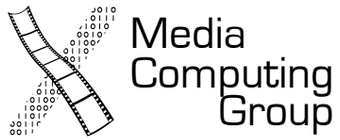


RWTH AACHEN UNIVERSITY

Mobile Application Development
L01: Introduction to HCI

Jonathan Diehl (Informatik 10)
Hendrik Thüs (Informatik 9)

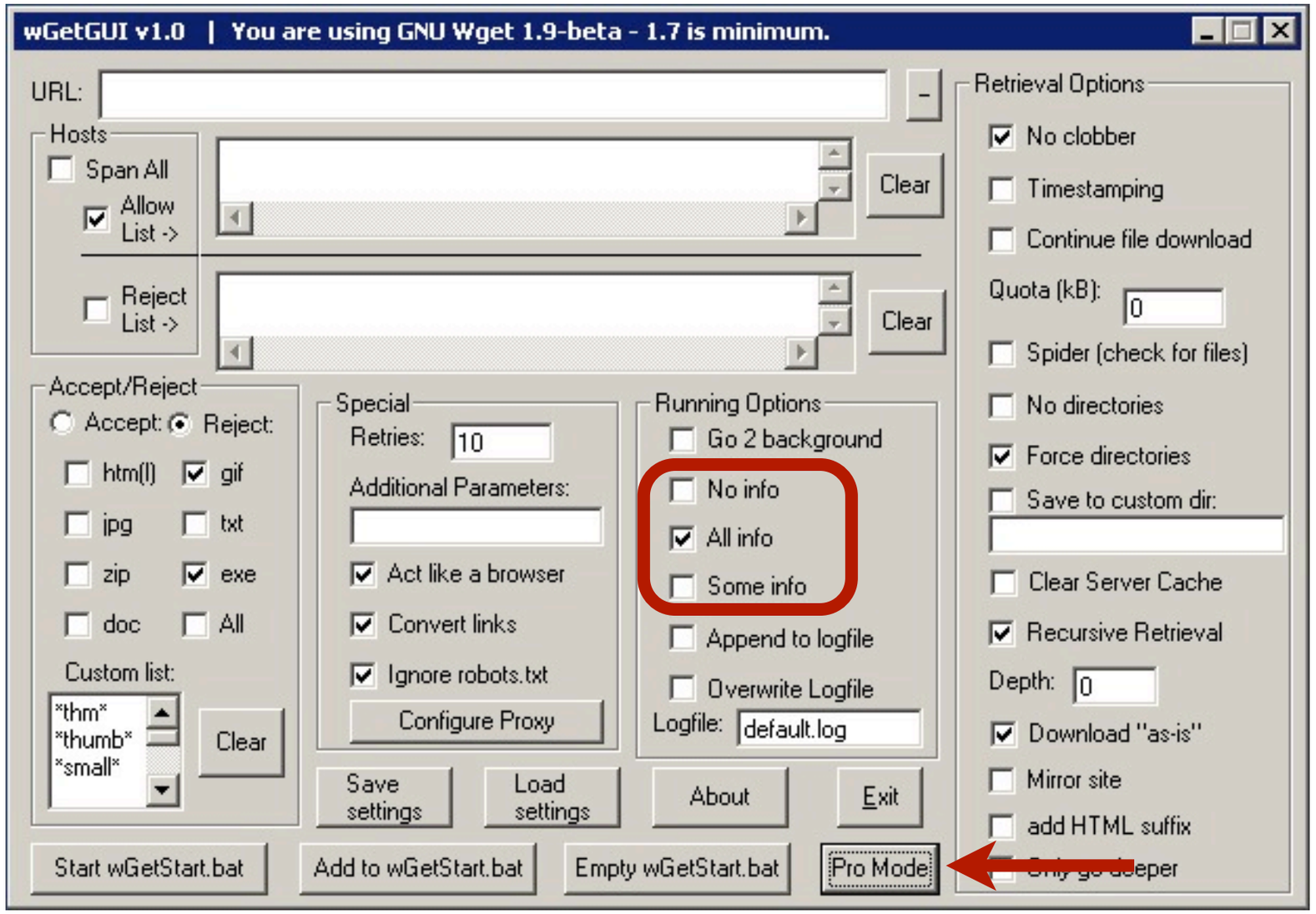
Course Schedule

- Lab/Lecture: 9:00 - 11:15
- Room: 4U15 (starting April '11)
- Topics
  - Human-Computer Interaction (3)
  - iOS (3), Android (3)
  - Mobile Technology (5)
- Final Project over the last 6 weeks
- Exam (2h) + Project Presentation (10min)

