



# Principles of GUI Design and Programming



Visual Design

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- ▶ Visual design



# Visual Design

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- ▶ In the beginning, interfaces were functional not beautiful
- ▶ Then they introduced
  - ▶ Principles of UI design to increase usability
  - ▶ Visual design to make the interfaces more appealing
- ▶ Visual design is at least a course on its own and we cannot do justice to it here
- ▶ The human brain is a visual processing engine
  - ▶ Our design can take advantage of this to
    - ▶ Convey information without explicitly mentioning it
    - ▶ Take advantage of cultural understanding of design elements
    - ▶ Take advantage of cultural behavior such as reading direction



# Visual Interfaces

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- ▶ **Visual interfaces should**
  - ▶ Use visual properties to group elements and create a clear hierarchy
  - ▶ Provide visual structure and flow at each level of organization
  - ▶ Use cohesive, consistent, and contextually appropriate imagery
  - ▶ Integrate style and function comprehensively and purposefully
  - ▶ Avoid visual noise and clutter

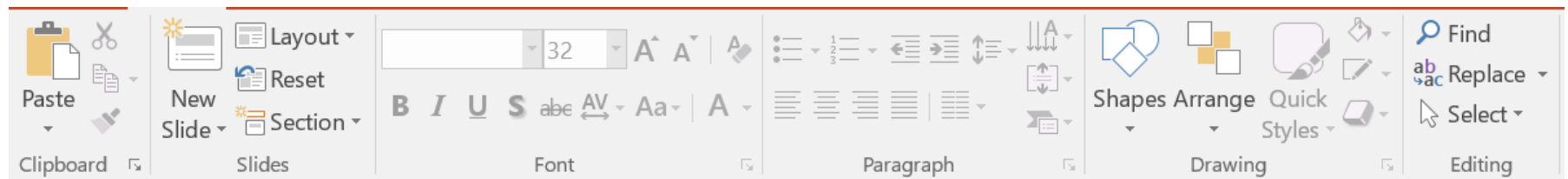


# Grouping

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## ▶ You should

- ▶ Provide some visual cue to indicate groups of related items
  - ▶ Boxes, white space, colour, etc
- ▶ Indicate a hierarchy of most important and less important elements
  - ▶ Font size, font colour, amount of screen real estate, etc.
- ▶ Items which are related can be placed in proximity to each other
- ▶ The prominence of each group indicates its importance



# Colour Spaces

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- ▶ **There are several common colour spaces**
  - ▶ RGB – additive colours for screens
  - ▶ CMY – subtractive colours for paper
  - ▶ LAB – luminance and two chrominance channels used for TV transmission and some image processing
  - ▶ HSL – hue, saturation and lightness which can be used to describe colour use in user interfaces



# Using Colour

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- ▶ **Most important elements**

- ▶ Larger, greater contrast in hue, saturation and lightness from the background
- ▶ Saturated colours stand out while less saturated recede
- ▶ Less important elements can be
  - ▶ Less saturated, lighter, indented, less contrast with background
- ▶ More important items can be
  - ▶ More saturated, darker, exdented, more contrast with background

- ▶ A good visual hierarchy is not noticed by the users but just conveys information subconsciously



# Using Colour

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- ▶ Not all cultures place the same meaning on colour
  - ▶ Red
    - ▶ In the west – love, excitement, happiness
    - ▶ In Asia – happiness, joy, celebration
    - ▶ In South America – associated with religion
    - ▶ In the Middle East – danger, caution, evil
- ▶ Localization is the process of changing the colours in your interface to be appropriate for the culture that will be viewing them





# The squint test

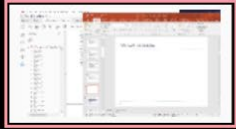
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- ▶ To judge whether there is a clear separation of components and indication of hierarchy
  - ▶ Close one eye and squint with the other
  - ▶ If the blurry image lets you see the main components in order of importance, it is doing its job
  - ▶ If not, adjust the size, lightness, saturation, hue and spacing until the components can be seen clearly



