

# Dawkins and Latour: A Tale of Two Unlikely Fellows<sup>1</sup>

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## Abstract

Two popular, yet highly controversial concepts of non-human agency from two different fields of knowledge are compared in this essay: the theory of the selfish gene, introduced into neo-Darwinian evolutionary biology by Richard Dawkins, and actor-network theory, as brought forward in science & technology studies by Bruno Latour. It is argued that the two theories, despite all apparent differences, share key motifs and motivations when they try to forward knowledge in their respective fields by adopting a vocabulary that aims at metaphorical redescriptions of the origins of intentionality—in both senses: as purposefulness of action and as meaning.

There is a history of microbes that is also filled with sound and fury. History is no more limited to the so-called human agents than to the non-human agents. What were once miasmas, contagions, epidemic centers, spontaneous diseases, pathogenic terrains, by a series of new tests, were to become visible and vulnerable microorganisms. Why? Because for the first time in the history of the world (...), the researchers (...) were to offer these still ill-defined agents an environment entirely adapted to their wishes (...). For the first time these agents were to be separated out from the confusion of competitors, enemies, and parasites, which hitherto they had to take into account. For the first time—for them as well as for us—they were to form homogeneous aggregates (Latour 1988, 82).

Nobody would ever claim that a bacterium was a conscious strategist, yet bacterial parasites are probably engaged in ceaseless games of Prisoner's Dilemma with their hosts and there is no reason why we should not attribute Axelrodian adjectives—forgiving, non-envious, and so on—to their strategies. (...) A doctor might say that the [wounded] person's 'natural resistance' is lowered by the injury. But perhaps the real reason is to do with games of Prisoner's Dilemma. Do the bacteria, perhaps, have something to gain, but usually keep themselves in check? (...) Needless to say, there is no suggestion that the bacteria work all this out in their nasty little heads! Selection on generations of bacteria has presumably built into them an unconscious rule of thumb which works by purely biochemical means (Dawkins 1989, 229).

## Blind spots

In the early 1980s, a vocabulary of non-human agency was introduced into the social studies of science and technology (abbreviated: STS).<sup>2</sup> For better or worse, it evolved into one of the most popular and widely used conceptual resources within that academic field. The purpose behind what has become known as actor network theory (abbreviated: ANT) was to offer new, unorthodox, and critical perspectives on its subject matter, namely natural science and its alleged commitment to a philosophical orthodoxy of realism and objectivity.<sup>3</sup>

It is a striking fact that this theory—if we may call it a theory—, at least on the part of its co-founder and most prominent and eloquent partisan, Bruno Latour,<sup>4</sup> has paid little if any attention to something that might pass as its *alter ego* in the natural sciences. I am referring here to the theory of the selfish gene (no abbreviation here; evolutionary biologists seem not be as fond of capital letters as social scientists are). This theory—again, if we may call it a theory—was first proposed by Richard Dawkins in his book *The Selfish Gene* (Dawkins 1989). Since its first publication in 1976, it has become both an influential work in evolutionary biology and a popular science classic. Although Dawkins locates himself and his work firmly among the ranks of scientific orthodoxy, he introduced a markedly un-orthodox, and very imaginative, vocabulary of non-human agency into the field of knowledge about evolution even earlier than ANT did for its own field.<sup>5</sup>

Since it belongs to the natural science of evolutionary biology, one might expect selfish gene theory to be a legitimate object of investigation by science studies. In fact, its conceptual peculiarities should have made it a particularly rewarding one. Alas, the selfish genes never entered the population of non-human agents in ANT. Such apparent non-perception might be expected the other way around, simply because Dawkins, in an attitude of scientific self-righteousness, does not bother to take the social studies of science seriously.<sup>6</sup> However, this kind of ignorance should not be expected from a form of knowledge that is explicitly concerned with the very modes of reasoning and practice within the natural sciences that give rise to *their* ignorance of other fields and forms of knowledge.

In this essay, I will not try to give a conclusive answer as to what are the reasons for (or causes of) this peculiar blind spot in ANT. Most likely, it is due to plain ignorance of those literary styles and techniques within scientific theorising that might escape or contradict the image of ready-made science as stern, serious, objective, which ANT constructs in order to deconstruct it.<sup>7</sup> Even more likely, it stems from ANT's utter disinterest in scientific *theory*, as opposed to scientific practice.<sup>8</sup> What I am going to attempt in this essay, instead of speculating about reasons, is to undo that blind spot by mapping out the surprising similarities between the two discourses of non-human agency—which should however not downplay the significant differences. It will be rewarding, I believe, to identify not only common motifs, but also common motivations behind the two theories. The lesson to be learned could simply be this: Even in the Science Wars, life in the trenches on either side is not as different as the ideologies that fuel the war might suggest.

## Motifs and motivations

As the opening quotations may already have indicated, one motif common to both Dawkins and Latour is their ascription of agency to things that are not persons—not even possibly. Unlike the cases of the Great Apes or intelligent computers, there is no doubt that one cannot seriously hold genes or microbes to be intentional agents in any conventional sense. The non-human agency Dawkins and Latour refer to has little if anything to do with the debates within the philosophy of mind about where intentionality of behaviour starts, and where in the world it might be harboured. Indeed, Dawkins and Latour do *not* explore the borderline between intentional action and unconscious behaviour. My thesis is that they, firstly, do explore the borderline of what it *means* to be intentional. Secondly, they achieve this by using similar techniques—disregarding all apparent differences in style and scientific background—, namely by unconventional modifications of language use. Before explicating this twofold thesis, let me first give a brief overview of each theory.

