# An axiomatic approach for ranking by paired comparisons

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**Abstract**

We review the axiomatic properties of some ranking models used for generalized tournaments with missing values and multiple comparisons. First, the talk deals with the characterization of two procedures, the score and the fair bets methods. The results about the former are valid only in the special round-robin case (when all objects have been compared with the other ones at the same number of times), while the latter violates a natural requirement, the symmetric treatment of wins and losses. These weaknesses are partially addressed by the least squares method and the generalized row sum procedure, which is a parametric family of ranking methods that range from the aggregate net score to the least squares.

The talk discusses a number of axioms defined in several papers under different names, including anonymity, score consistency (i.e., coincidence with the score method for round-robin problems) and various monotonicity properties. Others are introduced on the basis of the comparison structure and possible ways of manipulation. Most of them are satisfied by the least squares method, with the notable exception of self-consistent monotonicity. Based on a graph-theoretical approach, new models are proposed for mitigating this problem, while preserving simple computation by solving a system of linear equations. The collection of main properties can support the future axiomatization of ranking methods.

*Keywords*: Preference aggregation, Paired comparison, Ranking, Least squares method, Comparison multigraph

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