Multimedia Design for the Web

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Tutorial Outline

9.00 - 10.30	Background psychology for multimedia design
coffee	
11.00 - 12.30	Design process:
	Information Architecture
	Case study - requirements & content
	Media selection and integration
lunch	
1.30 - 3.30	Attraction & Attention
	Case study - storyboards
tea	
4.00- 5.30	Storyboard walkthroughs
	Multimedia dialogues

Multimedia & the Web

- Maturing market after the initial hype

- Competitive advantage in usability and effective design

- Delivering clear messages

- Attractiveness and persuasion: e-commerce implications

- Aesthetic design

Motivation

- Information overloading: cluttered multimedia confuse users

- Annoying, distracting animations frustrate users

- Time-to-market mantra: poor design fails faster

- Fatigue and stress induced by poor design may have legal implications

Multimedia & the Web

Design problems

- Choosing the right media to convey the message

- Making sure the message and theme are clear and coherent

- Directing the user's attention - thread of viewing/reading

- Optimise the User Experience- but what *is* engaging and attractive interaction ?

Multimedia & the Web
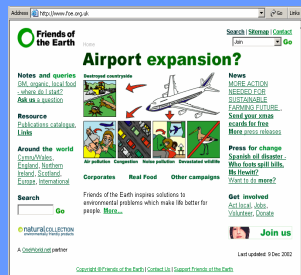
Applying Psychology to Design

- Perception: how people receive information. Vision and hearing are prime modalities; but touch, smell, taste in the future

- Cognition: how people comprehend information and reason with it

- Attention: how we manage multiple demands on limited cognitive resources

- High-level model of human information processing as "tool for thought"

- Design principles and guidelines based on cognitive models and experimental evidence

Multimedia & the Web

Vision

- Central vision for detail, peripheral vision for awareness (movement but not much else)

- Visual perception is an abstracted view of reality; seeing is by interpretation - "what we see is what we know"; visual illusions

- Eye scans over images in rapid movements or *saccades;* look at complex detail, odd/separate features, object boundaries, colour

- Visual acuity varies widely (age, colour blind); also depends on ambient light

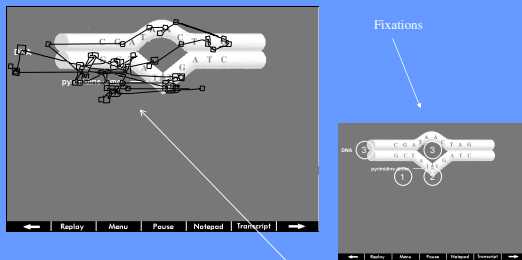- Detail best in high contrast (foreground/background)

Where will you look in this image ?

What information will you extract ?

Eye tracking

Fixations

Rapid scans - fixations followed by jumps - saccades mainly unconscious control

... your motivation, knowledge, animation, layout structure, density, colour, expectations

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Hearing

- Abstracted view of reality, separate processing for speech: what we hear is what we expect to hear

- Transient modality, subject to interference: background noise, directional or broadcast modality

- Human speech recognition tolerates mispronunciations, non-grammatical sentences, dialects

- Sound/speech discrimination varies with age, depends on frequency (pitch), amplitude (loudness) and contrast (foreground/background: Db ratio)

Cognitive User Model

Bottlenecks
1. Capacity overflow: information overload
2. Integration: common message?
3. Contention: conflicting channels
4. Comprehension
5. Multi-tasking input/output

Working Memory

- Limited capacity: 7 +/- chunks, but chunk size depends on abstraction

- Chunking helped by making patterns and associations explicit, e.g. telephone numbers 020 7477 8000 better than 02074778000

- Demands on working memory: input from senses, vision and hearing + facts used in reasoning + facts retrieved from long term memory + output (speech, actions)

- We manage by chunking and rapid time-slicing between input/process/output but easy to overwhelm WM with too much MM input

Long-Term Memory

- Remembering: two-phase process - recognition then recall.

