The Limits of Causal Action:
Actor–Network Theory Notion of
Translation and Aristotle's Notion of Action

Ivan Tchalakov[1] & Georgi Kapriev[2]

Abstract

The paper discusses the problem of *heterogeneous micro-communities* in science and technical systems and methods of their empirical study. It analyses the critiques of the traditional sociological notion of action, carried out by *actor network theory* and *theory of pragmatic regimes of action* (Thévenot) and focuses on their alternative notion of translation. The authors claim that in addition to its major advantages (symmetrical treatment of human and non-human agents, better understanding of the dynamics of their relationships, etc.) this notion needs further development in order to cover some important aspects of human behaviour. This becomes apparent when studying stable and long-standing heterogeneous micro-communities (couplings) based on the acceptance of the non-human agent (or of certain properties in it) as existent and corresponding relationships of inter-corporeality with it. The denial of the existence of a non-human agent by the humans outside reduces the activity of those engaged in the coupling as senseless, beyond the accepted modes of behaviour, and they are often under pressure to stop their activity.

In the quest for what stabilises heterogeneous micro-communities and makes it possible for humans to endure not only the mistrust and hostility of their colleagues, but also the surprises and obstinacy of the non-human agents they are trying to tame, the authors propose to reconsider the sociological notion of action and to reintroduce the idea of asymmetry between human and non-human actors, yet on a different (non-Cartesian) ground. The basic claim is that traditional sociological theories of human action reduce it to the type of *causal* action. Aristotle calls this type of action 'movements' which have a 'limit', and which are directed not to the goal itself, but to what leads toward this goal (*Metaphysics*, Book 9, ch. 6, 1048b 18–30). This specific reduction makes it so easy to substitute the notion of human action with the notion of translation as the common designation for the activities of both human and non-human actors. The paper analyses Aristotle's notion of *existential* action (ἐνέργεια) to discover principles of analysis, which have been lost in the Western tradition, and which have been preserved and developed further in medieval Byzantine philosophy.

The sociological concept of action

In their book Harry Collins and Michel Kusch (1999) define human action with the following example: in the British society of the 1990s, they said, we can go to the cinema, drive to work, play darts, supervise a student, take out a mortgage, and so on. As a member of the Azande society studied by Evans-Pritchard, we could do none of these. We could, however, accuse someone of being a witch, prepare *benge*, consult the poison oracle, and invoke spirits. In current British society we can do none of these. Hence '(…) to understand what an action is, one must first understand what we mean by society and what we mean by 'form of life'. This has little to do with legal and illegal, but with the differing social and conceptual structure of life in the two societies'. Members of the same form of life share a common network of concepts and actions. They agree in their concepts because they share a realm of possible actions, and they agree on their actions because they share a common network of concepts. From this point of view the authors divide human behaviour in two broad types (1) actions, 'the things we can do intentionally in a given society' and (2) other things we do that are not actions, i.e. *physical movements*, as a 'piece of behaviour' in an extended sense, the physical movements humans use to execute the actions they intend—blinking, for example[3] (Collins & Kusch 1999).

The analysis of Collins and Kusch summarises a line of sociological reasoning that is more than a century old. In it, the analytical distinction between *actions* and *concepts* is crucial—although they are considered as 'tightly intertwined' (intentions are conceptual, concepts provide guidance for actions, etc.).[4] To this we should add the Marxist tradition, which introduced the third element—the 'material mediation' of action, i.e. the presence of the socially produced and socially transmitted *tools* (artefacts) mediating the human relationships with the world.[5]

The sociological analysis of action presupposes that an individual experiences certain constraints from the other members of society (both those present, but also those in the past via the inherited tools and concepts). They modify an individual's actions and make them 'social'. In this context, the different sociological traditions provide different definitions of action.[6]

While its is possible to draw a demarcation line between those stressing the role of community (collective representations, socially inherited artefacts, etc.) or the role of the individual (its ability to evaluate situations, to choose between rules and appropriate means in executing the actions, etc.), they share the common assumption that every action relies on competencies, possessed by the social actors and cultivated during the process of socialisation (adaptation, habitualisation). These competences comprise language or 'collective representations' (concepts, values), and specific skills. However, as Thévenot has pointed out, the diversity of models of human action in contemporary sociology '(…) makes it almost impossible to find out the common features needed to understand both the differentiation and the ability for composition—a basic evidence, related with the very idea of society' (Thévenot 2001, 200). He stresses that in spite of the contributions of some political (Hegel, Marx, Hannah Arendt) and social theories (Simmel), clarifying the mutual constitution of the human agent and the things that 'furnish' the social world, the classical notion of action '(…) does not respond well enough to the need of simultaneous analysis of both the environment[7] and of the human agent, without giving privilege to any of them' (Thévenot 2001, 200).

Thévenot and the representatives of the so-called 'pragmatic stance' in contemporary French sociology (Luc Boltanski, Michel Callon, Bruno Latour, and others) try to solve the problem of action by focusing on co-ordination as an essential feature of human comportment in society and by adopting a pluralistic approach. They consider human action in 'its broadest possible range of understanding (…) [and] refuse in principle to reduce one category of action to another, that is to say, refuse any hierarchical or genealogical procedures that assimilate so as to explain' (Bénatouïl 1999, 383). Another distinctive feature of their approach is the exclusive attention to the non-human agents and their ability to resist, and hence to restrict, human actions. New concepts have been introduced, such as 'regimes' of action, 'engagements' with the world, 'heterogeneous associations', 'heterogeneous networks' of human and non-human agents, 'translation', etc. (see for example Callon 1986a; Callon 1986b; Latour 1987; Thévenot 2001).

The notion of 'translation' as substitute of 'action'

The critique of traditional sociological concepts of action, expressed by actor-network theory, deserves special attention. Michel Callon introduced the notion of 'translation' as the substitute for 'action' in the early 1980s in his analyses of laboratory and engineering practice (Callon 1980; 1986b; 1989). We will present his arguments briefly below, using one of his later texts on what he called 'dynamic model of science'.

If considered in the framework of traditional sociological theory, including the analysis of Collins and Kusch (1999) cited above, 'translation' describes simply one human activity among others. What makes it possible for this notion to replace the idea of action as such?

According to Michel Callon the dominant model of science as rational knowledge focuses on scientific discourse and explores the links it establishes with the reality of which it speaks. It considers the outcome of research activity as consisting of statements (networks of statements). In this model the key issue is the classification of these statements and the characterisation of their relations. The distinction between *observational statements* (or empirical ones) and *theoretical statements* is central and it accounts for the dual dimension of science: experiments and data collection, and also conjectures and generalisations. Callon gives an example with three statements having different degrees of generalisation,[8] showing that for only one of them could human beings reach an agreement based on their visual experience. The notion of translation may be used to describe how the three statements are related to each other. As Callon has pointed out, however, this translation is far from obvious. Philosophy of science has suggested several means for creating these translations, all taking the form of abstract calculation—correspondence rules, coordinated definitions, dictionaries, etc. *The impossibility to move from one kind of statement to another by means of logic alone is generally recognised* (see Callon 1996, 30–31).

Michel Callon elaborates the model of science as an 'extended translation', which solves the problem of the missing link between statements:

The extended translation model develops this definition beyond the domain of codified knowledge. *Translation refers here to all the operations that link technical devices, statements, and human beings*. The extended translation model substitutes

the notion of an actor with that of an actant, a notion borrowed from semiotics. Actant refers to any entity endowed with the ability to act (Callon 1996, 50).

According to him the notion of actant is particularly important in the study of scientific activity because the latter permanently modifies the list of entities constituting the natural and social world. Within labs, he stresses, social groups interested in scientific production are also being formed, constituting the famous 'social context'. By giving such a broad definition of *action*, in fact the latter disappears in favour of that of *translation*:

> An actant may be a pharmaceutical firm that aims at developing anticancer drugs, a political party that supports cruise missiles, a technician working in a mass spectrometer, a researcher interpreting data charts, or an electron that does not interact with a flow of protons. All these actants are brought into play, mobilizing in statements, instruments, or embodied skills. Each translation may modify, transform, contradict, or alternatively strengthen former translations (Callon 1996, 54–55).

We see that the 'extended translation' covers the definition of action provided by Collins and Kusch, but it also refers to the 'actions' of other entities, such as electrons. What is important for Callon is not the ability [to act] itself, but its production, made by a *statement* ('somostatin inhibits the release of the growth hormone'), by a *technical artefact*,[9] or by a *human being* who creates statements and constructs artefacts (Callon 1996). This is a dynamic ontology where few stable things are left. Society and nature fluctuate like the networks that order them—*existence precedes essence*, claims Callon, and the essence itself has 'variable geometry, changing as time passes'. The broad divisions such as between nature and society and between human and non-human are rejected.

Yet Michel Callon and other representatives of this approach are cautious:

> Demanding that the non-humans should have intentions *in the same way as humans* is itself an anthropocentric or sociocentric demand (…). It does not mean that we wish to extend intentionality to things, or mechanism to humans, but only that with any one attribute we should be able to depict the other (Callon & Latour 1992, 352–354).

Donna Haraway in turn points out that the non-humans 'are not necessarily 'actors' in the human sense, but they are part of the functional collective' (Haraway 1992, 331; see also Albertsen & Diken 2003).

These defensive statements reveal, however, that the authors cited implicitly proceed from the same basic idea of human action as *intentional* action, described by Collins and Kusch (1999). They claim even something more—it is possible to ascribe intentions to non-human actors, if not 'the same way as humans'. That is why in describing the scallops at Saint Brueck Bay, Callon does not hesitate to characterise them as having their specific 'interests' and as being able to accept or refuse 'collaboration'.

In this context Bruno Latour adds further arguments in favour of an 'extended' notion of translation. The sociological theory, he says,

> (…) must modify on the one hand the objective nature of objects, and on the other hand the concept of action. Now normal anthropological usage presupposes in action a 'making-be' for which it induces, by extension, a subject with appropriate competences and an object, which *thanks to the actor has now gone from potentiality to actuality*. Nothing in this schema seems to be reusable by a social theory interested in sharing sociality with things (Latour 1996, §26).

He rejects the idea of 'action with a point of origin' because it conceals the constant circulation or flow of transformations that delineate the concrete state of society. Instead, the action should be considered at any point as *mediation* and as an *event*, and it follows that

> (…) we need to retain the only two characteristics of action—the *emergence of novelty* and the *impossibility of ex nihilo creation*, without in the process conserving anything of the Western anthropological schema which always forces the recognition of a subject and an object, a competence and performance, a potentiality and an actuality (Latour 1996, §26).

Another consequence of this approach is the refusal to consider the competences of the actor as the precondition for action—Latour insists that they should be 'inferred *after* a process of attribution, pause, abutment or focusing'.[10]

The concept of translation and the 'entrepreneurial' type of science

Since the early 1980s a number of remarkable studies have been carried out in the framework of the above approach which strengthen the position of actor-network theory as one of the leading theories in science and technology studies. It is worth asking ourselves now, '*after*' its success (as the title of a popular volume suggests), whether there is something in contemporary science and technology that facilitates and makes possible the redefinition of the traditional sociological notion of action and its replacement with notions like 'event' and 'translation'? Applying this theory in our own studies for more than a decade, it seems to us that its success is partially based on a key feature of modern science—*the emancipation and increase of the proper role of methods and techniques of study in the process of research*.[11] In this respect Bruno Latour's analysis of Louis Pasteur is especially revealing.

