the gamedesigninitiative at cornell university

Lecture 3

Mobile Gameplay

Focus of Today's Talk

Smartphones

Tablets

And In a Few Ways, This

Challenge: Input Modality

- Don't have standard gamepad controls
  - Add-on hardware is unpopular
  - Not standard, few games use

- Loss of a lot of functionality
  - D-Pads, joysticks for avatar control
  - Buttons for performing core actions
- Have to **rethink game input**

the gamedesigninitiative at cornell university

The Cheap Way Out

The Cheap Way Out

So What Can We Do?

- (Multi) Touch Controls
  - Pointing, dragging
  - Clicking, selecting
  - More advanced gestures
- Accelerometer Support
  - Tilting
  - Rotating

So What Can We Do?

- (Multi) Touch Controls
  - Pointing, dragging
  - Clicking, selecting
  - More
- Accelerometer Support
  - Tilting
  - Rotating

AR features (light, camera) are also a possibility.

Touch: Basic Approach

- Can use touch interface like a **mouse**
  - Touch to click on a point,
  - Trace from touch to drag
- Port mouse-heavy PC/Mac games
  - Particularly strategy games/RPGs
- Keyboard exists, but is limited
  - Have to obscure screen to pull up keyboard
  - Use very sparingly (e.g. save file)

the gamedesigninitiative at cornell university

Example: *Plants vs. Zombies*

4152 Example: *Gathering Sky*

the gamedesigninitiative at cornell university

Balancing Multitouch

- PC games are “balanced” for a single pointer
  - Multitasking requires a lot of back and forth
  - Challenge is to do actions in an efficient order
- Multitouch eliminates this challenge
  - Fingers everywhere!
  - Movement is fast
  - **Ex**: *Whack-a-Zombie*

the gamedesigninitiative at cornell university

Size Matters

- Small screen makes multitouch *hard*
  - True multitouch only on a tablet
  - Phones are largely limited to gestures
- Fingers are **fatter** than pointers

the gamedesigninitiative at cornell university

Size Matters

- Small screen makes multitouch *hard*
  - True multitouch only on a tablet
  - Phones are largely limited to gestures
- Fingers are **fatter** than pointers

Click here to undo everything

the gamedesigninitiative at cornell university

Click versus Pointing

- PCs use **hover** to give information
  - Gives pop-up menus, tool-tips
  - Used in RPGs, strategy games
  - Major UI design technique

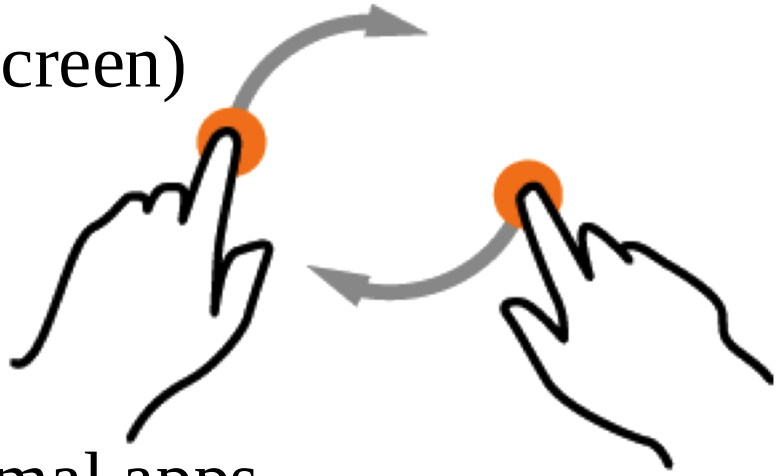
- There is no hover on mobile!
  - How to distinguish action from info?
  - **Press-and-hold** is becoming the standard
  - So actions must happen on **release**, not press.

the gamedesigninitiative at cornell university

Example: Assassin's Creed Rebellion

Touch: Gestures

- Can also leverage device **gestures**
  - Manipulation strokes common to device
  - **Example**: Pinching for zoom
  - **Example**: Rotating (object, screen)
- Natural for camera control
- **Design Approach**:
  - Think about how used in normal apps
  - How do you leverage this in a game?



the gamedesigninitiative at cornell university

Basic Gestures

Tap

Double Tap

Tap and Hold

Flick

Pinch

Spread

Rotate

Drag (Scroll)

