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Creatures of Norms as Uncanny Niche Constructors[1]

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1 Introduction

Imagine a Paleolithic hunter who has failed to hunt down anything for a couple of days and is hungry. He has an urgent desire, the desire to eat, which he is unable to fulfill – his desire is frustrated by the world. Now imagine our contemporary bank clerk who went to work without his wallet and is hungry too. He too is unable to fulfill his urgent desire to eat because it is frustrated by the world.

From the viewpoint of the two individuals the situations are similar. However, there is at least one crucial difference. While the hunter cannot eat because there is no food in the vicinity (at least as far as he is aware), the clerk can easily get hold of tons of food - it would suffice to visit the nearest supermarket. The reason he cannot get the food is not that it is *physically impossible*, but because taking food from a store's shelves without paying is *forbidden.*

This story brings home the fact that many of the barriers that constrain our present lives, restricting us to paths only within the space to which they limit us, are no longer barriers in the literal sense of the word - they are no longer produced entirely by the conspiracy of the causal laws that form our physical niche. Rather, they are produced by the conspiracy of attitudes of our fellow humans—they are deliberate *rules*, rather than inexorable *natural laws*. In this way evolution is now canalized less by the physical environment relatively independent of it, and more by the ploy of the organisms it brought into being.

A full appreciation of this autocatalytic situation may lead us to a deeper understanding of certain philosophical doctrines, pervasive especially after Kant, regarding normativity as the hallmark of the human. We come to see how these doctrines get enlightened by scientific theories regarding the development of the human race and its continuities/discontinuities with its animal cousins.

2 Niche Construction as a Factor of Gene-Culture Co-evolution

Evolution, the popular wisdom says, is about the ways organisms adapt to the environment in which they live, the ways they utilize its sources and avoid its dangers. Hence the whole process can be depicted as a chain of reactions to, or perhaps the overcoming of, a "mismatch"—a mismatch between organisms (considered as a lineage), on the one hand, and their environment, on the other. In general, to do away with a mismatch between two entities, we might think of adjusting either of them (or, of course, both of them simultaneously); but as it is only organisms that evolution can directly "control," there would appear to be an asymmetry; the evolution appears to be restricted to manipulating the organisms. This is why the situation is usually seen as a one-sided adaptation.

But this is not the whole truth. Evolution *can* manipulate the environment, though of course only *via* the organisms living in it. Suppose there is a feature of an environment that crucially menaces the survival of the organisms (it may be some kind of predator, poisonous plant, or landscape feature, such as a hidden chasm etc.). Selection can respond to this situation not only by adapting the organisms so as to skillfully avoid this menace, but also by adapting them so that they themselves eradicate the menacing factors, thereby effecting a change in the environment itself. This is something that has been addressed, in the literature, under the heading *of niche construction* (Odling-Smee 1996, Laland *et al.* 2000, Odling-Smee *et al.* 2003). The authors often point out that this is a neglected way evolution works.

Of course, changing the organisms so as to avoid—or, alternatively, to exploit—some environmental feature would usually be an infinitely simpler task for evolution than making them permanently modify the environment. This is an obvious reason for the tendency to take a one-sided view of how evolution deals with an organisms-environment mismatch. But we should keep in mind that this does not hold unexceptionally—

organisms clearly do change their environment in various more or less permanent ways; hence niche construction is not impossible.

The broader context in which the idea of niche construction is usually discussed in the literature is that of the so-called *gene-culture coevolution* (Cavali-Sforza and Feldman 1983, Durham 1991, Feldman and Laland 1996). The basic idea is that from the viewpoint of evolution, culture is not a mere by-product, an idle super-structure, of the genetic development, but rather its effective factor. Though culture, without doubt, is a product of genetic evolution, it firms up into a source of additional, paragenetic "inheritance," which, however, works inextricably from its genetic substrate.

