

# Fundamentals of Human-Computer Interaction 1



Photos/collage by Jack L. Moffet in Dan R. Olsen, « Interacting in Chaos », Interactions, sept-oct 1999.

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Interaction  
phenomenon  
to be  
controlled



# Outline

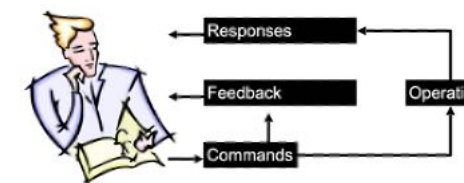
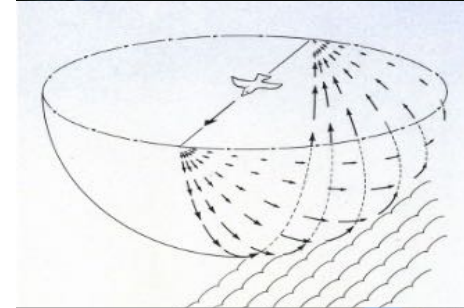
Introduction

Interaction styles

Psychology of interaction

Graphical interaction

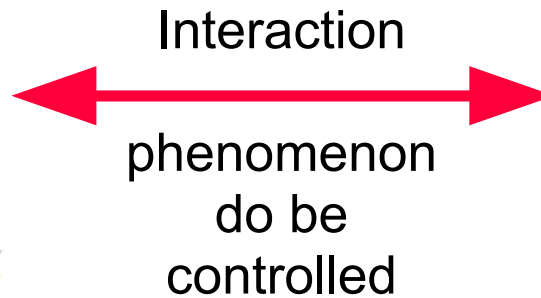
Conceptual design



# Human-Computer Interaction



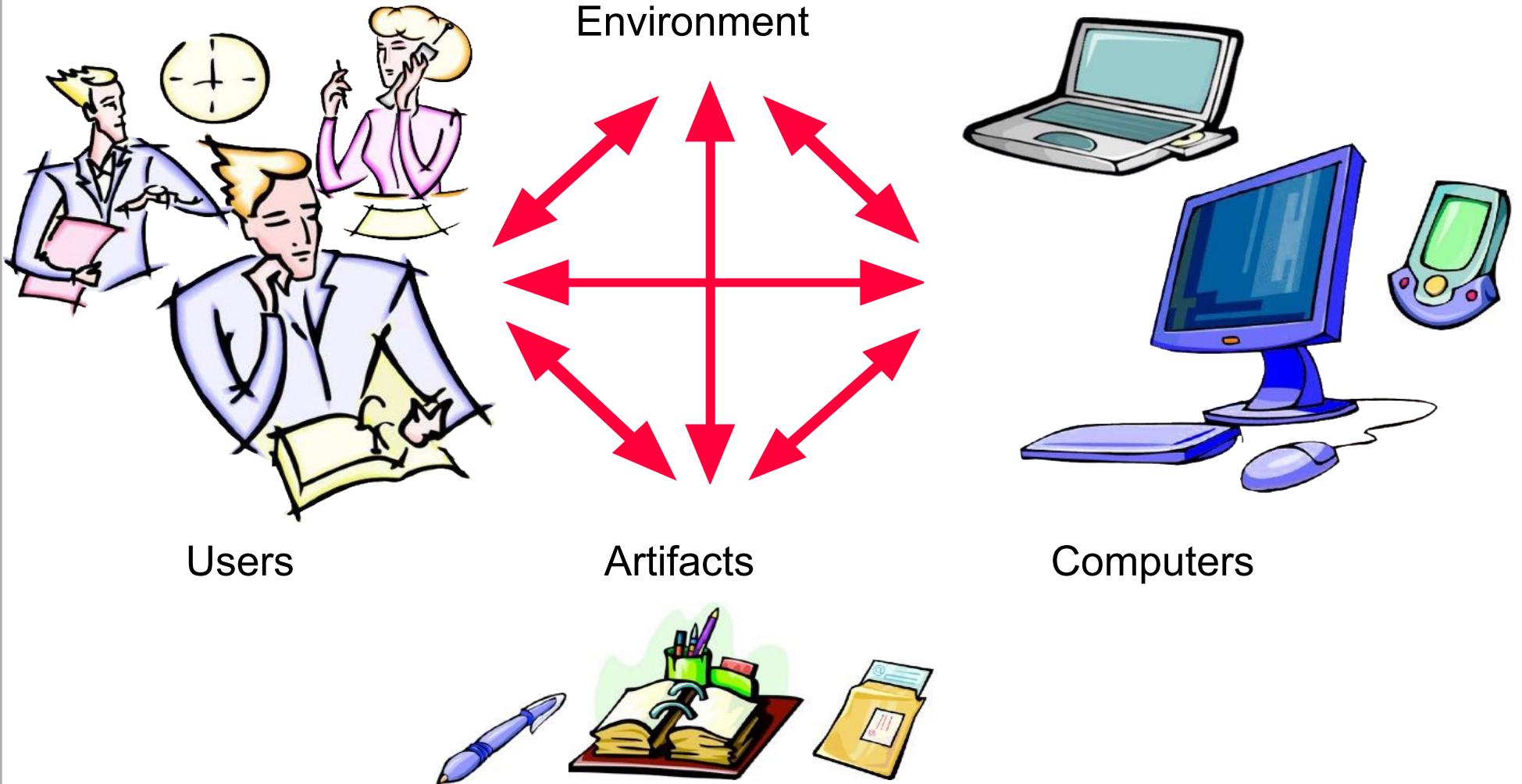
Capabilities: action,  
perception, cognition



