GEORGI KAPRIEV, MARTIN ROUSSEL AND
IVAN TCHALAKOV (EDS.)

LE SUJET DE L'ACTEUR

An Anthropological Outlook on Actor-Network Theory

MORPHOMATA

In the past few years, the Actor-Network Theory of French philosopher and sociologist Bruno Latour has become a hotly debated topic in the humanities. From a philosophical perspective, his theory of things keeps being reevaluated: is it possible for 'Human and Non-Human Actors' (Latour) to be analyzed as equally important actors? Does Latour's theory of a simultaneous 'agency' of things and concepts indeed move beyond a subject-object relation? If it does, how far does it in fact go? Is it possible to develop a common new ontology by moving away from the notion of substance, and instead reducing any kind of entities to what they reveal in the course of their (inter)action?

The contributions to *Le Sujet de l'Acteur* are looking for interferences between the idea of 'agency' and cultural dynamics. How can we relate questions of (social) action with those of cultural manifestations? Focusing on questions of symmetry or dissymmetry between the world of 'things' and 'human beings,' the volume includes contributions from the fields of social studies, literary studies, and philosophy. Although the contents are categorized in systematic and historical aspects, all contributions draw on the importance of case studies for the theoretical framework, either starting with systematic questions that are then answered exemplary, or starting from historical cases as well as theoretical options.

KAPRIEV, ROUSSEL, TCHALAKOV (EDS.)—
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An Anthropological Outlook on Actor-Network Theory

WILHELM FINK

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PREFACE

What contribution could Byzantine philosophy provide to current Actor-Network Theory? What would be a sociological contribution to the field of cultural studies and questions of cultural change? These two questions mark the starting point of *Le Sujet de l'Acteur*, and from there the next step was to draw on the relation of human and non-human actors. How do we describe the relation between 'intentional history' and subliminal processes of transition, deformation, or recontextualization?

In the past few years, the Actor-Network Theory of French philosopher and sociologist Bruno Latour has become a hotly debated topic in the humanities. From a philosophical perspective, his theory of things keeps being reevaluated: is it possible for 'Human and Non-Human Actors' (Latour) to be analyzed as equally important actors? Does Latour's theory of a simultaneous 'agency' of things and concepts indeed move beyond a subject-object relation? If it does, how far does it in fact go? Is it possible to develop a common new ontology that combines things, humans, and concepts, by moving away from the notion of substance, and instead reducing the entities to what they reveal in the course of their (inter)action?

Such questions, seemingly at odds with more common traditions of thought, are the centerpiece of research at the Morphomata Center for Advanced Studies. The Center is dedicated to the study of change inherent in, and the comparative aspects of, cultural figurations—the particular objects, things and artifacts created by and in a given culture—as well as the potency of these figurations throughout history. Questions such as how these concrete artifacts and the quotations and borrowings they engender shape social acts, and how transmitted cultural forms can be reinterpreted, are of special interest at Morphomata.

Thus, the contributions to *Le Sujet de l'Acteur* were looking for interferences between the idea of 'agency' and Morphomata's interest in cultural dynamics. How can we relate questions of (social) action with those of cultural manifestations? Can the questions of intention and

phenomenality be correlated with the resistance of things and their forms? Thus, the volume focuses on questions of symmetry or dissymmetry between the world of 'things' and 'human beings,' including contributions from the fields of social studies, literary studies, and philosophy. Although the contents are categorized in systematic and historical aspects, all contributions draw on the importance of case studies for the theoretical framework, either starting with systematic questions that are then answered exemplary, or starting from historical cases as well as theoretical options. In this way, our conceptual thinking on the agency of cultural forms is broadened and enhanced.

The idea to draw the intention of Morphomata's work on the history and dynamics of cultural figurations towards the agency of 'things' in comparison to the agency of 'humans' came while Georgi Kapriev was fellow at the Morphomata Center. The discussions between Georgi Kapriev and Martin Roussel were followed by a workshop in June 2013, including Ivan Tchalakov as true expert in the field of ANT. We would like to thank the participants and contributors to this volume for their open-minded thinking. Furthermore, our thanks go to Günter Blamberger and Dietrich Boschung for publishing the results in their "Morphomata" book series. Many thanks for discussions to everyone at Morphomata and especially to Hanjo Berressem, Marian Feldman and Torsten Hahn. Finally, we're thankful to Björn Moll for his corrections to the manuscript of *Le Sujet de l'Acteur*.

Georgi Kapriev, Martin Roussel and Ivan Tchalakov

MARTIN ROUSSEL

'AGENCY' OF FORM AND THE DELEGATION OF THE HUMAN

Outline and Introductory Remarks

Le Sujet de l'Acteur deals with issues relating to the Actor-Network Theory (ANT) brought to prominence by French sociologist Bruno Latour. What we are aiming for, however, is not a discussion of specific issues of network theory or of the anthropological field, but a reflection on ANT with regard to some aspects linking back to questions raised in the last 200 years, the anthropological era, and even way beyond to the Byzantine era and its interpretation of the Aristotelian *hypokeímenon*, which eventually became the Cartesian subject—notably despite of its literal meaning as 'underlying thing.' Georgi Kapriev and Ivan Tchalakov have already coined this debate with a number of articles focusing on the dichotomies of symmetry/asymmetry as well as of axiomatics/exchange.[1] Likewise, in a genealogical sense, Kapriev's article on "The Byzantine Trace" should be taken as a starting point for this volume's juxtaposition of ANT and anthropological issues. For a more profound acquaintance with ANT, Ivan Tchalakov discusses ANT's terminology with a focus on recent discussions in sociology and the role of the amateur's action for a 'pragmatics of taste' (Hennion). For my part I would like to add some philosophical remarks on the more general issue of the relatedness, if not dependency

1 Cf. Georgi Kapriev and Ivan Tchalakov, "Actor-Network Theory and Byzantine Interpretation of Aristotle's Theory of Action: Three Points of Possible Dialogue," *Yearbook of the Institute for Advanced Studies on Science, Technology and Society* 57 (2009): 207–38; Ivan Tchalakov and Georgi Kapriev, "The Limits of Causal Action: Actor-Network Theory Notion of Translation and Aristotle's Notion of Action," *Yearbook of the Institute for Advanced Studies on Science, Technology and Society* 47 (2005): 389–433.

of the Human and the Non-Human as it comes into view from a history of cultural figurations and, in that respect, the 'agency' of form.[2]

AGENCY AND THE QUESTION OF FORM

In opposition to classical action-theoretical conceptions of 'agency,' Bruno Latour's Actor-Network Theory is concerned with the analysis of social networks as decentralized and mutually influential entities. While philosophy from Hegel to Marx had already tended to depersonalize the agent of social action and accentuated i.e. the agency of groups, i.e. of social classes, a philosophy of mind such as Hegel's will exclude any 'Unspiritual' from agency. Things, however, are more complicated in Marx. For him,

