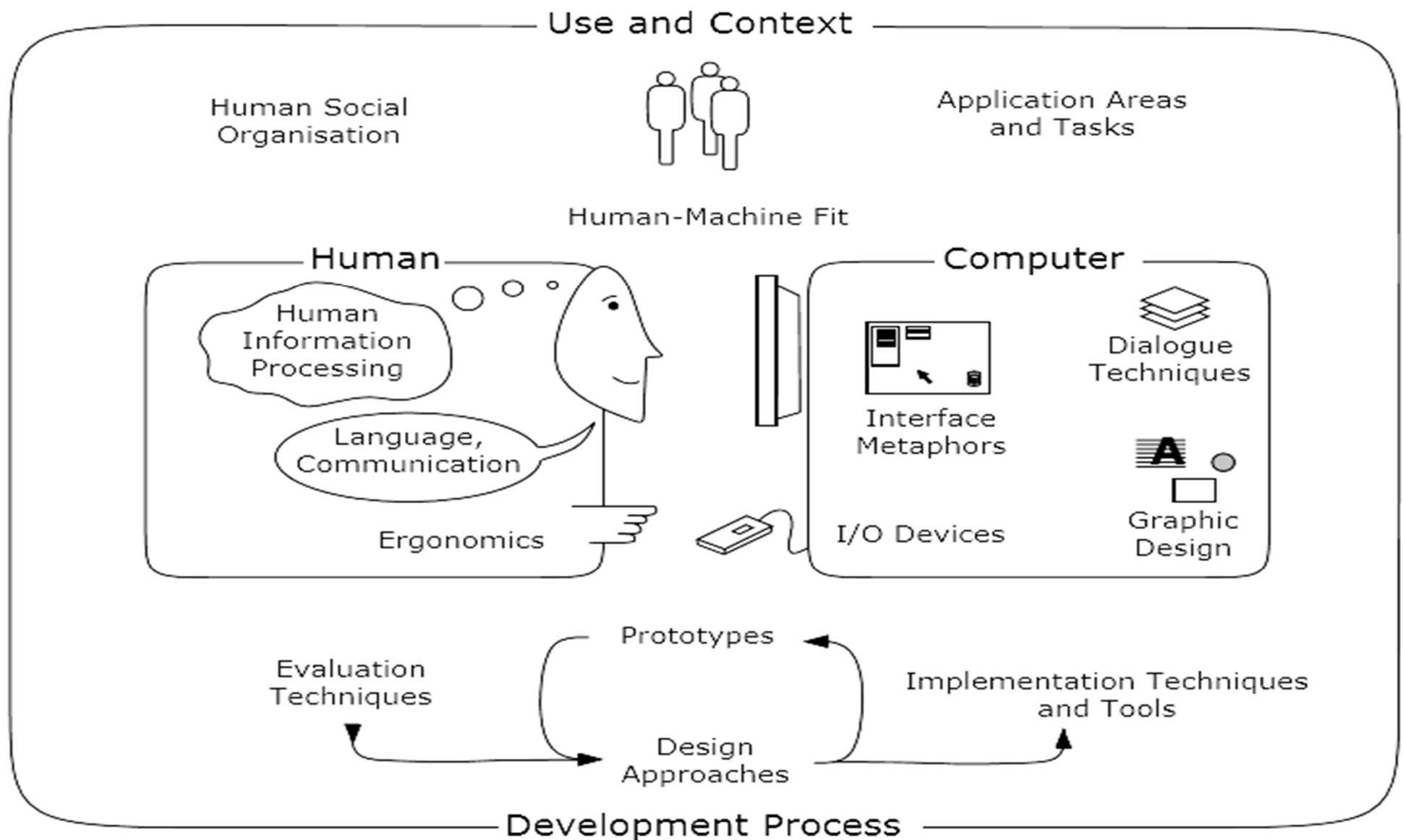


Human Computer Interaction

**THE PSYCHOLOGY
OF USABLE THINGS**

By: Nguyễn Công Hoan

Content



The nature of Human-Computer Interaction. Adapted from the ACM SIGCHI Curricula for Human-Computer Interaction [Hewett et al., 2002]

Agenda

- Psychopathology of Everyday Things
- Psychology of Everyday Things
- Psychopathology of Computers

The Psychopathology of Everyday Things



Shower Control



- Shower control: water either goes into the bath out of the faucet or comes out of the shower
- Sticker with instructions on the faucet.
- How do you make the water come out of the shower instead of the faucet?
- You have to reach under the faucet and pull the knob down!

