

# Computer-Aided Instruction for Very Young Children

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Honors Program

# The Problem

- How to use computers in early childhood education?



# Motivation

- My experience: Mouse, Keyboard too difficult for young children
- Teachers are optimistic but cautious about use of computers [Cook]
- Problems with many current CAI systems [Blecha]:
  - Tedious keystrokes
  - Unnecessarily repetitive operations
  - Software that is difficult to use
  - Minimal pedagogical value of programs that hide the inner workings of models
- Question:
  - How much benefit could young children derive from direct interaction with a computer?

# The Educators

- UW Early Childcare and Education Center
- Meeting with staff and interview with a teacher
  - Slightly skeptical about the use of technology in an early ed. classroom
- Philosophy:
  - Child-directed learning
  - Open-Ended / Creativity
  - Teachers scaffold but don't interfere
  - Iteration and reflection
- Work to meet the Wyoming Readiness Standards

# Observation of Children

- Some things they do:
  - Drawing
    - e.g. themselves in many different ways
  - Block Building
  - Foam
  - Light Table
  - Constructing from recyclables
  - Writing name from straws

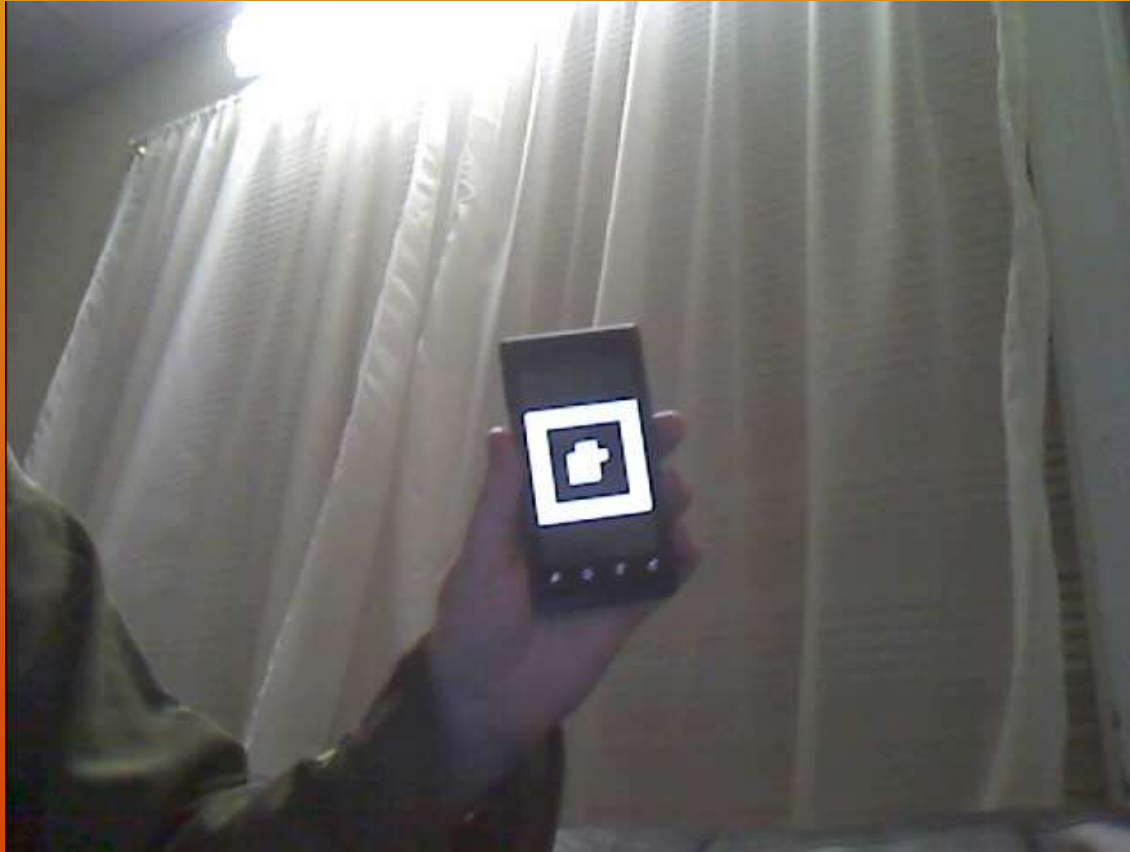


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# A Thousand Light Bulbs

- Hardware
  - Touch Screens
  - Multi-Touch Tables
  - Non-Breakable Devices
  - **Floor Projection / Fiducials**
- Projects
  - Literacy Education
  - Block Building
- And finally.....

