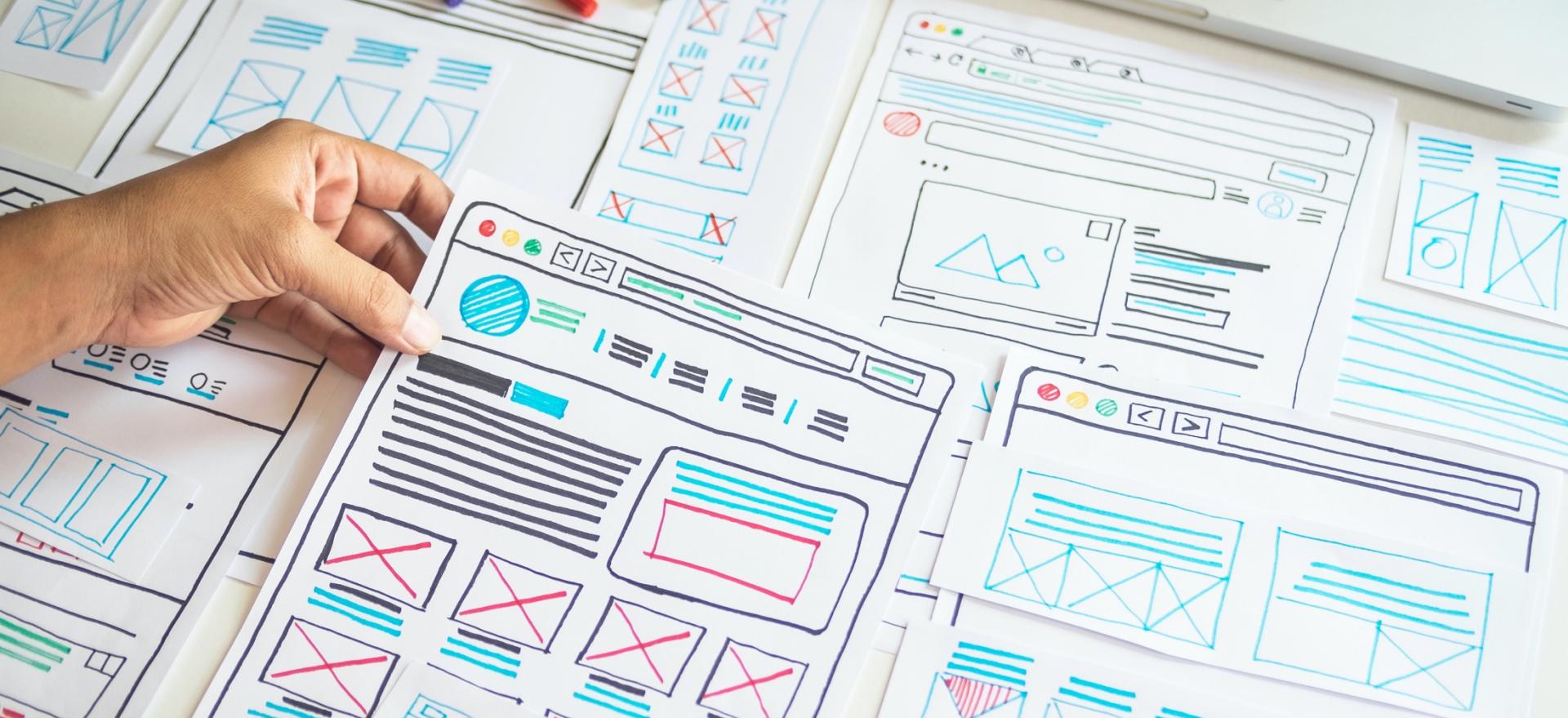


Sonia Chiasson

COMP3008 – FALL 2020

Materials are intended for COMP3008 class use only.
Sharing or posting of class content is not permitted.



