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Evolutionary Dynamics and Helping a Neighbour

Animals often incur a cost to provide help to their neighbours, and at first glance this observation strikes many people as strange. In a "dog-eat-dog" world, why on earth would any individual be willing to decrease its own fitness to increase that of a competitor? It turns out there are good reasons why helpful behaviours might be favoured in nature, and in this talk I will explore one such reason: kinship. I will briefly outline a branching-processes model for the emergence of helping. Among other things, I will demonstrate how details of the long-term behaviour of the branching process can be understood in terms of biologically meaningful quantities like relatedness and reproductive value. I will also outline a simple ODE model for the emergence of cooperative breeding systems. Such systems occur whenever individuals help raise offspring produced by their neighbours, and they represent one of the most conspicuous instances of helping in nature.