

What is Interaction?

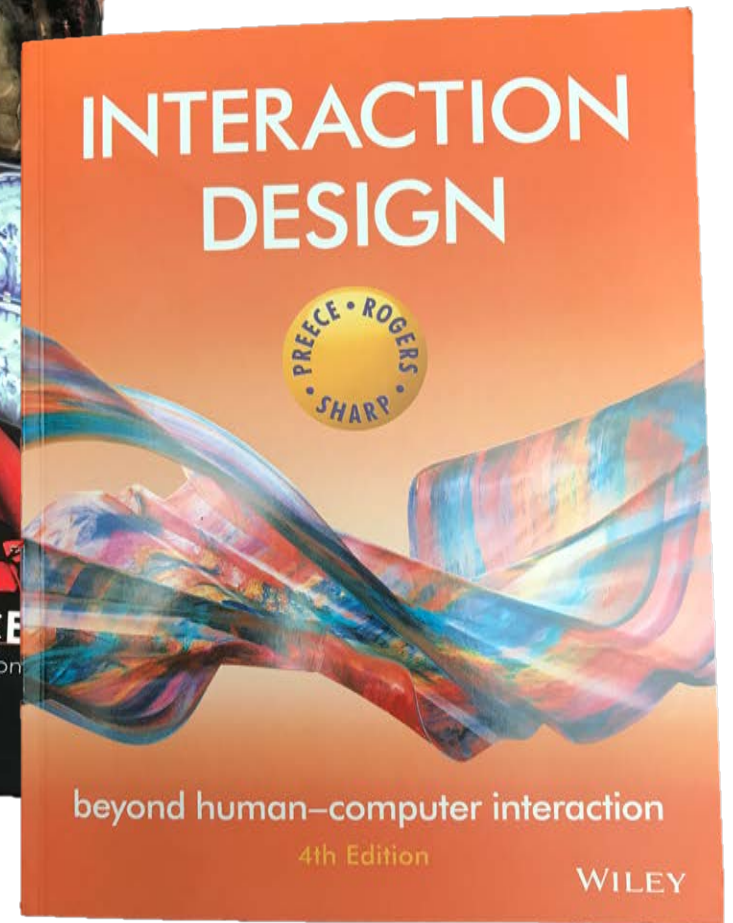
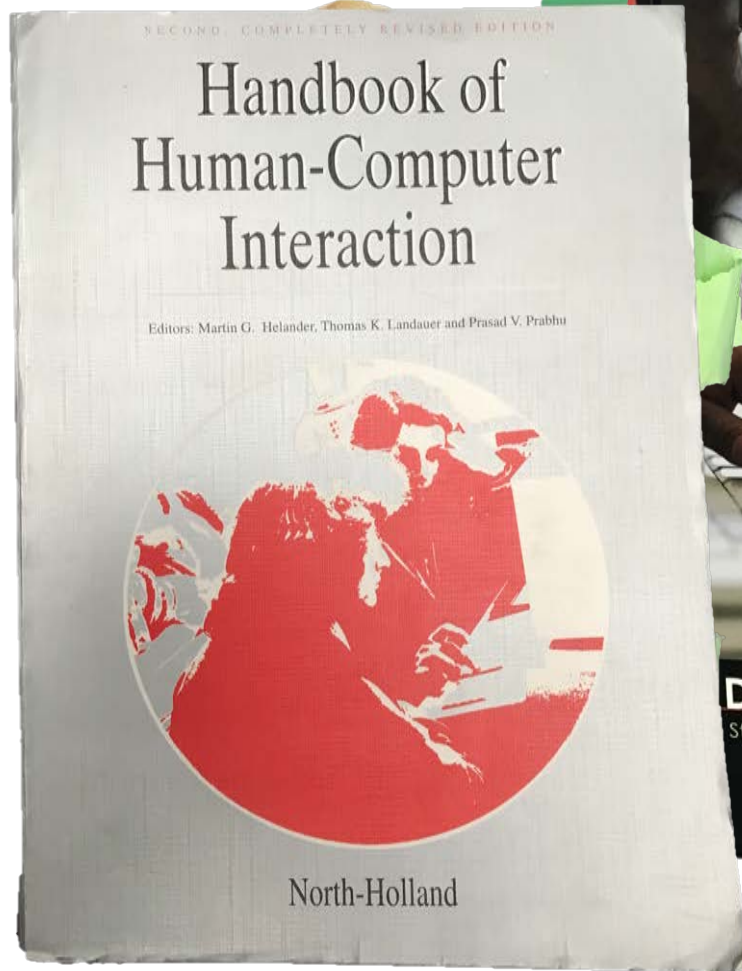