## Dawkins

When the British zoologist Richard Dawkins introduced the notion of the 'selfish gene' into evolutionary theory in 1976, his main objective was to reinvigorate neoclassical Darwinism by way of systematically adopting recent findings in the science of genetics. Neoclassical Darwinism, simply put, amounts to the claim that the mechanisms of genetic variation, natural selection and phenotypic adaptation to the organisms' environment, which together result in their environmental fitness, provide us with the necessary and part of the sufficient conditions for an explanation of the evolution of life in all its varieties.

Dawkins' selfish genes were designed to intervene into, and ultimately resolve, an increasingly divisive and sterile debate within evolutionary biology about the question of the units of natural selection (Dawkins 1989, 7–11). If natural selection is an important, if not *the* salient causal factor in the evolution of organisms, and thus, if natural selection (rather than vital forces or hidden laws of form) shall explain the adapted design of organisms (Dawkins 1983), the entities on which natural selection operates must be scrupulously identified. Most of 20th century evolutionary theories (subsumed under the label 'modern synthesis'), as well as, for the most part, Charles Darwin himself, committed themselves to the selection of *individuals* within a population. The differential reproduction of individuals, as effected by organic and/or behavioural traits that, for genetic, non-adaptive causes vary within that population and that match environmental conditions to different degrees, simply is natural selection.

However, if individual selectionism is true, as most evolutionists believed, apparent acts of altruism by individuals—acts that may harm the individual while benefiting the population—presented them with a puzzle: What benefit could arise for an individual from its self-sacrifice? A solution to this problem seemed to lie with theories arguing for a selection of *groups* (that is, populations, races, or even species), where it is the collective that natural selection operates on, and where the perpetuation of the collective is the measure of natural selection—a view common in the popular perception of evolutionary theory, and, in the most unfortunate case, opening doors to Social Darwinist justifications of racist policies.<sup>9</sup> Apart from the danger

of ideological (mis-)alignments, theories of group selection run into their own kind of difficulties when it comes to defining what a group is—since the boundaries of populations are less than sharp, and since biological races and species, in evolutionary theory, are precisely *not* natural kinds.<sup>10</sup>

The alternative to species vs. individual selection that Dawkins suggested was to focus on the *gene* as the unit of natural selection. From the perspective of evolutionary common sense, this seems like an odd move, since natural selection *by definition* operates on the level of the phenotype, not the genotype.

Indeed, Dawkins proposes a complete revision of the roles of organisms and genes in evolution: Genes are molecules with, first, the ability to replicate themselves in biochemical processes, and, historically second—when resources for self-replication become scarce, so that the self-replicating molecules have to compete for them—, the ability to protect and improve their replication mechanism by encoding structures serving as *vehicles* for that purpose. Those vehicles are the individual organisms.<sup>11</sup> Genes are naturally selected by measure of their rate of self-replication. The rate of self-replication ultimately depends on how competitive their program for organisms is, that is, it depends on how organisms perform in their environment. It does however *not* depend on the benefit for each and every individual organism. Within a population, altruistic behaviour may actually increase the *overall* rate of replication of genes that cause, or are concomitant with, suchlike altruistic behaviour—although perhaps only on the part of the other individuals within that population. The ultimate beneficiaries are the genes, so that the individual behaviours, whatever their effect on the individuals themselves may be, are in the hypothetical interest of the genes.

The vocabulary of competition and self-interest for genes and their phenotypic effects that Dawkins coined is firmly rooted in liberal economics. More precisely, it is an application of game theory, especially the game of the Prisoner's Dilemma, to evolution.<sup>12</sup> The focus of game theory is on the behaviours and strategies of individuals in the face of the unpredictability of other individuals' behaviour. From an initially a-social state of affairs, patterns of interaction emerge, *with or without the individuals being conscious of those patterns, or of their own behaviours*. The strategies—the most basic ones

being cooperation, defection, retaliation and forgiveness—are identified in a behaviourist and methodologically individualistic fashion, that is, with regard to their effects only, with exclusive attention on one-to-one relations between individuals, and without regard to integrated patterns of co-operation that may have predated the onset of game-theoretical reconstruction. On those premises, Dawkins seeks to identify evolutionary stable strategies (ESS; here's an exception to the non-abbreviation rule that I suggested earlier...) that secure the hypothetical self-interest of genes in their own replication on the basis of phenotypic effects of individual altruism that they produce (Dawkins 1989, 69, 282 f.).

Dawkins' argument for the selfishness of genes can be summarised as follows:

- (G 1) There are two kinds of systematic effects that DNA sequences produce:
- (a) the self-replication of DNA sequences and
  - (b) the encoding of phenotypic structures by DNA sequences.
- These two systematic effects are closely correlated to the point of mutual dependence.
- (G 2) Following (G 1b), DNA sequences, within the setting of organic reproduction, structure traits and behaviours on the phenotypic level so that a certain, locally circumscribed phenotypic trait X may be mapped onto the DNA structure x, thereby identifying it as a gene.
- (G 3) Gene x is one variant of a set of possible configurations of DNA sequences  $x_1, \dots, x_n$ , which are its alleles, each producing a slightly different (but similarly localised) phenotypic effect  $X_1, \dots, X_n$  among the individuals of a population.
- (G 4) Gene x pursues self-interested strategies inasmuch as the difference in phenotypic effects X it produces, whatever it might amount to for each individual, contributes to the stable and continued replication of that gene, as compared with  $x_1, \dots, x_n$ .
- (G 5) For gene x thus being spread among the population at a higher rate than  $x_1, \dots, x_n$ , phenotype X appears to occur *for the purpose* of optimising the replication of gene x.

If it is true that Charles Darwin, in the course of developing his theory of evolution by natural selection, derived the key models from the *laissez-faire* strand of the economics of his time (especially Robert Malthus and Adam Smith)—which he arguably did—,<sup>13</sup> then Dawkins' approach appears to be a logical (and perhaps ideological) continuation and extension of that style of reasoning.