> the wood remains wooden when it is made into a table: it is then "an ordinary, sensuous thing [*ein ordinäres, sinnliches Ding*]." It is quite different when it becomes a commodity, when the curtain goes up on the market and the table plays actor and character at the same time, when the commodity-table, says Marx, comes on stage (*auftritt*), begins to walk around and to put itself forward as a market value. *Coup de théâtre*: the ordinary, sensuous thing is transfigured (*verwandelt sich*), it becomes someone, it assumes a figure. This woody and headstrong denseness is metamorphosed into a supernatural thing, a *sensuous non-sensuous* thing, sensuous but non-sensuous, sensuously

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2 The premise is that cultural forms become effective in history not as absolute, but within negotiations, and therefore within a continuous displacement, commentary and reassignment of its concrete figure. "The corrective should be sought," following Adorno, "in the relationship of the content, including the intellectual content, to the form. [...] In contrast to the crude textbook separation of content and form, contemporary poetology [Adorno adds with regard to Hölderlin's poetry] has insisted on their unity. [...] Such a unity can be conceived only as a unity across its moments." Theodor W. Adorno, "Parataxis. On Hölderlin's Late Poetry," in *Notes to Literature*, vol. 2, ed. Rolf Tiedemann, trans. Shierry Weber Nicholson (New York: Columbia University Press, 1992), 128. Agency (*Agens*) obtains its historical vector, i.e. its efficacy, while being "transformed into a work [...] in exhaustive interaction with other moments: the subject matter, the immanent law of the work" (110).

> supersensible (*verwandelt er sich in ein sinnlich übersinnliches Ding*). [...] The commodity thus haunts the thing, its specter is at work in use-value. This haunting displaces itself like an anonymous silhouette or the figure of an extra [*figurante*] who might be the principal or capital character.[3]

Across capitalist and critical positions, these dynamizations of the material as commodity can, according to Adorno, more generally be understood as an "agency of form" ("Agens der Form"):[4] Formalization is the fundamental process which grants agency. Formalization as opposed to abstract form (as opposed to matter) thereby includes the index of the concrete. In formalization, the concrete given receives a temporal vector. That this isn't tantamount to universality is emphasized by an anecdote recounted by Hegel:

> After all I remember how in my youth I heard a mayor lament that writers of books were going too far and sought to extirpate Christianity and righteousness altogether; somebody had written a defense of suicide; terrible, really too terrible!—Further questions revealed that *The Sufferings of Werther* were meant.
> This is abstract thinking: to see nothing in the murderer except the abstract fact that he is a murderer, and to annul all other human essence in him with this simple quality.[5]

Formalization bears the question of a persistence of origin and the question of semantic change,[6] that is of misunderstanding, recontextualization or dynamization of knowledge. Alfred Gell's *Art and Agency* still considers

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3 Jacques Derrida, *Specters of Marx: the State of Debt, the Work of Mourning and the New International* (New York et al.: Routledge, 2006), 188–189.
4 Theodor W. Adorno, "Parataxis," 114. Cf. the comment on the phrase "Agens der Form" in: Martin Roussel, "Agens der Form. Kontingenz und Konkretion kultureller Figurationen," in *Morphomata. Kulturelle Figurationen: Genese, Dynamik und Medialität*, ed. Günter Blamberger and Dietrich Boschung (München: Wilhelm Fink, 2011), 147–174.
5 Walter Kaufmann, ed. and trans., *Hegel. Texts and Commentary* (Garden City, NY: Anchor Books, 1966), 115.
6 Cf. Dietrich Boschung und Ludwig Jäger, eds., *Formkonstanz und Bedeutungswandel. Archäologische Fallstudien und medienwissenschaftliche Reflexionen* (Paderborn: Fink, 2014).

itself *An Anthropological Theory* which, while granting agency to works of art, reflects them within an anthropological paradigm.[7] This is all the more surprising as there have been, in sociological theories of the last decades, a number of attempts to unhinge the sociological moment from anthropocentrism and to think social action in terms of alternative key concepts, such as 'communication' in Niklas Luhmann's systems theory. Bruno Latour's Actor-Network Theory, belonging to this context, has largely caused a stir by promoting—unlike Luhmann, for example—a strictly symmetrical anthropology placing human and non-human actors not in a humanistic matrix, but in a network of agencies that require configuration. The original edition of his most prominent work, *Nous n'avons jamais été modernes* (1991) is designated as an *Essai d'anthropologie symétrique*.[8] Latour has put his argument of a symmetrical anthropology to the test in a number of discursive fields, among others the field of politics with an account of *Parliament of Things*[9] or in regards to the relation between religion and science with an "argument in ecotheology" leading up to the trenchant question: "Will non-humans be saved?"[10]

TRANSCENDENTAL SUBJECT AND THING IN ITSELF

With the question "What is the Human Being?," Immanuel Kant gives us—in his own words, surprisingly—the core of his transcendental philosophy. But how does this question relate to the three leading questions of his three Critiques, *The Critique of Pure Reason*, *The Critique of Practical Reason*, and *The Critique of Judgment*? In his transcendental project, Kant follows these questions: "What can I know? What ought I to do? What may I hope?" Following an argument developed in Michel Foucault's *The Order of Things* (*Les mots et les choses*), this does not mean that the core of Kant's criticism basically is anthropology. In fact, Kant's

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7 Cf. Alfred Gell, *Art and Agency: An Anthropological Theory* (Oxford: Clarendon Press, 1998).

8 Engl. Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993).

9 Cf. Bruno Latour, "De l'acteur-réseau au parlement des choses," *M (Mensuel, marxiste, mouvement) numéro* 75 (1995), spécial sur Sciences, Cultures, Pouvoirs (interview J.C. Gaudillère): 31–38.

10 Bruno Latour, "Will Non-humans Be Saved? An Argument in Ecotheology," *Journal of the Royal Anthropological Institute (N.S.)* 15 (2009): 459–75.

criticism may be taken as a means to understand the central position of this question: "What is the Human Being?" This question, the fourth and comprehensive one, marks a crucial point that otherwise remains as abstract as the target of another famous reference in Kant, which is the 'thing in itself' (*Ding an sich*): Why is there a requirement in Kant for a notion such as the 'thing in itself'? And why is there a requirement in Kant for something like a definition of the Human?

