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The role of social learning and evolutionary games in vaccine scares

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In recent years, a growing number of theoretical models that couple human vaccinating behaviour with disease dynamics have been developed in an effort to understand phenomena such as vaccines scares. However, these models remain largely unvalidated against empirical data. In this talk I will describe recent research that tests a simple behaviour⊠disease model against empirical vaccine coverage and disease incidence data from two historical vaccine scares in the United Kingdom. The model combines an imitation dynamics model with a compartmental epidemiological model. The model appears to have good predictive power for pertussis dynamics in the deterministic regime, though not for measles dynamics in the stochastic regime. Adding injunctive social norms to the model further increases its explanatory power for a broader time window of the data set. Vaccine scares could become more common as eradication goals are approached for more vaccine-preventable diseases. Such models could help us predict how vaccine scares might unfold and assist mitigation efforts. Also, many of the same mechanisms that operate in human-epidemiological systems also operate in human-environment systems, such as social learning and social norms.

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