Capabilities: computation,  
storage, input/output

Environment: physical, social,  
organisational, cultural, etc.

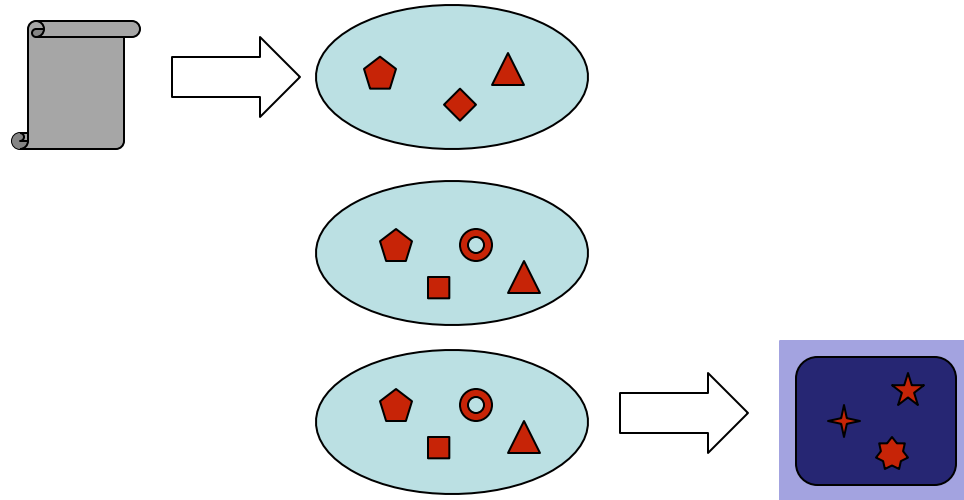
# In the real world: *Situated Interaction*



# An interactive system is **not** ...

An algorithmic system that:

- Reads input
- Processes it
- Writes results

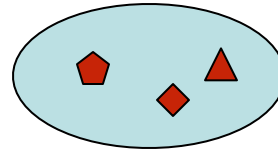


See Wegner, *Interaction is more powerful than algorithm*

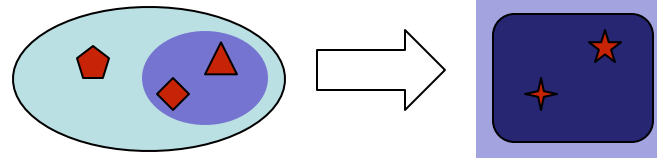
# An interactive system is ...

