Visual Thinking, Design and Sketching

COMP3511/9511 Human Computer Interaction

Adapted from slides by Dr Daniel Woo

References

- Shneiderman (2002), Leonardo's Laptop, MIT Press
- Buzan (1993), The Mind Mapping Book, BBC Books
- Preece (2002), Interaction Design, John Wiley
- Lord and Sibley (1998) Cracking Animation, Thames & Hudson

Design Diaries

- Store your design ideas
- Allow you to reflect
- Can be easily annotated - paper is low tech
- Used to record your observations, analysis and design
- Remember to date all pages
- Will be reviewed and assessed by tutors

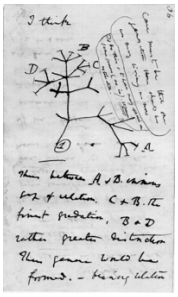
Design Diaries

- Documentation is important
- Not only does the final product require documentation, you need to document (and justify) why certain design decisions were made
- Important for understanding the design rationale - how did you arrive at the solution?
- Legal implications

Da Vinci

Buzan 1993, The Mind Map Book

Charles Darwin



Buzan 1993,The Mind Map Book

Creative Thinking

- Coming up with new ideas
- Thinking about alternatives
- Forming new associations
- Breaking down cognitive barriers and mental blocks
- Individually
- Group Activity

Dominant Hemispheres

Right
Rhythm
Spatial awareness
Gestalt (whole picture)
Imagination
Daydreaming
Colour
Dimension

Buzan 1993,The Mind Map Book

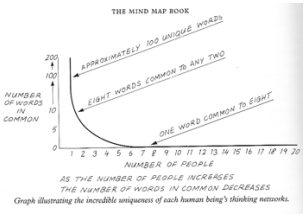
Left
Words
Logic
Numbers
Sequence
Linearity
Analysis
Lists

Brainstorming

- Ideas without prejudice
- Quick
- No wrong answers
- Cannot criticize
- Encourage all different ideas
- List of words/phrases

Brainstorming Exercises

Common Words

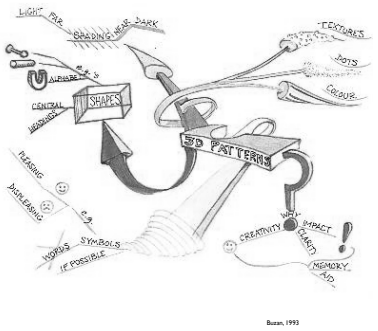


Buzan 1993

Mind Maps

- Tony Buzan (started around 1970)
- Similar to brainstorming
- Visually motivated, not just words
- Drawings can be used in place of words
- Show associations
- Can be colourful

Buzan, 1993



Buzan, 1993

Why draw? Why use colour?

- Drawing, spatial awareness, colour, imagination, etc are right hemisphere dominant activities
- Words, logic, numbers, sequence, linearity, analysis, lists are left hemisphere dominant activities
- Exercise your right hemisphere!

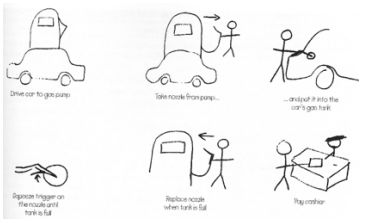
Architect Analogy

- Think about the role an architect has when creating a building
- How is that similar to the role of an interaction designer?

