Modelling interference on interference competition models

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Abstract

Paradoxically, prior interference competition models did not account for the effect of both intra- and inter-species interference. We do so by adapting the works of Beddington [3] and DeAngelis [2] on predator-prey models to the classical Gause interference competition model [7].

The established theory estates that global species coexistence (i.e., regardless of the initial amount of individuals) is only possible, roughly, when the ratio of the inter-species effects over the intra-species effects is less than 1. This feature was intended to support the Gause's Competitive Exclusion Principle (two species competing for the same resource can not -hardly- coexist) and the Enrichment Paradox (this hypothesis is at odds with Nature).

We have found that taking into account inter-species interference in competition allows competing species to global coexistence even if the above mentioned ratio is larger than 1. This feature was not allowed in previous works on interference competition that introduced herd-type behavior [1], [4], [8], the time spent in competition [5] or group defense [6]. We have found also multi-stability scenarios not allowed by the classical model [7] but found in the above mentioned references which, in turn, here are feasible in a wider range of the parameters space aided by both intra- and inter-species interference. Therefore, accounting for interference contributes to unveil the Enrichment Paradox.

References

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