# Fiducial Tracking

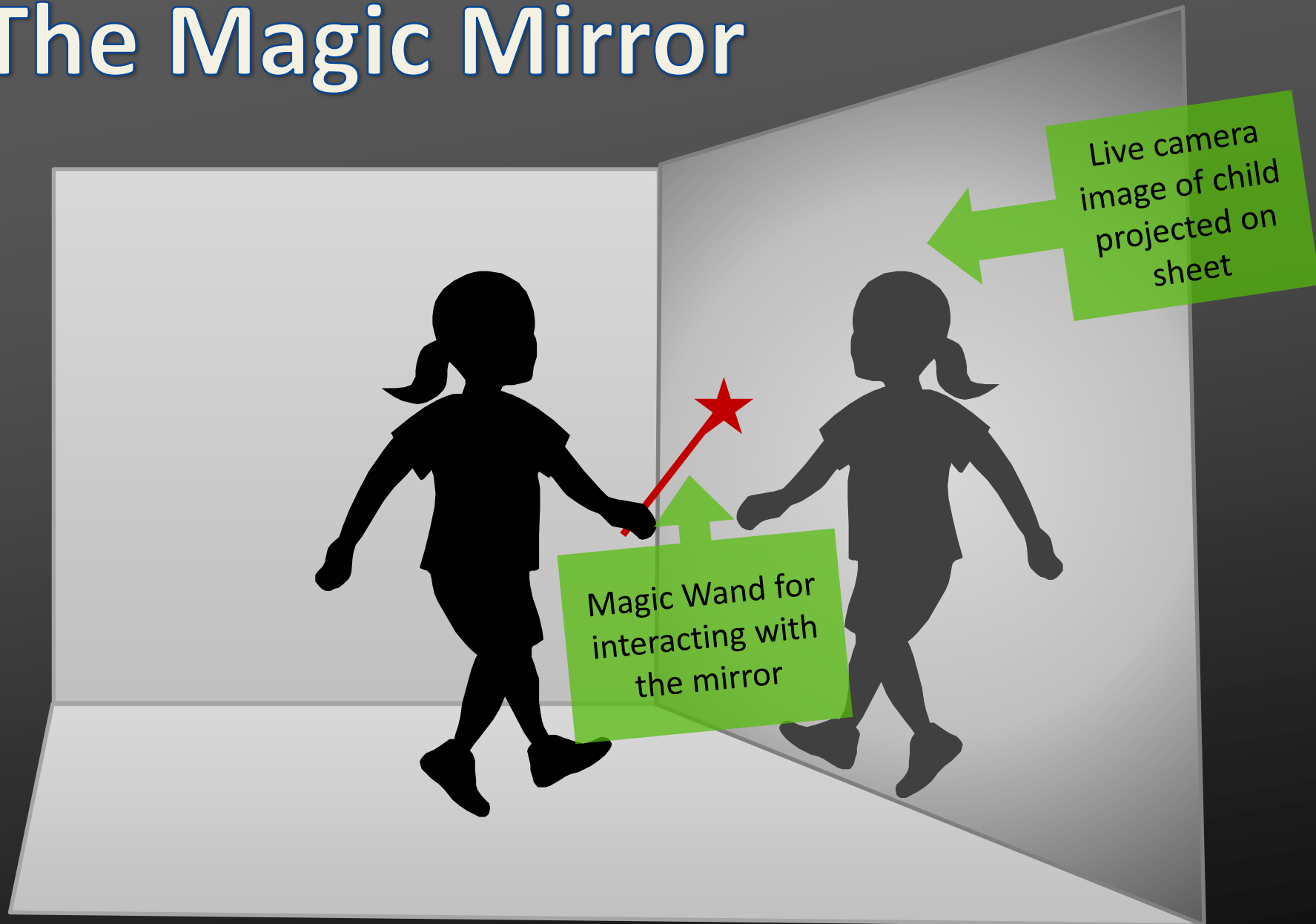


