The Psychology of the UI

John Tuohy

The Psychology of User Design

- Today we discuss
  - Why Stephen cannot set the clock in his hotel room
  - Why I cannot operate the shower controls in my room
  - Why I poured orange juice all over my hand this morning
  - Why we are all having trouble with the overhead projectors
  - Why we keep making the same mistakes over and over
  - And, I'll show the best *designed* phone ever!

- This is all about user design
- Which is all about the "Psychology of the UI"
- Or, more aptly named…

The Psychology of You and I

- Let's review our own technical specifications and how we process information
- Short term memory
  - Can maintain five to seven unrelated items for a very short time
  - Can be extended with repetition
- Long term memory
  - It's all in there
  - Hard to access
  - Very bad with arbitrary information
  - Access aided by repetition
  - Retrieval mechanism is really complex
  - Seeks a model to organize and retrieve
- Attention
  - Is limited in items it can process
  - Is limited in length of time

The Psychology of Decision Making

- We use cues, visual and other, from the world
  - *Knowledge in the World*
- We use information we've learned and internalized
  - *Knowledge in the head*
- We work best with a mental model
  - We always attempt to makes sense of things
  - We are very bad processing unrelated information
  - We are aided by consistency
  - Mental model can be incorrect (superstitious behavior)
- We are error prone
  - Memory errors
  - Errors caused by lack of attention or motivation
  - Errors caused by applying the wrong mental model
- We are always actively processing information to make decisions
- Much of this occurs at the sub-conscious level

Visibility and Feedback

- Making choices visible makes objects easier to use
  - Visibility provides knowledge in the world
- Visibility is not required to use an object
  - We can use knowledge in the head
- Providing feedback is essential
  - The faster the feedback the better
  - Feedback can be provided at multiple levels
- The Visibility / Action / Feedback loop

  Repeat

  Evaluate your options based on the state of an object

  Perform an action

  Loop

Knowledge - in the World and in the Head

There is a tradeoff designing for these two types of knowledge

	Knowledge in the World	**Knowledge in the Head**
Retrievability	Retrievable when visible	Requires memory search or reminding
Learning required	Learning not required (if done right)	Learning is required
Efficiency	Tends to be less efficient	Can be very efficient
Ease of First Use	High	Low
Aesthetics	Can be unaesthetic and inelegant	Nothing needs to be visible giving designer more aesthetic flexibility

Affordances and Constraints

- The world will often provide the needed information to know what to do with an object.
  - This is called “affordances”
- Often an object’s limitations will help you determine how it can be used
  - This is called “constraints”
- This information is often processed sub-consciously
- It relies on information from the world and information from the head
- These should not require any actual signs or labels

Affordances and Constraints

- Examples:
  - Chairs are for sitting
  - Buttons are made for pushing
  - Dials are made for turning
  - Checkboxes are made for checking
  - These boots are made for walking
  - Door knobs are made for turning
  - Doors are made for opening and closing
    - But do you push or pull?

Affordances and Constraints

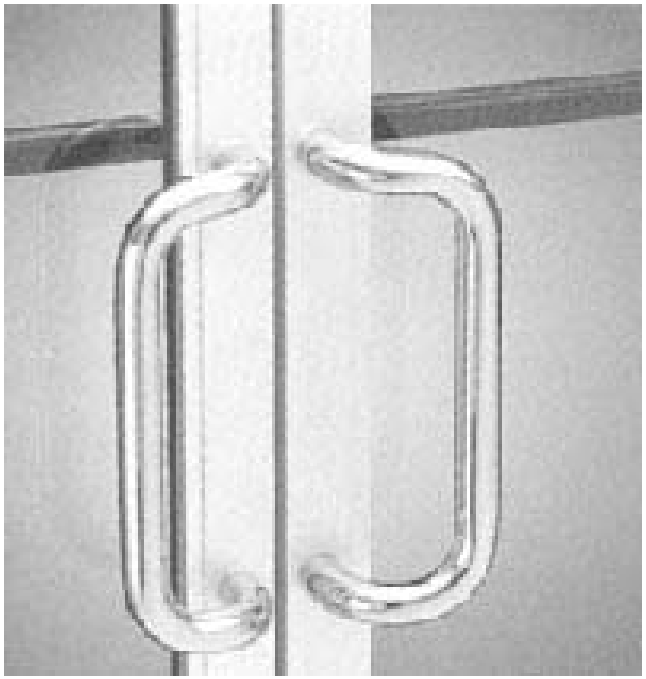
- Nice Door, Ugly Label. Is there a better way?

Affordances and Constraints

- Flat plates are for pushing
- Vertical handles are for pulling

Affordances and Constraints

- Horizontal handles are for pushing
- Vertical handles are for pulling



Affordances and Constraints

- Labels on a door indicate a failed design.