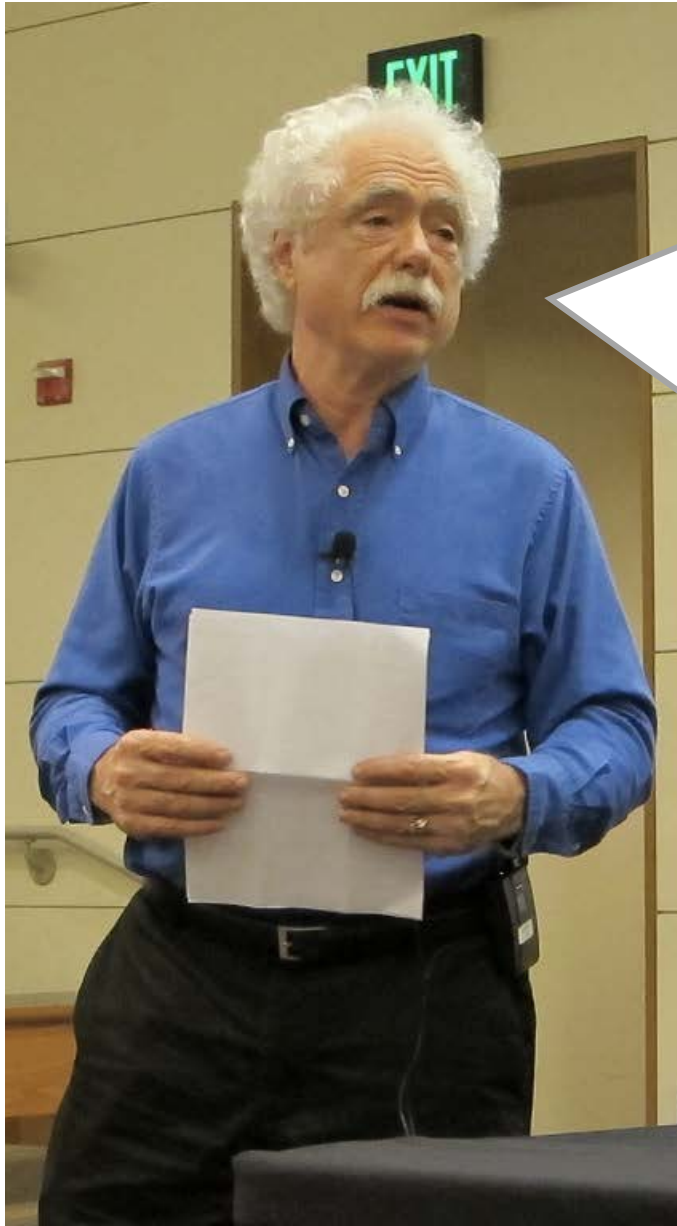
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But what is
interaction?





Webster defines
'interaction' as 'mutual or
reciprocal action or
influence'. Clearly, humans
act on computers and
computers influence
humans. But how? In what
dimensions?

Winograd, CHI keynote 1990



But what is
interaction?