- Memorisation helped by reasoning and problem solving - depth of encoding

- Memorisation helped by chunking (abstraction), clear structure, access paths and context

- Multimedia can help by providing richer access paths and memorisation context (visual, verbal, audio cues), also richer schema

- Consistent content and navigation structure help memorisation and recall

Selective Attention

- Input competition from the world: vision, hearing, etc., with reasoning, memorisation and action

- Background and foreground processes; automatically monitor the world while thinking, talking, etc.

- Attention directed to change in the world: sound, moving image are very salient

- Too many inputs at once will create conflicts, continual stimuli over a long period can cause stress
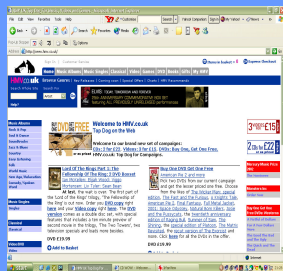
Reading and Viewing Multimedia

- Dynamic media - film, video, speech - we have no choice but to process in sequence; onset of a dynamic medium grabs attention

- Text: also processed mainly in sequence, reading order of syntax, but may skip/scan

- Still image: viewing sequence more complex. What we comprehend in an image depends on:
  - what we look at (motivation, task)
  - what we know
  - how salient objects are in the design

- Need to control user's reading/viewing sequence – attention to theme, key items

Some Implications

- What we extract/remember from multimedia depends on:
  attention, motivation, prior knowledge, designed effects

- Information processing has to time-slice between receiving information / processing it / remembering it

- Attention gets distracted by different channels, especially dynamic media (visual dominance)

- We only remember fraction of content from dynamic media (speech, video): *gist* memory

- Comprehension in text/speech is linear: it follows input. This is not so in image: depends on motivation, user's goal, knowledge of the domain and media design

Implications for Learning

- Schema integration: learning will only be effective if the user has sufficient existing knowledge to make sense of the new material

- Self-paced learning: people need time to reflect and assimilate new information; replay facilities for video, speech, sound.

- Active learning: interaction is the key; learning by doing and problem solving are more effective than passive comprehension

- Engagement: learners have to be motivated; multimedia can be more arousing

Arousal, Affect and Attention

Arousal - a peaceful image

More arousing images
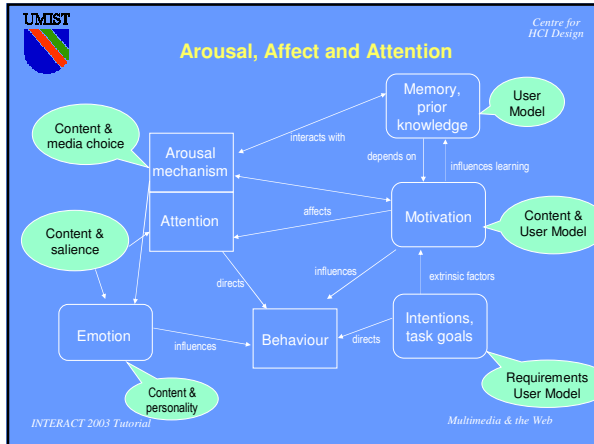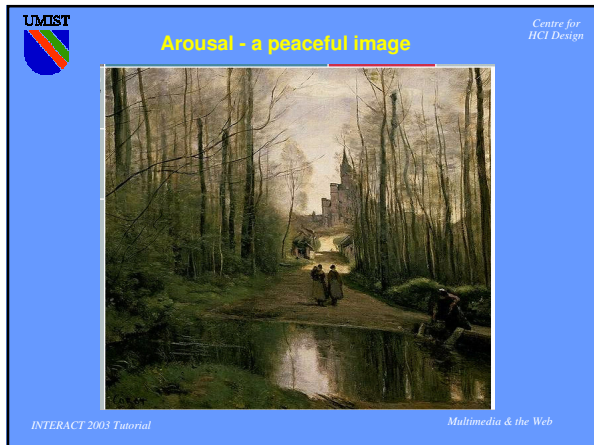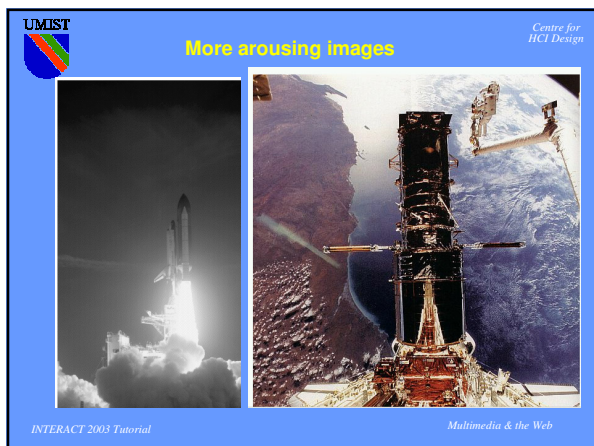
Some not very motivating content