Simple Multitouch Gestures

Two Fingers

Tap

Tap/Press

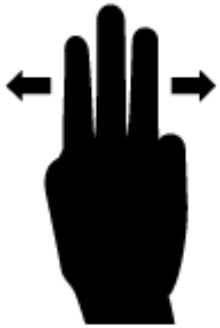
Double Tap

Drag

Three Fingers

Tap

Double Tap



Swipe

Drag

Simple Multitouch Gestures

Two Fingers

Sort of possible to get position

Tap

Tap/Press

Double Tap

Drag

Three Fingers

Getting position is largely hopeless

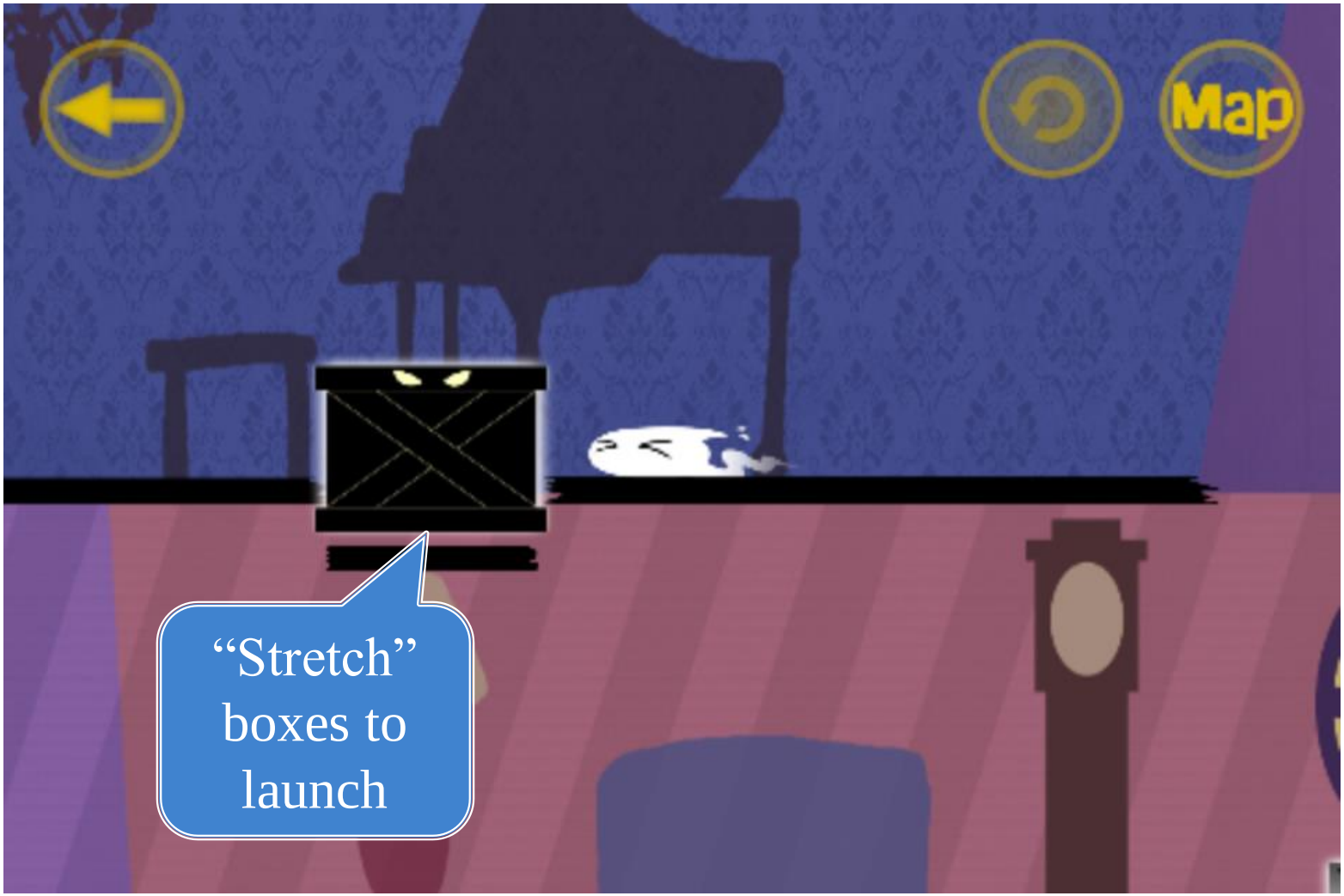
Tap

Double Tap

Swipe

Drag

4152 Example: *Phantom Escape*



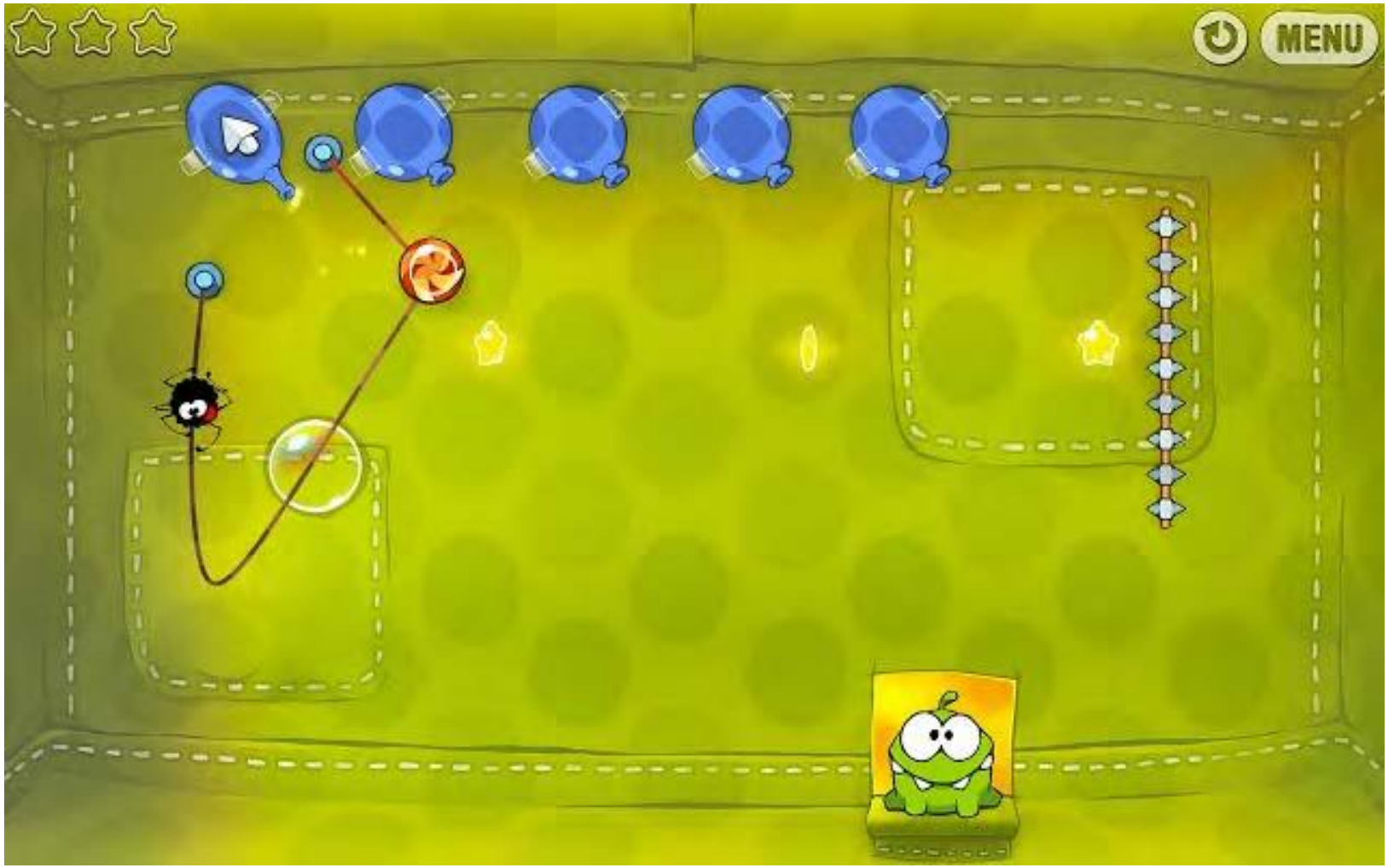
4152 Example: *G.M.P.*

Touch: Natural Controls

- Successful games strive for **natural controls**
  - Verb controlled by a single movement/gesture
  - Gesture has a very natural physical feel to it
  - Maps naturally on to the action in the game
- **Examples**
  - Cutting (Cut the Rope)
  - Tracing (Flight Control)
  - Pulling (Angry Birds)
  - Twisting (Monument Valley)

