# My Research about Bounded Rationality and Networks

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Standard neoclassical economics assumes that agents are unboundedly rational and that they interact in impersonal markets. Alternative assumptions are that agents have bounds to rationality and interact in networks. My Ph.D. dissertation investigates how the efficiency of aggregate choice depends on different individual behavioral rules.

Two essays in my Ph.D. dissertation (Boncinelli, 2007a,b) study evolutionary models arising from a choice setup where individual preferences are not complete. The failure of completeness is motivated by an informational issue. Agents need deep information in order to evaluate alternatives. More precisely, agents are supposed to be able to assess the value only of those alternatives they have directly experienced and of those other alternatives which are similar to experienced ones, in that they share with the former much of the information for their evaluation. Furthemore, agents are supposed to choose deliberately only among alternatives that they are able to evaluate. Therefore, at each time an agent's choice falls upon the most preferred alternative among those evaluable. Since any choice which is different from the previous one potentially modifies the choice set by modifying one's own experience, a new maximum is in principle available at any time; the outcome is a path of choices, ending where the new maximum coincides with the old one. The arising dynamics is studied in different versions, varying the length of memory, adding small perturbations, and introducing elements of imitative behavioral rules.

The final essay of my Ph.D. dissertation – a revised version of which is Boncinelli (2008) – deals with a slightly different issue. I consider a model where agents choose among alternatives following imitative behavioral rules. As a distinctive feature, I assume that agents can only imitate those whom they observe, and that observability is in general not global. In particular, I assume that observability depends on the actions taken by individuals. In this framework, I compare global observability to local observability in pure (anti)-coordination problems. Intuitively, global observation makes more agents choose according to the same information. This favors coordination. However, it also increases the number of observed behaviors, so dispersing the probability of next choice. This hinders coordination. Over finite time horizons no definite result can be obtained. However, when considering the very long run – i.e. in the stochastically

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stable distribution (Young, 1993) – the latter effect disappears because only observationally homogeneous states are visited with positive probability in the limit. This allows me to establish the long run superiority of global (local) observation in pure coordination (anti-coordination) problems. Currently, I am working to apply the notion of observability relation to different models of imitation.

The importance of networks is more explicit in Bilancini and Boncinelli (in press), where we use a model of endogenous network formation to provide a joint explanation of segregation and locally sustainable cooperation. We consider a multiplayer prisoner dilemma, where the agents involved in the interaction are described by a network. Boundedly rational agents choose both whether to cooperate or defect and whether to severe a link and being randomly matched with another mate. The possibility to disconnect from a defecting mate is a form of targeted punishment and it represents the key element for the derivation of results. Intuitively, the incentive to cooperate increases in the number of cooperating neighbors, because of the threat of being disconnected and matched with possibly defecting mates. Therefore, if and only if you have enough cooperating neighbors, then you may find convenient to cooperate. In order to analyze the complex dynamics arising in the model in greater detail, we developed a computer program in C++ and we run simulations. The results are in line with the expectations. For a wide range of parameters, the most likely outcome is the coexistence of segregated clusters of cooperators and defectors.

# References


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