Using Better Communication To Improve Programming-by-Demonstration

Doctoral Consortium

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Richard McDaniel

HCI Institute

Carnegie Mellon University

Outline

- Introduction
- Overview of Techniques
- Mock-up Experiment
- Conclusion

Introduction

Purpose

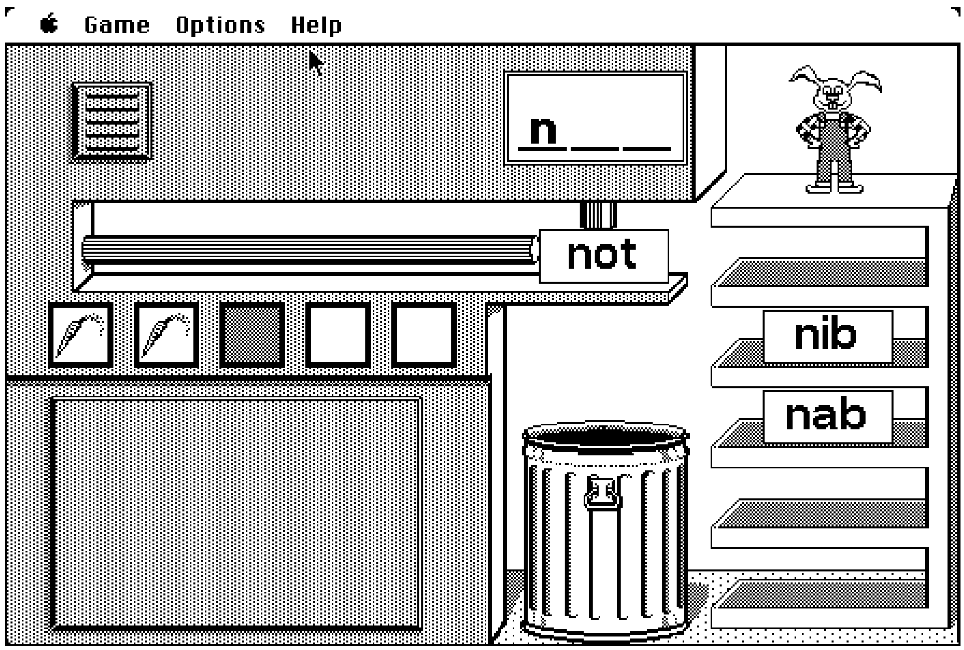
- Improve range of applications that can be created solely through demonstration.
- Develop new techniques to improve the user’s ability to communicate with a PBD system.
- Perhaps reduce the need for hard inferencing.

Domain

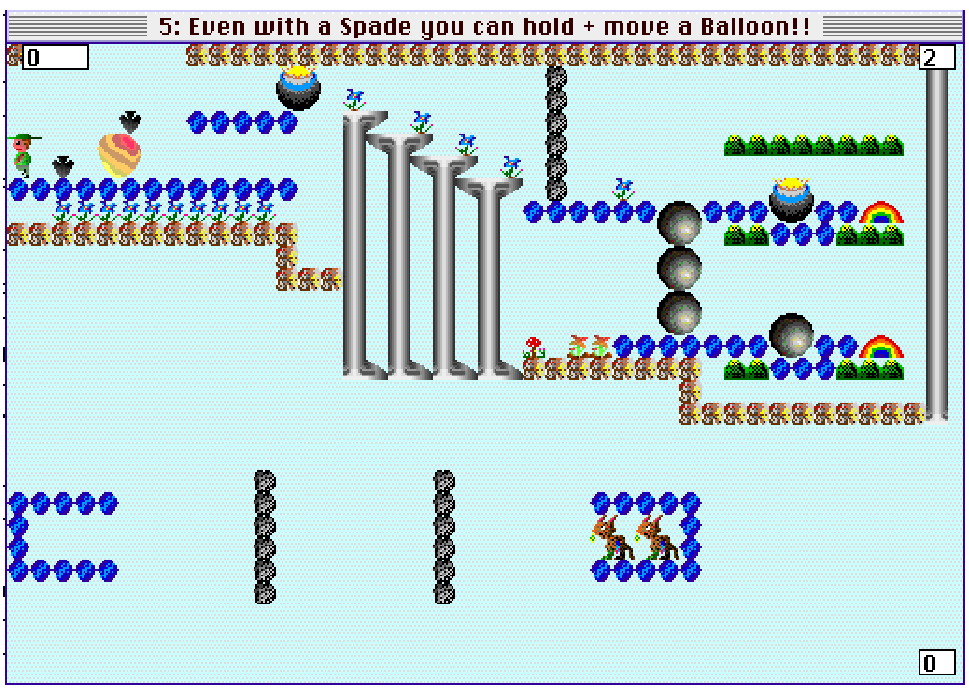
- Two-dimensional interactive applications.
- “Board Games”
- PBD used to generate rules of the game for human players.
- Computer cannot necessarily play the game.

