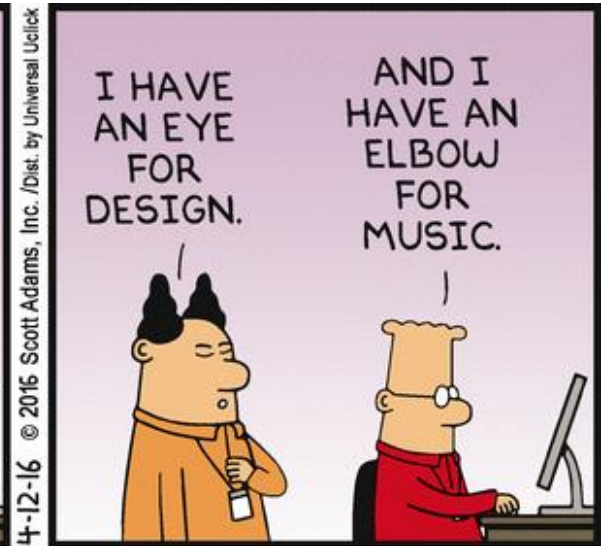


Affordances

SWEN-444



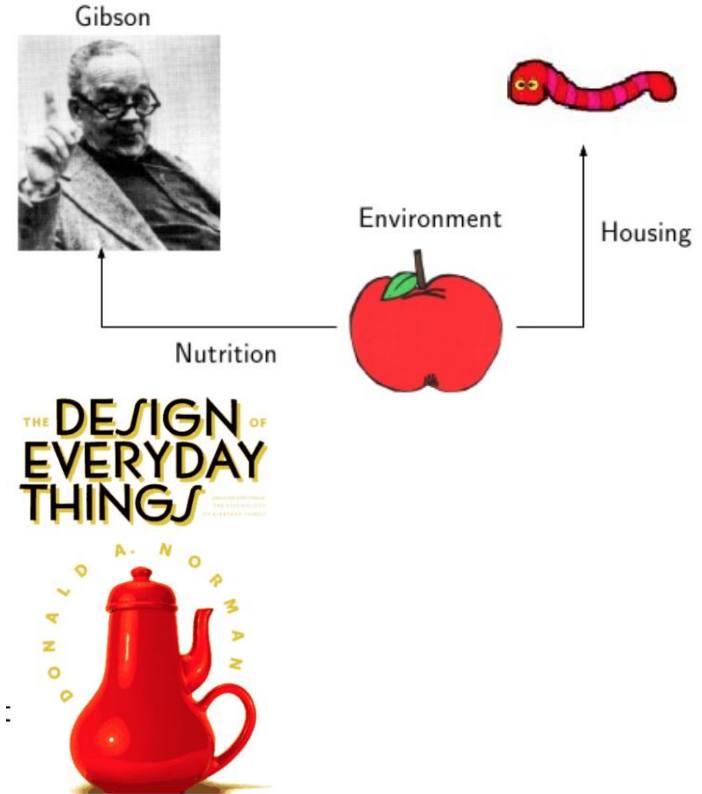
@ScottAdamsSays

Dilbert.com

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What is an Affordance?

- Psychologist James Gibson, “Theory of Affordances”, 1977 article
 - “The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill.
- Cognitive scientist Don Norman, studied under Gibson.
 - “... the term *affordance* refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used... Affordances provide strong cues to the operation of things.”



