

From Social Dilemmas to Social Opportunities: Behavioral Foundations for an Evolutionary Institutional Economics

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Abstract

The rational choice model has a central place in the neoclassical narrative of the welfare-enhancing features of market capitalism, yet the ‘model of man’ that it implies has been widely criticized. But what is the alternative? We propose a naturalistic model of humankind that integrates insights from evolutionary social science and Relational Models Theory (Fiske, 1991, 1992). Our model is not just motivated by the fact that the rational choice model is at odds with actual human behavior, but also by the recognition that the neoclassical narrative of welfare, with its emphasis on individual-level competition, fundamentally misrepresents the sources of human welfare. We argue that (1) from an evolutionary perspective, economic welfare depends on solving problems of interdependence – social dilemmas as they occur in team production, the governance of common pool resources, and the provision of public goods, (2) in the course of human evolutionary history, this has led to cognitive adaptations specifically aimed at regulating interdependent relationships, (3) these cognitive adaptations have resulted in a moral psychology that revolves around four universal models to frame social relations (Communal Sharing, Authority Ranking, Equality Matching, and Market Pricing), (4) these four relational models are the building blocks of socio-economic institutions that allow us to reap the benefits of cooperation. We contrast the resulting model of man, which we will refer to as *Homo socialis*, with the *Homo economicus* model featuring in rational choice theory, and we derive some general implications for the design of welfare-enhancing institutions that allow us to turn social dilemmas into social opportunities.

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'Most economists think that they are building cranes that suspend important theoretical structures from a base that is firmly grounded in first principles. In fact, they almost always invoke a skyhook, some unexplained result without which the entire structure collapses ... A typical conclusion [is] that rules that assign property rights and rules that let people trade lead to good outcomes. What's the skyhook? That people will follow the rules. Why would they respect the property rights of someone else? [We] may have in mind something like this: police officers will arrest people who don't follow the rules. But this is just another skyhook. Who are these police officers? Why do they follow rules? ... Economists who have become addicted to skyhooks find it hard to even understand what it would mean to make the rules that humans follow the object of scientific inquiry. If we fail to explore rules in greater depth, [we] will have little to say about the most pressing issues facing humans today'

(Paul Romer, 2008)¹

1. Introduction

Economists of various stripes have long been uncomfortable with the *Homo economicus* 'model of man' that is central to most economic theorizing. This model casts us as agents that rationally pursue their individual self-interest. A host of empirical findings have shown that both the rationality and the self-interest assumption do not accord with actual human behavior. Nobel Memorial Prizes have been awarded for work on bounded rationality and cognitive biases that has shown the rationality assumption to be unrealistic. And a wealth of evidence from behavioral economics suggests that the self-interest assumption is equally problematic. But if the *Homo economicus* model is at odds with human behavior, what is the alternative?

The purpose of this paper is to propose a model of humankind that does accord with the empirical evidence on human behavior. We derive this model, which we will refer to as *Homo socialis*, from an evolutionary account of human welfare in which competition among cooperative groups rather than competition among individuals is the key to economic growth. For groups to become units of selection their members need to cooperate, and our evolutionary account of human welfare combines an ultimate explanation of human cooperation in terms of multi-level selection and gene-culture co-evolution (cf. Stoelhorst & Richerson, 2013) with a proximate explanation of human cooperation in terms of relational models theory (Fiske, 1991, 1992).

¹ <http://paulromer.net/skyhooks-versus-cranes-the-nobel-prize-for-elinor-ostrom/>

The core of our critique on the *Homo economicus* model is not just that it does not accord with actual human behavior, but that the neoclassical account of human welfare of which it is part is incorrect. From an evolutionary perspective, the unavoidable conclusion is that human welfare is not primarily the result of competitive exchanges among individual agents, as neoclassical economics would have it, but of cooperative interactions in the face of social dilemmas: situations in which agents are interdependent – leading to a conflict between individual and collective interests. Examples of such social dilemmas are team production, the governance of common pool resources, and the provision of public goods. Cooperative interactions in such situations co-evolved with ‘moral sentiments’ that allow us to overcome the dilemmas inherent in situations of interdependence.

