Human Factors and Human-Machine Interaction
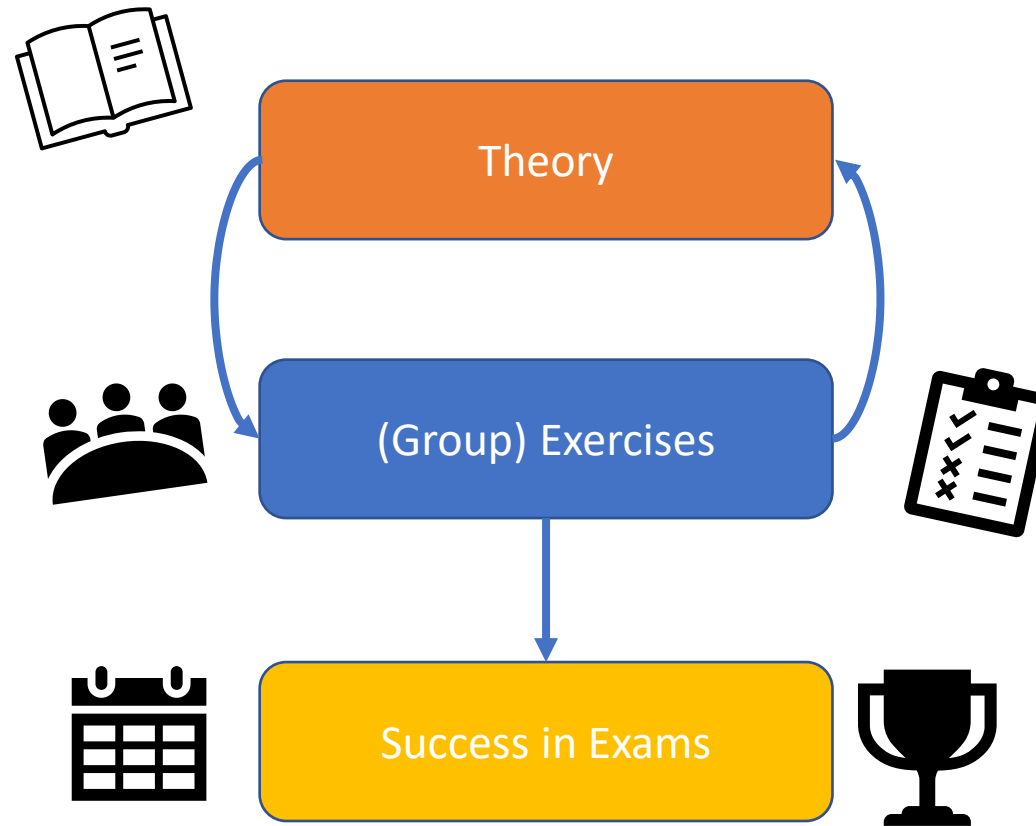
Introduction

FACULTY OF COMPUTER SCIENCE

COURSE ORGANIZATION

Interactive Lecture

# SCHEDULE (PRELIMINARY)

Lecture No.	Date	Topic
1	18.03.2024	Introduction & Design Basics
2	25.03.2024	Design of Everyday Things
	01.04.2024	Holiday
3	08.04.2024	Design of Everyday Things
4	15.04.2024	Cognitive Basics
5	22.04.2024	Cognitive Basics
6	29.04.2024	Information Dashboards
7	06.05.2024	Information Dashboards
8	13.05.2024	Information Dashboards
	20.05.2024	Holiday
9	27.05.2024	Usability Engineering
10	03.06.2024	Usability Engineering
11	10.06.2024	Usability Engineering
12	17.06.2024	Usability Engineering
13	24.06.2024	Usability Engineering Workshop
14	01.07.2024	Usability Engineering Workshop
15	08.07.2024	Exam Preparation (Q&A)