Affordances in UX Design

- UX design must consider affordances and their role in
 - Appearance
 - Content and meaning
 - Manipulation characteristics
 - Software functionality connection
 - Potential for emotional impact
- Affordances work together. Types of Affordances in Interaction Design:
 - Physical
 - Cognitive
 - Sensory
 - Functional
 - Emotional

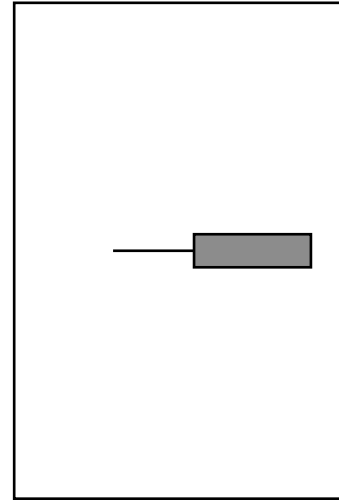
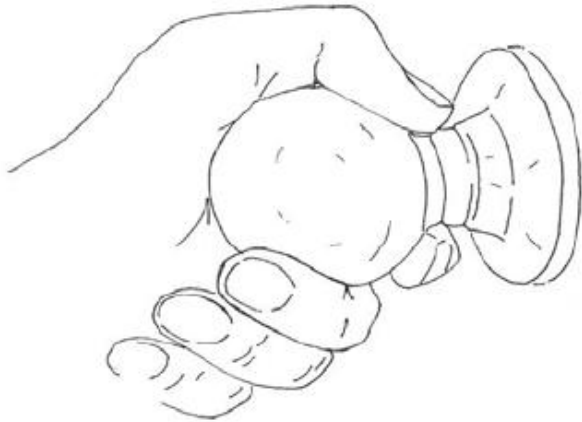
In HCI/UX, an affordance is something that helps, aids, or makes it possible for a user to do something

Physical Affordances

- A design feature that facilitates or enables users to do their physical actions
 - Clicking, touching, pointing, gesturing, and moving things
 - E.g., button size and location
 - In non-computer designs, it is about handles, levers, gripping, turning, moving things
- Design issues
 - Physical characteristics of interaction devices
 - Physical disabilities

Example - Physical Affordance

- Shape determines grasp strategy



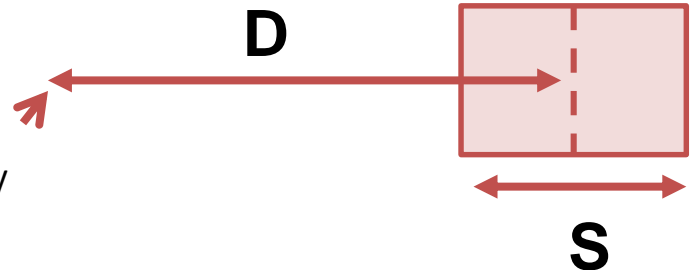
Example - Physical Affordance

- Buttons afford pushing.
- Sliders and scroll bars afford dragging.



Fitts' Law

- An empirical model explaining speed-accuracy tradeoff characteristics of human muscle movement, 1954.
- The time taken to hit a target (e.g. a button, menu or icon on screen) is a function of the size of the target and the distance that has to be moved to the target
 - A larger target is easier to hit than a small one
 - A close target is easier to hit than a distant one
- Time T to move your hand to a target of size S at distance D
 - $T = RT + MT$
 - RT is **reaction time** (get hand moving), and
 - MT is **movement time**
 - $MT = a + b \log(D/S + 1)$
 - Where $\log(D/S + 1)$ is the index of difficulty



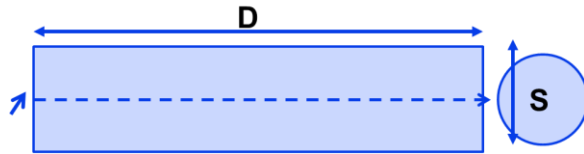
Fitts' Law Demo

[Fitts' Law Simulator](#)

- Basis: physiological feedback loop
 1. Perceptual processor perceives hand location
 2. Cognitive processor compares to target location to determine remaining distance
 3. Motor system corrects to move remaining distance (may overshoot)

Implications of Fitts' Law

- Large targets and small distances between targets are advantageous
- Screen elements should occupy as much of the available screen space as possible
- The largest Fitts-based pixel is the one under the cursor (why?)
- Screen elements should take advantage of the screen edge whenever possible
 - The edges of the screen have infinite depth and no targeting required
- Steering tasks – moving linearly in a “tunnel” of length D and size S is more difficult than pointing



