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Understanding Users Part II

Intro to Design

CSCI 5601



Announcements

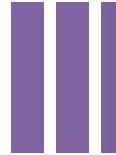
- **Welcome**
- Midterm: Mon. June 19 – I'll discuss this more in class next week.
- Final Exam date has been scheduled by the registrar: Saturday, Aug 5 2:00:00 PM (2 hours)
 - Room 127, Goldberg Computer Science Building
 - https://www.dal.ca/academics/exam_schedule/halifax_campus_exam_schedule.html#C



Announcements

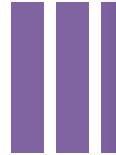
- Next Lab, you will be performing your interviews/context inquiries in person in your labs
 - We will supply the schedule – the hope is to have 3-5 people do it over the lab time
 - We will provide a schedule of who will be 'users' for other groups.
 - You will always have at least 3 members in your group for the interviews/contextual inquiries





Roles during the interviews/ contextual inquiry

- Roles: main interviewer, observer/note taker, answers/note taker/s
 - One person should be the designator as the main interviewer (introduce the group, the topic, the main themes and ask questions and ask to show how they do such tasks)
 - One person who will mainly recording OBSERVATIONS of how they do things but also asking follow-up/clarifying questions while someone is doing something (e.g., if they show you how they look up the weather – this person will be recording/noting how they do this and may ask why they did something while looking it up).
 - One-two people will be recorders. They will type the answers to questions. At the end of lab, they will combine their answers.
 - You may audio record the answers as well – but once you have finished reporting the answers – make sure to delete.
-

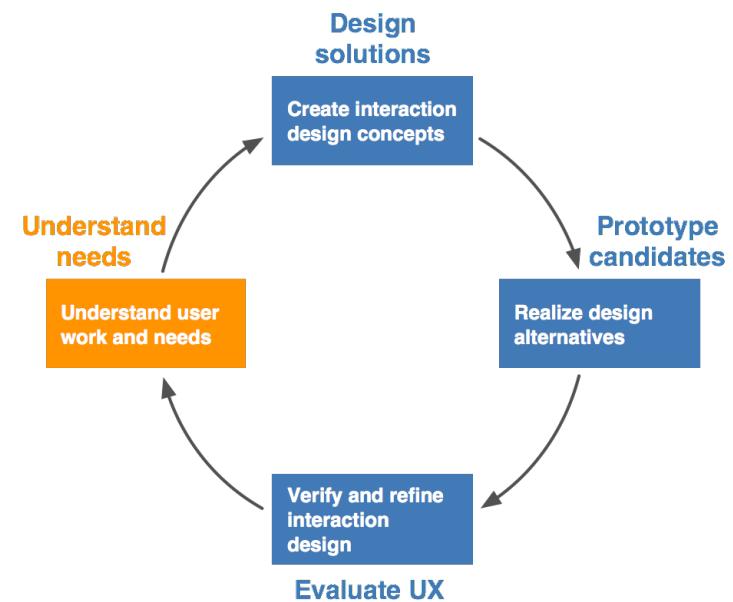


Process of Interviews/ CI

- Incorporate the feedback you receive from your TAs from Lab2 (and the pilot today)
 - Before the lab on Wednesday, create the document that will allow for easy recording/note taking by your recorders (observation and interviews) – this will be submitted at the end of the lab [I will post an example template you can use for this on Brightspace]. NOTE on your documents to record answers/observations do NOT use actual names, instead use P1, P2, P3 etc. on all the documents where the number indicates the first user, second user etc.
 - Everyone team member should be familiar with the questions and how to record the user feedback as the schedule of 'users' won't be posted until the start of lab (so you can't depend on one person to do all the interviews)
 - The TAs will post a schedule and the list of users for which groups at the start of the lab. It is important that everyone attends this in person
 - At the end of the lab, you will submit your recordings (the ones on paper) onto Brightspace – can either merge all the recorders notes into one document or zip them into a single folder
-

Last day we looked at

- Usability models and finished contextual inquiries
- Last day focusing on Users Needs in terms of Data elicitation
- Today, we are talking about specific users and tasks, and introducing design concepts
- Next day, we will be looking at Data Analysis and Data Modeling



Today

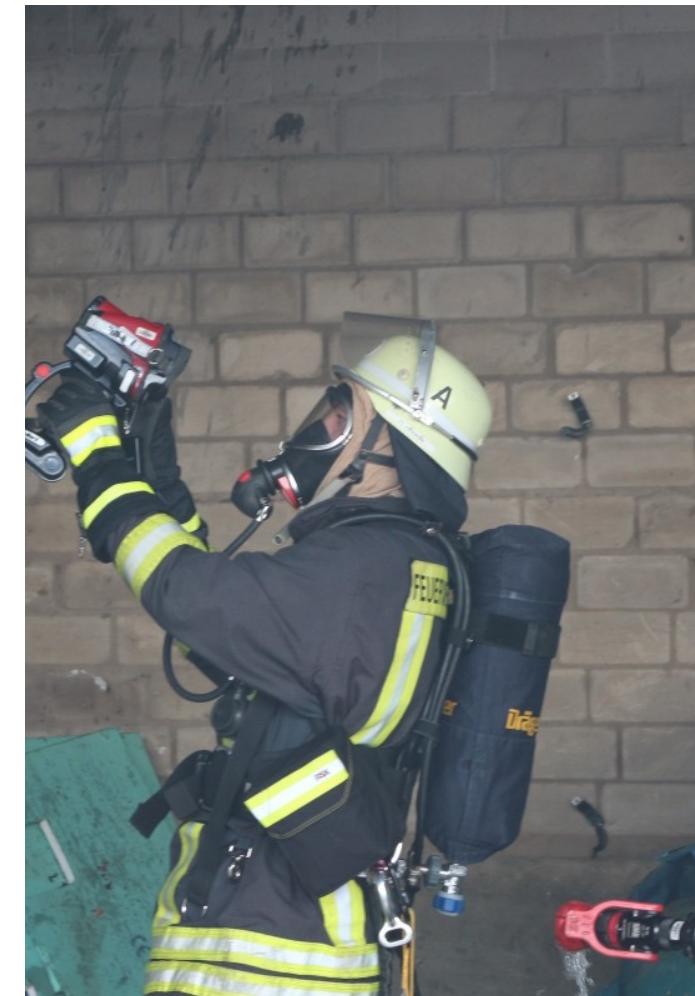
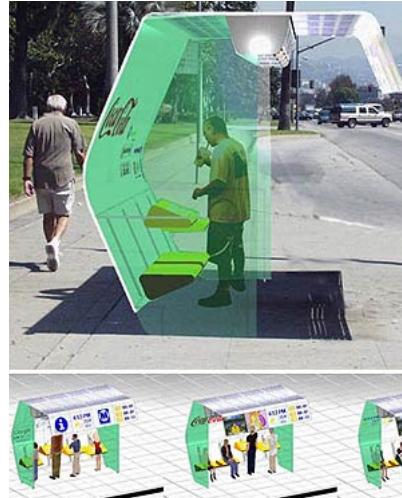
We are looking at an important aspect

- Users
- Design



Users: Who are they?

What do we need to consider about them when designing?





Who are the users/stakeholders?

- Not as obvious as you think:
 - those who interact directly with the product
 - those who manage direct users
 - those who receive output from the product
 - those who make the purchasing decision
 - those who use competitor's products
- Three categories of user (Eason, 1987):
 - **primary**: frequent hands-on
 - **secondary**: occasional or via someone else
 - **tertiary**: affected by its introduction, or will influence its purchase



What are user 'needs'?

- Users rarely know what is possible
 - Users can't always tell you what they 'need' to help them achieve their goals
 - Instead, look at existing tasks:
 - their context
 - what information do they require?
 - who collaborates to achieve the task?
 - why is the task achieved the way it is?
 - **Envisioned tasks:**
 - can be rooted in existing behaviour
 - can be described as future scenarios

Universal Usability

- Diversity of human abilities, backgrounds, motivations, personalities, cultures, work types and styles
- Need to understand the differences between people in order to successfully design
- Approach of “dumbing down” – designing for the lowest denominator – not very successful
- E.g., do you want the same UI as your grand-parents?



Universal Usability

- Instead – think of specific users and design for their abilities to help with a positive experience
- This strategy has even led to many new approaches that may benefit many



User Characteristics

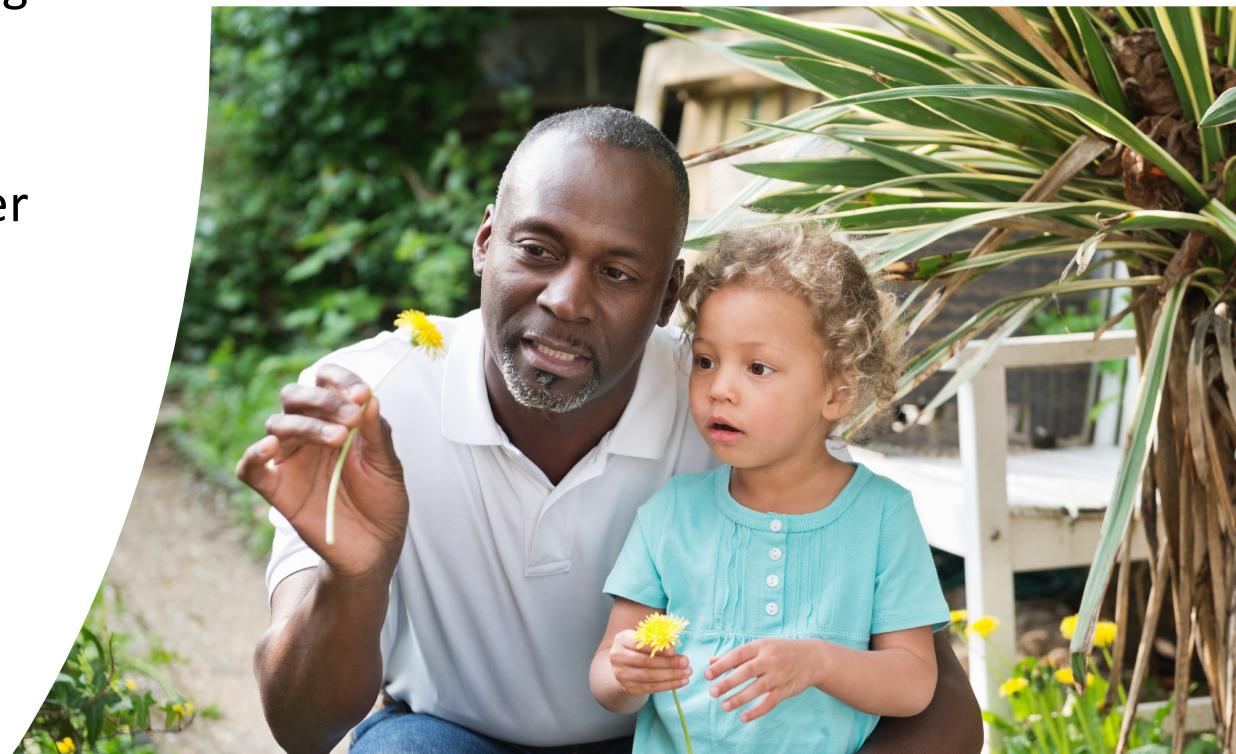
- 7 common categories of user characteristics (but many more!!):
 1. Age
 2. Culture
 3. Physical abilities
 4. Educational background
 5. Computer/IT experience
 6. Motivation
 7. Attitude



H., Rogers, Y., Preece, J. (2007). Interaction Design: beyond human-computer interaction.(2nd Edition). England: John Wiley & Sons, Ltd.

1. Age

- Age will impact your design
- You can divide people by age groups differently depending on your UI and its purpose
- For example, the two most diverse age groups are: older adults and children





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Older Adult Users

- There can be issues of negative physical, cognitive, and social aspects
- Their motivation and attitude towards using technology may be negative (e.g., too hard to learn)
- But by understanding some of the factors surrounding older adult users can help your design

- Also, don't always assume that older adults fear using technology – they are often open to new ways of doing things and want to learn.