Our Approach to Answering the Question

- Identify concepts of interaction from the literature
- A concept needs to say something about
 - mutual determination between computers and humans
 - the key phenomena in interaction
 - what makes interaction good
 - how to do evaluation and design

Interaction as ...

dialogue

transmission of information

tool use

optimal behavior

embodiment

experience

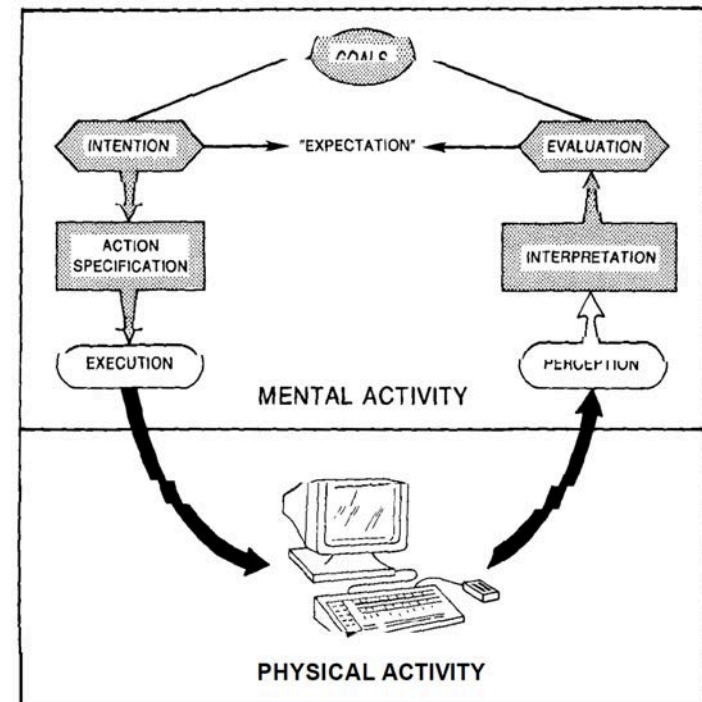
control

Concept	View of interaction	Key phenomena and constructs	Good interaction	Example support for evaluation and design
Dialogue	a cyclic process of communication acts and their interpretations	mappings between UI and intentions; feedback from the UI; turn taking	understandable; simple, natural; direct	methods/concepts for guessability, feedback, mapping; walkthroughs
Transmission	a sender sending a message over a noisy channel	messages (bits); sender and receiver; noisy channels	maximum throughput of information	metrics and models of user performance
Tool use	a human that uses tools to manipulate and act in the world	mediation by tools; directness of acting in the world; activity as a unit of analysis	useful and transparent tools; amplification of human capabilities	compatibility in instrumental interaction; break down analysis
Optimal behavior	adapting behavior to goals, task, UI, and capabilities	rationality; constraints; preferences; utility; strategies	improves or reaches maximum or satisfactory utility	models of choice, foraging, and adaptation
Embodiment	acting and being in situations of a material and social world	intentionality; context; coupling	provides resources for and supports fluent participation in the world	studies in the wild; thick description
Experience	an ongoing stream of expectations, feelings, memories	non-utilitarian quality; expectations; emotion	satisfies psychological needs; motivating	metrics of user experience; experience design methods
Control	interactive minimization of error against some reference	feedforward; feedback; reference; system; dynamics	rapid and stable convergence to target state	executable simulations of interactive control tasks

Table I in the paper

Interaction-as-dialogue

- Interaction is a cyclic process of communication
- Key phenomena are mapping and feedback
- Good interaction is understandable and natural
- Evaluation can be done as guessability studies or walkthrough of phases



Norman 1986

Interaction-as-transmission

- Interaction is about sending messages over a noisy channel
- Key phenomena are messages (bits), sender/receiver
- Goodness of interaction is about maximal throughput of information

$$TP = \frac{1}{y} \sum_{i=1}^y \left(\frac{1}{x} \sum_{j=1}^x \frac{IDe_{ij}}{MT_{ij}} \right)$$