# Virtual Desktops

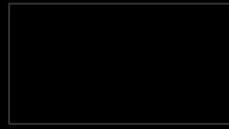
Desktop 1



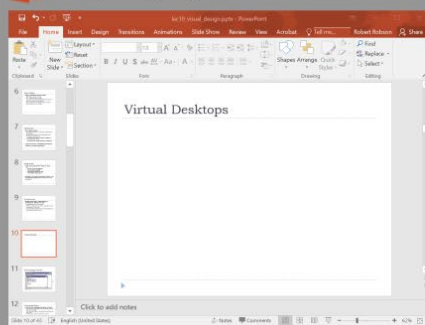
Desktop 2



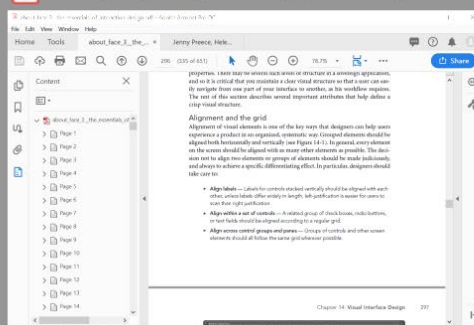
New desktop



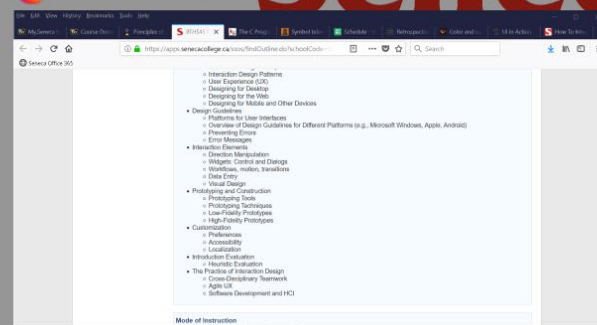
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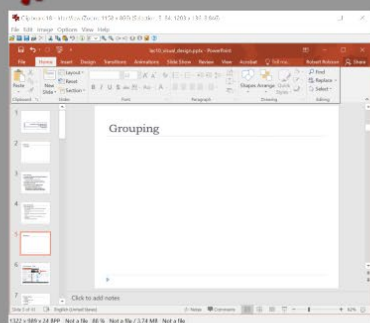
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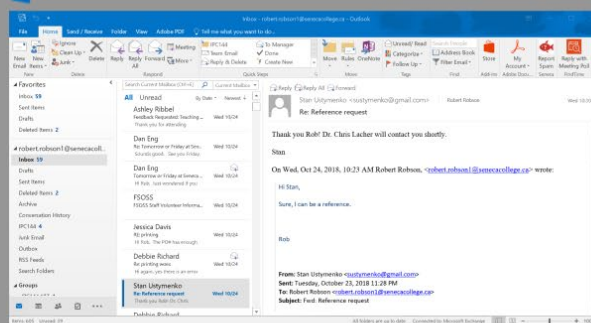
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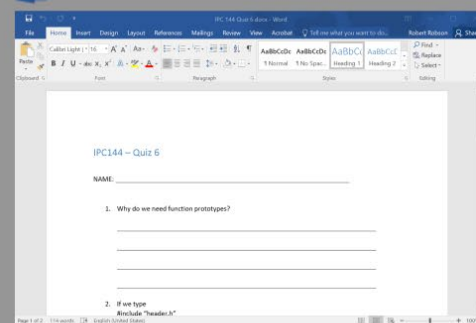
Clipboard18 - IrfanView (Zoom:...



