Principles to Support Usability

according to Alan Dix et al.

Learning Goals

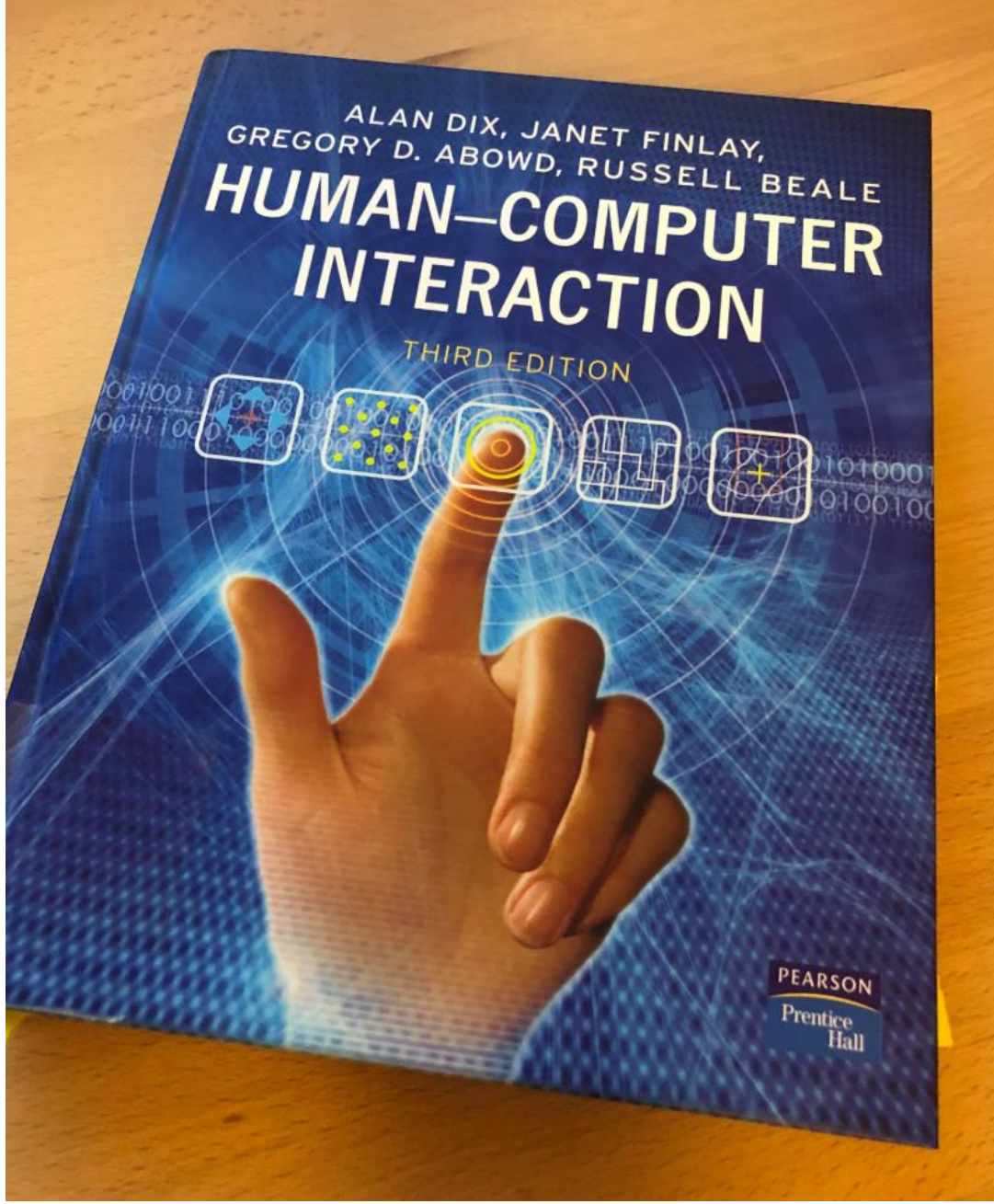
- Understand …
  - the principles that support usability according to Dix et al.
  - what points contribute to each of the principles

- Be able to …
  - explain these principles and give examples
  - discuss user interface designs with regard to these principles

Principles to Support Usability

By Dix et al.

- **Principle 1: Learnability**
- Principle 2: Flexibility
- Principle 3: Robustness



Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). *Human-computer interaction*. Pearson Education, p260ff, https://hcibook.com/.

Principle 1: Learnability

Principles to Support Usability Dix et al.

The ease with which new users can begin effective interaction and achieve maximal performance.

- Predictability
- Synthesizability
- Familiarity
- Generalizability
- Consistency

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Principle 1: Learnability

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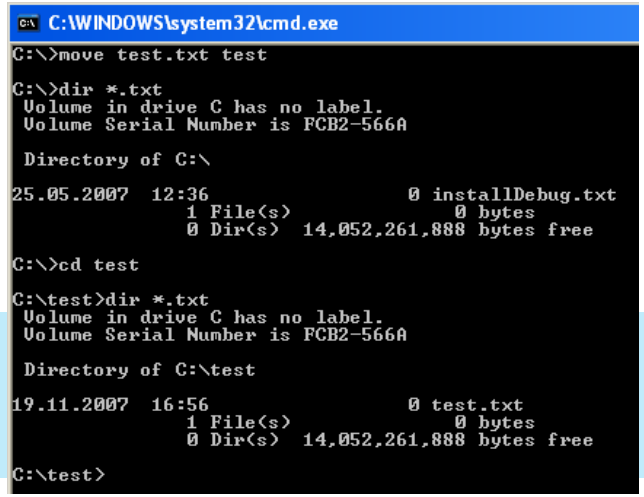

The ease with which new users can begin effective interaction and achieve maximal performance.