The character of this adoption of a vocabulary of economics, and of patterns of economic reasoning, which always implies reference to the (individual) intentions of economic agents, should not lead to erroneously ascribing intentions, or at least some kind of goal-directedness, to the genes, let alone to the evolutionary processes themselves. First of all, the types and patterns of effects caused by the genes that qualify them as strategies, as well as the strategies themselves (what is 'selfish', 'forgiving' etc.?), are identified by the observer. In evolution, adaptation is the result of processes of random variation and natural selection that are utterly un-intentional and non-teleological. There must be something that justifies the observers' use of an intentional vocabulary in the *explanation* of those processes in order to make that use scientifically viable.

What is striking about the Dawkinsian mode of explanation is that it occurs in a realm of science where the methodological norms should be expected to consist in rigorous theory-building, rational argumentation, neatly presented empirical evidence, and avoidance of any excessively loose metaphorical literary style. Any shortcomings at those requirements normally would be read as concessions to the task of popularising scientific findings. But in Dawkins' case—although he is at least just as much a populariser of science as he is a scientist—things do not quite look like that. He aims at more than just popular presentation of science when he employs the metaphor of the selfish gene. As he states in the foreword to his classic book, he regards his attribution of agency to genes to be a heuristic tool for gaining a new perspective on the inner workings of life. As with good, exciting works of art or literature, Dawkins admits—asking the reader to read his book 'almost as though it were science fiction' (Dawkins 1989, vii)—, this is best achieved by way of paradox and provocation.

From this perspective, selfish or altruistic strategies of genes are a matter of metaphorical redescription, with explanatory purposes in mind. Accordingly, Dawkins repeatedly insists on the purely metaphorical nature

of the selfish gene, and on his theory not being a new theory, but only a reformulation of Darwinian orthodoxy (Dawkins 1989, x f.; 1999, 1 f.). The main problem with ascribing strategies to chains of molecules even in a metaphorical way is that genes are not properly circumscribed natural entities. The criteria for their identification are their phenotypic effects. However, in nature as well as in molecular genetic laboratories, one-to-one mapping relations between genes and phenotypes are hard to establish, and it is argued by many biologists that mutual interference occurs between genes, and even that non-genetic factors may play a role in inheritance.<sup>14</sup> The only place where the hypothetical properties of entities such as genes are not in danger of perishing in the thin air of their theoretical nature is where the concept of the selfish gene was first developed: mathematical modelling on the basis of computer tournaments between programs simulating the emergence of stable patterns of selfish vs. altruistic behaviour from random variation.

The crucial question is whether such model-building is tenable with regard to the explanation of real-life evolutionary patterns—whether it may ultimately be replaced by a full, reductive explanation of evolutionary biology in the terms of molecular genetics, or whether the ascription of strategies to genes, selfishly, as it were, confines us to a perspective on evolution that will eventually limit our apprehension of its rich and varied phenomena.<sup>15</sup> This is where the decision about the scientific value of genetic agency has to be made.

## Latour

Compared to Dawkins' theory, or concept, or metaphor of the selfish gene, things may look different from many viewpoints in the case of Bruno Latour and actor network theory. But Latour's introduction of non-human agents into the science & technology studies discourse did not only strike metaphorical chords very similar to Dawkins'; it also faced a similar explanatory challenge.

Since the establishment of the 'strong programme' in the sociology of science, the topics of social inquiry into the natural sciences have included scientific knowledge claims: Being domains of social practice, the argument

went, the conceptual contents (the ‘hard core’) of the natural sciences will not remain unaffected by that social practice (the ‘soft’ context). It will be so, however, not (only) in a negative way—that is, not only in terms of ideological, economical, and other social constraints on the production and the forms of knowledge. There is an epistemically productive side to social practice as well. In order not to be biased in either direction, the sociology of scientific knowledge (SSK) adopted a principle of symmetry, in behaving in a (normatively) impartial way towards different and competing, true and false scientific knowledge claims (Bloor 1976, 5).

Latour found some grave shortcomings in the classical SSK approach (Latour 1992; 1999a): First of all, SSK focused on scientific *knowledge*, ignoring all the other elements of scientific practice. The most notable aspect of that self-restriction was to pay exclusive attention to what *people* do, think and say when they do science, thereby ignoring the crucial role that is played by the material world, which until then, according to Latour’s criticism, was relegated to somewhat nebulous material ‘constraints’ on practice.<sup>16</sup> In addition, Latour was dissatisfied with the great epistemological divide between hard-boiled scientific rationalism and its idealistic counterpart in SSK’s social constructivism, which is based on dualistic ontological foundations—nature vs. society and culture—, leaving the field for a thorough study of scientific practice fragmented and incomplete.

In order to overcome this great divide, Latour tried to change the perspective on science and its matters by way of introducing non-human beings as agents (or, in apparently synonymous phrasings, actors, or actants) into the picture. The often recalcitrant behaviour of science’s would-be passive objects and apparatus shall be made explicit by this strategy, revising SSK’s principle of symmetry by extending it towards a symmetrical stance regarding the ontological status of all things in this world as natural or social, passive or active, object or subject of speech and action (Latour 1992, 278 f.).

The agency of Latourian agents consists in having effects on each other, which he calls ‘translations’ (Latour 1987, 108–121, 129; 1988, 11, 65–67, 162, 181). This term should be read in a much wider sense than that of linguistic translation (let me, for the sake of clarity, add an index to translation when using it in the Latourian sense: translation<sub>L</sub>).

Having any kind of effect on each other that modifies the other’s state and further conditions of existence suffices (almost, as we will see) for calling that effect a translation<sub>L</sub>.

