Users

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Ergonomics vs. Cognetics

- Ergonomics: The study of how people (physically) work
- Cognetics: The study of how people (mentally) work

- "We must master an ergonomics of the mind if we want to design interfaces that are likely to work well."

  -- Jef Raskin, *The Humane Interface*, p. 10

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Users: Two States of Mind

- Users have two states of mind:
  - Cognitive unconscious: processes of which you are not aware at the time they occur. The resources they make available to us are HUGE.
  - Cognitive conscious: the processes focused on the relatively few things that you are aware of at the time they occur. The resources they makes available to us are tiny (but powerful).
- Examples
- Movement
  - From unconscious to conscious
  - From conscious to unconscious

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Users: Two States of Mind

Property	**Conscious**	**Unconscious**
Engaged by	Novelty, emergencies, danger	Repetition, expected events, safety
Used in	New circumstances	Routine situations
Can handle	Decisions	Non-branching tasks
Accepts	Logical propositions	Logic or inconsistencies
Operates	Sequentially	Simultaneously
Controls	Volitition	Habits
Capacity	Tiny	Huge
Persists for	Tenths of seconds	Decades

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Users: Two States of Mind

- "Understanding that we possess these two distinct sets of limited mental abilities and understanding how they work in relationship to human-machine interfaces is as essential to designing interfaces as is knowing the size and the strength of the human hand when we are designing a keyboard."

  -- Jeff Raskin, *The Humane Interface*, p. 11

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Locus of Attention

- Locus of attention: feature, object, or idea about which you are intently and actively thinking
  - Related to "focus" but...
  - Cannot completely control where our locus will be
  - We can have at most one locus of attention
    - Maybe none
    - If we try more than one...
    - Combining with automatic activities...

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Seeing Doesn't Mean We See

- Our single locus of attention filters out many of our perceptions
  - Looking for things...
  - Tuning out sounds and smells...
  - Therefore: some aspects of a UI may be tuned out as well
- Perceptions persist briefly and then decay quickly
  - Many perceptions do not automatically become memories
  - Therefore:

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Context Switches

- There is a significant cost to switching from one locus of attention to another
  - Context switch: about 10 seconds
    - If the same context switch is performed repeatedly...
  - Therefore:
- Exploit single locus/context switches
  - Magician
  - Canon Cat

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Absorption

- You can be more or less absorbed in your locus of attention
  - More absorbed:
    - more difficult to transition to another locus
    - requires greater stimulus to effect such a change
    - Examples:
- Absorption is essential to productivity
  - Therefore:

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Absorption

- Absorption can have negative consequences
  - Aviation story
  - Proportional to stress: "As stress increases, people concentrate more and more on but a few features of their environment, paying less and less attention to others... You become less likely to see hints, help messages, or other user aids as you become increasingly agitated about the problem." (Raskin, p. 27)
  - Therefore:

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Automatic Actions

- Performing a task repeatedly makes it easier
  - Eventually, don't need to give it conscious thought
  - Conscious thought may impede the action
- Automatic tasks enable simultaneous actions
  - If we are doing more than one activity at a time, all but at most one of them are automatic
  - Sort of...
- Such automatic actions are essential to higher life forms

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Automatic Actions

- However:
- **Humans cannot avoid developing automatic responses**
  - "Practise makes perfect" vs. "Practise makes permanent"
- Sequences of actions become clumped into a single action
  - Once started, you cannot interrupt a sequence of less than 1-2 sec.
  - Longer sequences can only be interrupted with conscious thought
- Unlearning automatic actions

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Automatic Actions

- Therefore:
- Persistent use of any interface will develop automatic actions that users are unable to avoid and are difficult to unlearn
  - Deliberately take advantage of this
    - Consistency is vital
    - Multiple ways to do the same thing is not necessarily good
    - Be aware of dangerous automatic actions
- Example: File deletion confirmations
  - Any confirmation step that elicits a fixed response soons becomes useless
  - Alternatives

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Summary

- Introduction to "cognetics" (complement to ergonomics)
  - cognitive conscious vs. cognitive unconscious
  - locus of attention
  - automatic actions
- Will want to recall this material at various times when we discuss design

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