Examples

Reader Rabbit



Gold Pusher



Overview of Techniques

New Interaction Style - Nudges

- Do Something! - demonstrate new behavior.
- Stop That! - indicates negative examples.
- Hint Highlighting - mark objects and properties that contribute to demonstration.

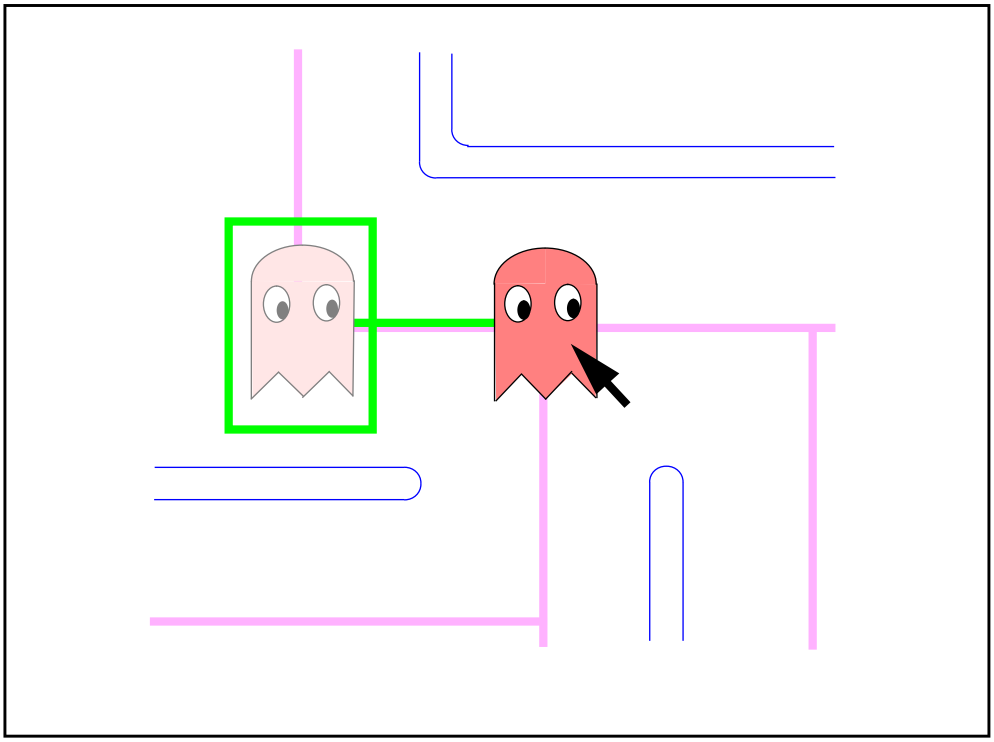
New Annotations and Metaphors

- Deck of Cards - easy to use metaphor for collecting, sorting, and randomizing data.
- Behavior Icons - icons near objects to denote how they behave.
- Temporal Ghosts - dimmed, translucent view of objects in their prior state.
- Guide Objects - (generalization of guidewires) objects that denote positions and connections.

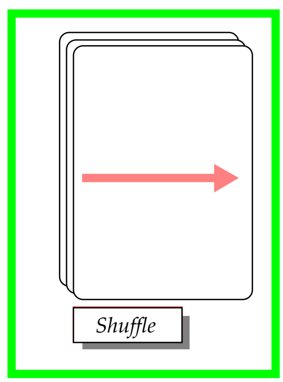
New Inferencing Algorithms

- Integrates all the techniques.
- Not fully developed, yet.