A computer system that:

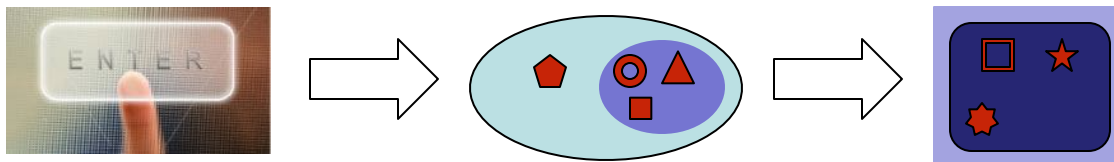
- Holds an internal state



- Creates perceivable representations of part of this state



- Reacts to input as soon as it arrives



# Three properties of interactive systems

Reactive:

U provides input to S,

S must process it immediately and generate output to U

Open:

dependencies between S's output  
and U's future input are unknown to S

Asymmetric:

U does not have to react immediately to S

U likes to know the dependencies between S's input and output

# Two conceptions of human-computer systems

« human-in-the-loop »

System-centric view where the user must conform to the system's rules, e.g. provide input in a specific order or format

Addresses operational tasks where the user performs actions that the computer cannot (yet) do



# Two conceptions of human-computer systems

## « computer-in-the-loop »

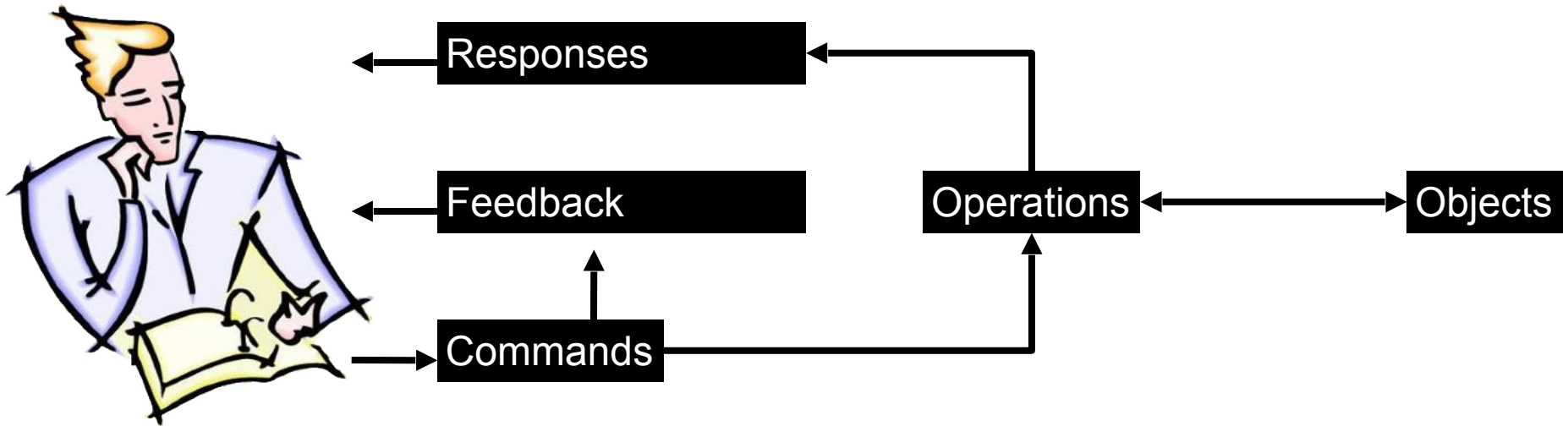
Human-centric view where the computer must be adapted to the capabilities of the user

Addresses creative tasks where the computer extends or augments the capabilities of the user



# Conceptual model

Model of how this system operates



Ideally, matches the user's *mental model*

# BEWARE!

We all use interactive systems

We all have ideas of how to improve them

... But few are designers or HCI researchers

Paradox of Human-Computer Interaction (HCI):

