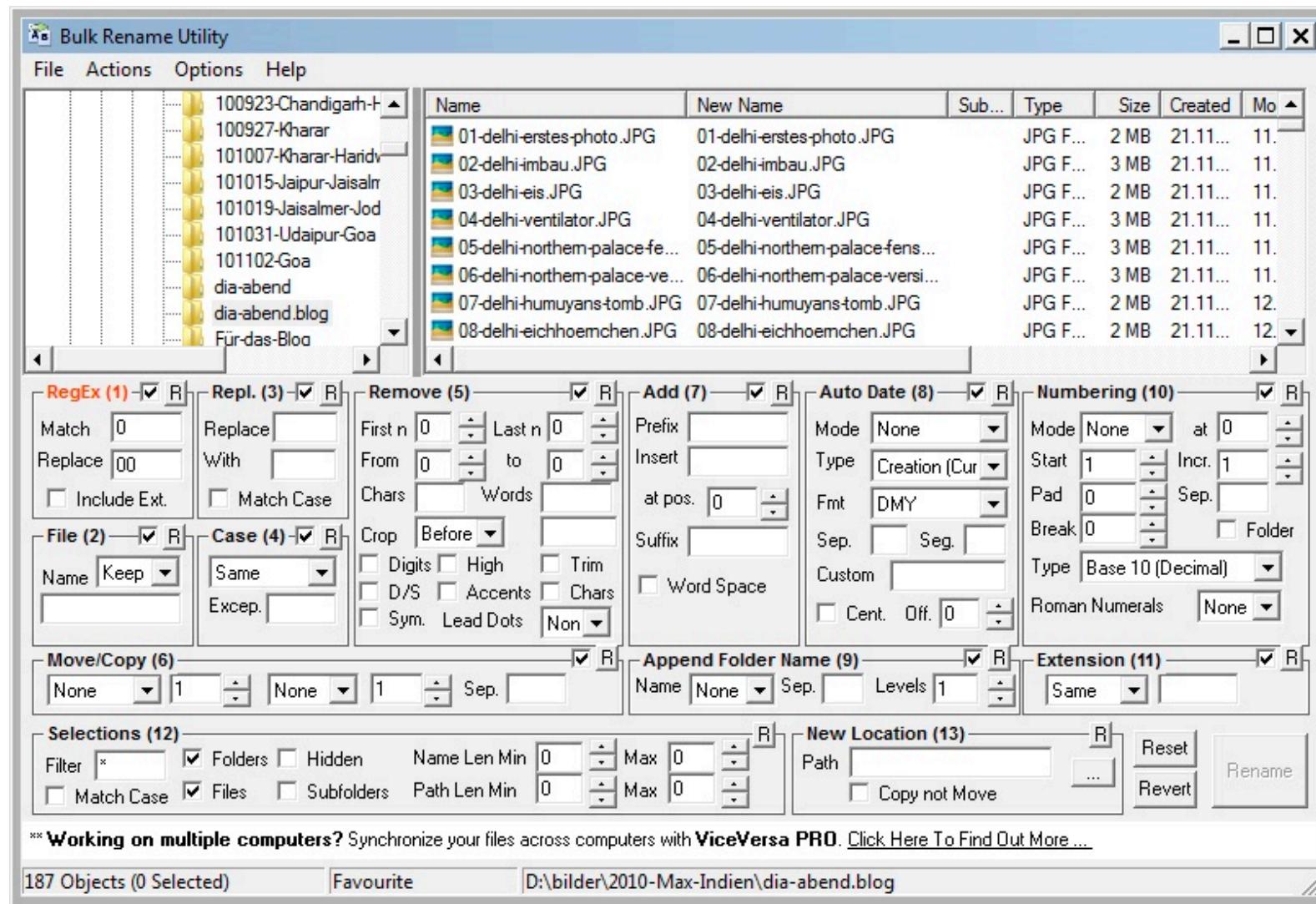
- Simplicity
  - reduction
  - regularity
  - double-duty
- Contrast
  - visual variables
  - sharpen distinctions

# Simplicity

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- “Perfection is achieved not when there is nothing more to add, but when there is nothing left to take away.”  
– Antoine de St-Exupery
- “Simplicity does not mean the absence of any decor...It only means that the décor should belong intimately to the design proper, and that anything foreign to it should be taken away”  
– Paul Jacques Grillo

# Simplicity



# Simplicity

Gmail Images  

A search bar with a magnifying glass icon on the left and a microphone icon on the right.

Google Search

I'm Feeling Lucky

Google offered in: 中文(简体) Melayu தமிழ்

Singapore

Advertising Business About How Search works

Privacy Terms Settings

# Techniques for Simplicity: **Reduction**

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- Remove inessential elements

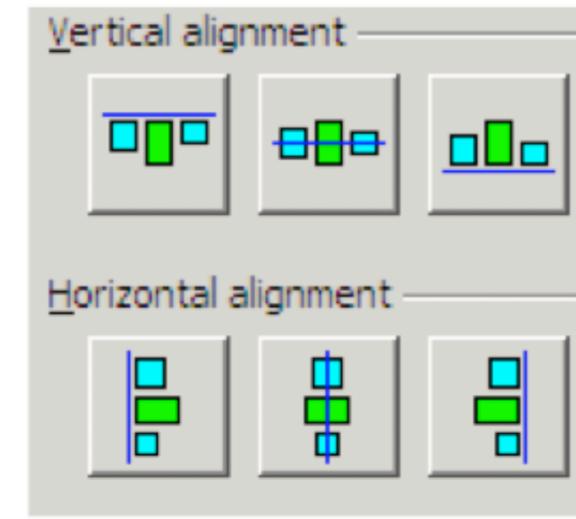
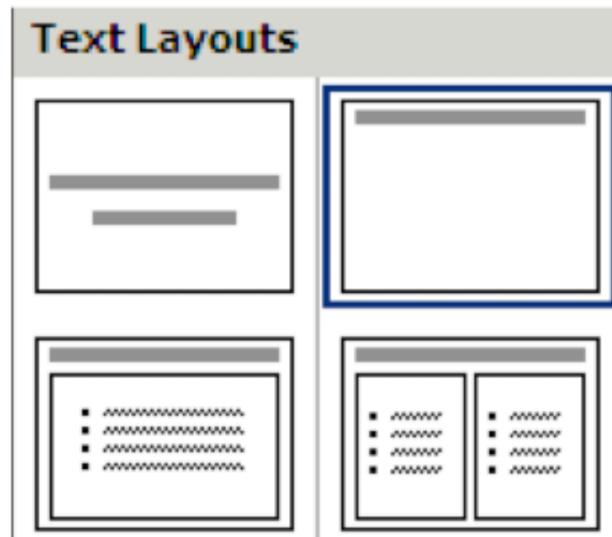