Following Jacques Derrida's famous 1968 discussion of Foucault's history of the humanities in a lecture titled "The Ends of Man,"[11] we come to see the anthropological disciplines—what today is called Social Anthropology—set widely apart from the *Geisteswissenschaften* and especially from Psychoanalysis and Philosophy—even though there is a German tradition of *Philosophische Anthropologie* in the line of Johann Gottfried Herder and Arnold Gehlen or Helmut Plessner. As Derrida argues in his lecture, there has been a critical discussion of Kant's anthropological framework since Hegel's *Phenomenology of Spirit* that eventually leads to a fundamental rethinking of the Human in terms of a historization of the very notion of the Human. As followers of this line of thought, Derrida cites Husserl's and Heidegger's—especially in his 1946 *Brief über den "Humanismus"*—questioning of the metaphysical foundation of philosophy. In the German tradition, Odo Marquard understood this as a missing dialogue between *Philosophische Anthropologie* on the one hand and *Geschichtsphilosophie* in the Hegelian meaning on the other hand, that is between an ontological concept of the human being and its inclusion in a dialectical or phenomenal understanding of history.[12]

To draw a simple conclusion from this enormous debate in the 20th century: What makes it possible to talk about human beings not as an object or a thing or even an animate being among others, but as a privileged subject? And how do we speak of this subject without immediately being involved in the complexity of the psychoanalytic discourse on the unconscious? Foucault, with the 18th century in mind, once argued that the human being emerged as the effect of a shift between the French *la physique* and *le physique*, between the physical body and the specific

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11 Jacques Derrida, "The Ends of Man," in *Margins of Philosophy*, trans., with additional notes, by Alan Bass (Chicago, IL: The University of Chicago Press, 1982), 109–136.

12 Cf. Odo Marquard, "Zur Geschichte des philosophischen Begriffs 'Anthropologie' seit dem Ende des 18. Jahrhunderts," in *Schwierigkeiten mit der Geschichtsphilosophie* (Frankfurt a.M.: Suhrkamp, 1982), 122–144.

human body or constitution. To what extent are we able to distinguish two kinds of 'bodies,' the physical in general and the human in particular?[13] Kant's "What is the Human Being?" opens the relation of these two very possibilities, but in this case the question is not yet the answer. Today, in the 21st century, the Kantian exposure finds itself transmitted to the field of a theory of action that does not start from the position of Kant's transcendental freedom of will but within the world of resisting things, the bodies that matter:[14] How can we talk about things as actors, of agents or actants of social activities? In Derrida's argument, our understanding of 'human being' is enclosed by these two very possibilities in which our *Dasein* (human existence) comes to an end: being a 'thing' or a 'being' in the sense of the Kantian transcendental subject. Hence, what is the basis to separate the Human from the Non-Human? What is the basis for understanding 'us' as human instead of physical things? What allows us to see our humanity as a privilege separating the Human (as being unitary) from the Non-Human (which is always in plural)? Finally, the discourse of 'we' and 'us' leads Derrida to the question: "But who, we?"[15]

ANIMISM, ANIMALS, AND CONVERGENT PERSPECTIVES

In the last decade, there has been a lot of discussion in the social sciences about the rationality of social networks or the 'social' in general. One of the keywords of the debate became animism as a way of claiming an agency that is, in the words of Isabelle Stengers, "not ours:"

> Reclaiming animism does not mean, then, that we have ever been animist. Nobody has ever been animist because one is never animist "in general," only in terms of assemblages that generate metamorphic transformation in our capacity to affect and be affected—and also

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13 Cf. Michel Foucault, *Introduction to Kant's Anthropology*, trans. Arianna Bove (Los Angeles, CA: Semiotext(e), 2008).

14 Seen from the point of Judith Butler's *Bodies that Matter: On the Discursive Limits of Sex* (New York: Routledge, 1993), one easily understands that *le physique* includes a normative dimension in the sense of gender politics, that is the privilege of a specific concept of the Human against the optionality of the body that should matter, but also as a normative matrix in general.

15 Jacques Derrida, "The Ends of Man," 136.

> to feel, think, and imagine. Animism may, however, be a name for reclaiming these assemblages, since it lures us into feeling that their efficacy is not ours to claim. Against the insistent poisoned passion of dismembering and demystifying, it affirms that which they all require in order not to enslave us: that we are not alone in the world.[16]

The new interest in animism may be redefined as a questioning of the humanistic dichotomy of 'human' and 'thing' that we find analyzed in the Kantian thinking. Stenger's argument suggests one take a look at the categories that subvert this dichotomy and those that go along with it, like rational/irrational, speculative/receptive, active/passive, etc. How shall we account for the forces that "generate metamorphic transformation in our capacity to affect and be affected"?

In the following, I would like to discuss this possibility of transformation and exchange of capacity in regard to Derrida's above mentioned question, "But who, we?" What is in question is, thus, the distinction between the singularity of human existence (which expresses itself in the singular of saying 'I') and the plurality of an 'animate being' that is not 'one,' meaning no generalized voice and not traceable—or reducible—to an analytic kind of reason. Thirty years after his lecture on "The Ends of Man," Derrida came back to those—one might say: animistic—questions when talking about animals, saying that there are only animals in the plural, while the Human Being is at one. If we thus speak of the human being as neither an essential or transcendental subject nor as a contingent thing, we are speaking of, as Derrida puts it, *L'animal que donc je suis* (*The Animal That Therefore I Am*).[17] Speaking, on the on hand, of us as 'animalistic,' as well as on the other hand of things as being 'animate,' might open up the space of a convergent thinking that answers the question of who, or what, has agency. How does the human body matter when it comes to agency? How do we compare agents of such different

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16 Isabelle Stengers, "Reclaiming Animism," *e-flux* 36 (July 2012), accessed July 3, 2014, http://www.e-flux.com/journal/reclaiming-animism/. Cf. the debate—which is not aimed at a rehabilitation of animism, but at a critique of the distinction between 'animism' and 'modern science' as coined and maintained by 19th century ethnology—about a detachment from the subject/object-schema: Irene Albers and Anselm Frank, eds., *Animismus. Revisionen der Moderne* (Zürich: diaphanes 2012).

17 Jacques Derrida, *The Animal That Therefore I Am*, ed. Marie-Louise Mallet, trans. David Wills (New York: Fordham University Press 2008).

constitutions such as Human and Non-Human Beings? The question "But who, we?," under the auspices of *The Animal That Therefore I Am*, thus is redirected to the distinction of men and animals as Derrida describes "the thesis of a limit as rupture or abyss between those who say 'we men,' 'I, a human,' and what this man among men who say 'we,' what he *calls* the animal or animals."[18]

Let's take a look at animals—in concrete terms—to answer this series of questions, which also question the symmetry or asymmetry in a network between different kinds of agents and actants.[19] The animals I am thinking of, two of them, come to us by way of Heinrich von Kleist's novella "Michael Kohlhaas," published in 1810, in which Kleist tells his version of a Renaissance story. Crossing the border between Brandenburg and Saxony to sell horses, Kohlhaas is forced to leave two of the best among his herd of horses to the nobleman Wenzel von Tronka. Returning on his way back to Brandenburg, Kohlhaas wants to pick up the two fabulous black horses that were left. Although he now knows about the nobleman's illegal withhold, Kohlhaas still would be happy to retrieve his horses. "But how great was his astonishment," writes Kleist,

> when he, instead of his curried and well-fed black horses, saw nothing but a pair of skinny, drawn old mares; bones like hooks to hang a load; manes and hair that were kneaded lacking any care and maintenance: the true image of misery in the animal world![20]

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18 Jacques Derrida, *The Animal That Therefore I Am*, 30. Here, Derrida frequently uses the French neologism *animots* referring both to the *animaux* (animals) and the *mots* (words), the words to call animals as animals and the words animals are, that is the discourse on animals.

