

## Highly Interactive, "Lively" Interfaces



### Many things happening at once...



- 3D, VR
- Distributed UIs (ubicomp, CSCW)
- Animated Interfaces

## Example 1 of Animated UI: Cartoon-style Animation

- Replace sudden changes with smooth ones (Chang and Ungar, Hudson and Stasko)
- Increase
  - understandability
  - liveness/liveliness of UI
  - pleasure

## Animation Effects: Solidity

- Motion blur
- Arrivals and departures

## Animation Effects: Exaggeration

- Anticipation

## Animation Effects: Reinforcement

- Slow-in Slow-out
- Arcs
- Follow through

## Why Cartoon-style Animation?

- Theatrical communication (clarity)
- Engagement

## UIs are not Cartoons

- Active vs. passive

## Pervasive Animation: The Morphic UI

- UI for the Self programming language
- Focus on *directness* and *liveness*

## Example 2 of Animated UI: Fluid Documents

- *In-place* embedding supporting material in a document
- Salience and space
  
- Negotiation

## Issues when building such UIs

- Multiple "agents"

## Issues when building such UIs

- Animation

## Cognitive Co-Processor Model

## Implementation

- Integrated with I/O model
- Time-based
- Smoothness
- Interruptible
- Synchronization possible

## Integration: Work Queues

- Central queue where all work is registered
  - objects with "step" functions
  - remove from queue when done

## Integration: FSM

- Use FSM to model state of animation
  - Each step triggers a transition (often back to the same state)

## Time-based

- Machine and load independent

## Smoothness

- Time-based helps
- Smooth out motion: blur
- Speed up rate: degradation

## Interruptible

- User must be in control

## Synchronization

- Multiple animations can relate in complex ways

## Example Integration: Artkit

- Transition functions
  - Methods:
    - | start\_transition, transition\_step, end\_transition
  - Object
  - Time interval
  - Trajectory: Curve, Pacing Function

## Time Intervals

- Relative to other transitions