What's in the bottle?

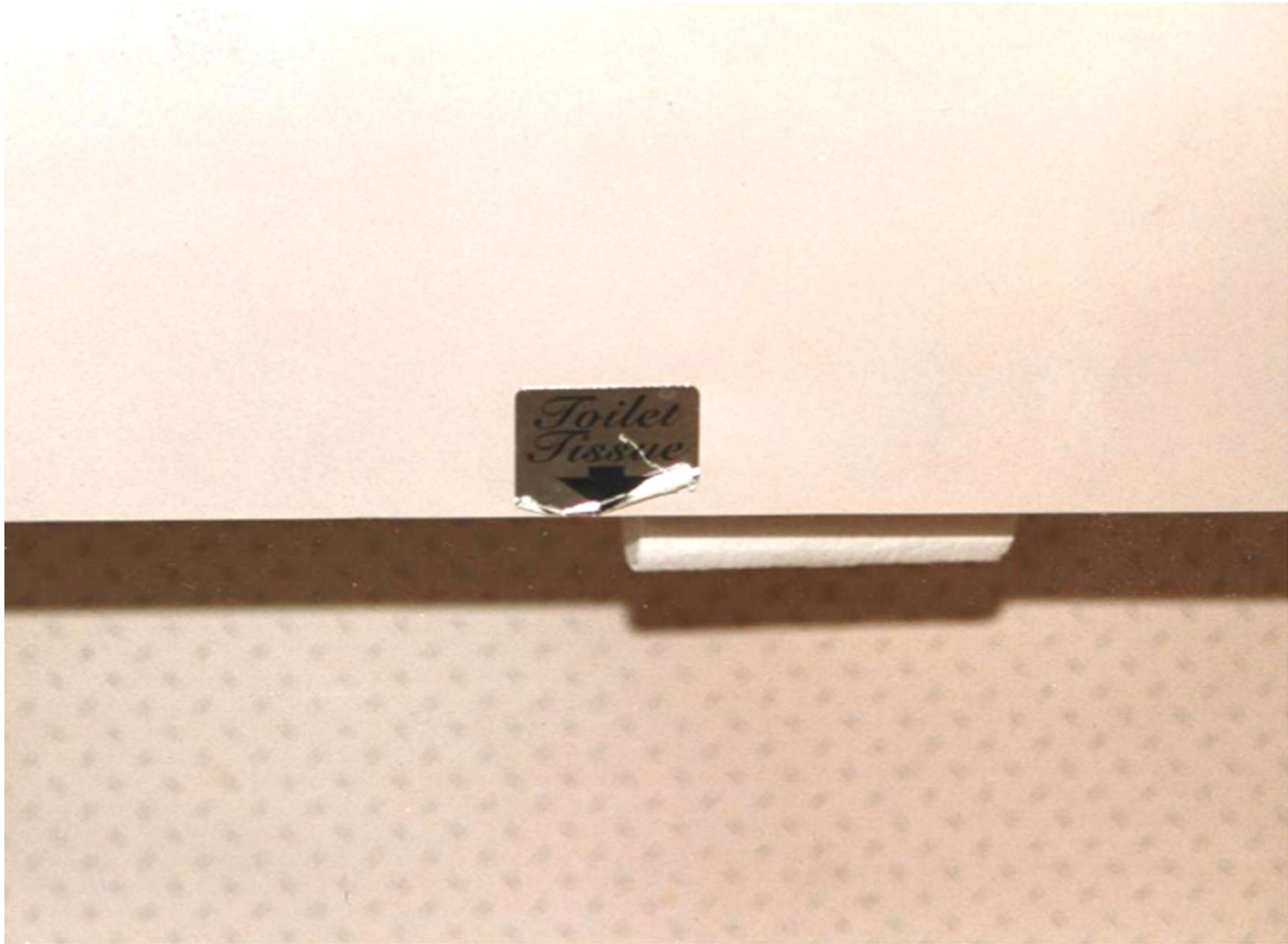


Where is the Toilet Paper?



