Lecture 2:

ActionScript 3 and Game Design
Promise

- Get you up to speed on Flash
- Tell you about an interesting experiment
- Teach basics of game design
Outline

- Updates
- Flash / ActionScript 3
- What is a game?
- How do we brainstorm?
- What makes a game fun?
- Upcoming assignments
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Update

• Groups are still being formed, will be done by tomorrow afternoon

• I’m aware of room size problems

• Assignment 1 was due yesterday
  • Send ASAP

• Assignment 2 is due Tuesday at 11:59pm
  • Separate tasks for programmers and designers

• Project Pitches on Thursday
  • Each group will present their idea
  • I will talk about this later today
Welcome newcomers!

- Please do Assignment 1 ASAP
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Before starting…

• Download the *debug player* of Flash
  • Allows the IDE to link to the Flash player
    • Set breakpoints
    • Monitor variable values
    • View console output
  • If this is not on the Phillips 318 machines, let me know
  • Getting this to work in Chrome requires an extra step

• Avoid mxml
  • Flash Builder 4: Create new “ActionScript Project”
  • Flash Develop: Create new “AS3 Project”
Classes

public class MyClass
{
}

• Only one class per file!

• Class name must match file name
Inheritance

public class MyClass extends OtherClass
{
}

Introduction
import flash.display.Sprite;

public class MyClass extends Sprite {
}

Introduction
Constructors

```javascript
import flash.display.Sprite;

public class MyClass extends Sprite {
    public function MyClass()
    {
        // Constructor implementation
    }
}
```
Packages

```java
package mygame {
   import flash.display.Sprite;
   public class MyClass extends Sprite {
      public function MyClass() {
      }
   }
}
```

Introduction
Hello World! (finally)

package mygame
{
    import flash.display.Sprite;

    public class MyClass extends Sprite
    {
        public function MyClass()
        {
            trace(“hello world!”);
        }
    }
}

Introduction
Variables

```javascript
var a:int = 0;
```
Functions

```javascript
var a:int = 0;

function addOne(input:int):int {
    return input + 1;
}
```
package mygame
{
    import flash.display.Sprite;

    public class MyClass extends Sprite
    {
        private var a:int;

        public function MyClass()
        {
        }
    }
}
package mygame
{
    import flash.display.Sprite;

    public class MyClass extends Sprite
    {
        public function MyClass()
        {
            trace(addOne(2));
        }

        public function addOne(input:int):int {
            return input + 1;
        }
    }
}
The Stage
Adding Children

package mygame
{
    import flash.display.Sprite;

    public class MyClass extends Sprite
    {
        public function MyClass()
        {
            var myChildClass:Sprite = new Sprite();
            addChild(myChildClass);
        }
    }
}
package mygame
{
    import flash.display.Sprite;

    public class MyClass extends Sprite
    {
        // inherits x, y
        public function MyClass()
        {
        }

        public function move()
        {
            x = 100;
        }
    }
}
Event Listeners

```java
package mygame {

import flash.display.Sprite;

public class MyClass extends Sprite {

    public function MyClass() {

        addEventListener(MouseEvent.MOUSE_CLICK, click);
    }

    public function click(event:MouseEvent):void {

        // do something
    }

}```
Removing Event Listeners

```actionscript
package mygame {
    import flash.display.Sprite;

    public class MyClass extends Sprite {
        public function MyClass() {
            addEventListener(MouseEvent.MOUSE_CLICK, click)
        }