<https://www.youtube.com/watch?v=iC3kCIRFPbA>

Halifax Library Programs for adults – [tech based](#)
[Apple courses](#) in store



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Benefits for older adults (using technology)

- Employment opportunities
- Education
- Social interactions
- Emotional support (e.g., from family, community groups)
<https://www.youtube.com/watch?v=-1lkPL4deU4>
- Promote sensor/motor skills (e.g., hand-eye coordination, dexterity, increase reaction time) – sometimes done through games

https://www.youtube.com/watch?v=Sk53cBpZ_Ik
<http://www.youtube.com/watch?v=RRvX2z601gU&feature=related>

Older Adult Users

With user centered design we help promote a positive user experience for older adults.
For example, for interfaces:

- We can provide control over:
 - Font size
 - Display
 - Contrast levels
 - Audio levels
- The design should provide:
 - Easy to use pointing devices
 - Clear navigation paths
 - Consistent layouts

Children

- With this age group we often look to encourage learning through entertainment
- Even pre-school age children can use computer systems – toys, for art and creativity and games to help promote eye-hand coordination
- Once they start reading – they can use a wide array of portable devices, desktop apps and web services

[https://www.youtube.com/watch?
v=fsEAqT9OC2s](https://www.youtube.com/watch?v=fsEAqT9OC2s)



Children

- For pre-school and elementary school aged children, you will often design for:
 - Education and learning
 - Fun
 - Socialization
 - Self-confidence
 - Creativity



Children

With user centered design we can promote a positive user experience for children, consider:

- Interactive
- Engaging
- Support social interaction with peers
- Reduce frustration (e.g., start over without penalty, undo, etc.)
- Use the familiar (like familiar characters, environments, repetition)
- Consider safety and security



Children

- For real young children:
- Recognize their limitations
 - Limited dexterity – avoid mouse dragging, double clicking or small targets
 - Emerging literacy – avoid textual instructions, error messages try audio sounds instead
 - Low capacity for abstraction – avoid long complex sequences and problem solving



INTERNATIONAL CHILDREN'S DIGITAL LIBRARY
A Library for the World's Children

Books About Library People How to Contribute In the News Help Sign In

English Español Монгол Русский

Visitors Library Account Books Members Forum Recommended Books Popular Books Books List

EDUCATION

the Director Advisors Team Contributors & Publishers

FEATURED BOOKS

Dima Written by Safa Ameri; Arabic Read book » Magic Dogs of the Volcanoes Written by Manlio Argueta; English, Spanish Read book » The Rocket Book Written by Peter Newell; English, French, Hebrew, Korean, Russian Read book » Exploring the ICDL with Sarah Read more »

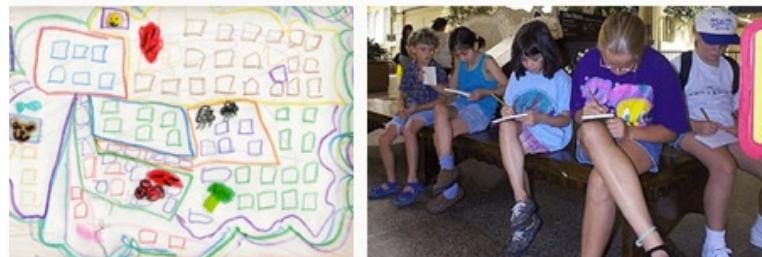
LIBRARY NEWS AND NOTES

Children

- Don't be afraid to use kids in your UI design process if you are designing for children
- Dr. Allison Druin – uses children throughout the design process (Univ. of Maryland)



ren are looking at a low tech prototype of a "classroom of the future"



The left is a sketch of a digital library and on the right children are taking notes.

<http://www.youtube.com/watch?v=Gx3pDG-NVWM>

2. Culture

- Diversity in many areas – here are a few
- Characters, numerals, special characters
 - E.g., currency, even “exit”

Date to leave

1 adult

0 children

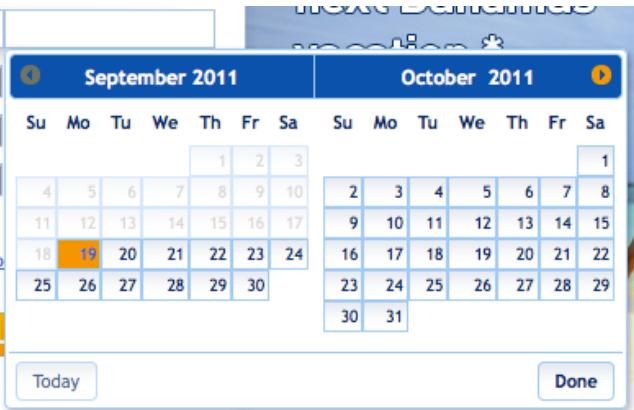
0 infants

7 or more guests?

Have a promo and coupon code

GET FL

Today Done



The screenshot shows the Industry Canada website with a blue header featuring a red maple leaf logo. The header includes the text "Industry Canada" and "ic.gc.ca". Below the header, there are navigation links for "Home", "Contact Us", "Help", and "Search". A breadcrumb trail indicates the current page: "nation & Communications Technologies > AT-Links > APT". On the left, a vertical sidebar lists categories such as "nada", "d", "SIN", "NSPSC", "ources", and "s". The main content area is titled "Assistive Technology Links" and "Accessible Procurement Toolkit (APT)". It features a section titled "APT" with a grid of icons representing various assistive technologies like printers, laptops, phones, and keyboards. Below this is a section titled "Use this toolkit if you plan to procure new technology or services for the general environment." followed by a detailed description of the toolkit's purpose.

Assistive Technology Links Accessible Procurement Toolkit (APT)

3. Physical Abilities

- Flexibility of desktop, web, robotics, input/output modes, and mobile apps makes it possible for designers to provide special services to users with disabilities
- Many governments have laws to ensure access to technology and different agencies have different guidelines (e.g., CNIB)
 - For example, in the US it requires access to vision impaired, hearing impaired and mobility impaired

Physical Abilities

- Ways to assist all people can design for alternatives for interacting with the interface depending on the persons abilities:
 - For example:
 - Use alternatives to keyboards and mice (e.g., touch screen, joy sticks, or software to help select targets)
 - Use screen magnification or display to audio output and vice versa
 - Have ATM or interactive displays at different heights
 - Use or come up with new interaction and input modes depending on the user group
 - E.g., BrailleTouch for Georgia Tech (keyboard for visually impaired)

<http://www.youtube.com/watch?v=k5snVu5q2b8>

<https://www.youtube.com/watch?v=l-Rqr00vz8g>

(be my eyes - App designed by Hans Jørgen Wiberg)





4. Education

Differing levels of education - affect reading abilities and levels of understanding

- Pre-school
- Elementary
- High school
- University
- Post-graduate

Education can differ – different terminology, experiences, needs, tasks

- Medical
- Engineering
- Computer Science
- Journalism
- Accounting
- Mathematics
- Sciences
- Trades
- Political Science,
- etc.



5. Computer/IT experience

- Different people have different levels of knowledge of how a computer system works
- Often consider new user/novice user and experienced user
 - If you were designing an application that would have both new users and experienced users, what would be some of the ways you could ‘help’ both a new user and an experienced user learn the interface?



6. Motivation

- The purpose or user need will often determine the level of motivation of learning and using the system
- Levels could be considered high, medium, or low
- For example:
 - Look up weather info
 - Use a system at work
 - Try a new social networking site

7. Attitude

- Attitudes of individuals towards using a system are often clouded by previous experience or lack of experience
 - For example – an older user who has never used Skype or Facebook before – their attitude towards using the system may be of hesitation, why do I need this or should I bother, etc.
 - So... how could we help them?
- Show the benefits of using the system (contact with grand-children), education, information
- Make the UI simple, intuitive, easy to use and could mimic something familiar
- Give them control over font settings, etc. to help ease concerns of seeing items
- Perhaps even a short lesson



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Design

Concepts and Important Considerations

CRAP

(Contrast, Repetition, Alignment, Proximity)

Contrast

- Use Contrast to direct the viewer's eyes to what's important(primary task) and to helps direct them on what to do next or options (secondary task).

Repetition

- Use repetition to make systems more usable (and easier to learn) when similar stuff is presented in similar ways.

Alignment

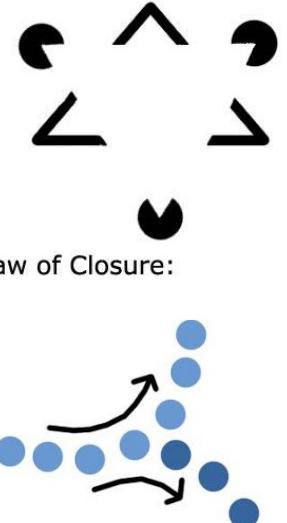
- Use alignment (horizontal and vertical) to help group elements and make the design clean and clear.

Proximity

- Place similar objects or groups together to show how they relate (based on the principle of proximity was by the Gestalt school of psychology).

Gestalt Principles

- It is easier to perceive that things go together if they are arranged to look like they go together – another way of designing for visual constraint
- This is based on Gestalt psychology which is made up of laws that describe the way we perceive the world :
 - **Law of Proximity:** elements that are close together appear as groups rather than as random elements
 - **Law of Similarity:** elements of the same shape, size or colour appear to be together
 - **Law of Closure:** when possible, we complete the incomplete “close the gap”
 - **Law of Continuity:** elements are seen to blend together in a smooth path, rather than as separate points
 - **Law of Symmetry:** we tend to perceive regions bounded by symmetrical borders as coherent figures
 - **Figure/Ground (also known as Multi-stability):** The human eye isolates shapes from backgrounds.



Multi-stability – our brains will try and figure out ambiguity

Law of Proximity

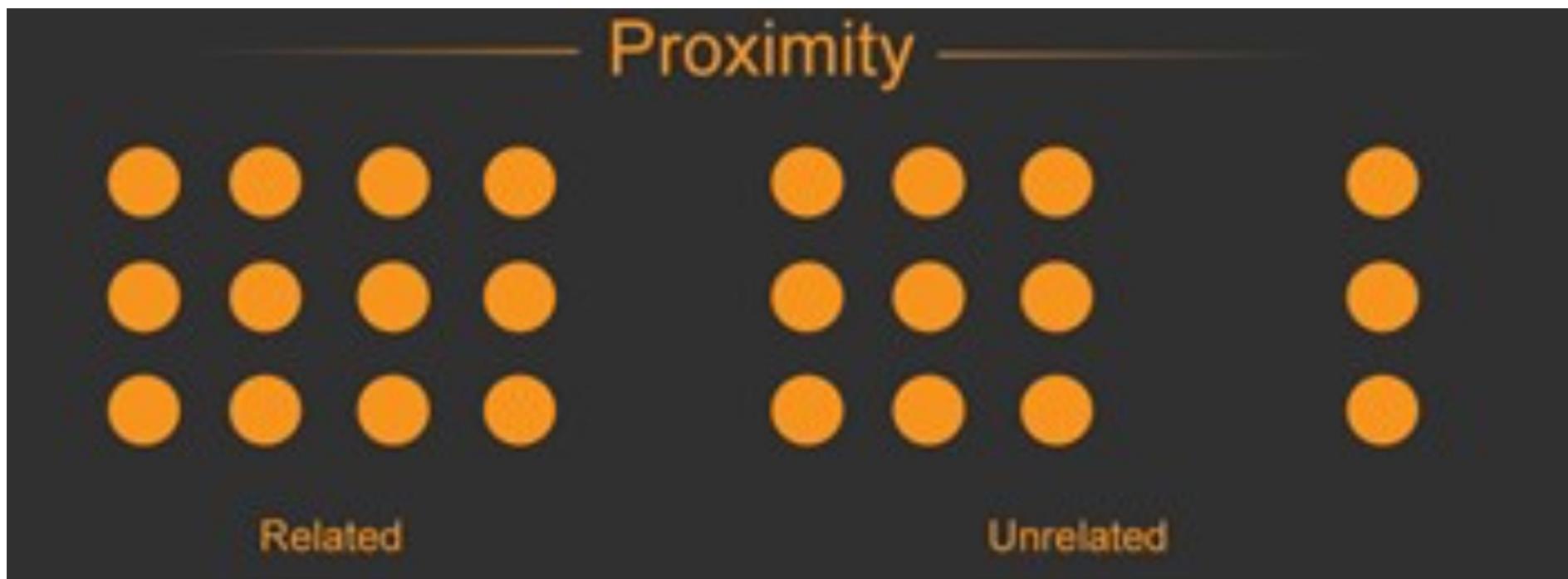


ELEMENTS THAT ARE CLOSE TOGETHER APPEAR AS GROUPS RATHER THAN AS RANDOM ELEMENTS

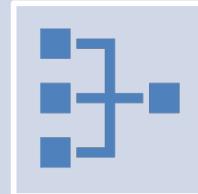
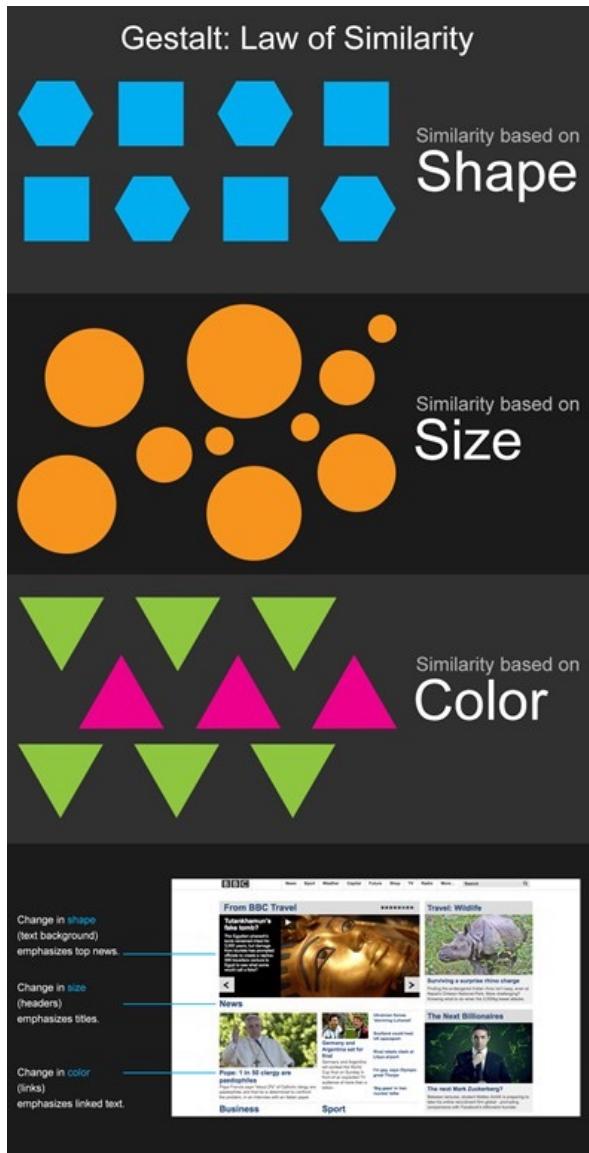
DEALS WITH HOW OUR EYES AND BRAINS DRAW CONNECTIONS WITH DESIGN IMAGES.

