Chapter 4 - Basic Rules for UI Design

- Affordances
- Constraints
- Mappings
- Consistency and predictability
- Feedback
- Error tolerance and error avoidance
- Eight Golden Rules
- Interface animation
- Physics analogy
- Metaphors as a basis for UI design
Affordance

“A situation $X$ affords action $Y$ to an animal $Z$ on occasion $O$ if certain relevant compatibilities between $X$ and $Z$ obtain”
(Shaw et al. 1982)
Affordance

“A situation X affords action Y to an animal Z on occasion O if certain relevant compatibilities between X and Z obtain” (Shaw et al. 1982)

I should have used the term "perceived affordance," for in design, we care much more about what the user perceives than what is actually true.

Donald Norman, www.jnd.org

Don Norman 1994
https://www.youtube.com/watch?v=NK1Zb_5VxuM&t=6s
Find the Affordance!
Don Norman: a brief quote on affordances

https://www.youtube.com/watch?v=E_rwwEo5YhY
(Group) task: What would be a good way to convey the fact that a motion sensor is used?
What is Wrong?
Affordances in GUIs
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Physical Constraints
Logical Constraints
Cultural Constraints

http://mietenstopp.blogspot.de/2010/07/stop_zwangsraeumungen_ar_2010px.png

Recycling

http://3.bp.blogspot.com/-a2Z3O2pyTQ0/UGf7yVw7j/hAAAAAAAASdE/438cFiYkXpI/AAAAAAAAAGA/EeT0FKmTHWk/s1600/recycling.jpg

http://www.nuernberg-hg.de/china/Bilder/shanghai9.jpg
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Which Valve Controls Which Flame?
Origins of the Button Arrangement?
Mappings & Gulf of Execution

- ISO 2575
  - 4.21 Fog Light
  - 4.22 Rear Fog Light
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Types of Consistency

• Syntactic consistency
• Semantic consistency
• Lexical/terminological consistency
• Internal consistency
• External consistency
Current Example: Google Material Design

https://www.youtube.com/watch?v=Q8TXgCzxEnw
A Surprising Inconsistency…
Historic Excursion: Phone Keypads


http://www.vcalc.net/Keyboard.htm
Historic Excursion: Calculator Keypads

David Sundstrand 1914

IBM Keypunch Machine for card-based computer input (approx. 1970)

David Sundstrand 1914

http://www.vcalc.net/Keyboard.htm
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Please Wait!

Please Wait!

Öffnen ...

„Große–Datei.key“
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Who Is Responsible for Error Correction?

Mobile phone number: 0171-01710171

⚠ Example: 0612345678

The telephone number is invalid or incomplete. Please re-enter your telephone number.

www.klm.com (2014!)
Avoidable Errors

WÄHLEN SIE DIE ANZAHL AUS

Parkplatz Ticket

https://secure.legoland.de
Bitte wählen Sie aus dem Menü eine bestimmte Anzahl aus

OK

+ Weitere Informationen

Art
Parkplatz Ticket

Online-Preis ab
€ 6,00

Anzahl

0

IN DEN WARENKORB
Expressive Error Messages…

- describe the problem as specifically as possible
- contain a suggestion to solve the problem
- are polite

Whoops, looks like something went wrong.

```
ContextErrorException: Warning: date_default_timezone_get(): It is not safe to rely on the system's timezone settings. You are *required* to use the date.timezone setting or the date_default_timezone_set() function. In case you used any of those methods and you are still getting this warning, you most likely misspelled the timezone identifier. We selected the timezone 'UTC' for now, but please set date.timezone to select your timezone. in /Library/WebServer/Documents/elearning/app/cache/dev/classes.php line 5048
```

Error message from the “symfony” Web framework
(Not Only) Making Errors Undone: Undo

http://static3.businessinsider.com/image/529e7e42ecad04c15ddfbba2/heres-how-to-undo-a-sent-email-in-gmail.jpg
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Classical List of Rules (Mostly Covered…)

Ben Shneiderman: Designing the User Interface
See: www.cs.umd.edu/users/ben/goldenrules.html

1. Strive for consistency.
2. Cater to universal usability.
3. Offer informative feedback.
4. Design dialogs to yield closure.
5. Prevent errors.
6. Permit easy reversal of actions.
7. Support internal locus of control.
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Interface Animations in a Game

https://www.youtube.com/watch?v=HTQbbrqNre0
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UI Elements with Physical Analogy

![Image of UI elements with physical analogy](image-url)
Physics Analogy in the Extreme: Bumptop
Chapter 7 - Basic Rules for UI Design

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Metaphor ???

http://www.logoschat.de/images/P17230.jpg


Teletype Terminal as Metaphor
Desktop as Metaphor

XEROX 8010 Star Information System
Star provides integrated text and graphics. A variety of type sizes and styles may be used.
Specialised Metaphors I
Specialised Metaphors II
Microsoft: At home with Bob

What do you want to search for?
- Pictures, music, or video
- Documents (Word, Excel, etc.)
- All file types
- Computers or people
- Information in Help and Support Center

You may also want to...
- Search the Internet
Example: “Pile” Metaphor  (Mander et al., CHI’92, Apple)

Figure 1. Piles on the desktop. In general, piles can contain various media, such as folders and individual documents. The pile in (a) was created by the user, and is consequently disheveled in appearance. In addition, the system can create piles for the user, based on rules explicitly stated by the user or developed through user-system collaboration. These piles have a neat appearance, as shown in (b), to indicate that there is a script, or set of rules, behind them.

Figure 2. Adding a document to a pile. If a document is positioned over an existing pile, the pile highlights to show that it can accept the new document. When the mouse button is released the document ‘drops’ onto the pile.
Figure 4. **Browsing by spreading out a pile.** Gesturing sideways with the mouse pointer, or with a finger in the case of a touch screen, causes the pile contents to spread out. Individual items can now be directly manipulated.

Figure 5. **Browsing while maintaining the pile's structure.** Gesturing vertically with the mouse pointer as shown in (a), or with a finger in the case of a touch screen, generates a 'viewing cone' (b) that contains a miniature version of the first page of the item under the pointer. This viewing cone will follow the vertical position of the pointer; the miniature changes as the pointer moves over each item. The user can move through the pages of an item in the viewing cone by using the left and right cursor keys on the keyboard. When an item is visible in the viewing cone, it can be selected by clicking the mouse button. The item then appears next to the pile on the desktop, as shown in (c).
15 Years Later: “Flip 3D”, “Cover Flow”, “Stacks”