CS/INFO 4154: Analytics-driven Game Design

Class 6:

“Nobody Reads and Nobody Listens”
<table>
<thead>
<tr>
<th>Mon</th>
<th>Wed</th>
<th>Fri</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/11</td>
<td>9/6 Learnability Part 1</td>
<td>9/8 Learnability Part 2</td>
</tr>
<tr>
<td>Learnability Part 3</td>
<td>9/13 Learnability Part 4</td>
<td>9/15 Throwaway Testing 1</td>
</tr>
<tr>
<td>9/18</td>
<td></td>
<td>9/27 Alpha Testing 1</td>
</tr>
<tr>
<td>Throwaway Testing 2</td>
<td></td>
<td>9/29 Alpha Testing 2</td>
</tr>
</tbody>
</table>
Assignment 4: Game design document

- Need to assign tasks to *specific group members*
- Due Thursday, September 7th, 11:59pm
Assignment 5: Throwaway Prototype

- **No pressure**
- “Hello World!” of your game
- Doesn’t need to be playable
- Doesn’t need to be integrated
- Pick *some pieces* of your game and build them
  - Avatar moves/jumps on flat land
  - Hexagonal grid with nothing on it
  - Background artwork
Challenge: teach player how to play

For most teams, this is the *primary* challenge to overcome.
Outline

1. Setting the stage
2. A brief history of tutorial design
3. The science of video game tutorials
4. Techniques for learnability
Outline

1. Setting the stage
2. A brief history of tutorial design
3. The science of video game tutorials
4. Techniques for learnability
5 minutes: pair activity

- Pick your favorite game (quickly)
- **Discuss:** How did you learn how to play this game?
  - How long did it take to learn how to play?
  - How long did it take to get *good* at it?
  - Did you use any resources?
  - Did you *ignore* any resources?
Outline

1. Setting the stage
2. A brief history of tutorial design
3. The science of video game tutorials
4. Techniques for learnability
In the beginning, there were arcades

Pacman (1980)
Then there were consoles...
Then there were consoles…

Super Mario Bros. 3 (1998)
Instruction booklets!

NEW TECHNIQUES!

1. Holding a shell (Holding the B Button)
2. Running with a shell (Holding the B Button)
3. Kicking the shell (Releasing the B Button)
4. Breaking a block

When Mario has a tail

1. Accelerating
2. More acceleration
3. Take off
4. Mario can only fly for a short time

Power Meter going up
Meter full, (P) starting to flash
Press the A Button repeatedly
Problems with this?
Manuals also common in PC games

Doom (1994)
The rise of in-game tutorials

Legend of Zelda: Ocarina of Time (1998)
Training modes

*Deus Ex* (2000)
“Passive” tutorials

Braid (2008)
Stencils

Plants vs. Zombies (2009)
What is the trend?

No help  A lot of hand-holding
“If Doom was done today” (2011)

Author: Chubzdoomer            Link: https://www.youtube.com/watch?v=C4yIxUOWrtw
“If Doom was done today” (2011)

Author: Chubzdoomer  Link: https://www.youtube.com/watch?v=C4yIxFOWrtw
“If Doom was done today” (2011)

Author: Chubzdoomer

Link: https://www.youtube.com/watch?v=C4yIxUOWrtw
“If Doom was done today” (2011)

Author: Chubzdoomer  Link: https://www.youtube.com/watch?v=C4yIxUOWrtw
Reversing the trend

Getting Wood
Attack a tree until a block of wood pops out

Minecraft (2011)
Question #1:

- Do tutorials matter *at all?*
Question #2:

- What is the impact of teaching in context?
Question #3:

- What is the impact of limiting player freedom?
Question #4:

- What is the impact of providing help on demand?
5 minute pair debate

1. Do tutorials matter at all?
2. What is the impact of teaching in context?
3. What is the impact of limiting player freedom?
4. What is the impact of providing help on demand?
Discussion: Question #1

- Do tutorials matter *at all*?
Discussion: Question #2

- What is the impact of teaching in context?
Discussion: Question #3

• What is the impact of limiting player *freedom*?
Discussion: Question #4

- What is the impact of providing help *on demand*?
Outline

1. Setting the stage
2. A brief history of tutorial design
3. The science of video game tutorials
4. Techniques for learnability
Evaluating Tutorial Effectiveness

Refraction  Hello Worlds  Foldit

Andersen et al. CHI 2012
Refraction
Refraction: Gathering data

13,159 players
Hello Worlds!
Hello Worlds: Gathering data

22,157 players
Foldit
Foldit: Gathering data

9,754 players
Question #1: Tutorial presence

How did adding tutorials compare to *no* tutorials?
Question #1: Tutorial presence
Question #1: Tutorial presence
Question #1: Tutorial presence
Question #1: Tutorial presence

no change

no change

no change
Performance (levels completed)

**Foldit**
- No Tutorial: 3
- Tutorial: 7

**Refraction**
- No Tutorial: 10
- Tutorial: 15

**Hello Worlds**
- No Tutorial: 10
- Tutorial: 12

$p < 0.001$

$p > 0.05$

$p > 0.05$
Engagement (time played, seconds)

**Foldit**

- No Tutorial: ~500 seconds
- Tutorial: ~700 seconds

**Refraction**

- No Tutorial: ~1000 seconds
- Tutorial: ~1200 seconds

**Hello Worlds**

- No Tutorial: ~800 seconds
- Tutorial: ~600 seconds

Statistical significance:
- Foldit: $p < 0.001$
- Refraction: $p > 0.05$
- Hello Worlds: $p > 0.05$
Question #1: Tutorial presence

no change

no change
Question #2: Context sensitivity

Context-sensitive

- Click on a laser to view its value with the magnifying glass.
- You can bend the laser using benders. Benders have an input and output direction, so place them carefully.
- Laser beams cannot go through asteroids, so make sure to avoid them!