The model that we propose does not deny that we have self-interested tendencies, but emphasizes our social nature and sees our ‘moral sentiments’ as central to human welfare. More specifically, we distinguish three cognitive modes. The first is an *instrumental* mode that is akin to the model of *Homo economicus* and that is triggered when we do not think of our interactions with others in social terms. The second is a *strategic* mode that is triggered when we think of our interactions with others in terms of individual-level competition, i.e. when we think of these interactions in social terms – but with the explicit goal of furthering our own interests at the expense of others. In these first two modes, our individual self-interest will guide our actions. The third mode is *moralistic* and is triggered when we think of our interactions with others in terms of appropriate behaviors, i.e. in terms of social norms. In this moralistic mode, we frame our social relations on the basis of (combinations of) four relational models: Communal Sharing, Authority Ranking, Equality Matching, and Market Pricing. Each of these four models implies a specific set of meta-norms that help sustain cooperation in the face of social dilemmas.

We discuss three implications of our alternative model of man. The first is that economic theories based on the traditional *Homo economicus* model fundamentally misrepresent the behavioral foundations of human welfare. Our welfare is primarily the result of an evolved moral psychology that sits on top of our self-interested tendencies and that allows us to overcome a short-term focus on our individual self-interest in favor of a longer-term focus on collective interests. The second implication is that institutions designed on the basis of the rational actor model, by appealing to our individual self-interest, will trigger our instrumental mode – and in doing so exacerbate rather than solve the social dilemmas that stand in the way of increasing human welfare. Third, institutional design should instead aim to trigger our moralistic cognitive mode, as it is this mode that allows us to sustain the group-level cooperation on which our welfare depends. The fundamental challenge of

institutional design, then, is to further human welfare by turning social dilemmas into social opportunities through a judicious combination of Communal Sharing, Authority Ranking, Equality Matching, and Market Pricing relationships.

2. Human welfare depends on solving social dilemmas

From Adam Smith, via Walras and the marginal revolution, to general equilibrium models and welfare economics, the canonical view of human cooperation in economic theory is of the ‘invisible hand’ of the market guiding the actions of self-interested agents towards a collectively optimal outcome. In this view, welfare is the product of a perfectly decentralized system of rational agents interacting through arm’s-length competitive exchanges (Demsetz, 1988). As each of these agents rationally pursues their individual self-interest, the market maximizes collective welfare through an automatic, bottom-up, self-organizing process consisting of individual agents responding to prices.

The problem with this model is not just that it misrepresents actual human behavior, which is neither fully rational nor fully self-interested, but that it fundamentally misrepresents how welfare is created. Historically, human welfare is the result of joint production rather than market exchange. And even in today’s market economies, most of what is exchanged on markets must first be jointly produced in firms. This matters because joint production, or what Alchian & Demsetz (1972) referred to as ‘team production’, creates a social dilemma: a situation in which there is a tension between the short-term individual self-interest of the players, on the one hand, and their collective interest, on the other.²

Social dilemmas (the canonical example being the prisoner’s dilemma) are a large class of situations in which the central idea of the perfect decentralization model of welfare does *not* apply: in social dilemmas, rational self-interested actors will not cooperate to maximize collective welfare. Mainstream economists have long recognized this problem in relation to the provision of public goods (Samuelson, 1948), and subsequently in relation to club goods (Buchanan, 1965) and the governance of common pool resources (Hardin 1968; Ostrom 1990). But, in keeping with the idea of

² The team production problem occurs when there are complementarities between agents’ inputs in the production process, so that the collective output is more than the sum of the individual inputs. Note that this is the case in most production. This situation creates a metering problem in the sense that it becomes very costly, or even impossible, to assess the marginal contributions of individual agents to the collective output. This creates a social dilemma: as the market can only ‘reward’ the collective output, the individual incentive becomes to free ride on the contributions of others – i.e. minimizing one’s own effort while still sharing in the spoils of the collective output (Alchian & Demsetz, 1972).

perfect decentralization, the provision of private goods continued to be seen as something that is unaffected by social dilemmas.

