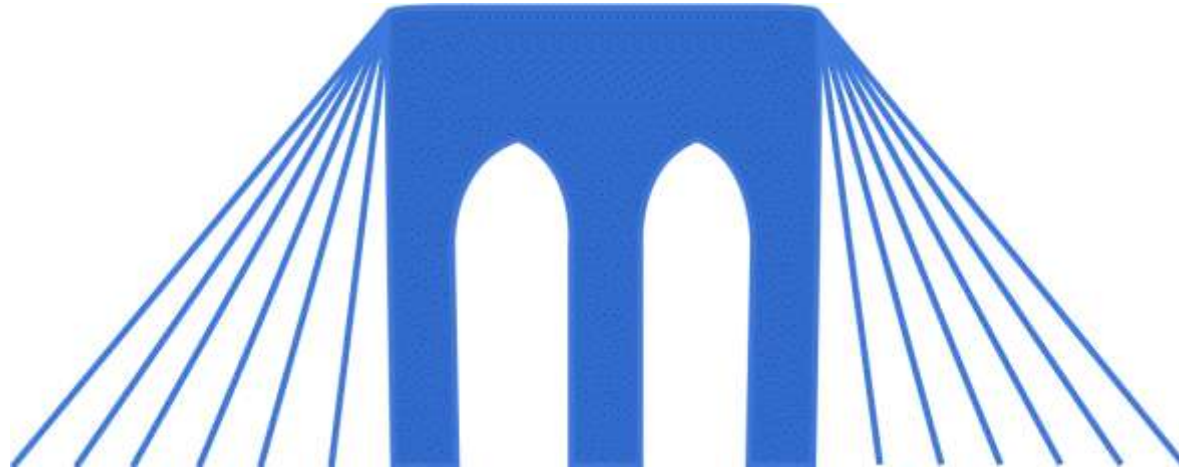# BRIDGES TO COMPUTING

General Information:

- This document was created for use in the "Bridges to Computing" project of Brooklyn College.

- You are invited and encouraged to use this presentation to promote computer science education in the U.S. and around the world.

- For more information about the Bridges Program, please visit our website at: http://bridges.brooklyn.cuny.edu/

Disclaimers:

- All images in this presentation were created by our Bridges to Computing staff or were found online through open access media sites and are used under the Creative Commons Attribution-Share Alike 3.0 License.

- If you believe an image in this presentation is in fact copyrighted material, never intended for creative commons use, please contact us at http://bridges.brooklyn.cuny.edu/ so that we can remove it from this presentation.

- This document may include links to sites and documents outside of the "Bridges to Computing" domain. The Bridges Program cannot be held responsible for the content of 3rd party sources and sites.

INTRODUCTION TO USER INTERFACE DESIGN

M. Meyer

Bridges To Computing

2010

QUESTIONS

1. When was the last time you bought something that was technologically complex?
   - Examples:
     - I-pad (or some other tablet PC)
     - New Cell-Phone
     - New Game System (Xbox, Wii, etc,)
     - New Car
     - GPS Device
     - New Computer
     - New Software Program (game)

2. Did you read the manual?

   Most people don't.

Ipad

MICROSOFT SURFACE

9

INTRODUCTION TO USER INTERFACE DESIGN

- In 1988, Donald Norman applied the term "affordances" to the context of human–machine interaction.
- He used the term to refer to those action possibilities which are readily perceivable by an actor.
- The term can be applied to both physical objects (a mouse) and virtual objects (the pointer on the screen).
- When we create an object and display it on a screen, how is it perceived by a user? Specifically, what actions will a user think that the object can enable.

- Question:
  Can we design an interface where the user easily can perceive what actions s/he needs to take to generate the results s/he desires?

"Affordances"

The Design of Everyday Things

Donald A. Norman

MNEMONIC FOR AFFORDANCES

- A mnemonic device is any learning technique that helps you to remember something.

- Specifically, when you try and remember what "affordances" is all about. Remember the doors...

- On the next page are two doors, for each door, would you push or pull?