Latour describes Louis Pasteur as pursuing the specific strategy of 'genius'. Referring to Lev Tolstoy he compares him with Napoleon and Kutuzov—Pasteur similarly knows how to place his weak forces in order to set in motion numerous other actors and bring about major transformations (Latour 1988). His analysis as one of the masterpieces of actor-network theory reveals the chains of intermediaries, the associations that emerge and fall apart, the never-ending process of 'trial of strength' and 'translations' engaging actors in different shape and scope—academic circles, industrialists, farmers and veterinaries, hygienists, journalists, but also bacteria, domestic animals, organic molecules, etc. It seems to us that the very choice of Pasteur as the subject of study, with his specific trajectory of research passing through several disciplines but remaining with none of them, is very informative for the peculiar relevance between the subject-matter of actor-network theory and its methods of study.

Pasteur began his carrier as a crystallographer 'who interested a dozen or so of his respectable peers' and passing through several disciplines 'ended as the deified 'Pasteur', the man of the century, the man who gave his name to streets all over France' (Latour 1988, 81).[12] The type of research developed by Pasteur is far away from the gradual process of slow, continuous, and uncertain acquaintance and naming of unknown

agents—the process, traditionally called 'fundamental research'. The latter usually presupposes many years (sometimes decades) of work away from the public interest and popularity.[13] It often ends—as Latour ironically put it, with a presentation in the Academy and the announcement 'Here's a new agent!' Many scientists never even reach this point, left only with the hope that one of their colleagues or disciples will continue their work.

Michel Callon has observed a similar phenomenon in his study of a French fuel cell laboratory—*it was the method of research that established the identity of different research groups in the lab* and the way they define (translate) its main research task. His analysis indisputably reveals how the different background and formation of the scientists and corresponding differences in their methods lie at the root of their rivalry in practically all spheres of laboratory life: from setting the direction of research, the definition of what was considered as relevant resources for research, the distribution of those resources, the definition of relevant partners outside the lab, the way they legitimise their actions, etc. The conflict between the rival research groups lasted for many years and eventually led to the disintegration of the laboratory (Callon 1989, 173–213).

Similar stories are abundant in the studies of scientific and engineering practice during the past two centuries. In the mid-1940s the disciples of Niels Bohr invaded genetics and *replaced traditional field research and microscopic methods with spectroscopic analysis and experimental methods* they had learned from nuclear physics. The new science of molecular biology was born, which in a few years achieved remarkable success, very much the way Pasteur had succeeded almost a century before.[14] Our own studies in the field of holography also support the findings about the crucial role of research methods imported from other fields of science—holography was discovered in 1947 by Denis Gabor, but the field remained almost unnoticed and out of the main stream of physics until the early 1960s, when the *laser methods of research, developed in solid state physics, made their entry* (Tchalakov 1998; 2004b).

In his analysis of the chains of translations carried out by Louis Pasteur—with their dynamics, uncertainties and risks—Bruno Latour thus found a lasting and steady phenomenon: *the methods*! Abandoning crystallography, Pasteur 'did not abandon the laboratory methods acquired',

he stresses. This steady phenomenon re-emerges in most of the case studies carried out in the framework of actor-network theory—the 'strong link' is not between researchers and non-human agents directly, but between researchers and 'hybrids', i.e. the technical artefacts, equipment and procedures they are using in this process. This is indeed a rather peculiar type of science, which I am tempted to call *entrepreneurial*—here the mastering of a specific method (tool) and its transfer into a new area of research gives the newcomer a competitive advantage over those indigenous to the field (such as the farmers and veterinarians Pasteur found in his study of anthrax).

The second major characteristic of 'entrepreneurial' science is the way the problems are formulated. It is evident from the examples provided above that scientists came to fields where the research problems had already been articulated, the debates had already started and the interested parties outlined. With their methods, the scientists in fact *transform* (or translate) the old problems—'translation' always presupposes a text (or story) that is already available, an existing configuration of actors and interests. Like entrepreneurship in the economy, this type of science does not consist in 'simple' application of the method and re-formulation of the problem. The translation, i.e. turning the existing communities upside down by introducing new methods of study that make new actors emerge from nowhere or redefine the old ones, also requires 'persistence, audacity, and precision' (Latour). Yet fascinating as it is, what we are facing here is a rather peculiar type of research. It has long remained hidden from philosophers and historians of science, to be identified today as a dominant way of making science, rooted deeply in modern history. The expansion of the actor-network approach has found the 'translation' mode of activity dominating in other spheres too (economics, medicine, media, etc.).[15]

The 'other' type of science

Yet there is another type of science. As empirical studies have shown, this is a science guided by patient, laborious, and uncertain efforts to gain acquaintance with a new agent or unknown features of an existing agent

and where the methods of study are secondary. This is a science where you continue probing into your study when the colleagues you are working with are leaving in despair, or switch to other problems, or some of them even manage to prove that the elusive entities you are studying are non-existent.

This is science too, possibly not as successful as the 'entrepreneurial' approach, but indispensable for the development of knowledge and for the evolution of human ways of engaging with the world. This is the science of Pasteur's colleagues from the crystallographic laboratory who remained there and continued to research the problems of interest to their tiny community only. And whose efforts made it possible for someone like Pasteur 'to come and go', taking with him the methods they had developed, or the new entities they had discovered and tamed.

Box 1. The Science of Barbara McClintock

In her book about the prominent American geneticist Barbara McClintock Evelyne Fox-Keller tells the remarkable story of the decades-long efforts made by this scientist to pursue her line of research and to defend her discovery against the hostile attitude and mistrust of the fellow research community (Fox-Keller 1983). In 1940 McClintock introduced the idea of *transposition*, i.e. the ability of living organisms to control the reproduction of their genes. At that time most geneticists did not even think of the idea of control. It was the period when the nuclear physicists, disciples of Niels Bohr, came to biology bringing a completely new view of how to do science (reductionism) and new physical technology (spectroscope instead of microscope). Working in the old cytological tradition of microscopic study of chromosomes, Barbara McClintock faced deep misunderstanding.

She claimed the genetics elements were subject to a system of regulation and control that involved their rearrangement. But then what meaning was left to the notion of the gene as a fixed, unchanging unit of heredity? Central to neo-Darwinist theory of molecular biologists in the 1940s was the premise that whatever genetic variation does occur is random, and McClintock reported genetic changes that are under control of the organism! Such results just did not fit into the standard framework of analysis.

She met fierce resistance: 'I was surprised that I couldn't communicate (…) that I was being ridiculed, or being told that I was really mad'. The leading molecular biologist and Nobel Prize winner Joshua Lederberg once cried out: 'By God, that woman is either crazy or a genius!' Another well-known geneticist visiting her lab in Cold Spring Harbor publicly announced: 'Now, I don't want to hear a thing about

what you are doing. It may be interesting, but I understand it's kind of mad'. A few were less polite, referring to her as '(…) just an old bag who'd been hanging around Cold Spring Harbor for years'. The gap between McClintock and her colleagues became too wide and almost unbridgeable.

What followed was more than twenty years of lonely research. She withdrew further into her work, protected by her 'inner knowledge', but at the same time becoming increasingly worried about confronting potentially hostile audiences, and even about visits from unsympathetic colleagues. It was not until 1967, with the works of Watson and Crick in the US and Jacque Monod in France, that the idea of the organism's control over genes re-emerged. In the 1970s the *transposition was rediscovered*! Barbara gradually regained its prestige, and numerous awards soon followed.

Let us compare the two cases briefly presented in boxes 1 above and box 2 (see below at the end of the section) with the science of Louis Pasteur described by Bruno Latour. On the one hand we have the victorious march of Pasteur, conquering by series of 'sideways movements' the chemistry of ferments and related industries, the educated public interested in the problems of spontaneous generation, the epidemiology of anthrax together with veterinary science and French farmers, etc. On the other hand we have decades-long efforts of researchers declared 'losers', who did not make any 'sideways movement', however, and persisted in their direction of research—abandoned by their students, by their colleagues, and by the public. This science sometimes fails, but as the two cases suggest, it was worth the long years of efforts. Eventually they achieved what they had strived for, and their opponents had to withdraw their criticism.

So this is not a marginal type of science. Rather it refers to research practices which have escaped the attention of the actor-network approach until now—possibly because they have been exploited too much by the old epistemology and history of science. But such cases raise valuable questions, which have not yet been completely answered: How are we to describe Barbara McClintock's long years of activity *before* final public recognition? What made it possible for Methodius and Rossitza to withstand pressure and hardship for more than 10 years? In general, what makes researchers so self-reliant and able to oppose the overall opinion of their colleagues, to resist the hostile attacks and continue their own way?

We believe it is possible to study the 'other' type of science in tune with the achievements of actor-network theory. A few years ago one of us suggested the use of the concept of 'coupling' to describe the 'melting pot' processes occurring in laboratory life and to consider the relationships between researchers and non-human agents they are studying as 'heterogeneous couples' (Tchalakov 1996; 2004a). From the point of view of an actor-network approach the coupling could be defined as a process by which, during the process of research, scientists gradually emerge as 'spokesmen' for the non-human agents, their messengers in 'society at large'. This definition, however, describes the coupling from the outside. Although it reveals the mechanisms of 'reciprocal taming' and the exchange of 'features and properties' (Latour 1993), *it leaves untouched the problem of what cements concomitance in the couple, what supports and what stabilises it*. It seems to us that at this point, the semiotic analysis of the intimate relationship between humans and non-humans with its 'minimum ontology' leads to a situation where the actors 'do not speak' and start concealing essential layers of what is happening in life 'inside'. It hits a boundary characterised by non-transparency and 'silence'.

Yet we claim that it is a possible actor-network theory answer to the question about the ability of researchers to endure the long years of lonely work in a hostile environment. To this end we need to push further Latour's idea about the role of objects in stabilising the 'social' relationships and to consider 'heterogeneous coupling' between researchers and non-human objects as an elementary community based, however, on *new types of relationships that escape the traditional notion of translation*. The idea of coupling between humans and non-humans invites us to depart from activist schemes considering actors only through their goals, plans, interests, trials of strength, etc. This process has already been sufficiently explored.

It is our thesis that 'heterogeneous couples' as elementary micro-communities are constituted on specific *relationships of intercorporeality* between human and non-human actors (Merleau-Ponty 1960; 1964). Here the natural or technical object appears as a kind of 'other'. In community with it the human actor often finds himself on the 'outside' of the other humans. According to Merleau-Ponty, however, this loneliness remains above the primary intercorporeality with the things in the world. The man

in a heterogeneous couple is alone, but in intercorporeality with fellow non-humans, with the obscure, enigmatic, and evasive 'object of knowledge'.[16]

Karin Knorr-Cetina has already directed our attention to this type of phenomena talking about 'unity' and 'sharing' as well as about the 'disappearance of self-consciousness' and about 'subjective fusion' of the researcher with his 'knowledge objects'. According to her, the main characteristic of these objects is 'the lack of completeness of being that takes away much of the wholeness, solidity and the think-like character they have in our everyday conception'. The 'knowledge objects' McClintock or Methodius had faced are the extreme type, which according to the 'normal science' view of their colleagues lack not only 'completeness of being', but being itself. It is important to note that Knorr-Cetina charac-terises this everyday viewpoint as looking 'at objects *from the outside* as one looks at *tools* or *goods* that are ready to hand' (Knorr-Cetina 2001, 181). This is exactly our claim about the difference in the basic human-non-human relationship between 'entrepreneurial' and 'other' science. In an earlier paper Knorr-Cetina cited the study of Evelyn Fox-Keller and defined relationships between people and what she calls 'knowledge objects' as *solidarity* and *mutuality*. It is worth stressing Knorr-Cetina's reminder that according to Emile Durkheim, unity and sharing can be both *ethical* and *semiotic* (Knorr-Cetina, 1996, 16; see also Knorr-Cetina 2001).

