ACTIVITY 0

CAN YOU “BEAT” RANDOMNESS

# DIRECTIONS

Have one group member upload this docx file to your Google Drive and share it with your groupmates and your instructor. Name your document “**GroupX\_Activity0”** (where X is your group number). Work together to type up your responses to each question. Download your document as a PDF and submit this to Canvas individually.

# INTRODUCTION

In his best-selling book *The Drunkard’s Walk: How Randomness Rules Our Lives*, Leonard Mlodinow describes a probability guessing game that psychologists have played with different subjects such as humans, rats, and other non-human animals: Subjects are shown a sequence of red and green lights or cards. After subjects watch the colors appear for a while, they are then asked to predict the color that will appear on subsequent lights or cards.

We are going to play a game, similar to the one described by Mlodinow, as a class. A sequence of 20 colors will be shown. Based on this sequence, we will play a game that generates these colors in a similar manner and asks us to predict the next color. The game will start by asking you to determine your strategy. Initially, you are likely just guessing, but after playing a few times, you will be developing strategies to get more guesses correct. Type in a name that reflects what your strategy is each time you play.

Once we set a strategy, we will make our predictions by typing G or R and pressing enter. The program will display our prediction under the Guesses row. The program will then generate a color and display it under the Correct row. During each game you play, the program will tell you the total number of predictions made thus far and how many of those predictions matched the actual color (were correct). After each game, a table will be displayed, showing you how many out of 20 you got correct on each play of the game along with the strategy you chose.

To access the guessing game, click the link below:

<https://introtostat100.web.illinois.edu/>

# PART 1: DEVELOPING STRATEGIES

1. To simulate “watching” the colors like Mlodinow’s subjects did, play one round of the game (i.e. make 20 predictions) to gain some intuitions for how the colors are being generated. When asked to pick a strategy, just say you are “guessing” for now. What percentage of your 20 predictions were correct?
2. When playing this game, did you notice anything in regards to how the colors were chosen? Jot down any observations you have so far below’.
3. Based on these observations you made, develop a strategy (i.e., how and why did you make your predictions?) that you think may help you guess the colors correctly and describe this strategy below. (If you aren’t sure about a clear strategy yet, you can play more “guessing” rounds to get more ideas)
4. Play the game once again using the strategy that you just described (in (3)) for all of your predictions. What percentage of your 20 predictions were correct this time?

Stop working on the activity for now – we will have a class discussion on the strategies that we created to get some ideas going. If you’re waiting for that to begin, you can try out your strategy again and record the results from each set of 20 guesses, or try to brainstorm some alternate strategies. Jot your ideas or results in the space below for now.

# PART 2: GATHERING DATA ABOUT STRATEGIES

1. Describe two strategies other classmates described in your class discussion that were different than your original strategy in (3).
2. Play a few rounds of the game for each of the two different strategies you obtained from other classmates. Use the table below to record your results across each strategy that you’ve tried. (feel free to add more rows to the table if you do more tries!)

|  |  |  |  |
| --- | --- | --- | --- |
| Strategy Name: |  |  |  |
| # Correct (Trial 1) |  |  |  |
| # Correct (Trial 2) |  |  |  |
| # Correct (Trial 3) |  |  |  |

1. When you used the same strategy multiple times, did the number of correct guesses change or was it the same? Explain why you think they were the same/different.
2. Do you find any particular strategy to be more effective at guessing correctly? What led you to think this?

# PART 3: EXTENSIONS

1. Do you think that there is a “best” strategy? That is, do you think that there is a single strategy that is better than any other strategy? Why or why not?
2. Suppose that while playing the game, you observed 5 green lights in a row. Can you predict the color of the **next** light? Explain.
3. Suppose that while playing the game, you observed **10** green lights in a row. Can you predict the color of the **next** light? Explain.