19 The relation between animals and the world of reason was discussed at the "XXII. Deutschen Kongress für Philosophie" in the section "Kolloquium 19: Do animals live in the space of reason? Action and decision in non-human animals"; Julian Nida-Rümelin and Elif Özmen, eds., *Welt der Gründe* (XXII. Deutscher Kongress für Philosophie. 11.–15. September 2011 an der Ludwig-Maximilians-Universität München. Kolloquienbeiträge. Hamburg: Meiner 2013, 885–923; cf. in particular Hans-Johann Glock's article on "Animals: Agency, Reasons and Reasoning," 900–913).

20 My translation. German: "Wie groß war aber sein Erstaunen, als er, statt seiner zwei glatten und wohlgenährten Rappen, ein Paar dürre, abgehärmte Mähren erblickte; Knochen, denen man, wie Riegeln, hätte Sachen aufhängen können; Mähnen und Haare, ohne Wartung und Pflege, zusammengeknetet: das wahre Bild des Elends im Tierreiche!" (Heinrich von Kleist:

In the words of the castle's reeve, Kohlhaas should "thank God that his mares were, if at all, alive?"[21] What follows is the story of Kohlhaas as one of "the most righteous and one of the most dreadful human beings of his time,"[22] as is noted in the famous opening lines of the short novel. With his black horses barely alive, Kohlhaas would prefer sending them to the knacker's yard or the cemetery rather than taking them home. Thus, the horse dealer's request for an *institutio in integrum*, a total recovery, seems futile. The horses look like dead things—almost, one must add. Throughout most of the novella's plot, nothing reminds the reader of these horses: neither Kohlhaas burning down the Tronkenburg nor him later burning down Luther's town Wittenberg, leading his own war against the authorities. Nothing could be more afield from issues of agency than these horses that seem to even have slipped Kohlhaas' mind. Seventy pages later we are informed that they have been sold to the swineheard of Hainichen and then to the knacker in Döbbeln (93). Here, the formerly classy horses stand on crooked legs with hanging heads, and even Kohlhaas agrees that they should be skinned (97). To make it blatantly obvious, Graf Kallheim responds to his master's, the Kurfürst's, question about a possible recovery: "'Milord, they *are* dead: they are dead under constitutional law because they no longer have any value, and they will be physically dead before they might be saved from the bone yard.'"[23] It doesn't seem as if Kleist tells us a story about horses: instead, what the plot tells us is the story of Kohlhaas' self-empowerment culminating in his impersonation of the archangel Michael.

This, of course, proves to be an illusion, and somewhat illusionary is also what happens to be the last news on the black horses. Kohlhaas, eventually brought to the place of his execution—the punishment for murder and acts of arson—, has been granted his rights in the case of the two black horses, which suddenly appear at the place of execution,

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Sämtliche Werke und Briefe in vier Bänden. Vol. III: Erzählungen, Anekdoten, Gedichte, Schriften, ed. Klaus Müller-Salget (Frankfurt a. M.: Suhrkamp, 1990), 23) Hereafter cited by page number.

21 My translation. German: "daß die Mähren überhaupt noch leben?" (23/25)

22 My translation. German: "einer der rechtschaffensten zugleich und entsetzlichsten Menschen seiner Zeit." (13)

23 My translation. German: "'gnädigster Herr, sie *sind* tot: sind in staatsrechtlicher Bedeutung tot, weil sie keinen Wert haben, und warden es physisch sein, bevor man sie, aus der Abdeckerei, in die Ställe der Ritter gebracht hat [...]'" (99–100).

"gleaming in good health," as it is said, "stomping around with their hooves."[24] In the enforcement of the judgment, the nobleman Wenzel von Tronka was ordered to feed the horses and return them to the horse dealer. Kohlhaas then dies with his neck under the scaffold, but not without first "tapping the horses' fat necks"[25] and donating them to his two sons (which had previously never been mentioned).

What is, thus, the agency of these black horses—almost dead, or indeed dead under constitutional law? They have none, one might say, as they are but a plaything in the game between Kohlhaas, Tronka, and others. But what this final twist of fate reminds us of is that the entire story of the horse dealer is all about the total recovery and that he may only have used the wrong means to defend his just and fair cause. Under the auspices of justice, these black horses cross the great divide between the dead thing that they become and the moral subject that proves to exist only in Kohlhaas' final death. All that remains from these crossing spheres, from the world of dead things and the world of the free, is Kohlhaas' gift of death, meaning the gift he gives to his sons with his last will. What Kleist's story of Michael Kohlhaas tells us, then, is a story of *The Order of Things*, as Foucault would say, a story that withdraws both, the subject and the object, and that this story, finally, can only be told through the emergence of animals, set in plural, without names but alive, well fed, and agleam.

When Kleist's "Michael Kohlhaas" sends us the black horses as a delegation of life, given in Kohlhaas' gift of death, we are urged to understand the animals as a sign of life that itself has no voice. We might even hear through it the de-articulation of language in Kafka's tale of Josefine, the singing mouse with her undefined whispering, and we also might hear Foucault's constant noise of the discourse. All of this is in the delegation. Latour would probably take this as proof of our not being modern, rational, and totally enlightened, even in the sense of a total possible justice. There is nothing like a 'thing in itself' (*Ding an sich*) as long as we speak of our networks of experience; likewise there is no presence of the Cogito that has agency without transmission, without processes of giving and taking shape. However, in the giving of form, humanization takes place, which also means that it misses the point of humanity, that it gets displaced and refigured in the face of things.

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24 My translation. German: "von Wohlsein glänzenden, die Erde mit ihren Hufen stampfenden Rappen." (140)

25 My translation. German: "und klopfte ihren feisten Hals." (140)

Thus, we talk about the giving, refiguration, and rethinking of form in the exteriority of culture. The Morphomata Center for Advanced Studies focuses on cultural figurations in the sense of the Greek word *mórphoma*, in the plural *morphómata*, that is the moulding and formation as well as the given form of things. Thus far, Morphomata understands cultural change as the proliferation given in the exchange of forms. Dealing with figurations instead of symbolic orders does not exclusively address working in the field of material culture but also a thinking about culture as nothing else but the process of delegating—and distracting—the human, or, to always study culture in a symbolic withdrawal. Put another way, we find that this corresponds to what Bruno Latour wrote about the shifting position of humans in in the context of a sociology of form: "The human is in the delegation itself, in the pass, in the sending, in the continuous exchange of forms."[26]

A discussion of humanity not from a dogmatic point of view but within a history of defining and redefining only takes place as the history of an exchange of forms. One in this sense morphomatic aspect of Latour's sentence lies in the paradoxical impression that the continuity of this history is conveyed by an ongoing exchange that does not allow for an essential understanding of such terms as action, subjectivity or intentionality. This general outline of a field of research between *Philosophische Anthropologie*, the history of Humanisms, and Social Sciences is consulted regarding its advantages in describing social practices apart from the more political agenda of a critique of subjective autonomy as the core of our modern times. In this sense, Ivan Tchalakov's opens a series of more systematic approaches in this volume with an analysis of the amateur's action that is predestined as a paragon for Actor-Network Theory. With 'resistance' and 'endurance,' Tchalakov focuses in a discussion of Antoine Hennion's 'pragmatics of taste' on two aspects in research that call into play 'things' and 'technical equipment' as well as the possibility of 'failure' or the 'lack of experience.' Stoyan Tanev opens up the discussion to the genuine field of theory comparing issues of asymmetry in interactions between human and non-human agents within the range of Actor-Network or Activity Theory, the first supposing asymmetry, the second symmetry. Literature's specific interest in those kinds of dysfunction is discussed in Charlotte

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26 Latour, *We Have Never Been Modern*, 138 (cf. 131, 137–138).