Latour wants us to understand the distinctions between natural and social, causal and intentional categories that we may take for granted as the outcome, not as a precondition of translation<sub>L</sub> processes. This assumption is problematic in itself: Contrary to Latour’s own claims, he needs to (and implicitly does) assume that some kind of social agency is always already established before the onset of translations<sub>L</sub>. Without ever referring to the Prisoner’s Dilemma, Latour and ANT quite frequently circumscribe what they call non-human agency in terms of cooperation within, or defection from, a certain practice (the best examples of this linguistic use are to be found in Callon 1986, but also in Latour 1988). Ultimately, translations<sub>L</sub> only exist inasmuch as they become part of social and linguistic practices, as, for example, in the case of ‘inscription devices’ (Latour 1987, 64, 67–69)—which seems to violate his principle of radical symmetry. This objection seems so self-evident that it suggests something else to be *indicated* by this use of the terms of ‘translation’ and ‘agents’ without being *explicated*.

However, the notion of non-human agents, Latour insists, is not to be understood metaphorically, but in a semiotic sense (Latour 1988, 35). Semiotics is a systematical, formalised theory of sign systems of all kinds, where ‘actor’ is a technical term for figures in systems of utterances (for example the hero of your novel, but also the star sign Scorpio in your conversation about astrology), while ‘actant’, in the most general way, denotes roles that may be taken over by somebody or something in a system of utterances (sender or receiver, subject or object, protagonist or antagonist). Yet Latour does not systematically follow the style of semiotic analysis. At least he uses the terms ‘agent’, ‘actor’ and ‘actant’ interchangeably, although ‘actant’ and ‘actor’ have different technical meanings in semiotics, while ‘agent’ is not part of semiotic terminology at all.<sup>17</sup>

Indeed, as much as Latour insists on his use of a vocabulary of actors and actants being of semiotic nature, testing his use of that vocabulary for the sustainability of this claim does reveal that it is, at best, a mixture of imprecise use of semiotic terminology, speculative philosophising, and

plain metaphor: The second part of *The Pasteurization of France*, titled 'Irreductions', presenting the reader with a very peculiar reading of the philosophical tradition, is explicitly concerned with devising a special ontology of non-human agents as entelechies and monads that he borrowed from Leibniz and biological vitalism, and that seems to serve as a metaphysical foundation for Latour's anti-foundationalist knowledge enterprise. There is an inherent force of *willing* ascribed to those entities—which is not quite the same thing as assigning them roles in systems of utterances as 'actors' or 'actants'. In other places, there are passages to be found which fit neither of the former categories, but are best made sense of by reading them as literary metaphors.<sup>18</sup>

Accordingly, Latour leaves the reader with conflicting interpretations that multiply rather than diminish on a closer look at the text. However, this may be an intended effect: Latour deliberately refrains from making any truth-claim that could be examined and evaluated. If one wants to expose the norms of reasoning allegedly operating *within* science by reasoning *about* science in a manner that has been derived *from* science—and this is part and parcel of Latour's criticism of SSK—, one will end up in a *contradictio in adjecto*. Although Latour takes delight in putting down postmodernism and deconstruction, his wilful neglect of rational argumentation, and the motivation behind it closely resemble the idea of deconstruction as developed by the late Jacques Derrida.<sup>19</sup>

If we still want to press Latour for a consistent argument, I think it would amount to the following:

- (A 1) x is an actor, or actant, if it figures in a system of utterances, as described in semiotics, by having a structuring effect on the overall itinerary of that system of utterances. It is not a requirement for the actors, or actants, that there should be a referent in the world onto which they ultimately map.
- (A 2) In a second step, the very distinction between systems of utterances and the external world is called into question, since both interact in manifold ways, so that anything that exerts some kind of force, however minute, may effect a change in relations between utterances and world.

- (A 3) Following (A 2), the mode of semiotic analysis is extended to the world in general, inasmuch as interactions (translations,) exist between systems of utterances and things that are perceived as external to them.
- (A 4) Thus, x is an actor, or actant if it is part of an interaction as described in (A 2), and if it may be subject to a semiotic analysis, following (A 3) and modifying (A 1).

The baseline of this (reconstructed) argument is that virtually anything and everything that does have an effect which is accounted for in human speech and practice may count as an actor, or actant—whereby it falls under semiotic categories. This claim is reinforced by Latour's utter refusal to make the standard distinction between the world and its representations (Latour 1987, 23–25, 48 f., 52–55, 64–70; 1988, 160; 1999a, 122). By having an effect on the world, everything from microbe to man counts as an actor. The world in turn is interpreted as a text, where semiotic actors are of formal, abstract, and idealised nature.

The decision that Latour seeks to avoid by not settling for a consistent argument is whether ANT shall be a theory, and therefore part of the social sciences—as social, and as sciences—, whether it shall be a political critique of the sciences (both natural and social), whether it shall be a philosophical narrative of the more literary kind, or whether it shall be something that oscillates between the former three in a mood of irony and deconstruction. My suggestion is that Latour's avoidance serves a purpose: Precisely for its manifold ambiguities, ANT allows for a variety of uses by different, as it were, user groups that contributed to the popularity of ANT within and outside of STS.

Firstly, in its bursts of free-form philosophising, ANT fuels philosophical debates about nature, science and the nature of science. Although it is not allowed access to the inner circles of debates in academic philosophy, its impact on public debates (in newspaper features, TV documentaries etc.), where it is perceived as philosophy, is significant.