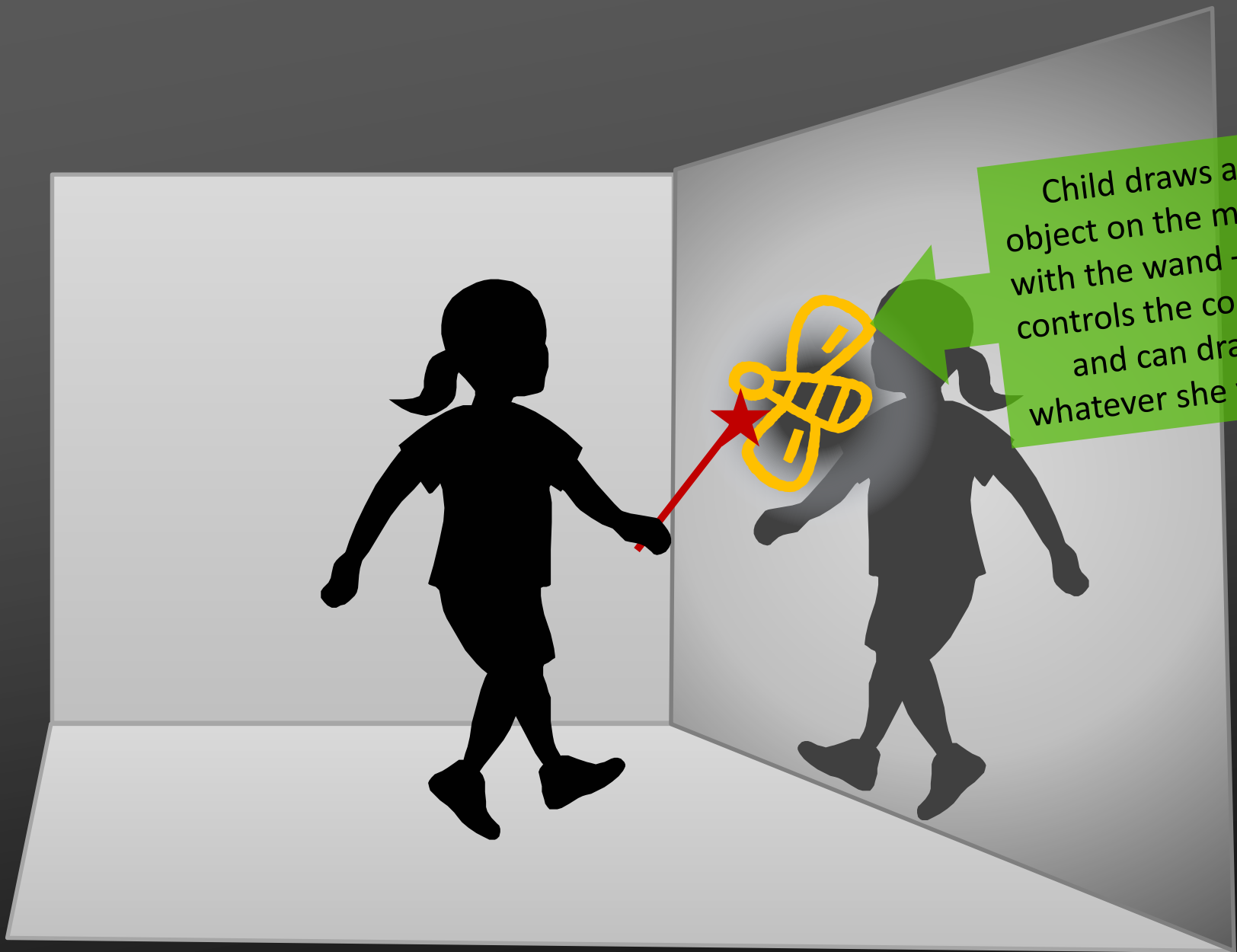
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