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Beyond replicator dynamics: From frequency to density dependent models of evolutionary games

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**Highlights**

- A new approach to the theory of two-player symmetric evolutionary games where pairs are formed by the mass action principle is developed.
- This theory explicitly considers the duration of interactions between the two players and their status as singles between interactions.
- When applied to the Hawk-Dove game, this theory shows that Hawks and Doves can coexist in two different states when interaction times between two Hawks are long enough.
- We show how interaction times between pairs and the existence of singles lead to density dependence in game dynamics (e.g., the replicator dynamics) that are density independent otherwise.
- The ms shows the link between frequency dependent dynamics of evolutionary game theory and density dependent models of population dynamics.

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