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Pay attention !

or, How to make sure the user gets the message in multimedia

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The problem

- Multimedia applications often create information overload
- Many MM applications are poorly designed and ineffective for learning (Rogers & Scaife, 1998)
- Cognition of multisensory information processing is poorly understood and rarely applied to design
- Without a sound theory-based approach to design, based on cognitive psychology, Multimedia (and Web) design will be inconsistent 'fashion' and 'craft'

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A solution?

- Cognitive psychology has relevant research: multimedia educational psychology
- So apply psychology as guidelines, techniques and methods
- But track record of HCI guidelines is poor (see ISO 9241)
- Need to educate designers with enough psychology so they can reason about the issues

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Lecture Outline

1. Basic psychology of attention and motivation
2. Attention and content: interpreting attractiveness, arousal, persuasion and aesthetic design
3. Design to direct the user's attention: getting the message across in multimedia
4. Conclusions: psychology and design practice

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Why is attention important?

- We can't process everything we see and hear
- The information we extract from multimedia depends on:
  - our motivation
  - our goal and task
  - what we already know
  - the content of the message
  - the salience of the media
- Design has a key role to play in making sure the user gets the message: by content selection and design for attention
- The pundits say so: attention economy (Davenport, 2001).

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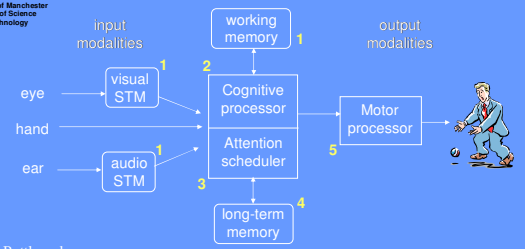
Cognitive User Model



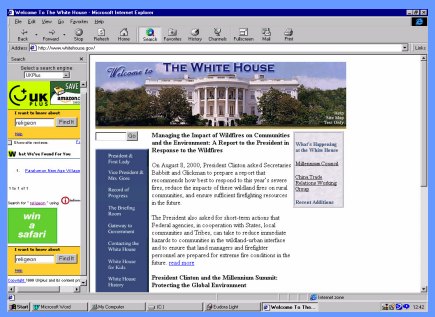
Bottlenecks
1. Capacity overflow: information overload
2. Integration: common message?
3. Contention: conflicting channels
4. Comprehension
5. Multi-tasking input/output

Implications and design principles

- Cognitive processes have to time-slice between receiving information, processing it and remembering it
- Attention gets distracted by input on different channels, especially dynamic media (visual dominance)
- We only remember a fraction of content from dynamic media (speech, video): *gist* memory
- Comprehension in text/speech is linear: follows input; but not so in image:depends on motivation, user's goal, knowledge of the domain and media design
- Thematic congruence: different parts of the message should be easy to integrate and comprehend
- Manageable information loading: users have time to assimilate the necessary information; sequential or concurrent presentation
- Avoid attention conflicts: make sure the user can assimilate information without being distracted.

Motivation and attention

Some not very motivating content



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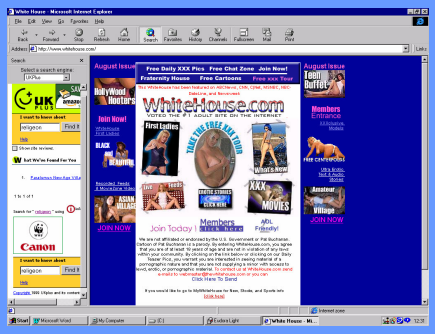
Some highly motivating content ...



... at least for men

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More subtle uses of motivation

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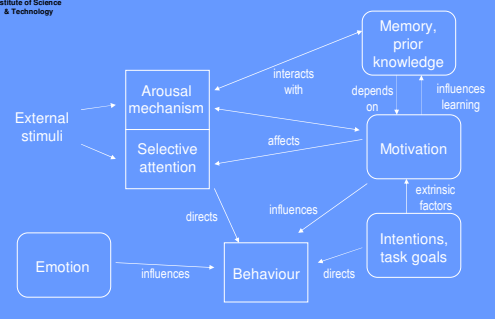
Arousal, Effect and Attention



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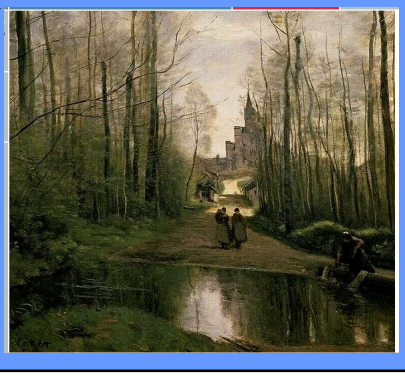
Arousal: a peaceful image



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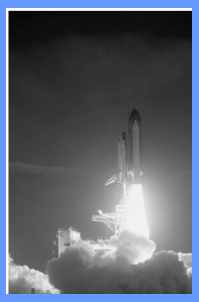
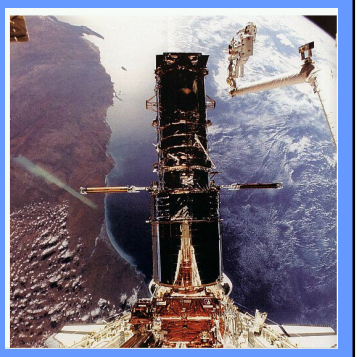
More arousing images





