Review of: "A Random Journey Through the Math of Gambling"

Michael Mascagni[1]

1 Florida State University

Potential competing interests: No potential competing interests to declare.

This paper is more of a graduate lecture. In fact, I have had many of the parts of the lecture in the past. However, one thing is missing: the use of Donsker's Invariance Principle. I learned this material in a graduate probability class taught by Monroe Donsker, on Brownian motion (BM). At the time, Donsker did not call this his invariance principle; it was just the subject of his PhD dissertation. His principle states that the discrete random walk process can be thought of as an approximation to Brownian motion in a very precise way. One can convert many of the probability problems encountered in the discrete case into problems involving BM. Here, one needs to use the binomial distribution over and over again, whereas with BM one needs only use the normal distribution. The Banker's Ruin problem is quite famous, and the derivation of its law as the arcsine law is equally famous. Of the many derivations I have seen, the most elegant is using the invariance principle and the Feynman-Kac formula. All this fits nicely into a course on mathematical finance.