

# Parrondo's Paradox

Ido loven

Supervisor: Shlomo Rozenfeld

## Introduction

Have you ever felt that nothing works for you? That you can't succeed? Pay attention to the following idea and find out how you can make a profit from this situation.

Parrondo's Paradox, which was discovered by Juan Parrondo is a paradox in game theory in which two losing games can produce a positive outcome under the right conditions, when played randomly.

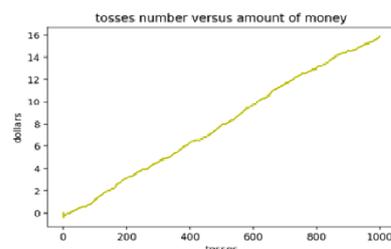
In this project, I attempted to confirm that the paradox occurs, to find out what is the maximum profit we could gain by playing the two losing games, and which sequence of them is the best.

## Model

The model is based on Stan Wagon's Parrondo Paradox Model. At the center of the model there are two games, game A and game B, which as can be shown through the model, are losing games. However, when combining these two games into a third game – game C, it can be seen that this game C is a winning game. The first part of the model shows that the paradox exists by playing the two losing games randomly. The second part of the model finds the best possible sequence of the losing games depending on the desired length and accuracy.

## Results

While the losing games both lost 0.009 dollars for every coin toss, game C won 0.016 dollars for every coin toss.



The lengths of the sequences that were examined were four, five and six games. The optimal sequence of games was found to be a sequence of five games and by playing this sequence, a 0.066 dollars profit will be gained for every coin toss.

game\_B  
game\_A  
game\_B  
game\_B  
game\_A

## For Further Research

- ◇ The sequences checked in order to find the optimal sequence could be much longer and lead to better results.
- ◇ The number of combined losing games could be larger and the paradox might keep occurring.