        public function click(event:MouseEvent):void {
            removeEventListener(MouseEvent.MOUSE_CLICK, click)
        }
    }
}
```
package mygame
{
    import flash.display.Sprite;

    [Embed(source='image.png')]
    private var background:Class;

    public class MyClass extends Sprite
    {
        public function MyClass()
        {
            var image:Bitmap = new background();
            addChild(image);
        }
    }
}
Summary

- Flash is pretty easy
- However, some peculiarities
So you want to make a game…

What is a game?
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What is a Game?

Hopscotch Rules

- Each player has a unique marker
- Toss marker from starting line
  - Marker hits squares in sequence
  - Progress to next square each turn
- Hop through squares and back
  - Skip over square with marker
  - Hop on one foot
  - Except for side-by-side squares
- If fail, repeat at next turn
What is a Game?

Rules

- Players take turns
  - Spin the number wheel
  - Move that many spaces
- When land on space...
  - Ladders take you up
  - Chutes take you down
- First one to 100 wins!
What is a Game?
Group Activity

- What is a game?
  - What features must games have?
  - What features can they not have?
Some perspectives
a closed, formal system that engages players in structured conflict and resolves its uncertainty in an unequal outcome

(Game Design Workshop)
Sid Meier

a series of *interesting decisions*

(GDC 2012)
a form of interactive entertainment where players must overcome challenges, by taking actions that are governed by rules, in order to meet a victory condition

(Fundamentals of Game Design)
a system in which players engage in artificial conflict, defined by rules, that results in a quantifiable outcome

(Rules of Play)
Common Threads

- Players
- Challenges
- Rules
- Goals
How to design a game

1. Think really hard
2. Make the game
How to think really hard

Brainstorm!

There IS a technique to this
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Brainstorming Technique

- Focus
- **Limit the amount of time** (30 minutes max)
- Appoint a scribe who will write down ideas
- Positive phase
  - Only write down new ideas! *Don’t criticize any suggestion.*
- Negative phase
  - Discuss each idea and reject as a group
- Repeat if necessary
  - But take a break!
  - If done correctly, you will be exhausted.
Science of Brainstorming

AIDS Campaign Experiment, Dow et al.
Scenario 1

Design

Design
Scenario 1: Share One

Meeting Room

Final Design

Final Design
Scenario 2

Design 1

Best Design

Design 3

Design 1

Best Design

Design 3
Scenario 2: Share Best

Meeting Room

Final Design

Final Design

Introduction
Scenario 3

Design 1

Design 2

Design 3
Scenario 3

Design 1

Design 2

Design 3

Introduction
Scenario 3: Share Multiple
## What are the tradeoffs?

<table>
<thead>
<tr>
<th>Producing fewer designs</th>
<th>Producing more designs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Can spend more time per design</td>
<td>• Can search the space of possibilities</td>
</tr>
<tr>
<td>• After the first design, subsequent designs may not be that different</td>
<td>• First idea is not always the best</td>
</tr>
</tbody>
</table>

**Introduction**

50
What are the tradeoffs?

**Sharing fewer designs**
- Meeting time is more focused
- Easier to reach consensus

**Sharing more designs**
- Exposed to more possibilities
- Can play off each other’s ideas
<table>
<thead>
<tr>
<th>Share One</th>
<th>Share Best</th>
<th>Share Multiple</th>
</tr>
</thead>
</table>

Which did the best?
Which did the best?

Clicks per million impressions

Share One  Share Best  Share Multiple

Introduction
What does this mean for you?

- Take the time to think
- Don’t just accept the first idea
- Come up with *multiple ideas* and bring them to the group
- *Your ideas are valuable even if they aren’t used*
What does this mean for you?

- Go play games!
- Can’t design games without understanding them
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Group Activity

• What makes a game fun?
• Why do you play your favorite games?
What makes a game *fun*?

- No one really knows
- “Folk Psychology” of Game Design
Mihaly Csikszentmihalyi
Flow

Anxiety

Boredom

Challenge

Skill
Flow

Anxiety

Boredom

Challenge

Skill

The Game Design Initiative at Cornell University
Flow

Anxiety

Boredom

Challenge

Skill
Flow