- **Predictability**
  - Determining effect of future actions based on past interaction history
  - Visibility of operations and effects
- Synthesizability
- **Familiarity**
  - how prior knowledge applies to a new system
  - affordance (‘guessability’)
- Generalizability
- Consistency

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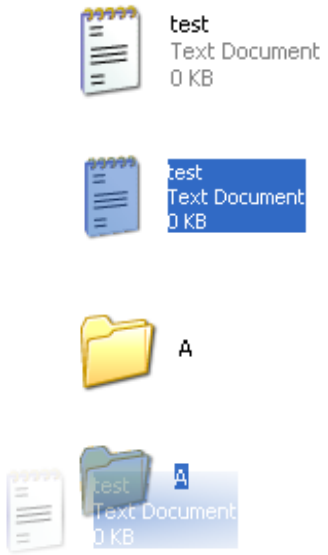
Principle 1: Learnability

Principles to Support Usability Dix et al.

The ease with which new users can begin effective interaction and achieve maximal performance.

- Predictability
- **Synthesizability**
  - ability of the user to assess the effect of past operations based on the current state
  - the user should see the changes of an operation
  - immediate vs. eventual feedback
- Familiarity
- Generalizability
- Consistency



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Principle 1: Learnability

Principles to Support Usability Dix et al.

Star Trek IV: The Voyage Home

25 seconds
Show from Movie: Star Trek IV: The Voyage Home
https://www.youtube.com/watch?v=hShY6xZWVGE

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Principle 1: Learnability

Principles to Support Usability Dix et al.

The ease with which new users can begin effective interaction and achieve maximal performance.

- Predictability
- Synthesizability
- Familiarity
- **Generalizability**
  - extending specific interaction knowledge to new situations
- **Consistency**
  - likeness in input/output behavior arising from similar situations or task objectives

25 seconds
Show from Movie: Star Trek IV: The Voyage Home
https://www.youtube.com/watch?v=hShY6xZWVGE

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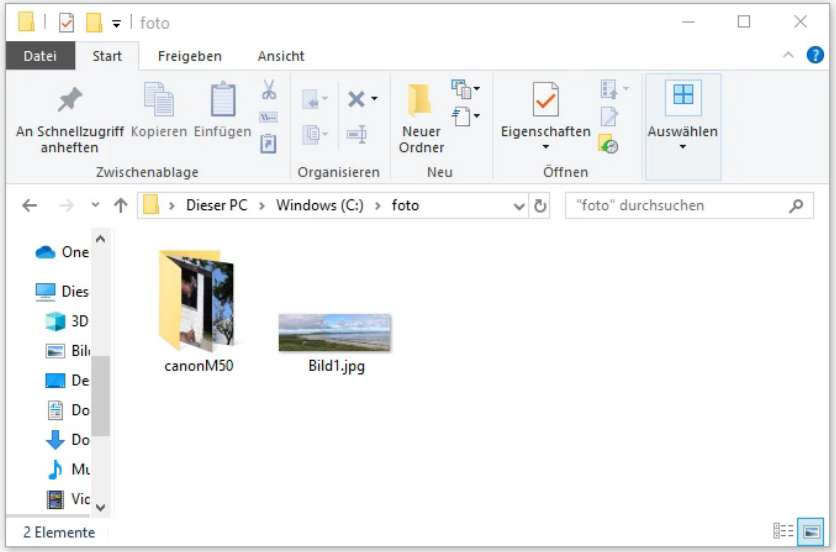
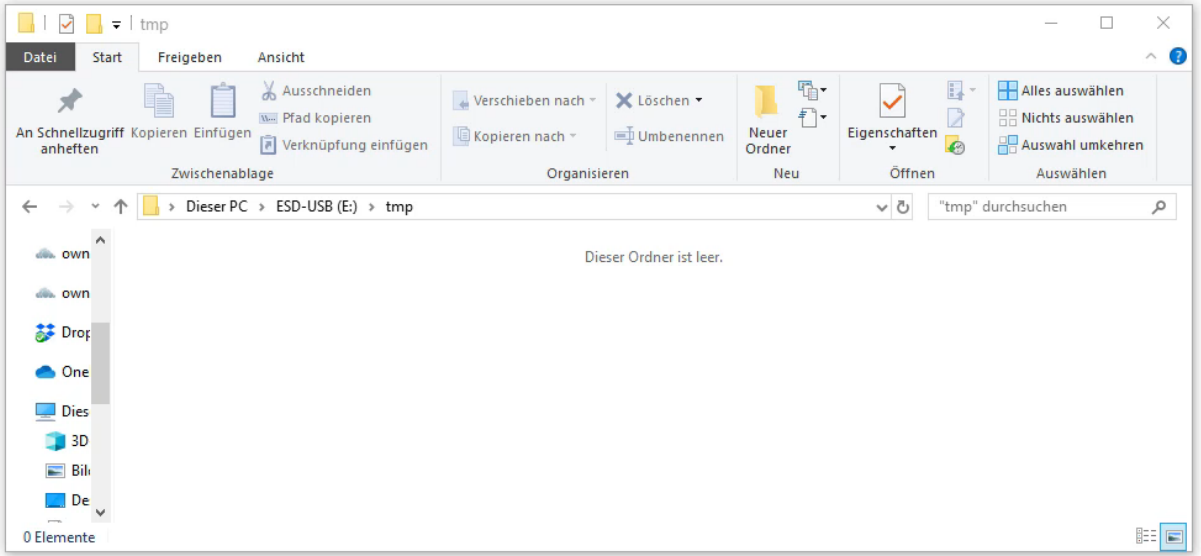
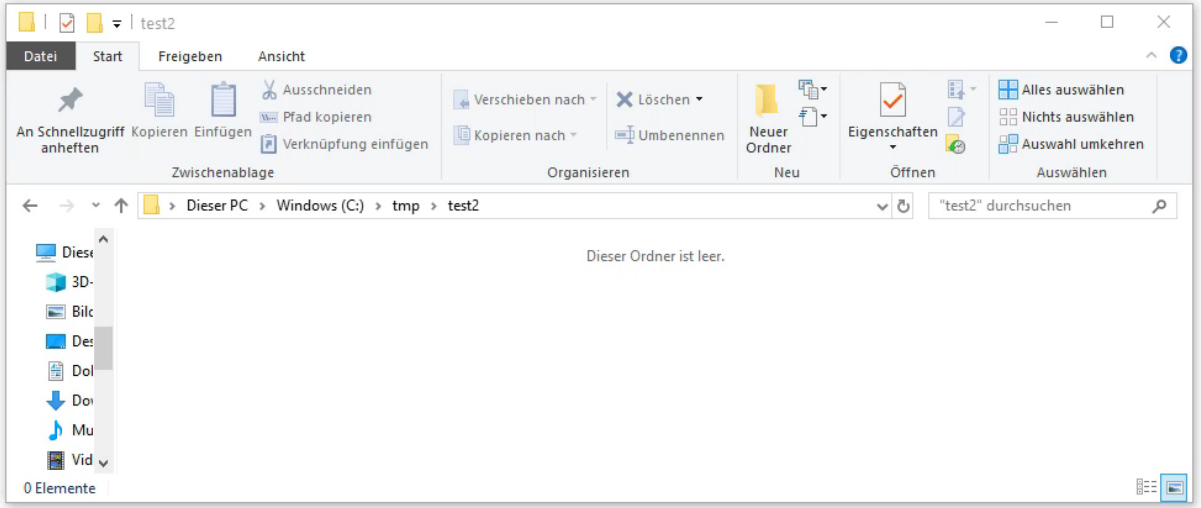
Example: Predictability, Consistency