Can you see where the toilet paper is in this hotel bathroom?

Ah, there it is! Well-hidden



Conclusion

Things that are hard to use
because they do not follow
human factors principles

Bad Design

- “ When simple things need pictures, labels, or instructions, the design has failed. ”
- “Poorly designed objects are not that easy to understand. They doesn't contain visible clues to their operation.”

• [Don Norman, The Design of Everyday Things, 1988 [Norman, 1992, page 9]]

BadDesign.com



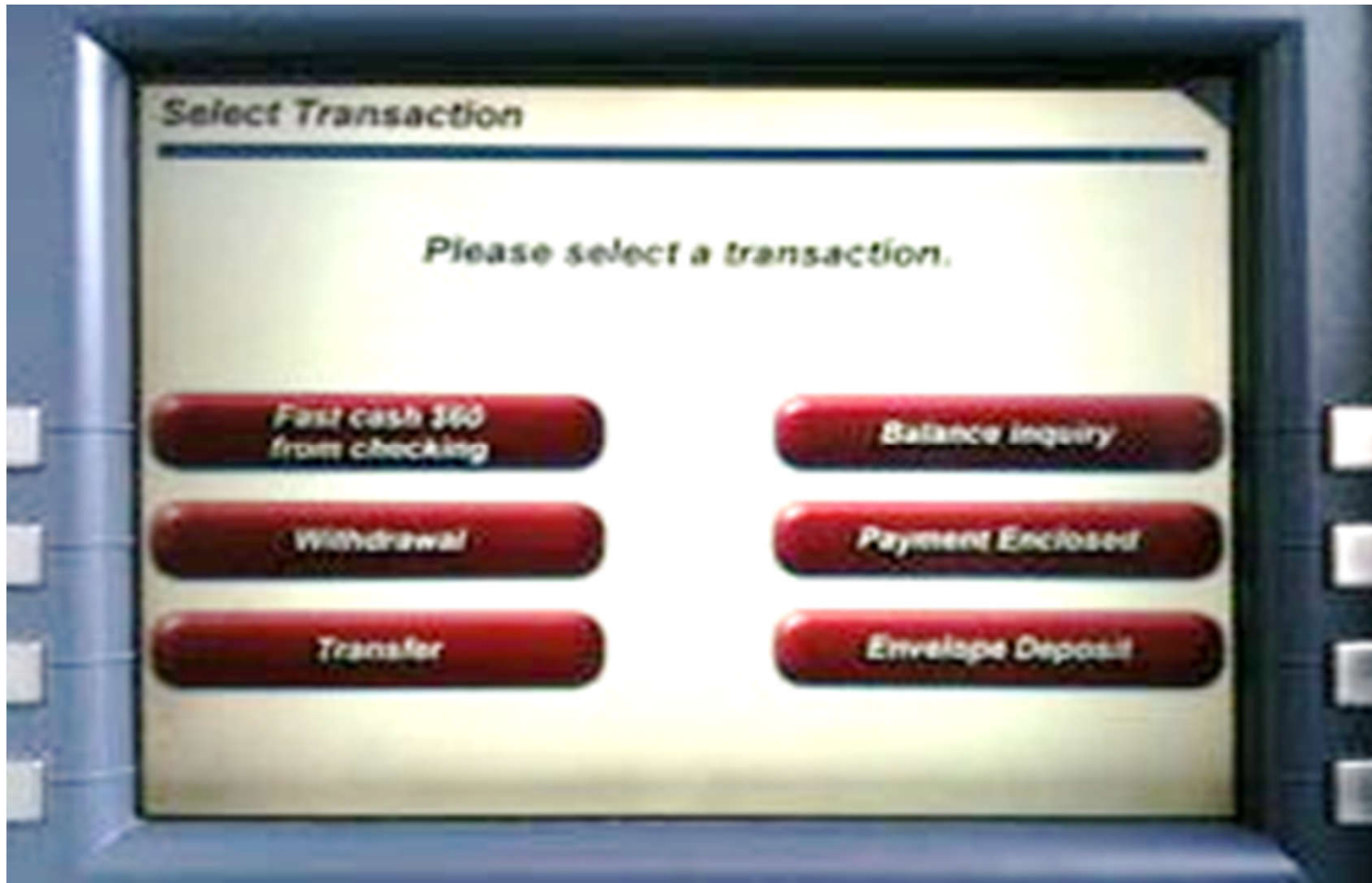
The Psychology of Everyday Things

- Perceived and Real Affordances
- Real World Affordances
- GUI Affordances
- Labels
- Mappings
- Constraints
- Conventions
- The Principle of Causality

Perceived and Real Affordances

- **A** **ordances** are the range of possible (physical) actions by a user on an artefact:
 - **Perceived A** **ordances** are the actions a user perceives to be possible.
 - **Real A** **ordances** are the actions which are actually possible.
 - **Perceived affordances** are what we *think* it can do, which may be correct or incorrect
 - The way to make sure the *affordances* are clear (that is, the *perceived affordances* match the *real affordances*) is to use *signifiers*, which are signs indicating what you can do