In this context, niche construction is seen as one of the important tools of cultural inheritance. As Laland *et al.* (2000) put it:

> We are suggesting that our ancestors constructed niches in which it "paid" them to transmit more information to their offspring. The more an organism controls and regulates its environment, and the environment of its offspring, the greater should be the advantage of transmitting cultural information from parent to offspring.

This leads the authors to the following picture:
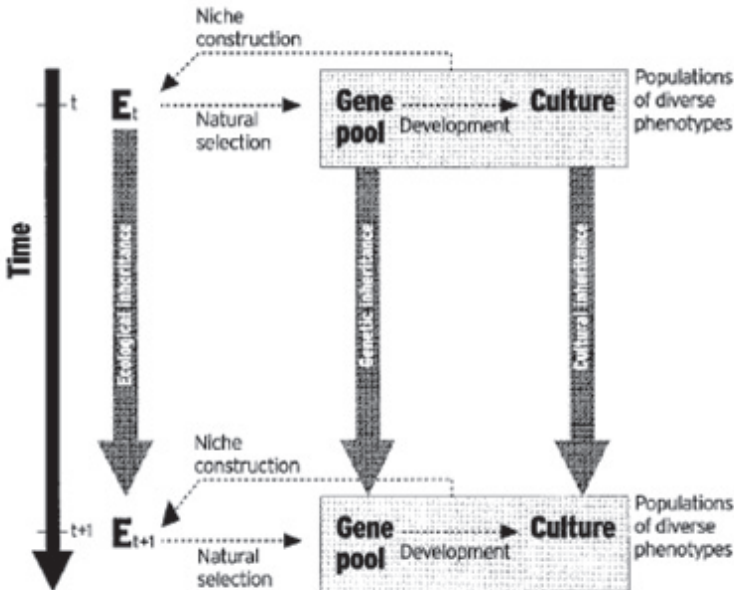
Laland *et al.* (ibid.) comment on the idea this picture is intended to capture as follows:

> It is possible that, once started, vertical cultural transmission may become an autocatalytic process: greater culturally generated environmental regulation leading to increasing homogeneity of environment as experienced by parent and offspring, favouring further vertical transmission. With new cultural traits responding to, or building on, earlier cultural traditions, niche construction sets the scene for an accumulatory culture.
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> [...]
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> In the presence of niche construction, adaptation ceases to be a one-way process, exclusively a response to environmentally imposed problems; it becomes instead a two-way process, with populations of organisms setting as well as solving problems.

The authors also think that once we appreciate the importance of niche construction for cultural transmission, we will be able to see that the chasm between "nature and nurture" is not so vast. Though culture, as developed by us humans, is surely a quantitatively unprecedented phenomenon, it is not qualitatively different from what we find in non-human species; it amounts to a mere unprecedented inflation of tendencies that were already extant:

> Humans may be unique in their extraordinary capacity for culture, but they are not unique in their capacity to modify natural selection pressures in their environments. ... Human culture may allow humans to modify and construct their niches, with spectacular ecological and evolutionary consequences, but niche construction is both general and pervasive and probably influences the ecology and evolution of many species.
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> [...]
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> Culturally modified selection pressures are now regarded not as unique, but simply as part of a more general legacy of modified natural selection pressures bequeathed by human ancestors to their descendants.

This indicates that, for the authors, the idea of niche construction contributes to underwriting the continuity between us humans and our animal cousins. In this chapter, I wish to emphasize another aspect which actually underwrites the *discontinuity* between humans and the rest of the animate word. I want to point out that the kind of niche construc-

tion that is crucial to us in our present state of development is no longer restricted to an elaboration of the *physical* world. It has surged forward into erecting what can be seen as *virtual* worlds, the anchoring of which within the physical one is only very loose.

3 Three Ways of Constructing One's Niche

When speaking of "niche construction," we must draw some important distinctions. In particular, we must distinguish several levels at which an organism may modify its niche in a way relevant for its further development. Let us discern three such levels (without claiming to rule out other ways of categorizing the spectrum).