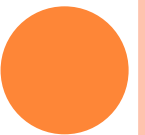# THE DOOR YOU PUSH LEADS TO SAFETY! QUICK! WHICH DOOR DO YOU USE?
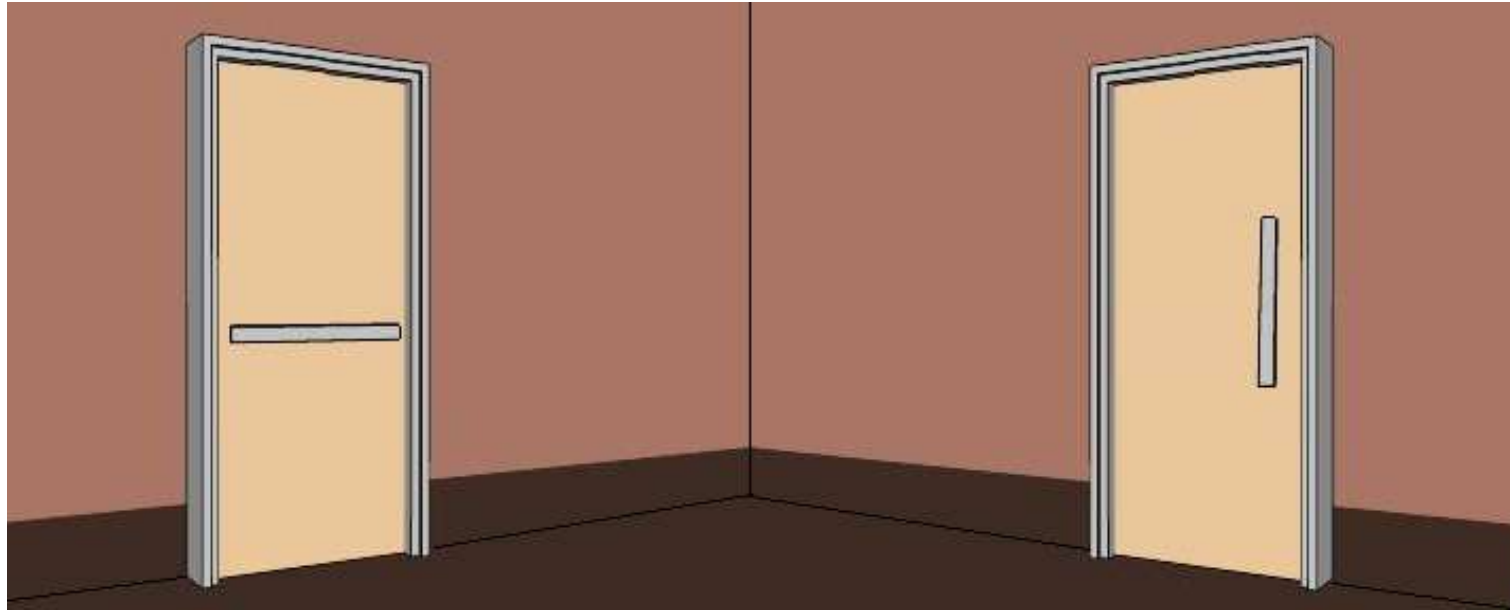
PERCEIVE "ACTION POSSIBILITIES"?
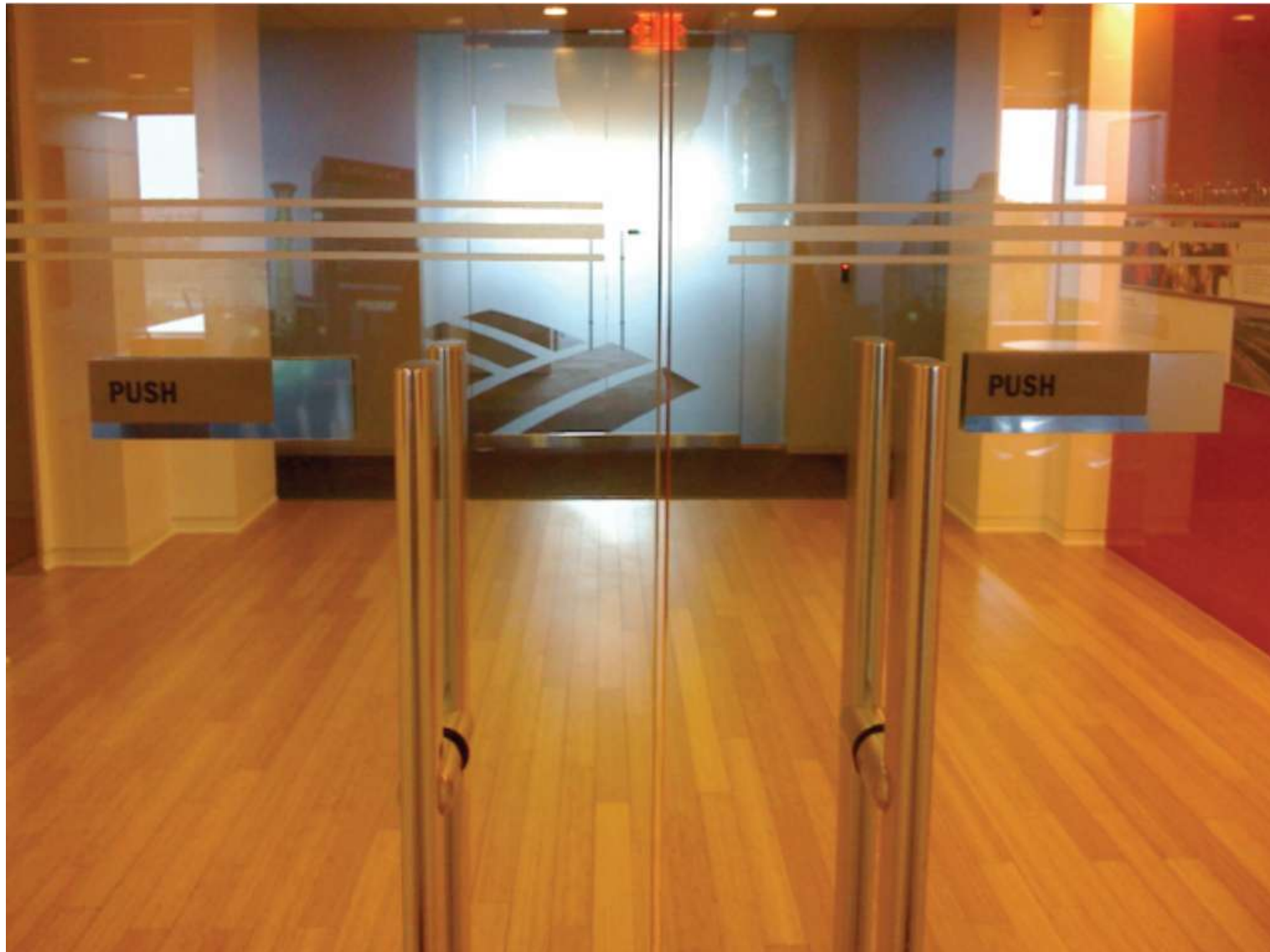
"More than 2,500 of the 3,250 walk buttons that still exist function essentially as mechanical placebos, city figures show." (2004 NY TIMES)