Project Goal

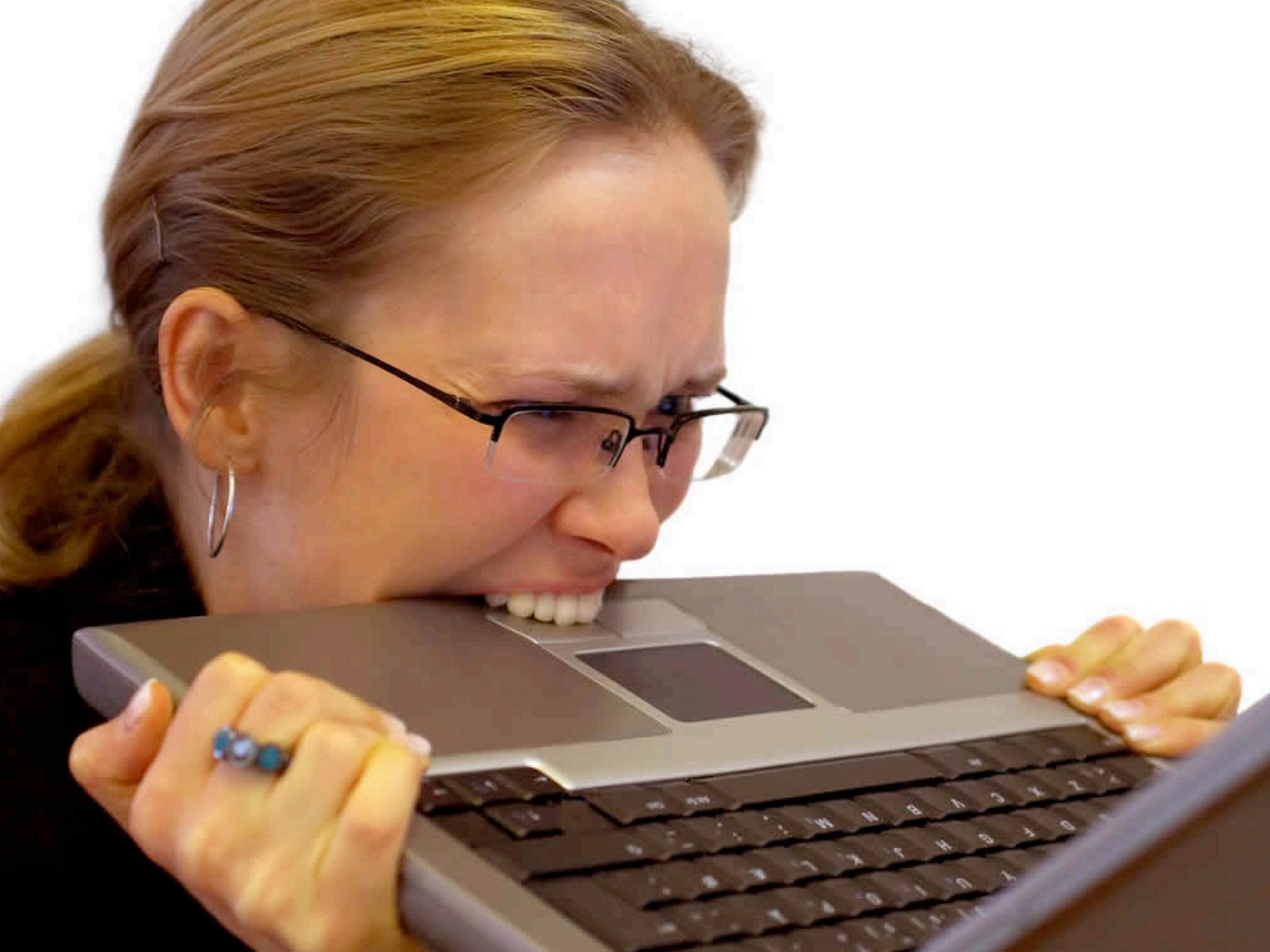
Your App in the AppStore / Market

(if you want it)

