CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
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Project Number
S1528

Project Title
Scrambling Stats: The Ability of Various Card Shuffling Methods to Produce Logically Arbitrary Card Arrangements

Abstract

Objectives/Goals
If compared against the 3 other most commonly used shuffling methods, the Block shuffle will produce the most random arrangement of cards.

Methods/Materials
Materials used included a computerized pseudorandom card-shuffling program and a half deck of standard playing cards. Using half of a deck expedited the shuffling process and still maintained applicability of the results. Shuffles studied included the "riffle-shuffle", the "block" shuffle, and "smooshing". To set up each shuffle, the cards were rearranged to the same position each time. Card position (measured relative to the top of the deck), trial number, and card was recorded for each trial. The "block" and "riffle" shuffling methods were tested by shuffling 3 times per trial, and the "smooshing" was performed for 30 seconds, the average time it took to perform the other methods.

Results
The shuffling methods did differ quite dramatically from one another, particularly the "riffle" shuffle, which was the least random. The "smooshing" shuffle however, was the most random.

Conclusions/Discussion
The "smooshing" method was shown to be more random than any other shuffles. The "riffle" shuffle was the most volatile among all shuffling method by the metric of average card position. Further, the "riffle" shuffle had many more consecutive card pairs and repeat card positions than the other methods. This implies that the riffle is the most predictable shuffle and that "smooshing" is the least so. Such results suggest that casinos should switch from the traditional "riffle" shuffle to something more able to produce fair results for the players.

Summary Statement
Three methods of card shuffling were compared for their ability to produce random results, and the "smooshing" shuffle was shown to be the best.

Help Received
None. The experiments were designed and performed solely by myself.