DESIGN PRINCIPLES

- In the world of design, what matters is:
  - If the desired controls can be perceived.
    - In an easy-to-use design, if they can both readily be perceived and interpreted.
  - If the desired actions can be discovered.
    - Whether standard conventions are obeyed"
- Four principles for interface design:
  1. Follow conventional usage, both in the choice of images and the allowable interactions.
  2. Use words to describe the desired action (e.g., "click here" and other labels).
  3. Use metaphor.
  4. Follow a coherent conceptual model so that once part of the interface is learned, the same principles apply to other parts.

DESIGN PRINCIPLES (CONT)

Remember:

- Some devices/interfaces force functionality;
  - e.g., starting a car requires a key.
- Design for error
  - Expect that the user will make errors
  - Figure out what those errors might be
  - Plan for these errors:
    - Eliminate them if you can.
    - Otherwise plan to handle them!

EIGHT RULES OF INTERFACE DESIGN *

- Be consistent
- Aim for universal usability
- Provide helpful feedback for every user action
- Provide closure with dialogs
- Prevent errors where possible and otherwise handle errors elegantly
- Allow reversal of actions
- Make users feel in control ("internal locus of control")
- Limit storage/memory load

* Source: Andrew Johnson (2006): http://www.evl.uic.edu/aej/422/

UNIVERSAL USABILITY
(FIRE DOOR)

RECOMMENDATIONS

www.wiidamage.com

- Real estate:
  - How much space do you have?
  - How much space will things take up?
  - Where will the user have the controls?
    - On the screen and in the real world.
  - Where will they want to move the controls?
    - On the screen and in the real world.

- Use of color:
  - Be aware of color blindness
  - Limit the number of colors
  - Use color to group things (that you want to group together)
  - Use color to support a task (e.g., brightness = easy to find)
  - Remember color conventions (e.g., red, yellow, green)

RECOMMENDATIONS (CONT)

- Grouping of objects
  - Group related objects together
    - Visual hierarchy can reflect object hierarchy (menus, levels)
    - Visual relationships: position, size, "weight" (ownership, links)
  - Balance (use it!)
    - Use symmetry to ensure balance.
    - Color effects perceived balance.
  - Clutter (avoid it!)
   - Relegate nonessential items to other areas (other pages, screens, pop-up boxes).
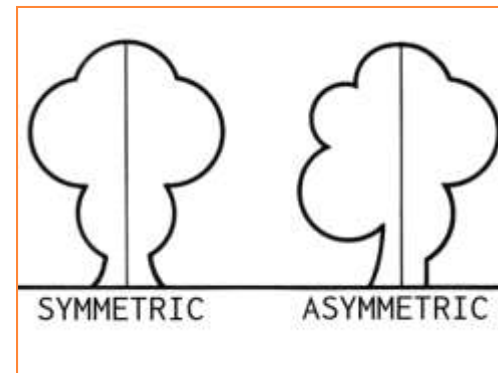
SYMMETRIC   ASYMMETRIC