Within STS, secondly, ANT has become the dominant conceptual resource for empirical studies of all sorts, where it is used in a very liberal fashion rather than as a methodology in the meaning defined by mainstream philosophy of science. The ANT vocabulary functions as a mode

of redescription of the explanandum that is guided by the maxim of 'follow the agents themselves' (Latour 1999a, 128). Its purpose is to increase the observer's sensitivity to elements within the domain of the explanandum that otherwise would be left underexposed—from personal and institutional agents to technological settings and causal factors. Thereby, ANT feeds a very particular form of positivism: Whatever vocabulary or methodology meets the aforementioned purpose of 'following the agents themselves' is to be adopted; there are no further analytical aims implied on this level of using ANT.<sup>20</sup>

On a third level, ANT is a means of political criticism, adopted not only by political activists, but also by Latour himself. It is so in the sense of a call for a radically inclusive and participatory political programme that is highly critical of scientific rationalism, instead committing itself to the ideals of an extended political ecology (see the subtitle of the German edition of Latour 1999c). That modified political ecology, of course, abandons the motto of 'back to nature!', since the common thread that connects all three levels of ANT is the motive of questioning the boundary between society and nature. This is what Latour's non-human agents are ultimately designed for.

## Parallel lines

Comparing Dawkins' and Latour's texts, there appear to be some similarities in the use of a vocabulary of action and intention, which I believe go beyond coincidental analogies:

- (P 1) Inasmuch as Dawkins and Latour aim at explanations of the subject matter of their respective fields of knowledge, the domain of the explanandum (evolutionary processes; science as social practice) is conceived of as a set of highly complex interrelations whose basic elements and connecting principles are to be identified.
- (P 2) Given (P 1), the explanation is designed in such a way as to move from the most basic relations (encoding; translation<sub>L</sub>) between the most basic units identifiable within the respective domains (genes; monads) up to the most complex phenomena (evolution; actor networks).

- (P 3) The elementary relations according to (P 2) are *referred to* in terms of *actions* on the part of the basic units. In building upon each other, they ultimately effect a complex order of nature and/or society.
- (P 4) At the same time, the relations between the units in question are *analysed as semantic relations* in the broadest sense (the mapping relations between genotype and phenotype; the semiotic roles of entities in both texts and world), where 'semantic' designates relations of reference, as are to be found in linguistic, artistic or other symbolic systems.
- (P 5) Both authors, in their texts, essentially try to *alter perspectives on the world*. It is their transformed *use* of conventional *meanings*, namely those of agency and its proper referents, that achieves this change.

Apparently, there are two points where some of the aforementioned parallels are in conflict with each other. The first seeming contradiction is between (P 1 and 5): Are the authors concerned with theories and explanations, or are they involved in an aesthetic, literary enterprise? As the outlines above should already have indicated, the answer will not be a matter of an either/or decision (see the next section, 'Metaphors and explanations'). The second apparent conflict occurs between (P 3 and 4): Are the relations between the units in question relations of acting on each other, or of referring to each other? Again, the answer will not be straightforward, and it will come with a twist (see the last section, 'Semantics and agency').

## Metaphors and explanations

In science, the meanings of theoretical and technical terms are a matter of definition. Ideally, their range of application and their conditions of applicability are properly identified, and their use should be unequivocal so as to allow for validation of scientific propositions. Theoretical terms, so defined, may serve as placeholders for things or forces whose ultimate nature needs not to be revealed in advance in order to come to an explanation of their properties and effects (as for gravity or genes). So much for the vain hopes of the philosophy of science. While Dawkins explicitly refrains

from *defining* selfish genes, Latour adopts the technical terms of semiotics only to subvert them. Dawkins' and Latour's theories, instead of defining meanings for theoretical terms, make use of metaphors. The metaphors they use are metaphors of agency. In either theory, there is an explanatory function to those metaphors. That function is not only to adopt a new perspective on the explanandum, but also to introduce theoretical entities that could serve as an explanans where conventional theories in the respective fields, with their conventional definitions, have failed. The difference between the two theories lies with the ultimate status of metaphorical, derived language and the language it is derived from, and eventually to be translated into.

Latour claims that there is no taken-for-granted background of truthful representations onto which alternate, derived usages could be mapped (Latour 1988, 176–178). Linguistic representation in the conventional sense is just a subspecies of Latourian translations<sub>L</sub>—and most likely a derivative one. Representation, according to Latour, is above all a relation of power: to make oneself speak on behalf of other people and things, thereby silencing them. He breaks down the linguistic sense of representation to political representation, and he breaks down political representation to acts of overpowering.<sup>21</sup> Latour's rationale for equating linguistic and political representation is obvious: The assumption that the establishment of meanings is an innocent cognitive affair is to be explicitly questioned. Instead, the establishment of meanings is described as a genuinely political affair, and therefore as a question of social agency.

At first glance, things look very different for Dawkins: His belief that the modes of scientific representation are neutral to social and political affairs is outspoken, and it is of an amazing *naïveté* (Dawkins 1999, 22 f. may serve as a good example). His use of metaphors, and his confidence in the scientific value of a metaphorical change of perspective rely on the promise that metaphors used in science are re-translatable (*now linguistically!*) into the sort of formalised, well-defined language of causes and effects that is required for proper natural science (Dawkins 1989, 45, 88).

However, although the Dawkinsian change of perspective obviously did not occur with anything like a critique of rationality in mind, his introduction of the selfish gene may serve as the paradigm of the prac-

tically irreducible explanatory function of metaphors, in the not quite as innocent sense defined by Mary Hesse (Hesse 1966, 'The Explanatory Function of Metaphor'): Redescribing the domain of the explanandum of one field of knowledge in the language of another *alters the way in which the former will be perceived further on*—regarding both the facts and the patterns of inference. If new, testable, truth-valued hypotheses can be successfully derived from a scientific metaphor, scientific explanation will be forwarded. This latter condition marks the difference between scientific and literary metaphors. Meeting that condition, however, does not imply that one could then readily re-translate the scientific metaphor back into scientific vocabulary proper, just as if nothing had happened. Successfully introducing metaphors into a science ultimately entails changing the frame of reference of that science (Hesse 1966, 163). There will be no *re*-translation once such change has been accomplished.