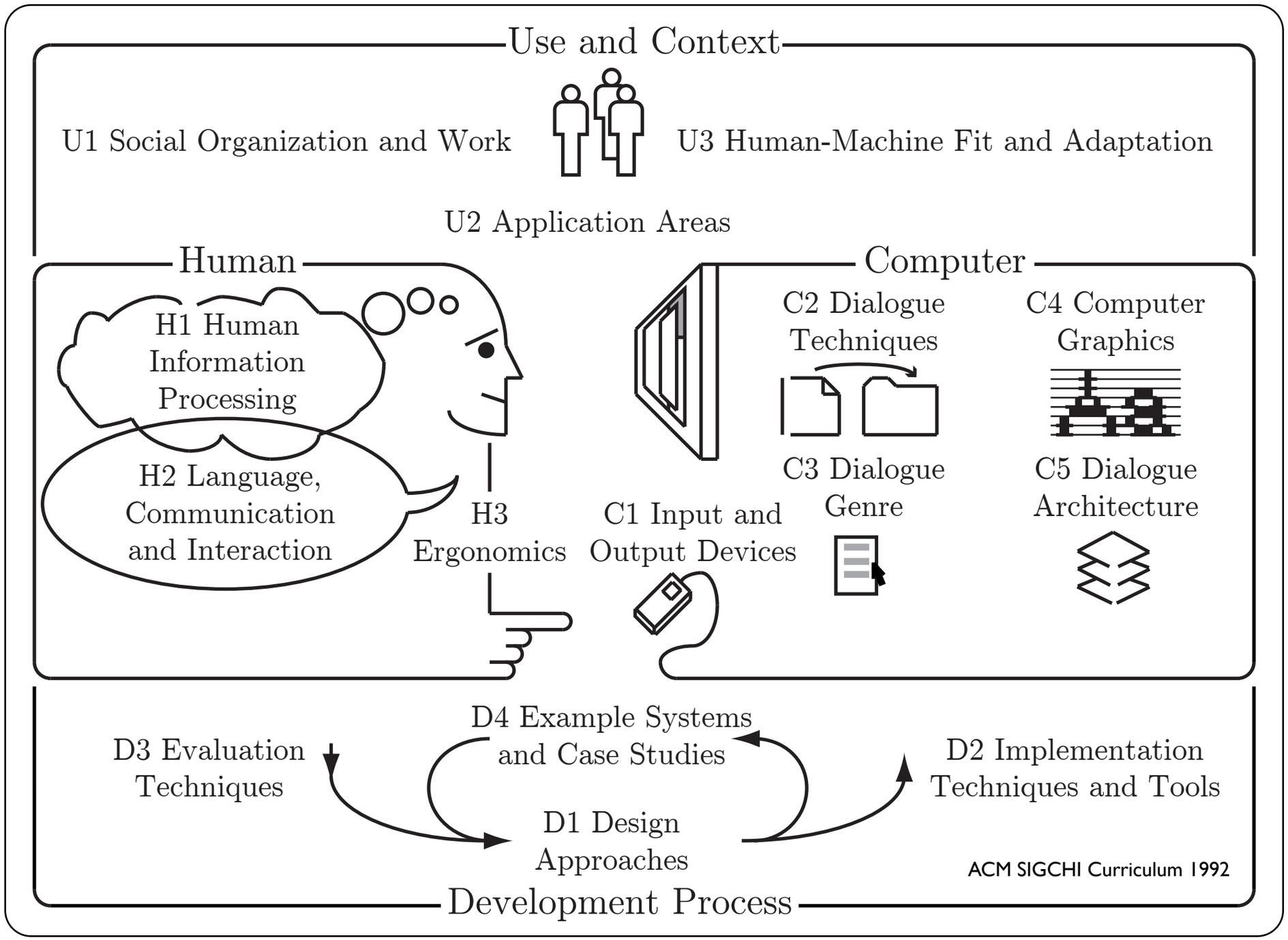


GNU wGetGUI v1.0


Heizarten
Speisearten
Selbstreinigung



Human-Computer Interaction



HCI Topics

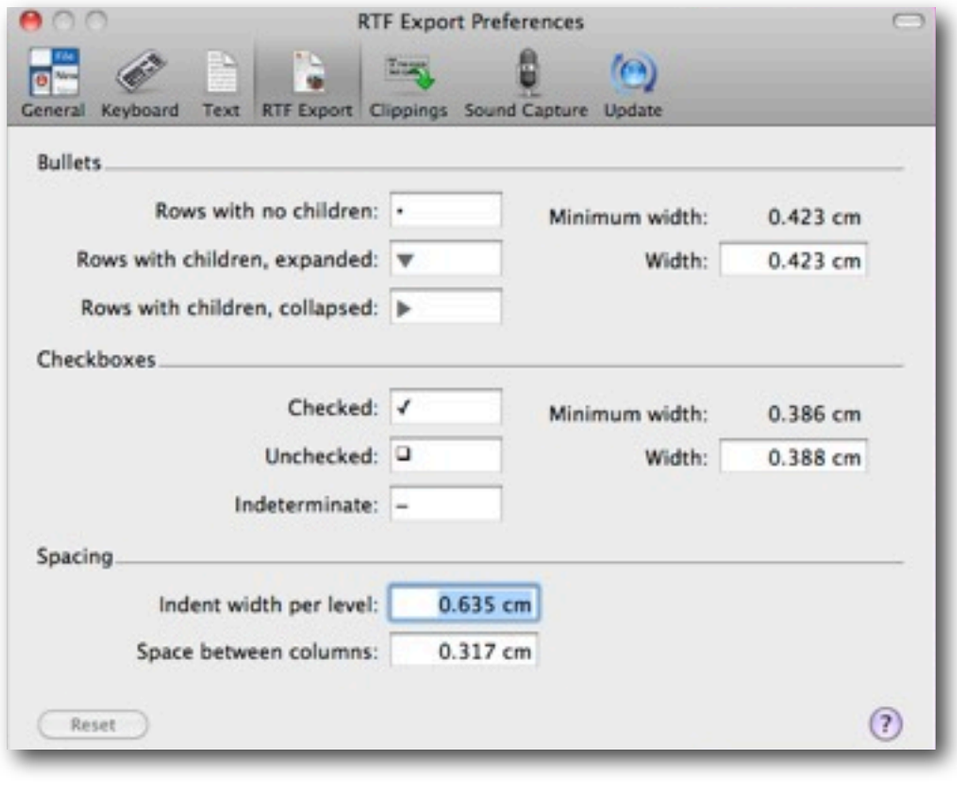
- Psychological Background
  - Gestalt Laws
  - Affordances
  - Constraints
  - Mappings
- Design Principles: 10 Golden Rules
- Design Process: DIA-Cycle