In contrast, our starting point in this paper is the recognition that the provision of *all* economic goods, including private goods, involves overcoming social dilemmas (Stoelhorst, 2017). If we take Alchian & Demsetz (1972) seriously, then it follows that there is no substantial difference in the provision of private and public goods: in both cases rational agents would free-ride on the efforts of others. And, in keeping with the words of Romer cited at the outset of this paper, in both cases the question then becomes how to explain, without invoking the skyhook of a benevolent and omnipotent central authority, that humans are nevertheless often able to cooperate in the provision of these goods.

This is where evolutionary theory comes in. In what follows, we will argue that human welfare is the result of an evolutionary process in which solving the problems of interdependence that go hand in hand with joint production led to cognitive adaptations that allow us to solve social dilemmas. Over the course of evolutionary history, the human species has evolved beyond acting purely self-interestedly as the result of this co-evolutionary process.

3. Why are we able to solve social dilemmas?

Why and how humans are able to achieve cooperation in the face of social dilemmas is exactly the question that is at the core of the evolutionary perspective on human behavior and organization that is emerging at the intersection of the natural and social sciences (Stoelhorst & Richerson, 2013). In the context of evolutionary theory, explaining cooperation poses a fundamental problem for reasons that are similar to why it is a problem in economic theory. Biological evolution can only 'reward' behaviors that are in the individual organism's self-interest in terms of fitness (i.e. in terms of its relative ability to pass on genes to future generations). So how can cooperative behaviors evolve at all?

The starting point for answering this question is, for all practical purposes, the rational choice model. If biological evolution can only reward behavior that has a positive benefit-to-cost ratio in terms of biological fitness, then we should expect organisms to evolve instincts that will make them behave as if they were aware of the benefit-to-cost ratio of their behaviors. In other words, we should expect biological evolution to give us organisms that behave in line with the rational choice model. If

we observe behavior that deviates from this norm, as we do in the case of multiple species, including humans, then this calls for an explanation of how such behavior could have evolved from a baseline in which organisms simply maximize their short-term self-interest.

Convincing models to explain the evolution of cooperation from a self-interested baseline are relatively recent (for a review, see Nowak 2006). The mechanisms that they posit include kinship selection, direct and indirect reciprocity, and multi-level selection. What all of these models have in common is that they recognize that the structure of interactions among organisms may change the benefit-to-cost ratios of their behaviors in terms of (inclusive) fitness. All of the mechanisms suggested by these various models are likely to have played a role in the evolution of human cooperation. However, the human species presents an additional puzzle for evolutionary theory because we are the only species that is able to sustain large-scale cooperation among non-kin using cultural transmission, that is, the ability to learn socially and build upon others' ideas (Tomasello, 2009). And it is this cultural ability that is central to explaining both the biological success and the economic welfare of our species (Henrich, 2017).

Based on a wealth of research into, among others, the differences between us and our closest evolutionary relatives the Chimpanzees, Tomasello (2016) proposes a plausible two-step process for the development of our unique cooperative abilities. In the first step, starting around 400.000 years ago, we became human by becoming interdependent. As the result of ecological changes, early humans were forced to evolve a survival strategy that made them dependent on each other in securing food. This went hand-in-hand with cognitive adaptations to enable cooperation, most notably adaptations that resulted in the ability to achieve a joint commitment to complementary roles. Such cognitive adaptations include joint intentionality and the self-regulation needed to fulfill one's role vis-à-vis a cooperative partner (Tomasello, 2016). Translated into economic terms, then, the first step in the evolution of our species was the evolution of cognitive adaptations that made the division of labor possible.

However, the interdependence that results from a division of labor also introduces a social dilemma. This dilemma may be relatively easily solved through reciprocity in dyadic interactions, but the problem is less easily solved when we move from dyads to groups, and is further compounded as group size increases. This led to a second step in our evolution, starting around 150.000 years ago, when we evolved into modern humans with cognitive adaptations for a collective intentionality and a sense of 'right' and 'wrong' that enabled the creation of cultural conventions, norms and

institutions (Tomasello, 2016). This second step was most likely the result of a combination of multi-level selection and gene-culture co-evolution (cf. Stoelhorst & Richerson, 2013).

Figure 1 summarizes how human cognition most likely evolved. We share the most primitive parts of our brain with many other organisms, and these parts of our brain (what we could loosely refer to as our 'reptilian brain') are the product of a long evolutionary history of solitary (non-social) living, honing our instincts to optimize our individual fitness through effective instrumental behavior aimed at survival and procreation. If this was all the brain we had, then we could indeed have passed for *Homo economicus*.

