

On the evolutionary origin of reciprocal cooperation

Jean-Baptiste André*

jeanbaptisteandre@gmail.com

WEB: jb.homepage.free.fr/HomepageJB/welcome.html

An important mechanism by which two individuals can mutually benefit from helping each other is reciprocity (in a broad sense). However, reciprocity is the object of an evolutionary paradox: a gap between theoretical predictions and empirical observations. On one hand, evolutionary modelers have shown that it can evolve relatively easily in a wide array of circumstances. On the other hand, empirically, very few clear instances of reciprocity are found outside the human species.

In this talk, I will propose a simple explanation to resolve this paradox. Based on a multi-locus model, I will suggest that reciprocity has rarely evolved because it raises an evolutionary problem of “bootstrapping” of the same kind as communication: it entails the joint evolution of several functions in the same time. Therefore, even though reciprocity may be adaptive once it has already evolved (i.e. it can be an ESS) it cannot be shaped gradually by natural selection.

Although it raises a bootstrapping problem, however, reciprocal cooperation has been able to evolve in a few cases in non-humans, and is widespread in the human species. At the end of the talk, I will thus suggest some evolutionary pathways by which it may have emerged in spite of the bootstrapping problem. I will show that understanding these pathways can be key in explaining both the distribution of reciprocity in extant species, and the evolutionary history of human cooperation.

*Laboratoire « Écologie & Évolution » UMR 7625 Université Pierre et Marie Curie, 7 quai Saint-Bernard, bâtiment A, Case 237, F-75252 Paris, Cedex 05, FRANCE.