Gestalt Theory

Gestalt Theory

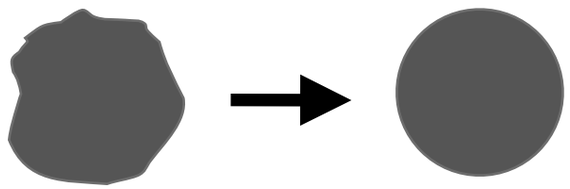
- Köhler, Koffka, Wertheimer: *"Gestaltpsychologie" (1912)*
- What do humans perceive as belonging together spatially or temporally?
- Basis of order in perception, movement, memory, thinking, learning, and acting
- Overall 100+ Gestalt laws

Why should I care?



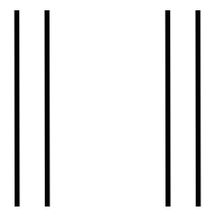
> *Good UIs respect and use Gestalt laws for understandability and intuitiveness*

- Simple rules for visual UI design
- Hints how users will react to spatial and temporal order



Law 1: Good Shape

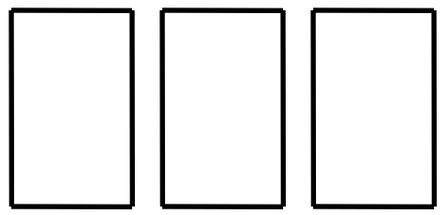
- Humans have a tendency towards (over-) simplifying complex shapes
- *"Cognitive compression algorithm"*



Law 2: Proximity

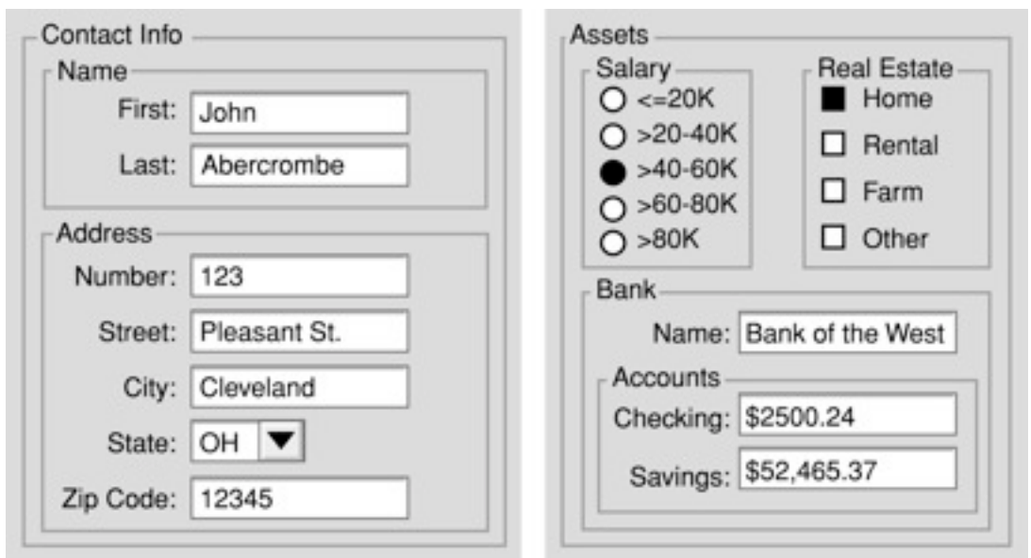
- Spatially (or temporally!) close objects are perceived as belonging together
- Allows for order by position only, without other aides

➡ Keeps the interface simple

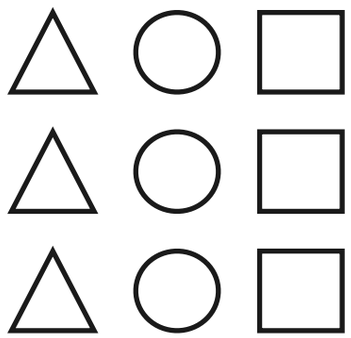


Law 3: Closure

- Closed shapes appear as belonging together
- Foundation of window metaphor
- But: Don’t overdo it!

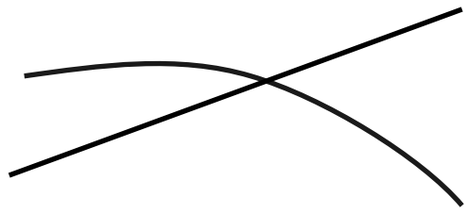


Too many boxes.
(From Johnson: *GUI Bloopers*)



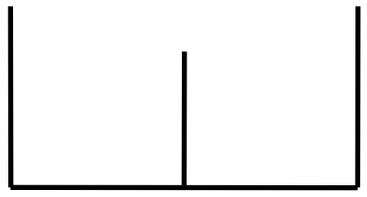
Law 4: Similarity

- Similar shapes appear as belonging together
- Can be a good thing or a bad thing...