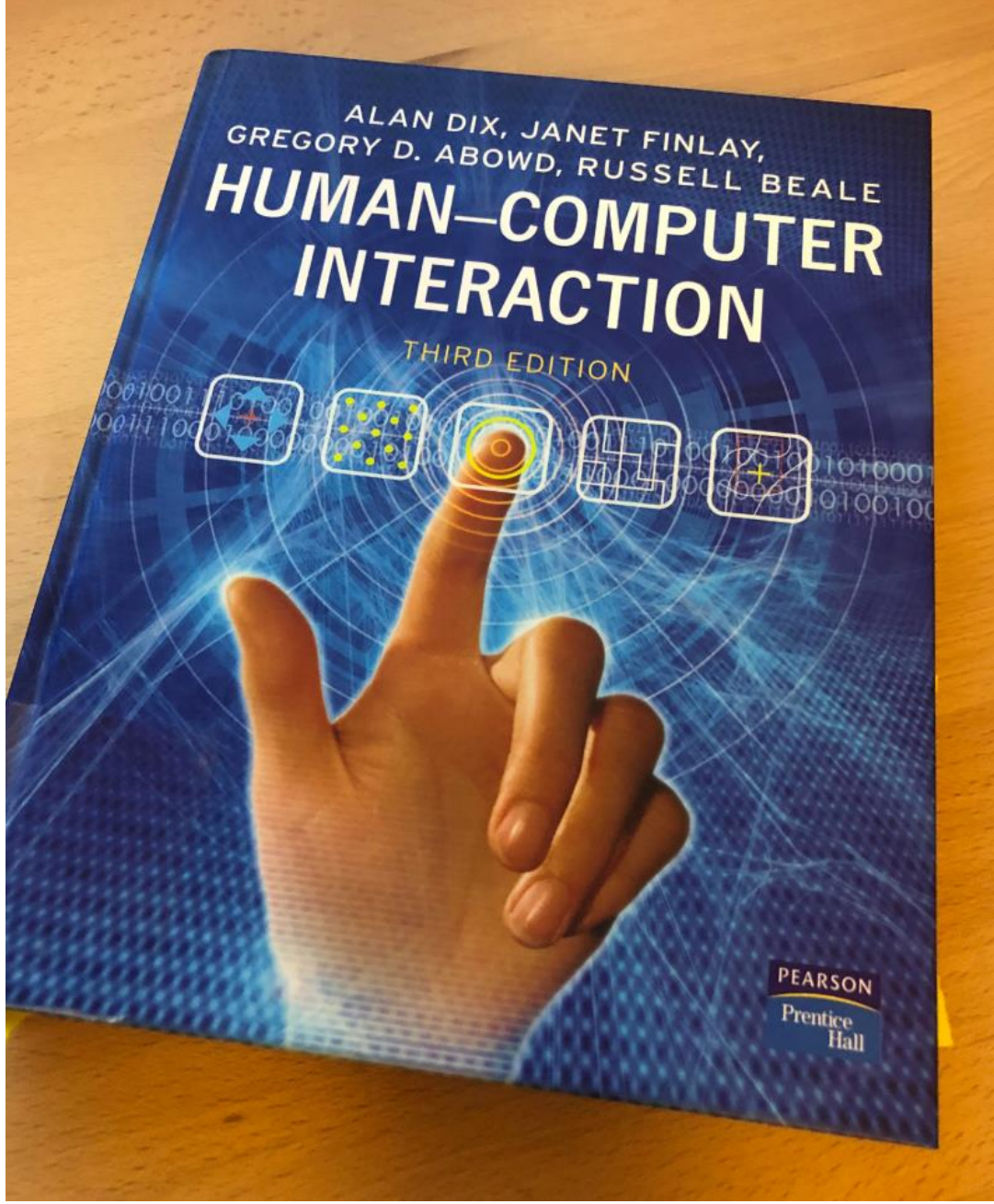




Principles to Support Usability

By Dix et al.