Measure of success = invisibility, transparency

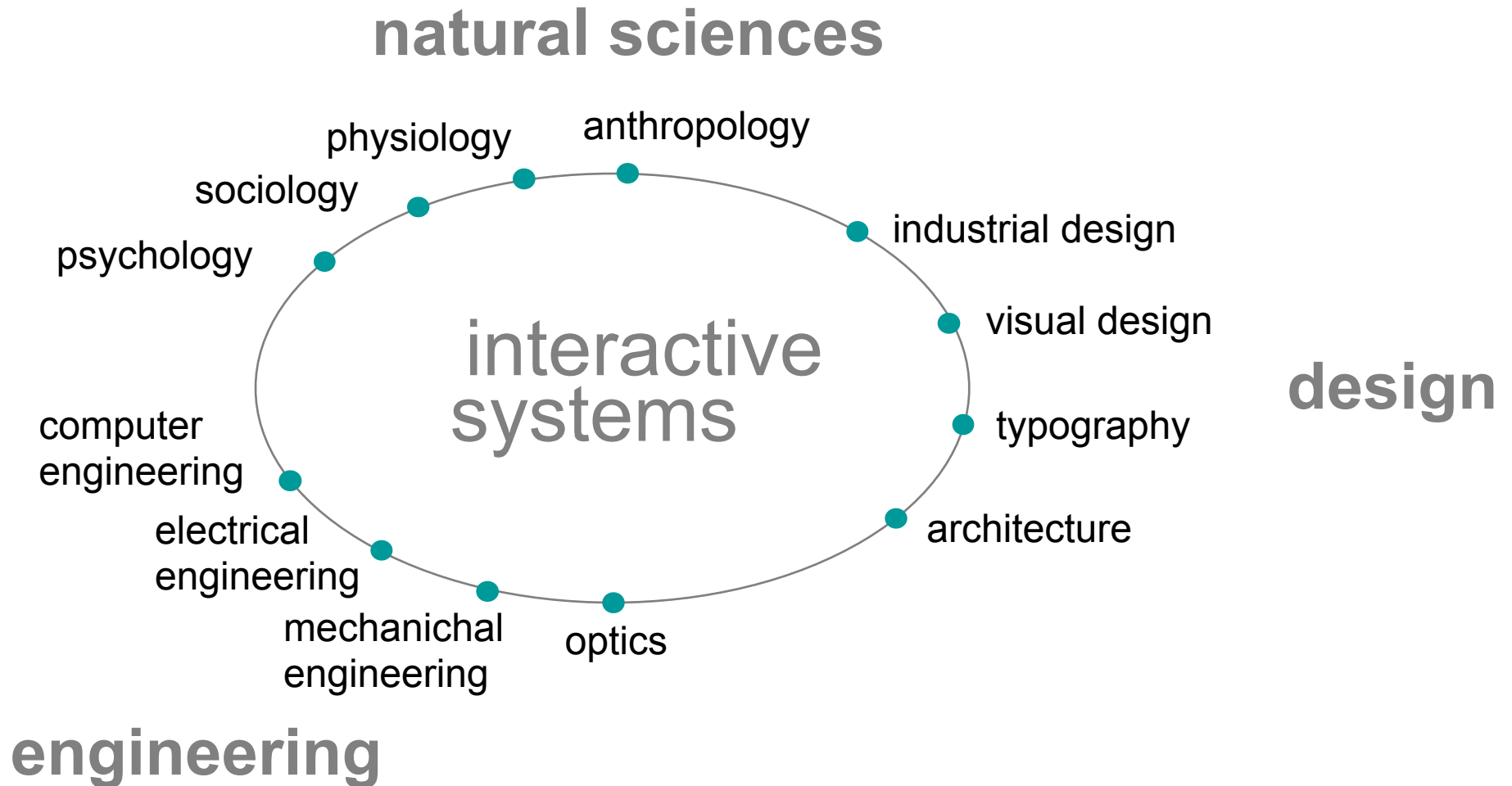
**Making things simple is difficult** (and difficult to understand)