the gamedesigninitiative at cornell university

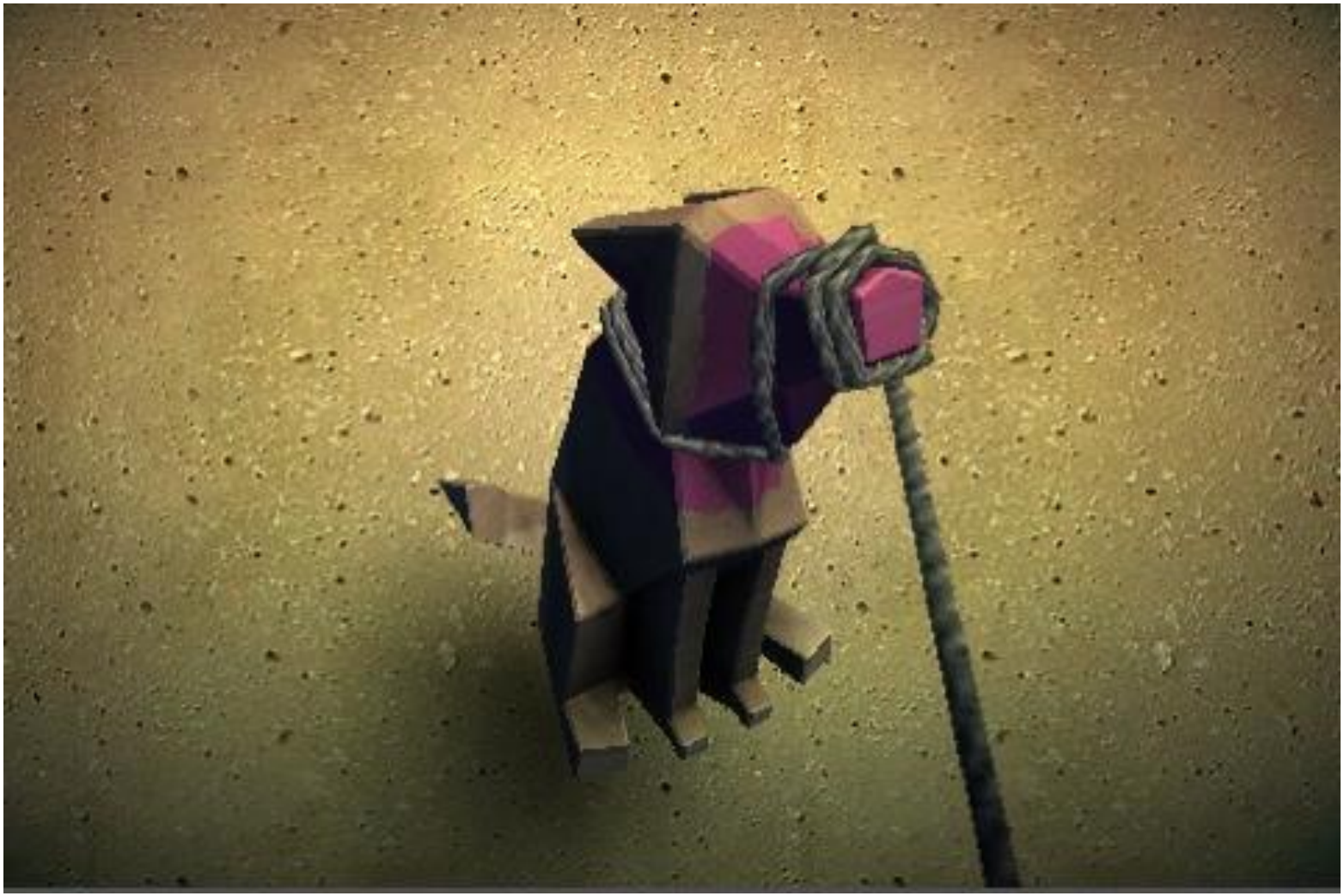
Example: *Cut the Rope*



Example: *Flight Control*

4152 Example: *Flick Ship Spaceship*

Example: *Zen Bound*



Example: *The Room*

Example: *Monument Valley*

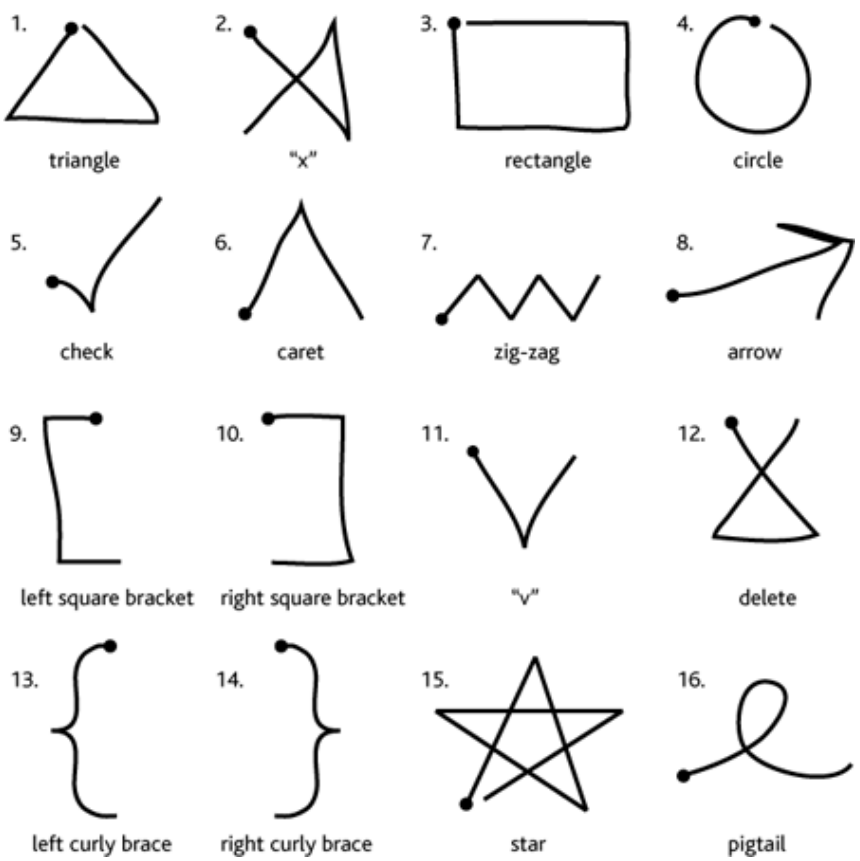
Specialized Gestures: *Infinity Blade*

Draw symbol on screen

Spell is cast when done

Dollar Gestures

- Recordable gesture API
  - Created a U. Washington
  - Code freely distributed
- Very limited resolution
  - Scales gesture to pixel grid
  - Grid uniquely identifies
  - Shape AND start matter
- **MEng project from 2020**
  - **Included in CUGL API**