DESIGN IMPLICATIONS?

Design implication: can use whitespace to build perceived relationships between different elements and simple shapes arranged together can create a more complex image



Law of Similarity



Users tend to link between elements of a similar nature and perceive them in a relationship with each other.



Design Implications?

Design implication: use basic elements such as shapes, colors, and size to show similarity

Law of Similarity

How has this page used similarity?

The image shows a grid of news cards from a digital news platform, illustrating the Law of Similarity through various design elements:

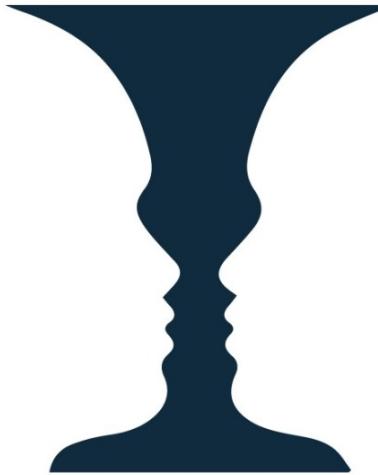
- Top Left Card:** Shows two men shaking hands. Headline: "Man Utd to face Liverpool in FA Cup - plus full fourth and fifth-round draws". Subtext: "Manchester United will host Premier League champions Liverpool in the fourth round of the FA Cup.". Published: 9h | Football | 1208.
- Top Right Card:** Shows a screen with text. Headline: "'Patience wearing thin' with football after continued Covid-19 breaches". Subtext: "Everton v Man City fixture called off on medical grounds after new Man City Covid-19 cases". Published: 5h | Football.
- Middle Left Card:** Shows a man in a suit. Headline: "Trump National stripped of 2022 US PGA Championship". Published: 14h | Golf.
- Middle Middle Card:** Shows a team celebrating. Headline: "European Champions Cup and Challenge Cup suspended". Published: 11h | Rugby Union.
- Middle Right Card:** Shows a soccer player on the ground. Headline: "When sledging goes wrong - Australia captain Paine's insults backfire". Published: 15h | Cricket.
- Bottom Right Card:** Shows two men smiling. Headline: "West Ham edge past non-league Stockport". Published: 5h | Football | 180.

Change in Shape
(text background and image size) emphasizes top news

Change in Headers
Emphasizes titles vs short description of story

Change in Text Colour
Emphasizes links to sub-topics

Figure/Ground



Examines how the eye can separate shapes in a design from the background of that design



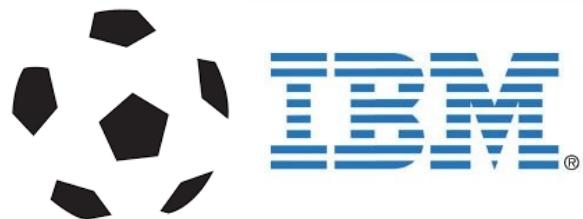
Design implications?

Design implication: Consider how to use colour, shading and contrast to distinguish objects from background to avoid ambiguity. (e.g., text on a page makes use of this law. The object is the text itself and the background is the page that displays the text).

Law of Closure



People perceive the whole by filling in the missing information. Uses the white and black space (high contrast).



Design implications?

Design implication: Consider how to use colour, shading and contrast to distinguish objects from background to avoid ambiguity. Also, as designers be strategic in deciding what information is essential and what is best to be left out (information overload vs not enough).

Law of Continuity



The eye follows the line or curve. And the crossbar of the "H" leads the eye directly to the maple leaf.



The human eye follows lines, curves, or a sequence of shapes in order to determine a relationship between design elements.



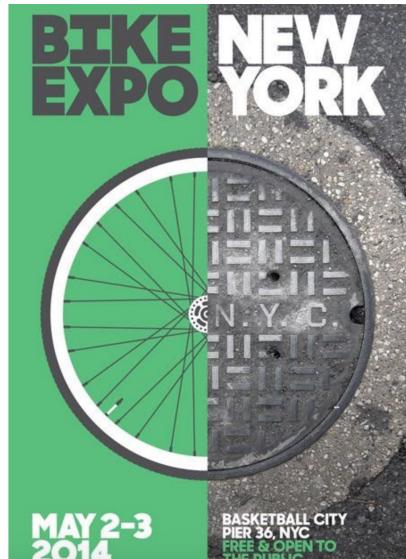
Design implications?

Design implication: users prefer to see a continuous flow of visual elements rather than separated objects (easier to navigate, understand etc.)

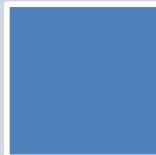
Law of Symmetry

Law of Symmetry

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The design should be balanced and complete; otherwise, the user will spend time and effort trying to perceive an overall picture.



Symmetrical elements are perceived as part of the same group



Design implications?

Design implication: The design should be balanced and complete or the user may spend time and effort trying to perceive an overall picture



Jakob Nielsen (usability guru – especially in web design)

Design guidelines:

- **Keep users informed of system status** with constant feedback.
- **Set information in a logical, natural order.**
- **Ensure users can easily undo/redo actions.**
- **Maintain consistent standards** so users know what to do next without having to learn new toolsets.
- **Prevent errors if possible;** wherever you can't do this, *warn* users before they commit to actions.
- **Don't make users remember information** – keep options, etc. *visible*.
- **Make systems flexible** so novices and experts can *choose* to do more or less on them.
- **Design with aesthetics and minimalism in mind** – don't clutter with unnecessary items.
- **Provide plain-language error messages** to pinpoint problems and likely solutions.
- **Offer easy-to-search troubleshooting resources**, if needed.

<https://www.interaction-design.org/literature/topics/design-principles>

<https://www.nngroup.com/articles/>



Different Elements of design to consider...

- Colour
- Contrast
- Texture
- Images and iconography
- Scale
- Depth and dimension
- Animation
- Variability – or – adapting to the user/conditions
- Typography
- Navigation

What is an "affordance"?

- “To afford” means to offer, yield, provide, give, furnish, aid, or help
- In HCI, an affordance is a UX design element that helps users do something
- The concept of affordances is fundamental to UX design
 - It underlies most UX design guidelines
 - It underlies most UX problems found in evaluation



5 Types of affordances in UX design

1. **Cognitive affordances:** help users with their cognitive actions
 - Content and meaning
2. **Physical affordances:** help users with their physical actions
 - Manipulation characteristics
3. **Sensory affordances:** help users with their sensory actions
 - Appearance
4. **Functional affordances:** help users do real work (and play)
 - Connections to software functionality
5. **Emotional affordances:** help achieve a positive emotional experience
 - Potential for emotional impact

1. Cognitive Affordance

It is a way to give users knowledge through the design

A cognitive affordance is a UX design element that helps users:

- Think
- Decide
- Learn
- Remember
- Understand
- Know about things

Cognitive: Content and meaning

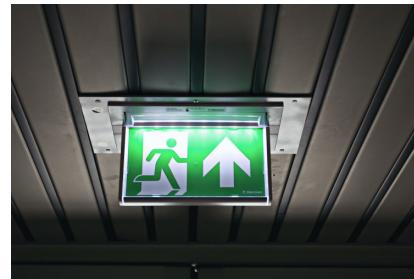


Cognitive affordance



Cognitive affordance

- Are among most significant usage-centered design features
- Plays starring roles in UX design
 - Especially for less experienced users and those who need help with understanding and learning
- Cognitive affordance meaning may depend on ***shared conventions***



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Exit Signs in Canada vs. Europe (they both have them) but...
there still be confusion.
Need to also consider – different interpretations...

Culture (example of differing conventions)

*Cognitive:
Content and
meaning*

₵ € \$
₹ ¥ £

- With the world in general, technology is becoming more accessible
- Cultural and international diversity in UI design considerations is more and more important
 - Need to consider the impact of different cultures and nationalities when designing (especially for websites and mobile apps)
 - Weights and measurements (e.g., km vs. mile, liter vs. gallon)
 - Telephone numbers and addresses (affects form layouts)
 - Etiquette, policies, tone, formality
 - Icons, buttons, and colours



How to Design for Cognitive Affordance

- Ideas?

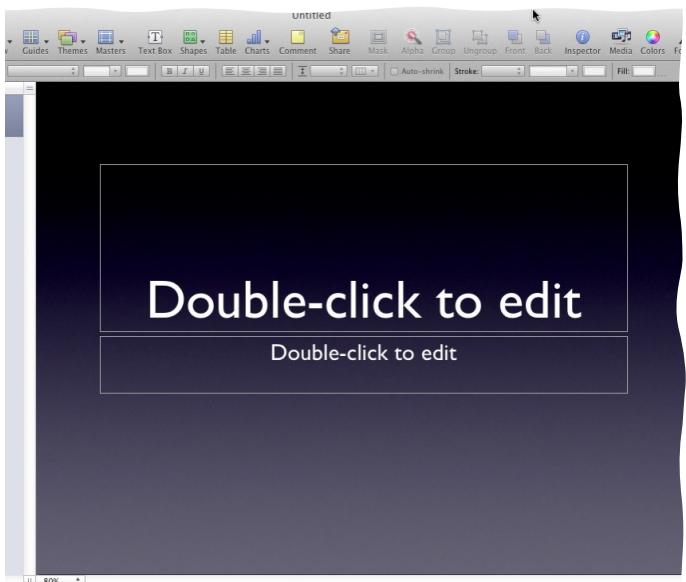
Cognitive: Content and meaning



Use Precise words and symbols for communicating

- Example: give clear and concise error message as feedback
- Example: A button label that helps users know what will happen if they click on it

- Example, symbol of an icon that clearly conveys its meaning
 - In terms of functionality behind it
 - Helps user predict consequences of clicking on it



Cognitive: Content and meaning



Consistency

- Use consistent wording to avoid confusion e.g., don't use multiple synonyms for same thing
- Use the same colour scheme in websites, application design
- Use consistent buttons and placement of buttons on interfaces



Help the user remember a task

- Example: Cognitive affordance to help user remember to complete a task using messages



Cognitive: Content and meaning

False Cognitive Affordances

- False cognitive affordances look like a cognitive affordance but are wrong or not helpful
- Be careful to not have false cognitive affordances because it will misinform, mislead, and confuse users
- Example: False cognitive affordance on a door sign



Cognitive: Content and meaning

Example: False cognitive affordance

- Looks Just like the symbol for detaching something “on the dotted line”

----- Do not detach -----

- Boxes that look like buttons but are actually just links with buttons drawn in
 - User has to click exactly on the text

Simple Search

Advanced Search

Browse

Register

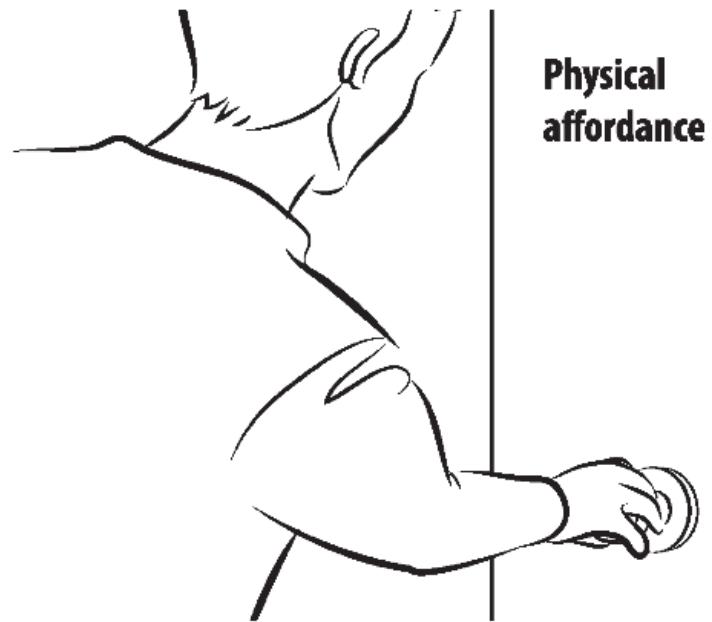
Help

2. Physical affordance

A UX design element that helps users make physical actions (e.g., click, touch, point, gesture, move an object)

Has to do with

- *Real physical actions (clicking, touching, pointing, gesturing, moving things) on*
- *Real physical objects*