Inbox - robert.robson1@senecacollege.ca - Outlook



IPC 144 Quiz 6.docx - Word



September 28

Creative Cl.

quizzes

Provides a way to see and organize too much information

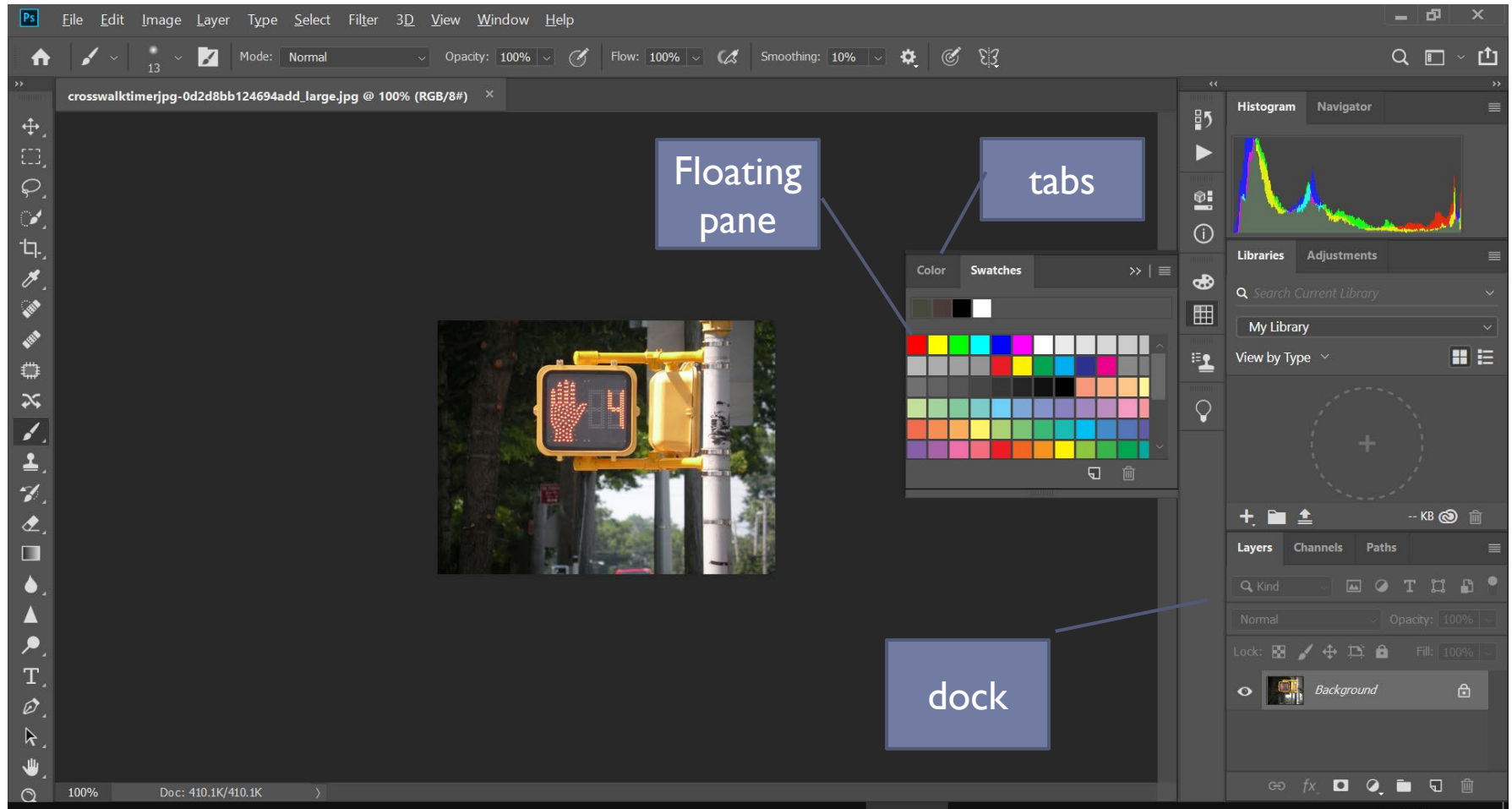
# Alignment Grids

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- ▶ **Alignment provides**
  - ▶ Organization
  - ▶ Grouping
  - ▶ Ease or reading
- ▶ **Align**
  - ▶ Labels
  - ▶ Input controls
  - ▶ Within groups and panes



