
Monotonous betting strategies in warped casinos

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Résumé

Suppose that the outcomes of a roulette table are not entirely random, in the sense that there exists a strategy which achieves the accumulation of an eventually unbounded amount of capital. Is there then a successful ‘monotonous’ strategy, which only ever (declines to bet or) bets on red, or alternatively, only ever bets on black? Alternatively, is there a successful ‘separable’ strategy, in the sense that it does not use the winnings from betting on red in order to bet on black, and vice-versa? We show that the answer to these question can be positive or negative depending on the simplicity of the strategies in question, the main two cases being the decidable strategies and the infinite mixtures of decidable strategies. More generally, we show that there are warped casino sequences, even with effective Hausdorff dimension $1/2$, such that for any effective mixture of strategies (also viewed as computably enumerable strategies) which succeeds on them, it is undecidable whether more capital is placed on red or black in each round. On the other hand, every casino sequence of effective Hausdorff dimension less than $1/2$ has a winning strategy which only bets on red or only bets on black. Finally we generalize our results to the case of effective mixtures where the favorable outcome is decidable. (This is a joint work with George Barmpalias and Andrew Lewis-Pye)

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