Jaekel's article "about Malfunction, Interference, and Waste" that engages in a subliminal knowledge of social action revealed in literature. This concern goes together with Michael Niehaus' argument about "Wandering Things," showing how story-telling gives plenty of examples of the agency of things and how stories are told as a kind of enactment of things.

The range of articles that assume a more historical approach reaches from Georgi Kapriev's "Byzantine Trace" to reflections on contemporary social practices. All the same, these approaches contribute to the problematization of the relation between subjectivity and subject matter in actions, but allow for a historically deepened understanding. Although setting out from a historical starting point, Kapriev's account traces the Byzantine version of an asymmetry between human and non-human agents that serves to expand the contemporary discussion mostly focused on social action and our understanding of the social. Whereas Kapriev brings in perspectives from the history of philosophy and even the historicization of basic philosophical terms, Arthur Tatnall, Jonathan Tummons, and Marta Dopieralski discuss issues of Actor-Network Theory evolving from recent fields. Tatnall offers a perspective on the development of two Australian super computers and analyzes these stories as two case studies about success and failure in the history of computing. Tummons, on the other hand, doesn't start within the field of technology but within the educational system of the United Kingdom. He understands his work as an "ethnographic research into the delivery of a teacher-training curriculum across a network of colleges in England." Marta Dopieralski argues that ANT's postulate of a symmetry between human and non-human entities may be too simple and should be replaced by questions about the opposition between "monolithically, monocausally thought creative power and scenes of distributed agency. Technology is only an indication of such agency which results in the dispositif of the cinema in order to distinguish it from art forms such as painting or writing."

The agency of form is found in the interplay of the human and the non-human. Thus, cultural forms crystallize (social) interaction. Forms in this sense may be regarded as interfaces for the exchange of data flows at the very moment of having agency. As practice, the *Cultural Analysis*[27] of the agency of form requires both an orientation towards case studies and an enhanced focus on the dynamics between form and information. *Le Sujet*

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27 Cf. Mieke Bal, ed., *The Practice of Cultural Analysis: Exposing Interdisciplinary Interpretation* (Stanford: Stanford University Press, 1999).

de l'Acteur contributes to this from varying disciplinary positions. With an emphasis on the continuously shifting process of knowledge formation, the contributors also follow—at least indirectly—the thought of French anthropologist Philippe Descola, e.g. towards a non-dualistic as well as non-essential ontology that goes *Beyond Nature and Culture.* This even leaves behind questions of an either symmetrical or asymmetrical anthropology, but opens up a wide range of different kind of ontologies (of the human).[28]

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28 Cf. Philippe Descola, *Beyond Nature and Culture*, transl. Janet Lloyd (Chicago: The University of Chicago Press, 2013). Descola, for example, distinguishes four ontologies: animism, totemism, analogism, and naturalism.

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SYSTEMATIC ASPECTS OF A/SYMMETRY

IVAN TCHALAKOV

THE AMATEUR'S ACTION IN SCIENCE

Abstract: The paper analyzes science practices focusing on the relationships between scientists and the objects of their study. Two main types of these relationships are identified, which in a previous paper I provisionally named *entrepreneurial* (or Pasteur's) type of science and *other* (enduring or McClintock's) type of science. The main difference between the two stems from the 'social statuses' of the studied objects inside the relevant scientific community, the border case being when the community assumes these objects as non-existent or as considered under an irrelevant (erroneous) conceptual frame. The paper pays special attention to this case, assignable to the enduring science, because here the researchers require special character and endurance in order to overcome the predominant disbeliefs and (negative) attitudes of their peers and fellow scientists. In previous papers, I have pointed out the emerging relationships of *solidarity* and *mutuality* between scientists and the objects of their study as key points, supporting the scientists' resistance and endurance to the dominant scientific beliefs. Now I develop a new argument supporting this claim, based on a comparison of French sociologist Antoine Hennion's inspiring analysis of a *sociology of taste* with the studies of transition from 'science as calling' to 'science as profession' and the evolution of the amateurs in science as part of this process (Max Weber, Robert Merton), recently examined by Steven Shapin.

THE INITIAL IMPETUS OF THIS STUDY

During a study of the life of optical scientists in a Bulgarian holographic laboratory that took place more than 15 years ago, I came across the interesting case of Methodius—a leading researcher in the lab, one of its founding fathers, who was accused by his fellow colleagues of wasting his time and resources on studying phenomena whose non-existence had

been proven mathematically.[1] Methodius was inspired by the earlier works on holographic computer memory, where, in designing micro-optical systems, his team had run into immanent difficulties provoked by the very nature of linear and diffraction optics. Would it be possible to create an optical element combining the advantages and avoiding the shortcomings of both? In 1988, Methodius established a working group funded by the Bulgarian Academy of Sciences, which researched this until then unknown optical element they called 'deep-relief lens.' However, things soon went wrong—a renowned Russian scientist from Saint Petersburg analyzed their results and found a miscount. According to him, what the group aimed at was simply an optical element of a high order of diffraction, their assertions hence groundless. A year later, both the PhD student and the software engineer in the group decided to withdraw,[2] while the other colleagues in the lab became increasingly distrustful. Only his wife Rositza—also a colleague in the lab—supported him.

Yet regardless of the others' skepticism and the uncompromising mathematical evidence against their claim, they continued their work at the price of stringent hardships, often paying the research expenses out of their own pocket. The results of their research became clear almost ten years later, when in 1997 the *Journal of Modern Optics* published two articles of theirs. A year earlier there had been a conference in the United States and the publication of a paper by other colleagues working in the new field. Methodius gradually restored his reputation.

Working on the publication of these research findings, I learned about the even more compelling story of American cytologist Barbara

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1 Cf. Ivan Tchalakov, "The Object and the Other in Holographic Research—Approaching Passivity and Responsibility of Human Actors," *Science, Technology & Human Values* 29/1 (2004): 193–215.