Designing for attention & motivation

Persuasion

Content selection → Personality dialogue

Motivation

Stimulating material

Visual style & form

Attractiveness

Aesthetic qualities

Media choice

Attention

Perceptual design → Salience effects

Utility, Usability

Functionality
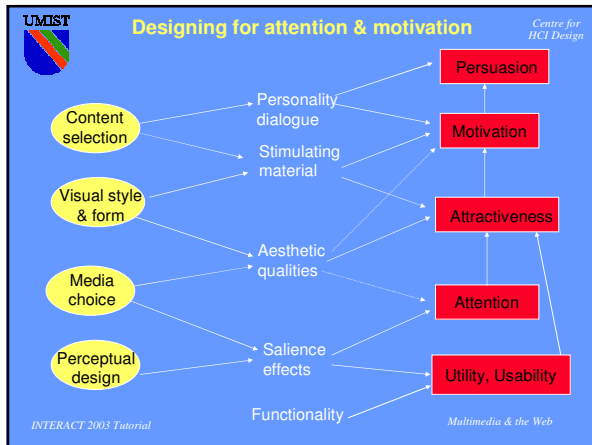
Usability Principles

- Thematic congruence: different parts of the message should be easy to integrate & comprehend

- Manageable information loading: users have time to assimilate the necessary information; sequential or concurrent presentation

- Viewpoints: present different aspects of the object/information by combination of media

- Reinforce the message: use multimedia to present similar information in different ways to help learning

- Select media appropriate for the user's characteristics and context

- Avoid attention conflicts; make sure the user can assimilate information without being distracted

Slide 1:

Session 2
Design Process

- Requirements and task/information analysis

- User analysis

- Media selection and integration

- Outline scripting

Slide 2:

Design process

Slide 3:
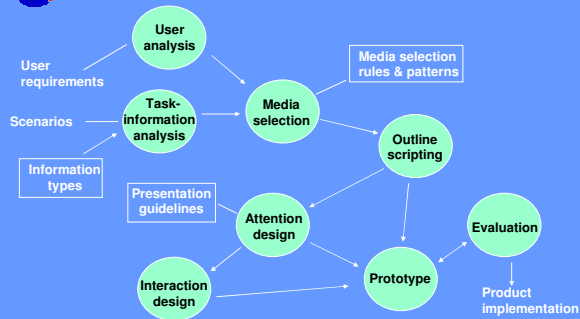
Users and Context

- Establish user's domain knowledge: necessary to judge complexity of content

- Create characters or 'personas' - useful for scenario analysis

- Assess pattern of use: occasional, frequent, continuous use → affects user's learning of content, need to adapt content for different users

- Investigate usage context: noisy environment, location (public kiosk, in-house system), ambient light, target hardware, etc.

Information Analysis

- Walkthrough task model: what information does the user need (input, decision support) at each step?