- Remove inessential features



# Techniques for Simplicity: Regularity

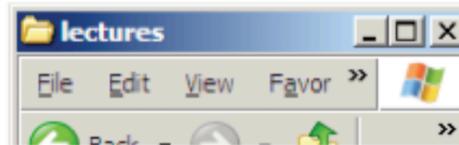
- Use a regular pattern
- Limit inessential variation among elements



# Techniques for Simplicity: Double-Duty

- Combine elements for leverage
  - Find a way for one element to play multiple roles

title bar



scrollbar thumb



help prompt



breadcrumbs

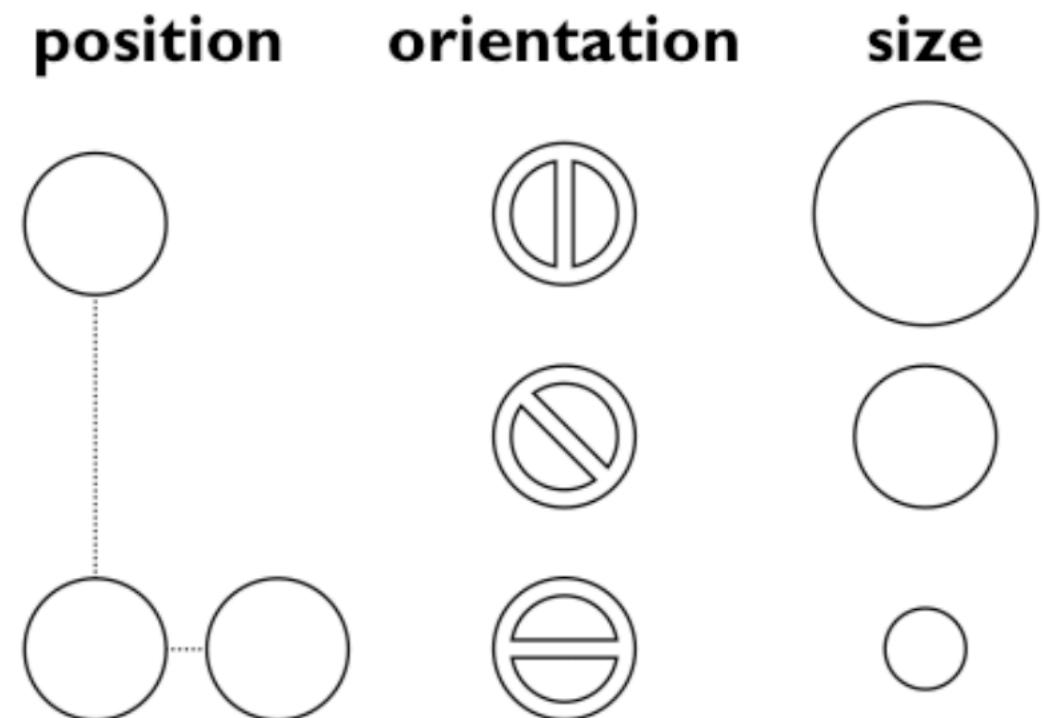
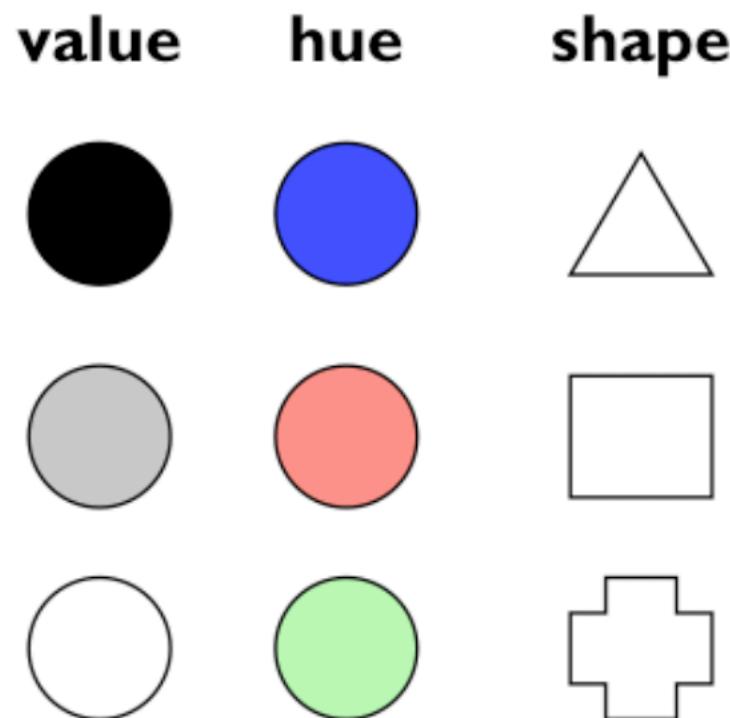
[Travel](#) > [Guides](#) > North America

pagination

Results Page:  
[1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [▶](#) [Next](#)

# Contrast

- Contrast encodes information along visual dimensions



# Techniques for Contrast

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- Choose appropriate visual variables
  - Use as much length as possible
- Sharpen distinctions for easier perception
  - Multiplicative scaling, not additive
  - Redundant coding where needed
  - Cartoonish exaggeration where needed

# Choose Appropriate Visual Variables

Subject	Sender	Date
Содействие в трудоустройстве.	chao	10/15/2004 4:26...
Автовладельцам	АвтоГранд	10/15/2004 4:45...
Обучение теннису	eliot	10/15/2004 7:16 AM
PITTSBURGH PA Silverton Home Services for... Erica Gallenbeck		10/15/2004 7:21...
156 - 00 - 00 &#1085;&#1072;&#1096; &#1...	XjXFYLXmXgX@tdb.com	10/15/2004 10:4...
156-00-00	hucksterEOFIN	10/15/2004 11:12 ...
A Library A Dream...	Arthur GuoBin Yin	10/15/2004 6:38...
SAVE 20% on holiday cards by shopping early	Snapfish	5:18 AM
How are you	Анисимов К.И.	11:24 AM

# Designing Information Displays

Title: [HCI Bibliography : Human-Computer Interaction / User Interface ...](#)

Summary: The HCI Bibliography (HCIBIB) is a free-access bibliography on Human-Computer Interaction, with over 20000 records in a searchable database. ... Learn about HCI. ...