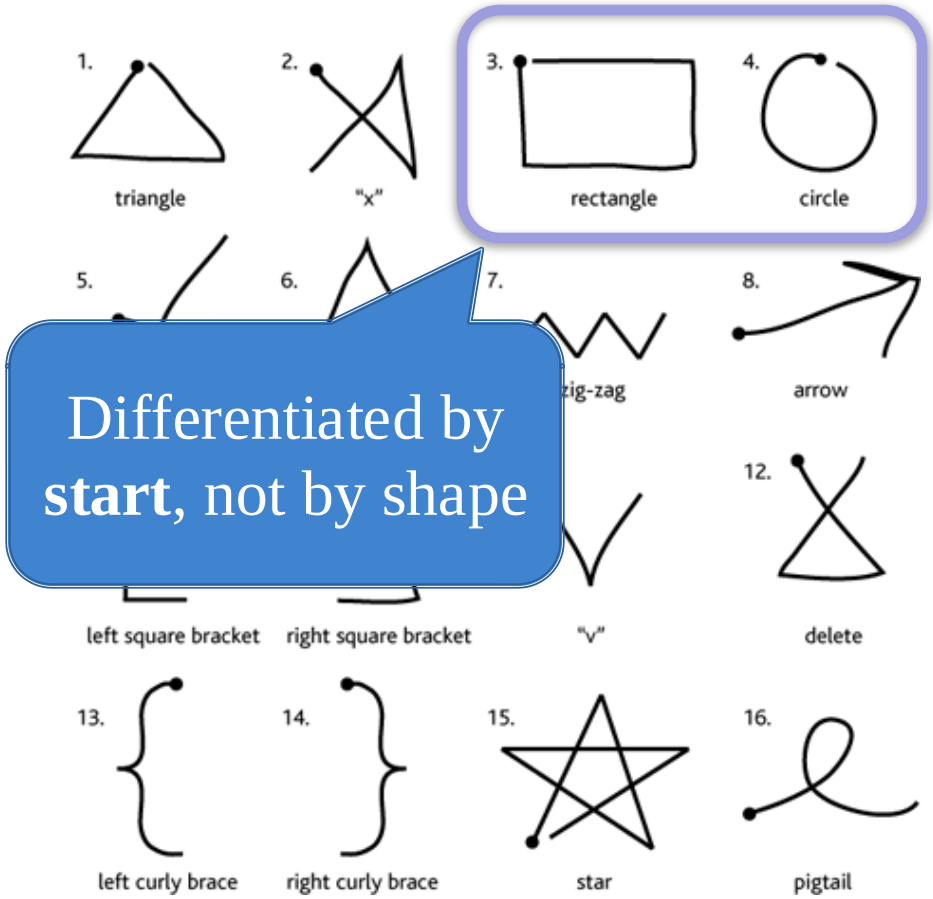


http://depts.washington.edu/madlab/proj/dollar

the gamedesigninitiative at cornell university

Dollar Gestures

- Recordable gesture API
  - Created a U. Washington
  - Code freely distributed
- Very limited resolution
  - Scales gesture to pixel grid
  - Grid uniquely identifies
  - Shape AND start matter
- **MEng project from 2020**
  - **Included in CUGL API**



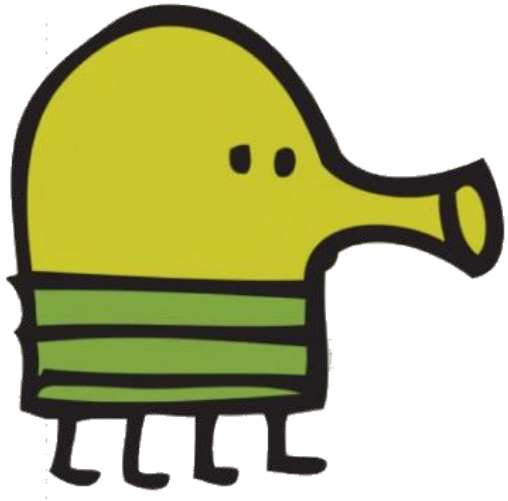
Differentiated by **start**, not by shape

