

Lecture 6

Human Side – Cognition Framework

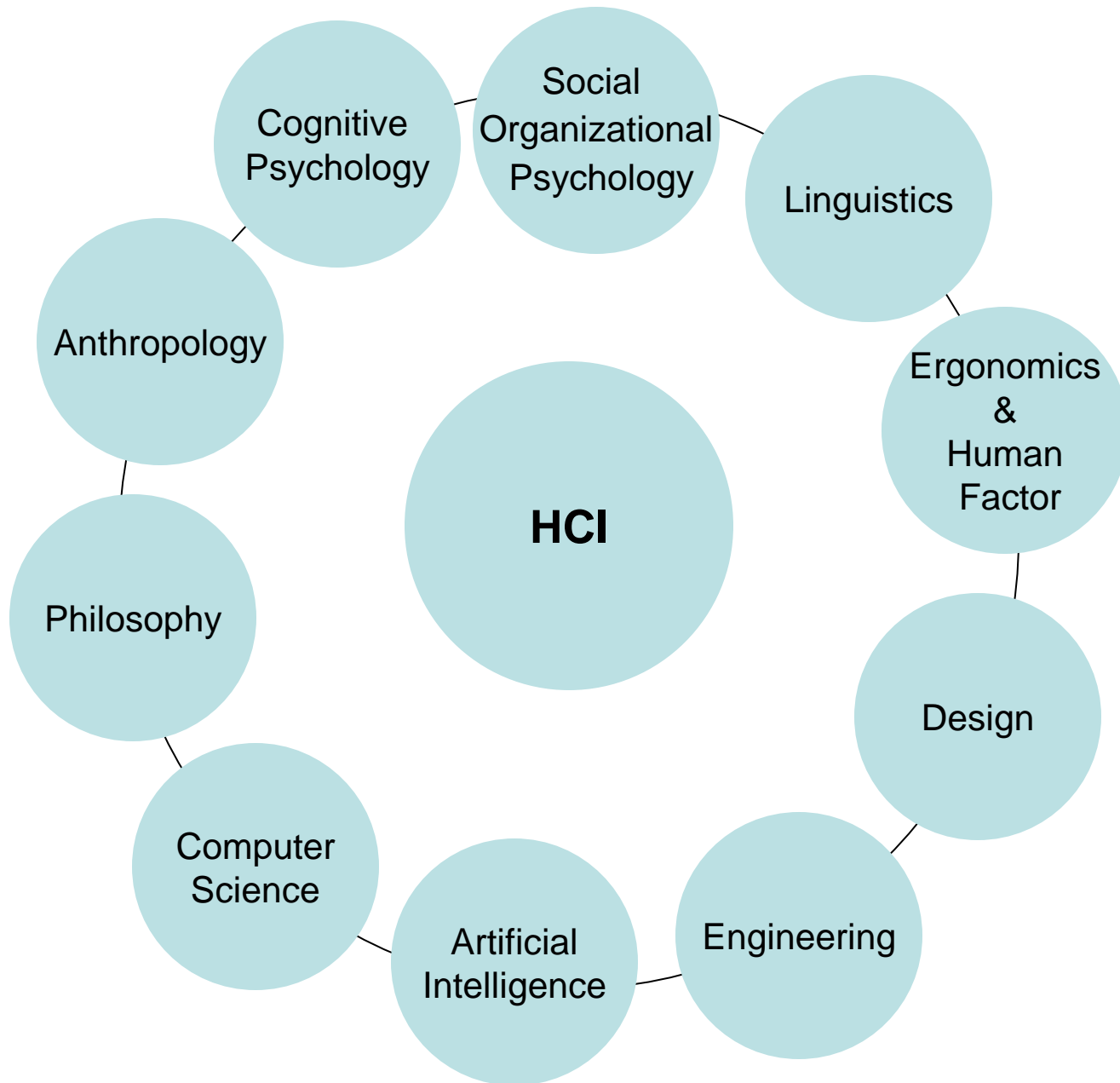
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In the Last Lecture