- Group information content: provide access paths for information-rich applications (kiosks, information retrieval)

- Note key information items: vital parts of the message

- Assign logical information types to each information group

- Annotate on to task model / content structure diagram

Scenarios

- Useful for analysing requirements, information needs, and interaction

- "Day in the life of" examples, or new visions of use.

Medical advice application

Persona: Mr Hardcastle, aged 55, smokes, visits the pub most evenings, likes football but doesn't take any exercise, overweight.

Scenario: Mr Hardcastle has had unusual chest pains; he consults the web doctor system. The system asks him a series of questions about his illness, personal details and life style. Mr Hardcastle feels this is intrusive, but the system persuades him the consultation is important, so he persists. The system diagnoses a potential problem and automatically calls the emergency doctor

Specifying Content

- Decide on storyline: thematic development, key messages

- Organise information in groups, structure in storyline

- Decide on key information requirements: vital parts of the message

- Think about the type of information:
  - descriptions of things, objects, agents, structures
  - actions, events, procedures, activities
  - time sequences, durations
  - values, quantitative information
  - causation
  - realistic or abstract

Communication Goals

1. What is the key 'carry home' message, e.g. brand image

2. What goals should the site achieve? e.g.
   - information provision, explanation
   - education
   - entertainment
   - persuasion

3. Plan theme or storyline for the site

4. Consider Interaction Metaphor and Style

Information Specification Example

Storyline: Explain Heart Disease

1. How the heart works
   - Heart and its components
   - Cardio-vascular circulation: components
   - Operation of heart: systolic/diastolic cycle

2. Heart disease
   - Caused by cardiac artery becoming blocked
   - Heart muscle starved of oxygen: dies - pain - heart attack
   - Artery blocked by fat deposits
   - Fat deposits linked to cholesterol and other causes

3. Causes of heart disease
   - Poor diet: too many saturated fats
   - Obesity: strains heart, also linked to diet
   - Smoking
   - Life style: no exercise, stress
   - Genetic predisposition

Information Architecture

Storyline: Explain Heart Disease

1. How the heart works
   - Heart and its components...............objects, components
   - Cardio-vascular circulation............objects, components, connections
   - Operation of heart ....events, actions in sequence

2. Heart disease
   - Caused by cardiac artery becoming blocked.........events
   - Heart muscle starved of oxygen ....event sequence
   - Artery blocked by fat deposits........................description
   - Fat deposits linked to cholesterol & other causes...description, cause

3. Causes of heart disease
   - Poor diet: too many saturated fats...................description, cause
   - Obesity: strains heart, also linked to diet............description, agents (people)
   - Smoking………………………………………………..   "   "
   - Life style: no exercise, stress……………………   "   "
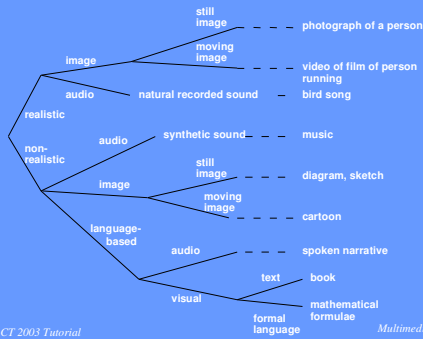   - Genetic predisposition…………………………..   "   "

Multimedia Definitions

- Modality of communication: multisensory interaction - visual (eyes), audial (hearing), haptic (touch), olfactory (smell), gustatory (taste)

- Physical medium for storing information: CD-ROM, hard drive, DVD; Formats for storing information: JPEG, MPEG-4, etc.

- Medium as a representation: image, movies, sound, text

- Medium as content of a representation: diagrams, text, graphs can all appear on a scanned image or in a video

- Static or dynamic (time-varying) media: continuous streams or single item

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Media Types

still image - - - - photograph of a person
moving image - - - - video of film of person running
image
audio natural recorded sound - bird song
realistic
audio synthetic sound - - - music
non-realistic
still image - - - diagram, sketch
image
moving image - - - - cartoon
language-based
audio - - - spoken narrative
text book
visual mathematical formulae
formal language

Media Selection & Combination

- Analyse the material with logical (amodal) information types, e.g. explaining actions, reporting values, describing objects, time, events, etc.