DESIGN CONCEPTS 1

Affordances

Perceived and actual
affordances: the actions
suggested by the design of an
object

- Knobs should be turned
- Buttons should be pressed
- Handles are for grasping
- Slots are for inserting things



Affordances

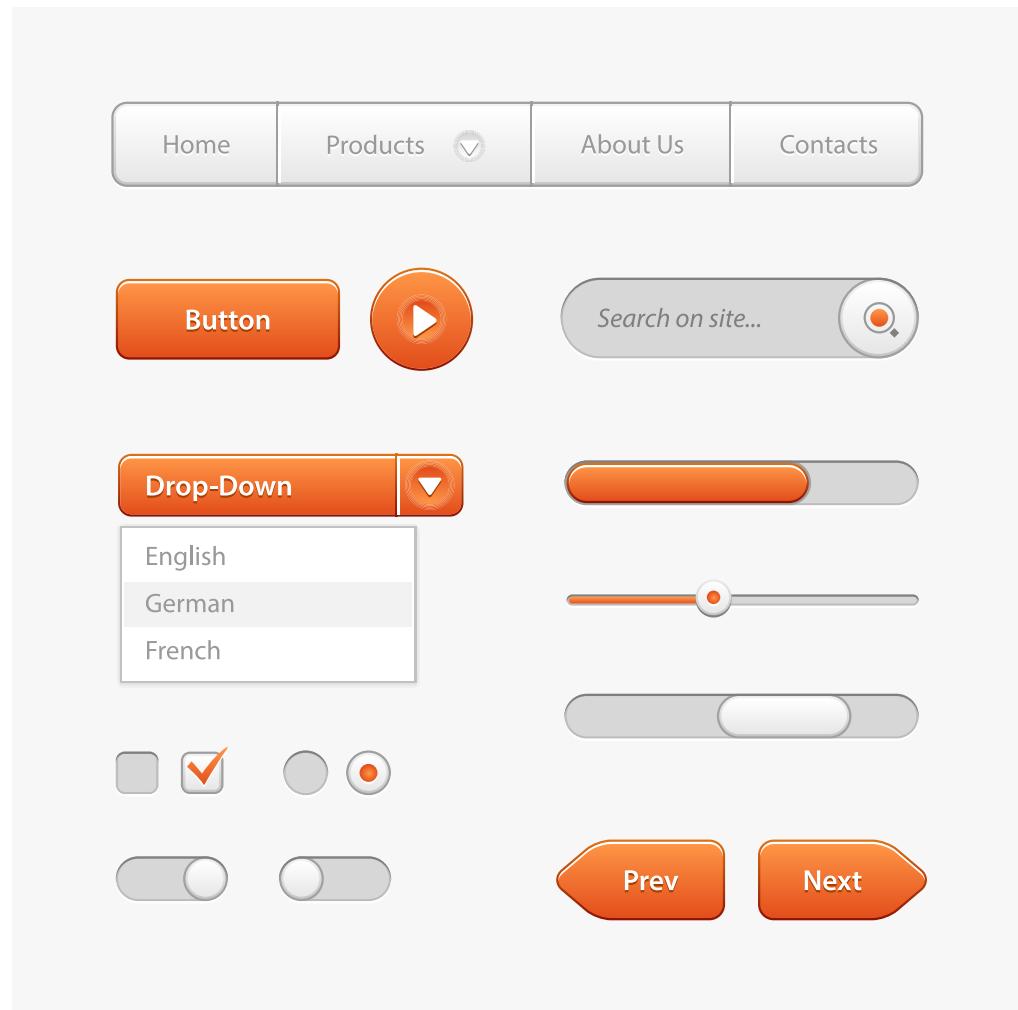
Problems occur when the *perceived affordances* do not match the designer's intended use

False affordance: apparent affordance doesn't have a corresponding real function (looks like a button but can't be pressed)



Perceived affordances in GUI

Need to create appropriate visual affordances through familiar idioms and metaphors



When simple things need explaining, the design has failed



Boxes over his head are moving around and are clickable to get info about their university programs. To view, "catch" the right one and click on it!