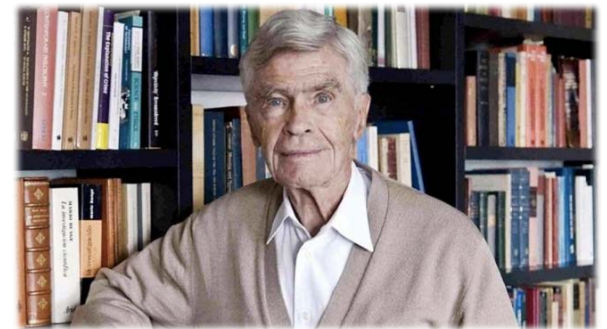
Differences in viewing interaction

- What is the human?
 - Material-social context vs. end-effectors
- What is the computer?
 - Input-output vs. tool-task unity
- Where is the boundary of interaction?
 - Seconds of low-level interaction vs. expectations/memories
- What is good?
 - Interaction should be natural vs. interaction should be high-throughput

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Beyond a folk notion of interaction

- Determination of different types:
 - Causal
 - Teleological
 - Mechanical
 - Statistical
 - Structural
 - Dialectical
 - Etc.



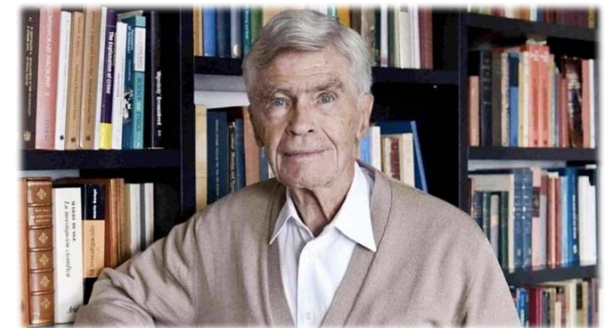
Bunge (1979)

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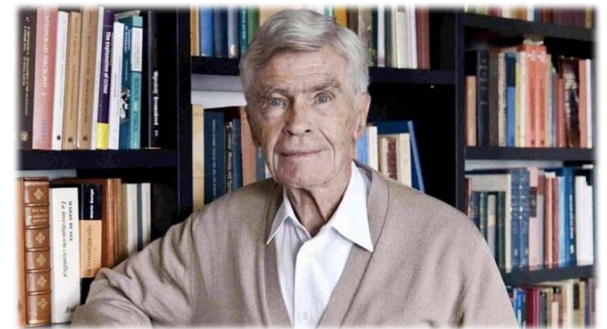
Interaction-as-transmission



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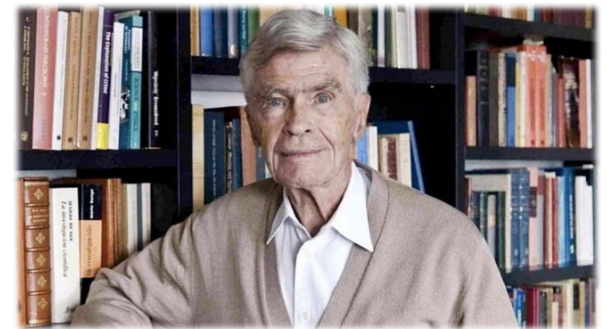
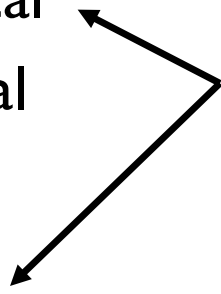
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Interaction-as-optimal-behavior



Bunge (1979)

Practical Implications

- Views of interaction are tools
- Perspective switching
- Table I for a quick overview

Work to do

- We need more propositions about interaction
 - A proposition (Dubin 1969) is a theoretical statement that links constructs, boundary conditions, and the overall state of a system
- Many alternative views of interaction can be articulated or extracted from the literature
- The relation between concepts of interaction and design needs more work
 - Views are either high-determinancy or adequate scope



What is Interaction?

- ... a form of mutual determination
- ... at least seven views of scope, key phenomena, goodness, etc.
- ... a tool for thinking about your work
- ... an opportunity to move HCI forward as a scientific field

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Credits

- Supported by ERC consolidator grants 648785 and 637991
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