The Bed of Procrustes

LITERATURE
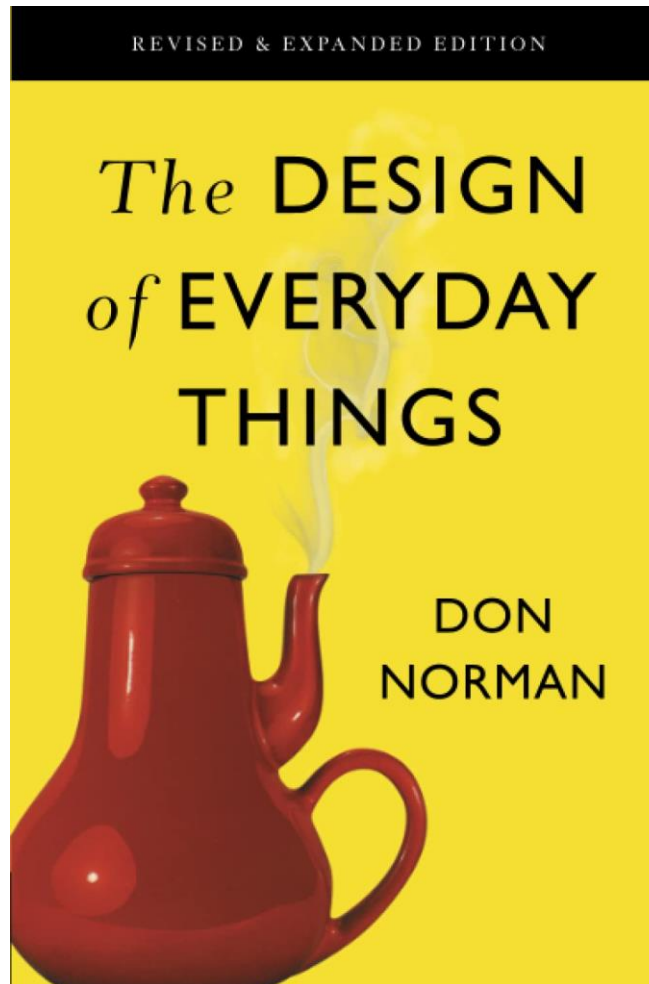
PSYCHOLOGY & DESIGN

- **Psychology**: Underlying mechanisms

- **Design**: universal (from door handle to complex processes)

- **Everyday objects/things**: Principles are universally valid

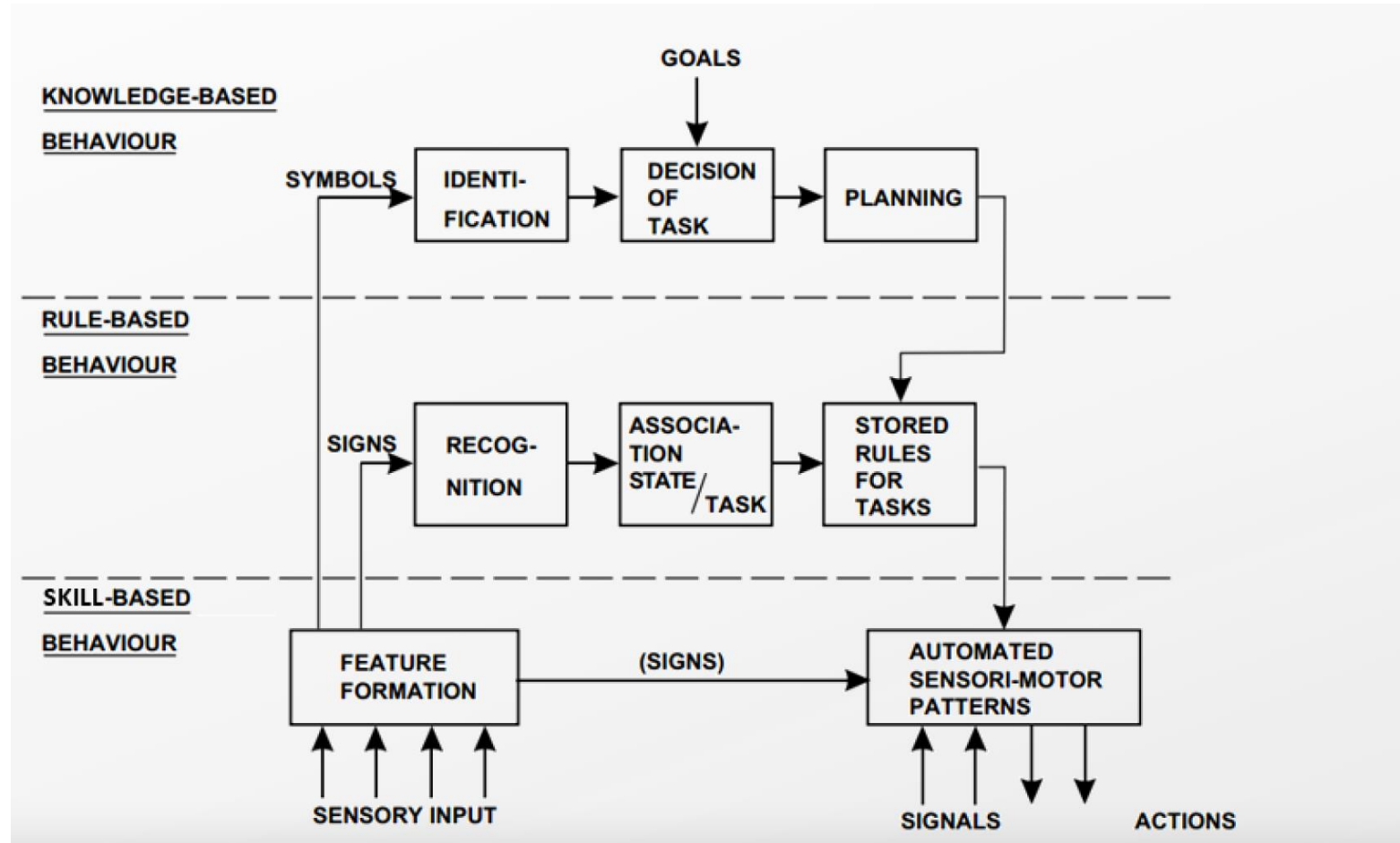- **Human Centered Design**: Principles remain valid across different technologies

