CS/INFO 4154: Analytics-driven Game Design

Class 7: Nobody Reads and Nobody Listens
Mon

9/10
Nobody Reads and Nobody Listens

9/17
Playtesting and Bias

Wed

9/12
Discoverability

9/19
Alpha Testing 1

9/21
Alpha Testing 2

Fri

9/14
Learning Progressions

Wed 9/19 @ 10:10am: Alpha Prototype
Assignment 5: Alpha Prototype

- one functioning level
- core game mechanics for this level
- minimal art/UX integration
- a list of input keys
Challenge: teach player how to play

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

So cold... and tired... I need shelter, but there's nothing around here but fallen branches!
Aground (2017)
I can barely hold all this Wood! My Stamina will go down faster now, but I almost have enough Wood to build a Hut...
Rest in Hut

Aground (2017)
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
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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?
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!
Problems with this?
Manuals also common in PC games

Doom (1994)
The rise of in-game tutorials

Legend of Zelda: Ocarina of Time (1998)
Deus Ex: Training mode

Deus Ex (2000)
Plants vs. Zombies: Stencils

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

No help  A lot of hand-holding
DANGEROUS DOOM ENVIRONMENT

Some parts of the DOOM environment can be more dangerous than the monsters you’ll face. Areas containing exploding barrels, radioactive waste, or crushing ceilings should be approached with caution.

EXPLODING BARRELS: Scattered around the base are drums containing fuel, toxic waste, or some other volatile substance. If your shots hit one of these barrels, it’s kaboom time! It might take several bullets to set off a barrel, but a single blast of any of the other weapons usually does the trick.

SLIME AND OTHER RADIOACTIVE WASTE: Many of the areas in DOOM contain pools of dangerous liquids that will damage you if you walk through them. There are several varieties of waste, each doing an increasing amount of damage. If it looks fluid, beware!

CRUSHING CEILINGS: Some of the ceilings in DOOM can smash you, making you cry blood. Often you’ll be able to see the ceiling moving before you go under it, but not always. Be careful and Save often!

TIP: Barrels can often be the most devastating weapon in your arsenal—delivering a body-blasting explosion to all nearby purgatory pedestrians. Wait until several evil guys get next to a barrel and blast away at the can, then watch ’em all go boom!

HEALTH AND ARMOR:

Even for a tough hombre like you, DOOM can be a deadly place. Whenever you are injured, the screen will flash red, and your health will decrease. Keep an eye on your health or you’ll end up face down.

HEALING: When you’re hurt, you’ll want to get healed back up as soon as possible. Fortunately, Medikits and Stimpacks are frequently scattered around the base. Grab them if possible.

Stimpacks give you a quick injection of booster enzymes that make you feel like a new man—at least, to a degree.

Medikits are even better, and include bandages, antitoxins, and other medical supplies to make you feel a lot healthier.

ARMOR: Two types of body armor can be found laying around. Both reduce damage done to you. Unfortunately, both deteriorate with use, and eventually are destroyed by enemy attacks, leaving you in need of replacement armor.

- Security armor is a light weight kevlar vest that’s perfect for riot control.
- Combat armor is a heavy duty jacket composed of a titanium derivative—useful for protection against real firepower, like the kind you’re gonna face.

If you’re wearing armor, you only pick up a replacement suit if it provides more protection than what you’re now wearing.

POWER-UPS

Other bits of “challenging electronics” may be found in DOOM. Most of these are pretty doggone handy, so grab them when able. These special items have a duration of either the entire level, a specific amount of time, or just provide an instant benefit. A few of them affect your game screen so you can tell when they are active. For example, when you pick up a radiation suit, the game screen turns green. As the suit deteriorates the screen will flash. This is a hint to get out of the radioactive ooze now!

Radiation Suits provide protection against radioactivity, heat, and other low-intensity forms of energy. Basically, these suits enable you to walk through the radioactive ooze without taking damage. While a suit holds out, your screen will have a greenish tint.

