IN SEARCH OF DYNAMICAL PATTERNS OF TEAM TACTICAL BEHAVIOURS DURING COMPETITIVE FOOTBALL PERFORMANCE

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Keywords: collective dynamics, unpredictability, association football

Introduction
Recent research has indicated the merits of identifying collective motion variables to analyze tactical behaviours of football teams (Frencken & Lemmink, 2008). In this study we aimed to identify the dynamics of team tactical behaviours during competitive performance.

Methods
2D positional data of 26 outfield players (20 effectives and 6 substitutes) from competitive match play of the English Premier League (Prozone®, ProZone Holdings Ltd, UK) were used to calculate a number of collective measures including: the width (m), length (m), surface area (m^2), geometrical centre (m), and stretch index (m) time-series of each team's playing patterns in six periods of 15 mins each (three in each half). We also calculated approximate entropy (ApEn) values for these variables to identify changes in regularity/predictability of playing patterns across the match. A mixed-model ANOVA compared mean differences in motion variables between teams (between-participants factor) and between periods of time (within-participants factor). A Friedman's test compared distributions of ApEn across time periods.

Results & Discussion
Significant differences were revealed for all playing pattern variables between teams and across the time periods ($p < .001$). Also, Friedman's test revealed significant decreases of ApEn values across each half ($p < .001$) (Figure 1).
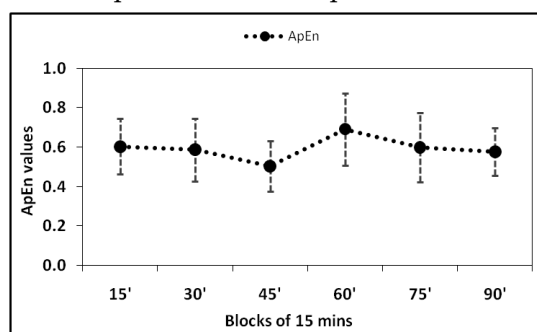

Figure 1. ApEn values along the match.

Conclusion
After initial stability, the home team displayed higher width, length, surface area and stretch index values than the visiting team in the third, fourth and fifth time periods. In the last period, the visiting team surpassed the home team in all these variables, perhaps due to the instability created by a goal suffered at minute 75, which changed the match-score. Tactical behaviours captured by these collective pattern variables revealed a trend to improve the predictability/regularity along each half. Future research is needed to understand the influence of situational/environmental variables such as evolving match status, venue, and opposition level in the regularity of teams' tactical behaviours.

References
1. Frencken, W., Lemmink, K. (2008). *Science & Football VI*, (pp.161-166).