International Journal of Performance Analysis in Sport
2016, 16, 753-768.

Application of entropy measures to analysis of performance in team sports

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Abstract

Over the last years, several researchers have been claiming that team ball sports may be viewed as dynamical systems and, thus, they should be thoroughly investigated using congruent concepts and tools. The study of variability in the sport performance domain has shown potential to contribute with valuable information about tactical behaviours related with space and time management within ever changing task constraints featuring team sports contests. Here we detail how different entropy measures have been applied to the study of performance variability to uncover the interactions underlying players and teams' performances. With that purpose, urging issues related with information entropy, approximate entropy and sample entropy applications are discussed as a mean to enrich the state of the art in team sport performance. In sum, measurements of entropy in team sports have shown great potential to assess the uncertainty of players' spatial distributions and dominant regions areas and of several collective team behaviours (e.g., team synchrony and team dispersion) throughout the course of a match. Entropy can also be used as a potential tool to identify expert performances and differentiate skilled from novice athletes. Future holds many other applications of this statistic in the context of performance analysis in sports, and the inclusion of new and more sophisticated entropy algorithms.

Keywords: variability, sports teams as complex systems, Shannon entropy, approximate entropy, sample entropy.