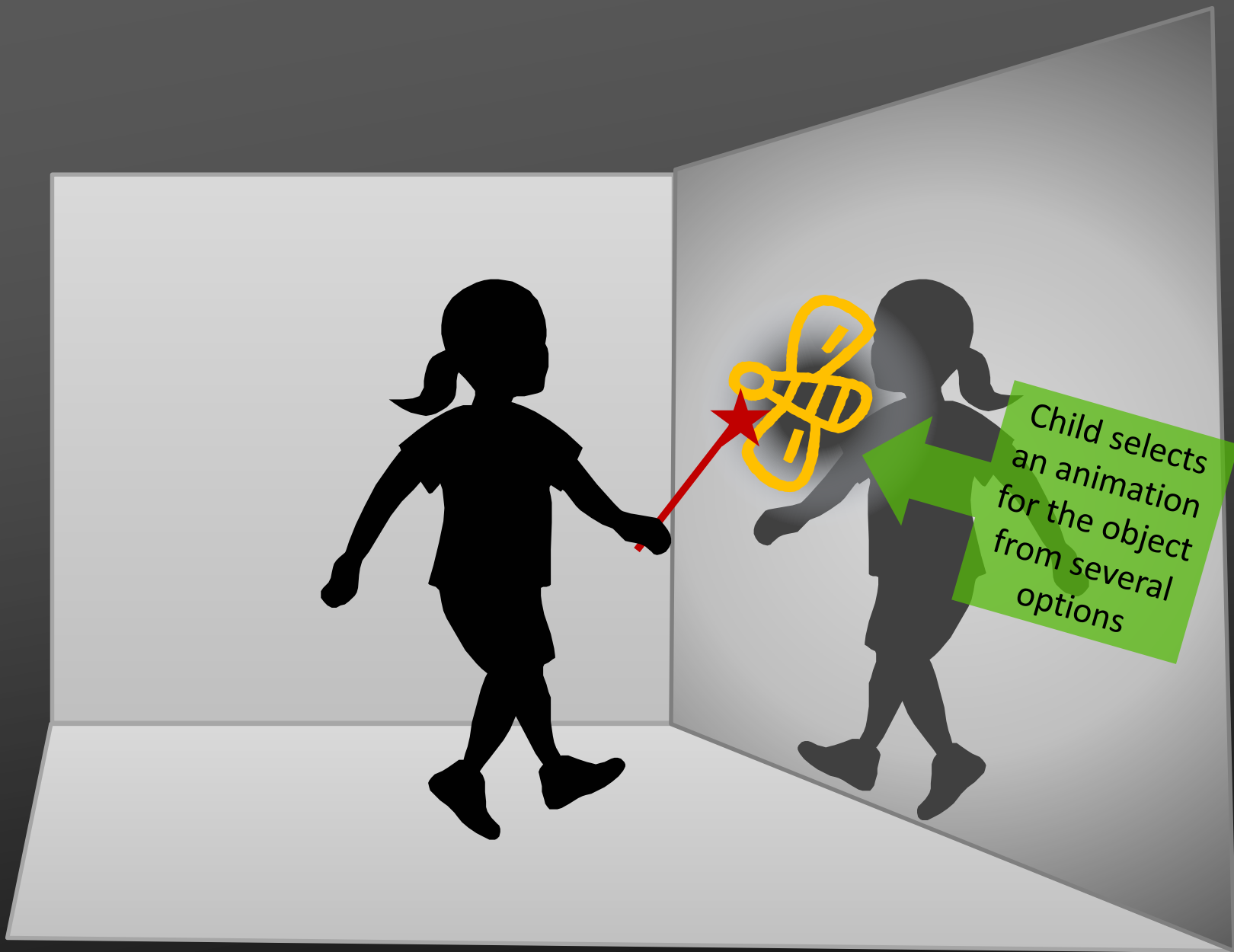