Perceived and Real Affordances

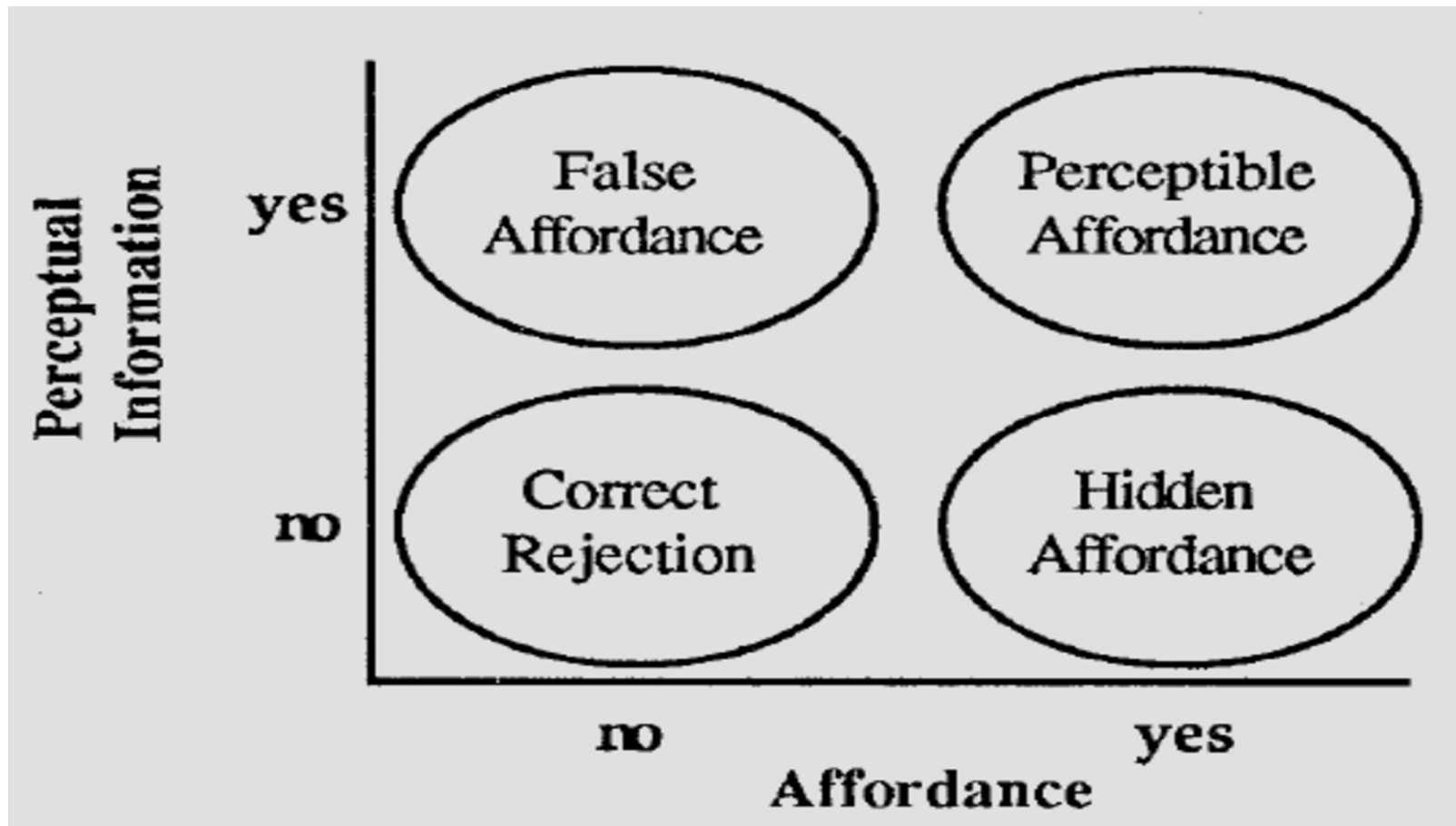


Less Helpful Affordance



The on/off slider button on the iPhone was changed when iOS4 was launched and the new design continues to confuse.

Perceived Affordances



Affordance Example



The handles on a tea set provide an obvious affordance for holding.

Strong Affordances

- A lot of basic engineering elements have strong affordances. For example:
 - when you see a button, you want to push it.
 - when you see a switch, you want to flip it.