But with the evolution of mammals and the instinct to care for offspring the basis for empathy was introduced, which turned out to be the crucial 'crane' for the eventual development of *Homo sapiens*. Like other primates, we live in groups, and our brains are adapted to social living – what we could loosely refer to as our 'social brain'. Research in social neuroscience (Lieberman, 2013) suggests that the networks of our 'reptilian brain' and our 'social brain' are antagonistic. What this means is that when the networks in the brain that underlie instrumental behavior are 'turned up', then the networks in the brain that underlie social behavior are 'turned-down', and vice versa. This has important implications for institutional design, because it suggests that instrumental and social behaviors can crowd each other out.

But, as Figure 1 shows, there is further distinction to be made before we have fully characterized the main elements of human cognition. Both humans and Chimpanzees are social primates, but human cooperative behavior is much more complex than the behavior of Chimpanzees. In fact, most of the cooperative behavior of Chimpanzees takes place in the context of competitive interactions, for instance when individual members within a group form coalitions against others (Tomasello, 2016). The further distinction that we should make, then, is that we can use our social brain for both competitive and cooperative interactions. What distinguishes us most clearly from Chimpanzees is our cooperative side: it is there that the two step evolution of our moral cognition (through, first, joint intentionality and roles, and then collective intentionality and norms) has set us apart.

[Insert Figure 1 here]

4. How are we able to solve social dilemmas?

To summarize the previous section: we are able to solve social dilemmas because we evolved cognitive adaptations that made us a moral species: because we are susceptible to group norms we often display behavior that puts the long term collective interest above our short term individual interest. Seeing others deviate from these norms triggers moral emotions such as anger and disgust, and deviating from them ourselves triggers moral emotions such as guilt and shame.

Our moral psychology has been central to our welfare for at least 150.000 years. But, of course, the story of our welfare hardly stops with us becoming modern humans. As Wilson et al. (2014) emphasize, the success of *Homo sapiens* derives in large part from our unique capacity for symbolic thought. This capacity has resulted in a second, cultural, inheritance system that sits on top of our genetically inherited behavioral dispositions. Culture essentially serves as a store of functional rules of behavior that are passed on through imitation and learning. The crux of our capacity for symbolic thought is that it allows for endless combinatorial possibilities, making culture a very versatile tool to help groups adapt to different environmental conditions.

In other words, while our moral psychology is the genetic and universal substrate of our welfare, the specific social relationships that different groups evolve are the culturally specific substrate of our welfare. The question is how these two levels of analysis connect? This is where Relational Models Theory come in (Fiske, 1991, 1992), through the dictum that ‘morality is social relationship regulation (Rai & Fiske, 2011).

Cultures are implementations of specific combinations of four elemental ‘relational models’ (Fiske, 1991, 1992). Relational models are cognitive frames that people use, automatically and often unconsciously, “to plan and to generate their own action, to understand, remember, and anticipate others’ action, to coordinate the joint production of collective action and institutions, and to evaluate their own and others’ actions” Fiske (2004: 3). The four relational models are Communal Sharing (a relationship of unity, community, and collective identity), Authority Ranking (a relationship of hierarchical differences, accompanied by the exercise of command and complementary display of deference and respect), Equality Matching (a relationship among equals manifested in balanced reciprocity), and Market Pricing (a relationships where people compute cost/benefit ratios and pursue their self-interest) (Fiske, 1991).

Relational Models Theory holds that these four models suffice to account for the high diversity in social relationships observed across cultures (Fiske, 1991). There are two reasons for this. First, individuals relate in different ways when interacting in different domains of their relationship, which generates variety across relationships. Second, the specific cultural context (e.g. ethnic, national, or organizational) determines the specific implementation rules of the relational models – that is, when, how, and with whom to implement a particular relational model (Fiske, 1991, 2004, 2012). Seen within the broader evolutionary view on human behavior, the four relational models may be understood as the elemental building blocks that enable and constrain the symbolic relations that define cultures. The relational models enable symbolic relations because of their combinatorial potential and flexibility with respect to the specific implementation rules they allow, but they also constrain symbolic relations because these relations ultimately are the result of only four elemental models that derive from deeply ingrained aspects of our evolved social and moral psychology.

