

Can the evolution of species-typical behaviour be modelled as if it were brainless?

Much work in ethology and Artificial Life makes the simplifying assumption that species-typical behaviour in an agent or organism can be adequately represented by rules for action that are inherited in toto. However, it is important to recognise this simplification as such, and question its validity for describing even the most predictable action patterns, when the behaviour of interest is mediated by a nervous system, as it is in real animals. A linear, straight-from-the-genes rule model of inheritance of behavioural characters may not accurately portray the inheritance of nervous control, with its rich dynamical potential. This is demonstrated with the evolution of sexual releasing stimuli in populations of artificial agents. Directional evolution of attractants under neural network-mediated preferences greatly outpaced that of portable, genetical rule based preferences in the same agents. Furthermore, the former sort of preference led consistently to the evolution of marked sexual asymmetries in sexually selected traits, not seen with the latter. Even sexual selection behaves differently when modelled with the dynamical properties of brains in mind.

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