Keywords: HCI

URL: [www.hcibib.org/](http://www.hcibib.org/)

Size: 14k



[HCI Bibliography : Human-Computer Interaction / User Interface ...](#)

The HCI Bibliography (HCIBIB) is a free-access bibliography on Human-Computer Interaction, with over 20000 records in a searchable database. ... Learn about HCI. ...

[www.hcibib.org/](http://www.hcibib.org/) - 14k - [Cached](#) - [Similar pages](#)

[Human-Computer Interaction Resources on the Net](#)

... This is a collection of information related to Human-Computer Interaction (HCI). ...

Collections of resources for HCI researchers and practitioners. ...

[www.ida.liu.se/labs/aslab/groups/um/hci/](http://www.ida.liu.se/labs/aslab/groups/um/hci/) - 9k - [Cached](#) - [Similar pages](#)

# Contrast in Publication Styles

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## Title

### Heading

This is body text. It's smaller than the heading, lighter in weight, and longer in line length. We've also changed its shape to a serif font, because serifs make small text easier to read. Redundant encoding produces an effective contrast that makes it easy to scan the headings and distinguish headings from body text.<sup>1</sup>

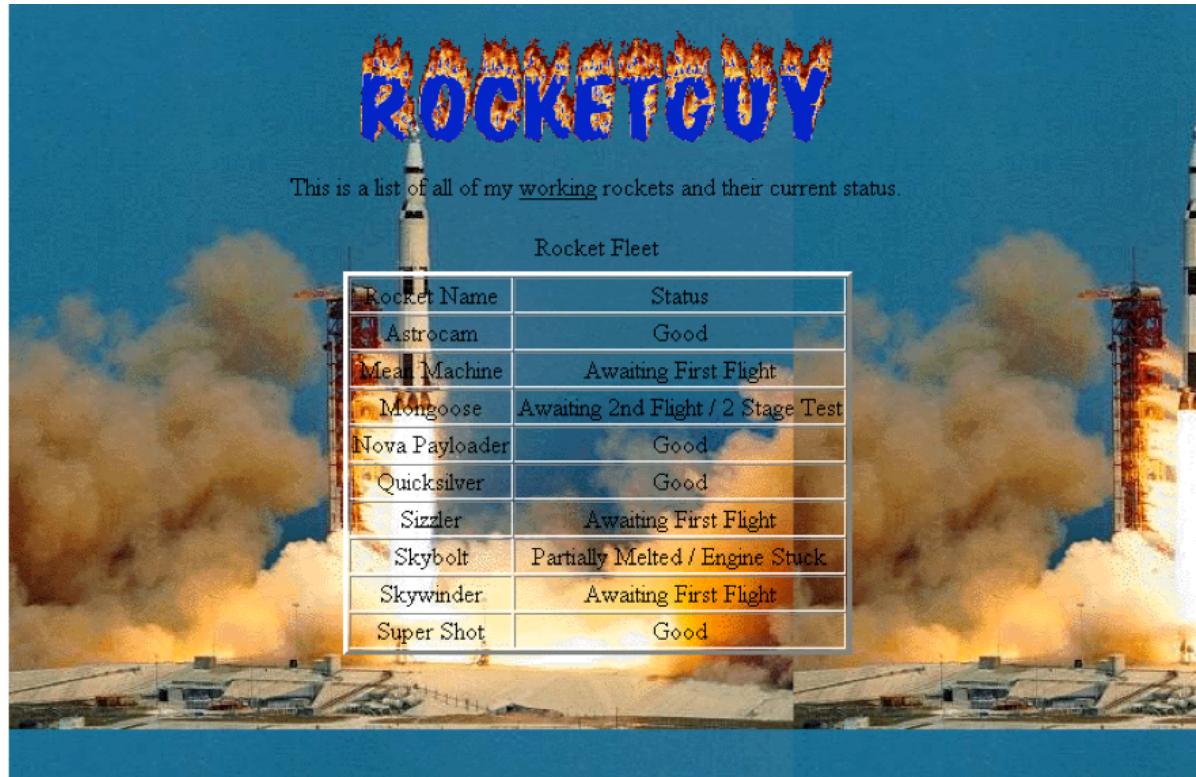


Figure 1. This is a caption, which is smaller than body text, and set off by position, centering, and line length.

<sup>1</sup>This is a footnote. It's even smaller, and positioned at the bottom of the page.

# Contrast in Background

- Use **quiet background**, so that what you want to **emphasise** can be emphasised



The page header features the 'link' logo and the 'DCU' logo. The main heading is '1<sup>st</sup> LINK Quantitative Research Method Summer School, DCU, 8-9 May 2014'. The text invites PhD students and researchers in social science to a systematic training on quantitative research methods. It includes sections for 'Save the dates', 'Topics', 'Software', 'Target group', 'Cost', 'Application', 'Instructor', and 'Example comments from students'. The background of the page features a photograph of a building with the text 'DUBLIN CITY UNIVERSITY BUSINESS SCHOOL' visible.

**1<sup>st</sup> LINK Quantitative Research Method Summer School, DCU, 8-9 May 2014**

The Leadership, Innovation, and Knowledge (LINK) Research Institute invites you to our first Quantitative Research Methods Summer School, 8-9 May 2014. The Summer School is designed to provide PhD students and researchers in social science area with a systematic training on quantitative research methods. After the summer school, you would know the whole data analysis journey and be able to apply these techniques into your own research.

**Save the dates:** Thursday 8 May and Friday 9 May

**Topics:**

- Day 1: Research design, sampling, data screening, reliability, validity, and factor analysis
- Day 2: Multiple linear regression, mediation, moderation and moderated mediation test

**Software:** SPSS 21.0

**Target group:** PhD students and researchers in social science area.

**Cost:** You can select one day or two days' course. €60 for one day course; €100 for two-day course. The cost includes computer, software, training course materials, tea and sandwiches during the day.