Constraints

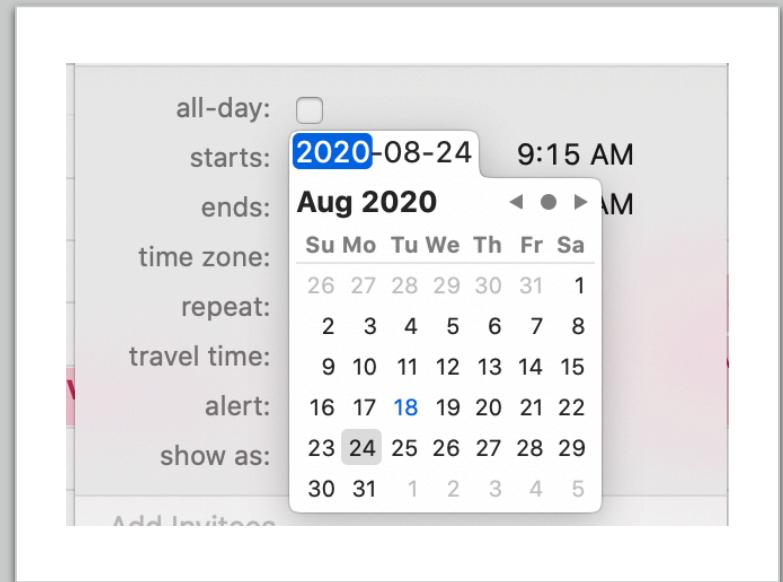
- The opposite of affordances. Limit the perceived potential actions based on the object's appearance
 - Physical constraints: physical limitations constrain possible actions (a large peg cannot fit into a small hole)
 - Cultural constraints: rely on social/cultural conventions to dictate what is acceptable (red = stop, stand facing front in an elevator)
 - Logical constraints: logic dictates what should probably happen (no leftover pieces when building Ikea furniture)



Constraints

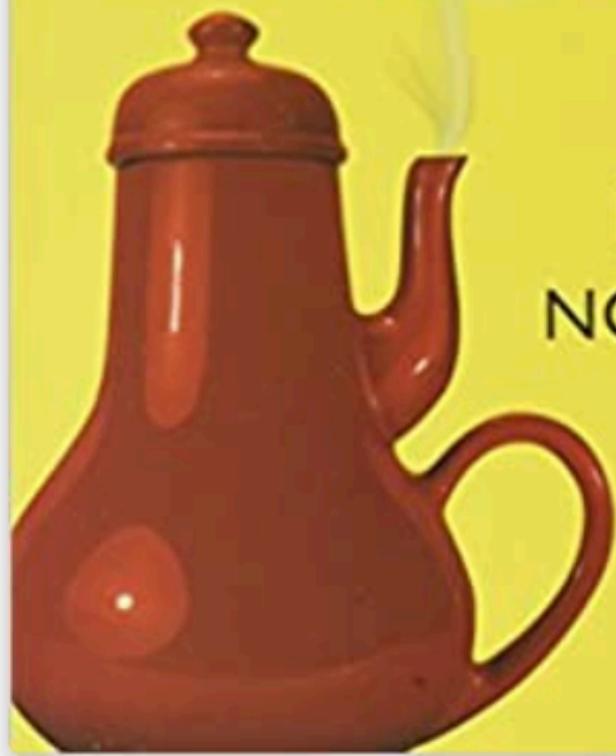
More constraints = less opportunity for error
... particularly for managing user input

START DATE (YY/MM/DD)*



REVISED & EXPANDED EDITION

The DESIGN of EVERYDAY THINGS



DON
NORMAN

Design/Psychology of
Everyday Things

by Don Norman

1990, latest edition 2013

TRY IT ...

Look at the doors around you.

- Do you ever pull when you should push?
- Do they need written instructions?