Physical—Manipulation characteristics

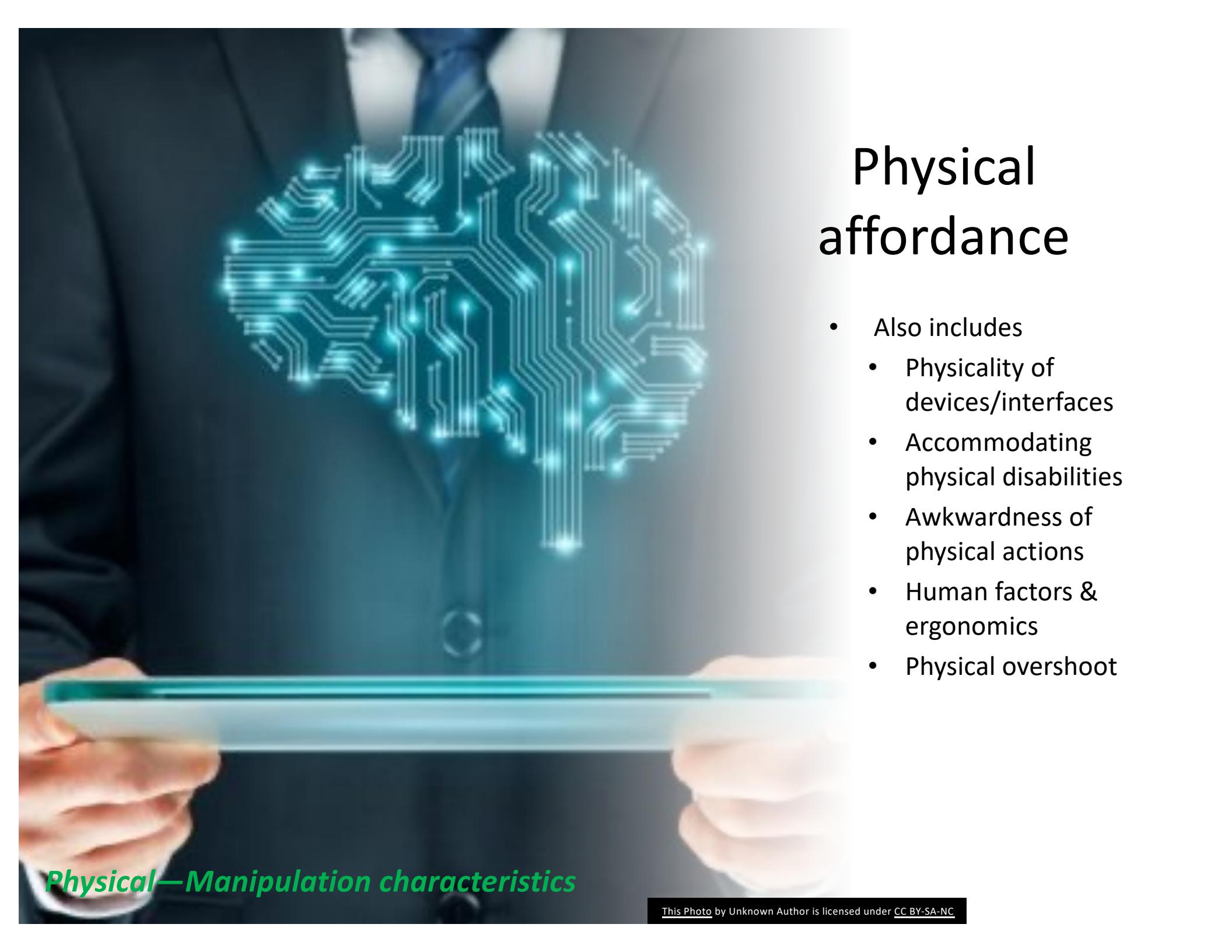
Starring role for experienced or power users

- Less need for elaborate cognitive affordances
- Task performance depends largely on speed of physical actions
- Example: Keyboard shortcuts
- Undo: Cmd/Ctrl + Z
- Print: Cmd/Ctrl + P



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Physical—Manipulation characteristics



Physical affordance

- Also includes
 - Physicality of devices/interfaces
 - Accommodating physical disabilities
 - Awkwardness of physical actions
 - Human factors & ergonomics
 - Physical overshoot

Physical—Manipulation characteristics

Physical Affordance Design

- Example, adequate size and easy-to-access location
 - Physical affordance features of interface button design
 - Enabling users to click easily on button
- Example: A button that is large enough so that users can click on it accurately

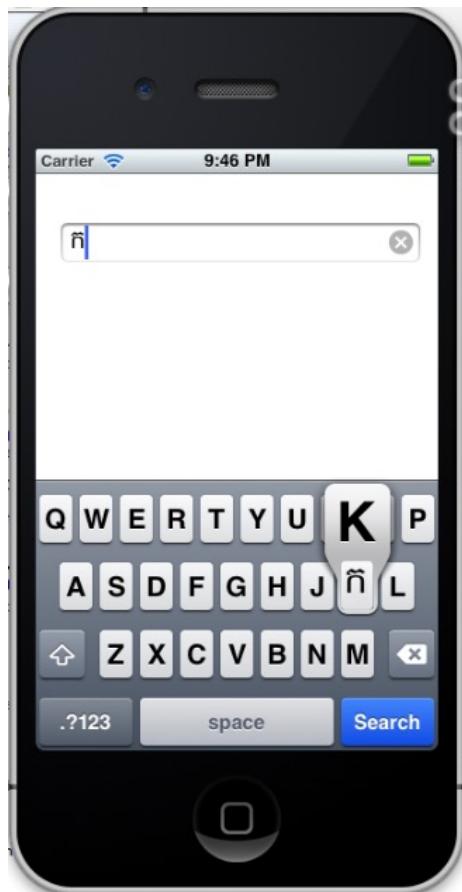


- Example: Size of a button affects ease of clicking
- They make this button large enough so anyone can click on it

Physical—Manipulation characteristics

Some physical affordances are better than others

Physical—Manipulation characteristics



And there is sometimes no consensus

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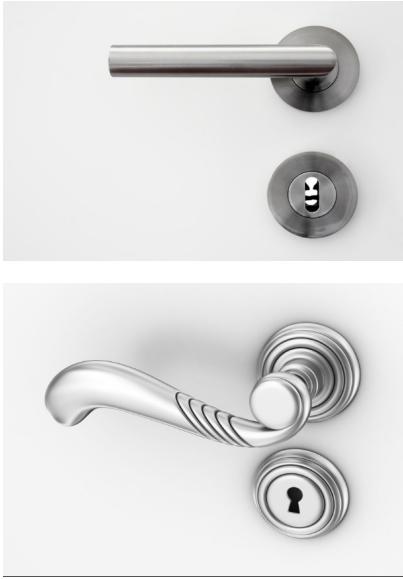


Some physical affordances are better than others

Physical—Manipulation characteristics

Physical affordances for opening doors

- Can also act as a cognitive affordance
- Depends heavily on shared conventions



Physical—Manipulation characteristics



Physical affordances can offer Emotional affordances

Again, depends heavily on shared conventions

Physical—Manipulation characteristics



Physicality

- “Physicality” refers to direct physical interaction with a real physical device
 - E.g., grasping and turning a real knob to tune a radio as opposed to clicking on up and down arrow buttons in a software interface

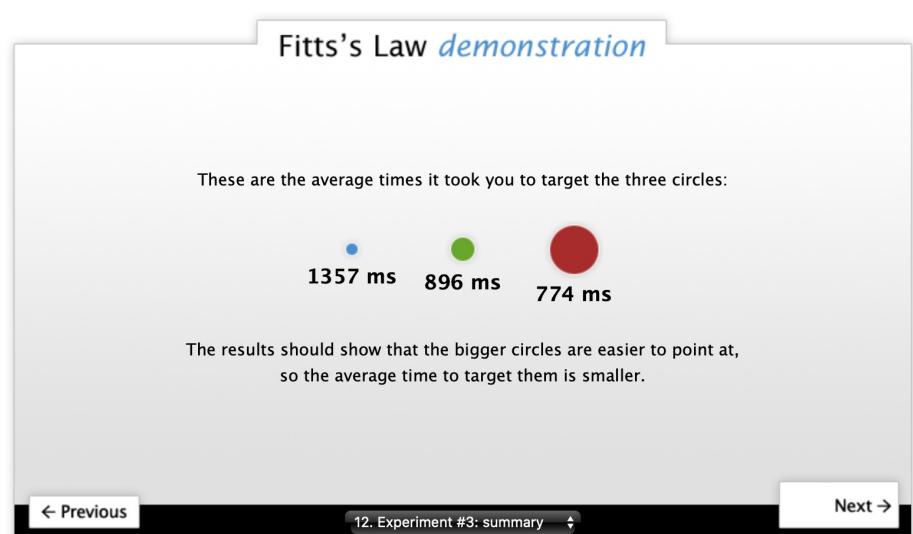
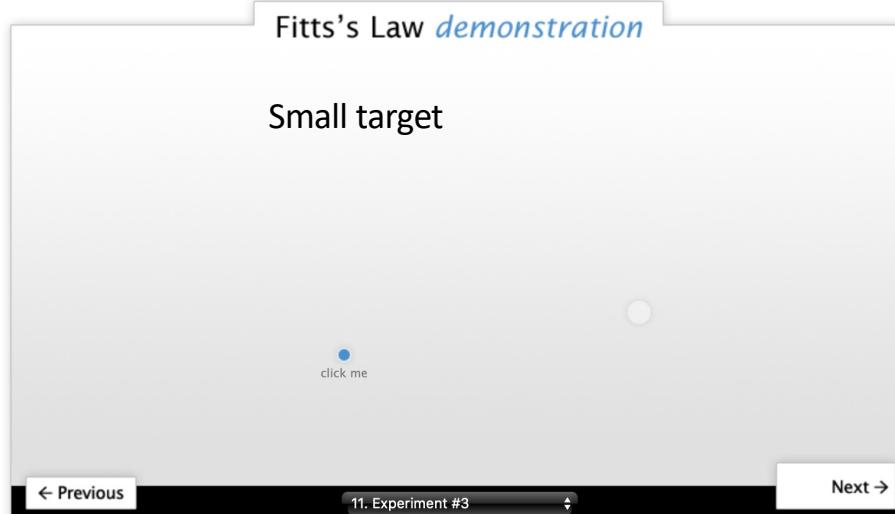
Physical—Manipulation characteristics

Fitts' law

- Governs certain kinds of physical movement during interaction
 - Cursor movement for object selection
 - Dragging and dropping objects
 - Any movement from initial position to target at terminal position
 - About object distance, size, and proximity
- Empirically based mathematical formula predicts user performance
- The time to acquire a target is a function of the distance to and size of the target.
 - Reckoned in terms of **time and errors**
 - Time to make movement is
 - Proportional to log₂ of distance
 - Inversely proportional to log₂ of cross-section of target normal to direction of motion

Fitts' Law Demo

- <http://fww.few.vu.nl/hci/interactive/fitts/>



3. Sensory affordance

- A sensory affordance is a UX design element that helps users sense things during interaction (e.g., see, hear, feel)
- Includes seeing, hearing, feeling (and tasting and smelling)
 - Example: A label font size large enough to be easily seen
- Associated with “sense-ability” characteristics of user interface artifacts
- In UX designs, used in supporting role to help user sense, to support other affordances: e.g., Cognitive, physical, and emotional affordances



Sensory
affordance



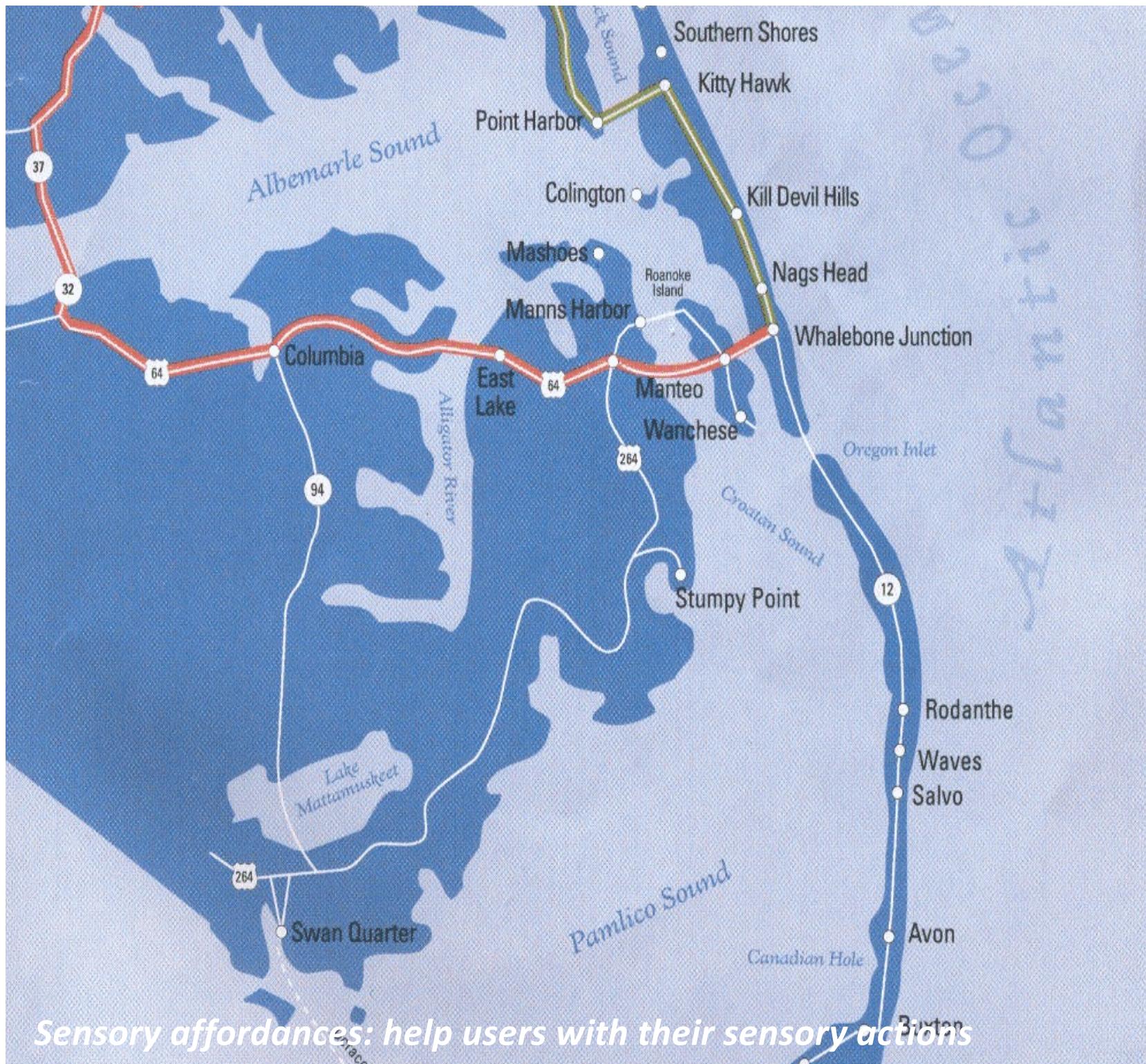
Sensory affordances: help users with their sensory actions