**Application:** There are 20 places for each day course. Places are reserved by received payments at

**Instructor:** Dr Na Fu, DCU.

Na is an IRCHSS postdoctoral research fellow at Dublin City University. She is a member of LINK Research Institute. Na received her BA in Engineering from Northeastern University (China) and a Doctoral Degree from Dublin City University in 2011. Na is specialising quantitative research method. Na is highly involved in providing quantitative methods advice for PhD students and colleagues in diverse fields, e.g. psychology, management, accounting, sports science, education studies, and computing science. Her research receives international and national recognition by lots of research awards, e.g. AOM Best Paper Award, IAM Best Paper Award, and Emerald PhD Thesis Award.

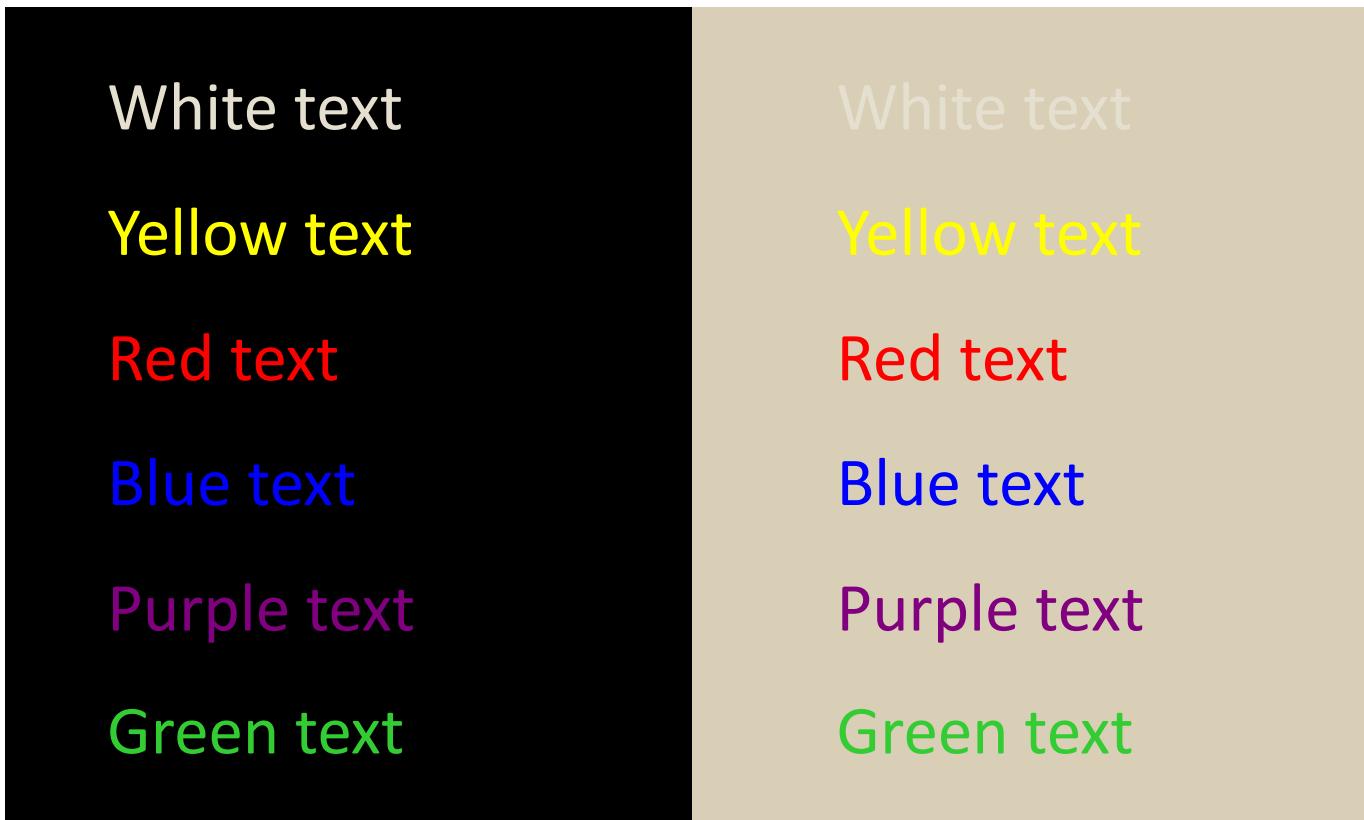
Example comments from students in Dr. Fu's quantitative research methods course are:

*"Na had a great ability to simplify daunting subjects which enabled us to understand concepts in the context of our own model."*  
*"Na's interactive style questioning the class re-enlarged our learning."*

# Contrast in Background

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- Background colors should establish a good contrast with the foreground to ensure readability of the text