5. Reassessing the rational choice model

How, then, does Relational Models Theory map onto the three cognitive modes of Figure 1? This is shown in Figure 2. To see the link, it is important to note that Relational Models Theory does not just recognize the four relational models discussed above. There are two more models: a ‘null relationship’ in which interactions are framed in impersonal terms and others’ conceptions, goals and standards are simply ignored, and an ‘asocial relationship’ in which other people are used as a means to an ulterior, selfish, end. Figure 2 maps these six models onto the three cognitive modes that evolution endowed us with that were pictured in Figure 1.

[Insert Figure 2 here]

Figure 2 gives us a good basis to critically assess the rational choice model and its place in the neoclassical theory of welfare. For as far as Figure 2 accurately captures human cognition, it throws up a number of fundamental issues for mainstream economic theories and the policy descriptions that are typically derived from them:

-First, the use of the rational choice model in standard economic theory results in a very problematic conflation of the ‘null relationship’ (which is based on self-interested and amoral) and Market Pricing (which is inherently moral and requires a normative commitment to the spirit of a contract). *Homo economicus* is someone who behaves instrumentally: he pursues his self-interest while disregarding

his social context. In other words, he behaves as if he frames his relationships with other agents as 'null relationships'. At the same time, the outcome of such behavior is supposed to give us the cooperative solution of Market Pricing, where everyone benefits from ongoing cooperation in proportion to their contribution to the collective welfare that is produced. This is the skyhook that Romer warned us for in the quote at the beginning of this paper: there can be no ongoing cooperation without either moral sentiments or a central authority enforcing property rights coming into play – and invoking a central authority only pushes back the problem of introducing, somewhere, moral sentiments into the story, because it calls for an explanation of why this central authority would take on the role of guarding the collective interest.

-Second, economic 'contract' theories (e.g., agency theory and transaction cost economics), which extend neoclassical economic theory to problems of institutional design, are based on a very problematic conflation of the asocial relationship (which is based on self-interest 'with guile' and *immoral*) and AR (which is inherently moral and requires legitimate authority).

-Third, and more generally, many of the instruments that economic theories advocate, such as an exclusive orientation on profits and strong incentives are likely to trigger our strategic and instrumental modes at the expense of our cooperative mode.

-Fourth, and following from the previous point, real world solutions to the social dilemmas of collective action in interdependent situations, such as Ostrom's (2000) design rules, work because they help actors *avoid* null and asocial relationships by using a judicious combination of CS, AR, EM, and MP to frame joint production relationships.

6. Implications for institutional design³

What do the arguments above mean for economic governance? The first three rows of Table 1 summarize the main points made so far, namely that social dilemmas are both more central to economic governance and less problematic to solve than traditional economic theory has assumed. They are more central because economic welfare crucially depends on solving collective action problems, even in the provision of private goods. Most private goods require firms to produce, and the viability of firms depends on agents solving team production problems. At the same time, social

³ This section is from Stoelhorst (2017)

dilemmas are less problematic to solve than traditional economic theory assumes, because for all of human evolutionary history our biological and economic success has depended on solving collective action problems like team production. As a result, human psychology has evolved in ways that help us overcome the social dilemmas that emerge when our individual interest in within-group competition diverges from the collective interest in between-group competition.

Note that the claim that social dilemmas are *less* problematic than traditional economic theory assumes does not mean that they are *un*problematic. In fact, the crux of multi-level selection theory is that it acknowledges the tension between individual and group interest, meaning that functional groups are always vulnerable to being undermined by self-interested behavior (Campbell, 1994). Nevertheless, an evolutionary view of human behavior and organization does suggest a fundamental redefinition of the problem of social dilemmas in economic governance: the problem of economic governance is not how to get self-interested agents (*Homo economicus*) to play cooperate in the face of social dilemmas, but how to get boundedly self-interested human beings (*Homo sapiens*) to do so.