Sensory affordance Design Issues

- Include visibility, noticeability, discernibility, legibility (of text), audibility (of sound)
- Include features or devices associated with haptic/tactile sensations
- Example, legibility of button label text supported by
 - Adequate size font
 - Appropriate color contrast between text and background

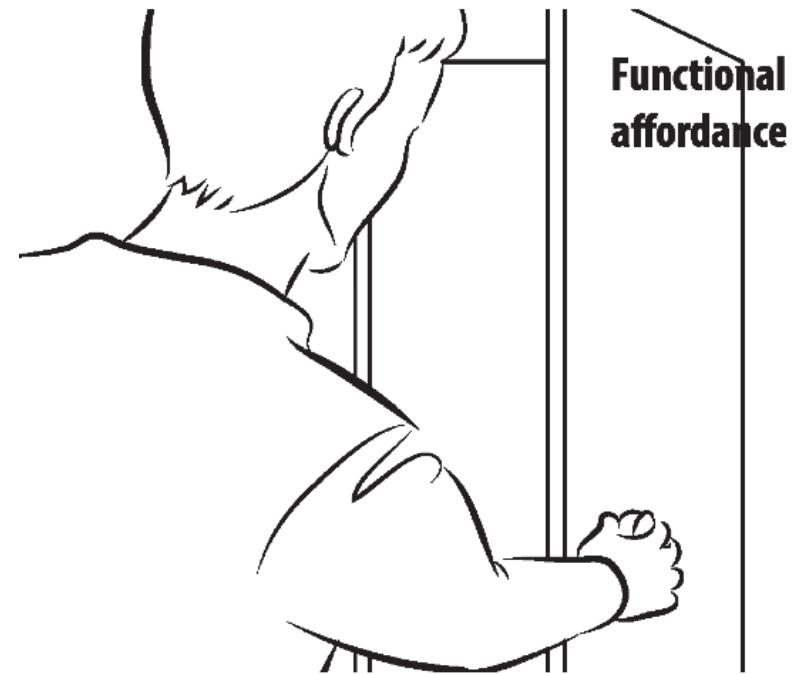
Sensory affordances: help users with their sensory actions

Map area has usual colors switched, so you can't tell land from sea



4. Functional affordance

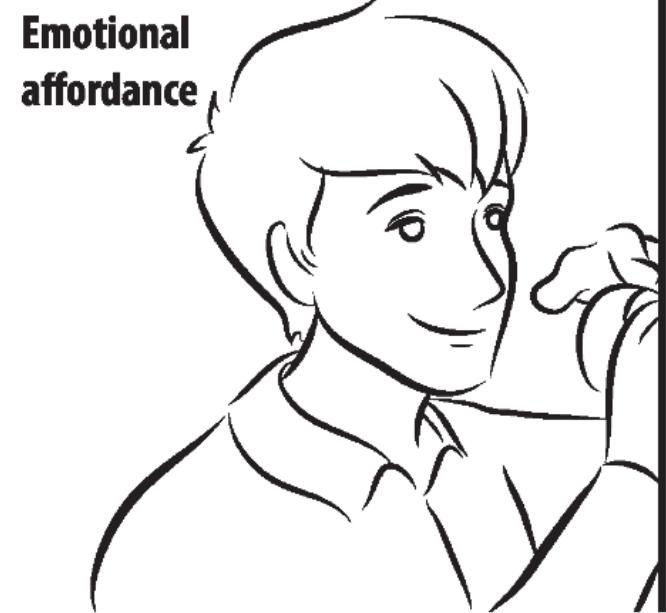
- A UX design element that helps users employ system (back-end) functionality to do work (usefulness)
- Links usability to usefulness
 - Help users get things done
 - Adds purpose to physical affordance
 - The reason users make physical actions
- Example: “Add to cart” has functionality behind it to add item to your order



Functional affordances: links usability to usefulness

5. Emotional affordance

- UX design element that adds emotional impact to the user experience, helping users make an emotional connection
- Characteristics of emotional impact afforded by emotional affordances
 - Fun, joy-of-use, aesthetics
 - Novelty, experiential features
- Example: Something that makes interaction fun
- Emotional affordances for meaningfulness
 - Support long-term emotional impact
 - Leads users to adopt device or app as part of their lifestyles
 - Can't live without it!



Emotional affordances: impacts user experience

② STUVA/FRITIDS
Wardrobe

\$570
00

Emotional affordance

- What design features afford a quality emotional impact?
- Features or design elements that make emotional connection with user
- Example: The ambiance inside Ikea stores

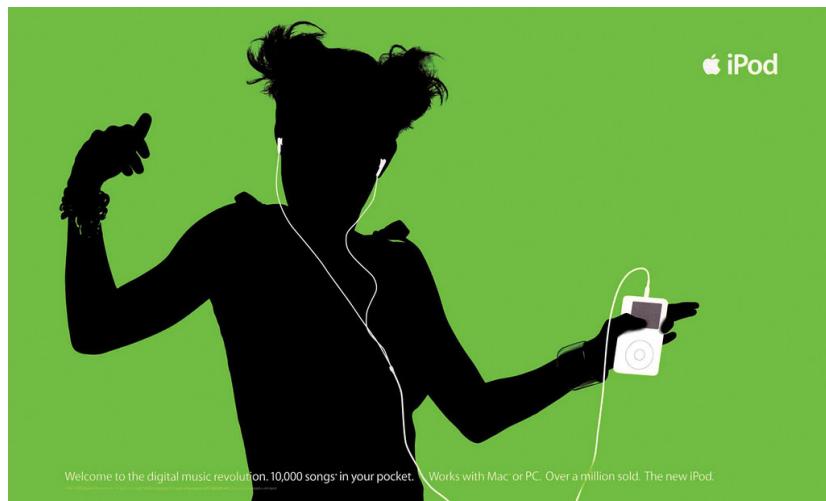
Emotional affordances: impacts user experience



Emotional affordance

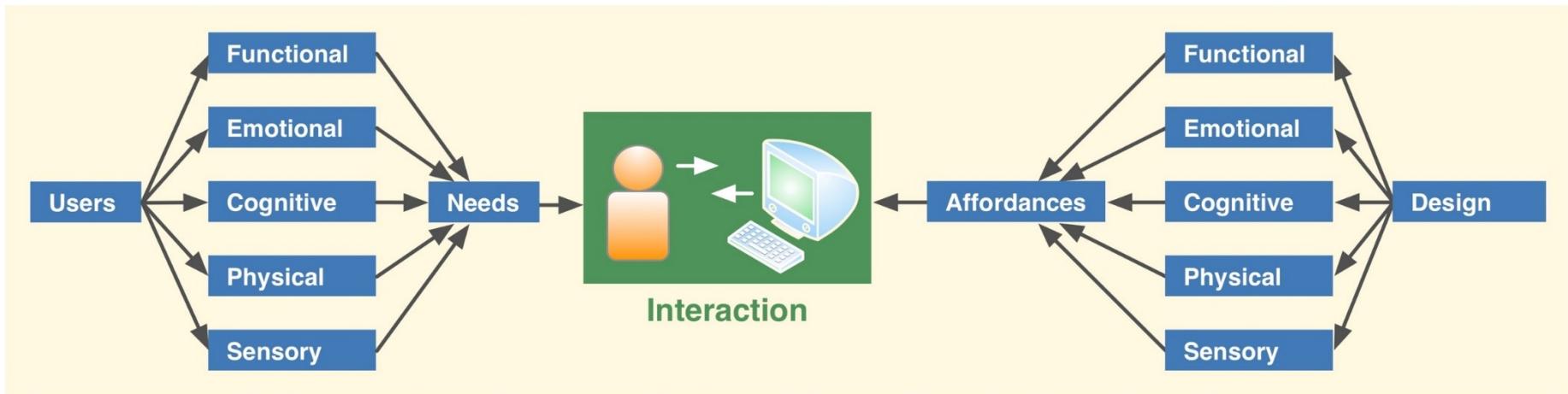
- Example: Silhouette shows excitement and highlights the iPod device

<https://www.youtube.com/watch?v=EUXnJraKM3k>



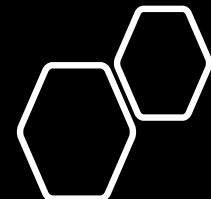
Emotional affordances: Impacts user experience

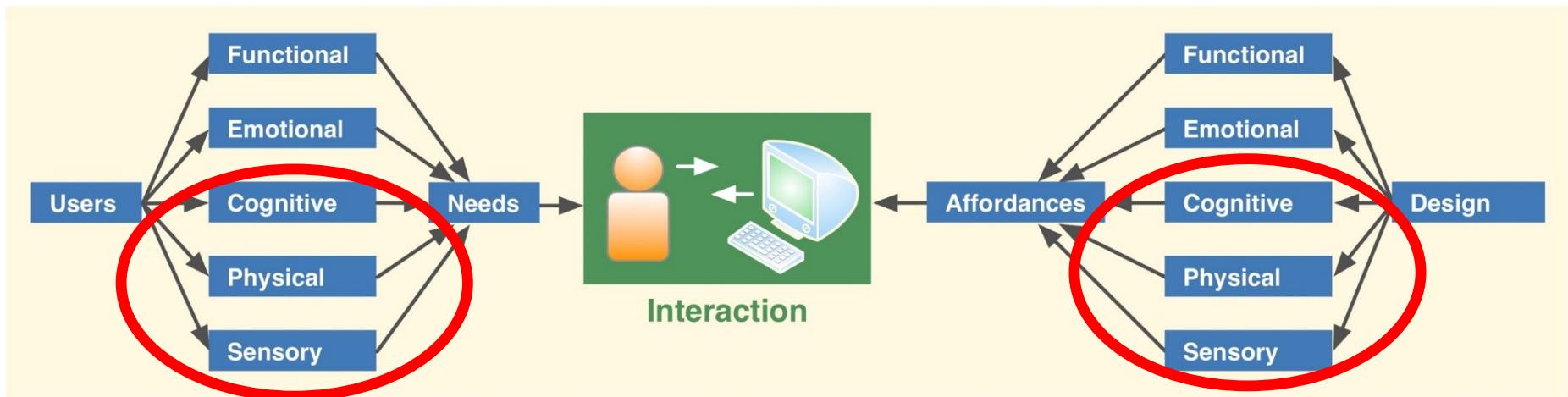
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Affordances as an alliance in design

- The different types of affordances work together, connected in design
- Overall design considerations
 - How does it connect to functionality?
 - What is the positive emotional impact?

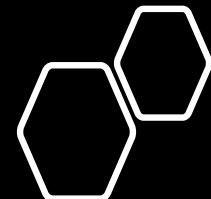




Affordances as an alliance in design

To accomplish usage goals, user must sense, understand, and operate user interface objects through:

- Cognitive affordances
- Physical affordances
- Sensory affordances
- Functional and emotional are also necessary to accomplish a goal and can add an emotional connection