http://depts.washington.edu/madlab/proj/dollar

the gamedesigninitiative at cornell university

Touch: Avatar Controls

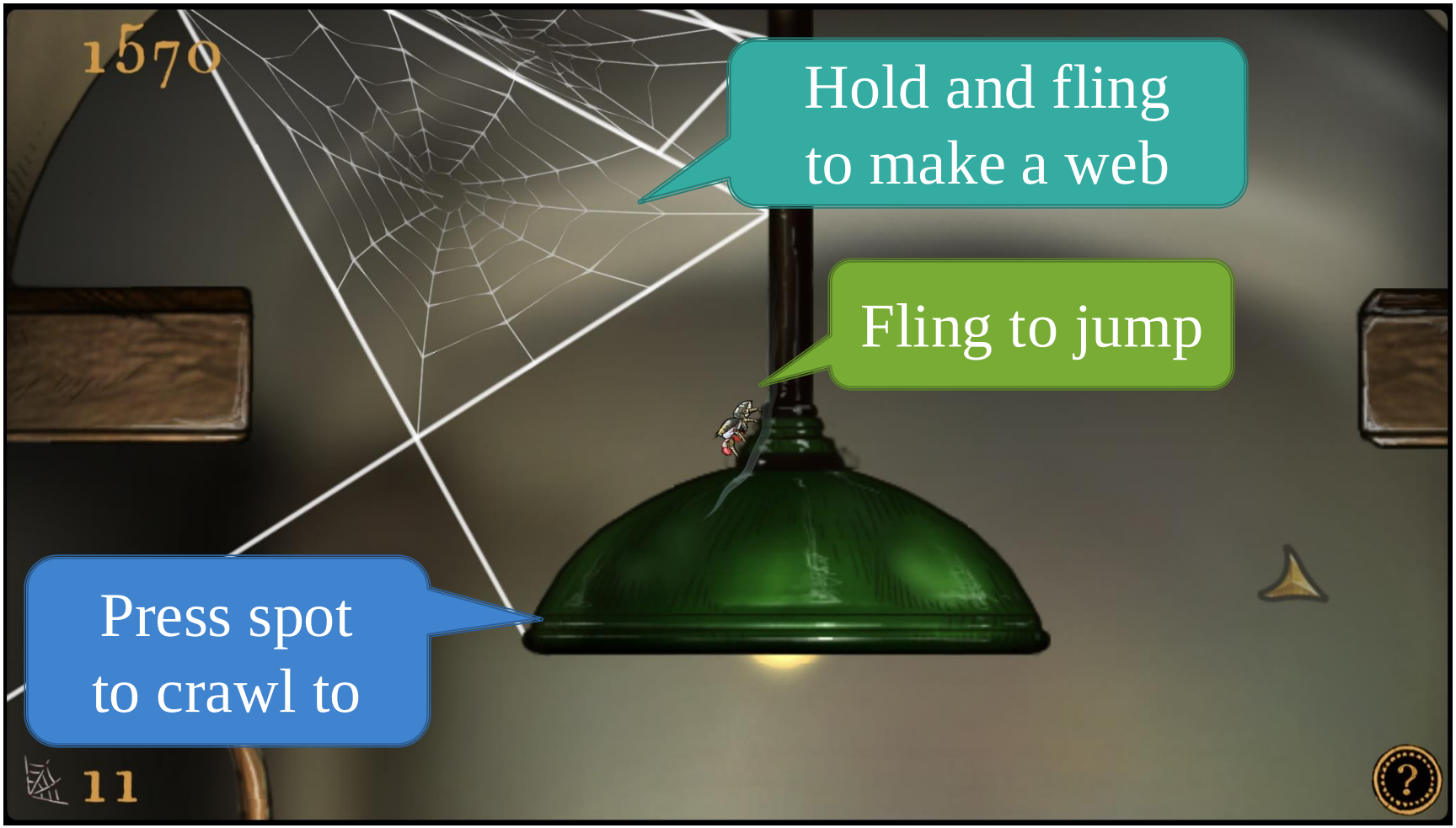
- Several (non-joystick) options for movement
  - Drag the character
  - Point to a waypoint
  - Point to direction



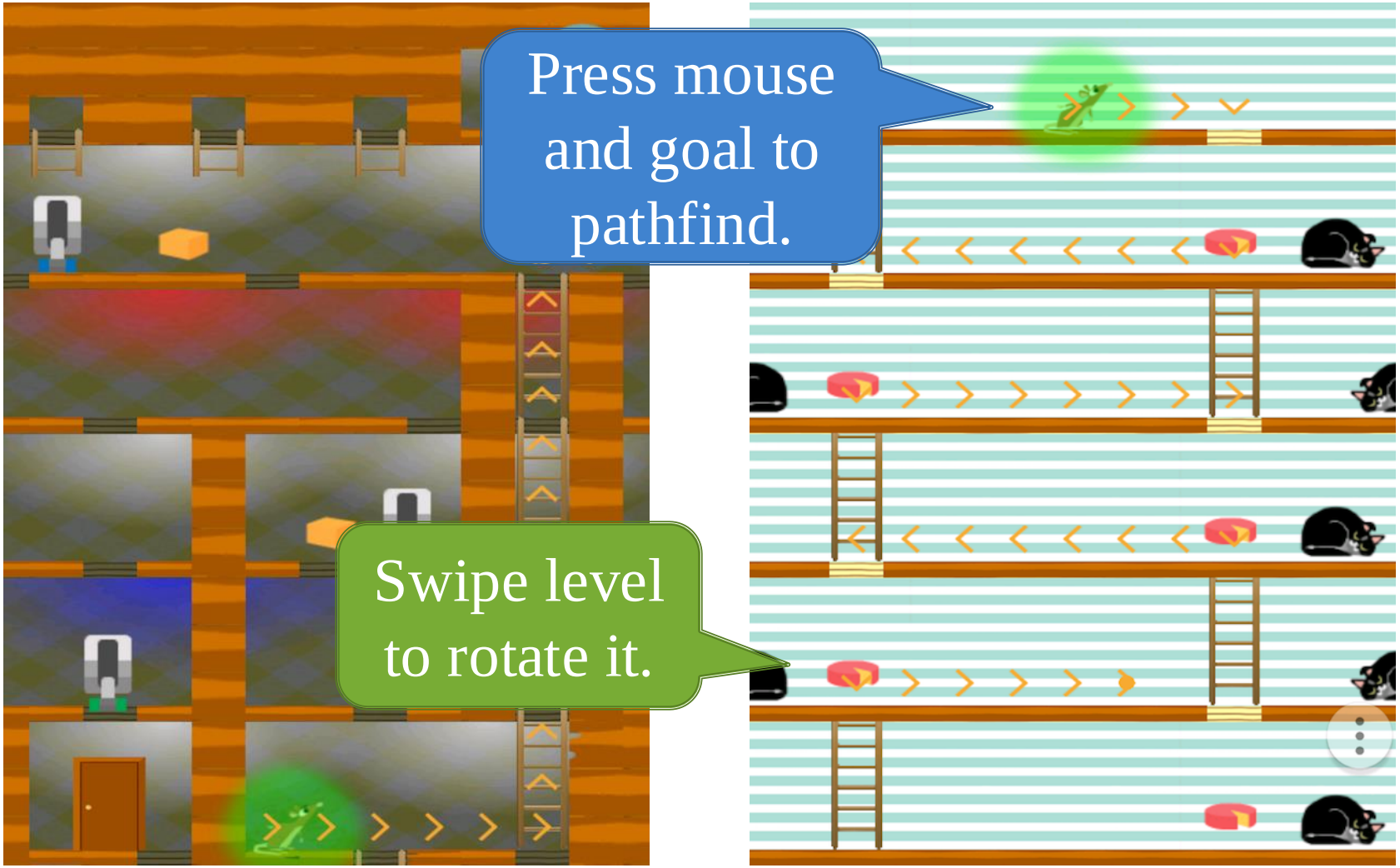
- But how to indicate avatar actions?
  - Want to move and act at same time
- **One Solution**: put actions into movement modes
  - Drag versus waypoint
  - Press+hold drag versus drag