Story Boards

- Commonly used in film production but have a role in user interface design
- Low-fidelity - paper based
- Don't worry about the neatness - it is a sketch!
- Series of sketches that represent a sequence of steps that user and system go through to achieve a task

Visit to the Petrol Station

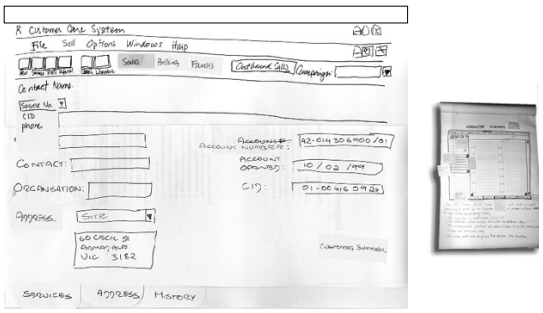


Preece, 2002

Sketching User Interfaces

- How are you going to lay out your interface?
- Where should I arrange buttons, text edit fields, navigation etc.?
- You will create paper mock-ups as part of the design process
- Use your diagrams to discuss the issues with others
- You will use diagrams when you evaluate your interface with users

low-tech approach



How to use your design diary

- Record your design thoughts
- Explore the problem space
  - Individually brainstorm ideas for the design components of your assignments
  - Brainstorm as group
  - Try mind mapping to visual solutions / alternatives

How to use your design diary

- Sketch out paper mock ups of user interfaces
- Develop storyboards
- Use it to communicate your ideas with colleagues

How to use your design diary

- One book
- Everything in one place
- You can review to understand how you arrived at your current solution - design rationale

Summary

- Encourage you to explore new approaches to thinking, designing, problem solving
- Explore more creative solutions

Understanding the problem space

- What do you want to create?
- What are your assumptions?
- Will it achieve what you hope it will?

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Careful not to make assumptions?

- Don't take something for granted when it needs further investigation
  - e.g. people will want to watch TV while driving

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Be careful what you claim

- stating something to be true when it is still open to question
  - e.g. a multimodal style of interaction for controlling GPS — one that involves speaking while driving — is safe

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Conceptual Models

Source: Tufte, *The Visual Display of Quantitative Information* (1983)

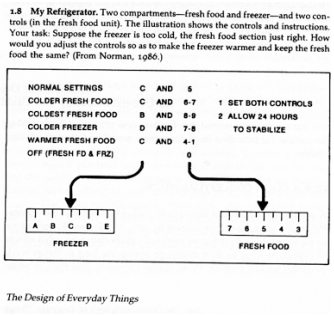
Conceptual Models

- A conceptual model is an abstract, possibly simplified idea that a person forms in their own mind about an object or situation
- It is a high level description of how a system is organised and operates
- The conceptual model is based on prior experience and knowledge, and it helps the person understand how something might work and how they might interact with it

Conceptual Models

- It is internal (we don't see it)
- May or may not reflect the actual way an object works
- We develop conceptual models of the world and objects around us, it is part of the cognitive process and the broader topic of mental models

Poor conceptual model

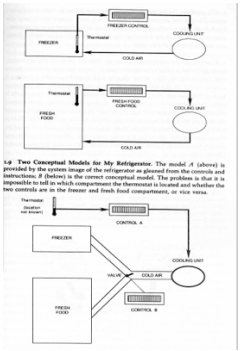


1.8 My Refrigerator. Two compartments—fresh food and freezer—and two controls (in the fresh food unit). The illustration shows the controls and instructions. Your task: Suppose the freezer is too cold, the fresh food section just right. How would you adjust the controls so as to make the freezer warmer and keep the fresh food the same? (From Norman, 1986.)

NORMAL SETTINGS	C	AND	5	
COLDER FRESH FOOD	C	AND	6-7	1 SET BOTH CONTROLS
COLDEST FRESH FOOD	B	AND	8-9	2 ALLOW 24 HOURS
COLDER FREEZER	D	AND	7-8	TO STABILIZE
WARMER FRESH FOOD	C	AND	4-1	
OFF (FRESH FD & FRZ)			0	

The Design of Everyday Things

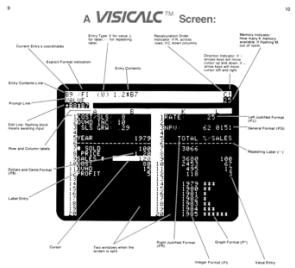
Poor conceptual model



From Norman, 1988, p14

A classic conceptual model: the spreadsheet

- Analogous to ledger sheet
- Interactive and computational
- Easy to understand
- Greatly extending what accountants and others could do



See ID section 2.3.2

Why was it so good?