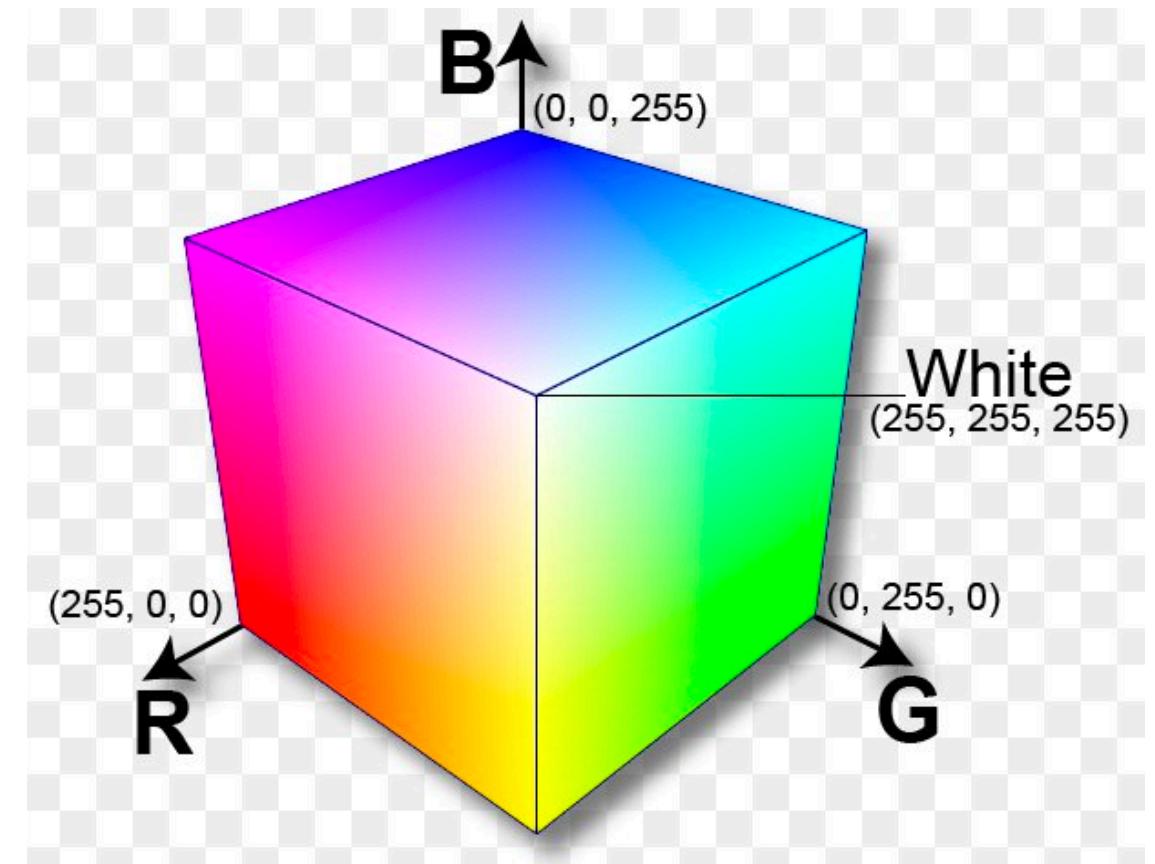
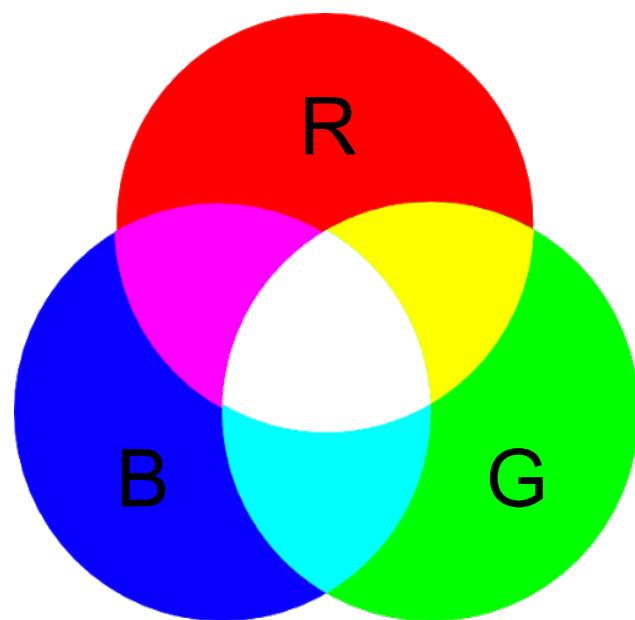
# Today's Topics

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- Visual Structure
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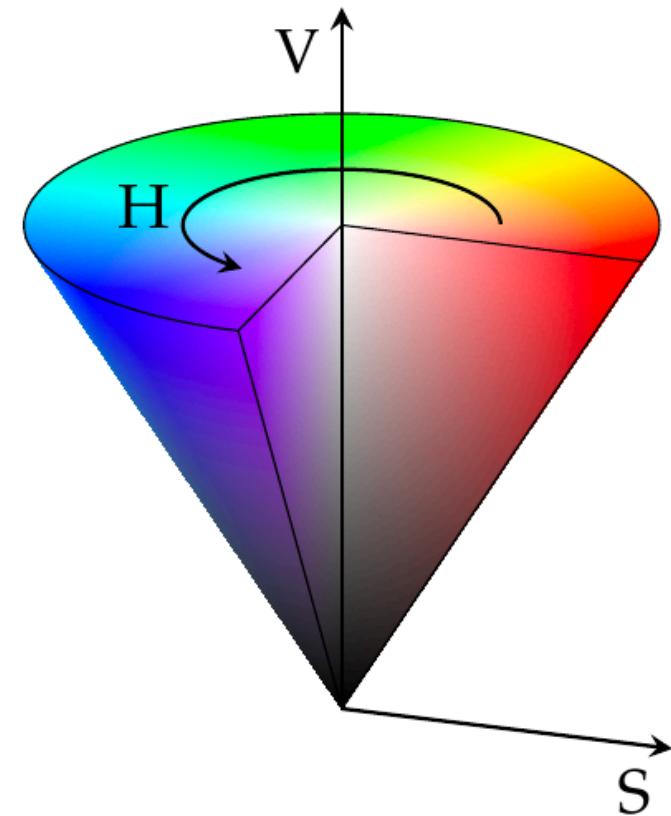
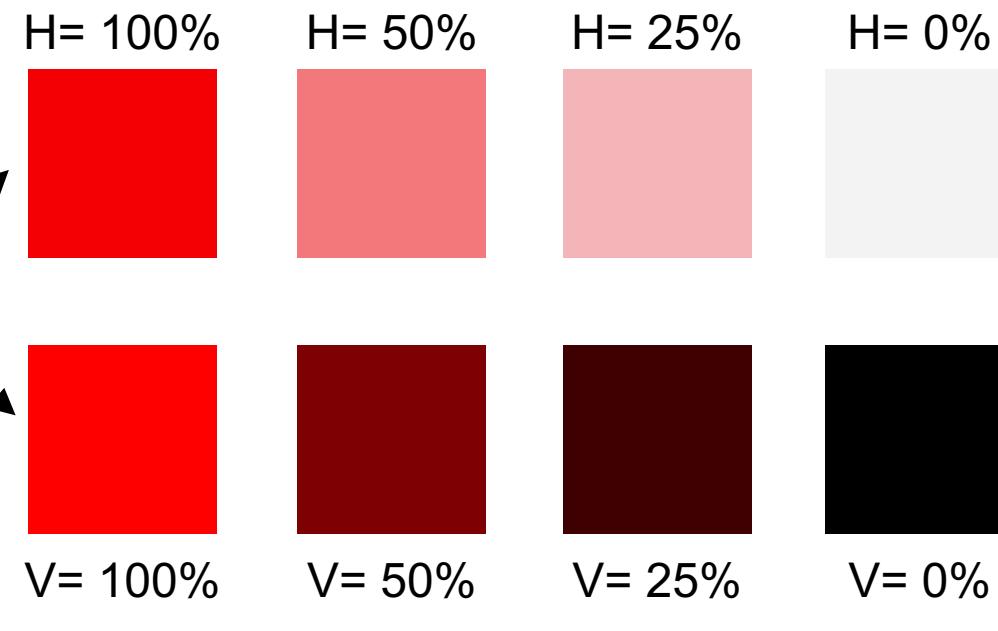
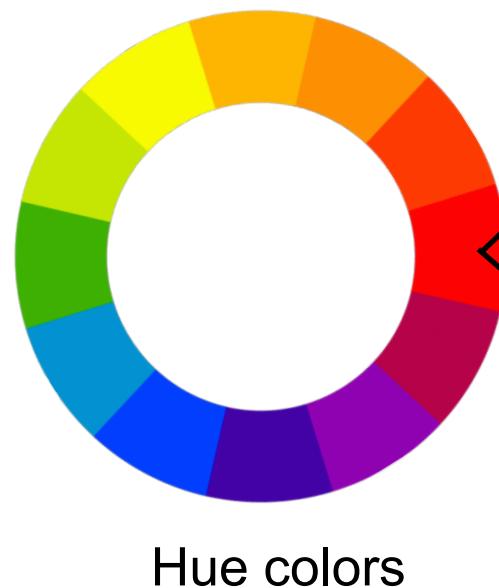
# Color Models