- Principle 1: Learnability
- **Principle 2: Flexibility**
- Principle 3: Robustness



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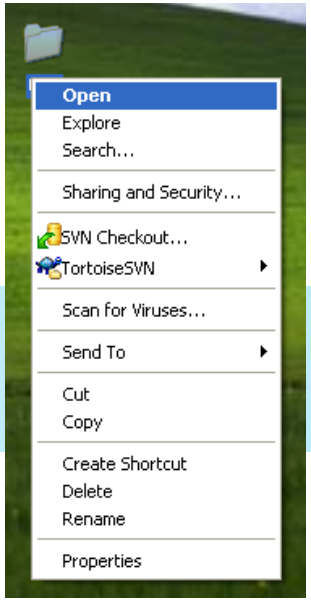
Principle 2: Flexibility

Principles to Support Usability Dix et al.

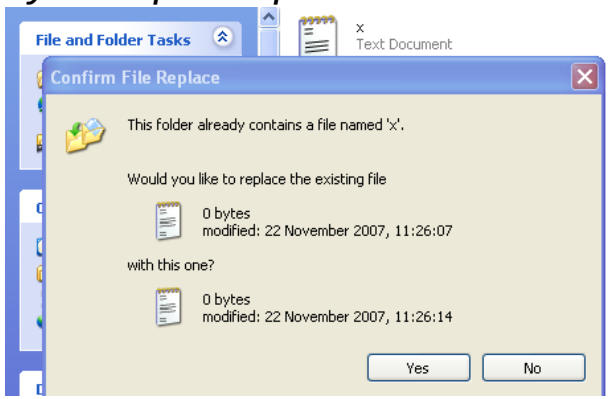
The multiplicity of ways the user and system exchange information.

- **Dialogue initiative**
  - freedom from system imposed constraints on input dialogue
  - user preemptiveness: user initiates dialog
  - system preemptiveness: system initiates dialog
- Multithreading
- Task migratability
- Substitutivity
- Customizability



user preemptiveness

system preemptiveness



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Principle 2: Flexibility

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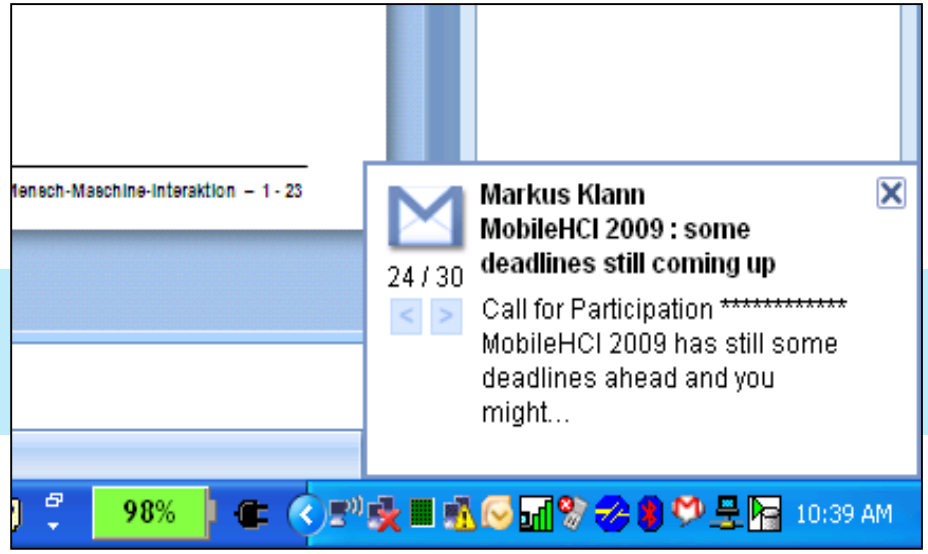

The multiplicity of ways the user and system exchange information.

- Dialogue initiative
- **Multithreading**
  - system supports user interaction for several tasks at a time
    - concurrent multimodality: simultaneous communication of information pertaining to separate tasks
    - interleaving multimodality: permits temporal overlap between separate tasks, dialog is restricted to a single task
- Task migratability
- Substitutivity
- Customizability

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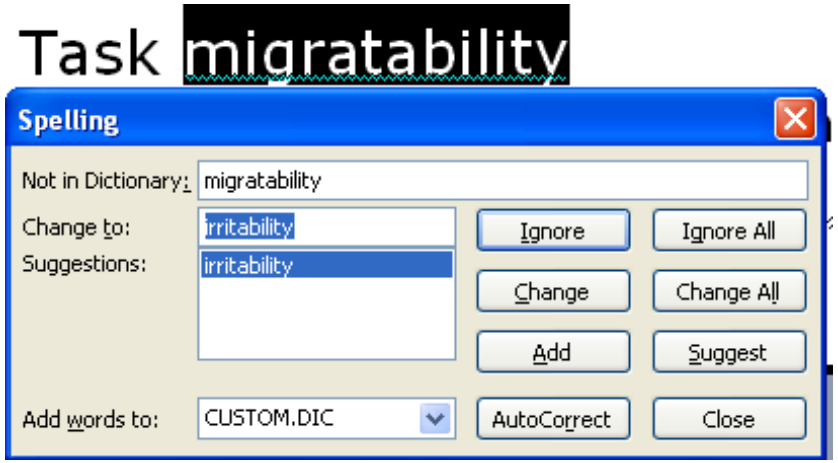
Principle 2: Flexibility

Principles to Support Usability Dix et al.

The multiplicity of ways the user and system exchange information.