Please note that I am not referring here to 'metaphorical meanings'—simply because there is no such thing as metaphorical meaning. The minimum requirements for a word or phrase in a natural language (as distinguished from formal, scientific languages) having a meaning are, firstly, its common, and mostly unequivocal use, and, secondly, an extension, as a circumscribed range of things to which they refer.<sup>22</sup> Metaphors fail at meeting the first requirement because their effects rely on their relative novelty, and they fail at the second requirement because their novelty implies that if there is to be a meaning to them, its extension is not (yet) properly circumscribed. The mark of the metaphor is the unconventional use of words or phrases, *which nonetheless retain their literal meaning*. Only when a metaphorical usage has become customary, and thus moved into common language use, it has acquired a new meaning—which however is not metaphorical, but again literal.<sup>23</sup>

If this account of the way metaphors operate is correct, then there will be a significant role for them to play not only in theory design, but first of all, in the development of natural language in general, namely in the practice of establishing meanings. While in formal languages definitions of the conditions of applicability for a symbol, word or phrase mark off its range of application, there is no such top-down mechanism that could be superimposed onto common natural language, written or spoken (if

only because there is no one in a position to do so). The question is whether the language of science fully belongs to the former, that is, the formal category. Hesse's account of scientific metaphors—which are mostly derived from common language—suggests otherwise.

If, as Dawkins says, 'a change of vision can, at its best, achieve something loftier than a theory', namely 'usher in a whole climate of thinking' (Dawkins 1989, xi), then, firstly, a successful change of this kind—which, since there are no a priori limits to concept transfer, is not going to be restricted to scientific concepts and theories—will ultimately have an impact on the way people or other linguistic beings refer to the world they live in. Secondly, new meanings are built on old metaphors. Apart from the meanings of logical terms that order the basic patterns of inference in systems of utterances ('and', 'not', 'if...then', 'is'), there is no pre-defined, taken for granted, immutable bedrock of meanings from which metaphors could be derived, but only temporary, transitional states of semantic affairs. On the assumption that meaning is common use, changing uses will result in changed meanings, so that the way a natural language stands will be altered by the derived forms of speaking, as it were, sedimenting, layer after layer, such as to become part of the basis from which to derive ever new forms.

The claim I want to bring forward by introducing this, in itself metaphorical, image of meaning is more humble than Latour's project of a deconstructive critique of scientific rationality, and it is more critical than Dawkins' negligence of what contextual conditions there may be to scientific theorising. My claim simply is that meaning, in natural as well as in scientific languages, essentially depends on the way speakers interact with each other, and with the world they live in, rather than on rational deliberation or axiomatic definition. Dawkins' and Latour's crossing of the borders between metaphor and theory, its manner and its effects may be cited as proof. Yet this does not provide us with an answer as to why, in their respective fields of knowledge, Dawkins and Latour chose that specific, and awkwardly parallel, route of introducing non-human agents into their theories.

## Semantics and agency

For Dawkins—since his theory rests on the assumption that the forms of living beings are defined by their genes—gene sequences are to be read as instructions, or programs, for the design of organisms. As instructions, they are sequences of tokens (the individual DNA strings) of a type (the self-replicating genotype) that are *about* the structure they encode. The type, in turn, is established by the fact that a certain DNA string with reliable frequency replicates in correlation with the development of a certain phenotypic effect within a lineage of organisms.

In Latour, as we have seen, his actors' agency boils down to having effects on one another which he subsumes under the term of 'translations'. Actors come to be actors only by virtue of those translations, in which they refer to each other and thereby define one another (aptly, Latour calls this relation 'interdefinition', in Latour 1988, 35). If we dispose of the distinction between the external world and systems of reference to the world, as Latour advises us to do, acting, that is, having effects on one another in a regular manner, and referring to one another indeed fall into one. Without acting on one another, there would be no actors to refer to.

The bottom line is that what Dawkins and Latour refer to as agency, first and foremost designates elementary relations of reference on which the (animal or social) world is built. It is those relations that first individuate their elementary relata. The point of divergence between the Dawkinsian and the Latourian image is the question whether or not the postulated relations of reference are genuinely natural phenomena. But why do both authors *use* notions of agency when they *mean* relations of reference in the first place? By now, one might expect it to be the other way around: Latour's semiotic approach, by definition, is concerned with relations of reference first, while in Dawkins, relations of genetic encoding have causal priority to the patterns of behaviour that are encoded.

This is what is most intriguing, as well as irritating, about Dawkins' and Latour's approaches: They reverse an order of intentionality that has been one of the building blocks of modern philosophy. On the modern view, that order plainly amounts to a reconstruction of the common sense

understanding of intentionality. Let me explain: According to philosophical standard definitions, from Franz Brentano onwards, two closely related features, appearing in a certain order, are the pre-conditions of a being's agency:

- (a) intentionality as the property of the mind of being directed towards things outside itself, which is supposed to be the precondition of
- (b) intentionality as the property of linguistic structures of being about, of referring to, of representing things.

If you have inner representations of the world that surrounds you, and if you aim at certain (existing or non-existing) states of the world, and if you can infer to and from those aims and representations, and then, if and only if you are in command of representations (that is, if you are conscious) of the aforementioned operations, you can be held to be an agent. In turn, the proper means of reference are linguistic structures.

The pivotal move to be found both in Latour's and Dawkins' texts is the following: Turning the standard philosophical order of intentionality upside down, they *refer to meaning without presupposing speakers' intentions*. Obviously, both the relation of genetic encoding and the relation of translation<sub>L</sub> are established without the participation of speaker intentions. However, since the relations of reference that matter here are much wider in scope than linguistic meaning, this point, taken by itself, would be artificial, if not empty. It will only be interesting if those relations of reference can be shown to have an effect on what speakers of languages think and mean.