1. *Modification of the natural physical niche*. Every organism, however primitive, changes its environment and it is likely that at least some such changes produce a feedback in the sense of modifying the selection pressures on the organisms in question. Such changes become significant for evolution when they are sufficiently large and systematic. (It is one thing to cope with an unfavourable environmental factor by means of evolving some kind of countermeasure; it becomes quite another if this factor can be eradicated, thus removing the necessity to react to it.) This kind of changes clearly does underwrite the continuity between humans and other animal species w.r.t. niche construction, urged by Laland *et al.* (ibid.)

2. *Building an artificial physical niche atop the natural one*. Once the abilities of dealing with the environment surpass a certain boundary, an organism may become capable of literally building its own, artificial niche atop of the natural one. This undoubtedly largely changes the character of the pressures the organism faces. (Once you have a house where you can hide from night predators, you can forego the instincts that were vital for your survival when you slept in the open.)

Especially interesting artifacts, then, are those which can be deemed "symbolic," artifacts that *represent* the knowledge accumulated by preceding and current generations and permit it to be passed on to the next generation. Hutchins and Hazelhurst (1992) write:

> [C]ulture involves the creation of representations of the world that move within and among individuals. This heavy traffic in representations is one of the most fundamental characteristics of human mental life, yet since it is a phenomenon not entirely contained in any individual, it has largely been ignored by cognitive science. If each individual is capable

of learning something about the environmental regularity and then *representing* what has been learned in a form that can be used by other individuals to facilitate their learning, knowledge about the regularity could accumulate over time, and across generations.

How these "symbolic artifacts" (books, in the most developed form) foster extragenetic, cultural evolution is obvious.

Clark stressed "our amazing capacities to create and maintain a variety of special external structures (symbolic and social-institutional)" (Clark 1997, 179), leading to the state where "intelligent brains *actively* structure their own external (physical and social) worlds so as to make for successful actions with less individual computation" (ibid., 191). In this way, we can say, we come to unload parts of our minds into the environment thus "supersizing our minds" (Clark 2008).

3. *Virtual niches*. Human societies not only elaborate and rebuild the physical niches in which they live and enhance them with symbolic artifacts; they also generate a brand new kind of pressures capable of channeling natural selection. This was noted already by Alexander (1989): as he put it, humans came to become **"**their own principle hostile force of nature." The fact that niche construction goes beyond the regulation of the forces of nature towards a "social niche construction" producing a certain kind of virtual environments superimposed upon the physical one has been tabled recently by a number of authors (Flinn, Geary and Ward 2005, Boyd and Richerson 2008, Odling-Smee and Laland 2009).

As we have indicated at the start of this article, people are diverted from certain actions not only because they *cannot* carry them out, due to the boundaries of their physical world, but also because they are *not allowed* to carry them out, due to normative barriers erected by their society. This is perhaps the most important, though largely neglected aspect of human niche construction.

There is also, I am convinced, a sense in which this fabrication of virtual, normative niches must precede the ability to produce "symbolic artifacts." To build a "symbolic artifact," such as a book, we need the stuff it is made of, namely symbols—in the typical case, a language. Now there are arguments (I have presented them elsewhere) for the claim that any symbolic system is constituted in terms of rules, i.e., precisely of the same kind of entities that are the scaffolding of our virtual niches. The trouble, it seems to me, is that the nature of this virtual space is currently not well understood.

Concepts usually employed to characterize the way in which a virtual niche influences the development of individuals include *imitation*, *transmission across generations* or *ecological inheritance*. I think that these concern merely one aspect of the situation, while a crucially important aspect goes almost unnoticed. What puts cultural inheritance into motion in the first place, and what continues to underlie it, is a specific kind of self-perpetuating behavioral (meta-)pattern that provides for virtual boundaries analogous to the tangible ones, as illustrated at the start of this article.