- Dialogue initiative
- Multithreading
- **Task migratability**
  - passing responsibility for task execution between user and system, e.g. spell checking
- Substitutivity
- Customizability



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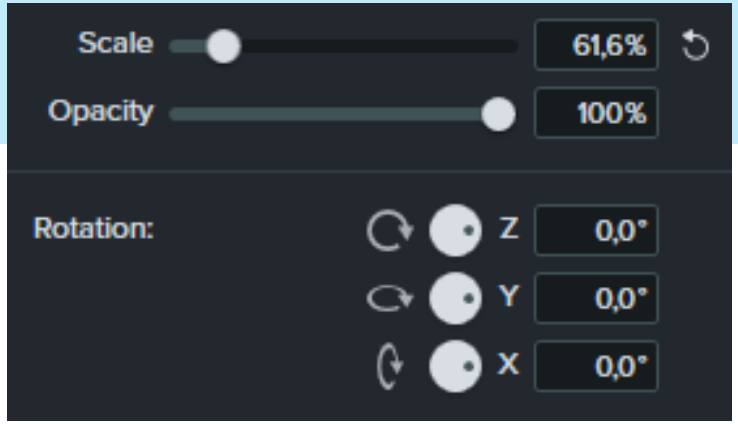
Principle 2: Flexibility

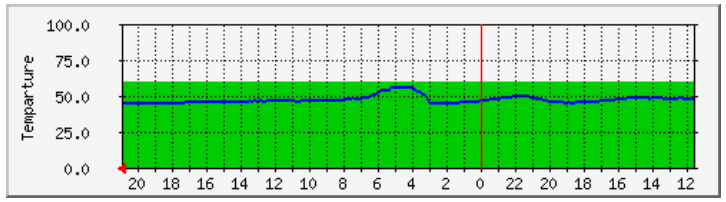
Principles to Support Usability Dix et al.

The multiplicity of ways the user and system exchange information.

- Dialogue initiative
- Multithreading
- Task migratability
- **Substitutivity**
  - allowing equivalent values of input and output to be substituted for each other
  - representation multiplicity
  - equal opportunity: blurs the distinction between input and output
- Customizability



	A	B	C	D
1				
2	Summand 1	1	2	1
3	Summand 2	2	2	2
4	Summand 3	3	3	3
5	Total sum	6	7	6



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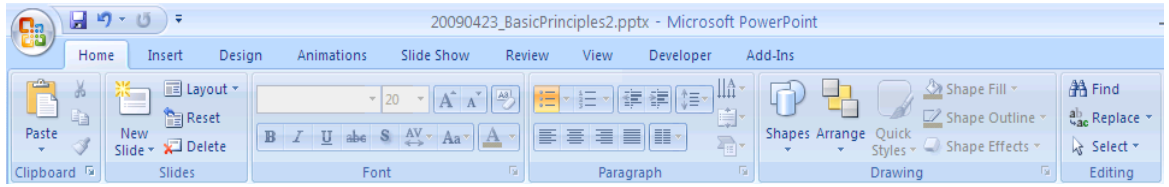
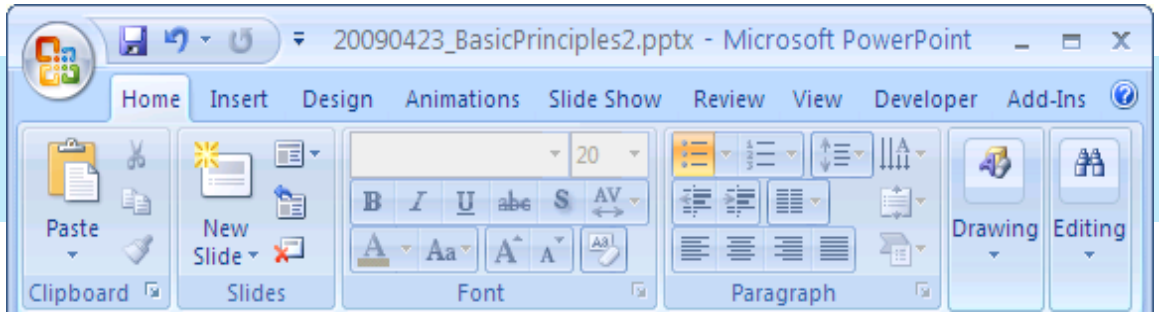
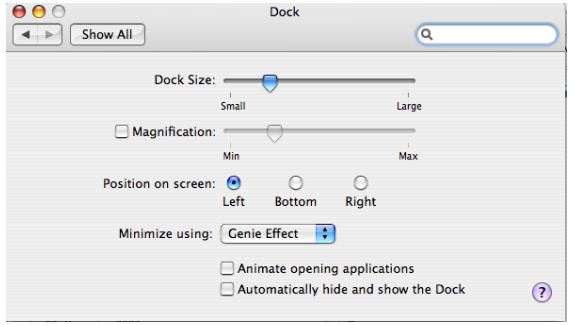
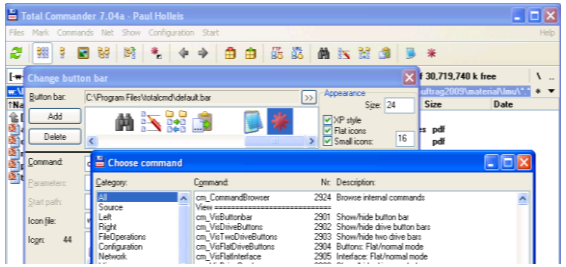
The multiplicity of ways the user and system exchange information.

- Dialogue initiative
- Multithreading
- Task migratability
- Substitutivity
- **Customizability**
  - modifiability of the user interface by the user (adaptability) or system (adaptivity)
  - adaptability (*anpassbar*): users ability to adjust the form of input and output
  - adaptivity (*adaptive*): automatic customization of the user interface by the system