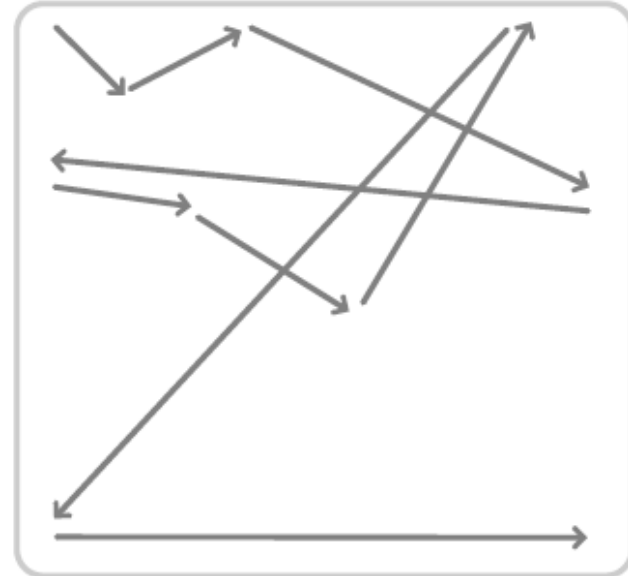
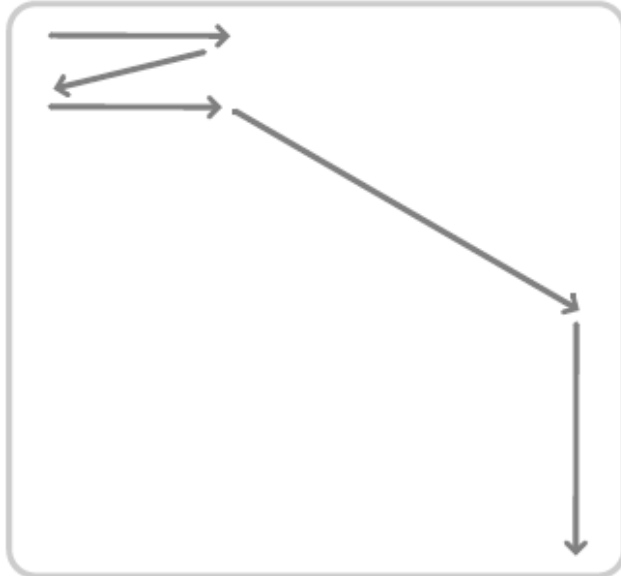
# Handling many panes



# Logical flow

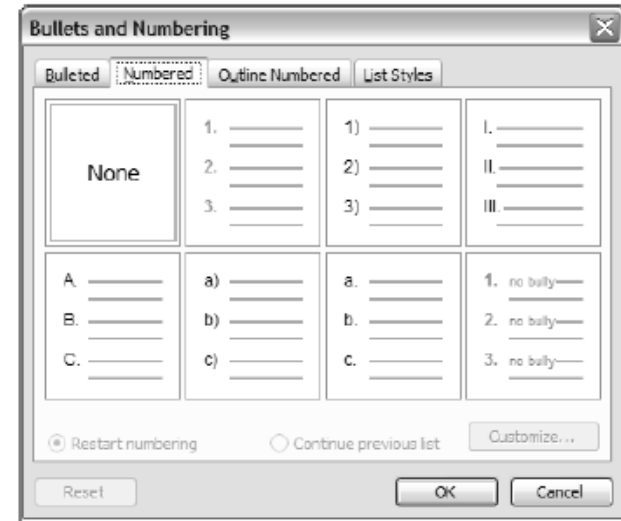
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- ▶ The UI should
  - ▶ Lead you through the process of filling in data
  - ▶ Provide tabs to move you from one control to the next in the right order
  - ▶ Make the path your eye follows simple and logical