What then is the difference between the 'other' type of science and the 'entrepreneurial' science of translation? If it is not the new method of research they apply to an existing problem, then what makes Barbara McClintock, Methodius and Rossitza, or the molecular biologists studied by Karin Knorr-Cetina so strong and able to endure not only the mistrust and hostility of their colleagues, but also the surprises and obstinacy of the non-human agents they are trying to tame? We believe this is their specific relationship with non-human agents, the solidarity and mutuality with them. These relationships make the scientists take non-humans as qualified 'others', and to manifest the peculiar 'humanism towards the other' Emmanuel Lévinas is talking about (rather 'humanism towards the *non-human* other') (Lévinas 1982). In the *relationships of solidarity and mutuality* the research methods and procedures are secondary, they are 'just a tool', staying in the background of research.[17]

The way Methodius explains where he found support during the years of his 'deep-relief lens' research is very illustrative:

(...) It is important to *believe* that the thing (the new lenses) is 'there', he said, that it is feasible and 'is'. It is the 'physics of things' that makes you certain of this. Henceforth nothing else is given: you have to devise your own theory and mathematical model, and then prove through experiments that what you claim possible is actually possible (from the interview, personal archive of Ivan Tchalakov).[18]

Concerning the discovery of genetic transposition, Evelyn Witkin asked Barbara McClintock how she could have worked for two years without knowing what was going to come out of it:

(…) It never occurred to me that there was going to be any stumbling block. Not that I had the answer, but [I had] the joy of going at it. When you have that joy, you do the right experiments. You *let the material tell you where to go*, and you're integrating with an overall brand new pattern in mind. You're not following an old one; you are convinced of a new one. And you let everything you do focus on that. You can't help it, because it all integrates. There were no difficulties (Fox-Keller 1983, 124).

We agree with Latour and Woolgar that it is difficult to prove the social and practical origin of such (sometimes anecdotal) accounts of scientists if we take them at face value (Latour & Woolgar 1986, 168–174). But if we consider them, as the authors suggest, as 'tales which obey certain laws of their 'genre'', then we could go beyond and look for the processes and relationships they manifest. Based on our empirical studies, as well as those of Evelyn Fox-Keller, Karin Knorr-Cetina and others, it is worth thinking about the *relationships of intercorporeality* as an outcome of the long years of 'apprenticeship' in the lab, of the assimilation of materiality of scientific practice and 'materiality' of scientific language in the particular area of research.[19]

The scientists describe this process using a series of verbal forms pointing to the *bodily, practical engagement in research*, which transforms the novice into a body that gradually becomes sensitive to the *invisible* of the scientific practice and to the *silence* of scientific language, and which provides the conditions for their 'explication' (Tchalakov 2004a, 199–203).

It is only after this process has advanced sufficiently that the primordial intercorporeal relationships with a non-human actor may possibly emerge or, as the scientists put it, a conviction emerges that the non-human 'is', that 'it exists'. Then this primary conviction displaces the evidence of the everyday world in science so that the inherited objectivities and intentions prove insufficient. By means of the same move it transforms them into *landmarks* and *borders*,[20] which delimit the researcher's scope of action in a negative (or passive) way.

It is difficult to describe these empirically observable relationships of sharing, mutuality and fusion between human and non-human actors only in the language of translation and 'trial of strength'. Here the minimal notion of 'action as event' is not enough. If the 'humanism towards the (non-)human other' is half the battle in enduring the hardship of the 'other' type of science, then it *is necessary to admit the asymmetry between non-human and human actors* and to describe the behaviour of the latter in categories of 'moral obligation', 'responsibility', 'duty', etc.—characteristics that are difficult to ascribe to non-humans.[21]

But this was how the traditional epistemological and sociological theories described such phenomena, even if they do not follow the Cartesian schemes (as was the case with Lévinas and Merleau-Ponty)! They all used, as Latour correctly pointed out, categories inferred *after* 'the process of attribution, pause, abutment or focusing'. In facing such phenomena, until now, the social scientists had to 'stop the process' and attribute 'a posteriori' the competences to the actors involved. So if we agree with the actor-network critique of the sociological theory of action, then in considering the action of scientists *together* with the non-human actors they are in community with, we should not fall into the old trap and are obliged to accept the symmetric approach of translation and the 'ontology of the event'. It seems that there is no other way except to follow the chains of translations and attributions before and after the 'events'. However, we are claiming at the same time that the endurance of researchers in the 'other' type of science is based precisely on the *particularity* of the human actor, of the *asymmetry* of his relations with the non-human. Does our analysis reach a standstill?

Box 2. Chasing 'deep relief lenses'[22]

Methodius is a Bulgarian physicist who in the early 1970s gained popularity in the international community by designing an efficient medium for recording micro-holograms. A few years later he was appointed director of a new research laboratory, designing holographic optical memories for computers. In the mid-1980s, after a decade of intensive research, the dreams of holographic storage had slowly faded away. But at that time Methodius was already working on the new problem of finding out what was in 'the gap between the wave and the corpuscular nature of light'. It was inspired by the earlier works on holographic memory, when his team ran into difficulties intrinsic to the very nature of linear and diffraction optics. Would it be possible to create an optical element combining the advantages and avoiding the short-comings of both? He browsed through related studies but found nothing. Then he discussed the matter with a prominent Russian scientist and he told him that there was neither a theory, nor did he know how this could be practically approached.

Together with his wife Rossitza (a researcher in the same laboratory) Methodius plunged into the new realm they dubbed 'in-phase optics'. In 1988 they established a working group, which obtained financing from the Academy. Their aim was the 'deep relief lens'—an as yet unknown physical entity combining the best features of both refracting and diffraction optical elements. A single lens of this kind was supposed to do the job of a complex optical system. But then things went wrong—a renowned Russian scientist from Saint Petersburg refuted the basic proposition after reviewing their results. According to him 'deep relief lenses' were simply optical elements of a high order of diffraction and what Methodius asserted as possible had no foundation. One year later the postgraduate student and the software engineer of the group decided to withdraw from the project—they thought 'it was not worthwhile to continue working 10–12 hours a day for nothing'.[23] The rest of the colleagues in the lab also lost their faith. Methodius' reputation as a founding father and outstanding scientist was shaken.

The two researchers soon found themselves alone and 'ousted'. However, regardless of their colleagues' scepticism and the uncompromising mathematical evidence against them, they continued their work at the price of stringent hardships. They used the lab instruments to make the first models of the deep relief lens from bichromatic gelatine plates, then gained access to the secret military institute and produced new lenses through ion lithography on glass. They paid the costs out of their own pocket. The results of their research became evident more than ten years later, in 1997 when the journal *Modern Optics* published two of their articles. There was a conference in the USA, and the publication in 1996 of a number of papers by other colleagues working in the new field. Methodius and Rossitza gradually regained their popularity among the colleagues.

The two types of science and possible synthesis. Aristotle's theory of action

Facing such a cul-de-sac, the best strategy is to ask ourselves: are these two types—the 'entrepreneurial' and 'other' sciences—really so different?

Does not the transfer of a given research method beyond its primary area of application, distinctive for the 'entrepreneurial' science, presuppose the same relationships of 'coupling' and intercorporeality we found in the 'other' type of science? Coupling, unity and sharing, that make the scientist sensitive to the *invisible* and *silence* in the habitual application of the method and able 'to see' (or 'hear') a possibility hidden to the others.

Contrary to this—why not admit that the 'humanism towards the non-human other', typical for the 'other' science, presupposes a freedom from the established research methods and procedures in the field? When the relationships of intercorporeality with the non-human come into being and you already 'believe in its existence', then, as Methodius said, 'nothing else is given'—you have to devise your own theory and methods, or borrow them from somewhere by 'sideways movement' like Pasteur (…).

Are there thus any grounds for the distinction between 'entrepreneurial' and 'other' science? Are we referring rather to phenomena common to all types of science? This is partly true. Yet the distinction is still meaningful precisely because the 'other' science (or the phenomena we put under this heading) has long been marginalised in science studies and the 'trial of strength', 'making alliances', 'translation', 'betrayal', 'delegation', etc. in their established meaning have become the catchwords and standard tools in describing scientific practice, as well as the practice in technology, medicine, economy, etc. While at the same time the subjective fusion, mutuality, intercorporeality, and humanism towards the (non-)human other are declared 'a posteriori constructions', having little to do with 'real' life. This aspect of science is almost silenced in our research—few have taken such phenomena seriously enough, even fewer are those ready to bear them in mind as the foundation stabilising heterogeneous communities and helping humans to endure the external pressure and internal tensions in the research process.

Paradoxically, when following the 'translations' of Louis Pasteur and his changing identities, Bruno Latour nevertheless discovered something stable and permanent, which is *not* related with the solidity of objects:

> (…) what is constant in Pasteur is his movement, regardless of the problems he dealt with. Whenever we expect him to pursue the development of a science in which he will have some success, Pasteur chooses *not* to pursue this fundamental research but to step sideways in order to confront some difficult problem that interests more people than the one he had just abandoned (Latour 1984, 68).

However, *these are not the activities* of Pasteur, which Latour describes in the language of translation, but rather an 'external' effect of these activities. That is why another term is used—'movement', which might be considered as Latour's own 'a posteriori' attribution, coupled with terms taken from psychological vocabulary.[24] But why not consider the 'movement' in Pasteur as a manifestation of this very asymmetry between Pasteur and the human and non-human agents he was related with, *as a specific activity of his, which however cannot be reduced to translation*? Dismantling the myths of the old epistemology and sociology of science, we have neglected some important aspect of our subject of study. The semiotic approach and the reduction of laboratory life to 'translation' and 'trial of strength' have revealed a new and magnificent image of 'science in action', and it is no longer possible to return to the old schemes. But the denial of intentionality and Cartesian oppositions between subject and object, mind and body, and society and nature was not for nothing. We paid the price—with the disappearance of these distinctions most of the old problems disappeared too.[25] Among them were the problems of 'ethos', of the ability to pursue a 'higher' line of behaviour that goes beyond the concrete goals of practical utility, the miracle of human life-long endurance of its own line of activities. These are the problems that sociology of science began with many decades ago—'science as vocation', the 'protestant spur to science'… The scientists themselves are also well aware of these phenomena and often refer to their activity in these terms. Today for the most of us these are simply 'a posteriori' constructions.

To formulate our hypothesis: Are there, nevertheless, some real phenomena which remain unexplained and are still awaiting conceptualisation

behind the Cartesian terminology of traditional sociology of science and the vocabulary of scientists themselves? If so, then we need to complement the semiotic approach of actor-network theory with notions relevant to the issue of intercorporeality and which reflect the tension that we believe exists in the very core of scientific endeavour. We mean *the tension between the pursuit of concrete goals, making interested, translation*—on the one hand, *and endurance of proper lines of activity, the asymmetrical responsibility towards the (non-human) other, acting with 'joy' or 'pain', and 'letting the material tell you where to go'*—on the other hand. Indeed, this is not the tension between two types of science, but between two irrevocably related aspects of scientific (and possibly any other human) activity. Traditional sociology conceptualised this tension by simply removing one of the sides, bringing it under the headings beyond activity, most of all as 'concepts' in the sense of Collins and Kusch—transcendentals of moral, religious, ideological, etc. consciousness. With an opposite move, contemporary science studies are keen to declare this side non-existent or to consider it as a 'network' effect of the stability of translations and steadiness of the objects involved.