Photos: 1344367082 by wedninth;
333769355 by Pair Srinrat;
350890904 by Chulika; 564748882
by CapturePB; 1646137660 by Ken
Schulze; 459057079 by Mr.Alex;
shutterstock.com

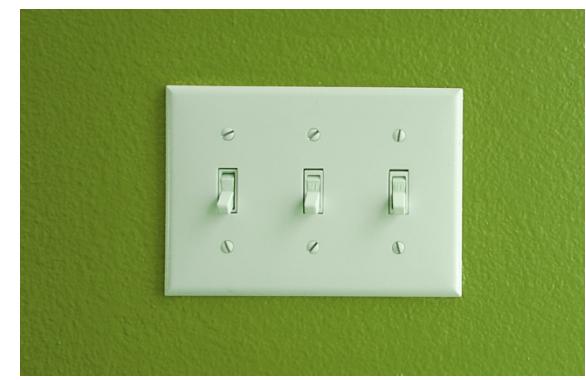




DESIGN CONCEPTS 2

Mapping

- The set of possible relations between objects
- Control-display compatibility
 - The natural relationship between controls and displays



Mapping

Quick – move the cursor from Screen 1 to Screen 2



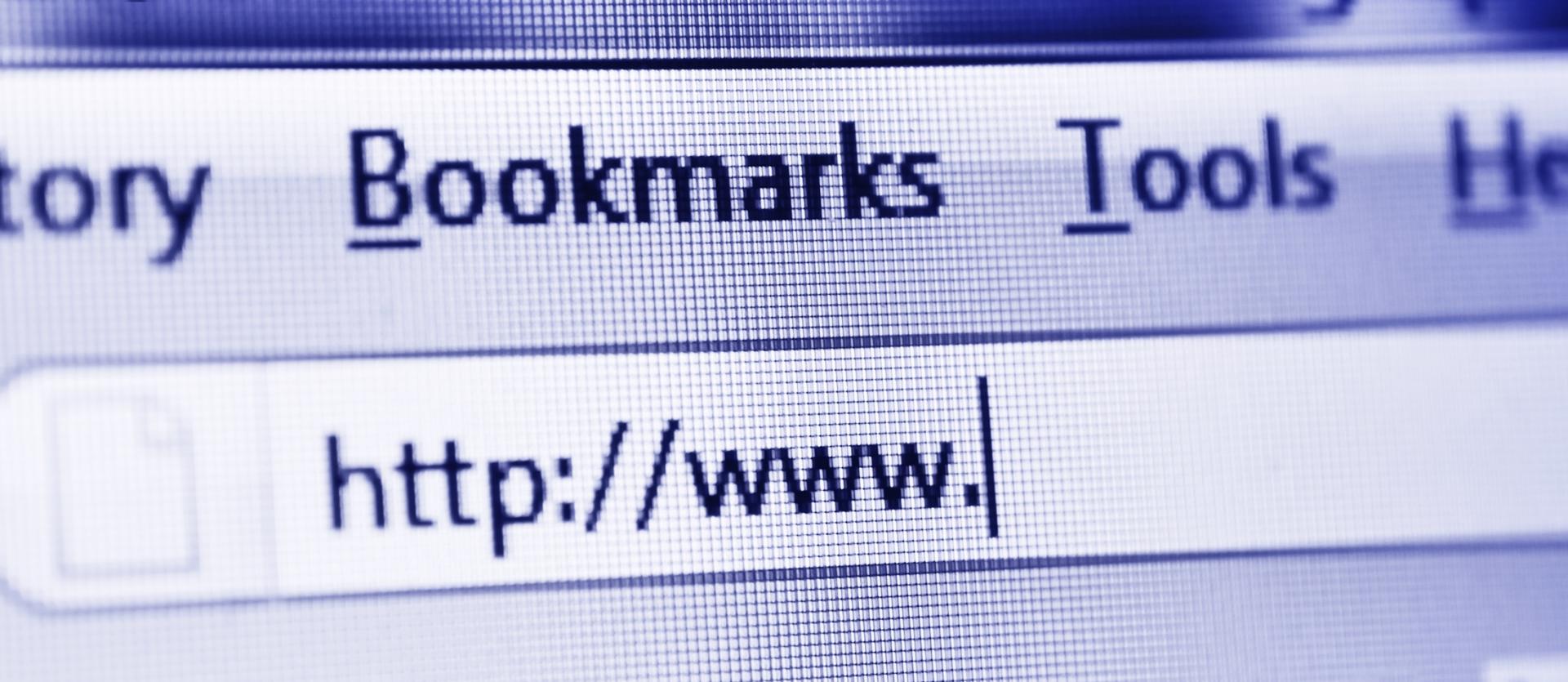
Screen 2



Screen 1

Scrolling on Mac vs Windows --- are you directly manipulating the page to move it up, or are you moving the scrollbar down??