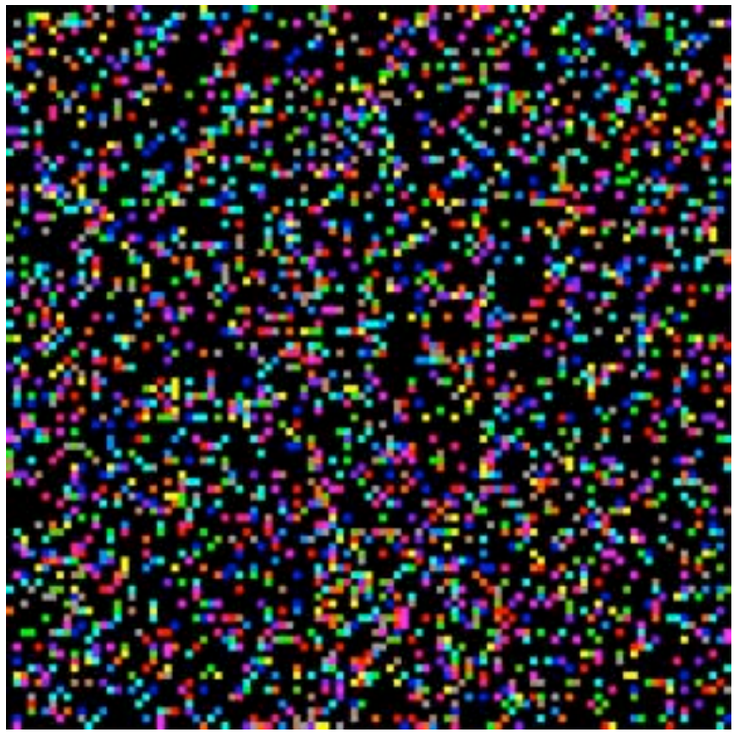
Law 5: Continuity

- A.k.a. *"Law of the Good Curve"*
- Continuous shapes appear as belonging together



Law 6: Experience

- Humans tend to interpret new things into known categories
- Foundation for the success of metaphors in UI design



Law 7: Common Fate

- A.k.a. “Law of Common Movement”
- Animated objects within a static environment appear as a group
- Animation has a very strong effect

Exercise: Gestalt Laws

- Find an example for each Gestalt Law
- Use given examples or from your own experience

British Rail Shelters

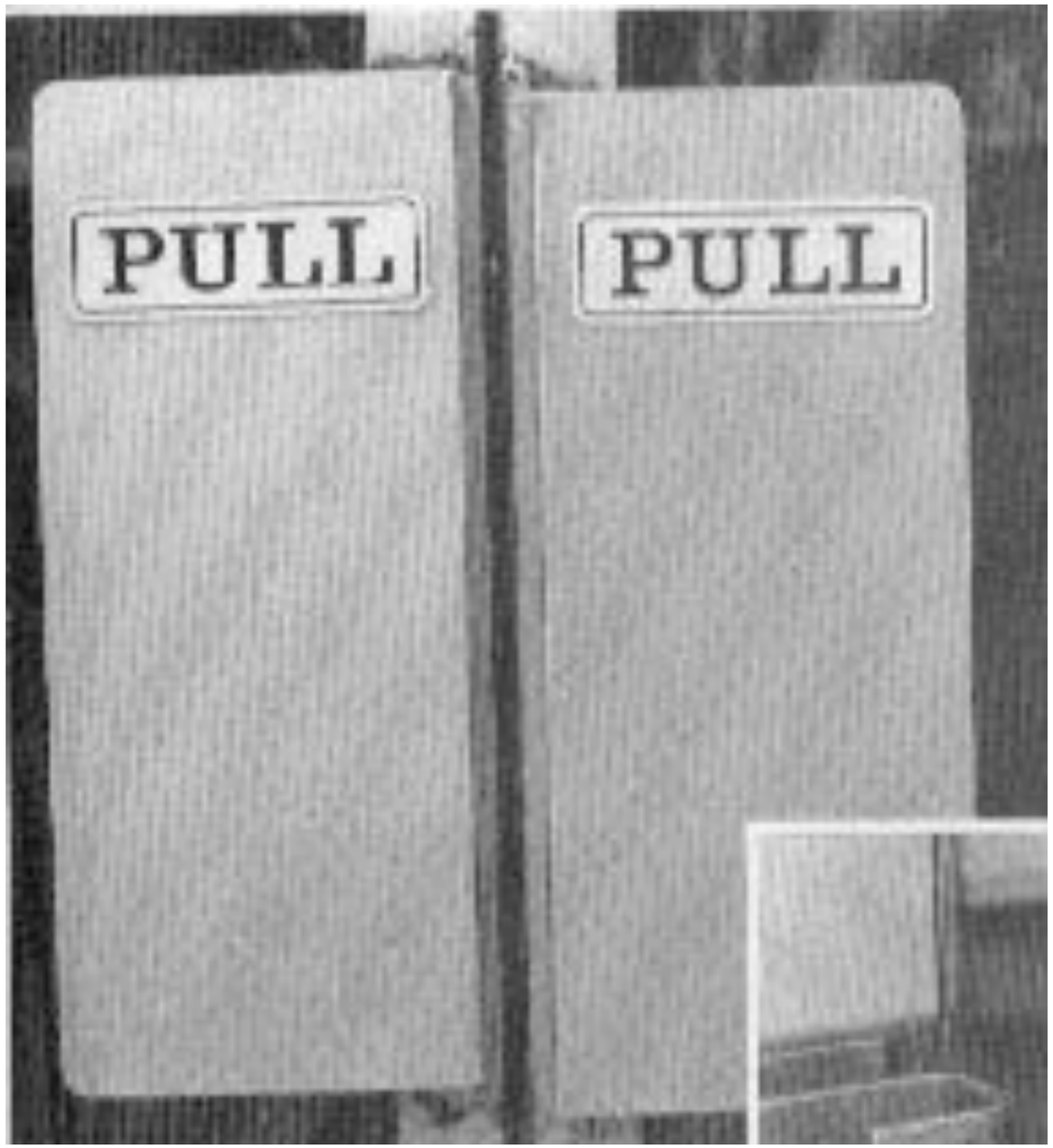
- Glass suggests ("affords") being broken
- Wood suggests ("affords") stability and support
- Flat surfaces suggest ("afford") being written on