Our proposal is to reconsider once more the traditional sociological notion of action, yet in a manner different from the way actor-network theory has done until now. We think that sociology in general and social studies of science in particular are not the first in the history of European thought to encounter this problem. In this respect the experience of the medieval Christian philosophers proves especially informative—they had faced a similar tension between everyday activities of the human being as a contingent and created being and the necessity to follow a line of behaviour that unites him with God and prepares him for salvation. The Byzantine Christian philosophers have developed a specific approach to this matter, which is rather different from the Latin tradition that predetermined to a large extent the subsequent development of modern European thought. The analysis of their works might suggest a direction of research, offering a new type of non-Cartesian solution to the problem of action.

This new approach to action is based on a specific reading of the Book 9 of Aristotle's *Metaphysics*. It assumes that Western tradition has developed a rather peculiar understanding of human action since the 12th century, which reduces it to a type of *causal* action. Aristotle calls this type

of action 'movements' which have a 'limit', and which are directed not to the goal, but to what leads towards this goal (*Metaphysics*, Book 9, ch. 6, 1048b 18–30). This specific reduction makes it so easy to substitute the notion of human action with the notion of translation as a common designation to the activities of both human and non-human actors, able to cause movements, to exercise and experience influence.

Hence the actor-network notion of action as 'mediation and event' was a rightful effort to overcome the limitation of causality towards a 'dynamic' ontology that goes beyond the limitations of 'static' substantiality. With this movement, however, it did not take into account that the limitation of causality it opposed *was in turn a reduction from another notion of action*, which has been lost in Latin tradition but has been preserved and further developed in Byzantine philosophy.

Aristotle's theory of action in the Latin and Byzantine tradition: Res against πρᾶγμα

To interpret the problem of action, the Byzantine philosophers used arguments and obtained results which escaped the attention of modern philosophy and social science. They pertain to the very notion of the character of being (*ens*, τὸ ὄν, *das Seiende*), where the perception of acting stands as the primary characteristic of reality—the reality is perceived as 'active' rather than as the substantial static character of things ('the objective nature of objects', as Latour named it). *The reality is acting hence act-ual*.

The difference can be easily explained with the semantic stem of two words routinely accepted as synonyms: the Latin *res* and the Greek πρᾶγμα. Both are translated as 'something', 'object', 'thing', but are not in effect unequivocally identical. While *res* suggests mainly objective or substantial detachment, *pragma* means above all 'deed', 'something actual', 'active', 'exercising influence, 'achieved', lat. *facinus*. Πρᾶγμα is the available concretum of abstractum πρᾶξις (practice) referring to a given subject (when there is a subject) (Passow 1993, 1056). While *res* underlies a vision of the world based on static self-determination,[26] *pragma* describes a world founded on dynamic interactions.

A seemingly curious case proves that substantial determination and stability are not indispensable for the perception of being in the Byzantine tradition. In the opening lines of his paraphrasis on Aristotle's *De interpretatione*, the philosopher Michael Psellos (1018–1078) had to answer the question whether a name (ὄνομα) or a verb (ρῆμα) is more perfect. He stressed that the verb is more perfect and is the most important part.[27] Hence, there is a clear difference between the 'guiding intuition' of the two traditions—while the Latin tradition perceives reality through the subjectively stable *res*—as re(*s*)ality, *the starting point for the Byzantine tradition is action or to use the Greek word—energy*. The Byzantines perceive re(s)ality as act-uality. Paradigmatically, this difference is founded in Aristotle's metaphysics and its interpretations.

According to the Byzantines' insight into Aristotle's theses, the concept of action in modern sociology should be determined as limited or deficient. This imperception is due to studying Aristotle in his Latinised version which incorporates all modern translations. As early as in the times of the medieval Latin scholastics, the 'knowledge of being *qua* being' (*ens inquantum ens*), i.e. metaphysics, promoted two principal perspectives from which every being should be analysed. They identify two modes of its being-ness (*modus ipsius entis*): general (*generalis*), valid to an equal measure for every being described by means of *transcendentals*; and special (*specialis*), which reckons with the different stages of being-ness (*gradus entitatis*) and is described by means of *categories* (Thomas Aquinas, *De veritate*, I, 1c). Therefore, it is quite logical that Aristotle's concepts δύναμις and ἐνέργεια, translated as *potentia* and *actus*, respectively, or as *possibilitas* and *actualitas* should occupy such an important place: they denote the modality of being-ness and therefore, serve the discourse in terms of categories. As *possibilitas* and *actualitas*, they hold front positions in the table of the '*modal categories*' (Kant 1990, 110, 266–272).

Some twentieth century Western philosophers resisted the drastic reduction of Aristotle's metaphysical project. The most adamant opponent is probably Martin Heidegger who observes that Aristotle used to reason considering four different and incompatible perspectives. As such he describes the scheme of categories, the determination regarding 'truth-untruth', the different types of properties and accidences. Second in this

list is the perspective determined by being-ness according to δύναμις or ἐνέργεια. Heidegger strongly disagrees with the translation of both concepts as *possibilitas* and *actualitas* and appeals for re-establishing their original meaning: *force* and *energy* (Heidegger 1995, 8–14, 40–99).

At the end of Book 8, Aristotle stresses that the being δυνάμει and the being ἐνεργείᾳ are in a certain way one and the same (ἕν), because there is no other cause than the one which conveys force to energy; because what has no matter is simply 'one', Aristotle adds 'mysteriously' (*Metaphysics*, VIII, 6, 1045b20–24). To make his position clear, he dwells in detail on essence (οὐσία) in Book 9.

Already in the opening lines, he distinguishes between the discourse about essence through categories (κατηγορίαι) on the one hand, and through the concepts of force (δύναμις), entelechy (ἐντελέχεια) and deed (ἔργον) on the other, warning that force and energy outrun what simply moves (*Metaphysics* IX, 1, 1045b32–1046a2). Force is defined as a principle according to which a thing changes into another thing (ἀρχή μεταβολῆς ἐν ἄλλῳ) or into itself *qua* other. Aristotle speaks about a *multitude of forces* (among which he ranks all arts and sciences) but reduces them to the *logos of a prime force* (πρώτη δύναμις). He defines it as the *force of exerting influence and of undergoing influence* (τοῦ ποιεῖν καὶ πάσχειν), but does not identify the two concepts (*Metaphysics* IX, 1, 1046a9–20). This force persists in what is being even when the latter is *not* in action. But a thing itself is powerful (δυνατόν), only when it can take action (*Metaphysics* IX, 8, 1049b13–14). The efficiency of the force (its capacity to act) is defined as ἐνέργεια which must be translated as '*action*'. It is important to note that Aristotle binds ἐνέργεια with ἐντελέχεια, with the completeness of being-ness embedded in the essence of being as its purposeful cause (*causa finalis*). It stands to reason that *action is defined as movement* (κίνησις) and movement is, indeed, defined as action (*Metaphysics* IX, 3, 1046b29–1047b2).

Aristotle identifies energy with the existence of the thing (ἔστι δ᾽ ἡ ἐνέργεια τὸ ὑπάρχειν τὸ πρᾶγμα): the energy of a thing shows that it exists (*Metaphysics* IX, 6, 1048a30–31). Every thing that exists (ὑπάρχειν) has its own energy or energies. The strong bond between energy and existence makes Aristotle initiate *an exceptionally important distinction which subdivides actions into two different classes*:

– Activities, practices (πράξεις) which have a limit, (πέρας) but no end (τέλος);

– Activities which are boundless but have a set purpose.

An action (πρᾶξις) is perfect when purpose-bound (*Metaphysics* IX, 6, 1048b18–23). It is worth observing that *Aristotle does not perceive ‘τέλος’ as the immediate purpose of a contingent action but as the purpose of an existent essence as such*. Today we would say: the purpose, which makes existence meaningful. Aristotle defines it as the purpose-principle of existence which makes things happen (γένεσις). This purpose is identified with energy *qua* energy, herein defined as something for which force (*dynamis*) is in being (*Metaphysics* IX, 8, 1050a7–10). Aristotle calls these actions which have a beginning and an end and which are not identical with the activity they produce, ‘movements’ (κινήσεις), while ‘energy’ *qua* energy is attributed to actions which are identified both with entelechy and existence (ὕπαρξις) (*Metaphysics* IX, 6, 1048a25–1049a34). In this way, essence and the form (εἶδος) are defined as energy: *the energy which decides the make-up* (properties) *of life* (ζωὴ γὰρ ποιά τις ἐστίν) (*Metaphysics* IX, 8, 1050b1–2).

To sum it up: In Book 9 of *Metaphysics*, Aristotle promotes a doctrine in which he definitely binds essence (*ousia*), force (*dynamis*) and action (*energeia*) together. Every thing which is in being and has therefore essence, possesses certain forces which can be reduced to only one capable of constantly being employed—the force of exercising influence and of undergoing influence. The influence of the forces—of every force—is called ‘energy’. *It is a Greek word, which we translate as ‘action’*. Aristotle distinguishes two kinds of actions. We can call the more multitudinous kind of actions ‘*causal*’, while Aristotle calls them simply ‘*movements*’. They are actions incited by a certain external cause, which cease when the cause is no longer there. They have a beginning and an end; they are restricted; they have a limit (πέρας).

Energy qua energy is called the manifestation of the essence and its force, which is bound to the last and supreme purpose of this essence. That is why Aristotle identifies this energy with entelechy, the causal purpose, the form, with existence and essence. This other kind is the *existential* action and *for every concrete being the word is to be used in singular*.[28]

It should be noted that essence coincides with its essential energy in just one conditional aspect. They are one and the same but essence carries energy. For its part, energy is no essence, it belongs to essence: *it is its existential action*. The energy is the existence of essence and its manifestation. This type of energy can be defined as *existential*. It is not generated by some immediate ‘in order to’, but rather pursues the purpose of existence as such than some contingent goal set by whatever circumstances in life. This energy is the real existence of essence.

In all well-known and historically established forms of philosophical acceptance of Aristotle in the Western tradition, this concept of being-ness remains in the background and is sometimes even missing. This lack of understanding is evident in the popular American edition of the *Metaphysics*.[29] When translating the κίνησις (causal movement) as ‘process’ and ‘ἐνέργεια’ (energy) as ‘activity’, the translator significantly deviates from the above interpretation as well as from the established Western tradition. It is more than clear that ‘processes’ like slimming, studying, walking, building a house, are what we commonly describe as ‘actions’ and the reader gets perplexed as to why they are called ‘processes’, while the term ‘activity’ is restricted only to a small number of phenomena. In the German translation by Hermann Bonitz, ‘movement’ is correctly rendered as ‘*Bewegung*’. However, ‘energy’ is inaccurately translated as ‘*wirkliche Tätigkeit* (*Wirklichkeit*)’ and both ‘*Bewegung*’ and ‘*wirkliche Tätigkeit* (*Wirklichkeit*)’ are translated as ‘*Vorgänge*’ (processes, procedures), although Aristotle does not reduce them to a common concept (Aristotle 1991, 119). The Western reader will be delighted to know that in the Russian translation ‘energy’ is rendered as ‘осуществление’ (realisation), while movement is ‘movement’ and both are referred to as ‘action’ (Аристотель 1976, с. 242).[30]

These modern translations evidence full awareness of the fact that to interpret the terms adequately is too intricate. Furthermore, they show that their translation from an (original) Aristotelian point of view is impossible. Although anxious to remain loyal to Aristotle’s dynamic way of reasoning, Heidegger lapses into superfluous substantialisation too—for example, by ascribing *Wesen* to energies as well. This is because the ‘classic place’ for such philosophical reasoning is not Heidegger’s

cultural environment. On the contrary, Aristotle's doctrine became the first premise for the formation of classical theories, which shaped the image of Byzantine culture.