# Symmetry and balance

- ▶ Interfaces with visual balance
  - ▶ Look better
  - ▶ Make it easier to find things
- ▶ The easy way to get balance is symmetry around
  - ▶ A vertical or horizontal line
  - ▶ A diagonal line



diagonal

vertical



# Imagery

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- ▶ **Images should be**
  - ▶ Cohesive
  - ▶ Consistent
  - ▶ Appropriate
- ▶ **Good icons**
  - ▶ Can help to understand interfaces
- ▶ **Bad icons**
  - ▶ Can confuse and mislead
- ▶ **Images should be**
  - ▶ part of a global language for the interface
  - ▶ Fit into a theme for the whole application

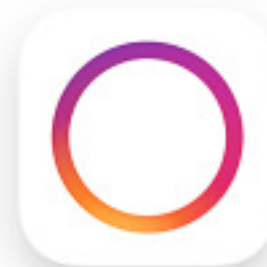
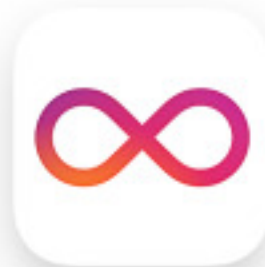
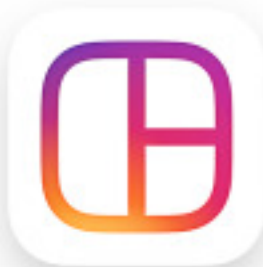


# The good, the bad and the ugly

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Old design looks like  
An instant camera



New, abstract design looks like ????

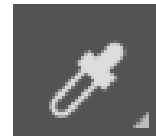
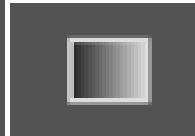




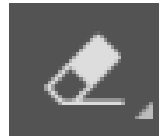
# Function oriented icons

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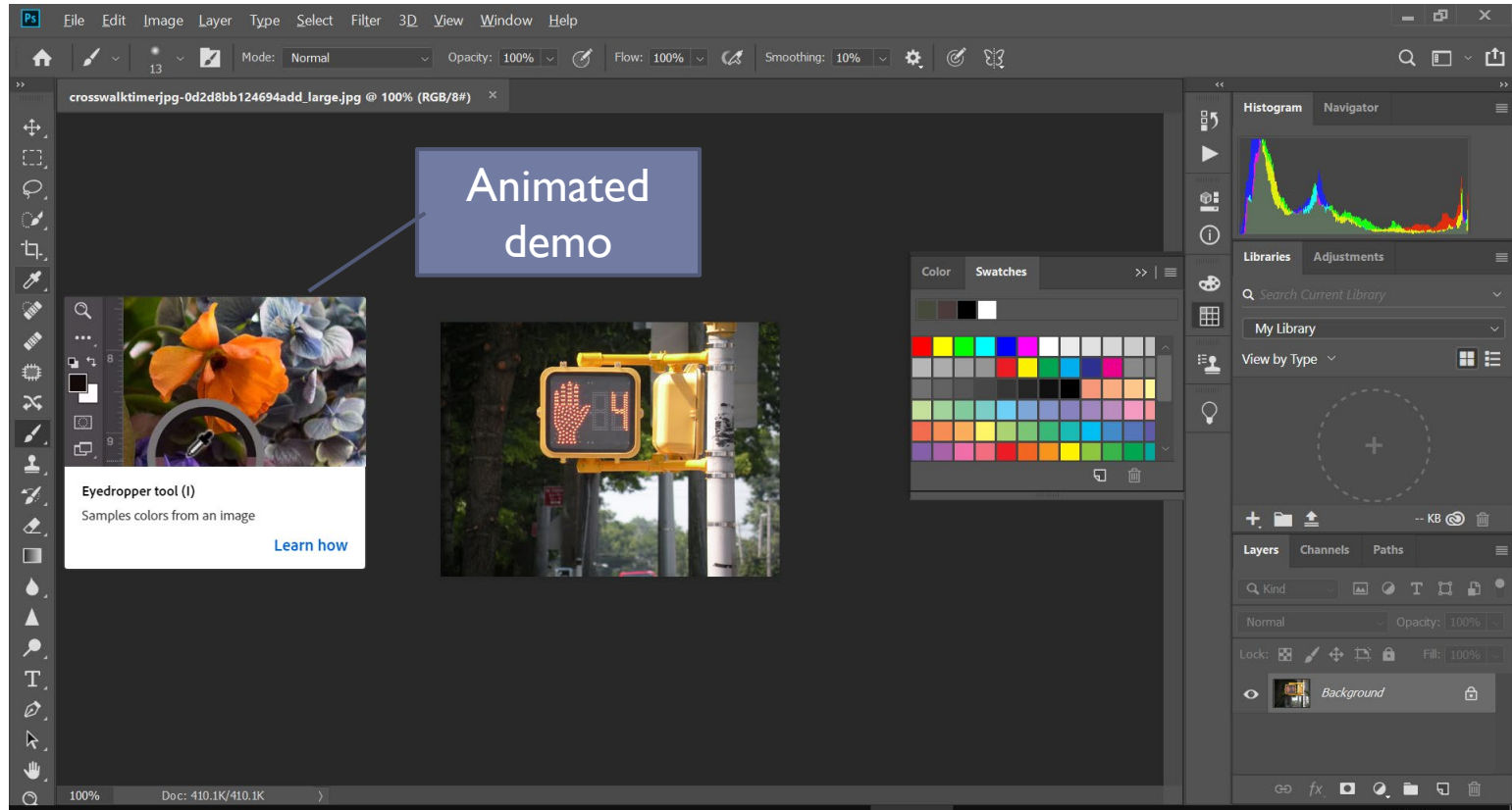
Make the icons look like things