GOOD VS. BAD DESIGN

- **Two** cognitive systems:
  - System 1: automatic, fast, intuitive, effortless
  - System 2: slow, strenuous, reflective
- Good Design
  - Is not really „present"
  - Fluent & effortless interaction (System 1)
- Bad Design
  - Requires attention
 - Reflective
  - Strenuous (System 2)

SRK TAXONOMY

PSYCHOPATHOLOGY OF EVERYDAY THINGS

- *„The scientific study of mental disorders, including their theoretical underpinnings, etiology, progression, symptomatology, diagnosis, and treatment […]*" (as defined by the APA)

- Goal: Seamless interaction

- Learning through Trial and Error and system limits

- Analogy:
  - Perception: Visual Illusion vs. Reality
  - Decision behaviour: Heuristics & Biases vs. Rationality
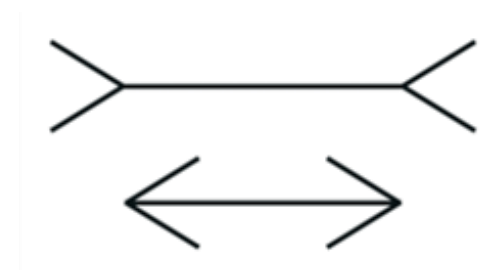
CHARACTERISTICS OF GOOD DESIGNS

Discoverability

- What actions are possible?
- Where and how to perform them?

Understanding

- How is the product supposed to be used?
- What do all the different controls and settings mean?
- What state is the system in?

EXAMPLE: DISCOVERABILITY & UNDERSTANDING

https://www.usability.ch/news/anarchie-der-fernbedienung.html

Pull

AUTOMATIC
DOOR

Pull

AUTOMATIC
DOOR

THE COMPLEXITY OF MODERN DEVICES

- **All artificial things are designed! → Design is universal**
- Design does not require physical structure
  - Rules
  - Procedures
  - Organizational structures
- Design: formal & explicit vs. informal & implicit
- Major areas of design:
  - Industrial design
  - Interaction design
  - Experience design