The earliest Greek-speaking Christian philosophers already emphasised the *difference between essence and its energies* to explain the unknowableness of the divine essence and at the same time the knowableness of God: God stands out in His energies. Creation is related to them but not to God's essence. Energy is God Himself but not His essence. It is the existential action of essence: energy is not the essence but is essential.[31] Gregory Palamas (1296–1359) describes energies in a way which is clear to his contemporaries: *πράγματα ἐστι, κἂν οὐκ οὐσίαι—they are realities but not essences*! ('Contra Gregoras', in Palamas 1966, 280,29–30). Understandably, the foundation of these theological reflections is a basic premise, i.e. the common conviction of the fourth century Christian philosophers that the essence of *every thing* is uncognisable in itself—what makes it cognisable is the manifestation of its own energy. The above reflections on the divine essence and God's divine energies respectively, are also valid for the essences which are created and for their created energies: *for every being*.

A broader vision of Aristotle's theory proves crucial for the Byzantine tradition. He speaks of essence and energies insisting that *there are no essences existing as such* and that *essence is given always individually*. That is why he introduces the concept of 'first essence' (*πρώτη οὐσία*). Developing this idea further, the Byzantine philosophers particularise the system of concepts. This is prompted by the fact that they face a problem which Antiquity has not identified so far—*one's own salvation*, not the fate of human nature, of humanity, but the fate of the *particular individual* who stands in the world and at the same time before the eyes of God.

Hypostasis: The Christian solution to the problem of action

Gregory Palamas explains existence and the way of existence of the divine energy by making an assertion which is symptomatic of the entire tradition: if essence was void of an energy that is distinguishable from the essence

itself, then it would not be real (*ἀνυπόστατος*) and would be considered only mentally. This common standpoint pertains to every kind of nature. No nature whatsoever could exist, nor be knowable if it did not possess essential energies (*χωρὶς τῆς οὐσιώδους αὐτῆς ἐνεργείας*) (Palamas 1962b, 685,10–12). In this sense, man in general would not be able to think, see, hear, speak, walk, eat, etc., if he did not carry energy different from his essence. Its being indicates that man is hypostatic (*ἐν ὑποστάσει*). 'Man in general' (*ὁ καθόλου ἄνθρωπος*) is entirely non-hypostatic (*ἀνυπόστατος*, not real). In this case, we speak about essential energy which is similar (*ὁμοία*) but not identical in the different human hypostases (Palamas 1992, 112,8–19; 112,20–28; 113,7–8). Concrete (human) beings differ in their existential actions (energies).

The most important concept here is *hypostasis* (*ὑπόστασις*).[32] The introduction of the concept in Christian philosophy is theologically founded: it denotes 'three in one'—the persons of the Holy Trinity, who carry the divine essence of God. While upholding this denotation, the scholars Basil the Great (330–379), Gregory of Nyssa (335/40–after 399) and Gregory of Nazianzus (328–390) regard the hypostasis as the *individual realisation of the common essence*. This realisation is characterised by its unique properties, both individual and individualising. The emphasis is not laid on the properties but on their agent. They are not perceived as accidences but as constituents of the specific being. This concept, although insufficiently developed, signifies something important: the common essence is no longer considered supreme and essentialism in ancient Greece also seems to take to personalism. Since then, the hypostasis has been supreme, not the nature.

Athanasius the Great (295–373) already refers, though cautiously, to God's three hypostases in preserving the 'oneness' (unity) of the essence. As distinct from neo-Platonism, Athanasius gives up the idea of grading. Instead of subordinating the three divine hypostases, he coordinates them. By doing so, he promotes a more dynamic perception of being and God because *hypostasis does not mean 'state' but 'act' and being which knows no peace*.

Leontius of Byzantium (before 500–543) takes a step forward. He sees the specifics of personableness in its 'being for its own self' (*τὸ καθ᾽ ἑαυτὸ εἶναι*), 'existence for its own self' (*τὸ καθ᾽ ἑαυτὸ ὑπάρχειν*). Leontius overcomes

the initial tension between defining the hypostasis through characteristics and through its independence, thus formally converging the two aspects. Importantly, he introduces the concept of *enhypostaton* (ἐνυπόστατον) to emphasise that essence or nature exists only because it is in a hypostasis. He also endorses the important Christological standpoint that *there can be two natures in one hypostasis, which do not necessarily change or form a third nature.*

Maximus the Confessor (579/80–662) carries on the tradition in bringing precision and insists that nature itself is accepted in the hypostasis because nature exists only when hypostasised. The mutual imminence of nature and hypostasis means that essence comes into being through the hypostasis and only through it (τὸ ἐνυπόστατον δηλοῖ τὸ ἐνύπαρκτον). The hypostasis is what realises the energy of nature (Maximus Confessor: *Opuscula theologica et polemica*, Migne PG 91, 205AB; 260D–268A). When defining the concept of 'hypostasis', he presents the two definitions which tradition has so far formulated and views them as naturally combined: 'hypostasis' is what exists in itself and individually; at the same time, it is one essence in togetherness with properties, which distinguish the specific hypostasis from the other hypostases of the same nature (Maximus Confessor: *Epistulae*, Migne PG 91, 557D). Besides this, he describes the hypostasis as an *acting subject* (ἐνεργῶν) (Maximus Confessor: *Opuscula theologica et polemica*, Migne PG 91, 205BC). He specially underlines the unreducibleness of the hypostatic order to the natural (essential) one.

At the same time, another concept received a status almost identical to the status of the hypostasis: πρόσωπον, *persona*, person. Initially, it meant person, appearance as well as an actor's mask and the part he performs in a play. Therefore, the concept '*persona*' implicates the moment when an event occurs in a dialogue and in relations (roles). In this way, the divine person is perceived as pure standing face-to-face, as pure actuality in reciprocal endowment and acceptance.[33]

John Damascene (650–749) finalises the process of structuring the system of concepts. In it, the concept 'individual/ἄτομον' fixes the individual being in its natural characteristics: individual is that which having been further detached, loses its natural determination, just like the human individual who does not have only a body or a soul. While 'individual' fixes the natural make-up, the concepts 'hypostasis/ὑπόστασις' and 'person/

πρόσωπον' reveal what nature contains in itself and in what it really exists. They are commonly used as synonyms. The distinction stems from the difference in emphasis. 'Hypostasis' fixes, above all, the independent and self-determined being, while 'person' communicates the peculiar action ensuing from the personal properties and the referral to other persons. From this point of view, a person may possibly represent another person, whereas this is not possible with the hypostases. A person can be identified as a hypostasis only on the basis of his independent activity.[34] Hence the evidence of the hypostasis as bearer of the two types of actions/energies—causal and existential—discussed by Aristotle in Book 9 of the *Metaphysics*, is retained.

The difference between the essential and the hypostatic order does not coincide with the Thomist differentiation between essence and existence. According to the Byzantine philosophers, 'existence' relates to the hypostasis as well as to essence. The hypostasis sets the format in which the manner of existence of the hypostasised essence is realised. As 'something self-existent' (πρᾶγμα αὐθύπαρκτον), the hypostasis 'recapitulates' this way of existence (Dörrie 1976, 13–69; Kapriev 2005, 23–24, 39–40, 58–59, 119–121; Kasper 1986, 210, 284–286).

Here we should observe the significant difference between the Latin and the Byzantine concept. While *persona* denotes only rational beings—God, angel, man (Boethius 1962a, III, 20–52, 82–84), ὑπόστασις has a universal meaning. *Every being has its hypostasis.* This means that every being, be it animated or not, has a hypostasis which contains its essence and through which it manifests its energies.

Now it is clear that *the hypostasis* does not possess the natural energy partially or separately but *extrapolates it according to its hypostatic properties.* The character and intensity of this extrapolation depend on the way the hypostasis exists and not on the existence of nature and because of this, the *hypostatic characteristics leave a strong imprint on the manifestation of energy.* Existential action of concrete hypostasis can be stronger or weaker, more dispersed or more concentrated; it can change its intensity and concentration in time. But the only thing that is certain is that the natural energy (existential action) can never be missing. Because only a non-being does not possess energy.

Body: The coordinator of causal and existential actions

In the previous section we presented the way the Greek Christian philosophers specified and further developed the Aristotelian thesis that essence exists only individually and his idea about the presence of two kinds of action in every concrete being—the multitudinous *causal actions* and unique *existential action*. Their notion of *hypostasis* marks crucial transformation, which overturns the priority of the essential order with the priority of the existential one. The essence exists only as *enhypostasised* and hence its energy cannot be identical in different hypostases and is subjected to important modifications according to *specific* properties of any given hypostasis: *the existence took over the essence*. Together with the idea about the possibility of more than one nature (essence) to co-exist in a given hypostasis, this line of reasoning offers fascinating resources for conceptualising human activity.

Everything that exists possesses causal energy and is necessary to accomplish causal actions ('movements' in Stagirit terms) depending on its experience in the real world. One of the Byzantine philosophers, himself a paradigmatic author, argues that man becomes aware of the material world through his senses, mind and intellect (*α΄ισθητικόν, λογικόν, νοερόν*), stressing the role of the sensuality in its relationships with the other two. The creation of different arts and sciences and the human creativity at all becomes possible due to this type of awareness in its natural relation to mind. Man is the only creature which is God-endowed to create out of nothing, but not out of the absolute nothing (Palamas 1992, Capita 150, 63; 71,24–3). This knowledge is accessible to all people by force of their nature. Being the result of the energies of human nature, it shapes man's existential as well as causal actions in the world.

At this point another important step was made. In addition to his *causal* (moved by contingent goals that have limits) and *existential* (as manifestation of his own nature) actions, the man in his hypostases is potentially able to accept the existential energies of other natures. In its original form, this notion mainly refers to the essential energies of God, but the same principle can be applied, we should say today, to the energies of every other non-human being.

The Orthodox tradition maintains that the God-blessed—the saints, are filled with divine natural energy and thus live the life of God Himself. They are exalted to the rank of God, which is called 'deification' (*θέωσις*). The contemplation of God in the unity with energies cannot be compared to any form of rational knowledge. This immediate existential knowledge of God is therefore called 'experience' (*πεῖρα*). From this point of view, Palamas opposes *φυσικὴ γνῶσις*, i.e. the compound knowledge of the natural mind acquired through the senses and concepts by force of experience, the immediate spiritual knowledge of the Supreme Being (divinity), *πνευματικὴ γνῶσις*. This experience and knowledge are believed to hold supremacy over the experience and knowledge of man. The two spheres of cognition do not challenge each other—they are subordinates.

However, the knowledge and experience gained through them are different and their subordination does not guarantee the unity and integrity of the human personality. In the name of human unity, there must be some place of meeting where experiences gained through knowledge in both spheres—habitual human experience and immediate spiritual knowledge of God—should come together, become co-ordinated and act jointly.

Palamas makes a step forward in the solution of the problem when speculating on one of the differences between the existence of human beings and angels.[35] Unlike angels, the life of the human rational and noetic/intellectual nature is both essence and energy.[36] Through this energy, it animates the body with which they exist in togetherness. By force of this the life is rightly asserted for the body. The difference between body and soul is that the inspirited body (*ἔμψυχος σῶμα*) holds life only as energy and keeps it thanks to the energy of the soul, while the soul has life both as energy and essence (Palamas 1992, Capita 150, 30; 32; 63, 51,10–20; 52,3–7; 71,24–72,7).

