Modelling Cultural Transmission of Subsistence Strategies in Monsoon dominated semi-arid environments.

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Abstract

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This paper models the dynamics of cultural transmission underpinning bi-directional transitions between two socio-ecological systems, namely hunting-gathering and agro-pastoralism. Shifts in subsistence strategies have been traditionally explored uni-directionally and restrained within the theoretical framework of the optimal foraging theory (OFT). OFT seeks to identify equilibrium conditions for a variety of scenarios given the core assumption of a perfect knowledge amongst the actors of the system. This approach has an important shortcoming in that it does not consider the role of path-dependence in a dynamic environment, where optimal solutions are temporal and constantly changing. In OFT, decision-making is driven by short-term benefits (myopic optimality), where dynamics of inheritance and transmission of knowledge can lead to increased specialisation and loss of alternative beneficial traits, resulting in a brittle system, unable to flexibly adapt to a subsequent change in the environment.

We examine the role played by the conservation of ‘obsolete’ knowledge to enable episodes of ‘cultural reversion’, whereby a previously abandoned strategy is re-adopted given an environmental transition to a stage for which it is more adaptive than the new one. We create an agent-based simulation to examine how modelling the transmission, inheritance, and conservation of knowledge related to subsistence strategy is paramount for understanding long-term equilibria in a changing environment. We focus on the adaptive history of northern Gujarat, where hunting-gathering and agro-pastoralism coexisted for several centuries within an eco-tone dominated by exceptional short-term variability in precipitation. We ultimately seek to identify expected equilibria for different socio-ecological systems under specific environmental conditions, and determine how resilient they may be to disturbance events.
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