FOOTBALL: AN INTRANSITIVE ENDEAVOUR

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Keywords: football, intransitivity, probability

Introduction

It has long been established competitions should be structured to give each team has a fair chance of winning. Given the vast number of people who play, officiate or support various football codes globally, and the amount of money invested, it is important that tournaments are designed appropriately. The aim of this research paper was considering similarities of shared parameters between codes, to investigate intransitivity in football codes. In the field of logic, transitivity is not present when a relationship between sets A and B, holds between sets B and C, but fails to hold between sets A and C.

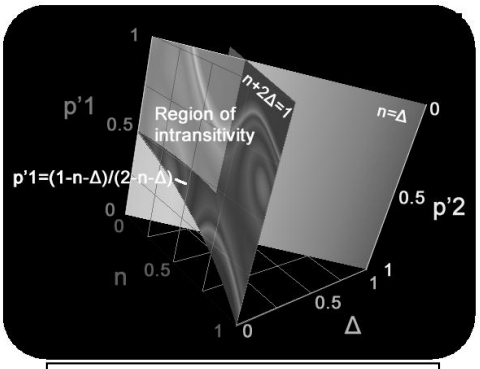
Methods

Variables effecting probabalistic outcomes of games were identified for the football codes: soccer, gridiron, rugby union, rugby league and touch football. An algebraic probabilistic model for obtaining tactical advantage in individual transition states was developed. Extrapolation of individual phases or elements of game play was made to probability of successful game results. Hypothetical teams were constructed in order to test the posibility of intransitive games states.

Results & Discussion

It was clear that intransitivity can logically exist for a variety of game related variables. There is therefore an element of intransitivity in the probability of winning games. This non-transitivity was present when tactical options were optimally chosen as well as when pseudo-randomized selection was utilized.
This intransitivity was shown with as few as two tactical options. Logically, with tactical options greater than two, the scope for intransitivity in real game situations would exceed that artificially created in this paper. Figure 1 shows a three team contest with a choice of two tactical options represented by probabilities p'_1 and p'_2.

Figure 1: Probabilities using the model parameters.



Gradient shaded region represents a 3D region of non-transitivity, satisfying all relevant inequalities.

Conclusion

Football codes need to be further examined within the context of models representing multiple game elements and real game data. The non-transitive nature of this relationship has implications for many sports. Provided this significance can be extrapolated to the probabilities of winning/losing a game (e.g. if the teams were equal in other parameters), then these implications would include tournament design, particularly with relevance to the finals structure of tournaments, sports betting and key decisions of tactical coaching.