- Factors in HCI
- Usability and Quality
- Interdisciplinary nature of HCI



Quote from Last Lecture – Terry Winograd

“HCI is the kind of discipline which is neither the study of humans nor the study of technology, but rather the bridging between the two. So you always have to have one eye open to the questions:

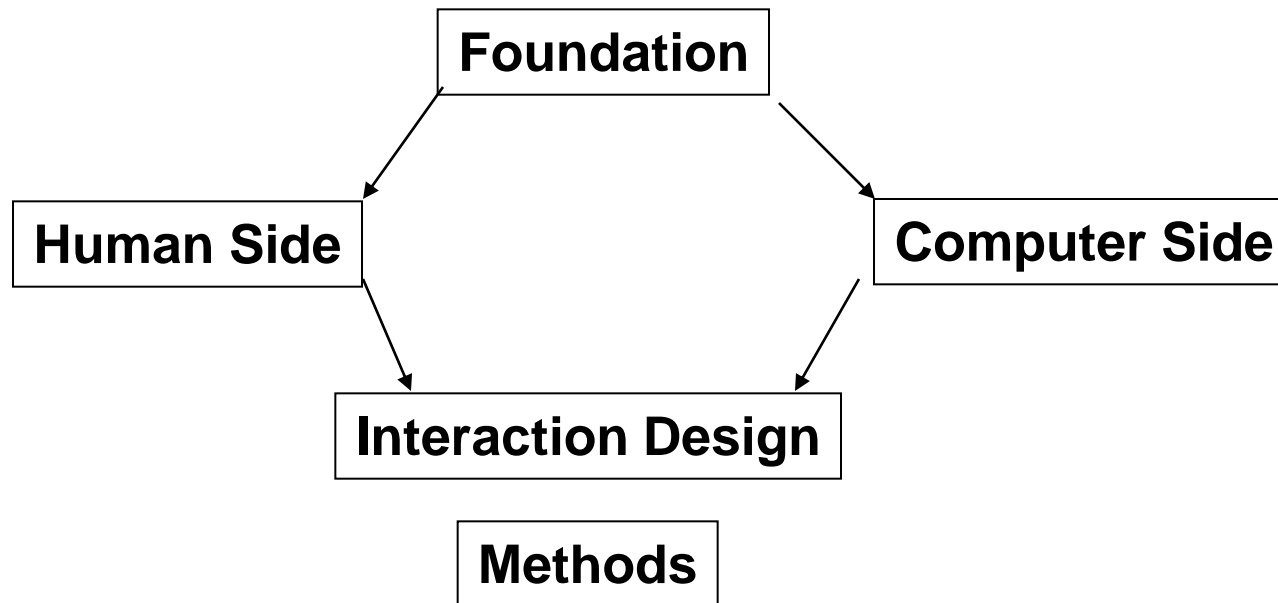
- What can the technology do?
- How can you build it ?
- What are the possibilities?

And one eye open to the question”

- What are people doing and how would this fit in
- What would they do with it ?

If you lose sight of either of those you fail to design well .. I think the challenge is to really keep knowledge of both the technology and the people playing ff against each other in order to develop new things”

How will we proceed now ?



In Today's Lecture – Human Side

- Cognition
- Cognitive Framework

Going for a Drive

- Driving a Car with a Keyboard
- Steering with Arrow keys
- Brake – Space bar
- Acceleration – Enter
- Indicators
 - Left – F1
 - Right – F2
- Horn – F3
- Headlights – F4
- Windscreen Wipe – F5

Going for a Drive

- Driving along on Highway
- Suddenly a Cow comes in front
- What do you do ?
- What are your chances of survival

Cognitive Psychology

- Psychology primarily concerned with human behavior and the mental processes that underlie it.
- It is primarily concerned with information processing

Cognition

- Process by which we became acquainted with things or in other words gain knowledge
 - Understanding
 - Remembering
 - Reasoning
 - Attending
 - Creating a new idea
- How Humans and Computers interact with one another in terms of knowledge transmitted by them

Cognition

- Also described in terms of specific process
 - Attention
 - Perception
 - Memory
 - Learning
 - Reading, speaking and listening
 - Problem solving, planning, reasoning, decision making

Modes of Cognition (Experiential and Reflective)

- Experiential
 - We perceive, act and react to events around us effectively
 - Identify the cognitions shown in previous as experiential
 - Driving a car, reading
- Reflective
 - Involves thinking , comparing and decision making

What Goes inside the head

Perceiving
Thinking
Remembering
Learning

Understanding others
Talking to others
Manipulation others



Planning a meal
Imaging a trip
Painting
Writing
Composing

Making decisions
Solving problems
daydreaming

Information Processing ...