2 Methodius was accused of being 'irresponsible' by his collaborators for giving priority to this (yet) unborn optical element. The collaborators claimed that, being a prominent researcher, he was "responsible for his people" and had to use his reputation to secure projects that would help the scientists survive. This was in the early 1990s, when the government spending for science decreased by a factor of almost 10 and the average monthly salary of researchers approached $ 150 ... Had Methodius agreed to follow the demands of his colleagues, this would have meant he'd abandon the "deep relief lenses" and leave them alone, withdrawing his 'responsibility'. Effectively, two types of responsibility clashed here—one towards fellow humans and one towards a 'nonhuman entity,' whose existence was not certain at all!

McClintock, described by Evelyne Fox-Keller.[3] During the 1930s, she became one of the leading American geneticists, even being elected a member of the Board of American Genetics Association. A few years later, McClintock introduced the idea of *transposition*, i.e. the ability of living organisms to control the reproduction of their genes. She claimed the genetic elements were subject to a system of regulation and control that involved their rearrangement. This was the period of time in which nuclear physicists, disciples of Niels Bohr, entered microbiology bringing in a completely new vision of how to conduct science (reductionism) and a new physical technology (the spectroscope instead of the microscope). Central to this 'neo-Darwinist theory' of molecular biologists in 1940s was the premise that whatever genetic variation does occur is random, whereas McClintock reported genetic changes that were under control of the organism! Claims such as hers did not fit in the standard frame of analysis and the prevailing notion of the gene as a fixed, unchanging unit of heredity. Besides, to make matters worse, she worked in the old cytologists' tradition of microscopic study of chromosomes, not applying the new spectroscopic methods. So when presenting her idea of the transposition of genes at conferences, 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," she remembered during the interviews. A famous geneticist visiting her lab in Cold Spring Harbor openly announced: "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." What followed were more than twenty years of lonely research. She withdrew further into her work, 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 Jacques Monod in France, when the idea of the organism's control over the genes re-emerged. In the 1970s, the transposition was rediscovered and McClintock regained her prestige, numerous awards followed before long.

How could these cases of scientists' extraordinary insistence on their own line of research, of their *resistance* to the external pressure from the scientific community, and of their *endurance* to the hardships they faced be explained? What gave the scientists a point of support during these

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3 Cf. Evelyn Fox-Keller, *A Feeling for the Organism* (New York: W.H. Freeman and Company, 1983).

long lonely years?—Myself an adherent of the Actor-Network Theory's (ANT) approach in studying scientific practice, I faced a real challenge.

THE 'ENTREPRENEURIAL' SCIENCE AND THE FORGOTTEN OTHER TYPE OF 'ENDURING' SCIENCE

Since the early 1980s, a number of remarkable studies have been carried out, making Actor-Network Theory one of the leading approaches in the field of Science and Technology Studies (STS). Applying this theory since the early 1990s, I came to the conclusion that its success was partially based on a key feature of modern science—*the emancipation and increase of a proper role of methods and techniques of study in the process of research.* In this respect, Bruno Latour's analysis of Louis Pasteur was especially revealing. 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 a century, the man who gave his name to streets all over France."[4] The type of research developed by Pasteur was far away from the gradual process of slow and uncertain acquaintance with unknown agents, where the appropriate research methods too are to be elaborated. This process, traditionally named as 'fundamental research,' usually presupposes many years (sometimes decades) of work removed from public interest and popularity, and often ends—as Latour ironically put it—with a presentation in the Academy

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4 Bruno Latour, *The Pasteurization of France* (Cambridge, MA: Harvard University Press, 1988), 81. After he abandoned crystallography, Pasteur "... found himself, in the problem of ferments, at the heart of a famous quarrel among the chemists and also in the heart of the beer-, vinegar-, and vine-producing industries, whose economic weight was out of all proportions to that of few colleagues in crystallography. *Yet he did not abandon the laboratory methods acquired in crystallography.* Above all, he transformed into a laboratory problem a crucial economic question 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 capitalized on the attention of an educated public that was already much larger than the industrial public. But he was not interested in developing a fundamental chemistry. He was put in charge with a new economic problem, that of the silk-worm industry." (ibid., 68–69)

saying "Here's a new agent!" Many scientists never even reach this point, left only with the hopes that their colleagues or disciples will continue their work. As seen from Barbara McClintock's case above, when in the mid 1940s the disciples of Niels Bohr invaded genetics and *replaced the traditional field researches and microscopic methods with the spectroscopic analysis and experiments they had learned from nuclear physics*, they did this very much the way Pasteur had succeeded almost a century ago.

Similar phenomena have been reported in a number of other ANT studies, such as Michel Callon's study of a French fuel cells laboratory, where the different research backgrounds of the scientists and the corresponding differences in methods they dealt with was at the root of a rivalry in practically all spheres of the laboratory life: from setting the direction of research, the definition of what were considered relevant resources and how to distribute them, the definition of relevant partners outside the lab, to the way they legitimized their actions.[5] My studies of research practices in the field of holography also support the claim of the increase of the proper role of research methods 'emancipated' and 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, entered holographic research.[6]

During the last forty years, this steady phenomenon re-emerged in most studies of scientific practice—the "strong link" is not in the 'direct relationships' between researchers and their research objects (the nonhuman agents they are taming), but *between researchers and the technical artifacts, equipment and procedures* they are using in this process. This, indeed, is a rather peculiar type of science, which I named '*entrepreneurial*'—here, the mastery of a specific method (tool) and its transfer into a new area of research gives the newcomer a competitive advantage over the indigenes of the field, such as that which Pasteur found over the veterinarians in his studies of anthrax. Usually, 'entrepreneurial' scientists come to a field where the research problems are already articulated, the debates are going on and the interested parties identified. Arriving with their new methods and techniques, the scientists in fact *transform* (or translate)

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5 Cf. Michel Callon, *La science et ses réseaux: genèse et circulation des faits scientifique* (Paris: La Découverte, 1989), 173–213.

6 Cf. Ivan Tchalakov, "The History of Holographic Optical Storage at the Both Sides of the Iron Curtain—1969–1989," *ICON—The Journal of the International Committee for the History of Technology* 11 (2005): 95–119.

the old problems—'translation' always presupposes a text (or story) that is already available, an existing configuration of actors and interests.[7]

Just like the entrepreneurship in the capitalist economy described by Joseph Schumpeter and Israel Kirzner, this type of science does not consist of a 'simple' application of the method and re-formulation of the problem. The translation, i.e. the turning upside down the existing communities by introducing new methods of study, making new actors emerge out of nowhere or redefining the old ones, also requires "persistence, audacity, and precision" (Latour). As fascinating as it is, we are dealing with a rather peculiar type of research. It remained hidden from philosophers and historians of science for a long period of time, only to be identified today by ANT and other STS approaches as a dominant type of science.

