11   BICYCLISTS' VIOLATIONS—AUTOMOBILE DRIVERS' FAULT? SIMULTANEOUS INCREASES IN POPULATION-LEVEL BICYCLE VIOLATION AND SAFETY IN A COMPLEX ADAPTIVE SYSTEM OF SOCIAL TRAFFIC BEHAVIOUR

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Background Bicyclists famously flout traffic rules, sometimes causing collisions with automobiles. Some research suggests that road users adapt to each other's behaviour, reducing conflicts. However, few bicycle safety studies investigate potential mechanisms of change in bicyclists' behaviour and safety outcomes. None examines the implications of drivers' well-known stereotypes of bicyclists.

Aims/Objectives/Purpose This agent-based model (ABM) explores the relationships among inter-group stereotype valence, learning-based behavioural adaptation, and population-level safety outcomes in a population of majority automobiles and minority bicycles.

Methods In this ABM, automobile and bicycle ('agents') pairs meet randomly at stop sign intersections. Agents have continuous, normally distributed scores representing 'trust' that bicycles and automobiles, respectively, will follow the turn-taking stop sign rule. To avoid collisions, agents follow the rule ('compliance') only when they trust that the other will also. Others' noncompliance decreases trust while compliance increases trust. In initial conditions, automobiles disproportionately mistrusted bicycles, but bicycles' trust/mistrust of automobiles was evenly split. We analysed stop sign encounters in which automobiles arrived first and bicycles second.

Results/Outcome Repeated random encounters tended to create positive feedback in which bicycles increasingly violated and automobiles increasingly deferred defensively to bicycles, while conflicts declined to zero at equilibrium. In addition, the size of the bicycle minority was related to the probability of an all-compliance equilibrium.

Significance/Contribution to the Field In a plausible world where road users hold outgroup stereotypes, learn, and adapt their behaviour, majority automobile drivers' stereotypes of bicyclists may affect bicyclists' behaviour and safety outcomes. Policies accounting for stereotyping and learning processes may enhance both rule compliance and safety outcomes.