- Develop Information Architecture: thematic sequence and content structure

- Mapping rules assign media to information types with a walkthrough method (Faraday & Sutcliffe, 1994-1998; Sutcliffe, 1999; ISO 14915 part 3: Media Selection and Combination)

- Media selection interpreted in light of design principles and communication goals

Choosing Media

• Convey detail: static media → text, diagrams, still image

• Supplementary information, attract attention: dynamic media → video, speech

• Physical and spatial information → photographs, diagrams, realistic images

• Values and quantitative information → tables, chart, and graphs

• Concepts, relationships and abstract models → diagrams, text captions

• Complex and continuous action → slide show of steps + video

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Media Selection example

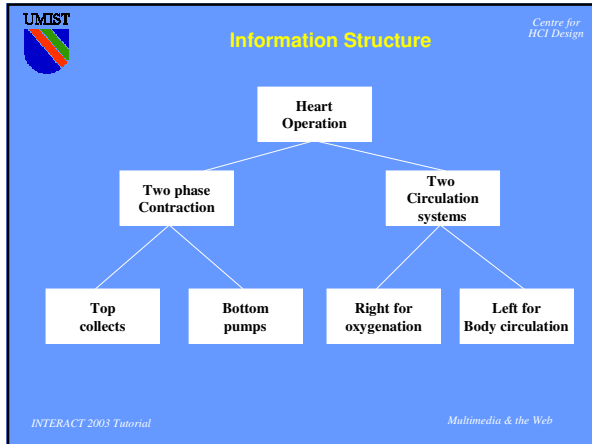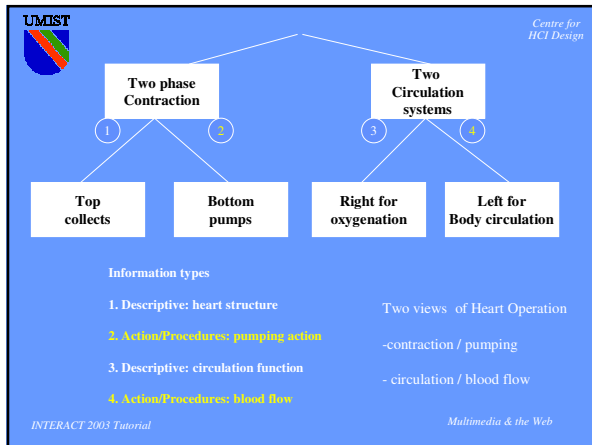Causal explanation: how something works…… text combined with designed image
Physical components and objects
Descriptive and action information types

Media Presentation Pattern
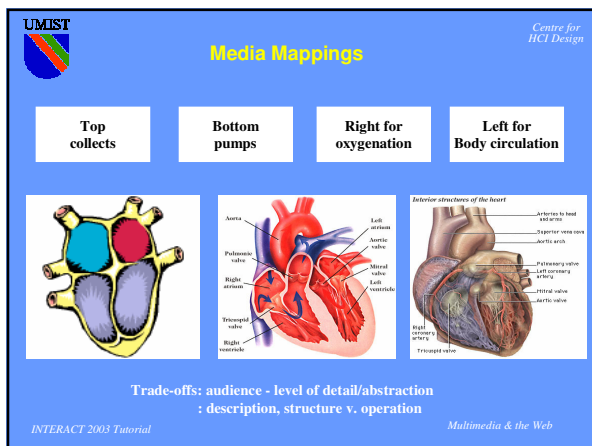## Causal explanation