RECOMMENDATIONS (CONT)

- Ask yourself: where does the eye naturally go?
  - Use alignment to establish visual relationships between objects.
  - Consider human optical adjustment
    - Use the "squint" test to see if things you want to stand out, do stand out
    - Don't make the eye wander all over back and forth across the screen)
  - Use "negative space" or "white space"
    - This refers to space that is not what you want the user to look at, but space that helps separate items and clarify the visual elements in a design

Visual Hierarchy
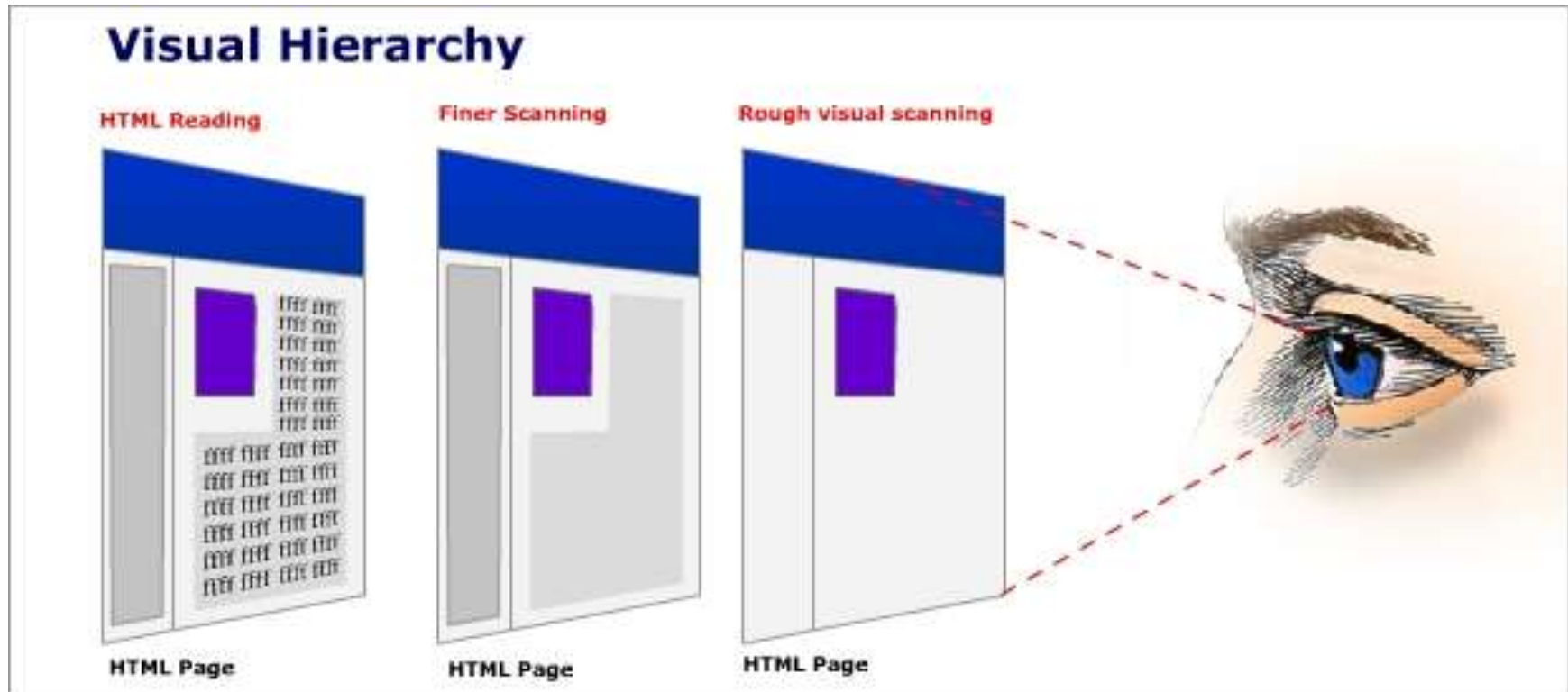
Things to Avoid

- Things that don't work as expected.
  (Surprise! It's not a picture, it's a button.)
- Different things that are too similar
- Things that are hard to see
- Things that don't work well together
- Things that get in the way
- Things that are hard to handle
- Things that are hard to remember
- Things that don't fit
- Displays that look like controls
- Incompatible/unexpected/unnatural mapping of controls to devices

LOOK FOR BAD DESIGN...
YOU'LL FIND IT EVERYWHERE

THE END