- Lets look at how humans process information
- Identify the following:



So what was it ?

- **Was it :**
 - An elephant ?
 - A Tiger
 - An Apple
 - Roses
- **Roses Of course**

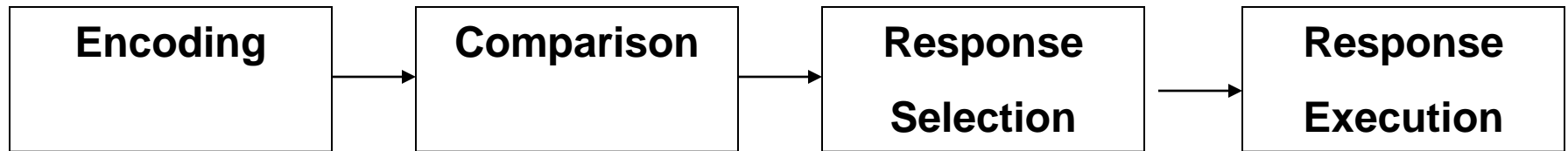
Information Processing Analysis

- Trace mental operations
- Example Retrieving a friends phone number
 - Identifying friends Name
 - Retrieving meaning of words
 - Understanding the meaning of set of words given in the exercise
 - Retrieve number from memory
 - Generate plan and formulate the answer
 - Recite digits or write them down

How come we all Recognized them as Roses

- Behind the scenes of Information processing in Humans:
 - **Input Channels** Sight, hearing, touch, smell, taste
 - **Encoding** information from environment in some kind of internal representation
 - Internal representation is compared with memorized representations (**Comparison**)
 - Concerned with deciding on a response to the encoded stimulus (**Response Selection**)
 - Organizing response and necessary action (**Response Execution**)