4 Virtual Niches

The characterizing aspect of our general human niche is that it is not constituted merely by inanimate objects and by the individuals of other species; but also by our conspecifics. And it is important to see that already this provides for a peculiar kind of niche construction: if the relevant environment of an organism is partly constituted by other organisms of the same kind, and if evolution always manipulates with the whole kind, then it changes the environment of the organism simply by means of manipulating the kind.

Within evolution theory, this has led to the employment of evolutionary game theory (Maynard Smith 1982). If an organism is not merely to react to the state of an environment that is independent of it in the sense that it is not influenced by the evolution of the organism, but also to other organisms that in turn react by means of their own evolution, then the "decisions" taken by evolution must assume the form of certain equilibria rather than of simple optimalization of features.

Hence considering the organism-environment relationship, we have *two* potential kinds of feedback: first, the part of an organism's environment that is constituted by other organisms (its conspecifics and perhaps organisms of some other species) reacts to the organism's evolution because it is subject to the same evolution; and the rest of the environment may "react" to the organism's evolution in that it is cultivated by the organism. Now I want to point out that our virtual niches may be seen as resulting from an interaction of these two feedback loops.

We humans not only try to outsmart each other in the battle over resources, we cooperate, share and jointly mine the resources, to an extent that has no precedent in any other species. (Of course, cooperation

can be seen as merely a more sophisticated form of outsmarting every-body else; this, however, does not alter the fact that it is an uprecedented strategy.) A straightforward and commonly accepted explanation of the emergence of such a large-scale cooperation (and together with it what Boyd and Richerson [1998] call human "ultrasociality") is still awaited, though it would seem that many of the presumed ingredients for it have been well scrutinized (see, e.g., Nowak 2006 or West *et al.* 2007). Never-theless, the fact that the cooperation happens is obvious.

Now cooperation is, from the very beginning, a matter of *rules* (though not necessarily the full-fledged, outspoken rules that fibrillate our advanced societies). To cooperate is to suppress one's immediate subjective needs (which hopefully gets rewarded in the long run) and to do so in tune with other individuals; hence what is needed is at least regularity across persons. However, for the cooperation to pervade and to graft into the next generation regularity is not enough; it must be regularity generally understood as something that *ought to be*—as some-thing one *should* sustain and to which one should make other people, especially one's own offspring, conform.

Hence, as I argued elsewhere (Peregrin 2010), the emergence of rules as the entering wedge to (not only) cooperation, presupposes the ability of thinking in the "normative mode," of being able to understand that something that *ought to be*. And once this ability is in place, we have the resources for erecting virtual barriers (by means of what *ought not to be*) and by means of them to erect virtual worlds. Rules (though originally, as Sellars 1949, 299 put it, "written in nerve and sinew rather than pen and ink" and only later capable of being explicitly articulated) form the virtual barriers that are able to restrain members of human communities analogously to the tangible physical barriers restraining any inhabitant of the physical world.

Consider an example given by Joseph Heath (2008, 153):

> Most people, for example, when getting on to a bus, would like to sit down. Even if all the seats are taken, it is still possible to sit on the floor, or on someone's lap. One could simply order another person out of his seat, or request that he moves, or physically grab him and pull him out. Most people never even consider these options, simply because such behavior is inappropriate in the context. Instead, they will often give up their scats to persons more in need of them. They will also hesitate before taking a newly vacated seat, to see if anyone else is moving for it, so that they may seem duly deferential to the needs of others. All of

these constraints on the pursuit of one's objectives arc a consequence of the set of social norms that govern social interactions on crowded buses (differentiated by age, gender, infirmity, and so on).

This duly illustrates the spontaneity with which we usually respect constraints implied by social norms: if we were asked where we can sit on a bus, the possibility of sitting on a place already occupied by another person (though it might be physically possible to remove the person from the seat and sit there) comes to us as similarly nonexistent as the possibility of sitting on a seat that is not physically there.

