Strategy dynamics

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Stellingen

behorende bij het proefschrift

Strategy Dynamics

van

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1. Stubbornness pays off: in a two-opinion dynamics the opinion with the larger density of inflexibles eventually will obtain the majority in the population. [Ch. 2]

2. Stubbornness can stand some defiance: in a two-opinion dynamics in which both opinions are supported by inflexibles, the opinion with a majority will maintain this majority if the density of those who go against its grain is sufficiently small. [Ch. 3]

3. Unstructured community-dynamical systems allow for a notion of attractor, called ep-chain attractor. It incorporates the fact that populations can go extinct at low densities and will not return (on the community-dynamical time scale). [Ch. 4]

4. For adaptive dynamics based on Lotka-Volterra community dynamics the invasion fitnesses for a mutant phenotype on monomorphic attractors determine the invasion fitness of that phenotype on any community-dynamical attractor. This greatly simplifies the calculation of the invasion fitness of a phenotype. [Ch. 5.]

5. Generically a sufficiently small mutational step preserves permanence, which prevents the extinction of both the invading mutant population and the populations present in the invaded community. [Ch. 5]

6. An opinion can be considered as a phenotypic trait, therefore the fate of an opinion in a community when rare can be modelled by adaptive-dynamical means.

7. The notion of ep-chain attractor (as defined in Ch. 4) can be extended to physiologically structured community-dynamical models. [1]

8. A reset of evolution will not cause a repetition of it in the narrow sense that similar organisms and ecologies from the past will reappear, but in the broader sense that evolutionary patterns of trait substitutions, evolutionary branching and pruning will again occur, shaping however a different tree.

9. If it is the intention to teach to students that biology is an exact science, the bachelor curriculum requires a considerable amount of mathematical biology.

10. Several mathematical statements in this thesis (in particular those involving matrix expressions in the Appendices to Ch. 5) satisfy the inexpressible-but-true property.

11. Doing a PhD is a course that starts with idealism and ends in pragmatism.

References

[1] M. Gyllenberg, F. J. A. Jacobs, J. A. J. Metz, On the concept of attractor for community-dynamical processes II: the case of structured populations, J. Math. Biol. 47, 235-248, 2003