Photos: Screenshots are my own



Causality

- The thing that happens right after an action is performed is assumed by users to have been caused by that action
 - Interpreted as “feedback”

A close-up photograph of a Black man with short curly hair and a beard, wearing round-rimmed glasses and a light blue patterned shirt. He is looking directly at a laptop screen with a surprised or shocked expression, his mouth slightly open and hands gesturing near the keyboard. The background is blurred, showing what appears to be a library or office setting.

False Causality

Incorrect effect: wrong interpretation linking action and event together

- E.g., Computer hangs after installing new program even though the two aren't related.
- Causes superstitious behaviour

Invisible effect: command with no apparent result

- E.g., Mouse clicks on an unresponsive system... often results in repeated commands which may eventually get interpreted, giving incorrect results

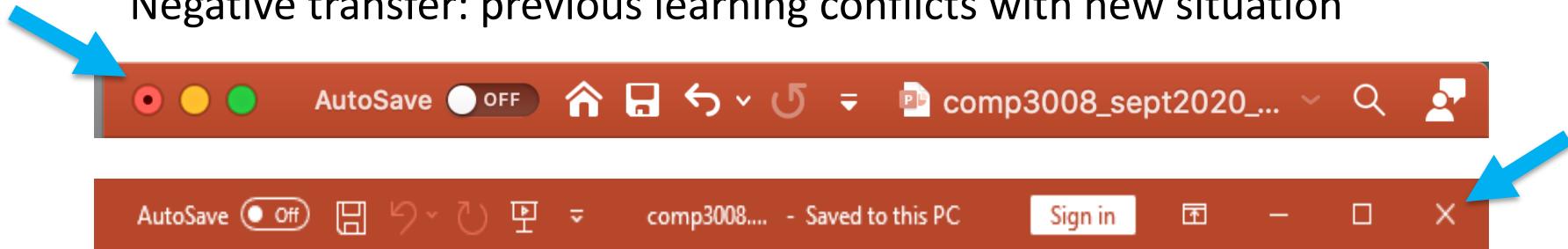
Transfer effects

Transfer learning/expectations of similar objects to current objects

Positive transfer: previous learning is applicable and correct in new situation



Negative transfer: previous learning conflicts with new situation





Cultural idioms

- Populations learn idioms (conventions) that mean certain things (red = danger, green = safe)
- Idioms vary in different cultures (locally specific)
 - Light switches: up = on (N. America), = off (Britain)
 - Faucets: clockwise = off (N. America), = on (Britain)
- Difficult to change
 - Qwerty keyboard designed to prevent jamming of keys
 - Dvorak keyboard ('30s) provably faster



Individual Differences: Physical



- Rarely possible to accommodate everyone perfectly
- Design should cater to 95% of audience (designing only for average is a mistake)
- Examples:
 - Smartphones: size, weight, positioning and size of icons
 - On-screen visibility: font size, line thickness, colour (colour-blind?)



Individual Differences: Expertise



Novices

- Walk up & use system
- Intro tutorials for more complex uses
- UI affords restricted set of tasks

Casual

- Standard idioms
- Recognition (visual affordances over recall)
- Reference guides
- UI affords basic task structure

Intermediate

- Advanced idioms
- Complex controls
- Reminders and tips
- UI affords advanced tasks

Expert

- Shortcuts for power use
- UI affords full tasks + customization





Key messages

- Good design accounts for human limitations and capabilities
- Use design concepts to analyze existing interfaces and to design new interfaces
- Concepts must be used appropriately
 - Not universal truths