# The Magic Mirror

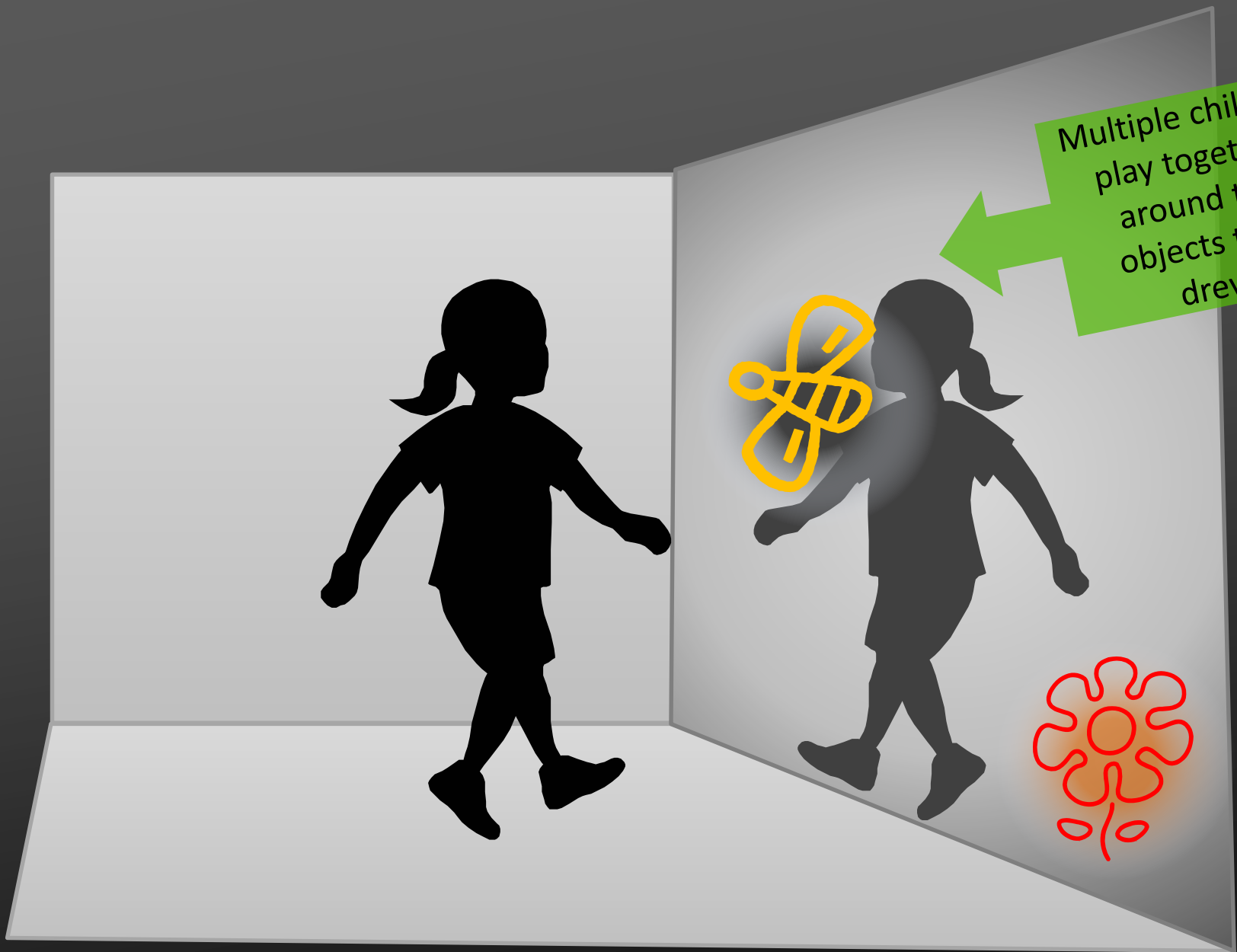




Child draws an object on the mirror with the wand – she controls the content and can draw whatever she wants



Child selects an animation for the object from several options



Multiple children  
play together  
around the  
objects they  
drew

# Additional Options:

Children can select  
pre-drawn objects to  
place on the mirror



# Additional Options:



# Advantages

- In theory: allows them to look at their surroundings and themselves in a new way
- Fits into the Early Ed. Center Philosophy:
  - Open-Ended, child can draw anything
  - Extension of what they already do
  - Aids in reflection (quite literally)
- Uses IR point tracking instead of fiducials
  - More reliable (although less flexible)
- Relatively easy to implement in a short amount of time
- Looks fun!

# The Hardware

- Projector and screen (possibly rear-projected)
- 2 WIImotes to detect IR
- Magic Wand – Mini Maglite with IR LED
- Webcam





# The Software

- Adobe Flex 4



- WiiFlash Library to read WII input

# Where we are

- Gathering hardware
  - Magic Wand is working! (Except...)
  - Have WIIs, webcam, projector
  - Need good screen for rear projection
- Implementation is in progress
  - Have drawing & snapshot working on webcam image
  - Need to integrate animations, WII input, library of images
- Current Problems:
  - How to make a relatively good mirror with a webcam while allowing the user to bring the wand close to the screen like a pen?

# Where we are going next

- Once implemented:
  - Let children play
  - Evaluate the system
    - Teacher
      - Wyoming Readiness Standards
      - Usability Questionnaires
    - Us
      - Observations

# Things I have learned so far

1. Really cool systems can be made with a ton a everyday items in combination
  - Like the kids building with recyclables
2. The internet has everything you need!
  - You would think that wouldn't surprise me anymore...
3. Two brains are much better than one
4. Ask for help
  - we had to get help from EE (John Davis) for the magic wand
5. Where there is a will there is a way
6. About the IRB Process

Thank you Dr. Ulinski!

Questions?