**Game Analysis Project**

Game Project (25% of course grade)

Grading Rubric: [link to rubric]

Cognitive engineering is about evaluating and designing complex environments that require critical decisions. Since real-world environments like these are difficult to access, we start with analyzing video-game play instead. This is a team project with 2-3 people.

Your goal in analyzing the game is to compare novice vs. expert performance and develop a simple mathematical model of performance for prediction. "Predict the performance" might mean the level at which a player dies, or the time to complete a level, or an average score reached. You can decide.

**Learning Objectives**

After completion of this project, you will be able to:

* Describe the dynamics of a game in terms of timing, entities, levels, etc.
* Describe a player’s cognitive challenges during that game in terms of response times required, zones of attention, and strategies.
* Develop metrics that describe game performance
* Characterize the differences between novice and expert players

**Timeline**

* Tue 8/25 Choose game team and game, ask me for approval
* Tue 9/22 & Thu 9/24: Present game project
* Mon 9/28: All deliverables due in Canvas by midnight

Choose a videogame for which:

* You have access to a reasonably good player, and a second player who is not as good.
* It takes significant practice to become an expert vs. a novice (the game 2048 does \***not**\* meet this requirement, for example)
* The game includes time pressure.
* The game is single-player (not multi-player).
* The game is not so violent/obscene/misogynistic that some of us would be disgusted/embarrassed to see screenshots/videos presented in class.
* The game is not purely cognitive, like Sudoku, chess, or crosswords. Some psychomotor action is helpful.
* The game is not Tetris.
* It can be a mobile app, a desktop app, immersive app, or whatever.

Confirm your game choice with me before beginning the project.

You'll want to analyze:

1. The game itself.
   1. What are the attentional demands?
   2. How frequent?
2. The human play of an expert vs. the human play of a novice
   1. What do they have to do?
   2. What are their possible errors?
   3. How do novices and experts differ?
   4. Will an attentional load reduce an expert to a novice?

Record data about how your players play so that you can compare performance data across players. You'll need as much data as you can gather, e.g., the average time to play before losing, the average level at which they fail, their average score, the average number of aliens shot, etc.

If you want to know where the attentional bottlenecks are, give your players an attentional loading task, e.g., tell them a stream of numbers and ask them to tell you if they hear 3 odd numbers in a row. Or 2 odd numbers if 3 is too hard. (Changing this number is a way to make the task harder or easier.) You could also use the N-back task (see example here: <https://www.psytoolkit.org/experiment-library/experiment_nback2.html>), but people often get really grumpy from that. Or if you think that attention is crucial whenever the blue alien appears, trying getting a baseline of performance, and then tell the player that you're going to text message them while they’re playing, and they need to read the text message to you when it happens, and do it during the blue alien and see how performance compares to without the messaging.

Let's try to walk through an example briefly with Tetris. In Tetris, you might decide that there are 2 attentional zones: 1) the top where pieces appear, and 2) the top of your wall where they accumulate.  For each attentional zone, you might decide on a frequency with which events occur there. Then, you could decide that the human has several tasks in this game, and make a task analysis component for each. Those might be:  
  
1) Identify a piece to focus on. During this step the human identifies the shape.  
2) Evaluate the wall crest and where the piece might fit.  
3) Move the piece to its goal position.  
(repeat)  
  
For each of those components, you'd try to gather enough data to establish average times and std deviations. The times and std devs would probably be for an expert to start, and then you could assign different ones for a beginner player.  
  
Then you'd spend some time clocking/timing actual players to get your times right. Then see if you can predict how many Tetris blocks will accumulate, on average, before the player fails.

Eventually, you'd compare stats for an expert play vs. a novice player. How are they different? Do they have faster responses, or different strategies, or what?

**Deliverables**

1. A report that includes (single-spaced):
   * An introduction to your game and its requirements for gameplay (1-2 pages; include at least 1 screenshot)
   * A description of your game at a more abstract level that allows you to compare it to games that are similar to yours in various characteristics (1/2 - 1 page or so).
   * A brief literature review on any academic work that has analyzed your game, if it exists (1/2-1 page)
   * Your description and justification for your analysis approach for the game (1-2 pages: include references if at all possible)
   * Your description and justification for your analysis approach for the human. (1-2 pages: include references if possible) Don't mention people's names--either make up names or call them P1, P2, etc.
   * Discussion of a) what you have learned from the experience and b) the extent to which your analytical approach will generalize to other games and other humans (1-2 pages).
   * Brief (one paragraph) description of the roles each of the team members played on the project, e.g., who did the data collection, the analysis the write up?
2. Presentation of 12 minutes. You'll probably use slides and/or video. Tell us the story of how you analyzed your game. Make sure it includes:
   * Brief video / pictures of your videogame (NOTE: Do not include the player's face in your video)
   * Game screenshots that show how you labelled / analyzed your game, e.g. with boxes around zones of attention or pointers to entities, etc.
   * Discussion of the human analysis vs. the game analysis
   * How did you compare the expert vs novice player?
   * References in small print in the corners of your slides if you used them to justify your decisions.