It seems to me, however, that the cases outlined in the previous section reveal *another type of science* we somehow have (almost) forgotten—a science guided by patient, laborious, and uncertain efforts for acquaintance of a new agent or unknown features of an existing agent and where *the methods of study are secondary*—often they need to be modified or even invented in order to 'match' the supposed properties of those unknown creatures. This is a science in which you continue probing into your study while the colleagues you are working with leave in despair or redirect their attention to other problems, some of them even setting out to prove that the elusive entities you are studying are nonexistent. This science may not be as successful as the 'entrepreneurial' one, but it is indispensable for the development of knowledge and for the evolution of human ways of engaging with the world. This was the science of Pasteur's colleagues from the crystallographic lab that remained there, researching problems relevant to their tiny community only. And whose efforts made it possible for someone like Pasteur 'to come and go,' bringing with him the methods they had developed as well as the new entities they had discovered and tamed. This science sometimes fails, but as the two cases above suggest, it was worth the long years of efforts. Eventually, they achieved what they had strived for and their opponents withdrew their critiques.

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7 Cf. Ivan Tchalakov and Georgi Kapriev, "The Limits of Causal Action: Actor-Network Theory Notion of Translation and Aristotle's Notion of Action," *Yearkbook of the Institute for Advanced Studies on Science, Technology and Society* 47 (2005): 389–433; Georgi Kapriev and Ivan Tchalakov, "Actor-Network Theory and Byzantine Interpretation of Aristotle's Theory of Action: Three Points of Possible Dialogue," *Yearbook of the Institute for Advanced Studies on Science, Technology and Society* 57 (2009): 207–38.

This is, thus, *not a marginal type of science*, even though it has now been almost forgotten. Rather, it refers to research practices which have escaped the attention of mainstream STS and Actor-Network Theory in particular—maybe because they have been exploited too much by the old epistemology and history of science.

THE MISSED LINK: STEVEN SHAPIN ON SCIENCE AMATEURS AND THE PROFESSIONALIZATION OF SCIENCE

The distinction between *entrepreneurial* (Pasteur's) and *enduring* (McClintock's) types of science reflects larger changes in the very way of doing science in modern society that took place over the last century. As Steven Shapin points out:

> From the early modern period through much of the XIX and even early XX century [...] the natural philosopher or scientist [was conceived] as morally superior to other sorts of people [...]. The eighteenth century Unitarian chemist Joseph Priestley wrote that "a Philosopher ought to be something greater and better than another man." If the man of science was not already virtuous, then the "contemplation of the works of God should give sublimity to his virtue, should expand his benevolence, extinguish everything meant, base, and selfish in his nature [...]." In 1916, Sir Richard Gregory, physicist, and the editor of *Nature* magazine, articulated views of the sanctity of science, proceeding from the sanctity of objects, which differed little from those expressed by Herschel, Priestley, or even Boyle. The study of Nature elevated those who pursue it: "The conviction that devotion to the study of Nature exalts the Creator gives courage and power to those who possess it; it is the Divine afflatus which inspires and enables the highest work in science." Given Nature so conceived as an object of inquiry, one might legitimately expect those who studied it to be *better* than the other people.[8]

In fact, for about two centuries, being a natural philosopher or scientist was a 'calling'—in 1937, in an apparent reference to Max Weber's famous

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8 Steven Shapin, *The Scientific Life* (Chicago, IL and London: University of Chicago Press, 2008), 24.

essay, the young Robert Merton published a paper on a "Protestant Spur to Science," where he described the favourable social and cultural environment in 17th century England that helped young noblemen engage with difficult and uncertain long-term efforts in scientific endeavours which perfectly matched the protestant idea of 'calling.'

These were lasting attitudes. A little more than a century ago there was the widespread conviction that a life in science was *not* the best way to material prosperity and a wealthy life. Steven Shapin cites the following address of an eminent American physician at a meeting of the Washington science society held in the late 1880s:

> The man of science [...] [is] a man whose life is dedicated to the advancement of knowledge for its own sake, and not for the sake of money or fame, or of professional position or advancement. He undertakes scientific investigations exclusively or mainly *because he loves the work itself* and not with any reference to the probable utility of the results [...]. There are some reasons for thinking that the maximum limit [of money the scientists make] is about $5000 per annum [...]. The more they demonstrate their indifference to mere pecuniary considerations, the more credible it is to them; so much all are agreed.[9]

There is no doubt that this specific perspective on doing science—the science as 'calling' dominated by curiosity and self-devotion—was in tune with the '*enduring*' type of science we outlined above. It created a favorable environment that helped scientists pursue their activity in spite of the hardships and external pressure to produce meaningful and useful results. By the turn of the 19th century, this was about to change. The increasing involvement of scientists in the institutional setting of government and industry had profound consequences for the very way of doing science. It not only turned science from a 'calling' into a 'carrier,' but profoundly redefined its very essence.

Steven Shapin recalls the almost forgotten fact that "[...] the early modern Speaker of Truth about Nature was, almost without exception, not a professional but *amateur*. He was understood to do it *not because it was his job*—but because, in some irreducible sense, he wanted to do it, or even because he was called to do it."[10] The figure of the man of

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9 Ibid., 45 (italics mine—I.Tch.).
10 Ibid., 35.

science as an amateur, conducting inquiry without the expectation of a remunerated career did *not* disappear until the end of the 19th century. The most famous scientist of the century, Charles Darwin, "was never *employed* to produce scientific knowledge, nor was the knowledge he then produced designed to be of use to contemporary structures of power and profit [...]. In Britain alone, the list of amateur-scientists in the late eighteenth and nineteenth century included some of the most influential figures in all sciences."[11]

It is worth stressing this link—the close relationship between '*science as calling*' and the *status of the scientist as amateur*. The key feature of the amateurs' activity—today as much as two centuries ago—is that the focus, the scale and the scope of this activity are to a larger extent defined by the amateur's commitment to the subject of his study and to his fellow community of amateurs. The increasing integration of science into institutions of the State and into organizational settings of industry changed this—it was the ability of scientists to provide *useful* knowledge and to solve the practical problems that most valued.

It was the "embodied expertise" that the State and business was paying for. The social position of the "expert," however, is quite a different position from that of the "amateur"—the expert is valued for the 'tools' he is equipped with to approach and solve problems, while *the amateur is something under-defined, uncertain and even dangerous* for the orderly institutional machine of modern corporations and government.

The integration of science into structures of power and industry proceeded slowly. According to Shapin, much of the talk about "the professionalization of science" during the nineteenth century must be considered with caution and the increasing integration of science into State and commerce was not a smooth and unequivocal process:

> [A]t the beginning of the twentieth century the identity of the scientist was radically instable. To be a scientist was still something of a calling but it was becoming something of a job; it was still associated with the idea of social disengagement but increasingly recognized as a source of civically valued power and wealth; it was still associated with a notion of special personal virtue but it was on the crisp of moral ordinariness.[12]

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11 Ibid.
12 Ibid., 41–42.