In Dawkins' case, gene-selecting adaptive evolution counts as the main cause of the emergence and shape of the human faculty of language. Genes most certainly do not determine human linguistic behaviour, let alone the meanings of utterances, but it is not unreasonable to assume that, apart from the faculty of speech as such, at least some basic patterns of language (for example elementary grammatical patterns) are genetically hard-wired in the human brain. Apart from this not too controversial claim however, Dawkins introduces a secondary mechanism of evolution that does not operate on the organic level. It is based on non-genetic

replicators that are subject to their own kind of natural selection: the memes, as units of behavioural imitation (words, sentences, melodies), whose rate of replication depends on the frequency, fidelity and reliability of imitation by their users.<sup>24</sup> If frequency, fidelity and reliability of imitation are the ultimate measure of a linguistic item's success among an environment of speakers, then it is not speaker intentions which determine its meaning. It is the linguistic item's rate of replication in correlation with certain states and events in the world that determines its meaning, using speakers' minds as vehicles for its replication.

In Latour's case, it is obvious that the way people speak and act in the world is not determined by their will to do so. Without the non-human agents of all kinds, whose influence, he argues, much of modernity (as defined by Latour) has tried to render imperceptible—a process in which scientific practice played a significant role—, linguistic beings would not only speak differently: It follows by implication from his assumptions about the origins of translation<sub>L</sub> that they would not be able to speak and act in this world at all—provided that his principle of radical symmetry is to be applied strictly. This is the clue to Latour's metaphysical endeavours that play down the autonomy of human actions in favour of an image of their mutual interdependencies even with the most minute things in the world.

Ultimately, Latour's and Dawkins' points, if taken at face value, will seem exaggerated and hardly credible. However, on the interpretation I suggested it would not at all be appropriate to take them as factual statements about how the world stands. What their conceptual oddities may show is the one crucial difficulty with saying how the world *stands*: The standard approach to intentionality presupposes a fixed, static reality to be matched by our representations. Yet evolution as well as any kind of social life-world, but also any epistemic order of things, including the 'hard' sciences, as the explananda of the theories in question, are precisely *not* of a fixed and static, predictable nature. In fact, they are subject to constant (and often incalculable) change.

In order to come to terms with the permanent change, and irreducible changeability, of the explanandum, instead of trying to conceptually fix its properties, a viable cognitive strategy may be to refer to that matter as to a certain degree regular, and open-ended processes that follow dynamics

of their own. The vocabulary of agency Dawkins and Latour employ, by hinting at the mutability of the explanandum, serves to fill in the blanks in uncharted regions of knowledge that, in practice, may otherwise not be filled. If there are any relations and regularities that may be singled out by the use of this vocabulary, without that vocabulary necessarily *denoting* them, the use of such a vocabulary of agency has some justification to it.<sup>25</sup> What *counts as* an agent in the respective contexts only depends on whether ascriptions of agency hold in practice, making the question of what really *is* an agent a secondary matter. Animism is a valid cognitive strategy, which was outlawed only in the modern, scientific world-view. Dawkins' selfish genes might be called as witnesses testifying that this was never fully achieved.

Whether one believes, as Dawkins does, that the gaps in our knowledge, at least in principle, could be properly filled in by a reductive genetic, and therefore truly scientific explanation, or whether one assumes, as Latour does, that there is something essentially elusive about what moves the world humans share with other things and beings, obviously does not make an insurmountable difference as to what kind of cognitive strategy may be chosen in the meantime—however long it may last.

## Notes

- 1 This paper is based on a talk given at the 4S Conference 2002 in Milwaukee, WI, USA, but has been completely rewritten since then. If I have to single out one person to acknowledge here, that person must be David Bloor, who first brought up the idea of comparing Dawkins and Latour. Besides him, many of my former colleagues at the Graduiertenkolleg "Technisierung und Gesellschaft", Darmstadt, Germany (especially Alfred Nordmann, Andrea zur Nieden and Dirk Verdicchio), contributed to transforming that idea into a structured argument.
- 2 The texts in science & technology studies that laid the foundations for actor network theory were Callon and Latour (1981) and Callon (1986).
- 3 For the programmatic intentions behind Latour's introduction of non-human agency, the most explicit source is Latour (1992).
- 4 I shall here omit Latour's refusals to be affiliated with ANT, like in Latour (1999b). It is true that Latour hardly ever uses the term 'actor network theory', but it

cannot be denied that the notion of non-human agency that he brought forward is part and parcel of ANT.

- 5 For Dawkins' commitment to the scientific world-view, see the opening paragraphs of Dawkins (1989, 1).
- 6 For an example of Dawkins' attitudes towards STS and its companions, see his flat disapproval of 'cultural relativism' in Dawkins (1995, 31 f.).
- 7 In Latour (1987, 4), he distinguishes between 'science in the making'—which is a process that does precisely *not* follow the norms of scientific reasoning, but, on close investigation, appears as a *melange* of social interactions and factual contingencies—and 'ready-made science', as the public, serious, scientific face of science which has to be distilled from the former, rather messy, state of affairs in the first place. This distinction, however, may be an artifact produced by critical intentions towards science.
- 8 The 'first rule of method' in Latour (1987, 13–17, 258) is a call for focusing the STS practitioners' attention to, as the title of the book already says, 'science in action', which implies that 'we will carry with us no preconceptions of what constitutes knowledge' (ibid., 13). It is interesting to see that some influential scientific texts obviously do not operate in the way Latour outlines in his famous little comic strip (ibid., Fig. I.6, 14). Dawkins has not shown, and never claimed to have shown that DNA *is* selfish.
- 9 Perhaps the most differentiated historical account of Social Darwinism is to be found in Hawkins (1997).
- 10 One of the crucial steps in the development of Darwinian evolutionary theory was to refute the essentialist definitions of species prevalent in biology until Darwin's day. If species shall be mutable, so that evolution may occur, there will be nothing that distinguishes them from mere varieties in an absolute and timeless, observer-independent sense—which would be required to qualify them as natural kinds in the philosophical meaning of the term. See Darwin (1859, 47, 248, 296 f., 411–437).
- 11 It was (Pittendrigh 1958) who coined the notion of organisms as vehicles for genes.
- 12 The Prisoner's Dilemma, very basically, is a game where two players, in ignorance of the other's actions and motives, are exposed to a situation of blindfolded interaction where both players receive a modest benefit from mutual cooperation, where they make maximum profit from defecting while the other player cooperates—and therefore loses it all—, and where both players are mildly punished in case of mutual defection. While defection seems the most promising option in the first round, reiterated matches are interesting cases for the evolution of cooperation.

