CS/INFO 4154: Analytics-driven Game Design

Class 9: Learning Pathways
Assignment 5: Throwaway Prototype

- Friday and Monday
- No pressure
- Doesn’t need to be playable or integrated
- Pick *some pieces* of your game and build them
  - Avatar moves/jumps on flat land
  - Grid with nothing on it
  - Background artwork
- Submit picture through CMS by *end of class* on Friday 8/15
Outline

1. More thoughts on difficulty
2. Learning pathways
3. Group activity: *progression design*
Outline

1. More thoughts on difficulty
2. Learning pathways
3. Group activity: progression design
Review: Flow
Flow: Ideal situation
Impact of challenge on engagement

Abuhamdeh and Csikszentmihalyi 2012
Inverted-U hypothesis
Extreme example: QWOP

Bennett Foddy
Pair activity: quick discussion

- Pick your favorite game
  - How difficult was your experience with this game?
  - Is this game easier or harder than other games you have played and liked less?
  - Does the inverted-U hypothesis predict your engagement?
Large-scale experiment

Click on fraction  Type fraction

Smaller ship  Larger ship

Less time  More time

Lomas et al. CHI 2013
Battleship Numberline

Lomas et al. CHI 2013
Impact of input type

Click on fraction

Type fraction

Lomas et al. CHI 2013
Impact of target size

Smaller ship

Larger ship

Lomas et al. CHI 2013
Impact of time limit

Less time

More time

Lomas et al. CHI 2013
Experiment: 28,800 conditions!

- Input types: *click on number line* vs. *type fraction*
- Ship sizes: 4, 6, 8, 10, 16, 20, 24, 30, 40%
- Time limits: 2, 3, 4, 5, 8, 10, 15, 30 seconds

Lomas et al. CHI 2013
Experiment: 70,000 people
Results

- Clicking on target = more time played
- Bigger target = more time played
- Longer time limit = more time played

Lomas et al. CHI 2013
Inverted U?

Lomas et al. CHI 2013
In contrast to the Inverted-U hypothesis, which predicts that a moderate level of challenge should lead to maximum engagement, we found that the easier the game, the longer people played”
Vocal Joystick

feet

boot

cat

law

Bilmes et al. ICASSP 2006
Analysis of Tetris

Closed Holes

Pile Height

Bumpiness
The sum of column-wise differences

Spiel et al. CHI 2017
Algorithms

- Nicetris
  - Ranks pieces by current goodness-of-fit, chooses best
- Bastet
  - Ranks pieces by current goodness-of-fit, chooses worst
- Grab Bag (original game)
  - Pieces drawn randomly without replacement
- True Random
  - Pieces chosen randomly at all times
- Skewed Random
  - 50% probability of ♣ or ♦, otherwise random

Spiel et al. CHI 2017
Pair activity: rank easiest → hardest

- Nicetris
  - Ranks pieces by current goodness-of-fit, chooses best
- Bastet
  - Ranks pieces by current goodness-of-fit, chooses worst
- Grab Bag (original game)
  - Pieces drawn randomly without replacement
- True Random
  - Pieces chosen randomly at all times
- Skewed Random
  - 50% probability of \[\text{[image of piece]}\] or \[\text{[image of piece]}\], otherwise random
Performance: Lines cleared

Spiel et al. CHI 2017
Perceived difficulty

Nicetris
Grab bag
True Random
Skewed Random
Bastet

Spiel et al. CHI 2017
Pair activity: rank least fun → most fun

- **Nicetris**
  - Ranks pieces by current goodness-of-fit, chooses best
- **Bastet**
  - Ranks pieces by current goodness-of-fit, chooses worst
- **Grab Bag (original game)**
  - Pieces drawn randomly without replacement
- **True Random**
  - Pieces chosen randomly at all times
- **Skewed Random**
  - 50% probability of □□ or □□□, otherwise random

Spiel et al. CHI 2017
Fun vs. Difficulty

Nicetris
Grab bag
True Random
Skewed Random
Bastet

Spiel et al. CHI 2017
“players tended to have more fun in TETRIS the easier they perceived the game to be”
Findings

“Interestingly though, individually, only eleven out of the sixteen players found the game more fun when it was perceived as less difficult.”

“The others attributed more fun to algorithms they perceived as more difficult, indicating that engagement and enjoyment are linked differently for different types of players.”

Spiel et al. CHI 2017
Key Lesson of this Class #3

when in doubt, make the game *easier*
Outline

1. More thoughts on difficulty
2. Learning pathways
3. Group activity: *progression design*
Review: Design Patterns

Platformer: Jump

Stealth Game: Avoidance

- Help player to recognize situations and apply learned skills
- Often inspired by game genre
- Ultimately, specific to your game design
Review: Composition

Avoidance + Avoidance

Avoidance + Chasing

Chaser
Make a Gantt Chart for *In the Company of Myself*

http://www.kongregate.com/games/2DArray/the-company-of-myself
Level 1
Level 2
Now that risk is involved, jumping on platforms doesn't seem as easy to me.
Level 4
Level 5

I haven't talked to anyone lately, but at least I can solve my own problems.
Which is harder?

Level 1

Level 2

Design Patterns
Which is harder?

Level 2

Level 3

Design Patterns
Which is harder?

Level 3

Level 4

Design Patterns
Which is harder?

Level 4

Level 5

Design Patterns

I haven't talked to anyone lately, but at least I can solve my own problems.
Which is harder?

Level 3

Level 5

Design Patterns
ITCOM Skill Tree

1.

2. + + +

3. + + + + + + + +

4. + + +

5. + + + + + + + + + + + + + + +
Two promising learning pathways:

- move → complex jumps → clone and jump → clone and complex jumps
- move → clone and jump → complex jumps → clone and complex jumps
Outline

1. More thoughts on difficulty
2. Learning pathways
3. Group activity: *progression design*
Group activity #2: plan your tasks

Step 1. Make an (Ideal) Gantt Chart for your game
Step 2. Design a level that *reinforces* a mechanic
Step 3. Design a level that *combines* two mechanics