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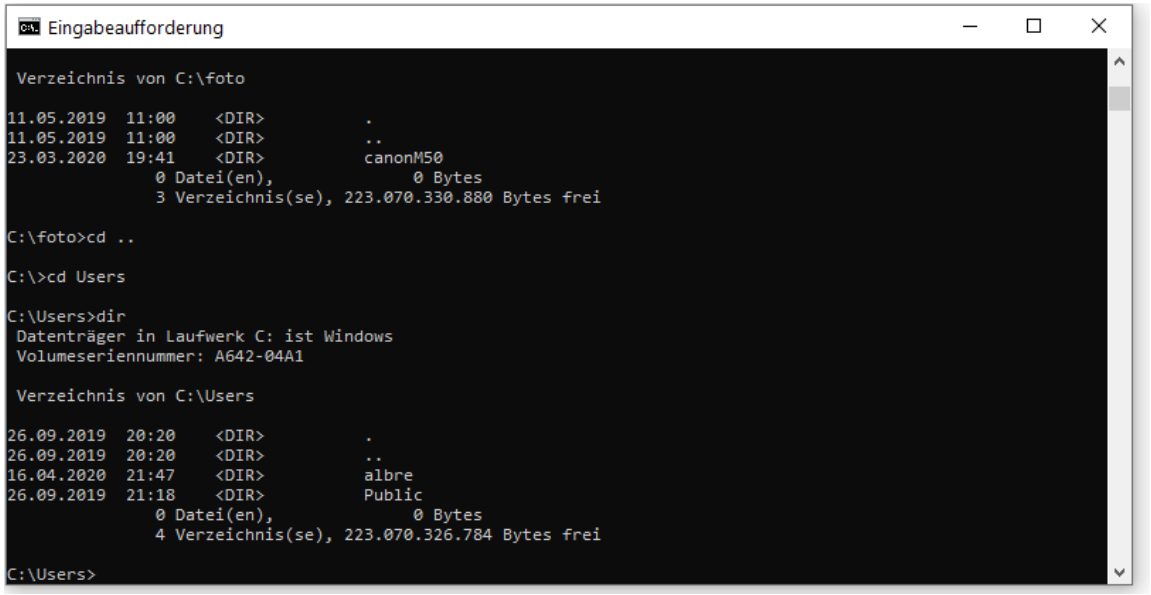

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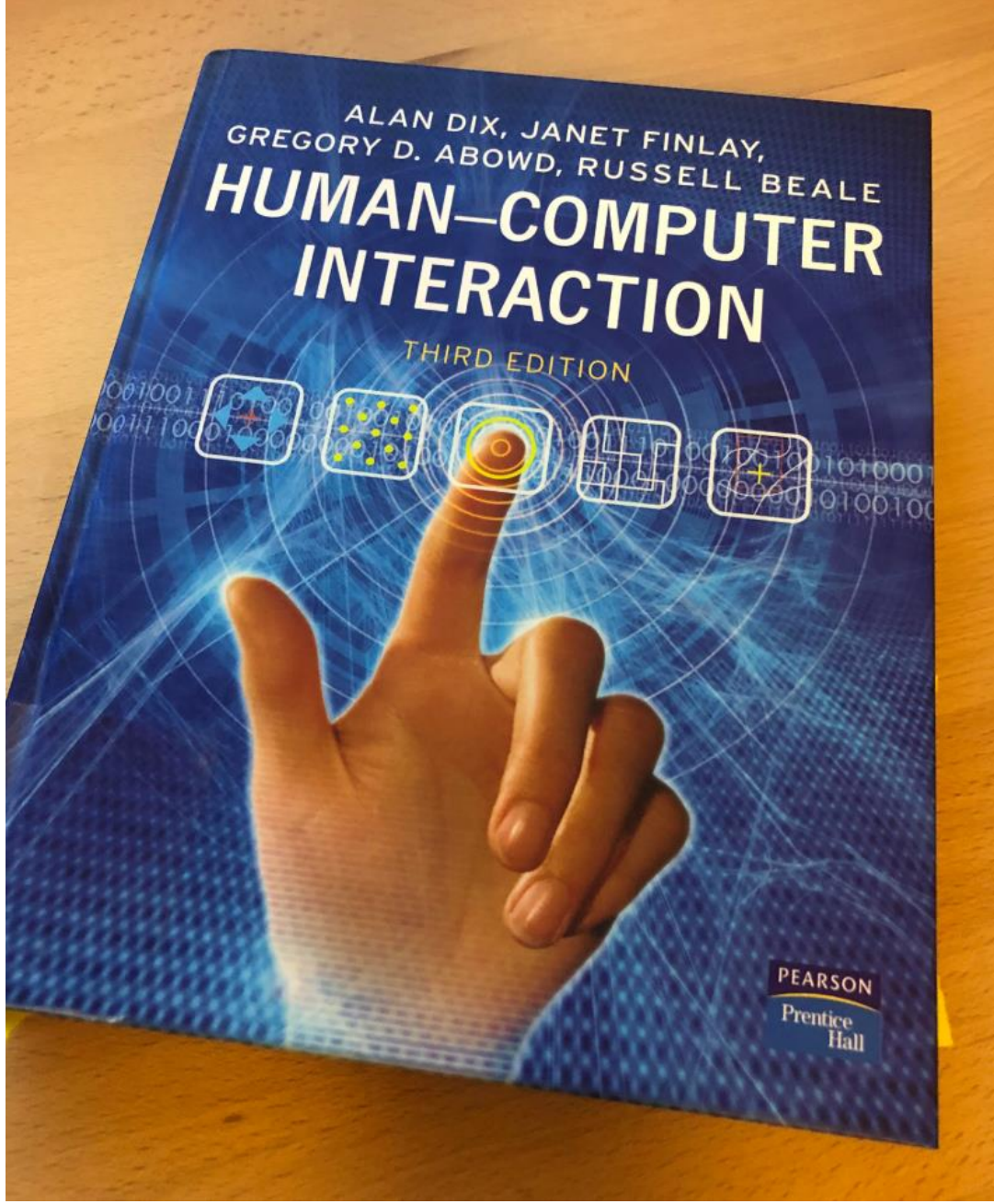

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Principle 3: Robustness

Principles to Support Usability Dix et al.

The level of support provided to the user in determining successful achievement and assessment of goal-directed behaviour.

- Observability
- Recoverability
- Task conformance
- Responsiveness

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Principle 3: Robustness

Principles to Support Usability Dix et al.

