### Experiment overview

The purpose of this experiment is to investigate the affective state of suspense. More specifically, to empirically test Ely and colleagues’ (2015) formal definition of suspense. In their definition, suspense is viewed as being derived from the expectation that consequential information will be revealed in an upcoming moment. This definition was entirely theoretical until 2021, when Zhi-Wei et al. found empirical evidence to support Ely et al.’s definition of suspense. The experiment created for this assignment is a replication of experiment one in Zhi-Wei and colleagues’ study, with a few minor modifications made. In this experiment, the researchers took games that the theoretical model of suspense predicted to be extremely high/low in suspense. They then asked participants to play these games and self-report their levels of suspense throughout the game. The model also predicts step by step fluctuations in suspense, which can also be compared to the participants’ reports of suspense.

### Description of procedure

Much like a game of Blackjack, participants randomly draw cards from a small deck. If their total exceeds 21, the game is a "bust" and they lose. Participants are notified that they will receive a base fee of £3 for taking part and will receive an extra £2 if they win the game, i.e., if their sum at the end of the game has not exceeded 21. Unlike in Blackjack, the participant does not make decisions on when to stop drawing cards, this is instead fixed. Intuitively, suspense builds in the task when the sum of the drawn cards approaches 21.

Each game round involves the player drawing cards from a deck comprising of nine cards with visible values. To intensify the suspense experienced in each trial, we implement a two-stage process for unveiling each card. Initially, participants observe the face values of the nine cards in the deck. Subsequently, the cards undergo a flip and shuffle animation. Two cards from the deck are then chosen and moved to the left side of the participant's screen. After each card draw, participants are prompted to provide a self-reported measure of their level of suspense. The suspense scale ranges from 1 to 5, where 1 signifies "no suspense," and 5 indicates "high suspense."

Following this, participants press the letter "c" on their keyboard to initiate the spinning of an animated wheel, determining the final card to be drawn. Participants can choose how long to spin the wheel by holding down the button. The spinner will increase in speed the longer the button is held. This is designed to create the illusion of stochastic outcomes, engaging participants by implying that their spinner control skills may lead to a more favourable outcome.

Upon card selection, the participant's current card total, representing the sum of face values for all drawn cards, is automatically updated in a graph at the top of the screen. The interface displays both the total sum and a graphical representation of the sum's evolution across sequential draws.

Disclaimer: The cards involved in the high and low suspense conditions have been made up for the purpose of this assignment.

### Experimenter’s manual

* Open the main file of the program and navigate to the experiment setup section (lines 20-40).
* Here you can change the name of the results file that is output by the program. It is set to ExperimentResults.csv by default. You do not need to create this file, the program will automatically create the file with the name you have given on the first run.
* Set max\_trials to be the number of card draws you would like the participants to complete. This is set to 5 by default.
* You may change the cards in the deck by changing card\_deck. Note that you should not add more than 9 values as this would require changes in the UI file to display more cards. Feel free to change the card values.
* Please input the cards that you would like to be selected per trial for each condition (i.e., in cards\_drawn\_high\_suspense and cards\_drawn\_low\_suspense). Do not set max\_trials to be greater than 5 if you have not added the cards to be drawn on rounds after 5. The card selection is predefined and not randomly generated since we are experimentally controlling the cards participants draw.
* Input the conditions you would like to run this experiment for, default is set to high suspense and low suspense, but conditions can be easily added with the following three changes.
* If you would like to add another condition, please add the new conditions to the conditions list.
* Then create a new set of card selections per trial for this condition in the same format as the high and low conditions given.
* Lastly, you will need to add the new condition and corresponding card selection you have created to card\_draws\_per\_condition. If adding a new condition, please ensure the name in card\_draws\_per\_condition matches the name you have given the condition. You do not need to change any other part of the program to cater for a new condition.
* Once you have made any required changes, you are ready to start the experiment.
* Once each participant is ready, all you need to do is hit play and a user interface will pop up.
* The following results will be stored in a file in wide format, i.e., a single row per participants: condition, demographic information, self-reported measures of suspense on each trial.

### Diagram: General Flow of the code

Each node on the graph represents a class in my code and gives a brief description of what it does (its’ methods) and any signals emitted by it.

A diagram of a game

Description automatically generated

### Program highlights

**Animations**

There are three animations in total.

1. **The flashing red arrow**: Novel way to signify to the participant that they need to press the shuffle card button to . It is retriggered at the start of ever round of card draws. I also wrote this very concisely (13 lines of code in total). This is a feature I added that was not in the original expt.
2. **The card shuffle:** Flips the cards and displays them spatial moving. This was complex to do since I needed to keep the cards within the widget boundaries and move them in random directions.
3. **The lottery wheel:** This was very complex. Firstly, since I needed to create a custom signal to override the keypressEvent QWidget method. Also, speeding up the wheel spin the longer the key is pressed added further complexity. Finally, determining the final wheel spin location and emitting this as a custom signal also increases the complexity.

**The Graph**

This goes beyond what we were taught in lectures. It updates dynamically over time as cards are drawn and the participant’s total is updated. I have also included a red block which displays where the game results in a “bust” or loss.

**Dynamic**

To add an additional condition you only need to make 3 changes, that are all located in the same part of the main file. I have tested with additional conditions without any errors. Similarly, to change the number of card draws in the game you only need to change max\_trials in main. Also, you do not need to create a file on the first run – the system automatically does this for you.

**Signals & Slots**

You will see in my program that I use custom signals extensively (10 in total). Since each step of the game is dependent on previous ones, I use custom signals to emit information that will be used in another part of the code. For example, suspense\_inputs\_complete is a signal that contains the list of all self-reports of suspense the participant has given, and it is only emitted when the game is complete. This is then used elsewhere to write the results to a file.

**OOP**

Improves readability, flexibility and maintainability. For example, if you would like to change the axis range on the graph you only need to navigate to the initialise function where I have defined attributes for the min and max x and y axis values.

**Interactive Design**

The game itself is highly interactive. Widgets are also interactive – for example, if you try to click next on the initial page without consenting the widget will be highlighted in red. However, as soon as you click it the error warnings disappear. Error warnings contain specific information rather than general, e.g., which fields the user has not filled in.

### Bibliography

Ely, J., Frankel, A., & Kamenica, E. (2015). Suspense and surprise. *Journal of Political Economy*, *123*(1), 215-260.

Li, Z. W., Bramley, N. R., & Gureckis, T. M. (2021). Expectations about future learning influence moment-to-moment feelings of suspense. *Cognition and Emotion*, *35*(6), 1099-1120.