This is where the role of institutions comes in, as summarized in the last four rows of Table 1. The purpose of institutions is not primarily to facilitate competition among individual self-interested agents, but to help boundedly self-interest humans overcome social dilemmas. Institutions, be they formal or informal, achieve this through the ‘rules of the game’ they impose on us. These rules work in one of two ways (alone or in combination): by triggering the bounds on our self-interest that change the pay-off matrix from *within*, and/or by changing the pay-off matrix from *without*. In contrast to traditional economic theory, when considering the latter mechanism there is no presumption of a benevolent designer that can impose a set of rules from the *top down*. Rules complexes rather evolve from the *bottom up*, as the result of competition between individuals and, at higher levels of analysis, competition between groups. One immediate implication of this is the explicit recognition that institutions are politically contested, and that the rules they impose are historically and culturally specific phenomena that may favor the interests of particular subgroups.

Another implication of a naturalistic view of institutions is that it points in a fundamentally different direction when it comes to the problem at the core of designing effective institutions. This problem is not so much humanity’s presumed self-interest, but ‘evolutionary mismatch’. The idea of evolutionary mismatch is that while our social and moral psychology evolved in ways that help us overcome our short-term self-interest, this psychology is the result of solving social dilemmas in the small-scale societies in which our evolutionary ancestors lived. As a species we are particularly good

in solving social dilemmas in the context of relatively small groups where face-to-face contact, reputation effects, and group identities allow for ways to discipline possible free riders. But our psychology is not necessarily particularly well-adapted to the large-scale, complex societies with their often anonymous interactions in which we live today. In the popular rendition of the core idea of evolutionary psychology, we are constructing our modern worlds on the back of 'Stone Age minds' – and the two do not always match.

Two problems, in particular, stand out as obvious effects of evolutionary mismatch. The first is the problem of keeping competition, and particularly between-group competition, peaceful. Because our psychology evolved in the context of between-group competition, our cooperative tendencies tend to be much stronger for in-group members, and, in fact, often go hand-in-hand with outright aggression to out-group members (Greene, 2013). The second is the problem of keeping leaders honest. While our evolutionary ancestors were very successful in maintaining egalitarian societies (Boehm, 1993), this has changed dramatically since, some 10.000 years ago, the Agricultural Revolution started the process of increasing the scale of our societies. One of the defining features of the cultures with which our psychologies co-evolved was that they were very effective in keeping in check those who would want to emulate the 'alfa male' behaviors of many other primate species (Boehm, 1993). The fact that the increasing scale of our societies went hand-in-hand with an increasing stratification turned this feature of human societies on its head. These two manifestations of evolutionary mismatch, out-group aggression and the tension between our evolved egalitarian preferences and the tendency towards inequality in large-scale societies, present themselves as even more fundamental issues for institutions to solve than providing public goods such as property rights. Attempts to provide public goods can at least appeal to aspects of our psychologies that specifically evolved to help us solve the social dilemma that is involved. But in the case of the two evolutionary mismatch problems, our evolved psychologies are actually the root cause of the problem.