Affordances

- Model by Norman, after Gibson
  - "...affordances of the environment are what it offers the animal..." [Gibson77]
- Affordances are the actions that the design of an object suggests to the user
  - "...the term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used…" [Norman88]

Utility of Affordances

- Affordances provide strong clues
  - No instructions/labels needed
  - A design with labels is often a bad design!
  - Also true for many software UIs
  - Exceptions: complex, abstract functions that do not support simple "physical" affordances
- Product design can support usability when using affordances well


PULL
PULL

False Affordances

False affordances suggest actions that are not actually possible or the right ones

Exercise: Affordances

- Identify all affordances in effect in this room
- Can you find false affordances?

Constraints

- Constraints are the “inverse” of affordances, and can augment them
- They limit the way an object can be used
- Goals:
  - Avoid usage errors
  - Minimize the information to be remembered
- Types of Constraints:
  - Physical, semantic, logical, cultural

Physical Constraints

- Limit number of possible physical operations
- Limiting is done by physical shape
  - Example: Traditional key does not fit into security lock
- More efficient and useful if constraint is visible ahead of time!
  - Example: Car key should fit both ways, but should then also work both ways

Semantic Constraints

- Use our common knowledge about the world and the current situation
- Example: Driver's figurine in a model plane construction kit has to sit facing forward to "make sense"
- Powerful means to improve intuitiveness
- But: Only use rules that are valid throughout your user population!

Logical Constraints

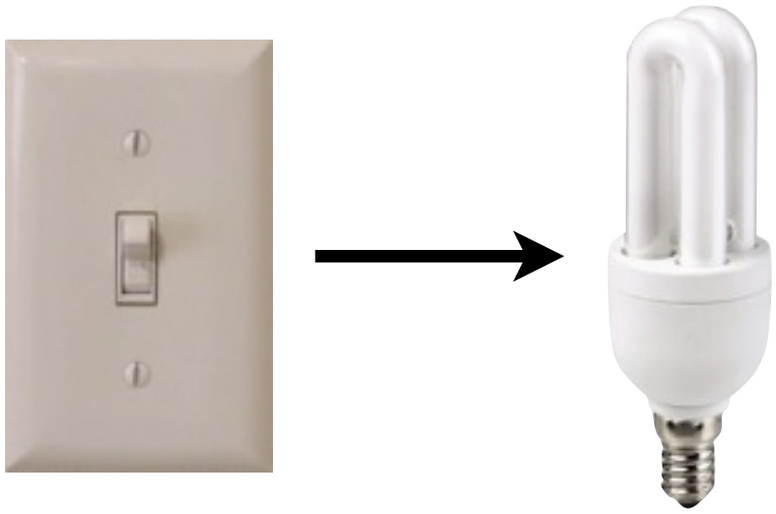
- Logical conclusions reject certain solutions
  - Example: All parts of a model plane construction kit must be used

Cultural Constraints

- Rely on generally accepted cultural conventions
  - Example: Red = Stop
- But: Only applies to specific cultural group!
  - Chinese labeling does not give us an idea where up is