Duration: Time Based

Berserk Packs heal you, plus act as a super-adrenaline rush, enormously boosting your muscle power. Since you’re already a pretty meaty guy, this enhanced strength lets you fear ordinary dooms from limb to limb, and you can even splatter those demons without too much trouble. However, you’ve got to use your Fist attack to get the benefit of the Berserk attack bonus. When you become Berserk, your screen will briefly turn red.

Duration: One Level
“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=C4yIxEQWrtw
“If Doom was done today” (2011)

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Link: https://www.youtube.com/watch?v=C4yIxUOWrtw
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
How to design an experiment?

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*?
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

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
Question #1: Tutorial presence

- no change
- no change
- no change
Performance (levels completed)

**Foldit**
- No Tutorial: 4
- 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

Refraction

Hello Worlds

p < 0.001

p > 0.05

p > 0.05
Question #1: Tutorial presence

no change

no change
Question #2: Context sensitivity

Context-sensitive

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

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
Question #2: Context sensitivity
Question #2: Context sensitivity

no change

no change

no change
Performance (levels completed)

**Foldit**  
- No Tutorial  
- Context-insensitive  
- Context-sensitive  

- p < 0.001

**Refraction**  
- No Tutorial  
- Context-insensitive  
- Context-sensitive  

- p > 0.05

**Hello Worlds**  
- No Tutorial  
- Context-insensitive  
- Context-sensitive  

- p > 0.05
Engagement (time played, seconds)

**Foldit**

- No Tutorial: Blue
- Context-insensitive: Red
- Context-sensitive: Green

$p \leq 0.014$

**Refraction**

- No Tutorial: Blue
- Context-insensitive: Red
- Context-sensitive: Green

$p > 0.05$

**Hello Worlds**

- No Tutorial: Blue
- Context-insensitive: Red
- Context-sensitive: Green

$p > 0.05$
Question #2: Context sensitivity

no change

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

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

Help button

No help
Question #4: Providing help

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.
Question #4: Providing help

Just putting an object into its correct position 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 lengths of the protein. The backbone is composed of individual segments, each with its own orientation.
Question #4: Providing help

Just pulling 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 lengths 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

![Bar chart showing Time Played (sec) for 'Nothing' and 'Help Button' with p = 0.036.]

![Bar chart showing Levels Completed for 'Nothing' and 'Help Button' with p = 0.001.]

- Time Played (sec):
  - Nothing: 500 seconds
  - Help Button: 600 seconds

- Levels Completed:
  - Nothing: 4 levels
  - Help Button: 5 levels
Providing help in *Hello Worlds*

**Time Played (sec)**

- **Nothing**: 750 sec
- **Help Button**: 650 sec

*p = 0.434*

**Levels Completed**

- **Nothing**: 10 levels
- **Help Button**: 9 levels

*p = 0.190*
Providing help in *Refraction*

- **Time Played (sec)***
  - *Nothing*: 1100 sec
  - *Help Button*: 950 sec
  - *p* = 0.031

- **Levels Completed***
  - *Nothing*: 15 levels
  - *Help Button*: 14 levels
  - *p* = 0.013
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 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> & <RIGHT> OR <A> & <D> TO MOVE

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
Generating, *sharing*, and *testing* multiple ideas leads to *better outcomes*.
Counterexample: *Minecraft*

*Minecraft* (2011)
Counterexample: *Minecraft*
Outline

1. Setting the stage
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Learnability

the capability of a software product to enable the user to learn how to use it
Mario, revisited

NEW TECHNIQUES!

- Holding a shell
- Running with a shell
- Kicking the shell
- Breaking a block

When Mario has a tail

- Accelerating
- More acceleration
- Take off
- Mario can only fly for a short time

Power Meter going up
Meter full, (P) starting to flash
Press the A Button repeatedly
World 1-1
Vox interview: Shigeru Miyamoto

How the inventor of Mario designs a game

Author: Christophe Haubursin and Joe Posner

Link: https://youtu.be/K-NBcP0YUQI?t=141
Advice: design for discoverability

Braid (2008)
Advice: design for *discoverability*

*Braid* (2008)
Advice: *progress* through mechanics

*I haven't talked to anyone lately, but at least I can solve my own problems.*

*The Company of Myself* (2009)