In this sense, the normative constraints yielded by the rules of our societies form true limits to our world just like those yielded by natural laws. True, not all the rules of our societies are internalized by all their members to the same degree; some of us have been brought up to simply ignore some rules or look at them as an inevitable evil. And also we may be able to *sometimes* assume a reflective attitude to the rules, in which we *do* see them as essentially different from natural laws, something that may not only be violated, but also questioned and possibly discarded. (This is, after all, what made Kant conclude that we have not only *Verstand*, but also *Vernunft*.) Each of us is nevertheless a social being in that we live in a world largely delimited by "soft," normative boundaries, rather than "hard," physical ones.

Returning to our earlier mentioned paleolithic hunter and contemporary clerk: the difference between their predicaments is highlighted if we imagine that the hunter was able to find food, but some tangible barrier lay between him and the food, preventing him from getting it. For both persons, the food is almost within grasp, but its grasping is obstructed. In the case of the hunter the obstruction is physical, whereas in the case of the clerk it is merely virtual, *normative*.

An objection might be that the second case does not truly differ from the first—that the physical possibility of taking the food from the supermarket shelf is only illusory, for it would lead merely to the supermarket's security taking the food away from the stealer (with other unpleasant consequences). But the fact is that it is often relatively easy and without much danger of recrimination to steal something in a supermarket—and despite this the clerk would probably still not do it, for he *does not want to steal*, i.e., he respects the norms of our society, according to which one *should not* steal.

Hence in both cases the protagonists are restrained by barriers provided by their environment—however, while in the first case it is a *physical* barrier straightforwardly yielded by causal laws governing the world, in the latter it is a *normative* barrier yielded by the fact that the clerk is bound with various kinds of rules. This indicates that besides the physical world, which restricts us in various ways, we also live in a kind of the virtual world (or worlds), which is superimposed over the physical one and yields surplus restrictions.

True, the normative boundaries are different from the physical ones in that they are "softer"—if our bank clerk really was *dying* of hunger, he would most probably break through the normative barrier and take some food from the supermarket shelf. (And given his condition, he might not even be called to account for this.) However, it is also true that the clerk, throughout his life, may never be in this kind of perilous situation—he will, more probably, face the normative barriers without the emergency license to break through them, and hence they will remain genuine barriers for him.

The continuation of the objection posed above might now be that the so-called normative barriers are only metaphoric descriptions for complicated causal mechanisms. Again, there is undoubtedly a sense in which this is true; but this sense is trivial. Of course, norms exist only in so far as people endorse them, and the endorsement of a norm can be tracked down to some patterns of activation in their brains. But there is no hope that we could exactly describe what is going on at a purely physical level. And, moreover, even if we could, it would hardly diminish the difference between the first and the second case: in the former one we have a straightforward physical impossibility of fulfilling one's desires, in the latter it is a vastly complex conspiracy of features of the physical environment (crucially involving the interaction of myriads of neurons in many human brains) yielding a much more complicated mechanism diverting the person from fulfilling it.

5 Conclusion

Humans' radical difference from their animal cousins can be seen as a matter of their having become truly uncanny niche constructors. Unlike other species, humans have not only tampered with their environment, but entirely rebuilt it. Moreover, along with the reshuffling of the existing

elements of the environment and erecting brand new, artificial elements atop of them, "virtual environments" have been brought into being, in which the physical barriers of the natural world are largely replaced or supplemented by artificial ones.

What the artificial barriers of our "virtual worlds" are made of are *rules* (understood as social institutions that can affect people as powerfully as physical restraints). However, as I argued elsewhere (Peregrin 2010), rules are also at the core of the human ability to pass on behavioral patterns (not to mention "thoughts," "ideas" etc.) and thus, as Kant put it, to live not only within the realm of nature, but also within our distinctively human realm of freedom. In this way, rules appear to be the true key to human distinctiveness—their emergence, i.e., the emergence of our ancestors' abilities to think in the "normative mode," to acknowledge "ought-to-be's," has endowed us with a complex package of distinctively human features, including the ability to develop culture and to build virtual niches.

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