Try it

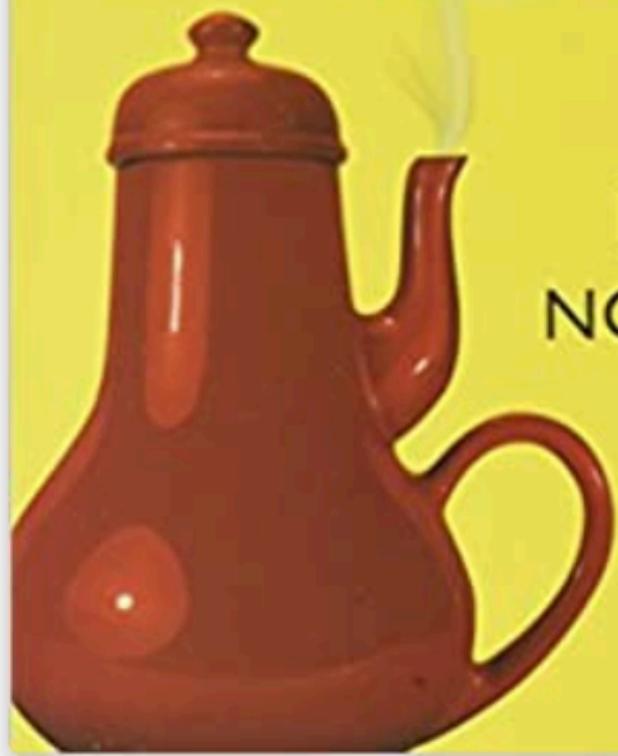
- Pick up a physical item
 - what are its affordances? Constraints? Mappings?
 - What kind of feedback does it give?
 - Does it use any idioms?
 - Are there any likely transfer effects?
 - Who is the target audience? Would it work for everyone?
- Now try it with an app



Photos: 1724650480 by 88studio; 1259408890 by Everything You Need; 700636498 by Sergey Peterman; shutterstock.com

REVISED & EXPANDED EDITION

The DESIGN of EVERYDAY THINGS



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Human Error



Humans are... well, human

A photograph of a woman with brown hair, wearing a blue and white checkered shirt. She is leaning over a light-colored wooden desk, looking down at a dark laptop screen with a concerned or stressed expression. Her right hand is resting on the laptop's trackpad, and her left arm is raised with her hand near her forehead. The background is slightly blurred.

- We are forgetful
- We don't see what's really there
- We're imprecise, ambiguous, clumsy
- We get confused when there's too much happening
- We get tired, bored, distracted



Types of errors

Mistakes: errors from a deliberate process. The user decided to do the wrong thing, often because of lack of knowledge or misunderstanding

- e.g., A user tries to connect their laptop to a printer using a wifi connection but it only has a USB connection.

Slips: errors in carrying out an intended process. The user knows what to do and may have done it successfully before, but still makes an error

- e.g., A user forgets to plug in their laptop to charge overnight.
- e.g., A user intends to video-call someone using Zoom but instead opens the Skype app.

A close-up photograph of a stack of books. A white, rectangular index card is inserted vertically between two books. The word "MYTHS" is printed in large, bold, black capital letters on the card.

MYTHS

Lesson 1: the myth of human error

- Most **failures** are due to **poor designs** that don't recognize human capabilities and fallibilities
- This **incorrectly** gets classified as “human error”

Preventing errors

- Include constraints within the interface to limit potential for error
- Offer suggestions
 - Auto-correct, auto-complete
 - Menus for options
- Use reasonable default values
- Be forgiving of formatting in user input
- Provide ability to undo
- Make it difficult to do risky things





Lesson 2: good design always accounts for human capabilities and limitations

How you can train yourself:

- Look for examples of “human error”
- Critique them for possible “design errors”
- Propose designs that limit/remove these errors

Try it

- Think of an app or something around the house where you or someone else often makes errors while using it
 - TV remote?
 - Which key to unlock the door?
 - Screen-sharing in video-calls?
 - Changing router settings?
- How could you improve its design?