References

- Alchian AA, Demsetz H. 1972. Production, Information Costs, and Economic Organization. *American Economic Review* 62(5): 777-795.
- Boehm, C., 1993. Egalitarian behavior and reverse dominance hierarchy. *Current Anthropology* 34, 227–254.
- Buchanan, J.M. 1965. An economic theory of clubs. *Economica*, 32(125): 1–14.
- Campbell, D.T., 1994. How individual and face-to-face group selection undermine firm selection in organizational evolution. In: Baum, J.A., Singh, J.V. (Eds.), *Evolutionary Dynamics of Organizations*. Oxford University Press, Oxford, pp. 23–38.
- Demsetz, H. 1988. The theory of the firm revisited. *Journal of Law, Economics, & Organization*, Vol. 4(1): 141-161.
- Fiske, A. P. 1991. *Structures of social life: The four elementary forms of human relations*. New York: Free Press.
- Fiske, A. P. 1992. The four elemental forms of sociality: Framework for a unified theory of social relations. *Psychological Review*, 99: 689–723.
- Fiske, A. P. 2004. Relational models theory 2.0. In N. Haslam (Ed.). *Relational models theory: A contemporary overview*: 3–25. Mahwah, NJ: Erlbaum.
- Greene, J.D. 2013. *Moral Tribes: Emotion, Reason, and the Gap Between Us and Them*. Penguin: New York
- Hardin, G. 1968. The tragedy of the commons. *Science*, 162: 1243–1248.
- Henrich, J. 2016. *The Secret of Our Success: How Culture is Driving Human Evolution, Domesticating Our Species, and Making Us Smarter*. Princeton: Princeton University Press.
- Lieberman, M. D. 2013. *Social: Why our brains are wired to connect*. New York: Crown.
- Nowak, M.A., 2006. Five rules for the evolution of cooperation. *Science*, 314: 1560-1563.
- Ostrom, E. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.
- Ostrom, E. 2000. Collective action and the evolution of social norms, *Journal of Economic Perspectives*, 14(3): 137-158
- Rai, T.S, Fiske, A.P. 2011. Moral psychology is relationship regulation: Moral motives for unity, hierarchy, equality, and proportionality, *Psychological Review*, 118(1): 57–75.
- Samuelson, P.A. 1954. The Pure Theory of Public Expenditure. *Review of Economics and Statistics*, 36(4): 387–89.
- Stoelhorst, J.W. 2017. Better Than Rational: A Naturalistic View of Economic Governance, *Complexity, Governance & Networks*. 7-21. Doi: 10.20377/cgn-39 (open access).
- Stoelhorst, J.W., Richerson, P.J. 2013. A Naturalistic Theory of Economic Organization, *Journal of Economic Behavior and Organization*, 90 (Supplement): S45-S56.
- Tomasello, M. 2009. *The cultural origins of human cognition*. Harvard University Press, Cambridge, UK.
- Tomasello, M. 2016. *A Natural History of Human Morality*. Cambridge: MA, Harvard University Press.
- Wilson, D.S., Hayes, S.C., Biglan, A., Embry, D.D. 2014. Evolving the future: Toward a science of intentional change. *Behavioral and Brain Sciences* 37: 395–460.