Anxiety

Boredom

Challenge

Time

Boss Fight
Lev Vygotsky

Introduction
Zone of Proximal Development

can’t do yet

can do with guidance

can do now
Casual vs. Core

- **Core gamers** play lots of games
  - Almost always to finish games they play
  - Want hard games; will tolerate frustration

- **Casual gamers** play for enjoyment
  - Will stop when the game stops being fun
  - Challenges must be reasonable

- Harder to distinguish than you think
  - Something designers are paying less attention to
Play length

- You are competing with
  - Other games
  - Cat videos
  - Chores
  - Work

- Game must be fun within 30 seconds

- Casual games can still have sophisticated gameplay
  - Example: Plants vs. Zombies
Reminder: Aspects of a Game

- **Players**: How do humans affect the game?
- **Goals**: What is the player trying to do?
- **Rules**: How can the player achieve the goal?
- **Challenges**: What obstacles block the goal?
Formal Design Elements

- **Players**: Player Mode Sketches
- **Goals**: Objectives
- **Rules**: Actions and Interactions
- **Challenges**: Obstacles and Opponents
Player Mode Sketches

- Game may have several *player modes*
  - Ways in which player interacts with a game
  - **Example**: Inventory screen vs. combat screen

- You should *storyboard* all of your modes
  - Sketches of each of the major player modes
  - May have action (like movie storyboard)
  - Illustrate how player interacts with game
Lifted: Player Mode Sketch

Indicating Action
Lifted: Completed Game
Diagramming Action

Diagram showing the concepts of risk and reward, as well as easy and hard levels.
Objectives

• Anything a player might strive for
• May be a primary game objective
  • Progressing the story
  • “Completing” the game
• May be an auxiliary game objective
  • Side missions/quests
  • Unusual achievements
• Sometimes player-directed
  • Reward structure in sandbox games
Be careful with this
Braid’s Slow-moving Cloud
Actions

- **Verbs** that describe what the player can **do**
  - Walk
  - Run
  - Jump
  - Shoot
- **Does not need to be attached to an avatar**
  - Build
  - Swap
  - Rotate
Designing Actions

• Starts with brainstorming the verbs
  • Define the types of verbs
  • Define the scope of the verbs

• Design Goals
  • Enough verbs to avoid being too simple
  • But not so much to be confusing (verb bloat)
  • Do the verbs directly achieve the goal?

• Each verb maps to a single input
Primary Actions

- How do verbs, goals relate?
  - Imagine there no challenges
  - What verbs *must* you have?

- **Example**: Platformers
  - **Goal**: reach exit location
  - Only need movement verbs
  - Killing enemies is *optional*
  - Other actions are *secondary*

- **Design Goal**: Primary only
  - Secondary verbs lead to bloat
  - Add features with interactions
Interactions

- Not a *direct* action of player
  - Outcome of the *game state*
  - Can happen without controller

- **Example**: collisions
  - Accidental or player forced
  - May be bad (*take damage*)
  - May be good (*gain power-up*)

- **Other Examples**:
  - Spatial proximity
  - Line-of-sight
  - Resource acquisition
Game Mechanics

• Game mechanic
  • Relationship between verbs and interactions
  • Often call this relationship the “rules”
  • Gameplay is manifestation of these rules
Challenges

- **Obstacles**
  - Prevent progress towards goal
  - Have to be “overcome”

- **Opponents**
  - Players or bots with their own goals
  - May or may not need to be overcome

- **Dilemmas**
  - Can only perform one of several actions
  - “Correct” choice not immediately clear
What are the challenges?
What are the challenges?
A note on story

Deuce
You're pretty direct. Uh... so how are things going with you?
The Dangers of Pure Story

What is the player doing?
Story can be great…

- But you should prioritize game mechanics
Summary

• Decide what the player is getting better at
• Decide what the player needs to do
Coming soon:

• Pong / Asset Creation due Tuesday!

• Project Pitches next Thursday in class

• Paper Prototypes the following Tuesday
  • I will talk more about this next Tuesday
Project Pitches

- Next Thursday in class
- Information posted as Assignment 3
- 5 minute pitch:
  - The main idea
  - Why will this be fun
  - The core mechanics
- 5 minute Q&A from audience
- Some groups will go the following Tuesday
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