Make them look like actions



# Show them what it does




- ▶ Photoshop has animated example of what the tool does when you hover over it

# Integration, style, function

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- ▶ Integrate the look for the app to be consistent
- ▶ Emphasize function over style
  - ▶ It might look beautiful but if no one can figure out what is does, you have a problem
- ▶ A bad interface will harm the reputation of the brand
- ▶ Adding additional graphics without purpose can make the interface cluttered
  - ▶ Keep it clean and simple
    - ▶ Minimal fonts and colours
  - ▶ Make it efficient to use

 Share



# Text and colours in interfaces

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- ▶ **ALL CAPS IS HARDER TO READ THAN MIXED CASE**
- ▶ Minimize the amount of text to read
- ▶ Ensure the text has enough contrast to be read easily
- ▶ Use one or two fonts
  
- ▶ Avoid too many colours
  - ▶ More than 7 colours makes the UI confusing
- ▶ Avoid complementary colours
  - ▶ Opposites on the colour wheel cause visual artifacts
- ▶ Avoid excessive saturation
  - ▶ It looks like a cartoon



# Mobile design

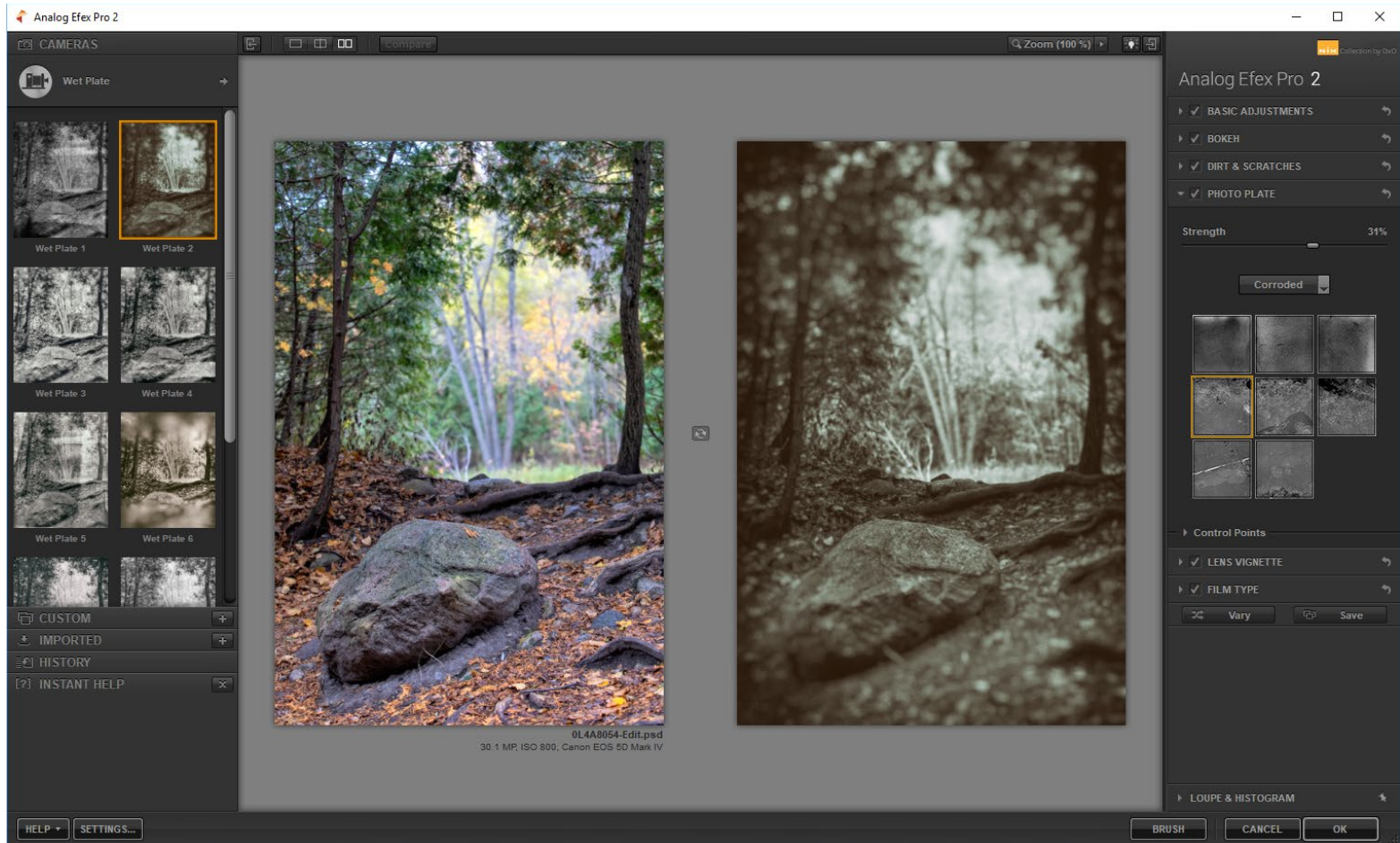
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- ▶ Controls should be big enough to see and click
- ▶ Visual landmarks since users will have to navigate several screens
- ▶ Use sans-serif fonts on lower resolution/size screens
- ▶ Clearly indicate if there is off-screen data



# Visual information design

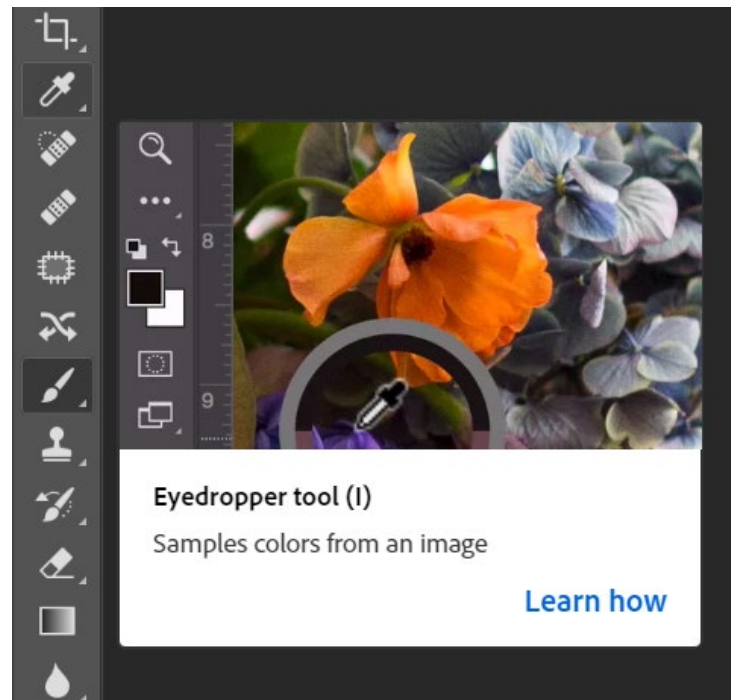
## ► *Enforce visual comparisons (before & after)*