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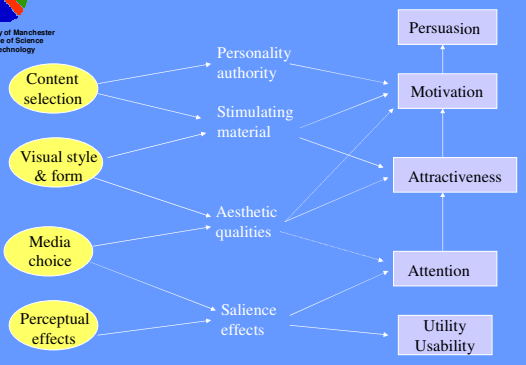
Designing for attention & motivation



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Designing for attention: content issues

- selecting content to match users' interests and motivation
- selecting content appropriate the user's task, information or learning needs
- use of content to make the message attractive
- dialogue and use of computer agent's personality to attract and persuade.

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Personality, image and dialogue

Animated characters: facial expression, gaze ...

Video: choice of character and dialogue, matching image to the audience

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Personality and politeness

- strangely, we seem to treat computers rather like people, if speech, text, or image cues identity
- stimulating speakers hold our attention: use of voice tone, movement
- characters who are dominant but friendly leaders attract more, are more trustworthy, persuasive
- praise persuades; even from a computer, criticism needs to be constructive
- politeness attracts: greetings, gaze to signal attention, need to respect personal space

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

Aesthetics and style

More traditional style

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Design for attention

- Design issues
  - selecting attractive content for the user population;
  - selecting appropriate content for the users' task;
  - planning the thematic thread through a presentation;
  - designing the reading/viewing sequence to make the thread clear;
  - emphasising key elements of the message.
- Design solutions
  - scripting for contact points;
  - user of attention directing techniques.

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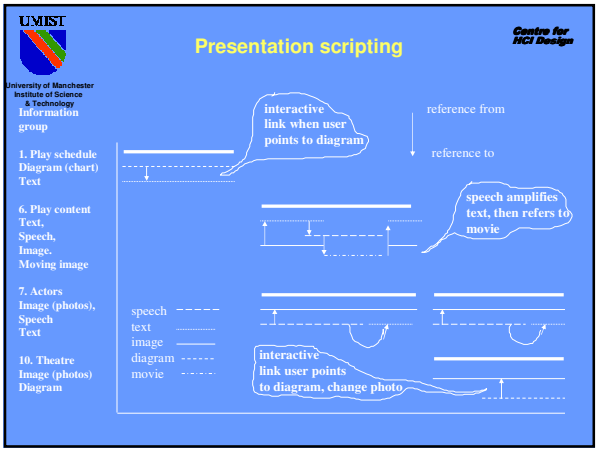
Presentation scripting



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Contact points

- Direct contact points
  - attention directed in source and destination medium;
  - use only when message is critical, task-driven applications
- Indirect contact points
  - attention cued only in source medium (like web links);
  - use when user needs more choice, browsing multimedia
- Implementation techniques
  - image: movement, highlighting, outline, shape, size, symmetry, oddity
  - moving image: freeze frame, movement, zoom, cuts
  - text: blink, bold, underline, font, size, format
  - speech/sound: voice change, prosody, rate, loudness

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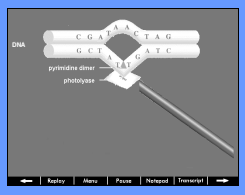
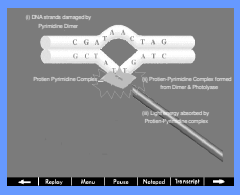
Use of contact points
(Faraday & Sutcliffe, 1997)



Speech: "… which form a stable protein-pyrimidine dimer complex and then use light energy absorbed from the visible range".



Speech: "Next, protein pyrimidine complex absorbs light energy from visible range".

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Conclusions

Designing effective and usable multimedia is a complex problem that requires knowledge of cognitive psychology and methods for:

- **selecting information and content**. Some guidance in *Task-based information analysis* (Sutcliffe, 1997)
- **selecting content for motivation and attraction**. Some ideas in Reeves & Nass (1998) *The media equation*
- **choice of media**. Some guidance in ISO 14915 part 3, *Ergonomic guidelines for designing multimedia user interfaces*
- **directing attention for optimal perception**. (See Sutcliffe, 1999; Faraday & Sutcliffe, 1994-1999)
- **aesthetic design**. Visual designers not very good on guidelines but see Mullet & Sano (1995) *Designing Interactive Systems* conference
- **agents and personality**. Only primitive understanding of how we interact with virtual persons.

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Open questions

- No predictive models of motivational influences and arousal
- Need to understand aesthetics, attractiveness in context of cognitive models of judgement and decision making
- Attractiveness, trust and personality poorly understood; many effects may change with experience
- Few predictive models of multimodal attention: but see interaction models/architectures of Nigay & Coutaz (1999)
- So plenty of research to do ...

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And finally ...

... some answers for designers are forthcoming:

Sutcliffe, A.G. *Multimedia and virtual reality: designing multisensory user interfaces*. Lawrence Erlbaum Associates, 2002.

Thank you for your attention.