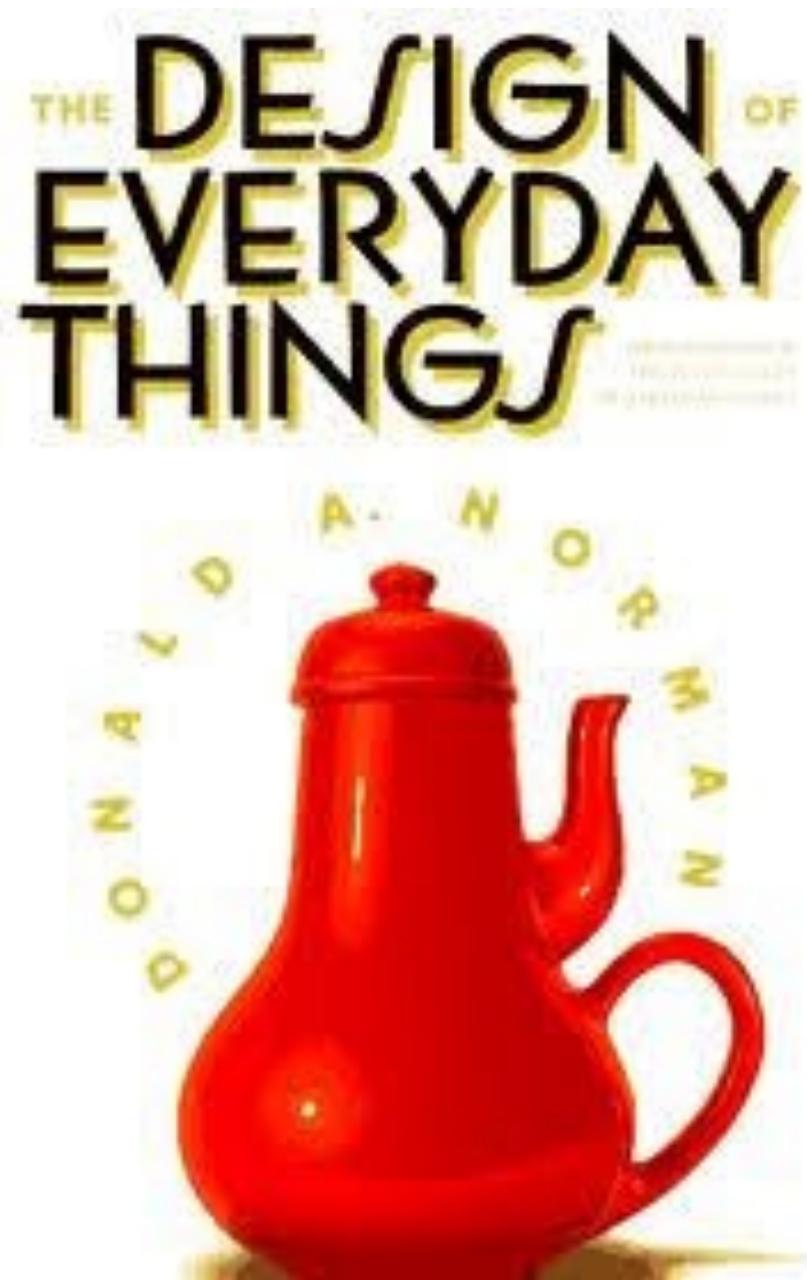




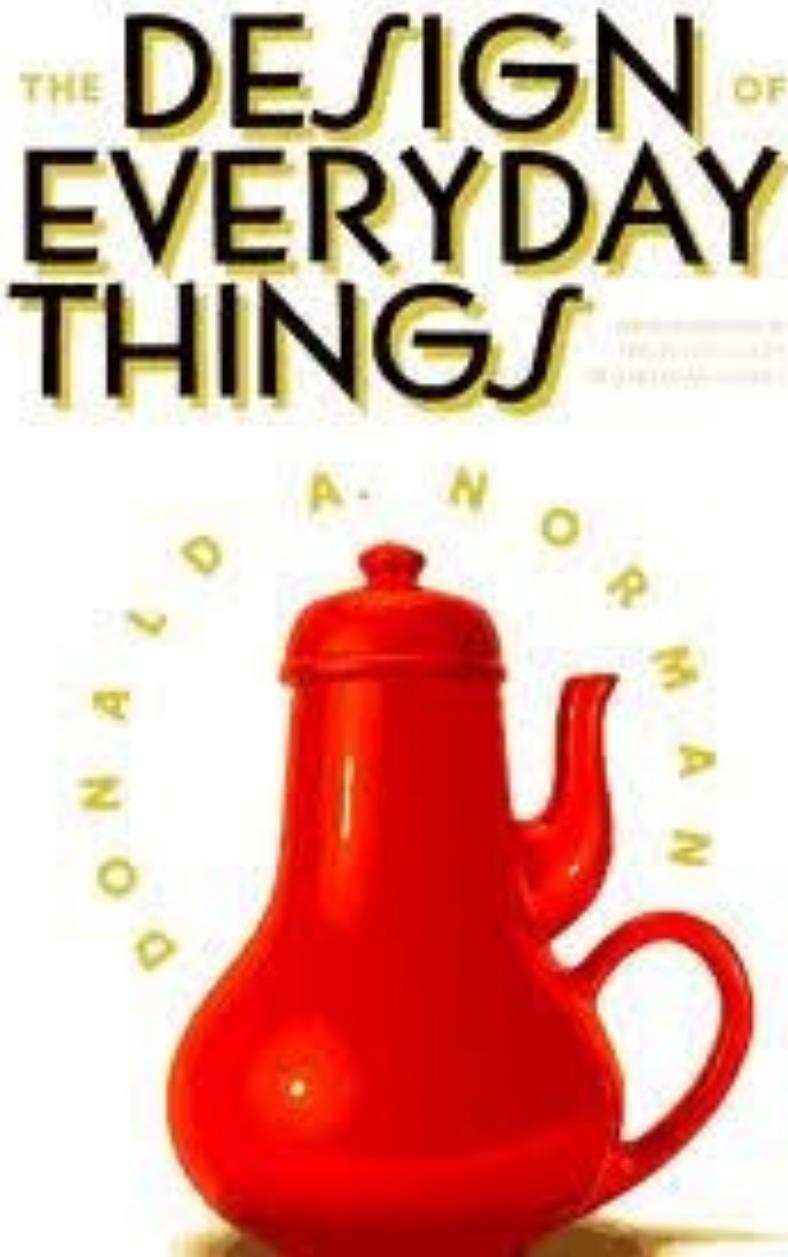
A UX design checklist of affordances

For design of each user interface artifact consider each of these types of affordance:

- ✓ Sensory—Appearance
- ✓ Cognitive—Content and meaning
- ✓ Physical—Manipulation characteristics
- ✓ Functional—Connections to software functionality
- ✓ Emotional—Potential for emotional impact



- What if I asked you to design a tea pot – it needs a handle, and spout to pour, and a lid to add water?
- Seems obvious right???
- Teapot requirements:
 - ✓ Top to add water and tea
 - ✓ Spout to pour it out
 - ✓ Handle to hold the teapot
- But doesn't work - what is wrong?
- *Don Norman*



Design of Everyday Things – Don Norman

- many so-called human errors are actually errors in design
 - human factors and UX design became important as human performance limitations reached when handling complex machinery
- Important concepts for designing everyday things
 - He discusses affordances from the perspective of 'perceived affordances'
 - causality
 - visible constraints
 - mapping
 - transfer effects
 - idioms & population stereotypes
 - conceptual models
 - individual differences
 - why design is hard

Perceived Affordance (how the affordance is interpreted)

- The perceived properties of the object that suggest how one could use it (can violate one or more often more of the affordances we looked at)
 - **perceived affordances:**
 - design invites people to take possible actions
 - **actual affordances:**
 - the actual actionable properties of the product



slots are for inserting
handles are for turning



chairs are for sitting
table for placing things on



This Photo by Unknown Author is licensed under CC BY-SA

buttons are for pressing



switch for toggling



knobs are for turning



computer for...

Perceived Affordance Problems

Problems occur when people's perceptions of how something works is not what the designer expects

Surface for placing transparencies

which way is up?

Which of the 5 affordances that we discussed does this projector violate? Why?



Mirrors for not touching
people don't reposition image

Handles for lifting
bends frame, focus distorted

Knobs for turning
focus or image position?

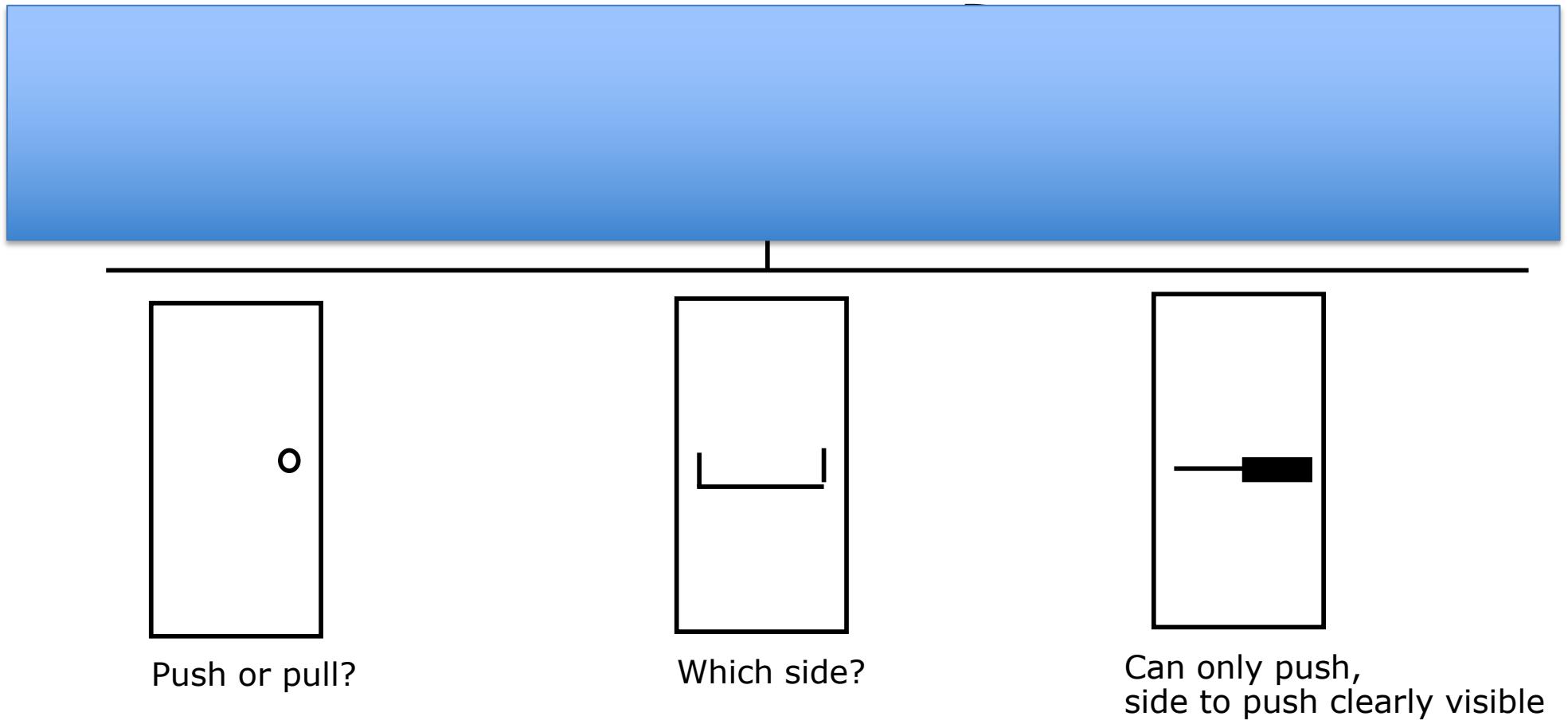
Functional – 'transparencies' often aren't displayed correctly - backend

what about this?

Cognitive and physical are obvious – what about emotional and sensory?

Visible Constraints (what do you think these are?)

- An affordance may be perceived incorrectly due to limitations of the actions possible perceived from object's appearance
 - provides people with a range of usage possibilities



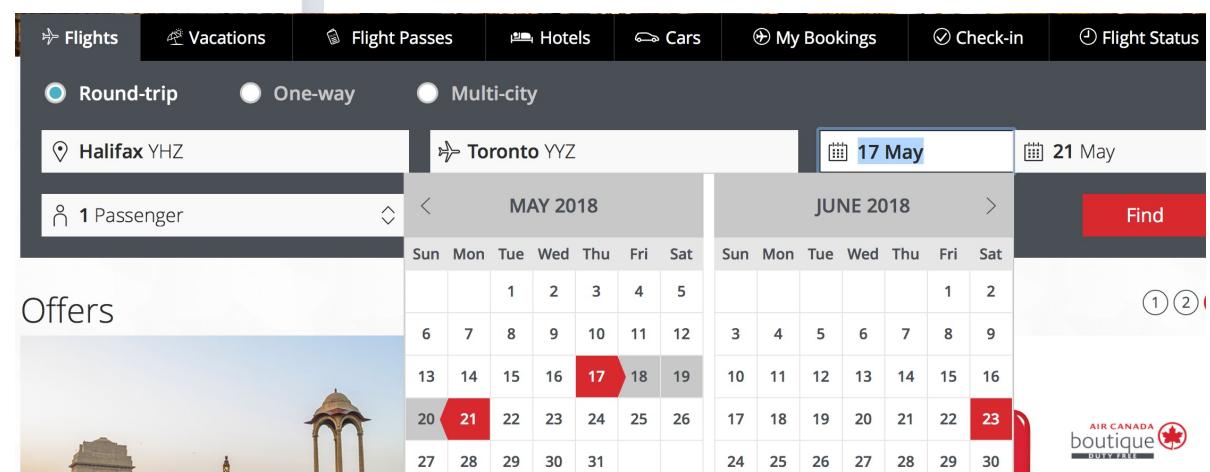
Visible constraints: Entering a Date

- The more constraints, the less opportunity for error
 - particularly important for managing user input

A screenshot of Microsoft Excel showing a formula in cell E5: =TEXT(B5,"mmm d")&" - "&TEXT(C5,"mmm d"). The table below shows various date ranges:

Start	End
1-Mar-16	10-Mar-16
15-Sep-16	15-Oct-16
1-Oct-16	15-Oct-16
1-Apr-16	1-Jun-16
1-Jul-16	

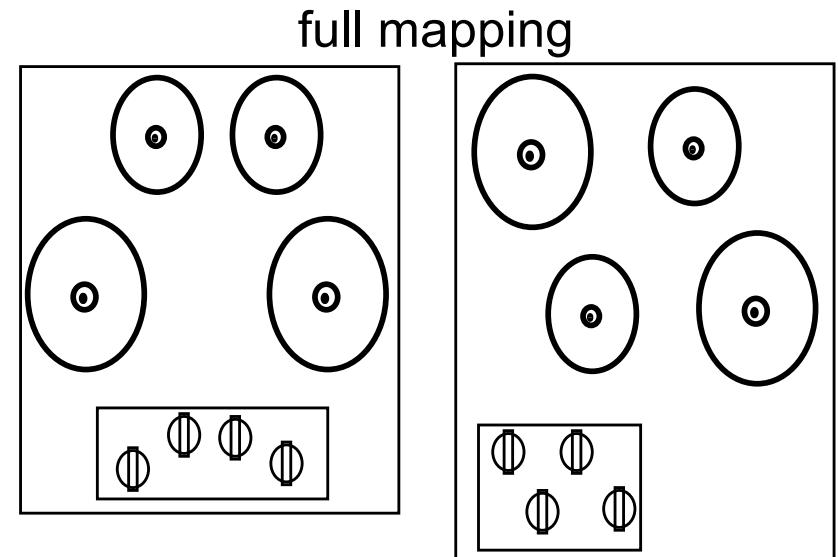
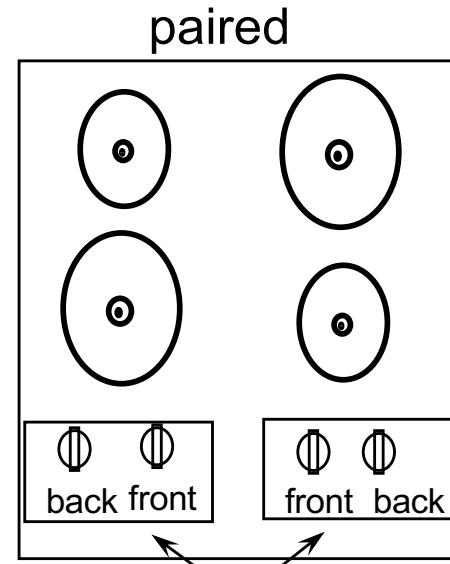
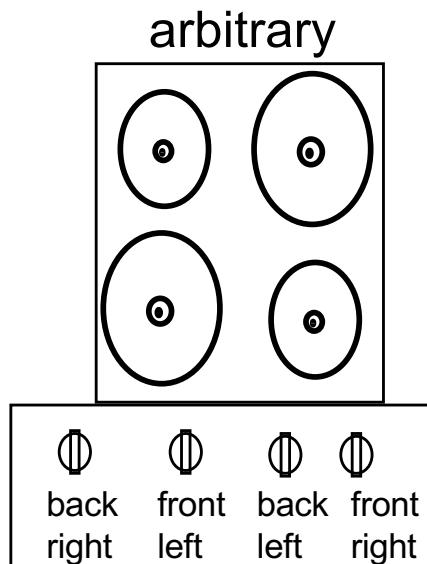
What affordances are at play here? And how does visible constraints help?