- See Dawkins (1989, ch. 13: 'The long reach of the gene') for the application of the Prisoner's Dilemma to evolutionary explanations, which is based on Axelrod and Hamilton (1981) and Maynard Smith (1982).
- <sup>13</sup> For decades, the cheapest victories over Darwinism have been won by linking Darwinian theory, and in consequence, Darwinism in general to the ideologies of *laissez-faire* liberalism. In order to be fair however, those influences should also be taken into account in terms of models and metaphors used in devising a scientific theory, where they may prove to be helpful and productive. Among the various more accurate historical, and less ideological accounts of the influence of the British political economists on Darwin and his theory, the perhaps most profound one is to be found in Schweber (1980).
- <sup>14</sup> Interactionist theories, which include developmental systems theories and theories of morphological constraints, should be mentioned as alternatives to 'hard' genetical theories of inheritance.
- <sup>15</sup> The criticism of neoclassical Darwinism within evolutionary biology that, in search of a fully scientific, and therefore reductionist, explanation of evolutionary patterns, the rich phenomena of evolution are reduced, and therefore lost, as well has been most forcefully expressed by Gould and Lewontin (1978).
- <sup>16</sup> It may be interesting to note that David Bloor himself, in the book that was to become the foundational text of SSK, acknowledged that programme's restriction to scientific knowledge. See Bloor (1976, 141 f.). In later texts, he defends SSK's idealism and its treatment of the natural world as causal, material constraints on human actions, in the light of his adoption of Humean empiricism. See Bloor (1996; 1999); the latter essay is perhaps the harshest criticism of Latour and ANT to be found *within* science & technology studies.
- <sup>17</sup> For the technical definitions in semiotics, see Greimas and Courtes (1979), whom Latour cites only in a few places. See Latour (1987, 261n13; 1988, 253n13), the latter of which is also the place to look for his interchanging use of 'actants', 'actants' and 'agents'.
- <sup>18</sup> In Latour (1988), the conflicting uses of a vocabulary of agency are found right next to each other. In the first chapter, the mode of description seems metaphorical: '[The microbe] uses your interest to carry out its own. (...) Its aims are so different from yours that your child dies' (Latour 1988, 33). Only a moment later, Latour claims: 'I am not using the word 'agent' in any metaphorical or ironical sense but in the semiotic sense' (ibid., 35). But what could be semiotic about the 'interests' of the microbe? Later in this work, he proposes relations of synonymy that take on an almost universal, decidedly ontological character: 'In place of 'force' we may talk of 'weaknesses', 'entelechies', 'monads', or more simply 'actants' (ibid., 159).

- <sup>19</sup> Especially in Latour (1993), he is vocal about rejecting postmodernism as being part of the problem that he identifies to lie with modernity. The term 'deconstruction' is used in an affirmative way only once, in Latour (1988, 190).
- <sup>20</sup> Latour quite frankly admits the positivist, and ultra-pragmaticist approach of ANT in Latour (1988, 188; 1999a, 128).
- <sup>21</sup> In fact, instead of the liberal ideals of equality and mutual understanding, antagonism is the political norm on which Latour founds his argument (Latour 1988, 148, 210, 228). Latour hardly ever explicitly mentions the source from which he derived his image of politics: As irritating as it may seem, with the critical and emancipatory intent that underlies Latour's programme in mind, that source is the conservative apologist of Nazism, Carl Schmitt. See Latour (1999c, 337n9, 346n54, 350n22).
- <sup>22</sup> The philosophical concept of meaning that I am employing here is the notion of meaning as use, a variety of what is called 'extensional semantics'—because it does not rely on descriptions of meanings, but only on their range of use when identifying them. That concept has found two different expressions in contemporary philosophy: one social—meaning as shared use within a language community—(Wittgenstein 1953), and one naturalist—meaning as quasi-natural selection of linguistic items' uses (Millikan 1984).
- <sup>23</sup> In my argument against metaphorical meanings, I am following Davidson (1984, ch. 17: 'What metaphors mean'). Hesse, too, although not being as explicit on the question of metaphorical meanings, emphasises the use aspect of metaphors. See Hesse (1966, 166–170).
- <sup>24</sup> For the introduction of the memes, see (Dawkins 1989, ch. 11: 'Memes: The new replicators'). What Dawkins intended as something like a thought experiment has since been transformed into a field of science—or pseudo-science, for want of proper theoretical concepts and methodology.
- <sup>25</sup> This strategy has been described and christened by Daniel Dennett as the 'intentional stance', in Dennett (1987). It may be worth noting that Dennett has become the leading philosophical advocate of Dawkinsian evolutionary biology, as in Dennett (1995) and in his afterword to Dawkins' most elaborate exposition of the theory of gene selection (Dawkins 1999).

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