# Show causality

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- ▶ Show the outcomes of actions
  - ▶ Tooltips
  - ▶ animations



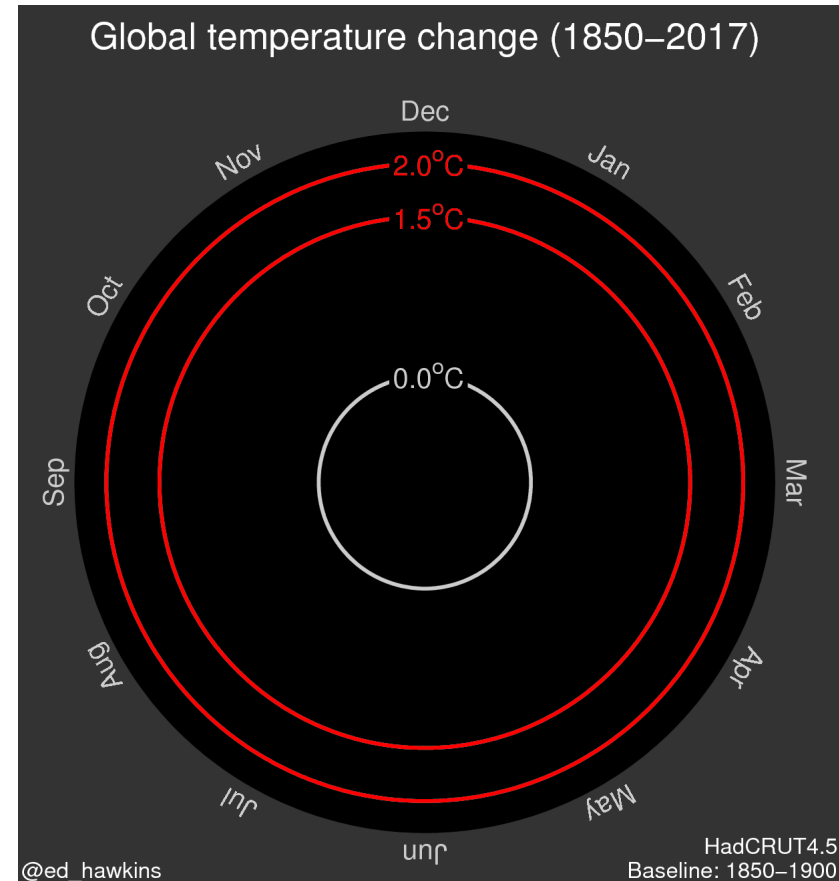
# Show multiple variables





# Show changes in time

- ▶ Changes in values over time should be shown
  - ▶ As snapshots beside one another
  - ▶ Do not superimpose data on one graph
  - ▶ Use animations to show changes over time if available



\* Dr. Ed Hawkins, @ed\_hawkins, from The Climate Lab Book.

# Interface standards

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- ▶ Most platforms now have interface guidelines
- ▶ These strive to
  - ▶ Make all applications on the platform look similar
  - ▶ Have them achieve a minimal level of quality
- ▶ They do not
  - ▶ Guarantee that the lower levels of the interface are of good quality
  - ▶ Can stifle innovation in interface design
- ▶ Without any standard
  - ▶ We get the chaos of the X windowing system