Obviously, here Palamas considers body as the point in which the existential and causal energy of nature are held together. At the same time, it is the abode of supernatural energies.[37] When speaking of saints, Palamas stresses that the blissful deifying energies are common for the soul and the body. These energies invest the flesh (*σάρξ*) with the dignity of the Spirit (*τοῦ πνεύματος ἀξία*). From the mind they pass into the body

and with their deeds perfect and deify it. In this way, the body is spiritualised (σῶμα πνευματικόν). Having attained blissful entelechy (μακαρία ἐντελέχεια), the soul deifies the body through which the actions of the body become divine (Palamas 1962a, Triades, II, 2, 12; II, 2, 9, 518,7–519,9; 514,20–515,11). The body keeps and conveys the divine energies to the world.

The body is the absolute owner, co-ordinator and mediator of every human experience, both its own and the supernatural. Palamas rejects the pseudo-ascetic spiritualism and the platonic disparagement of the body. He considers it the crucial hold (*Halt*) of man in being, which makes him a human being and defines his peculiar position.[38] Palamas, who lays an emphasis on the psychosomatic integrity of man, regards the body as the organ (ὄργανον) which co-ordinates man's natural and supernatural energies. Through this organ, they come together, step out of the body and influence the surrounding world.

While observing the tradition, Palamas interprets the deification of the human body analogously with the deification of Christ's body by force of the *perihoresis* within the hypostatic union. Already at the dawn of Christianity, this term was used to denote the interaction between the human and the divine nature in the hypostatic union of Christ and later found universal application. The perihoresis (περιχώρησις, interpenetration, *Durchdringung*) denotes the intercommunication and mutual penetration of the two natures together with their properties and energies. Despite *inter*penetration, *these natures preserve their otherness* (*Anderssein*).[39] The term indicates that in the hypostatic union, the human nature *is not absorbed* by the divine but enters into συνεργία (synergy, co-operation, *Mitwirkung*) with it.

The expression 'ἀντίδοσις ἰδιωμάτων', exchange of properties, has the same meaning. It expresses the fact that the properties of the two natures are not simply attributed to the hypostasis. There is a real exchange between the natures and their properties and co-ordination between the human and the divine energies. In Christ's hypostatic union, *there is asymmetry* in the interaction in which the divine nature is leading but not radically predominant over the human. Specifically, through its action deity makes the human nature capable of penetrating through its proper energies into the divine.

In Christ the deity of the Logos is one and the same for the soul and the body, and the body is deified through the soul. Similarly, in the inspirited man, the blessing of the Spirit pervades the body through the soul and enables it to experience the influence of deity (πάσχειν τὰ θεῖα). The saint acts through the blessing of deification, which is common for the body and the soul. In this συμπάθεια (compassion, *Miterleiden*) the body and the soul are bound together in unity with God (Palamas 1962a, Triades, II, 2, 12; II, 2, 9, 518,7–519,9; 514,20–515,11). The perihoresis in man means that all available energies—the supernatural, as well as the existential and causal natural actions, are in a state of συνεργία (synergy, co-operation), which is realised in the body and which the body demonstrates.

It follows as a logical consequence that the body (and through it the human psychosomatic integrity), accepts and assimilates the actions (energies) which the other creatures—both humans and non-humans originate. Once assimilated, these energies enter into synergism with the energies in the human body. Similarly, the human energies enter into synergism with the recipient human and non-human hypostases. It is important to note the fundamental asymmetry of these interactions, which results from the differences in the natures and the hypostases.

It should only be added that by definition and as a consequence of asymmetry, this process *cannot be limited*: it has no end *qua* end. A hypostasis cannot accept external energies entirely and completely. In this case too, the Byzantine philosophers manifest their radical views. Gregory Palamas states categorically that the movement towards the contemplation of God, i.e. towards the acceptance of the divine energies is continuous and does not end even in the outer world, in the face of God himself (Palamas 1962a, Triades, II, 2, 11, 517,13–18).

Conclusion

The Byzantine philosophers would certainly have been surprised to know that their revelations and observations come in useful in the sociology of all other sciences. It is not our intention, however, to promote a kind of 'sociological palamism'. Our idea is instead to draw a parallel between

problem situations in contemporary science and technology studies and in Byzantine theology and philosophy. By outlining the remarkable achievements of the latter and reconstructing the frameworks that made them possible, we would like to elicit some important methodological lessons relevant to the study of scientific and engineering practice. We believe it is worth the effort, because by mirroring the conceptual achievements of the Greek Christian philosophers we can more easily reach the very foundations of the traditional sociological notion of human action. This notion is deeply-rooted in the Latin tradition and modern philosophy and to oppose it, the actor-network theory (and 'pragmatic stance' in sociology, in general) developed its alternative notion of translation.

Aristotle's twofold notion of action and new concept of hypostasis allowed Byzantine thinkers to solve the problem of the action of Christ—to substantiate the possibility of two types of actions of a different nature existing simultaneously in his behaviour. On the one hand, these actions involve the pursuit of concrete goals, trials of strength, translations and enrolment, etc. On the other hand, they may become the venue of actions of a different type, which have their own meaning and purposes, pointing beyond the contingent goals of the hosts. These actions are considered to be the manifestation of the very existence of Christ as hypostasis with two natures which preserve their identity.

Palamas' arguments about the 'deification' of man, perihoresis and the role of the body in these processes, provided methodological resources for yet another step in analysing the notion of human action. Unlike Christ, the saints, Palamas claims, are human *only* by nature, but their specific hypostases and existential actions make it possible for them to 'accept' the existential action (energies) of God, which are external to them. In this way, human nature is spiritualised but does coalesce with the nature of God. The external nature, accepted through perihoresis, changes the movements of the saint and enables him to perform different causal actions in the world. If in this model we replace the existential actions of God with actions of another hypostasis—human or non-human—it follows that in his hypostases man is able to accept the actions of hypostases of a different nature, without becoming one with them. And based on this, to modify his habitual causal and existential actions.

No doubt, the dynamic ontology developed by Byzantine scholars, has a lot in common with the 'world of translation' of contemporary science studies, with its refusal of the old sociological notion of 'action with a point of origin' (Latour) closely bound to causality and accidentality. When considered in an appropriate manner, the notions of hypostasis, perihoresis, or the notion of the body as a coordinator of different kinds of energies, reveal a promising perspective in understanding the tension between the 'entrepreneurial' and 'other' sciences. These notions support the emancipation of objects and non-human entities in relation to human agents and their consideration as fully-fledged actors advanced by the actor-network theory. At the same time, they preserve the idea of asymmetry in their relationships, rendering an account of the specificity of the human (any other) actor.

Evidently, more effort is needed to develop the potential of this line of reasoning, and our paper is only a modest attempt in this direction. Already at this stage, however, we may hypothesise that, in fact, the notion of 'translation' operates at the level of 'movements', i.e. Aristotle's notion of action which refers to the causal actions. On the other hand, the idea of 'deification', of the acceptance of existential actions of other natures by specific human hypostases, launches a new understanding of the creative human activity. This activity allows man to accept the actions of some 'other nature' through the relationships of intercorporeality and make them the mainstay or base of a new type of (causal) actions of the human agent. The Byzantine thinkers elaborated these problems in relation to God and His action towards man and the world, as well as towards the corresponding human actions to Him. By doing so, they established an entire paradigm of thought, which does not pose any principle obstacles to reasoning in its terms about the experience of Louis Pasteur, Barbara McClintock or Methodius—every truly creative action in science, engineering, etc.

Possibly the main methodological problem facing the line of reasoning outlined, is the elaboration of relevant methods of observing the 'twofold' nature of action. We mean the elaboration of techniques, able to register the 'hypostasity' of the studied agents and then able to eliminate the 'noise' of the habitual causal actions, thus revealing the specific existential

actions of a given hypostasis. If our hypothesis that the existential actions of a given agent are to be found in his intercorporeality with other human and non-human hypostases comes true—a hypothesis whose articulation calls for an interesting encounter with philosophers like Merleau-Ponty, Ludwig Wittgenstein, and Gregory Palamas, then the observation should necessarily include visual methods of analysis, a search of a 'semiotics of the bodies' to complement the semiotics used in actor-network theory.

Notes

1   Corresponding author. Senior research fellow, Technology Studies Group, Institute of Sociology, Bulgarian Academy of Sciences; Associate professor, Department of Sociology, Plovdiv University, Bulgaria.
    E-mail: tchalakov@sociology.bas.bg; address: Institute of Sociology, 13A Moskovska Str., 1000 Sofia, Bulgaria.

2   Professor, Head of the Department of the History of Philosophy, Sofia University 'St. Kliment Ohridski', Sofia 1504, 15, Tsar Osvoboditel Blvd. Southern wing, floor 3, office 48; e-mail: kapriev@mail.bg.

3   Collins and Kusch also introduce the distinction between *result* of an action and the *consequence* of it: '(…) The result of an action is the state of affairs that has to be obtained for that action to have been carried out; they are conceptually linked to the intention; the *consequence of an action* is the further state of affairs that has been brought about by the attempt to carry out the action, they are *contingently related*' (Collins & Kusch 1999, ch. 2).

4   '(…) There can be no action without object, so that every action has its 'in order to', i.e. putting a concrete objective goal, whence it follows that every action is characterized by fixed goal-mediation' (G. Kapriev 2002, 260).

5   The latter ideas lay the ground for the so-called 'cultural-historical theory of activity' or simply 'activity theory', which originated in the works of Soviet psychologists Lev Vigotsky, A. Luria, A. Leontiev, and were further developed by Scandinavian (Y. Engstroem, V. Captelinin) and American (M. Cole, P. Grifgin) sociologists. A specific version of this theory was developed in Bulgaria by Lyuben Nokolov (see his *Structures of Human Activity*, Sofia, 1982) and Andrey Raichev (see his *Privileged Points of View*, Sofia, 2001, electronic version in English could be found at http://www.raichev.org/index.htm).

6   Laurent Thévenot nicely summarises this: '[Action is defined] (…) according to the established collectivities (Durkheim), meanings (Weber), the social inter-action negotiating the order (Strauss), according to a public frame (Goffman), the way of life in the city (Simmel), the discussion in the public space (Habermas), etc. Eventually the proper social action is distinguished by the manner of its execution (*modes d'agir*). How was this distinction carried out?—If the action is coordinated with the collectivities where it takes place, and if people are categorized according to their lasting preferences to act in a certain manner (Pierre Bourdieu), hence the pluralism in actions is related with the differences among the social groups. Other social theories introduce the distinction between social roles, social systems (Parsons, Luhmann), functions that define the interdependencies (Ellias), social worlds (Becker), orientations towards values (Weber, Habermas), forms of ties and belonging (Simmel), typifications (Schutz, Berger and Luckmann). Divisions between public and private, systematically studied by Goffman from the point of view of how public interactions are staged (*mis en scéne*) offer another way of differentiation' (Thévenot 2001, 199).

7   Taken as the totality of living and non-living material agents, and also including 'principles' as specific metaphysical 'entities' (Boltanski 1990, 73).

8   These statements are: (a) Any electron placed in an electric field is subject to a force proportional to its charge; (b) In the circuit C situated in this laboratory, the intensity of the current is 50 amperes; (c) The needle of the ammeter placed in the circuit C points to the figure 100.

9   'A chromatographer gives gases the ability to diffuse in a column having elements that are themselves defined as obstacles to this progression; it also implies a researcher in its functioning' (Callon 1996).

10 The weakness of structuralism according to Latour is 'to have sought rules beyond appearances, and to have imagined that some entity simply 'occupies a position' whereas it perpetually recreates one around itself, that it mediates. Hence the opposition that proved fatal to this system of thought between subject and the 'death of the subject' dissolved into a field of forces (…). But there are no subjects to dissolve, nor are there any fields of force to dissolve subjects in—since there exists no transport of force. *There are only translations*' (Latour 1996, note 39; see also Latour 1994, 197–217).