- Red-Green-Blue (RGB)
  - Red: 0% - 100%
  - Green: 0% - 100%
  - Blue: 0% - 100%



# Color Models

- Hue-Saturation-Value (HSV)
  - Hue is wavelength of color
  - Saturation is amount of pure color
  - Value is brightness



# Saturated Colors

- Saturated colors are considered “pure” colors; no grays added to the colors to make them seem lighter or more like a pastel
  - saturated colors **attract** your attention
  - saturated colors are **harsh** on your eyes



Saturated colors



Desaturated colors

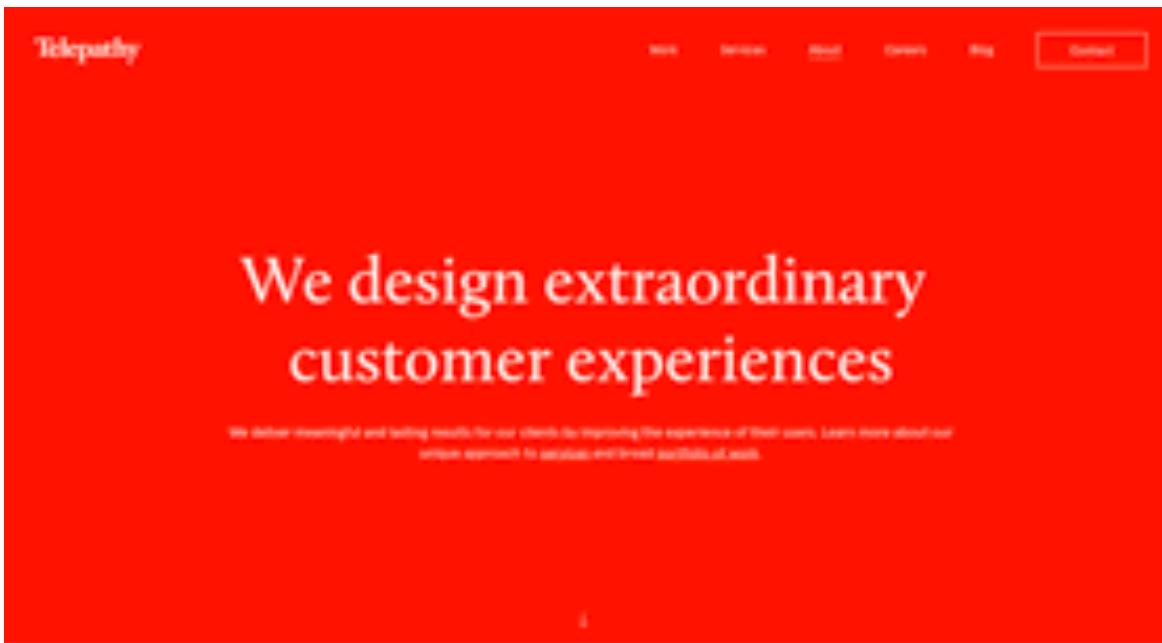
# Color Guidelines

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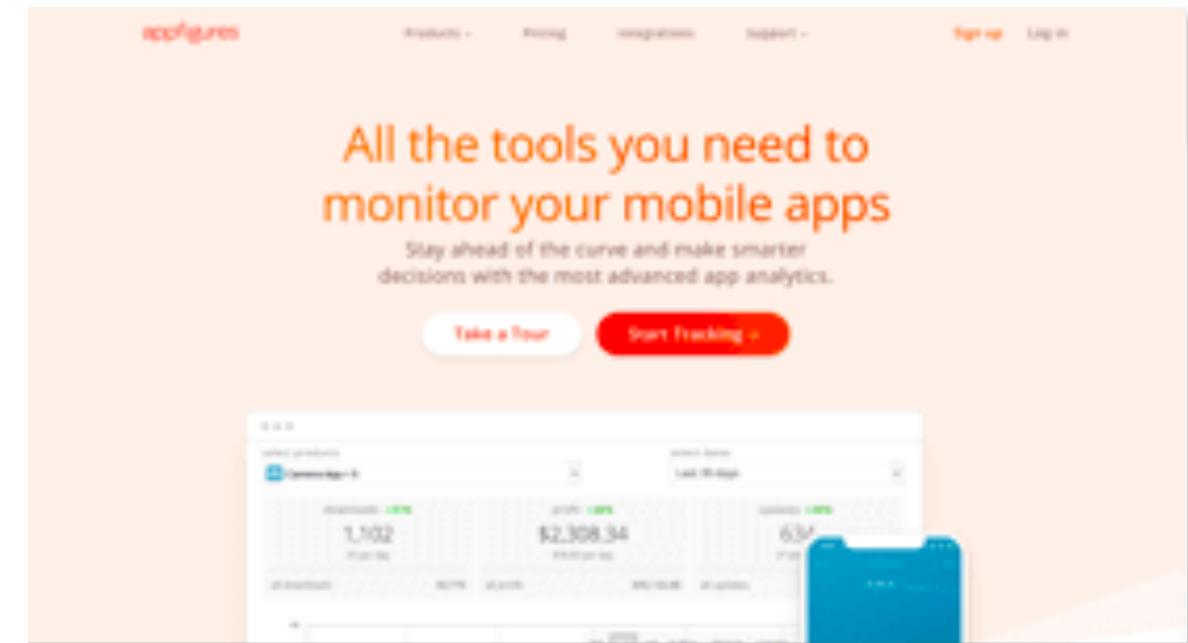
1. Avoid saturated colors
2. Use few colors
3. Be consistent with expectations

