浙江大学计算机学院
数字媒体与网络技术

Human Computer Interaction

Interaction Framework

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What is Interaction Design: Recap

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What is Interaction Design: Recap

- Designing interactive products to support people in their everyday and working lives.

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Goals of Interaction Design

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Goals of Interaction Design

- Develop usable products to allow users to carry out tasks
  - Safely
  - Effectively
  - Efficiently
  - Enjoyably

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Frameworks for Understanding Interaction

- A framework is basically a structure that provides a context for conceptualizing something
- We can use these frameworks to:
  - Structure the design process
  - Help us to identify problematic areas within the design
  - Help us to conceptualize the problem space as a whole
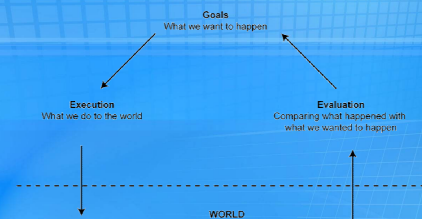
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Execution/Evaluation Action Cycle (EEAC)

- Donald Norman (1990) *The Design of Everyday Things*

- The structure of an action has four basic part:
  - **Goals:** We begin with some idea of what we want to happen; this is our goal.
  - **Execution:** We must then execute an action in the world.
  - **World:** To execute and action, we must manipulate objects in the world.
  - **Evaluation:** Finally, we must validate our action and compare the results with our goal.

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Execution/Evaluation Action Cycle (EEAC)

Goals
What we want to happen

Execution
What we do to the world

Evaluation
Comparing what happened with what we wanted to happen

WORLD

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Execution/Evaluation Action Cycle (EEAC)

- Goals do not specify particular actions
- Goals and intentions do not have a one-to-one, relationship

- "Delete text" goal
  - Intention that involves the Edit menu
  - Intention that involves the Delete key
- Each intention involves a sequence of actions

Goal > Intention > Actions > Execution

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Execution/Evaluation Action Cycle (EEAC)

- Evaluate Results
  - Perceive new state
  - Interpret what we perceive
  - Evaluate new state with goal
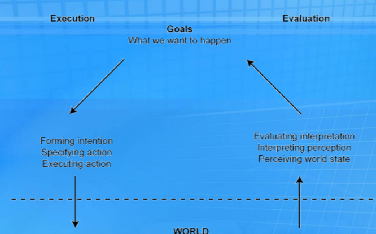
Perceive > Interpret > Evaluate

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Execution/Evaluation Action Cycle (EEAC)

- Seven Stages of Action

Eg. Reading

Execution   Evaluation

Goals
What we want to happen

Forming intention
Specifying action
Executing action

Evaluating interpretation
Interpreting perception
Perceiving world state

WORLD

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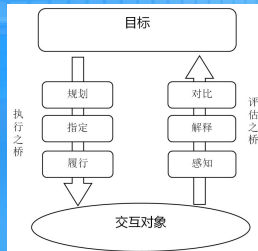### Execution/Evaluation Action Cycle (EEAC)

- The seven stages form a cycle

- The cycle can be initiated at any point

  - Some goals are data-driven - initiated when an environmental event is perceived

  - Others are goal-driven - initiated when the person conceives of a new goal

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Execution/Evaluation Action Cycle (EEAC)

- Seven Stages of Action

目标

规划 | 对比
指定 | 解释
履行 | 感知

执行之桥 | 评估之桥

交互对象

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Gulf of Execution

- Does the interface allows us to carry out the actions required by the intention?

  Goal = save a file
  Intention = use the file menu
  Action = click the save option

- Is there a save option in the file menu?

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Gulf of Evaluation

- Given a particular interface design, how easily can you:

  – Determine the function of the device?
  – Determine what actions are possible?
  – Determine mapping from intention to physical movement?
  – Perform the action?
  – Determine whether the system is in the desired state?
  – Determine the mapping from system state to interpretation?
  – Determine what state the system is in?

(Norman, 1990)

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Interaction Framework

- Abowd and Beale expanded on the EEAC to include the system

- **System (S)**—Uses its core language (computational attributes related to system state)

- **User (U)**—Uses its task language (psychological attributes related to user state)

- **Input (I)**—Uses its input language

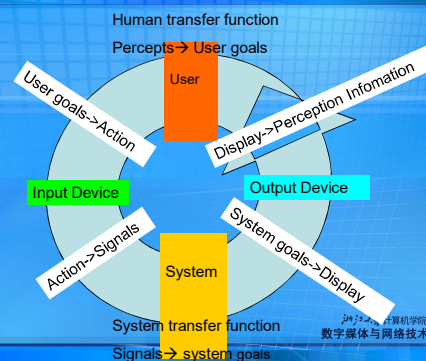- **Output (O)**—Uses its output language

1-16

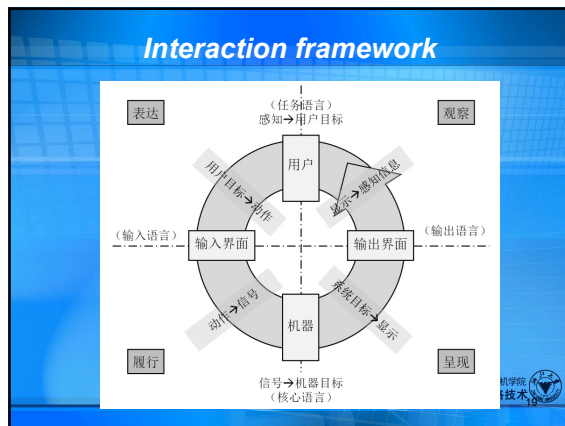### Interaction Framework / EEAC

- **Execution Phase**
  – **Articulation**—The user formulates a goal, which is then articulated using the input language.
  – **Performance**—The input language is translated into the core language (operations that the system will carry out).
  – **Presentation**—The system manifests the result of the core-language operations using the output language.

- **Evaluation Phase**
  – **Observation**—The user interprets the results on the screen and reconciles them with the original goal.

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General Idea of a User Interface

Human transfer function
Percepts→ User goals

User

User goals->Action

Display->Perception Infomation

Input Device

Output Device

Action->Signals

System goals->Display

System

System transfer function

Signals→ system goals

Interaction framework

General Idea of a User Interface

- A computer system involves communication from a *Designer* to a *User*
- Hopefully, the model intended by the designer is perceived by the user

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User Interface Design Requires:

- Knowledge of *People*
- Knowledge about the *Task*
- Knowledge about *Computers*

User Interface Design Requires:

- Knowledge of *People*
- Knowledge about the *Task*
- Knowledge about *Computers*

The 2nd part of this course is much more conceptual, informal and seemingly less technical than some of the courses you experience. This is because we must address the human aspects of interaction before we can provide satisfactory technical models and solutions.

Knowledge of People Requires Knowledge of :

- Cognitive psychology e.g. limitation of human short-term memory, gender differences
- Physical characteristics e.g. poor eyesight, small children
- Human perceptual abilities e.g. colour perception
- Language skills
- Learning ability
- Social interactions

Goal in HCI: Universal Usability

- Address the needs of ALL users
- The computer is incidental to the design
- Achieve usability by considering humans and human needs as the driving force behind a design.

(1) Occurring or likely to occur as an unpredictable or minor accompaniment
(2) Of a minor, casual, or subordinate nature

What is usability?

- what do you think usability is ......?

Thank you.