

# **Extended Statistical Java Gaming Simulation**

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## **Abstract**

Our team has redesigned the 3 chips game into the 4 chips game. 4 chips game strategy is more complex than the previous 3 chips game. To do that extension, we fully utilized our knowledge of JAVA to create a program that could quickly and accurately represent each of our hypothesis. Three cases including the random pick, with 3 chips rules and with 4 chips rules are explored. We then compared the results of the program to our predictive model for further improvement. Our team still went through the standard Forming, Storming, Norming, and Performing phases, though the time spent on each phase was greatly reduced. This project is excellent practice for how to apply Java programming and statistics for the complex real-world problems.

## **Keywords**

Java, Statistics, Probability, Predictive Modeling, Six Sigma

## **1.0 Introduction**

The purpose of this project is to expand the model our team created last year. This project, unlike our last one, forces us to fully utilize our resources, like the computer, since it is impossible for us to calculate everything by hand. In the previous paper, we had hoped that the program we had created could be used in medical research, but that was not possible. However, since we could have more experience with the computer and JAVA this year, our program has become more advanced, and is able to incorporate more rules than before.

## **2.0 Design of the “4-chips” Game**

For a quick review of the previous 3 chip game. The basic law is each 2 players play take turns to pick the one of more chips from the same color and who pick the last one is the winner. The sample space for the (6, 8, 10) 3 chips game is 480 and we can manually calculate the probability for each case. When we extend the game in to 4 chip game, for example, (6, 8, 10, 12) the sample space is 12X. The rules are more complex than 3 chips and the results are harder to predict. When we extend the game, the problem is more like real-world problem.

Therefore, we have redesigned the 3-chips game to the 4-chips game and here are the basic laws of the 4 chips game:

1. There are four groups of chips with different number and color in each group as the initial game condition (e.g. 12 Blue chips, 10 Red chips, 8 Yellow chips, 6 Green chips). The initial condition can be randomly assigned as long as there is NO identical number of chips in any two groups such as (X, X, Y, Z).
2. There are three types of players (Player Type A, Player Type B and Player Type C) who will play each other. One player will go first, and then two players will take turns until completed the game. Player Type A is not aware of any game rules, which means it's chip selection is completely random. Player Type B is aware of the 3 chips game rule, and Player C is aware of both 3 chip game rules and the additional 4 chip rules.

