Adaptability of humans is a strength ... and a weakness

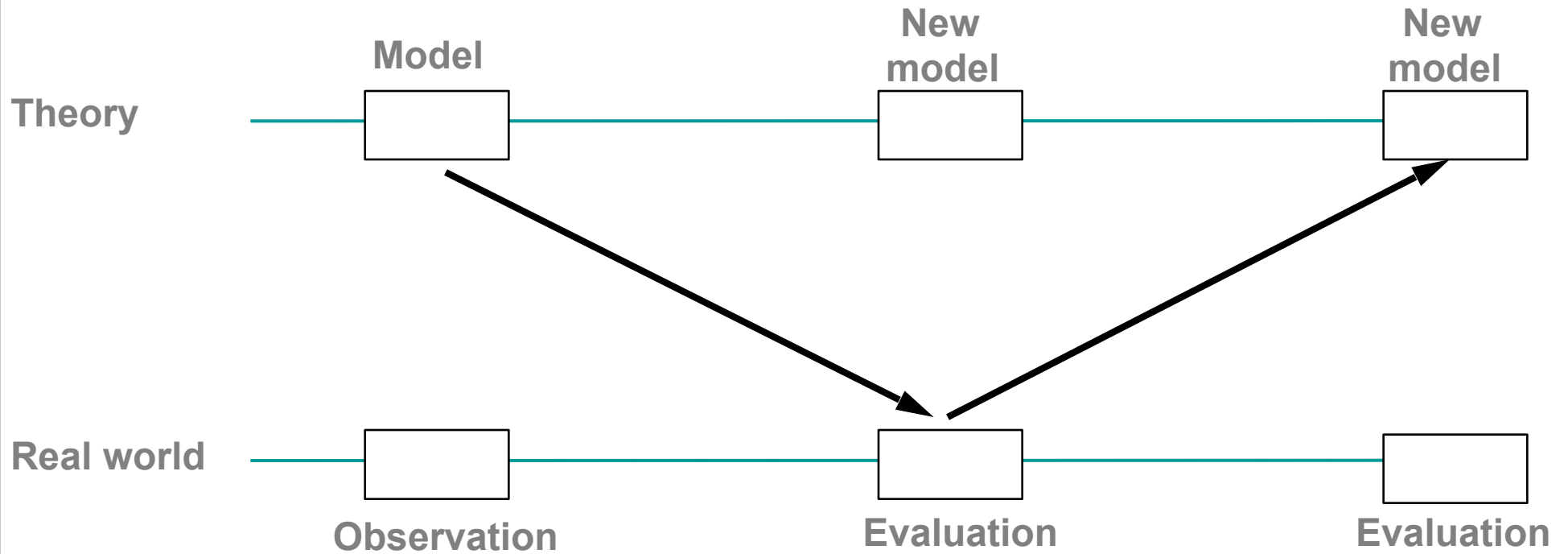
⇒ HCI is a complex multidisciplinary domain