Exercise: Constraints

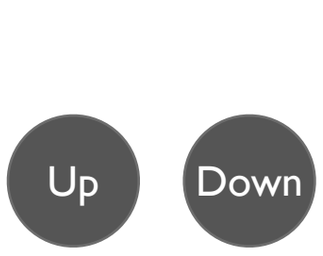
- Think about three examples for objects where constraints help us use them correctly
- Try to find examples for the different types of constraints
  - Physical, semantic, logical, cultural
- Sample areas: kitchen appliances, security devices, vending machines,…

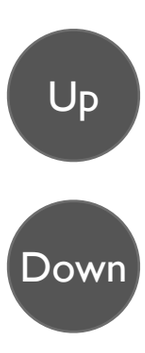


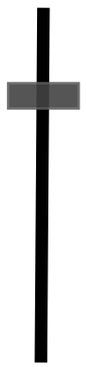
Mappings

- Mappings connect UI elements with the elements they control
- Good mappings are natural
  - Use physical analogies
  - Use cultural standards

Natural Mappings: Spatial Analogies







- Most prominent example of natural mappings
- How would you arrange the controls for this lifting platform?

Natural Mappings: Spatial Analogies

Rule: arrange controls in the same way that their real-world counterparts are arranged

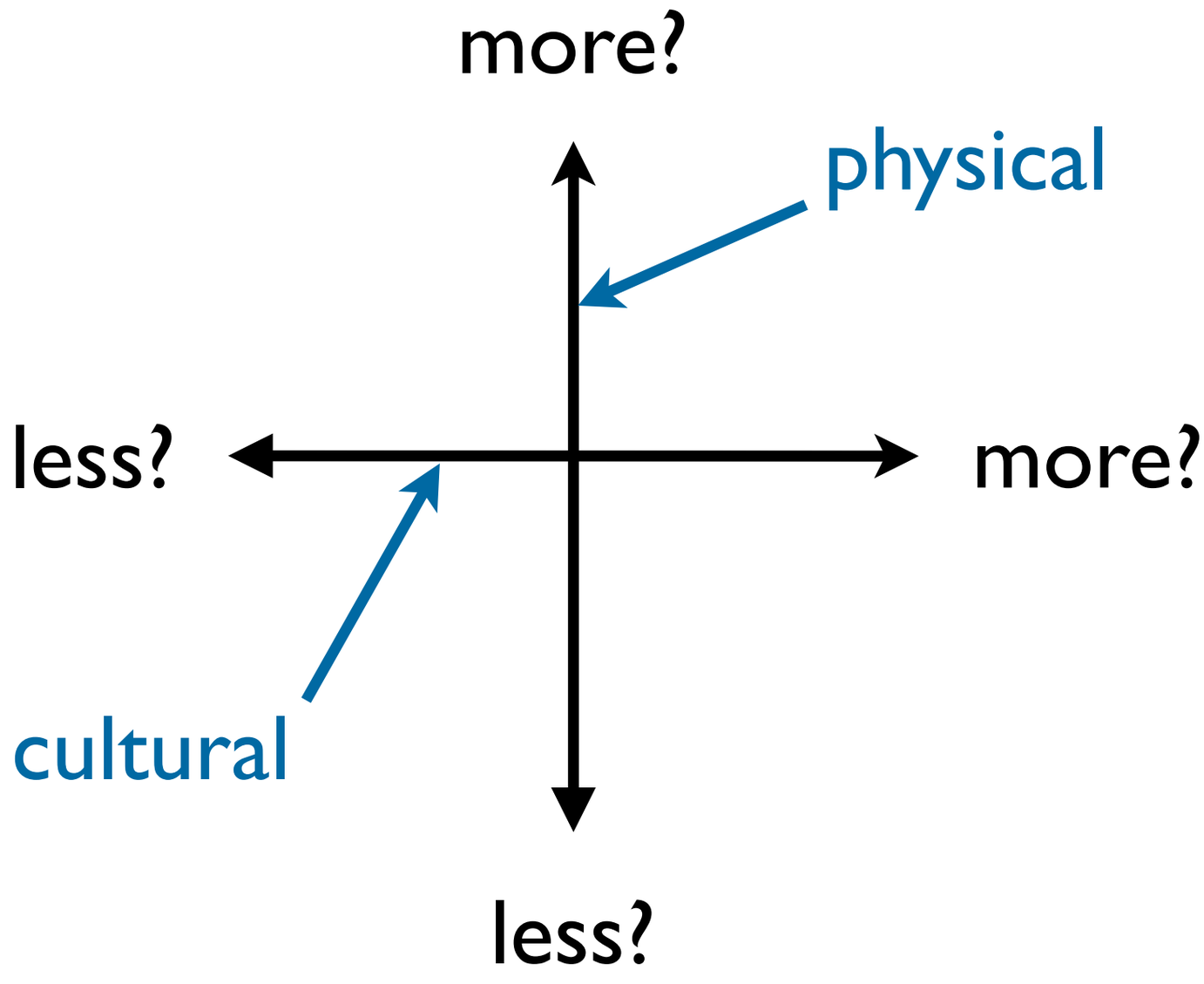

5
3
2
0
4
1
-1

Natural Mappings: Perceptual Analogies

- The input devices for controlling something look like the actual thing itself
- *"Voodoo Principle"*