 - when you see a crank, you want to turn it (although usually you can't tell if it affords being turned clockwise or counter-clockwise)

Real World Affordances

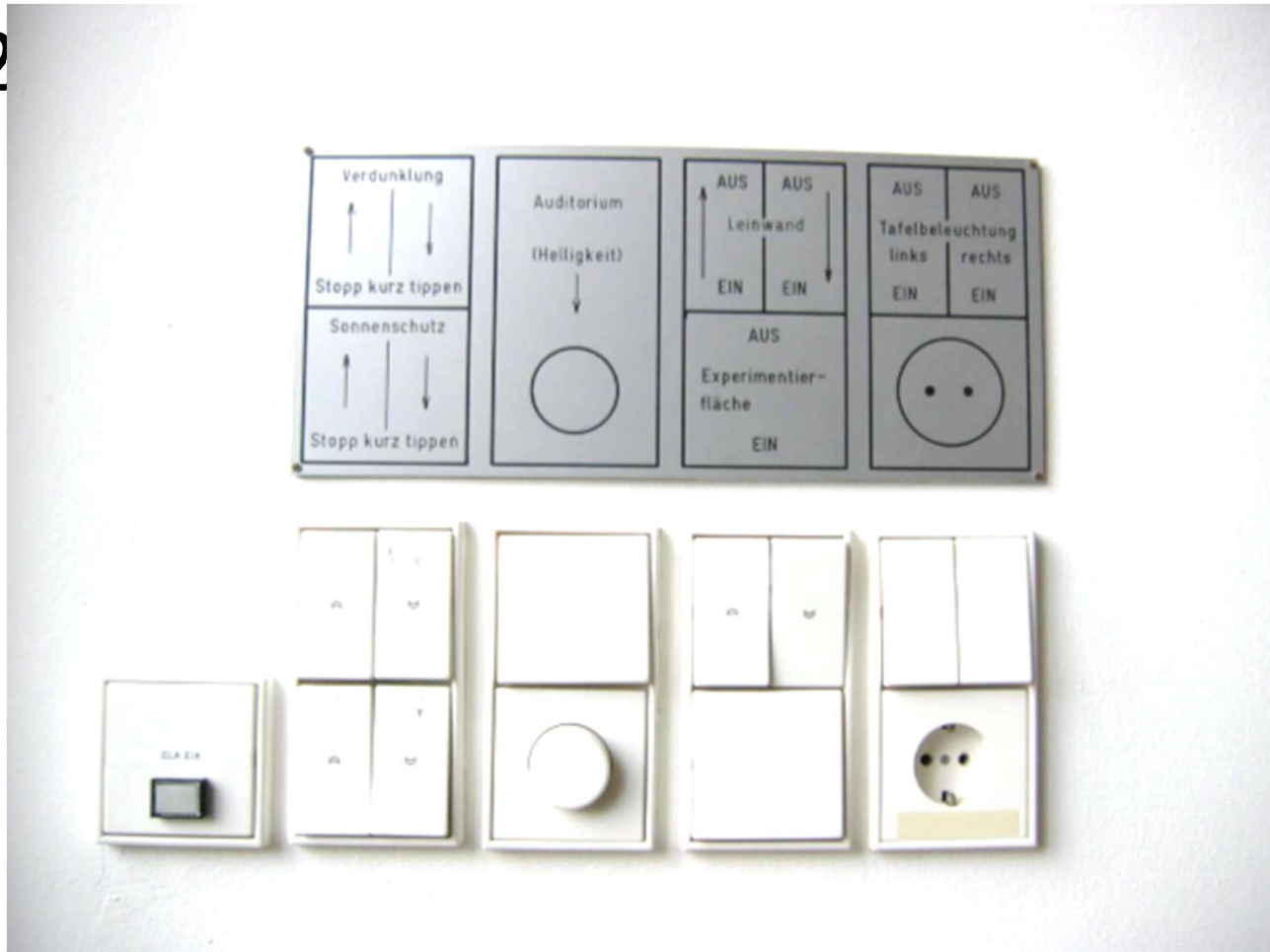
- For physical objects, there can be both real and perceived affordances (and the two sets are not necessarily the same).
- Appearance indicates how to use something:
 - A chair affords (suggests) sitting.
 - Knobs are for turning.
 - Slots are for inserting things.
 - A button affords pushing.
- When perceived affordances are taken advantage of, the user knows what to do just by looking.