# Guideline #1 Avoid Saturated Colors

- Avoid strongly saturated colors as they can cause visual fatigue



Interfaces with **saturated** colors



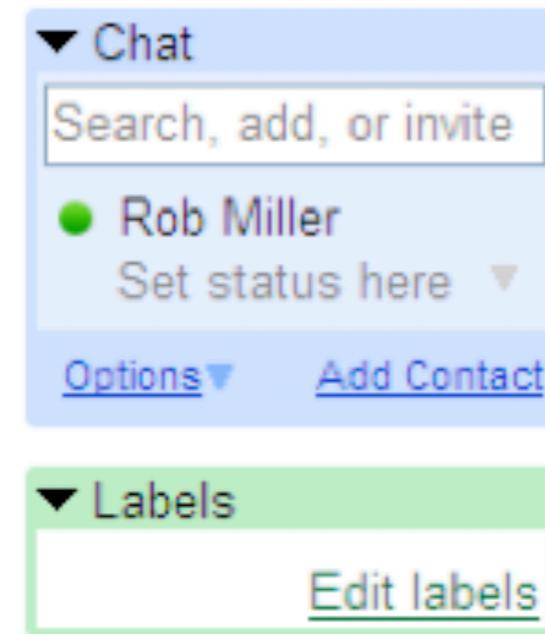
Interfaces with **desaturated** colors

# Guideline #1 Avoid Saturated Colors

- Avoid strongly saturated colors as they can cause visual fatigue



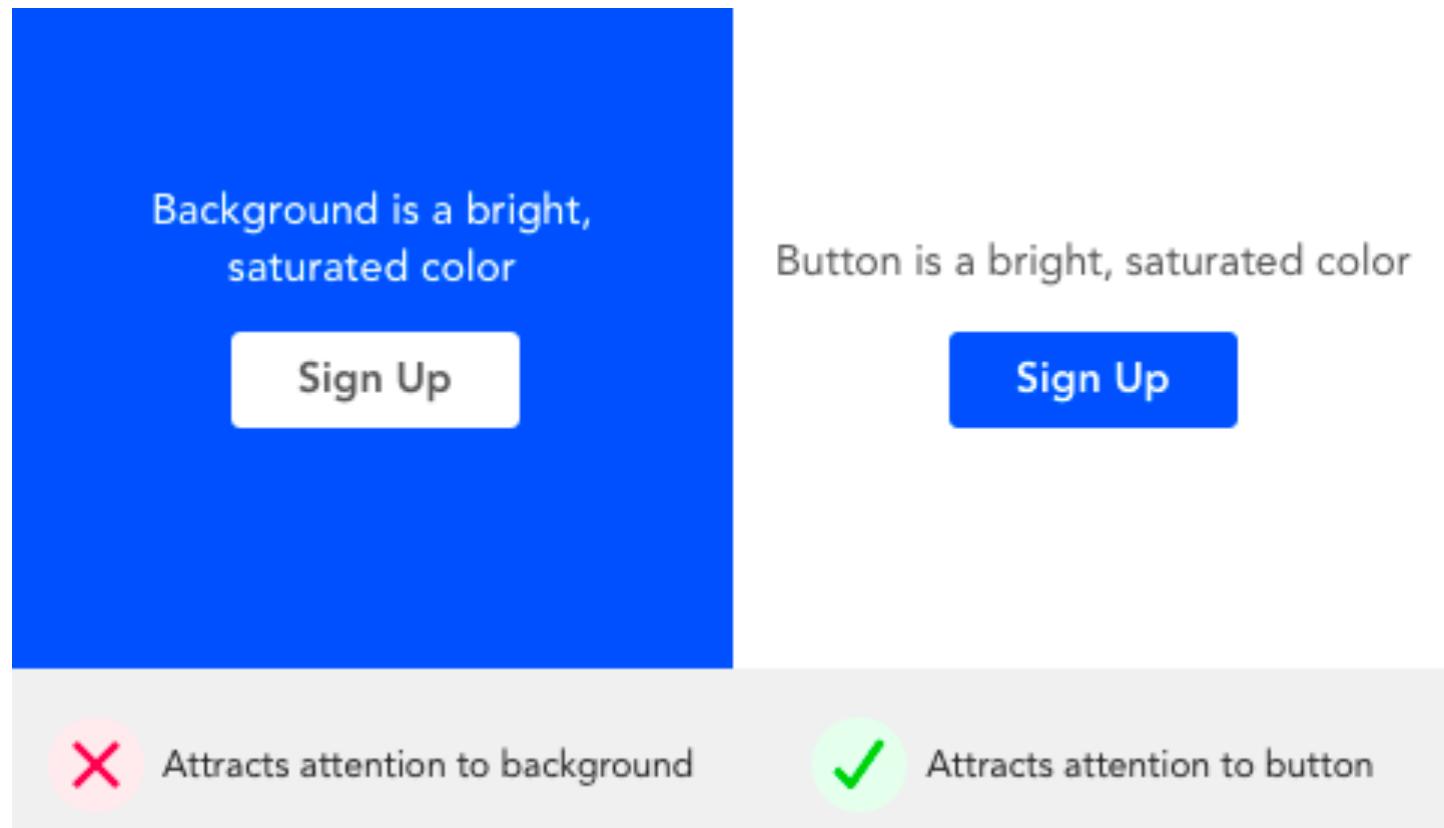
Interfaces with **saturated** colors



Interfaces with **desaturated** colors

# Guideline #1 When Saturation is Cool

- Saturated color are effective on buttons, links, alerts and system messages because they grab the user's attention