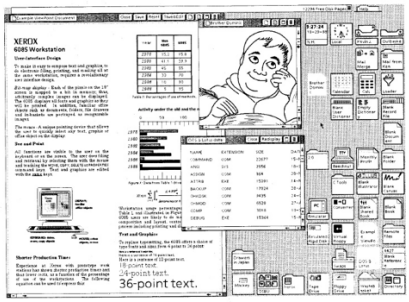
- It was simple, clear, and obvious to the users how to use the application and what it could do
- "it is just a tool to allow others to work out their ideas and reduce the tedium of repeating the same calculations."
- capitalized on user's familiarity with ledger sheets
- Got the computer to perform a range of different calculations and recalculations in response to user input

Another really good conceptual model

- 8010 Star office system targeted at workers not interested in computing *per se*
- Spent several person-years at beginning working out the conceptual model
- Simplified the electronic world, making it seem more familiar, less alien, and easier to learn

Johnson et al (1989)

The Star Interface



Interface metaphors

- Exploit user's familiar knowledge, helping them to understand 'the unfamiliar'
- Conjures up the essence of the unfamiliar activity, enabling users to leverage of this to understand more aspects of the unfamiliar functionality

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Benefits of interface metaphors

- Makes learning new systems easier
- Helps users understand the underlying conceptual model
- Can be very innovative and enable the realm of computers and their applications to be made more accessible to a greater diversity of users

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Problems with interface metaphors

- Break conventional and cultural rules
  - e.g. recycle bin placed on desktop
- Can constrain designers in the way they conceptualize a problem space
- Forces users to only understand the system in terms of the metaphor
- Designers can inadvertently use bad existing designs and transfer the bad parts over
- Can limit designers' imagination in coming up with new conceptual models

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Conceptual models

- three components
  - designer's mental model
  - the system created by the designer
  - the user's mental model (from interacting/seeing the system)

- A poor design can arise from the difference between the conceptual model that the designer intended and the conceptual model formed in the user's mind

Conceptual Models

User's Model

Designer's Model

System Image

Norman, 1998, 1986

Designer's model

- A designer wishes to create a system
- They will develop the conceptual ideas that will be incorporated into the system
- The designer has a conceptual model of the system they intend to build
- The conceptual model is inside their head, we haven't built anything yet

System Image

- The system image is physical system or object
- The system image consists of the physical structure, documentation, instructions, labels
- This system has been built, it is no longer a concept inside the designer's head

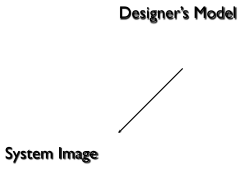
User's Model

- The user typically does not meet the designer
- The only communication between the designer and user is through the system
- What conceptual model does the user form in their mind when interacting with the system?

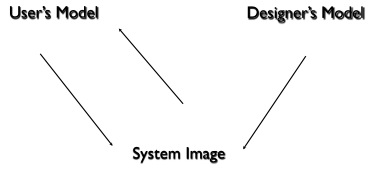
Conceptual Models

- The designer takes a series of abstract ideas and using appropriate process constructs a system that realises those ideas, forming a physical object in the real world
- The designer aims to translate the conceptual model into a system as best they can

Conceptual Models



Conceptual Models



Conceptual Models

- Does the system convey the conceptual model of the designer to the user?
- A good design will articulate the designer's conceptual model in the system image that enables the user to form the correct conceptual model in their own mind

Overview

- Design Diaries
- Creative thinking
  - Brainstorming, mind maps, story boards
- Conceptualising Design
  - Understanding the problem space
  - Conceptual Models
  - Interface Metaphors