User Modeling –
Descriptive Cognitive Models

John Stasko
Spring 2007

This material has been developed by Georgia Tech HCI faculty, and continues to evolve. Contributors include Gregory Abowd, Al Badre, Jim Foley, Elizabeth Mynatt, Jeff Pierce, Colin Potts, Chris Shaw, John Stasko, and Bruce Walker. Permission is granted to use with acknowledgement for non-profit purposes. Last revision: January 2007.

Agenda

• Other cognitive theories/models
  – Situated action
  – Activity theory
  – Distributed cognition
Cognitive/User Modeling

- Remember the Idea:
  
  . . . If we can build a model of how a user works, then we can **predict** how s/he will interact with the interface (before it is even built)

Last Time

- MHP, GOMS, CCT, KLM technique

- All model human as an information processing “machine”

- What’s missing?
(Social) Context

- Human information processor models all involve unaided individual
- In reality, people work with other people and other artifacts
- Other models of human cognition
  - Situation action
  - Activity theory
  - Distributed cognition

Situated Action

- Can someone describe it?
Situated Action

- Emergent property of moment-by-moment interactions
- Relation between persons and arenas
- Improvisation
- Detailed temporal accounts
- De-emphasizes rigid plans and rational problem solving

Situated Action

- Studies situated activity or practice
  - Activity grows out of the particulars of a situation
  - Improvisation is important

- Basic unit of analysis is “the activity of persons acting in a setting”

HCI Proponent: Lucy Suchman
Example

- Need 3/4 of 2/3 of cup of cottage cheese
  - Just has a simple measuring cup available
- Person solves problem by
  - Measuring 2/3 cup
  - Pouring out into a circle
  - Divide into quadrants
  - Take away one
- One time solution to one time problem

Situated Action Principles

- Structuring of an activity grows out of immediacy of the situation
- People engage in opportunistic, flexible ways to solve problems
  - Formulaic plans
  - Rational problem solving
Activity Theory

- Can anyone describe it?

Activity theory

- Subject, object, actions and operations
- Flexible in face of changing conditions
- Mediation by artifacts
- Transformative relationships
Activity Theory

- Unit of analysis is an activity
- Components:

  - Noun: Held by subject, motivates activity “object of game”
  - Goal-directed processes “tasks”
  - How action is carried out

Activity Theory Principles

- Key idea: Notion of *mediation* by artifacts (objects)
- Our work is a computer-mediated activity
  - Starring role goes to activity
  - In “regular” HCI, stars are person and machine
- Context is not “out there”. It is generated by people in activities

HCI Proponent: Bonnie Nardi
Distributed Cognition

- Can anyone describe it?

Distributed Cognition

- Distributed collection of interacting people and artifacts
- Less emphasis on individual cognition & system goal
- Representations and transformations
- Collaboration
Distributed Cognition

- Unit of analysis is cognitive system composed of individuals and the artifacts they use

- Studies the coordination and cooperation between people and artifacts in a distributed process

HCI Proponent: Ed Hutchins

Distributed Cog. Principles

- **Individual agents**

- Distributed collection of interacting people and artifacts

- Functional system is what matters, not individual thoughts in people’s heads
Upcoming

• Evaluation
  – Experimental design
  – Data collection
  – Subjective measures
  – Data analysis

• Next Thursday: Project work day