THE COMPLEXITY OF MODERN DEVICES

- **Aim** of **good design**:
  - Use people's strengths
  - Compensate weaknesses

- **Strengths** and **weaknesses** of Human and Machine
  - Paul Fitts: MABA-MABA-Lists
  - Artificial Intelligence, Automation

- **Reasons** for **bad** Human Computer Interaction (**HCI**)
  - We are all experts for human behaviour?
  - „Rational" design

https://link.springer.com/article/10.1007/s10111-011-0188-1/figures/2
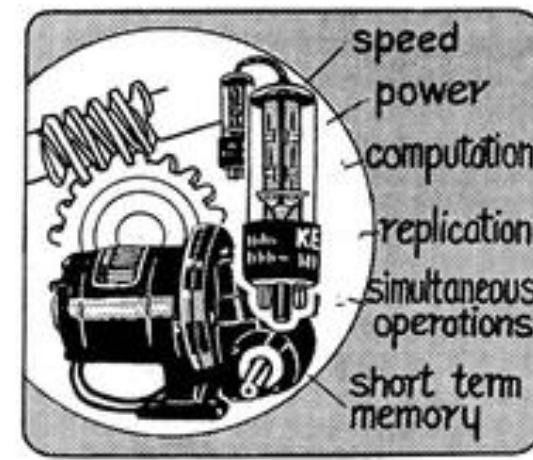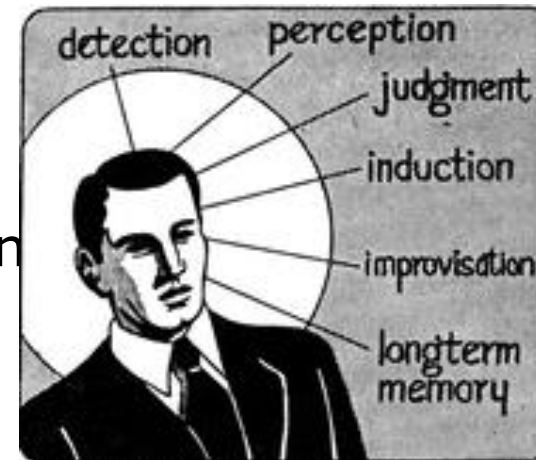
HCD – HUMAN CENTERED DESIGN

- The „Center":
  - Human Needs
  - Capabilities
  - Behaviour

- Design to accomodate these needs
- Learn from mistakes → Iterate
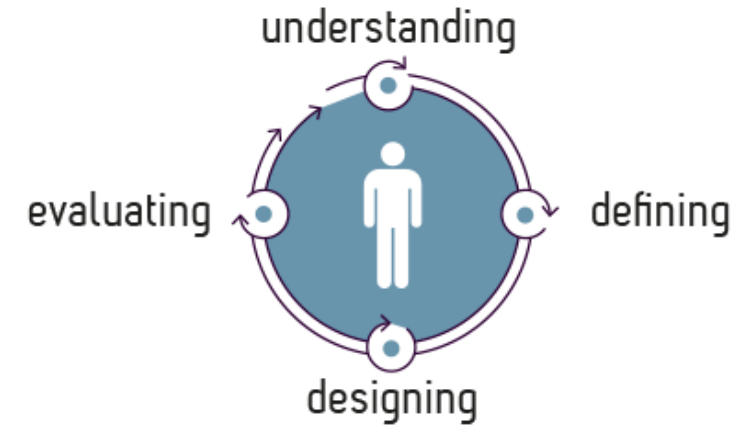
EXERCISE

1. Form groups of 4 people

2. Read up on **Discoverability** and **Understanding** (pp. 1-4)

3. **Find things/items** with (in your opinion) **good/bad** design

4. **Why are they good/bad?** Argue with the what we learned about Discoverability and Understanding

5. **Present**

FUNDAMENTAL PRINCIPLES OF INTERACTION

Discoverability & Understanding results from appropriate application of **six** fundamental psychological concepts:

- Affordances
- Signifiers
- Constraints
- Mappings
- Feedback
- Conceptual Models

We talk about these next week!

CREDITS

This presentation/course uses slides provided by Prof. Armin Eichinger. Thanks!