Carrier
5:05 PM
Keyboards
Add New Keyboard
English (UK)
Arabic
Bulgarian
Catalan
Cherokee
Chinese - Simplified

Directional Mappings



Exercise: Mappings

Design the perfect parking ticket machine

Conceptual Models

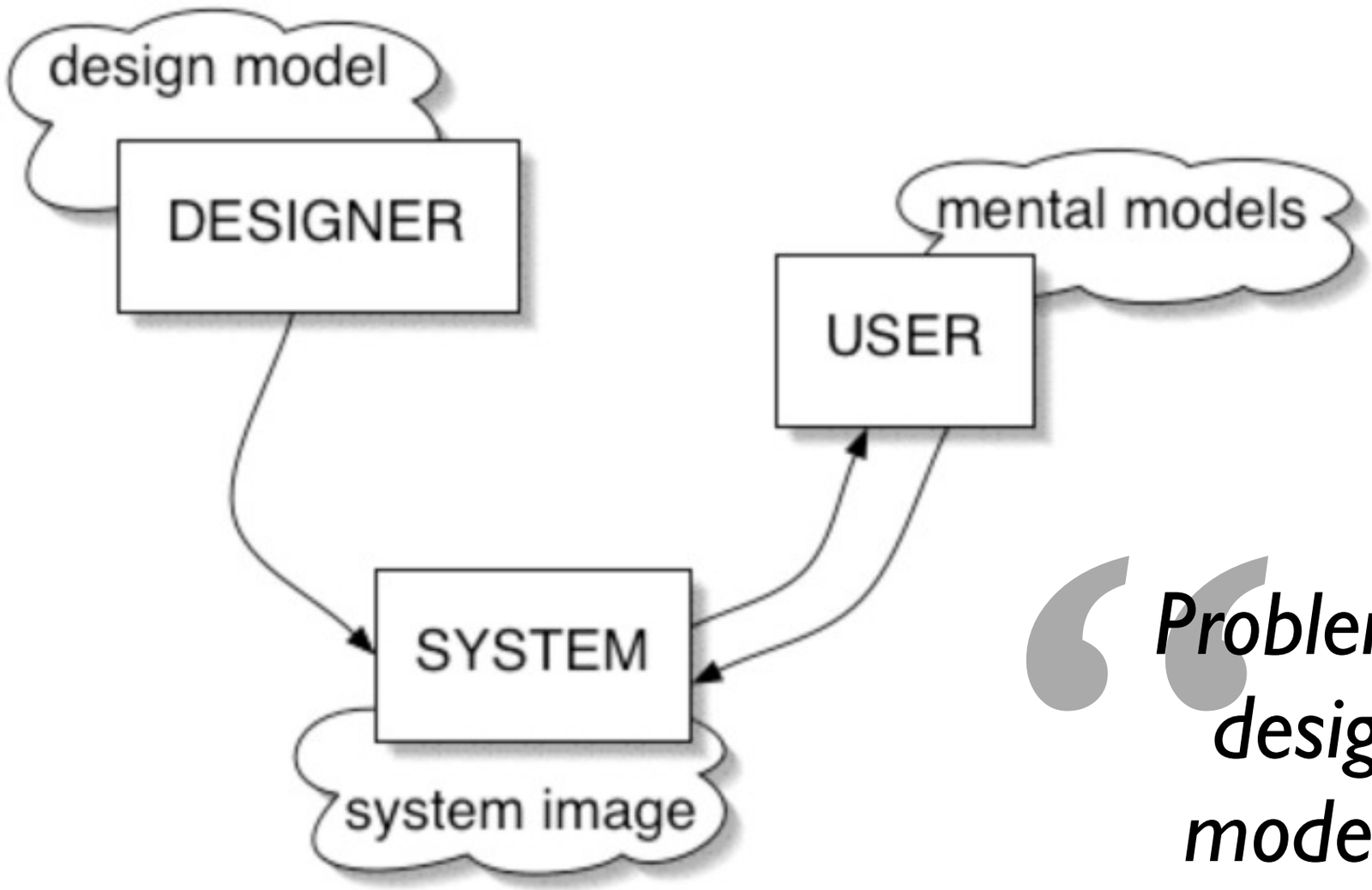
- We are surrounded by innumerable objects (20,000 everyday things)
- How do we cope?
  - Mind tries to make sense of things
  - Affordances support using objects easily
  - Designers can provide a good image of how a system works
- Humans form a conceptual model of how something works when they encounter it

Good Conceptual Models

- Principle of good design
- Allows to predict effects of our actions, and cope with problems

- Conceptual models are mental models of things
  - Other mental models: Of ourselves, others, the environment, …
  - Formed through experience, training, instruction

3 Models



“Problems arise when the designer’s conceptual model is different from what emerges as the user’s mental model”