11 With the spread of modern science throughout modern societies it can be easily found in economy, agriculture, medicine, army, etc.

12 After he abandoned crystallography, Pasteur '(…) found himself, in the problem of ferments, at the heart of a famous quarrel among the chemists and also at the heart of the beer-, vinegar-, and wine-producing industries, whose economic

weight was out of all proportions to that of the few colleagues in crystallography. *Yet he did not abandon the laboratory methods acquired in crystallography*. Above all, he transformed a crucial economic question into a laboratory problem and captured an entire industry that was concerned by his experiments. Yet he did not continue his work in micrography, leaving it to others. He moved right into the middle of a quarrel about spontaneous generation. There again he brought onto the laboratory terrain problems that had not previously been there and capitalised on the attention of an educated public that was already much larger than the industrial public. But he was not interested in developing fundamental chemistry. He was put in charge of a new economic problem, that of the silk-worm industry' (Latour 1988, 68–69).

13 Latour explicitly cites Dupos, who criticises Pasteur for interrupting the direction of his fundamental research that he could have carried out. It is easy, however, to identify the ironic connotations in Latour's comments and apparent admiration to the 'ingenuity' of Pasteur's 'sideways movements' (Latour 1988, 68, 70).

14 See Box 1.

15 Interesting enough in *Laboratory Life*, the book of Latour and Woolgar (1986), the notion of translation is practically missing, although the evidence there largely supports its later introduction.

16 Merleau-Ponty called this 'wild being' or 'wild layer of intercorporeality', revealing the role of the sensorial, bodily relationships of human beings towards the things in the world. It is important to stress that materiality and 'intercorporeality' should not be restricted to perception only, but that we should also take into consideration the 'materiality' of language. We cannot say that the sensory is primary, while the language meanings are secondary. They are on equal ground and what makes possible going beyond their opposition is their primordial *embodiment*. It is always given in *the invisible* (as primary basis of perception) and in *the silence* (that makes possible any articulation) of the world. Because of its presence in the world the living body reveals the meaning, understood as 'explication of a pre-given possibility'. By 'living body' we mean not only human situation among the material things, but also among the 'materiality' of the language we live. Coping with their resistance, we 'explicate' and make our behaviour (corporeal and linguistic) meaningful (see Ihde 1998; Tchalakov 2004b).

17 These are clear, empirically distinct phenomena: during our ethnographic study of a Bulgarian opto-electronic laboratory we also found evidence of *identification of the researchers with their methods of study*, similar to that discovered by Michel Callon in the fuel-cell lab. We found researchers 'coupled' with abstract mathematical methods and specific software, with specific instruments and procedures —for example so-called D-planning for probability calculations, specific inter-

ferometers, RAM cameras for immediate digitisation of images, etc. However, in addition to Methodius and Rossitza there were other couplings *not with the methods, but with the non-human agents researchers were studying*—photo-refractive crystals, super-micro-grain silver-halide plates, polarisation holograms, etc. (Tchalakov 2004b).

18 Fox-Keller provides another statement of Barbara McClintock referring to the priority of relationship between the scientist and the object studied: 'All our colleagues, who are busy either with the structure of molecules or with the appearance of organisms, regard the chromosome as doing what various theories, such as the chemical theory of chromosomes and the chromosome theory of heredity, require it to do. They find that it is doing its job, or seems to be doing its job, smoothly and well—so smoothly and so well that they can take it for granted; they can deduce its properties; *they do not need to observe them*. We must applaud the success achieved by our colleagues on the basis of these assumptions. But *they see chromosomes through the mind's eye* (italics ours). We, who see actual chromosome through the microscope, must explain what we have seen, and point out that it is not always what our friends expect. For us, neither the chemical code, nor the linkage map of the chromosome, nor the gene embodied in it, are enough' (Fox-Keller 1983, 90).

19 In the interviews Methodius explicitly linked his 'idea' about the deep-relief lenses with decades-long experience in diffraction and linear optics, and especially with the holographic computer memory project. His schoolmate from technical school in optics, then university-fellow and research colleague, used the following statement to characterise Methodius: 'He has infested a lot in optics!'

20 Methodius was investigating *between*, not *outside* diffractive and refractive optics!

21 Emmanuel Lévinas insists on the asymmetry in the relationships of intersubjectivity—unlike Alfred Schutz, who considers the intersubjectivity as based on the principle of 'interchangeability of perspectives'. In his essay 'On responsibility towards the other' Lévinas points out that '(…) one of the fundamental issues in *Totality and Infinity* is the asymmetry of the relationship of intersubjectivity. In this sense I am responsible for the other without expecting reciprocity, even at the cost of my life. The reciprocity, this is his affair. Only to the extent to which the relationship between me and the other *is not reciprocal*, I am definiteness (sujétion) for the other; I am essentially 'subject' in this sense' (Lévinas 1982, 94–95).

22 Tchalakov (1998), 'Making a hologram', Marin Drinov Academic Publishers, Sofia, ch.10 (in Bulgarian). For the revised version in English see Tchalakov (2004b), see also Tchalakov (2004a).

23   Methodius was accused of being 'irresponsible' by his collaborators for giving priority to this (yet) unborn non-human entity, the deep-relief lens. The collaborators claimed that, being a prominent researcher, he was 'responsible for his people' and must use his reputation to secure projects that will help the scientists to survive. It was in the early 1990s, when government spending for science decreased almost 10 times and the average salary of researchers approached $150, causing a massive brain drain. If Methodius agreed to follow the demands of his colleagues, this would have meant to abandon the 'deep relief lenses', to desert them, and to withdraw his 'responsibility'. So two types of responsibility clashed here—towards fellow humans and towards non-human agents, whose existence was not certain at all!

24   To cite Latour: '(…) Pasteur could have stopped at any moment and continued himself the work in the fundamental discipline that he was to leave to others. It was even in that direction that all professional training in the sciences of the time must have urged him. He could have 'flinched' at the point where he arrived at human medicine—indeed he did hesitate (…). This was certainly what people as different as Peter and Koch criticized in him. Yes, he ought to have done these things, but *that type of movement, that audacity* (italics ours), was precisely what defined him, Pasteur—what, indeed, was his *particular* contribution' (Latour 1988, 70).

      The case for us is clear enough—Latour has fixed the point, but he did not even think to put it under the heading of 'action'. As we shall see below, however, this is exactly what Aristotle and Byzantine philosophy considered not as 'movement', but as 'energy', i.e. the proper name for action.

25   Now the body is considered only as 'embodied skills' and as 'basis of narrative creation' (Latour 1996, 30).

26   *Res* became the pivotal point of contemplations on what had to be taken for granted when European culture was dawning. When constituting the first West-European metaphysical project, Boethius (480–526) made substance the main object of metaphysical analysis and, moreover, translated Aristotle's '*οὐσία*' not as '*essentia*', but as '*substantia*'. Therefore, the attempt to distinguish being *qua* being focuses on substance as the bearer of accidents. In Boethius' substantial metaphysics, *res* is in the limelight and is perceived as consisting of substance and accidences, the latter including (in accordance with Aristotle's doctrine of categories) relation (*ad aliquid*), activity (*facere*) and passivity (*pati*) (Boethius 1962b, 'De Trinitate' IV, 1–7, 16).

      The scientific revolution carried out by scholastics after the 1220s prompted a transition from substantial to transcendental metaphysics. It placed *communissima* as the general notions of cognition at the centre of analysis. The main transcen-

dentals are *ens* (being), *unum* (one), *verum* (true), *bonum* (good). They are not *subsistentia*, nor accidences. They signify the nature of the denoted and apply to everything which exists. The first transcendental is being, perceived as *primum intelligibile*. It is the first knowable thing which the rest supplement conceptually only (*secundum rationem*). One of the architects of this kind of metaphysics, Thomas Aquinas (1224/5–1274), added the concept of *res* to the transcendentals, although there is a conceptual difference between 'thing' and 'being' which makes no sense in Aristotle's metaphysics. *Res* pertains to every being *in se* and is the only transcendental based on the entire concept of *ens*. They denote the two aspects of one and the same *concretum*: *actualitas* and *realitas*. While the ratio of *res* is taken from the essence or quiddity, the ratio of *ens* from the act of being. Thomas Aquinas establishes the prime of *essentia*: being is perceived and determined *in concreto* by essence. Every being implies *res*, which indicates the independence of what is being. The reality (*realitas*) of a thing is determined by its substance which sets its objective determination. Thomas identifies two notional aspects of *res*: ontologically, *res* is what has a determinate and stable being (*esse ratum et firmum*) in nature; epistemologically, *res* is what is knowable through its essence. We should only add that for the purpose of his axiomatics, *Thomas thought it necessary to generalize the principle of causality in all dimensions of being*: regarding the essence of things as well as their own activity. Every thing is said to have *virtus ad operandum et causandum* (virtue of operation and causation which are obviously perceived as one and the same) and this is one of the main aspects of the transcendental philosophy. Another equally important aspect is set by the relation of the thing to the results of its causal actions (Aertsen 1996, 156–201; 372–387).

27   The view of Psellos contradicts the old standard doctrine, e.g. of Ammonius or Stephanus of Alexandria. According to this doctrine, a name indicates substance (*οὐσία*), and thus takes priority over the verb, which indicates activity (*ἐνέργεια*) and affection (*πάθος*). The standard doctrine was not accepted by all grammarians even before Psellos' time. Psellos attaches priority to the verb stressing that a name indicates only substance, whereas a verb indicates substance and at the same time refers back to something. Psellos insists that a verb makes us also think of a name. Therefore, a verb tends to be understood as a function with a place-holder for a name (Ierodiakonou 2002, 170–172). Consequently, activity and passivity, i.e. action (dynamics) constitute and legitimise the object itself, the substance denoted through the name.

28   This is why the specific 'movement' of Louis Pasteur discovered by Latour could be rightly considered as his unique *existential* action, unlike the multitude of his *causal actions* he had carried out making his discoveries. Similarly, the persistence and endurance of McClintock should be considered as her existential action too, unlike the causal action she performed while growing her crops and conducting

her experiments. With this example, however, we anticipate our analysis, because we need some other notions before making this inference.

29 One of the key texts in Book 9 is translated as follows: '(…) when I am seeing, I also, and at the same time, have seen; when I am minded, I also, and at the same time, have been minded; when I am engaged in intuition, I also, and at the same time, have been so engaged. On the other hand, when I am learning, I am not also, and at the same time, in state of having learned; when I am recovering my health, I am not also, and at the same time, in the state of having done so. Prosperity and having prospered are simultaneous, as are happiness and having been happy. Were this not so, it would be necessary for the relevant carrying-on to cease at some point, as is the case with thinking. In fact, this is not the case. Rather, when one is living (in whatever manner), then one has already lived. Given this discrimination (…) one lot are to be labelled *processes* (κίνησις), the other *activities* (ἐνέργεια). All processes are incomplete, e.g. attenuation, learning, walking and building, which are both processes and incomplete procedures (…). By contrast, it is the same thing that has seen and that is seeing, that has and that has had, intuition. And our word for procedures of this latter kind is activity (ἐνέργεια), for those of the former kind process (κίνησις) (the original Greek terms added by the authors, I. T., G. K.)' (Book 9, ch. 6, 1048b, 25–30, Hugh Lawson-Tancred translation, *Metaphysics*, Penguin 1999).

30 The Bulgarian translation of Ivan Hristov, published recently, renders exactly Aristotle's thought: 'This is what I call action and the other movement', although in general the translation also follows the established Western tradition (Аристотел 2000, 182).