⇒ Design and HCI research require unique skills

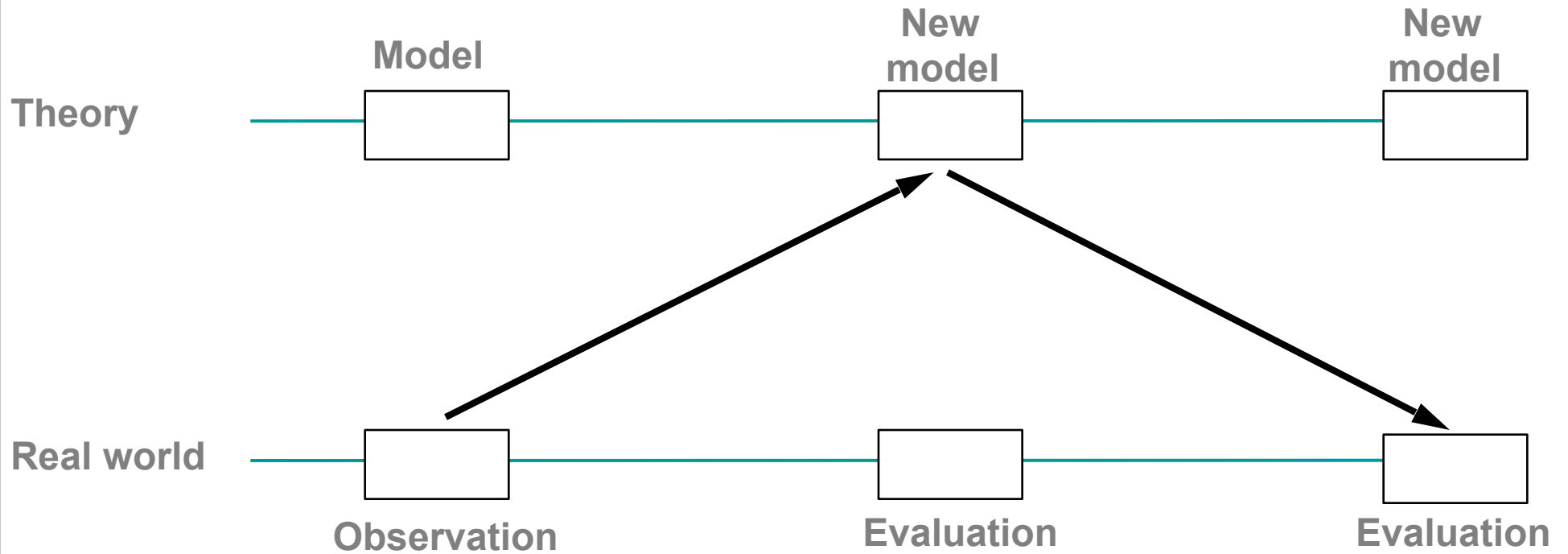
# Multidisciplinary approach



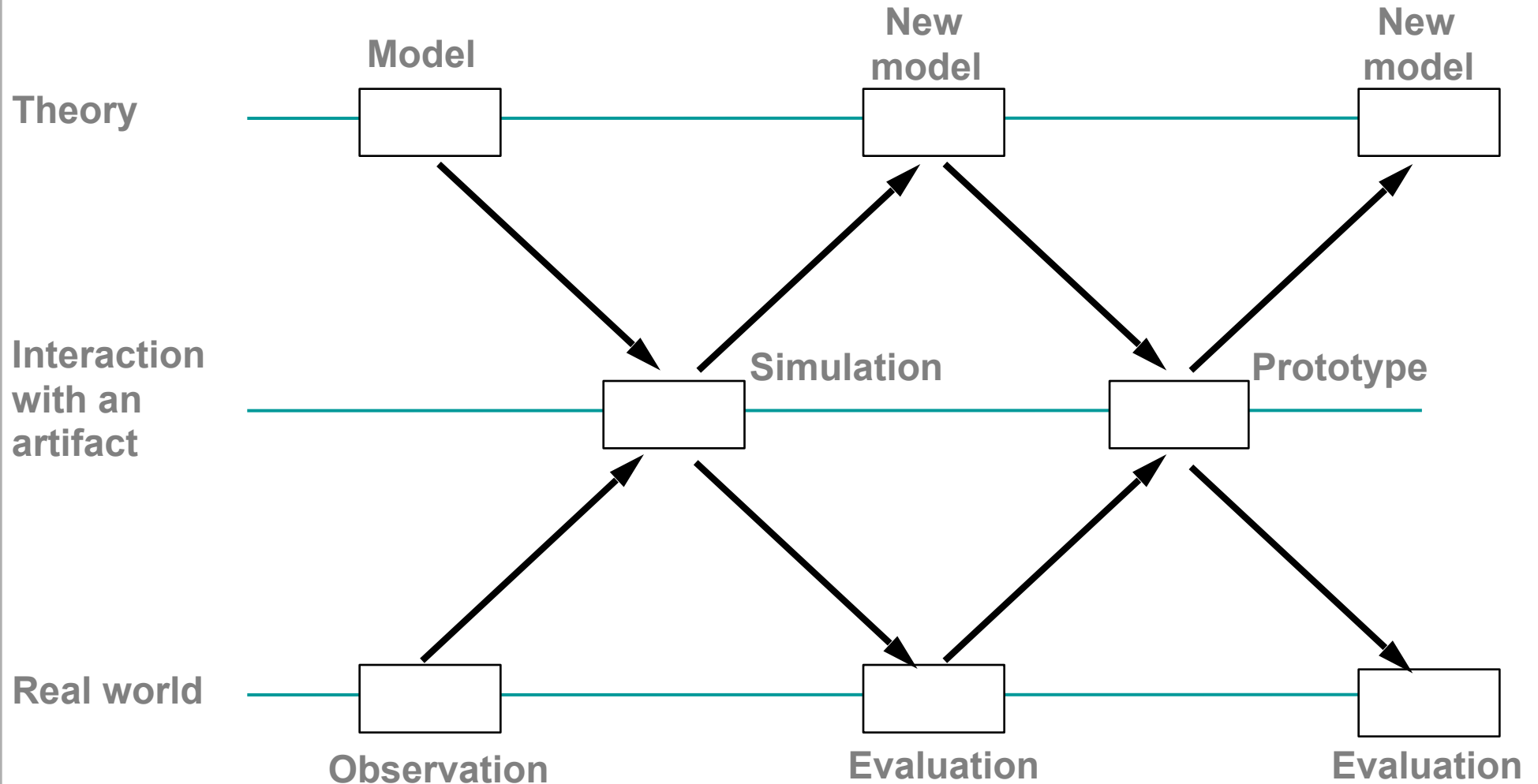
# Research strategies: Psychology



# Research strategies: Anthropology



# Research strategies: HCI



# The design of interactive systems

Importance of human factors

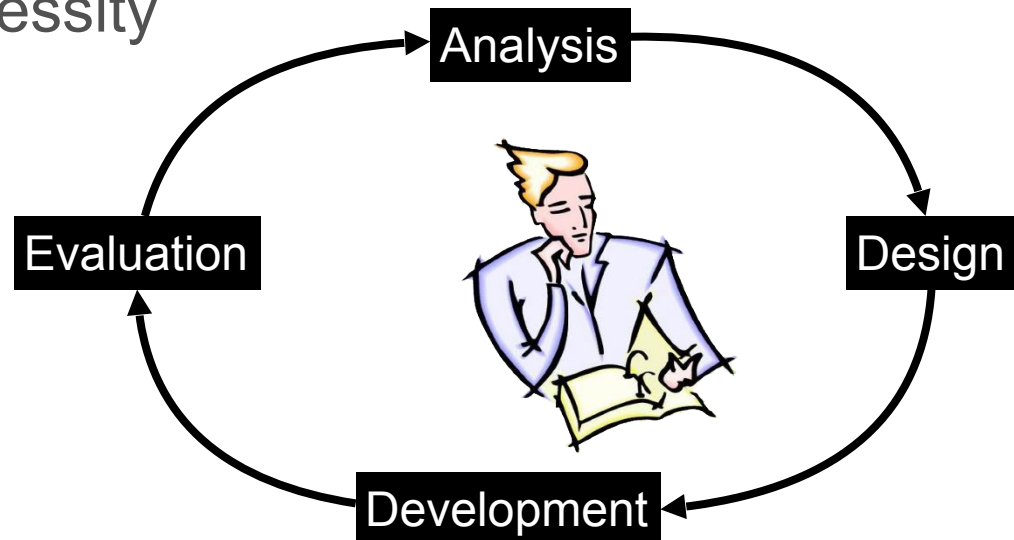
Few quantitative and/or generative theories

Chaotic aspect of design

Small causes, large effects

Iterative approach is a necessity

User-centered design



# Interaction paradigms

## Computer-as-tool

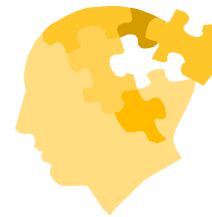
First person interfaces  
Augment the user



Focus of  
the course

## Computer-as-partner

Second person interfaces  
Delegate tasks



## Computer-as-media

Third person interfaces  
Human-human communication