Mapping

- The set of possible relations between objects
- Helps to distinguish affordances
- Control-display compatibility
 - the natural relationship between controls and displays
 - e.g., visual mapping of stove controls to elements

What affordances are at play here?
And how does mapping help?



24 possibilities, requires:
-visible labels + memory

2 possibilities per side
=4 total possibilities

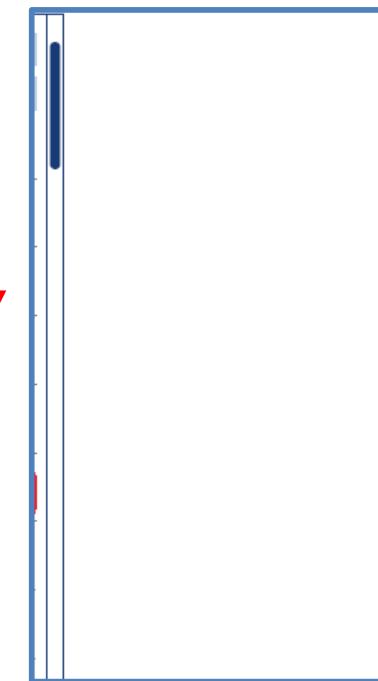
Mapping

- E.g., Control-display compatibility - cause and effect



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steering wheel-
turn left, car turns left



[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)

scroll bar – scroll down
viewport goes down

Mapping

Menu controls and active objects – notice that this applies visible constraints

Only controls that can operate on document are fully visible

Selected Action is highlighted

What affordances are at play here? And how does visible constraints help?

lecture6_devices.... x

2 / 14

66.2%

2/7/18

2. Structure

- Structure should align, group and position the user controls in a way to help the user use them efficiently and effectively
- Metaphors can help structure the interface in a way that is familiar
- E.g., tourism kiosk → uses maps

CS3180

3. Consistency

Emphasizes importance of uniformity in appearance, placement, and behaviour in a UI to make a system easy to learn and remember

- If you do something on one level of the UI, users expect it to be the same throughout the UI because they develop a mental model of the UI (this UI helps them predict how the subsequent screens, levels, layers, etc will behave)

CS3180 6

3. Consistency

- Greatly affects usability – if users think the system will act one way and it acts another – frustration
- Consider consistency for single systems, across systems within an organization or familiar domain (e.g., websites, MS office Suite)
- To ensure consistency: REUSE
 - GUI controls and design strategies within and between systems (e.g., logos, menus, etc.)
 - It is advantageous to users because they will need to learn fewer things and transfer knowledge

CS3180

4. Tolerance

- Emphasizes importance of designing the user interface to prevent user from making errors
 - Errors can be due to bad UI designs but also from poor task knowledge or domain knowledge, stress, etc.
 - Reduce errors by:
 - Help users avoid mistakenly by making wrong choice unavailable (e.g., grey out choices)
 - Show how info should be entered or accept all formats (e.g., dates on a form)
 - Help users recover if they make errors

CS3180 8

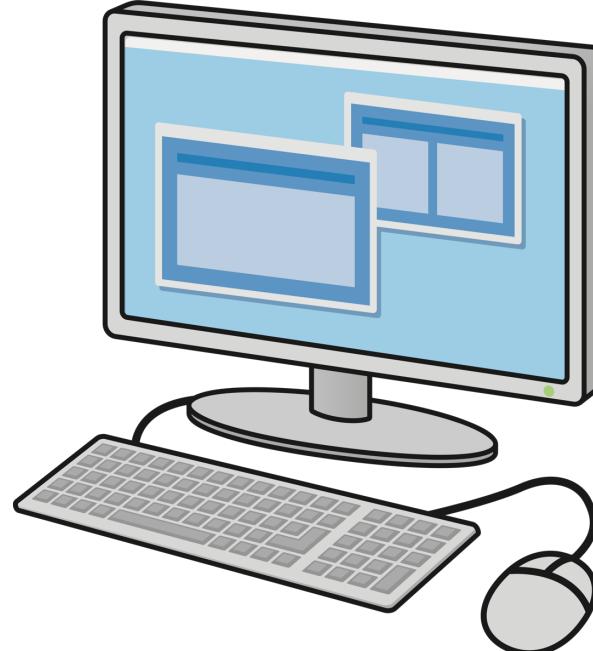
Causality

- The thing that happens right after an action is assumed by people to be caused by that action
 - *interpretation of “feedback”*
 - false causality
 - incorrect effect
 - invoking unfamiliar function just as computer hangs
 - causes “superstitious” behaviors
 - invisible effect
 - command with no apparent result often re-entered repeatedly
 - e.g., mouse click to raise menu on unresponsive system

How does causality help with affordances?

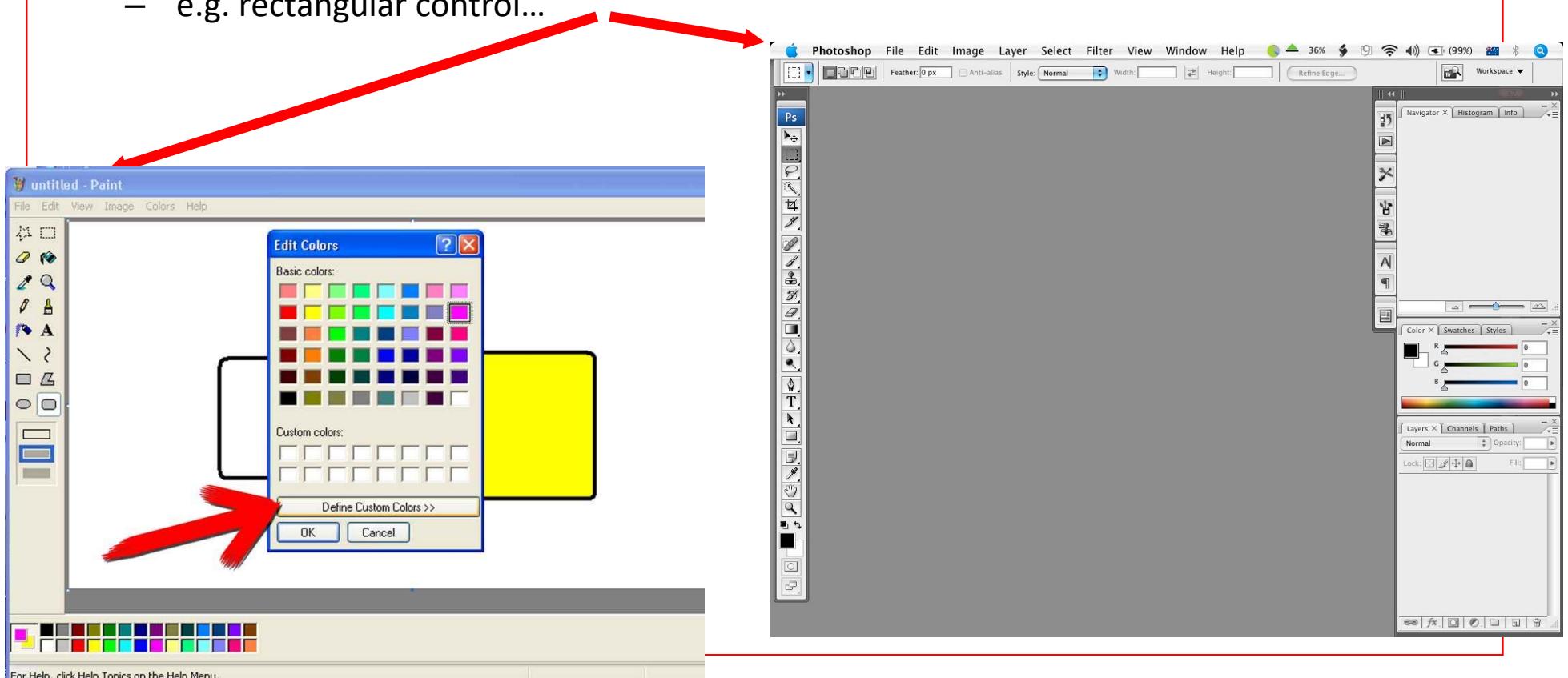
Transfer Effects – what is this?

- People transfer their learning/expectations of similar objects to the current objects
 - positive transfer: previous learning's also apply to new situation
 - negative transfer: previous learning's conflict with the new situation



Transfer Effect Problems

- How does knowing MSPaint help you in Photoshop?
 - e.g. rectangular control...



Interaction Design patterns : iOS vs Android

- Does it transfer?

Google Material Design:

- <https://www.youtube.com/watch?v=rrT6v5sOwJg>
- iOS Human Interface Design guidelines
- <https://developer.apple.com/ios/human-interface-guidelines/controls/pickers/>

From article:
Ved, "Interaction Design patterns : iOS vs Android"
Medium. April 14, 2017
<https://medium.com/@vedantha/interaction-design-patterns-ios-vs-android-111055f8a9b7>

Human Interface Guidelines

iOS ▾

Controls

Buttons

Edit Menus

Labels

Page Controls

Pickers

Progress Indicators

Refresh Content Controls

Segmented Controls

Sliders

Steppers

Switches

Text Fields

Extensions

Technologies

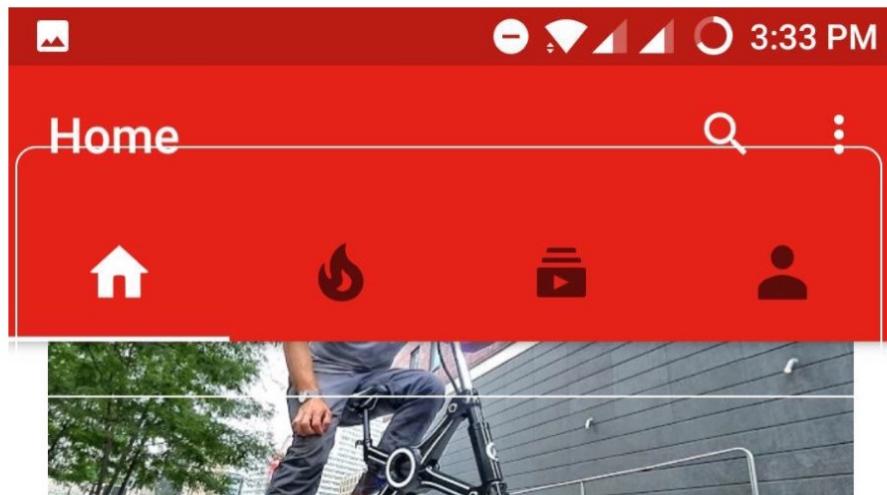
Resources

Info Buttons

An Info button reveals configuration details about an app, sometimes on the back of the current view, after flipping the view around. Info buttons come in two styles—light and dark. Pick the style that best coordinates with your app's design and doesn't get lost onscreen.