31 Therefore, we do not speak of *distinctio realis*, which presumes a substantial difference, but of an *actual difference* (πραγματικὴ διάκρισις) (Palamas 1966, 77,25–29; 88,18–22). It is not identical with real detachment (πραγματικὴ διαίρεσις), where God could be divided into pieces, nor with purely mental distinction (διάκρισις κατ᾽ ἐπίνοιαν) (Кривошеин 1936, 132).

32 This concept is missing in Aristotle—he uses the term to denote a kind of non-conceptual signification that distinguishes between real and imaginary. In the stoic philosophy, this denotation means reality and actuality as well as achievement/accomplishment and realisation. In the Stoa, the original matter has no appearance nor properties and is realised in tangible objects, while in neo-Platonism, the concept is used to denote the realisation and behaviour of the One (ἕν) in the lower strata of being.

33 In the Latinised West, Boethius formulates persona as '*naturae rationabilis individua substantia*'—'the individual substance of a rational nature' (Boethius 1962a, 'Contra Eutychen et Nestorium', III, 4–5, 84). In this way, he preserves the formal

and substantial commensurability of the natural and personal order—here person-ableness is still perceived as individuality, so he tends to identify the divine essence and the divine persons under a common category as substances—while the Byzantine philosophers categorically keep the two orders distinct.

34 The famous example provided by John Damascene stipulates that the prefect may speak or act in the name of the emperor—he is delegated by the emperor. Hypostasis, however, cannot be delegated! Cf. John Damascene, 'Dialectica', 5; 11; 43; 50, in Migne PG 94, 541CD; 573AB; 613AB; 632A.

35 The angels, having no body, possess the life only essentially and know the world in an immediate noetic way.

36 To stress once more that 'energy' (ἐνέργεια) is the Greek term for 'action'!

37 Or, to paraphrase Palamas today, the natural energies of beings other than man, and whose specific hypostases man meets in his living experience.

38 See the striking analogy of this thesis of Palamas with the idea of Ludwig Wittgenstein about the human body 'as hold of the metaphysical subject in the world' ('*Halt des metaphysischen Subjekts in der Welt*') in Ludwig Wittgenstein, *Tagebuchaufzeichnungen 1914–1916*, articles 12.10.16, (Wittgenstein, *Notebooks 1914–1916*, 1979); cf. Georgi Kapriev, 'Das Schweigen bei Ludwig Wittgenstein und Gregory Palamas', (2001, 147–148).

39 Cf. e.g. Maximus the Confessor, *Ambigua ad Thomam*, 5; *Opuscula theologica et polemica*, 16; *Disputatio com Pyrrho*, in Migne PG 91, 1053B; 208AB; 337CD.

References

Aertsen, Jan A. (1996), *Medieval Philosophy and the Transcendentals. The Case of Thomas Aquinas*, Leiden/Köln/Boston: Brill.

Albertsen, Niels and Bülent Diken (2003), *What is the Social?*, Lancaster University, Department of Sociology, LA1 4YL, UK, electronic publication.

Aristotle (1991), *Metaphysik*, Bd. 2, Bücher VII–XIV, Hamburg: Meiner.

Bénatouïl, Thomas (1999), 'A tale of two sociologies: The critical and the pragmatic stance in contemporary French sociology', *European Journal of Social Theory* 2 (3): 379–396.

Boethius (1962a), 'Contra Eutychen et Nestorium', III, 4–5, in Boethius, *The Theological Tractates and the Consolation of Philosophy*, London: William Heinemann LTD; Cambridge, MA: Harvard Univiversity Press.

Boethius (1962b), 'De Trinitate', IV, 1–7, in Boethius, *The Theological Tractates and The Consolation of Philosophy*, London: William Heinemann LTD; Cambridge, MA: Harvard University Press.

Boltanski, Luc (1990), *L'amour et la justice comme compétences. Trois essais de sociologie de l'action*, Paris: Métailié: 73.

Callon, Michel (1980), 'Struggle and negotiations to define what is problematic and what is not: The sociologics of translation, in K. Knorr-Cetina, R. Kron and R. Withley (Eds.), *Social Process of Scientific Investigation*, Sociology of Sciences vol. IV, Dordrecht: Reidel: 197–219.

Callon, Michel (1986a), 'Some elements of a sociology of translation: Domestification of the scallops and the Fishermen of St.-Brieuc Bay', in J. Law (Ed.), *Power, Action and Belief*, London: Routledge/Kegan Paul: 196–233.

Callon, Michel (1986b), 'Sociology of actor-network: The case of electric vehicle', in M. Callon, J. Law and A. Rip (Eds.), *Mapping the Dynamics of Science and Technology. Sociology of Science in the Real World*, London: Macmillan: 19–34.

Callon, Michel (1989), 'L'agonie d'un laboratoire', in M. Callon (Ed.), *La science et ses réseaux: genèse et circulation des faits scientifique*, Paris: La Découverte: 173–213.

Callon, Michel (Ed.) (1989), *La science et ses réseaux: genèse et circulation des faits scientifique*, Paris: La Découverte.

Callon, Michel (1996), 'Four models for the dynamics of science', in S. Jasanoff, G. Markle, T. Pinch and J. Petersen (Eds.), *Handbook of Science & Technology Studies*, London: Sage: 29–63.

Callon, Michel and Bruno Latour (1992), 'Don't throw the baby out with the bath school! A reply to Collins and Yearley', in Andrew Pickering (Ed.), *Science as Practice and Culture*, Chicago: University of Chicago Press: 343–68.

Collins, Harry and Michel Kusch (1999), *The Shape of Actions*, Cambridge, MA: MIT Press.

Damascene, John, 'Dialectica', in Migne PG 94.

Dörrie, Heinrich (1976), 'Hypostasis'. Wort- und Bedeutungsgeschichte, in H. Dörrie (Ed.), *Platonica minora*, München: Wilhelm Fink.

Haraway, Donna J. (1992), 'The promises of monsters: A regenerative politics for in-appropriate/d others', in C. Nelson and P. Treichler (Eds.), *Cultural Studies*, London: Routledge: 295–337.

Heidegger, Martin (1995), *Aristotle's Metaphysics Q 1–3*, Bloomington/Indianapolis: Indiana University Press..

Ierodiakonou, Katerina (2002), 'Psellos' Paraphrasis on Aristotle's *De interpretatione*', in Katerina Ierodiakonou (Ed.), *Byzantine Philosophy and its Ancient Sources*, Oxford: Clarendon Press: 157–181.

Ihde, Don (1998), 'Singing the world', in Don Ihde, *Expanding Hermeneutics*, Evanston, IL: Northwestern University Press: 63–76.

Kant, Immanuel (1990), *Kritik der reinen Vernunft*, A70, B95; A218–226, B265–274, Hamburg: Felix Meiner.

Kapriev, Georgi (2001), 'Das Schweigen bei Ludwig Wittgenstein und Gregorios Palamas', in *Philotheos 1*, International Journal for Philosophy and Theology 1, ed. B. Sijakovic, Beograd – Niksic – Trebinje: 144–149.

Kapriev, Georgi (2002), 'The non-classical critical theory: Striking the first balance', *Sociological Problems* 3–4: 260–262 (in Bulgarian).

Kapriev, Georgi (2005), *Philosophie in Byzanz*, Würzburg: Königshausen & Neumann.

Kasper, K. (1986), *Jesus der Christus*, Mainz: Mathias-Grünewald.

Knorr-Cetina, Karin (1996), 'Post-Social (Knowledge) Societies', paper presented at the plenary session of Joint EASTT/4S Conference in Bielefeld, Germany, October 1996.

Knorr-Cetina, Karin (2001), 'Objectual practice', in K. Knorr-Cetina, T. Schatzki and E. v. Savigny (Eds.), *The Practice Turn in Contemporary Theory*, London: Routledge.

Latour, Bruno (1987), *Science in Action: How to Follow Scientists and Engineers through Society*, Cambridge, MA: Harvard University Press.

Latour, Bruno (1988), *The Pasteurization of France*, Cambridge, MA: Harvard University Press.

Latour, Bruno (1993), 'A 'matter' of life death—or should we avoid hylozoism', *mimeo*.

Latour, Bruno (1994), 'Les object ont ils une histoire? Rencontre de Paster et de White-head dans un bain d'acide lactique', in I. Stengers (Ed.), *L'effet Whitehead*, Paris: Éditions Vrin: 197–217.

Latour, Bruno (1996), 'On Interobjectivity', in *Mind, Culture and Activity* 3 (4): 228–245.

Latour, Bruno and Steven Woolgar (1986), *Laboratory Life. The Construction of Scientific Facts*, Princeton: Princeton University Press.

Lévinas, Emmanuel (1982), *Ethique et infini*, Paris: Fayard.

Maximus Confessor, *Ambigua ad Thomam*, 5; *Disputatio cum Pyrrho*, in Migne PG 91, 1053B; 337CD.

Maximus Confessor, *Epistulae*, 15, in Migne PG 91, 557D.

Maximus Confessor, *Opuscula theologica et polemica*, in Migne PG 91.

Merleau-Ponty, M. (1960), 'Signes', in *Le philosophe et son ombre*, Paris: Gaulimard.

Merleau-Ponty, M. (1964), *Visible et Nonvisible*, Paris: Gaulimard.

Nokolov, Lyuben (1982), *Structures of Human Activity*, Sofia.

Palamas, Gregory (1962a), 'Triades, II', 2, 11, in G. Palamas (1962), *Syngrammata*, t. 1, Thessalonike.

Palamas, Gregory (1962b), 'Triades, III', 3, 6, in G. Palamas (1962), *Syngrammata*, t. 1, Thessalonike, 685,10–12.

Palamas, Gregory (1966), *Syngrammata*, edited by P. Chrestou, t. 2, Thessalonike, 280, 29–30.

Palamas, Gregory (1988), 'De unitate et diversitate Dei', in P. Chrestou et al. (Eds.), *Gregorios Palamas, Syngrammata*, t. 2, Thessalonike, 77,25–29; 88,18–22.

Palamas, Gregory (1992), *Syngrammata*, t. 5, Thessalonike.

Passow, Franz (1993), *Handwörterbuch der griechischen Sprache*, Bd. 2, Darmstadt: Wissenschaftliche Buchgesellschaft.

Tchalakov, Ivan (1996), 'Building human/nonhuman communities: From random couples of lonely researchers to a laboratory as stabilized heterogeneous group', Paper presented at Joint EASTT/4S Conference, Bielefeld, Germany.

Tchalakov, Ivan (1998), *Making a Hologram*, Sofia: Marin Drinov Academic Publishers (in Bulgarian).

Tchalakov, Ivan (2004a), 'Language and Perception in the Coupling Between Human and Non-human Actors', in Arno Bammé, Günter Getzinger and Bernhard Wieser (Eds.), *Yearbook 2004 of the Institute for Advanced Studies on Science, Technologies & Society*, München: Profil: 192–215.

Tchalakov, Ivan (2004b), 'The object and the other in holographic research—Approaching passivity and responsibility of human actors', *Science, Technology and Human Values* 29 (1): 64–87.

Thévenot, Laurent (2001), 'Régimes d'engagement: la pluralité des formats de l'action', EHSS, *mimeo*: 199.

Wittgenstein, Ludwig (1979), *Notebooks 1914–1916*, Chicago: The University Chicago Press.

Аристотел (2000), *Мемафирика*, Сонм, София.

Аристотель (1976), *Сочинения*, т. 1, Мысль, Москва.

Кривошеин, В. (1936), 'Аскетическое и богословское учение Св. Григорія Паламы', in *Seminarium Kondakovianum*, 8.