Figure 1: The Evolution of Human Social Cognition

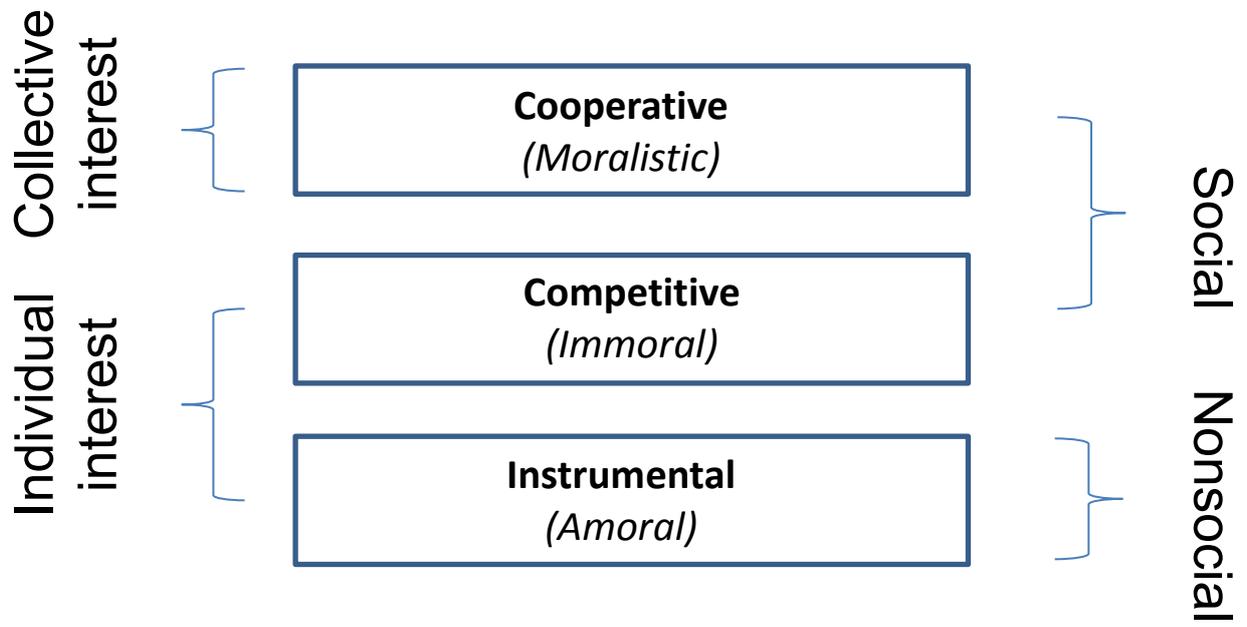
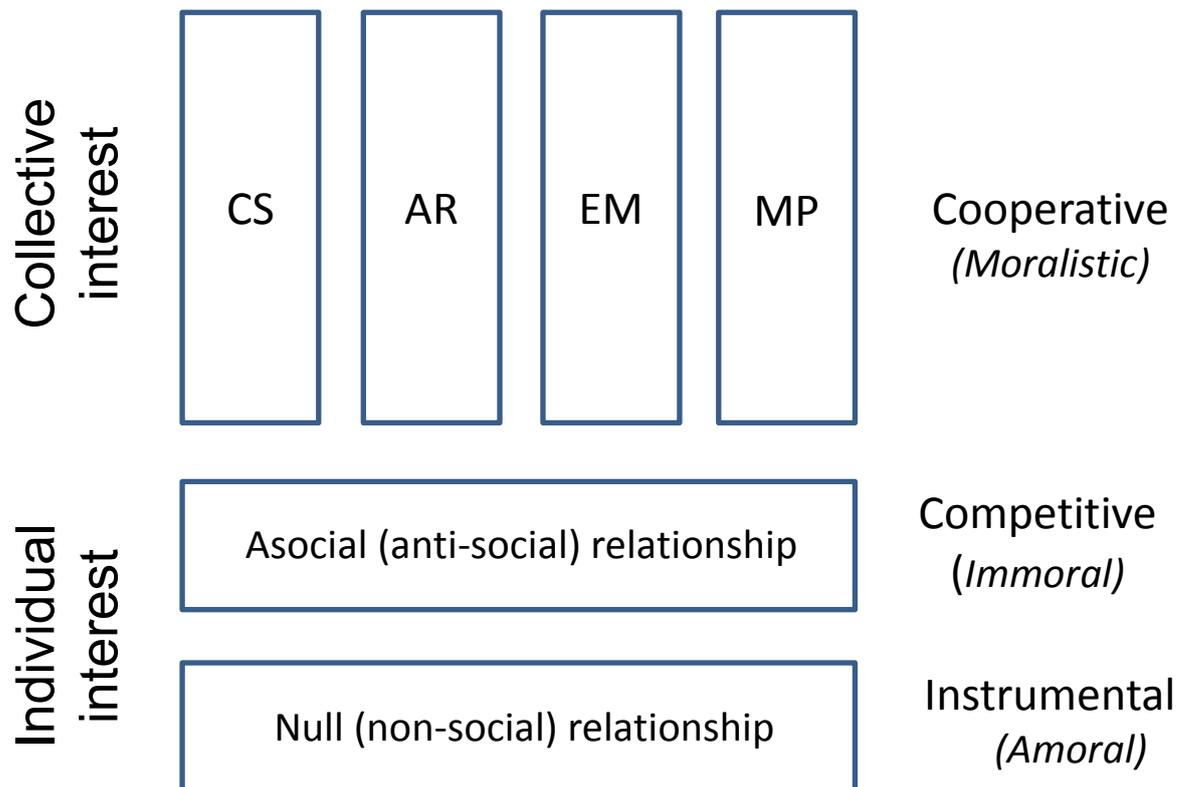


Figure 2: A Naturalistic Model of Human Social Cognition



	Traditional view	Evolutionary view
Main cause of welfare	Arm's length exchange (Independent action)	Collective action (Mutual dependence)
Nature of competition	Single-level selection (Competition between individuals)	Multi-level selection (Competition between individuals and groups)
Behavioral assumption	Self-interest	Bounded self-interest
The function of institutions	To facilitate decentralized exchange among self-interested agents	To help boundedly self-interested agents overcome social dilemmas
What institutions are	Single rule complexes imposed top-down	Competing rule complexes evolving bottom-up
What undermines institutions	Self-interest	Evolutionary mismatch
Policy focus	Secure property rights and provide other public goods	Keep competition peaceful and leaders honest

Table 1: A comparison of the traditional and evolutionary views of economic governance