Context-insensitive
Question #2: Context sensitivity

How did context-sensitive tutorials compare to context-insensitive tutorials?
Question #2: Context sensitivity
Question #2: Context sensitivity
Question #2: Context sensitivity
Question #2: Context sensitivity

no change  no change  no change
Performance (levels completed)

**Foldit**

- No Tutorial, Context-insensitive: 4
- No Tutorial, Context-sensitive: 7
- Context-insensitive: 5
- Context-sensitive: 8

**Refraction**

- No Tutorial, Context-insensitive: 15
- No Tutorial, Context-sensitive: 15
- Context-insensitive: 16
- Context-sensitive: 16

**Hello Worlds**

- No Tutorial, Context-insensitive: 10
- No Tutorial, Context-sensitive: 10
- Context-insensitive: 10
- Context-sensitive: 10

Significance levels:

- Foldit: $p < 0.001$
- Refraction: $p > 0.05$
- Hello Worlds: $p > 0.05$
Engagement (time played, seconds)

**Foldit**

- No Tutorial: 500
- Context-insensitive: 600
- Context-sensitive: 700

**Refraction**

- No Tutorial: 1000
- Context-insensitive: 1100
- Context-sensitive: 1200

**Hello Worlds**

- No Tutorial: 700
- Context-insensitive: 800
- Context-sensitive: 900

$p \leq 0.014$

$p > 0.05$

$p > 0.05$
Question #2: Context sensitivity

You can bend the beam using this laser bender.

This is the BACKBONE of the protein. Tell me more...

USE <LEFT> & <RIGHT> OR <A> & <D> TO MOVE

no change

no change
Question #3: Freedom

Stenciled

Context-Sensitive
Question #3: Freedom

How did freedom-restricting tutorials compare to freedom-granting tutorials?
Question #3: Freedom
Question #3: Freedom
Question #3: Freedom
Question #3: Freedom

no change  no change  no change

This is the correct answer.
Question #4: Providing help

Help button

No help
Question #4: Providing help

Just picking on sidechains is not enough to fold most proteins. In these levels you will adjust the BACKBONE, which is the central chain of connected atoms that spans the length of the protein. The backbone is composed of individual segments, each with its own sidechain.

USE <LEFT> 8 <RIGHT> OR <A> 8 <D> TO MOVE
Question #4: Providing help

- When you place your cursor over a laser, you will see a magnifying glass icon. Click to see the laser’s value.

- Just picking an alpha chain is not enough to fold most proteins. In these levels you will adjust the backbone, which is the central chain of connected amino acids that spans the lengths of the protein. The backbone is composed of individual segments, each with its own selection.
Question #4: Providing help

When you place your cursor over a laser, you will see a magnifying glass icon. Click to see the laser's value.

Just pulling an sidechains is not enough to fold most proteins. In these levels you will adjust the BACKBONE, which is the central chain of connected atoms that spans the length of the protein. The backbone is composed of individual segments, each with its own sidechain.

USE <LEFT> 8 <RIGHT> OR <A> 8 <D> TO MOVE
Question #4: Providing help

- no change
- no change
- no change
Providing help in *Foldit*

**Time Played (sec)**

- Nothing: 400 sec
- Help Button: 550 sec

$p = 0.036$

**Levels Completed**

- Nothing: 3.8 levels
- Help Button: 4.0 levels

$p = 0.001$
Providing help in *Hello Worlds*

**Time Played (sec)**

- Nothing: 700 sec
- Help Button: 700 sec

**Levels Completed**

- Nothing: 10 levels
- Help Button: 10 levels

p = 0.434

p = 0.190
Providing help in *Refraction*

**Time Played (sec)**

- **Nothing**: 1000 sec
- **Help Button**: 900 sec

*P = 0.031*

**Levels Completed**

- **Nothing**: 15
- **Help Button**: 13

*P = 0.013*
Question #4: Providing help

Click to see the laser's value.

Just pulling an sidechain is not enough to fold most proteins. In these levels you will adjust the backbone, which is the central chain of connected atoms that spans the length of the protein. The backbone is composed of individual segments, each with its own sidechain.

no change
“We present results from a study of 50,000 students showing that all four hint systems negatively impacted performance compared to a baseline condition with no hints”
Key Lesson of this Class #2

Nobody reads and nobody listens
Key Lesson of this Class #2

Nobody reads and nobody listens*

*unless they absolutely have to
Key Lesson of this Class #1

Generating, *sharing*, and *testing* *multiple* ideas leads to *better outcomes*
Outline

1. Setting the stage
2. A brief history of tutorial design
3. The science of video game tutorials
4. Techniques for learnability
Learnability

the capability of a software product to enable the user to learn how to use it
Review: Game Mechanics

Actions

Interactions
Actions tend to map to a *single* input

- button press
- key press
- click on something
- drag something
Advice: explicitly teach *actions*
Advice: don’t describe *interactions*
Advice: design for discoverability

*Braid* (2008)
Advice: design for discoverability

Braid (2008)
What makes an interaction discoverable?

- *Impossible to pass* without experiencing it
- *Isolation* from other actions and interactions
- Player is relatively *safe*
Examples of discoverability

Examples of discoverability