The level of support provided to the user in determining successful achievement and assessment of goal-directed behaviour.

- **Observability**
  - ability of the user to evaluate the internal state of the system from its perceivable representation
- Recoverability
- Task conformance
- Responsiveness

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Principle 3: Robustness

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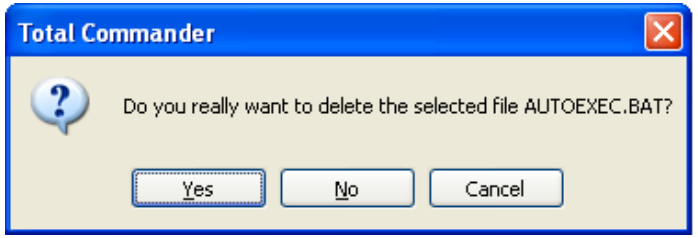
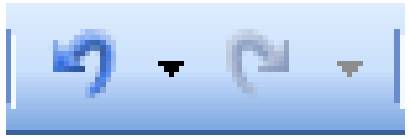


The level of support provided to the user in determining successful achievement and assessment of goal-directed behaviour.

- Observability
- **Recoverability**
  - ability of the user to correct a recognized error
  - reachability (states): forward (redo) / backward (undo) recovery
  - commensurate effort (more effort / steps for deleting a file than for moving it)
- Task conformance
- Responsiveness



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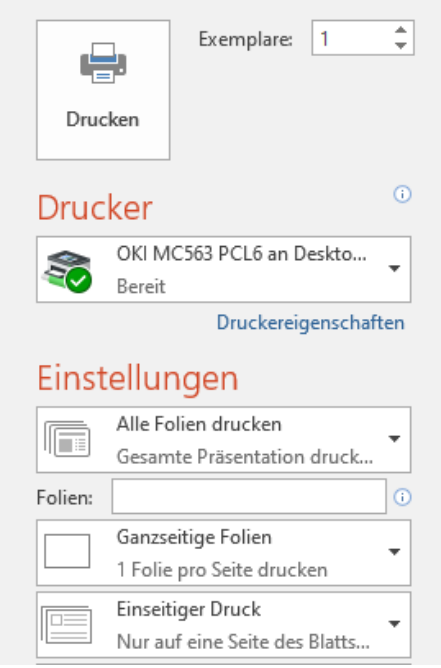
Principle 3: Robustness

Principles to Support Usability Dix et al.

The level of support provided to the user in determining successful achievement and assessment of goal-directed behaviour.

- Observability
- Recoverability
- **Task conformance**
  - degree to which system services support all of the user's tasks
  - task completeness
  - task adequacy
- Responsiveness



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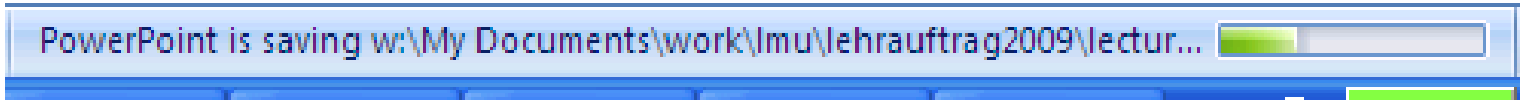
Principle 3: Robustness

Principles to Support Usability Dix et al.

The level of support provided to the user in determining successful achievement and assessment of goal-directed behaviour.

- Observability
- Recoverability
- Task conformance
- Responsiveness
  - how the user perceives the rate of communication with the system
  - preferred: short durations and instantaneous responses
  - stability and indication of response time



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By Dix et al.

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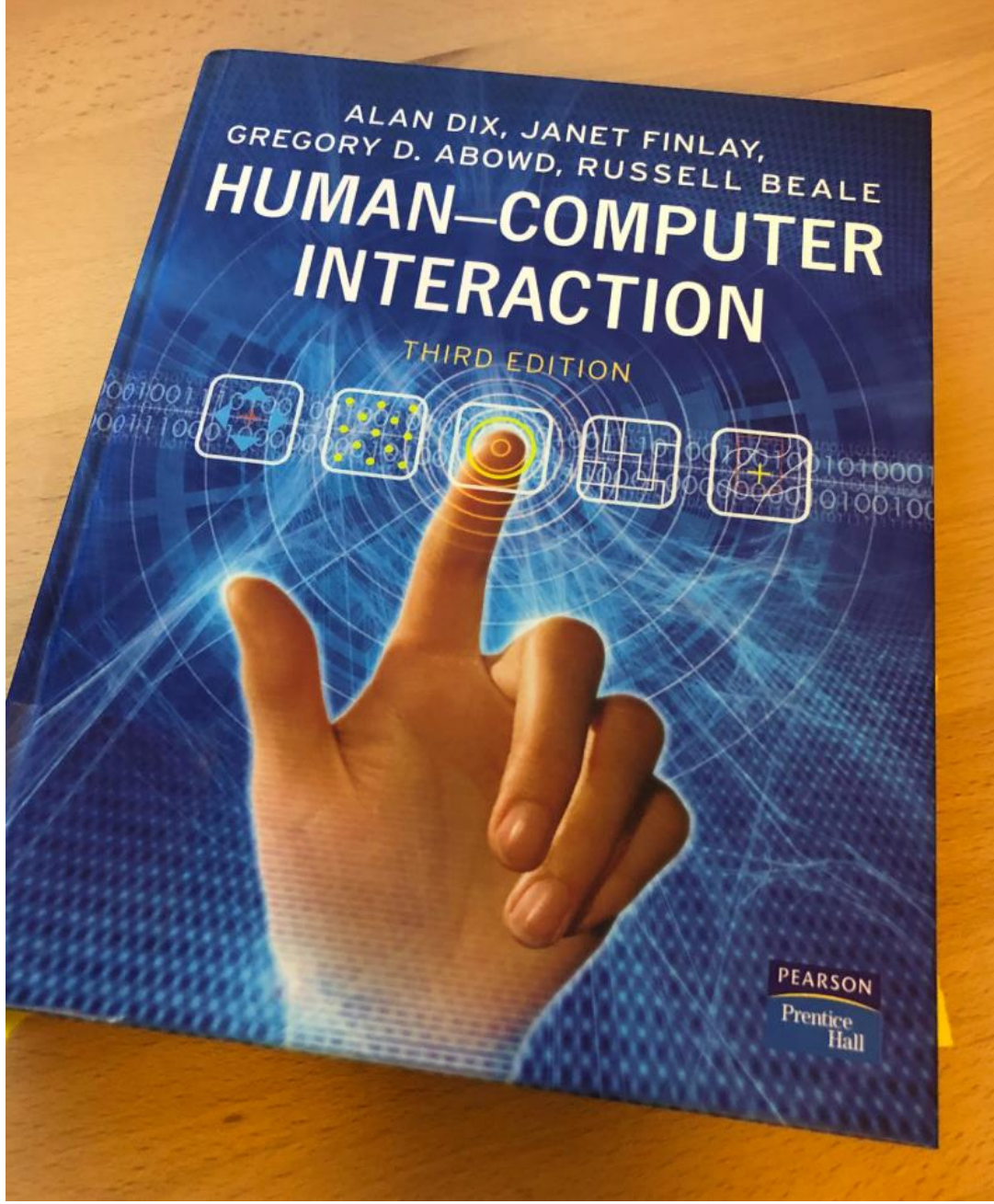