GUI Affordances

- For screen-based interfaces, the computer hardware already has built-in physical affordances:
 - Screen affords touching.
 - Mouse affords pointing.
 - Mouse buttons afford clicking.
 - Keyboard affords typing.
- Changing the shape of the cursor to indicate a clickable link is not an affordance (you can still click anywhere), but visual feedback.
- Physically locking the mouse button on non-clickable areas is a real affordance.

Labels

- “When simple things need pictures, labels, or instructions, the design has failed!” Norman [1992]



Mappings

- Mappings are the relationships between controls and their effects on a system. Natural mappings take advantage of physical analogies and cultural standards. Examples:
 - Turn steering wheel clockwise to turn a car right. Actually, there are two mappings here:
 - which control affects steering,
 - which direction to turn it.
 - Move a control up to move an object up.
 - Use a louder sound to mean a greater amount.

Constraints

- The difficulty of dealing with a novel situation is directly related to the number of possibilities. Constraints are physical, semantic, cultural, and logical limits on the number of possibilities.
- Physical constraints such as pegs and holes limit possible operations.
- Semantic constraints rely upon our knowledge of the situation and of the world.
- Cultural constraints rely upon accepted cultural conventions.
- Logical constraints exploit logical relationships.
For example, a natural mapping between the spatial layout of components and their controls.
- Where affordances suggest the range of possibilities, constraints limit the number of alternatives.

Conventions

- Conventions are cultural constraints. They are initially arbitrary, but evolve and become accepted over time. They can however still vary enormously across different cultures, for example:
- Light switches: America down is on, Britain down is off
- Water taps: America anti-clockwise is on, Britain clockwise is on
- The colour red: America danger, Egypt death India love, China happiness

The Principle of Causality

- Causality is the relation between two events, cause and effect, where the second occurs as a consequence of the first.
- Apparent causality is when something which happens immediately after an action, appears to have been caused by that action. We associate the effect with the apparent cause.

False Causality

- Coincidental effects lead to superstition:
 - Touch a computer terminal just before it fails, and you are apt to believe you caused the failure.
 - Start an unfamiliar application, just before the computer crashes.
- Invisible effects lead to confusion:
 - When an action has no apparent result, you may conclude it was ineffective (and repeat it). For example, repeatedly clicking the “Stop” button when the system is unresponsive.
- → There is a need for **feedback!**

Psychopathology of Computers

- **Beware Unix Commands**
 - Intend to type: `rm *~` to remove Emacs backup files.
 - Actually type: `rm * ~` which removes everything!
 - And there is no undo ...

The Terminal is Dead



When GUI Dead?