Affordances and Constraints

- Need I say more?

Affordances and Constraints

- Even without the label, this kid is kind of dumb. Why?

Mapping

- Mapping refers to using the state of one object (the map) to determine and operate the state of another object
- Good mapping makes an object easier to use
- The use of this is often sub-conscious

- Examples:
  - The buttons in an elevator
  - The steering wheel of a car
  - The computer mouse or track pad
  - Household appliances…

Mapping

- Bad mapping makes a feature hard to use

Mapping

- Good mapping makes a feature easy to use

Mapping

- Good mapping

Mapping

- Needs Improvement

Mapping

- Failed mapping

Mapping and Affordance

Good mapping, bad affordance

Great mapping, great affordance

Provide a Mental Model

- A complex task is easier to perform if we have a mental model of what we are doing
- This is why it is often more important to explain "why" instead of "how"
  - A complex "why" is often better understood and remembered than a simple "how"
- It's the way we are – we try to make sense of things

Provide a Mental Model

- If a model is provided a complex control becomes simple. It makes sense.

Provide a Mental Model

- A good model is more easily remembered and more easily extended to similar objects

Provide a Mental Model

- Make your own models. Even a possibly wrong model will be remembered

Designing for Error

- It is our lot in life to make errors. Design for it!
- Understand the different types of errors
  - Errors of memory
  - Errors of attention
  - Errors of misunderstanding
- When someone makes an error there is usually a good reason for it

Designing for Error

- How to design for errors
  - Understand the cause of errors and design to minimize those causes
    - Use constraints or forcing functions to reduce errors
  - Make it possible to reverse an error
  - Make an error harder to perform
  - Make it easier to discover an error
  - Make errors easy to correct
  - Don’t punish the person for making an error

Designing for Error

- Examples of using constraints to reduce errors
  - Floppy disks that can only be inserted one direction
  - Car keys than can be inserted in either direction
  - ATM machines that require you to remove the card before you take your money
  - Room key cards limit your choice to four – could be better

Designing for Error

- Touch controls located in different locations on a hot stove top. What could possibly go wrong?

Why designs go astray

- Aesthetics are placed first
- Designed for the technology available and not the use goal
- Designers are not typical users
- Designers, technical and visual, are not UI designers
- The clients are not the user of the product
  - Or if they are, they are in a different state of mind when they purchase the product!
- We worship on the alter of complexity
- Lack of design is replaced with options
- Creeping featurism
- The tyranny of revision compatibility

The Danger of Options

- Options may reflect a lack of planning by the designer
- Options are used “because you can”
  - The “can it do this” challenge
- Options sometimes asks the user to make choices they should not have to make
- Creating duplicate ways to do the same thing can be particularly dangerous
- If you must provide options
  - Make sure there is a need for it
  - Make sure that all options are viable
  - Make sure you are providing goal based options instead of exposing technical capabilities
- Complexity increases as a square of the number of options
- Carefully created options can make a good product great
- Poorly created options can make a good product not so good

How far did this design go astray

- Remarkably this washer and dryer require the same number of options, buttons, knobs and controls

Guidelines for design

- Design to make simple tasks simple and complex tasks usable
  - Take advantage of knowledge in the world and knowledge in the head
  - Simplify the task
  - Make things visible, provide feedback
  - Get the mappings right
  - Use affordances and constraints
  - Design for errors
  - Be consistent
  - When all else fails, standardize

The Power of Standardization

- Quick, what time is it!

A Final Reality Check

- Designing is really difficult
- There are trade-offs at almost every level of design
  - Aesthetics versus ease of use
  - Ease of use versus flexibility
  - Usability versus salability
  - Design superiority versus cost
- We are all sinners
  - There are no perfect designs, just better ones
  - Real life always has an annoying tendency to get in the way of perfection
- But if you apply these principals you can make your designs and your products better
  - and that's a start
- One more thing
  - First make sure your product / feature actually works
  - It doesn't matter if the UI design is good if it doesn't work

Further Reading

- Most of the content for this talk came from the book 1988 “The Psychology of Everyday Things” by Donald A. Norman
- The book is available from Amazon under the title “The Design of Everyday Things”
- Isaac Asimov had this to say about the book:

> “We are all victimized by the natural perversity of inanimate objects. Here is a book at last that strikes back both at the objects and at the designers, manufacturers, and assorted human beings who originate and maintain this perversity...”

- It’s a good read!

And in conclusion

- And now, an example of one of the best designed phones ever
- This takes advantage of almost all of the points we've talked about
- ...

The Best Phone Ever Designed