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Conversation with Alan Dix

https://youtu.be/n8S6ZgZzgbo

Did you understand this block?

Can you answer these questions?

- What are the 3 principles to support usability according to Alan Dix et al.?
- Give an example for robustness?
- How did our expectations for learnability change over the last 20 years?
- How does recoverability contribute to robustness?
- What two forms of customizability can be discriminated? Give an example for each.
- How does predictability improve learnability? How is predictability achieved?

Reference

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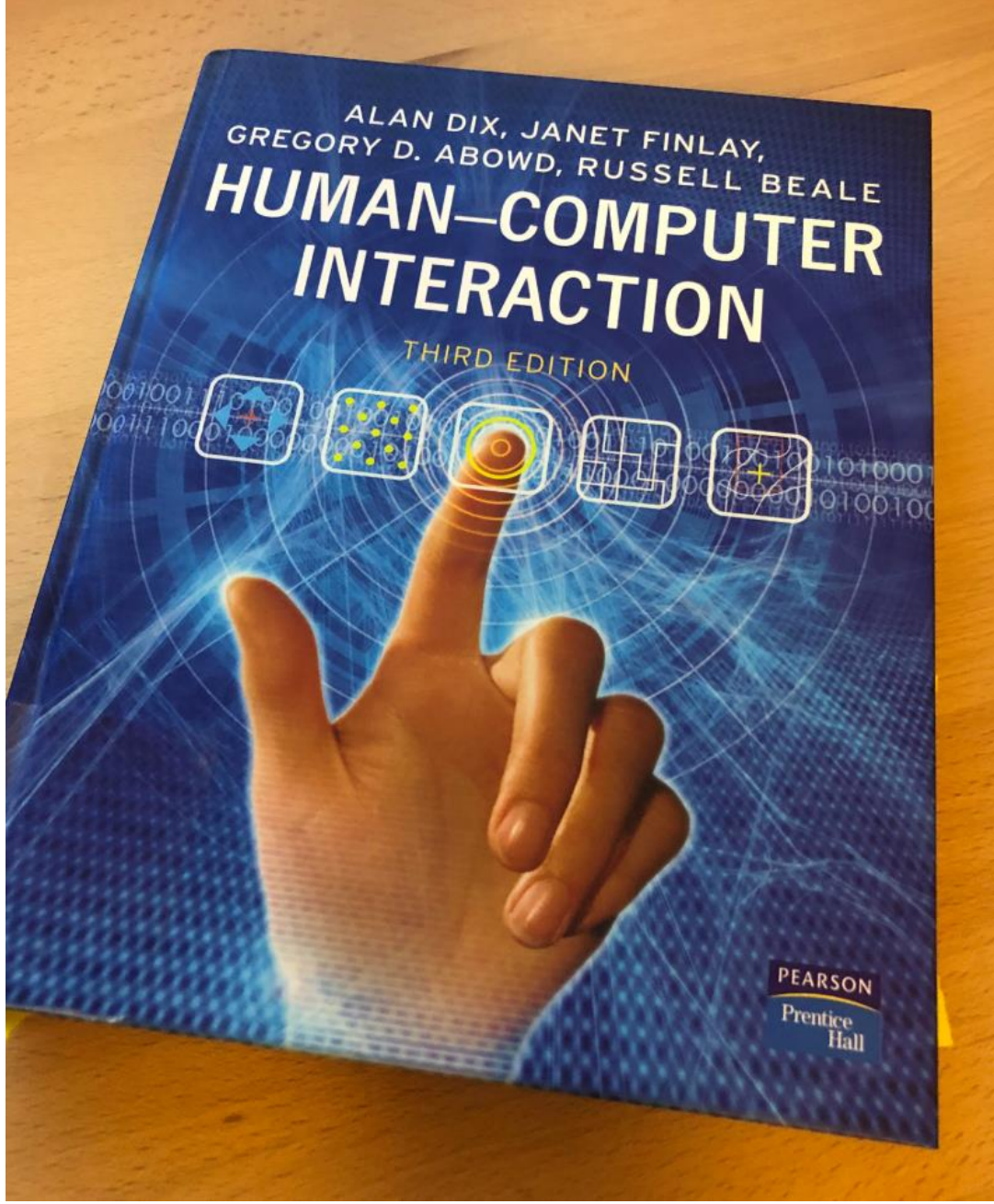

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