the gamedesigninitiative at cornell university

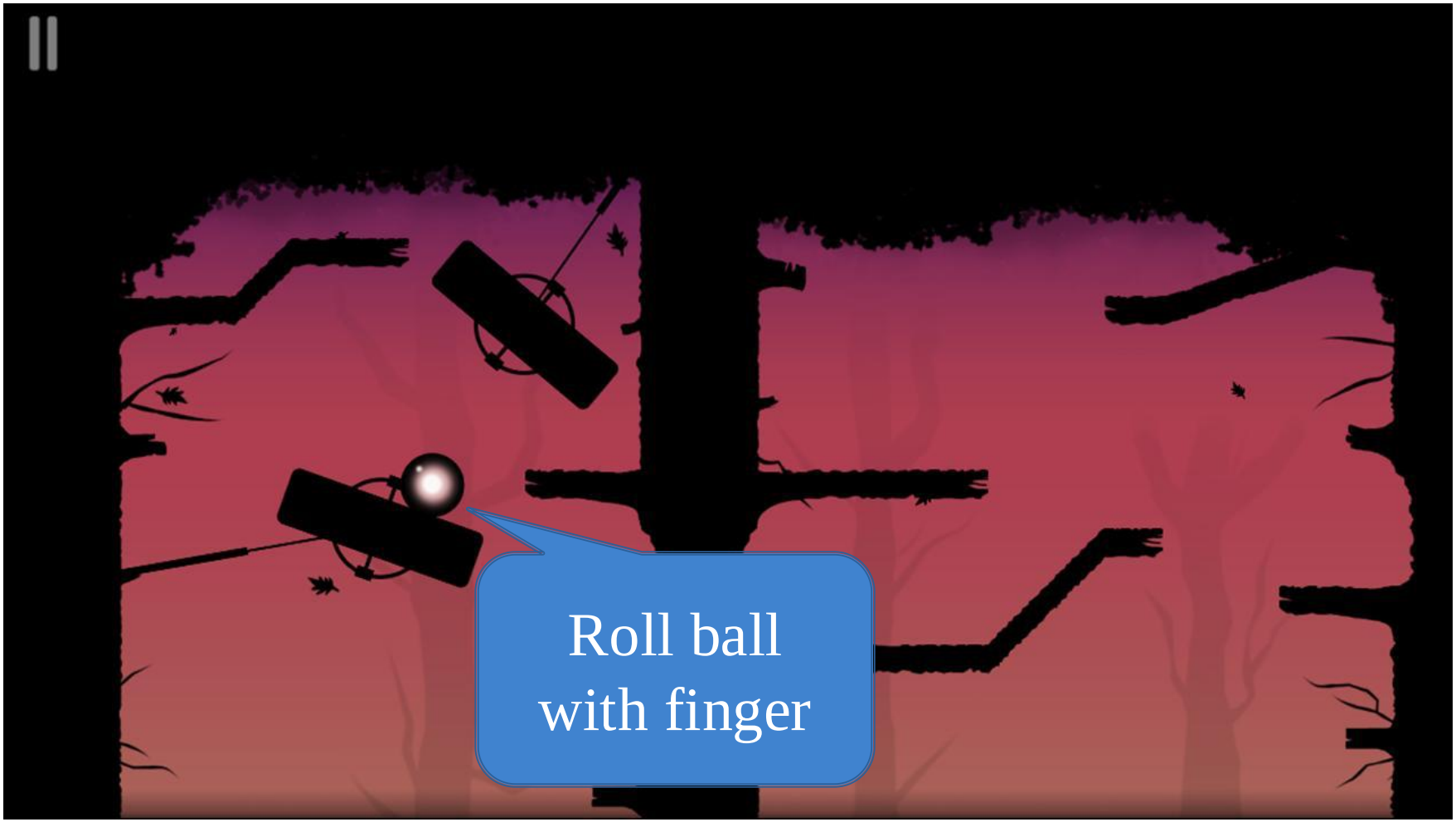
Example: *Spider*



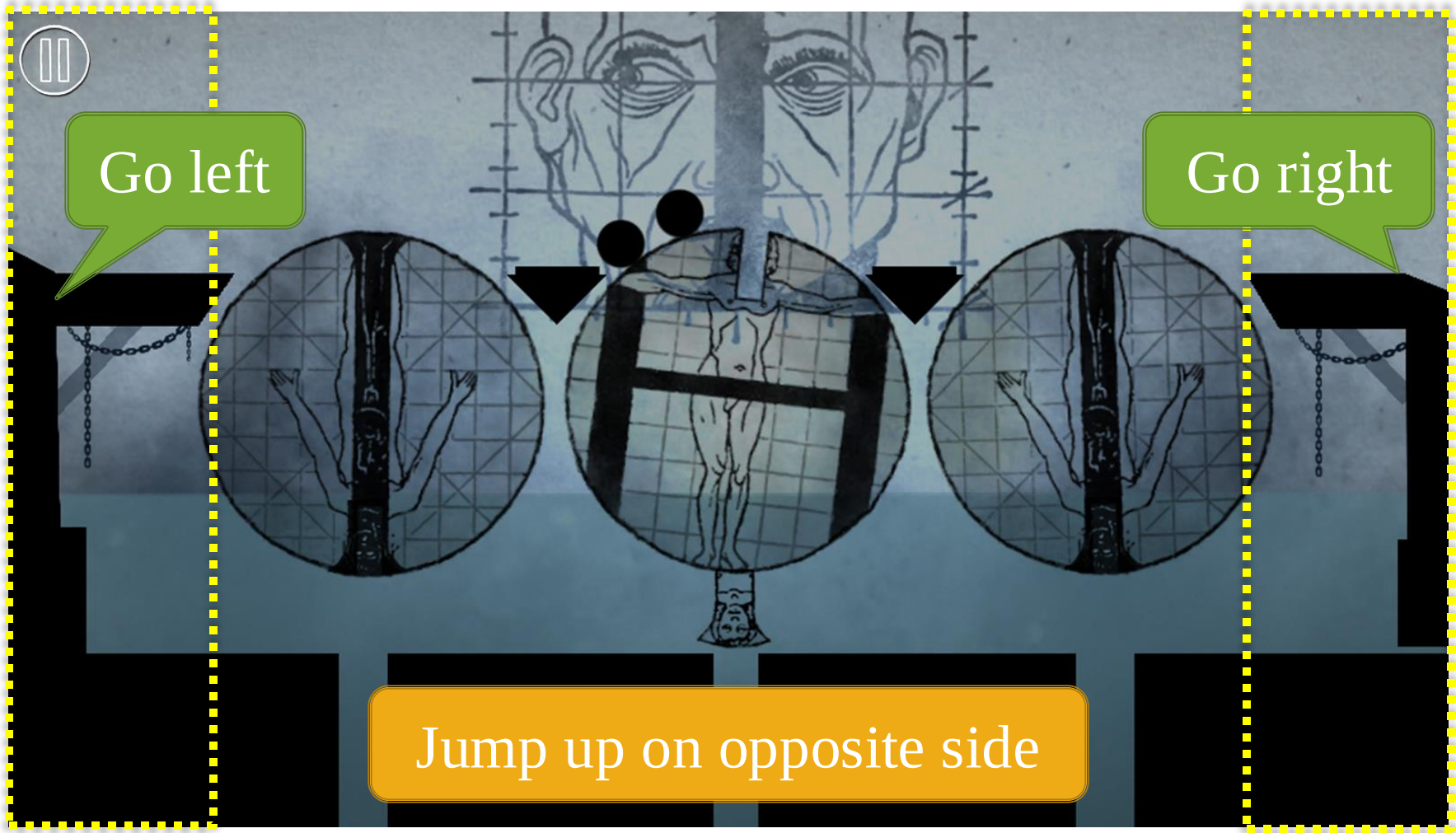
4152 Example: *Squeak & Swipe*



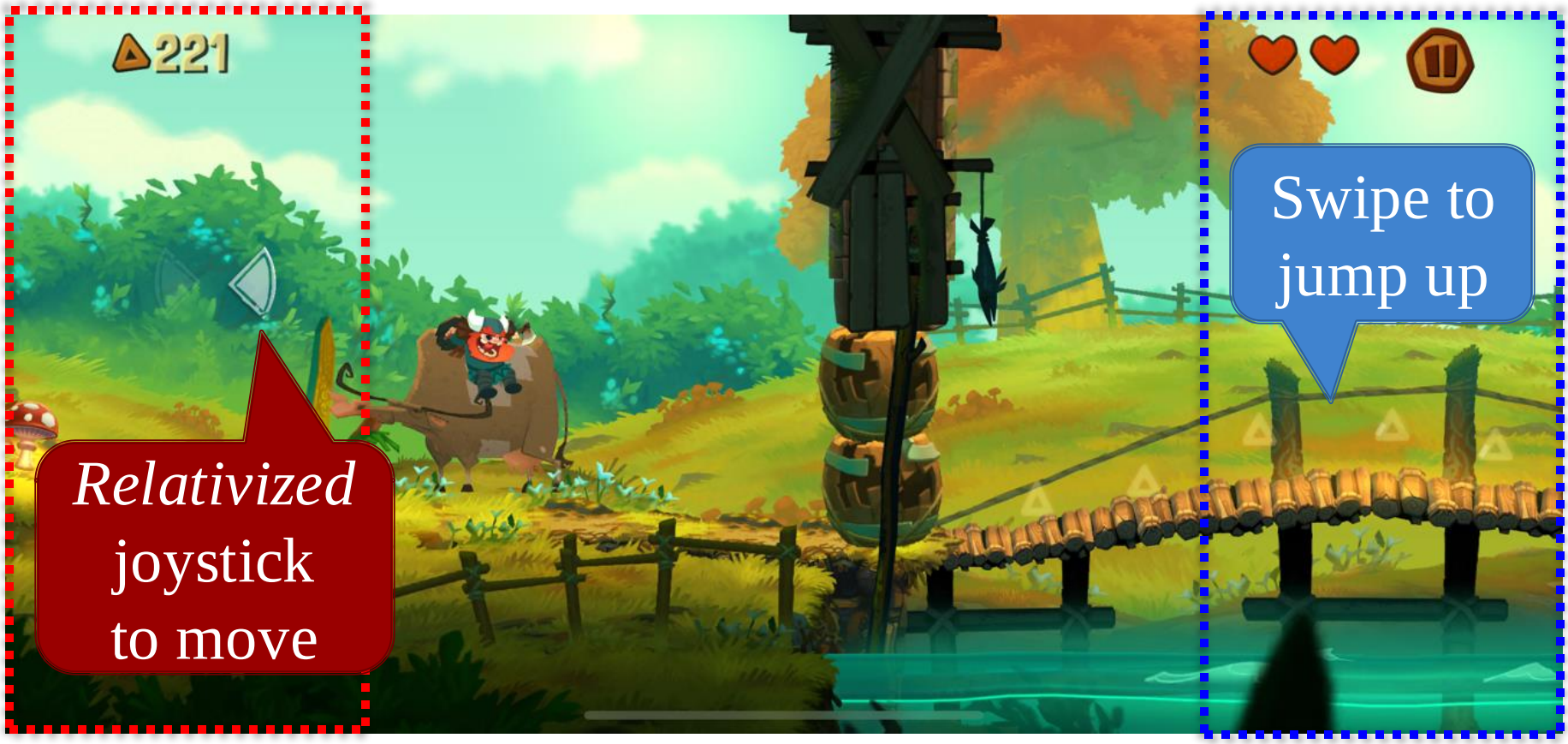
Early Platformer: *Night Sky*



Early Platformer: *Type:Rider*



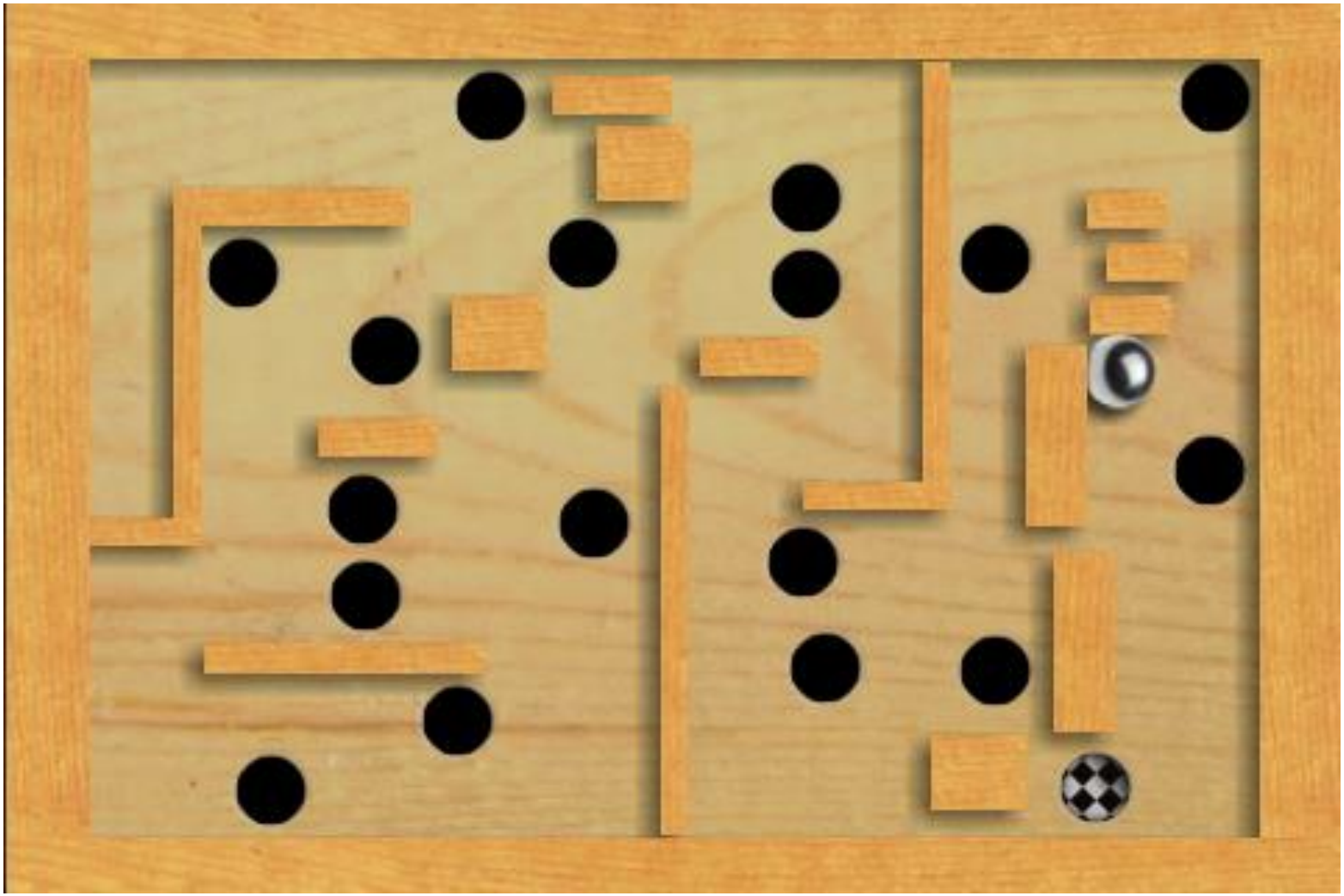
Modern Platformer: *Oddmar*



Accelerometer: Basics

- **Can** detect rotational movement
  - Rotate from flat plane
  - Rotate around edge
- **Cannot** detect other movement
  - Lateral movement of device
  - Absolute position of device
- Ideal mechanic for
  - Marble-style games
  - Steering/On-rails games

Example: *Labyrinth 2*



Accelerometer + Touch

- Solves the problem of actions
  - Use accelerometer for movement
  - Use touch for other actions