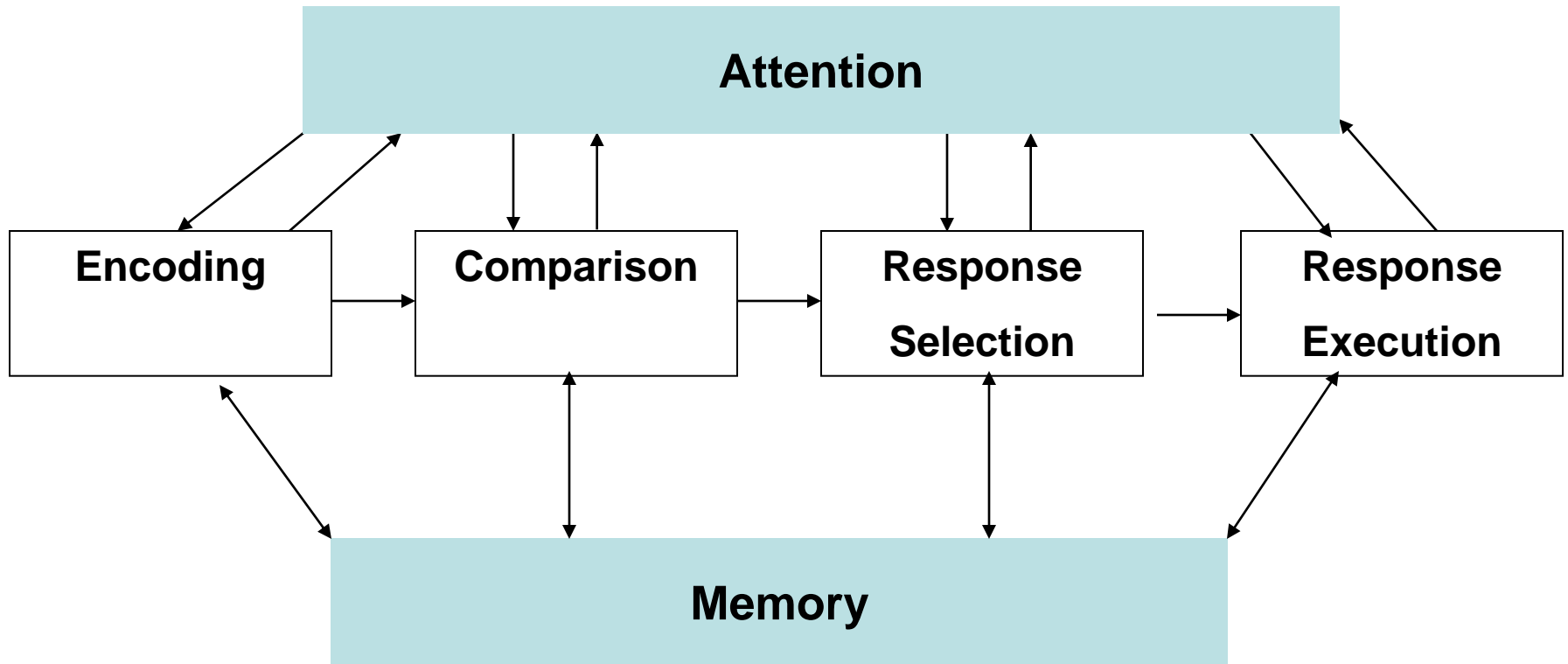
Human Information Processing Model



Extended Model

- How Information is perceived by the perceptual processors
- How information is attended to
- How information is processes and stored in Memory

Extension to the Information Processing Model



Human Processor Model

- Helps Conceptualize human behavior
- Models of users: Model human Processor
 - Perceptual System
 - Motor System
 - Cognitive System

Models

- Human Information Processing Models
- Human Processor Models
- These models are based solely upon mental activities

GOMS

- Goals
- Operators
- Methods
- Selection Rules

More Models

- Knowledge Representation Models
- Mental Models
- User Interaction Learning Models
- Apply to HCI through
 - Conceptual Models
 - Interface Models

Other Approaches

- Computational Approach
 - Computer metaphor as theoretical framework
- Connectionist Approaches
 - Brain metaphor as neural networks or parallel distributed processing
- Emphasis on
 - What is important is processed

More Frameworks

- External Cognition
- Distributed Cognition

External Cognition

- Externalizing to reduce memory load
- Computational offloading
- Annotating and Cognitive tracing

External Cognition - Externalizing

- Knowledge is transformed into external representations
 - Example birthdays
 - Phone numbers
 - Addresses
 - Appointments
- Talk about Ghalib tying knots to remember whatever verses he created at night

External Cognition – Computational Offload

- Computational Offloading
 - Try the following
 - 2×3
 - 12×15
 - 12387×9875

External Cognition – Annotating and Cognitive Tracing

- Annotating and Cognitive tracing
- Modify representation to reflect changes that are taking place
 - Annotating
 - Cognitive Tracing

Information Visualization

Beyond Cognitive framework

- Where do you think the framework lacks?
 - Lack of consideration for other aspects
 - How people interact with each other
 - How people interact with objects other than Computer system.
 - **In Short Context**

Distributed Cognitive framework

- **Describing cognition as it is distributed across individuals and settings (functional systems) in which it takes place.**
- **To provide explanation to conceptualize cognitive activities**
- **Analyze processing from the following aspect**
 - **Cognitive**
 - **Social**
 - **And Organization**

Distributed Cognitive framework

- **Consider an example taking a plane to higher altitude**
 - **ATC gives clearance to pilot to fly to higher altitude (verbal)**
 - **Pilot changes altitude meter (mental and physical)**
 - **Captain observes pilot (visual)**
 - **Captain flies to higher altitude (mental and physical)**

Summarize

- **In the Next Lecture**
- **Talk about Input Channels**