



Putting it all together: how ants colonies and slime mould amoebas solve multi-criteria decision problems

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Choosing between different alternatives can be a complex task requiring individuals or groups to collect, integrate and process information from a range of sources. Matters become even more complicated when the various attributes of an item are in conflict; for example, the best restaurant may also be the most expensive, the cheapest house might have the longest commute, and the tastiest food might be the most unhealthy. Multi-criteria decision making is particularly challenging for collective decision makers such as social insects and slime mould amoebas that must collectively integrate and process information collected by many individual sub-units. In this talk I will discuss multi-criteria decision making in two collective decision makers: ant colonies and slime mould amoebas. In the first part of the talk I will discuss how two ant species use information from public and private sources to build efficient transportation networks. I will focus on two ant species (*Iridomyrmex purpureus* and *Linepithema humile*) that have evolved opposing strategies for balancing conflicting objectives. In the second half of the talk, I will discuss multi-criteria food choice and route selection in the unicellular slime mould, *Physarum polycephalum*. Despite being a gigantic brainless amoeba, slime moulds are capable of integrating and processing information about food quality, risk and competition from hetero- and con-specifics. Slime moulds even exhibit human-like 'irrationality' when confronted with irrelevant decoy options suggesting they use an information processing strategy based on comparative- rather than absolute- valuation. I will conclude by discussing why studying multi-criteria decision making can help us understand animal behaviour under field-realistic conditions.