goals
event/state
domain

sequence

events, causal
sequence, background
knowledge

text   animated
                            sequence   summary, key events

still image

moving image

speech

Information Structure

Heart Operation

Two phase Contraction

Two Circulation systems

Top collects

Bottom pumps

Right for oxygenation

Left for Body circulation

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Two phase Contraction

Two Circulation systems

1   2   3   4

Top collects

Bottom pumps

Right for oxygenation

Left for Body circulation

Information types

1. Descriptive: heart structure

2. Action/Procedures: pumping action

3. Descriptive: circulation function

4. Action/Procedures: blood flow

Two views of Heart Operation

-contraction / pumping

- circulation / blood flow

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Media Mappings

Top collects

Bottom pumps

Right for oxygenation

Left for Body circulation

**Trade-offs: audience - level of detail/abstraction
: description, structure v. operation**

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Attraction and Motivation

- Attract attention by dynamic media: video & speech – but don't overdo it; turn off animation banners after 10 sec.

- Match media to user's motivation: key message

- Choice of media for mood setting:
  - ….. natural v. designed image
  - ….. sound and music
  - ….. speech and choice of voice

- Use of human image and speech to project personality

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Persuasion and Motivation

- Plan theme: Introduce topic, Make proposal, Provide choice, Praise user's choice.

- Praise persuades, even from a computer

- Politeness attracts: greetings, gaze to signal attention, need to respect personal space

- Stimulating speakers hold our attention, use of voice tone, movement

- Characters who are dominant but friendly leaders attract more; more trustworthy, persuasive

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Attractiveness and Personality
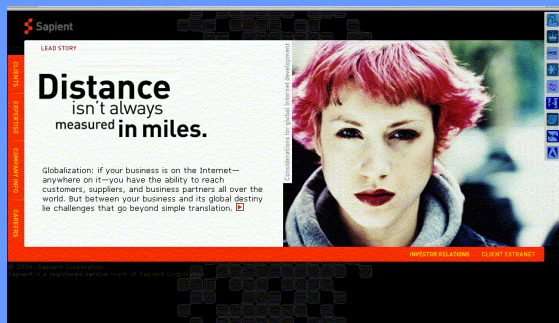
Aesthetics

- Beauty is in the the eye of the beholder but there are design laws ... of contrasting form, symmetry, and simplicity

- Media choice influences our judgement: via arousal, dynamic image media more exciting, use of music, natural images and sounds (sea, wind, water), choice of voice and prosody

- Use of background image, pastel shades

- Breaking design rules, element of surprise, the unusual, novelty

- Keeping design sensitive to users' interests and their task

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Aesthetics and Style
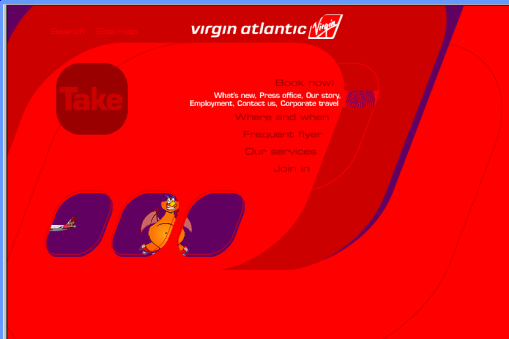
Storyboards

Screen dumps / sketches explained in sequence

Storyboard script

1. Presentation starts with image of the ship, a diagram and text description

2. Speech explains the diagram

3. User then has a choice of a quiz on an interactive simulation, or continuing with the scripted presentation

Scenario

You are interested in a course in navigation, you load the CD-ROM and select "Introduction to navigation at sea"; the first step is ...

Scripting Issues

- Sequential or concurrent? - depends on task and media type

- Concurrent for static media when task requires comparison and cross referencing

- Dynamic media sequential presentation, can embed in background of other media but little attention will be given to background

- Synchronisation: vital for speech + animated action (lip sync), less so for sound + action

- Time/event series analysis: need to consider segmenting dynamic media

Summary of Session 2

- Task/content model with information types

- Media selected for information content

- First-cut presentation script

- Requirements for presentation themes and key messages