In app Navigation

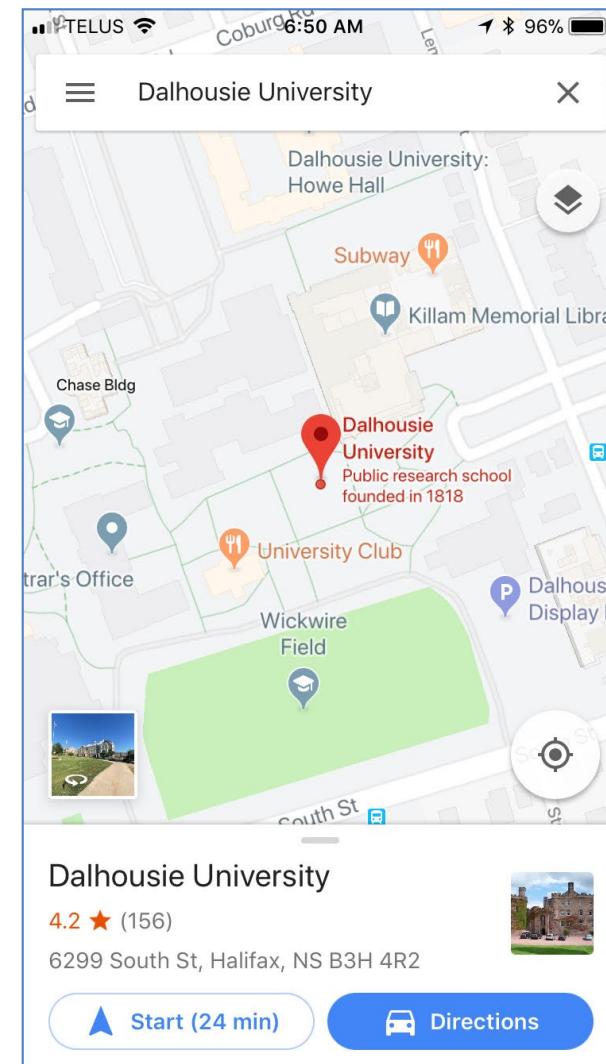
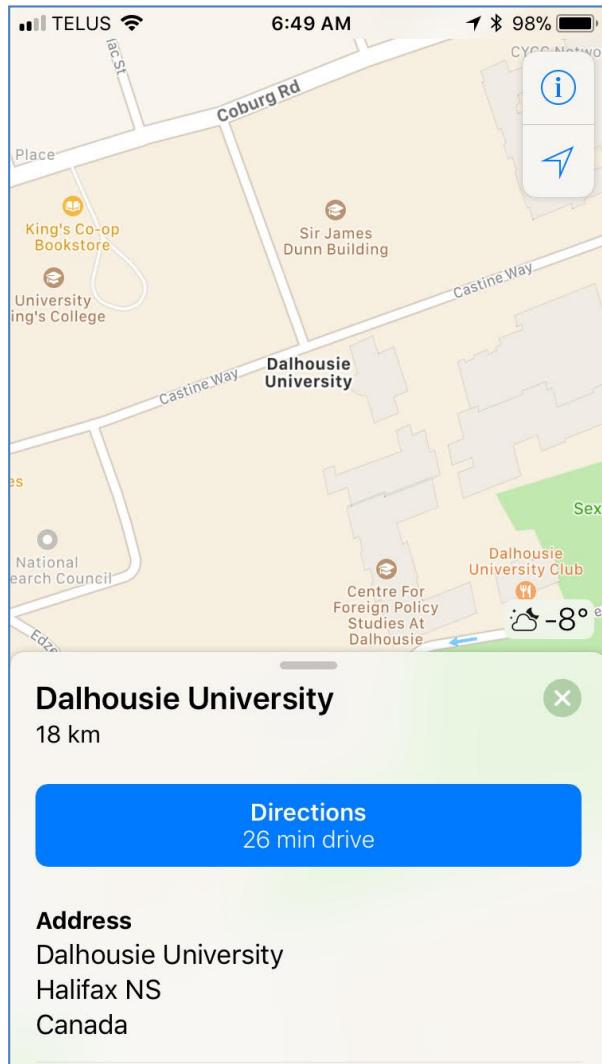


Left: Different sections of YouTube on Android are organized as tabs on top of the app. Right: Sections are organized as tabs on the bottom of the app on iOS.

What affordances are at play here?
How do each deal with ensure perceived affordances
matches real affordances?

Image from: <https://medium.com/@vedantha/interaction-design-patterns-ios-vs-android-111055f8a9b7>

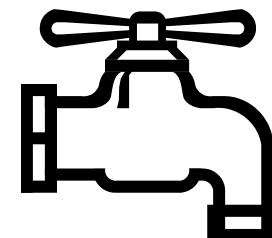
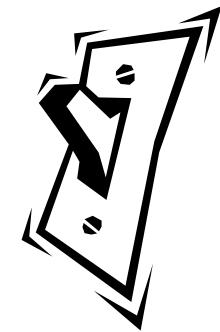
Map Applications

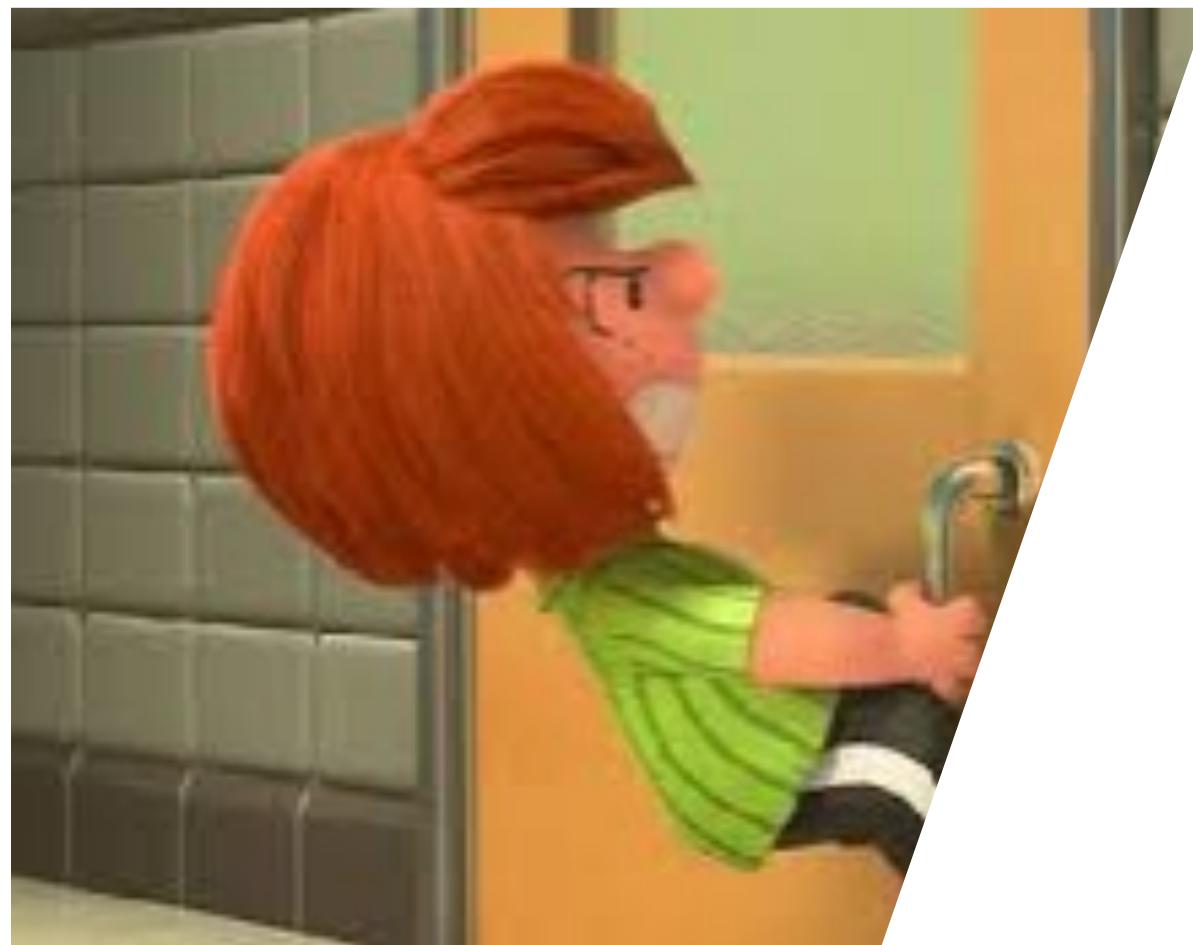


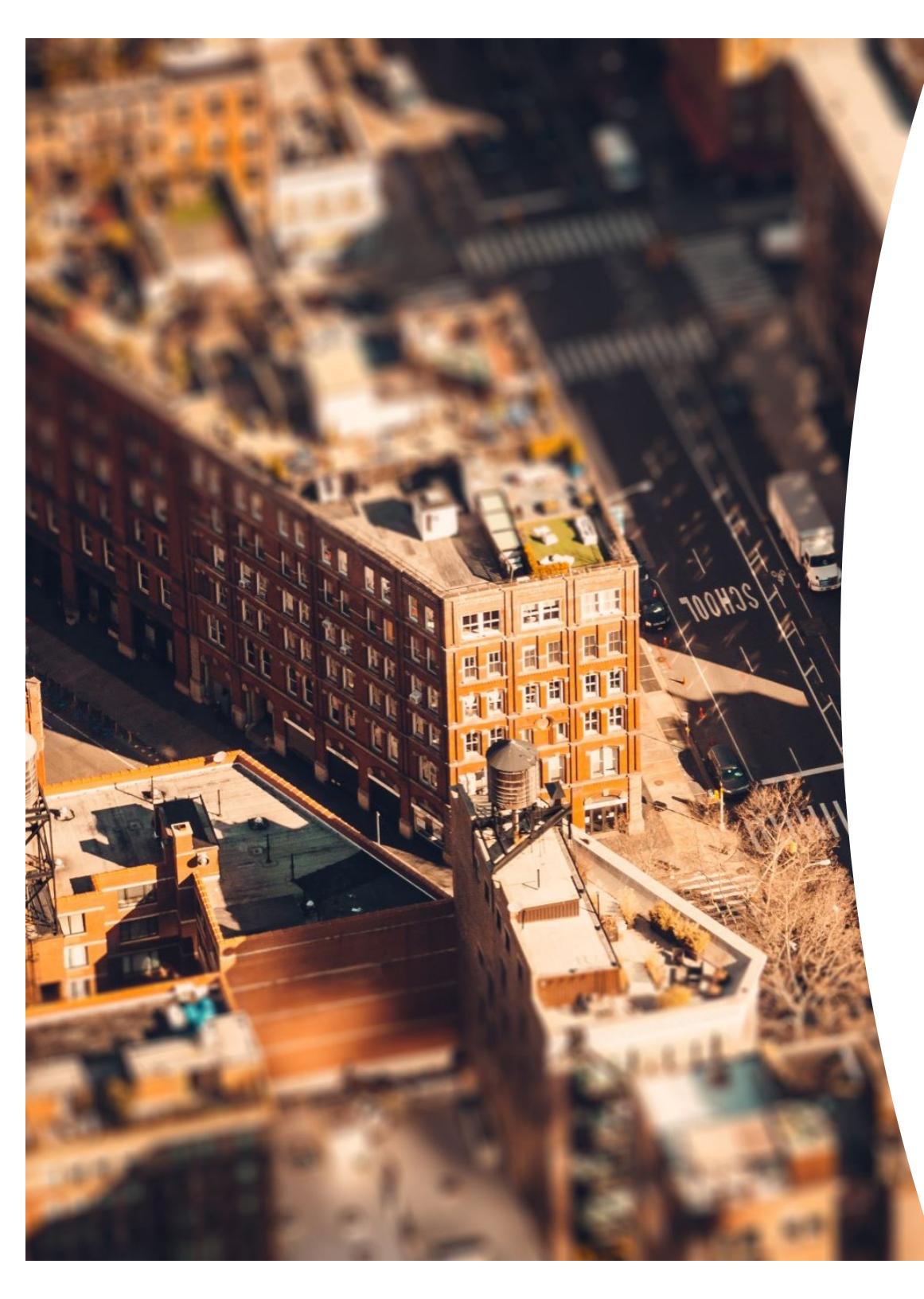
Subtle Differences... do they transfer?

Idioms and Population Stereotypes also impact perceived affordances

- Interface idioms:
 - ‘standard’ interface features we learnt, use and remember
- Idioms may define arbitrary behaviours
 - red means danger
 - green means safe
- Population stereotypes: Idioms vary in different cultures
 - Light switches
 - America: down is off
 - Britain: down is on
 - Faucets
 - America: anti-clockwise on
 - Britain: anti-clockwise off





A photograph taken from an elevated position, showing a street scene in a city. In the foreground, there's a building with a red brick facade and several windows. To its right, a dark-colored building has the word "SCHOOL" written vertically on its side. The street below is lined with trees and other buildings, creating a dense urban environment.

Over the next week....

- You can do this on your own or with a group (just include everyone's names in your post)
- Look around campus and the city and try find a couple of good examples of a 'Norman Door' – take a photo of it and post it to our class Team (make sure to include where you found it, why you think it is a 'Norman Door' and names of whom you are with).
- Note: this may not be an actual door but a really bad design from the perspective of form.
- Let's get a good collection of 'Norman Doors' on campus and HRM ☺

Class Activity Today: Pilot your interview questions/contextual inquiry

- Remember, that pilot data is not kept but rather informs changes that need to be made before the actual study (it's like a dress rehearsal).
 - Run the pilot like your study. One researcher directs the user and asks the questions. Other researcher/s will record answers- making notes of not just user behaviour but problems with scenarios/questions (good info).
 - Use all your scripts and task descriptions and questions as you would during the actual study.
 - ~~Record answers and observations on your observation sheets as if it were the real study~~
- After doing the pilot:
 - You can ask your test user what they found confusing (e.g., task description, interview question) or for any suggestions to make your study better. Don't record this session – but take notes.
 - Can make changes based on user feedback and your own observation (e.g., you may have noticed that the user was confused about a task even if they don't mention it).
 - Make updates/edits to your lab2 and noting who was here in class [make a note at the end of the lab]
 - Remember we don't collect names BUT I need the names of the 'users' for each group so I can schedule the actual evaluations appropriately