Playing HeX with Aunt Hilary: games with an anthill

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In a reflective and richly entertaining piece from 1979, Doug Hofstadter famously imagined a conversation between “Achilles” and an anthill (the eponymous “Aunt Hillary”), in which he playfully explored many ideas and themes related to cognition and consciousness. For Hofstadter, the anthill is able to carry on a conversation because the ants that compose it play roughly the same role neurons play in the brain. Unfortunately, Hofstadter ‘s work is notably short on detail suggesting how this magic might be achieved; it is as if, as Drew McDermott writes in the Cambridge Handbook of Consciousness, “*he wants to invent a new, playful style of argumentation, in which concepts are broken up and tossed together into so many configurations that the original question one might have asked get shunted aside*”.

“Swarm intelligence” is a relatively new branch of Artificial Intelligence that realigns intelligence away from the individual towards the collective; its aim is to illustrate intelligent behaviour by considering individuals in a social context and monitoring their interaction with one another as well as with their environment. Natural examples of swarm intelligence systems are: fish-schooling, bird-flocking, animal herding, nesting and foraging in the social insects etc. and in recent years, abstractions of such natural behaviour have motivated several new “Swarm Intelligence” heuristics. The simple and often successful deployment of these heuristics on traditionally difficult optimisation problems has generated significant interest (cf. Dorrigo et al 91; Dorrigo 92; Kennedy 95). Nonetheless, to date, ‘swarm Intelligence’ has merely been deployed on conceptually straightforward, if technically difficult, optimisation and regression problems.

In this paper we demonstrate that populations of simple ant-like creatures can be organised to solve complex problems; problems that involve the use of forward planning and strategy. Specifically we will demonstrate that populations of simple, ant-like, creatures can play a strong game of HeX (a complex strategic game). In our system the use of multiple populations of simple ant-like creatures can be compared to the dynamics of interacting populations of social insects, via the concept of “meta-population” (a term coined in 1969 by Levins). In this way although, pace Hofstadter, we do not establish that a meta-population of ants could hold a conversation with Achilles, we do successfully introduce Aunt Hilary to the complex charms of HeX..

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