

# Evolutionary games of interacting cells

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Social, biological and economic networks evolve with recurrent fragmentation and re-formation, often explained in terms of external perturbations. We show that these phenomena are also a consequence of imitation and internal conflicts between ‘cooperators’ and ‘defectors’. We employed a game-theoretic model of dynamic network formation and found that cooperators promote well connected networks and defectors cause the network to fragment; defectors are unable to maintain the highly connected networks they invade. There is also a trade-off between stability of cooperation and prosperity of the network. As networks of cooperators become more connected, prosperity increases, but the networks become vulnerable to invasion by defectors. We use this idea to investigate interactions between normal and mutated cells during cancer progression with the assumption that normal cells are cooperating and mutated cells can cheat. Our results show that cooperation is needed for normal tissue structure maintenance.

References:

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