- But have to hold the device
  - Hard to gesture as well

- **Idea**: Keep actions unobtrusive
  - Avoid "button mashing" mechanics
  - Allow touch to use thumbs as much as possible

the gamedesigninitiative at cornell university

Example: *Knightmare Tower*

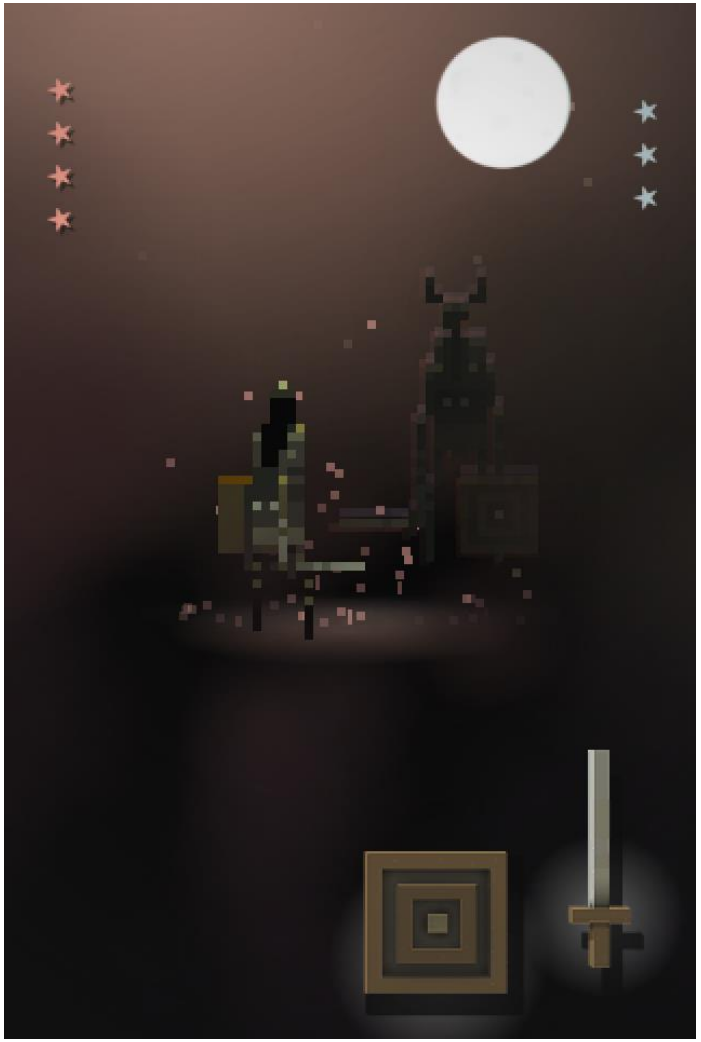
Accelerometer: Challenges

- The control device is the **display**
  - Extreme controls make game hard to see
  - Even worse when combine with touch
- Even basic movement is a **challenge**
  - Hard to quickly change directions
  - Prone to overcorrection
  - **Example**: *Labyrinth*

the gamedesigninitiative at cornell university

Accelerometer: Orientation

- Can detect device orientation
  - Either portrait or landscape
  - Use for different game modes
- *Sword & Sworcery EP*
  - Landscape for exploration
  - Portrait for combat
- Supported in SDL/CUGL
  - 3rd year in CUGL
  - Add listener to `Display`



the gamedesigninitiative at cornell university

Example: *Flipped Out!*

What About the Steam Deck?

Touch screen: **Yes**
Accelerometer: **No***

the gamedesigninitiative at cornell university

Final Word: Know Your Audience

- **Phone games** are meant for "quick play”
  - Must be able to start, play, and save in 2 minutes
  - Should be able to pick up where left off quickly
  - Controls should be (relatively) simple
- **Tablet games** can be more complex
  - Supports longer play units (why?)
  - Larger screen permits more complex controls
  - Games are closer to PC indie games
  - And can also cost more!

the gamedesigninitiative at cornell university