## Guideline #2 Use Few Colors

- Use only a small number of different hues as an interface with many colors appears more complex, more cluttered, and more distracting



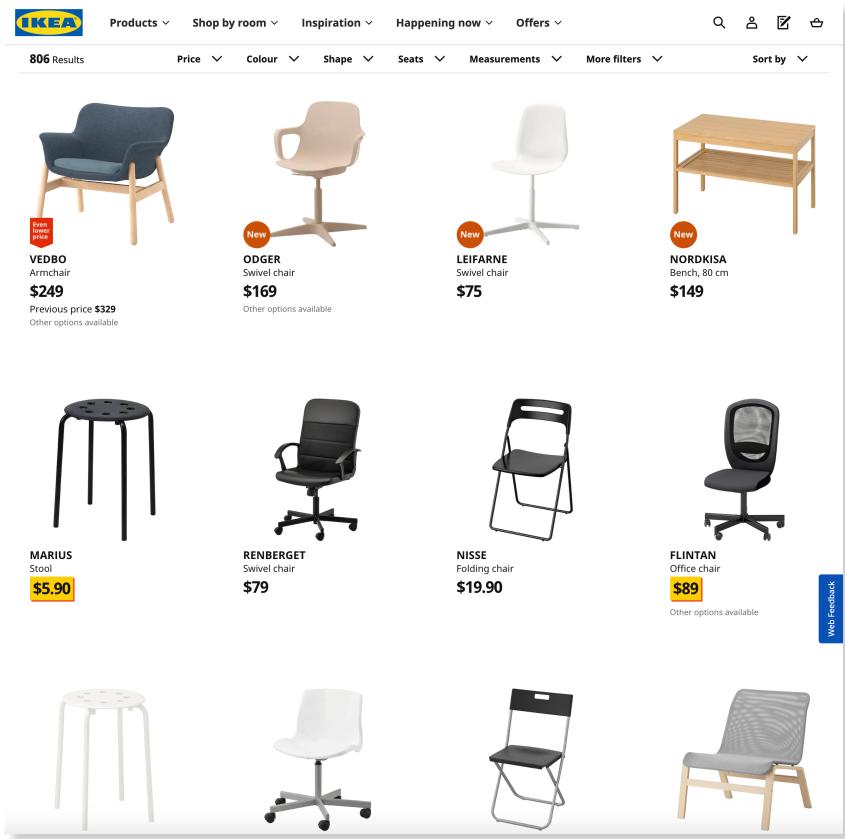
Few colors



Many colors

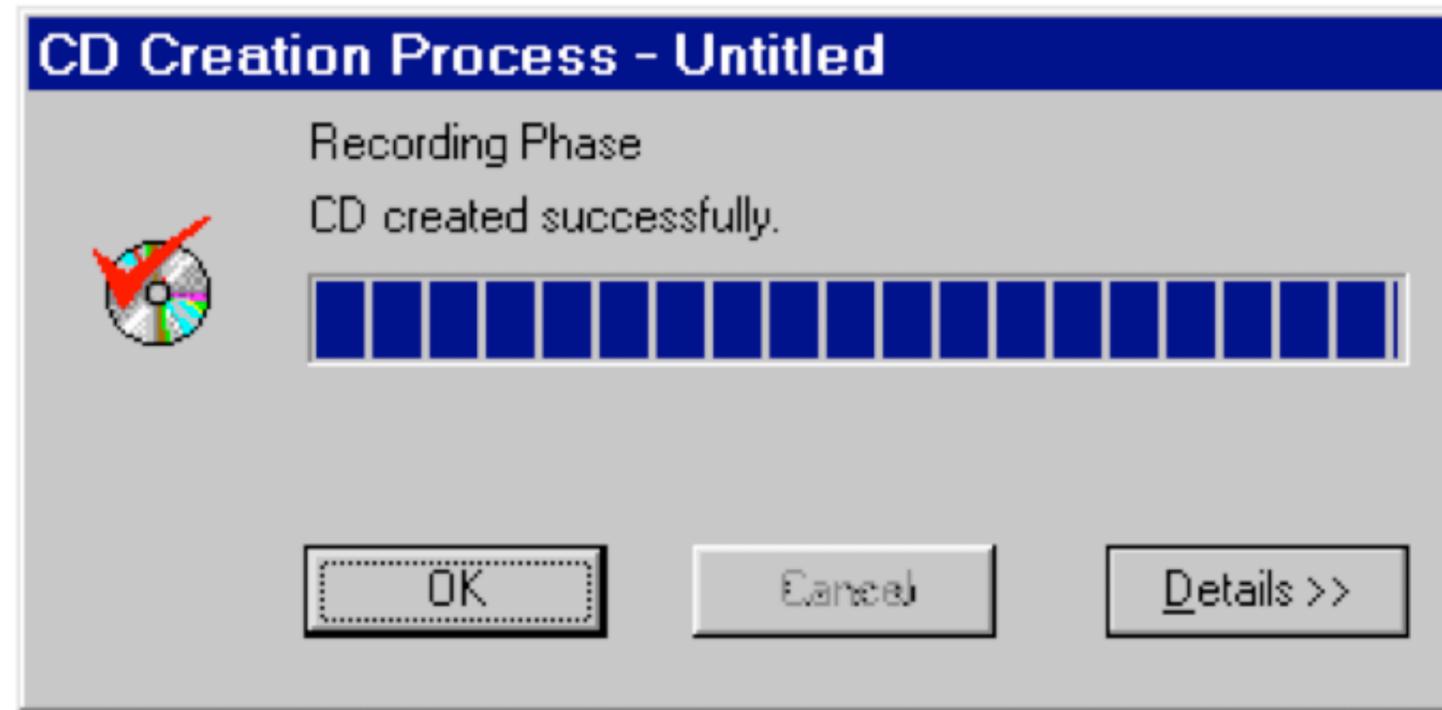
# Guideline #2 Use Few Colors

- Use only a small number of different hues as an interface with many colors appears more complex, more cluttered, and more distracting



# Guideline #3 Be Consistent with Expectations

- Color in the interface should match expectations of users



# Coming Up

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## Next Monday: Interaction Devices

- Instructed by *Peng Song*
- 13:30 - 15:00 by e-learning