Techniques & Annotations



Num Lives 3



Prototype User Study

Setup

- Five subjects. Three tasks. Two-hour time limit.
- Meant to determine deficiencies of the techniques (not to achieve numeric results).

Subjects

- Carnegie Mellon undergraduate students.
- Nonprogrammers but able to understand basic computer concepts.
- People who like games.

Tasks

- Based on video and board game behaviors.
- Each task had at least one complication that required some kind of programming-like action.
  - Task 1 - variable creation.
  - Task 2 - devise an algorithm.
  - Task 3 - generate random events.

Prototype User Study

Results

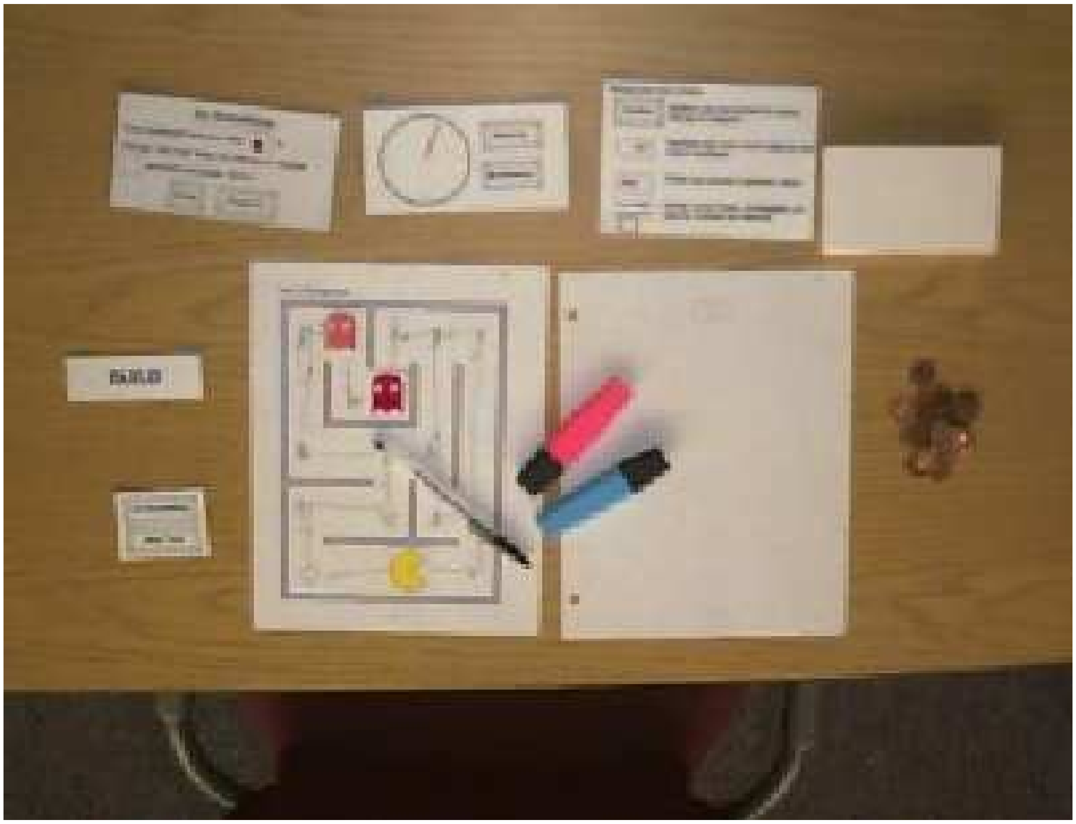
- Subjects had little trouble using techniques.
- All finished first task. Most finished the second.
- Two subjects had virtually no trouble whatsoever.

Problems

- Sometimes subjects would forget to highlight.
- When a mistake is made, subjects would get confused by computer's behavior.
- Some had difficulty differentiating autonomous behaviors from player controlled behaviors.

Paper Prototype

The Experiment



Conclusion

- Creating tool to build interactive, board-game-like applications.
- Devising new techniques to improve PBD.
- Completed first round of Experiments.
- Moving on to complete implementation and further testing.