Limitations of Fitts' Law

- Grouped targets that are too close lead to overshoot errors
- Differing sizes conflict with consistency
- Frequency-based widget arrangements may be less efficient to find things than logic-based arrangements
- Pop-up menus not visible until activated
- Speed-accuracy tradeoff - fast decision – more errors and vice versa



Cognitive Affordances

- A design feature that facilitates or enables users to do their cognitive actions
 - Thinking
 - Deciding
 - Learning
 - Understanding
 - Remembering
 - Knowing about things
- Precise words and symbols for communicating
 - E.g., clear precise error messages
 - E.g., Icon symbol clearly conveys its meaning



Examples: Good or Bad or ?



False cognitive affordances misinform, mislead



Do not detach

False cognitive affordances misinform, mislead

Subscriber

Name: **Tech. Re**

Account #: **Status:**

Contact

Telephone: **E-Mail:**

Address: **St**

Save **Cancel**

Sensory Affordances

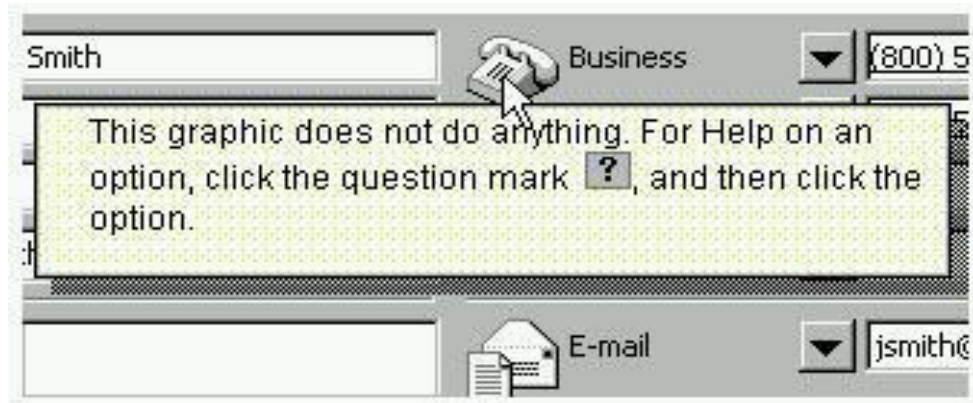
- A design feature that facilitates or enables users to sense things
 - Seeing, hearing, feeling (and tasting and smelling) something
- Used in supporting role to help user sense cognitive and physical affordances
 - Visibility and legibility of text
 - Audibility of sound
 - Devices associated with haptic/tactile sensations
- Example, legibility of button label text supported by
 - Adequate size font
 - Appropriate color contrast between text and background

Example - Good or Bad?



Functional Affordances

- Connect physical user actions to invoke system (back-end) functionality
- Link usability to usefulness
- Add purpose to physical affordance
 - For example, it's the reason a users clicks on a button



Emotional Affordances

- A design feature that facilitates or enables a quality emotional impact
- Features or design elements that make an emotional connection with users
- Derived from the cumulative impact of how well the other affordances succeed
- Example, the ambiance inside Ikea stores



User-created affordances as wake-up calls to designers



Example

- Affordances in the design of a “sort” button
 - First question – is the functionality useful?
 - Cognitive affordance
 - Clear and unambiguous label
 - Context to let the user know when it is appropriate to use it
 - Physical affordance – button size and location relative to other objects
 - Sensory affordance – in support of cognitive and physical affordances – text size and font, color, background contrast

Project Activity

- Start working on the detailed design of your project
- Discuss its UI elements' affordances
 - What physical, cognitive, sensory, and emotional affordances do you recognize?
 - How can they be improved?

UI Id	UI Type	Functional affordance	Cognitive affordance	Physical affordance	Sensory affordance	Emotional affordance
B1	Button					