This process gained momentum during the first decades of the 20th century and especially after World War II, when, indeed, science became a *mass* profession. The 'amateurs' had nothing to do with it anymore, as did the idea of the scientist as 'morally superior' to ordinary people. *The rise of classical sociology of science promoting the 'moral equivalence principle' was one of the key signs of this profound change.*

Writing during the Second World War, with the existence of both liberal science and liberal society under threat, American sociologist Robert K. Merton (1910–2003) announced that there was nothing special about scientists as people:

> A passion for knowledge, idle curiosity, altruistic concern with the benefit to humanity, and a host of other special motives have been attributed to the scientists. The quest for distinctive motives appears to have been misdirected [...]. [There is] no satisfactory evidence that scientists are recruited from the ranks of those who exhibit an unusual degree of moral integrity [...]. The objectivity of scientific knowledge [does not] proceed from the personal qualities of scientists.[13]

Instead of 'personal qualities,' he claimed, the *institutional imperatives*, the 'rules and mores' of scientific institutions and their inherent mechanism of social control were what guaranteed the integrity of scientists:

> [The scientific ethos] [...] is that affectively toned complex of values and norms which is held to be found on the man of science. The norms are expressed in form of prescriptions, proscriptions, preferences and permissions. They are legitimized in terms of institutional values. These imperatives, transmitted by precept and example and reinforced by sanctions are in varying degree internalized by the scientists, thus fashioning scientific consciousness.[14]

Steven Shapin defines Merton's works as "tactics in building an academic discipline," that is of the establishment of sociology as a legitimate part

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13 Robert K. Merton, *The Sociology of Science: Theoretical and Empirical Investigations* (Chicago, IL and London: The University of Chicago Press, 1973), 267–78.
14 Ibid., 606.

of the university curricula and securing a 'market' for sociological expertise in the public and private sphere against the competition of other disciplines such as psychology. At the same time, however, he considers Merton's works as *a sign and expression of the strong overall tendency in late modern culture* that has already begun to manifest itself in the works of discerning writers, journalist, philosophers and other thinkers. Yet by introducing his principle of 'moral equivalence of scientists' and by stressing the role of institutional control in science, Merton had the courage to stand against the still dominant mass beliefs and perceptions:

> The "moral equivalence" of scientists is now a commonplace, but it was *not* a commonplace at the time Merton begin to voice it [...]. His 1942 insistence upon the scientist's moral equivalence had the character of an argument against persisting "vulgar error". The knowing sociologists felt obliged to address the still well entrenched presumption to the contrary [...]. In doing so, Merton became a precursor of Foucault's celebrated identification of the typical post-WW II figure of the "specific intellectual" who used to speak transcendent, eternal, and universal truth to power, but whose role was now defined by providing particular expert services to power.[15]

In the specific idiom of a sociology of knowledge (or rather 'sociology of sociology'), we could consider Merton's project as providing a new frame of reasoning about the 'tectonic change' that took place in modern science at the turn of the 19th century and as an important step in legitimating and establishing this change. Less than two decades later, Shapin recalls, the retiring American president Dwight D. Eisenhower will warningly assert in his 1961 "Farewell Address" that "the free university, historically the fountain of free ideas and scientific discovery, has experienced a revolution in the conduct of research. Partly because of the huge cost involved, a government contract becomes virtually a substitute for intellectual curiosity. For every old blackboard there are now hundreds of new electronics computers. *The prospect of domination of the nation's scholars by Federal employment, project allocations, and the power of money is ever present—and is gravely to be regarded.*"

Referring to a situation in his science in the early 1960s as a 'crowd of mediocrity,' the biologist Paul Weis wrote that

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15 Shapin, *The Scientific Life*, 22.

> through the phase of history which we have come to survey till very recently, to be a scientist was a calling, not a job. Scientists were men of science, not just men in science. They had come to science driven by an inner urge, curiosity, a quest for knowledge, and they knew, or learned, what it was all about. *They were not drawn or lured intro science in masses by fascinating gadgets, public acclaim, manpower needs of industries and governments, or job security.*[16]

Biochemist Erwin Chargraff observed in 1987 that in the natural sciences "passion [...] has been replaced by ambition. *Our young geniuses are passionately ambitious instead of being passionately passionate*; and it has become very difficult to distinguish between what is an ardent search for truth and what is a vigorous promotion campaign."[17]

Half a century after Merton's initial writings, the situation in science was unequivocally established on the path of professionalization and, instead of presumption of curiosity and calling, there was the necessity of an apparatus of institutional surveillance. A report of the US National Science Foundation (NSF) has found that

> there are not many working scientist left who exert much spiritual power over their disciplines. However personally and professionally ethical prominent latter-day scientists may be, they have lost the halo of incorruptibility and unimpeachable integrity that many of their predecessors once projected. In fact, it seems pretentious nowadays for senior scientist to act as the exemplar of an admirable person worth emulating, when the role of arbiter of integrity and good manners in scientific conduct has been taken over by *impersonal organs such as the U.S. Public Health Service's Office of Research Integrity.*

The very existence of such 'Offices of Research Integrity' indicates how close fraud and misconduct had come to the center of the cultural consciousness about science.

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16 Paul Weis, *Staatsangehörigkeit und Staatenlosigkeit im gegenwärtigen Völkerrecht* (Berlin: de Gruyter, 1962), 470. Cf. engl.: *Nationality and Statelessness in International Law* (Alphen aan den Rijn: Sijthoff & Noordhoff International Publishers B.V., 1979).

17 Cited in Shapin, *The Scientific Life*, p. 84

THE FORGOTTEN 'ENDURING' SCIENCE AND THE AMATEURS

I concluded one of the preceding sections with the hypothesis that the distinction between what I called 'entrepreneurial' and 'enduring' sciences has escaped the attention of the Actor-Network approach and STS in general because they have been exploited too much by the old epistemology and history of science. However, the recent analysis of Steven Shapin we cited above revealed that there were more profound reasons for it and that the idea of science as 'calling' was not just outdated, but also in discord with the dominant tendency of its professionalization and of its engagement with institutions of power and commerce.

When I came to the case of Methodius and Barbara McClintock, however, it occurred to me that it still is possible to study the type of science they exemplify in tune with the achievements of Actor-Network Theory. In search for an appropriate frame of analysis I came to the concept of *coupling* to describe the 'melting pot' of laboratory life and to consider the relationships between researchers and nonhuman agents they are studying as '*heterogeneous couples*'.[18] The idea of a 'coupling' between humans and nonhumans invites us to no longer stick with the activist schemes considering actors only through their goals, plans, interests, trials of strength, etc., which has been sufficiently explored by students of ANT. Rather, I framed the 'heterogeneous couples' as elementary micro-communities, built on the specific *relationships of intercorporeality* between human and nonhuman actors,[19] where the natural or technical object appears as kind of 'Other.' Man in a heterogeneous couple is often alone, but in intercorporeality with the fellow nonhuman, with the obscure, enigmatic, and evasive 'object of knowledge.'

In several previously published papers, I have developed this line of reasoning by exploring the phenomenon of 'coupling' between human and nonhuman agents as based on *solidarity and mutuality*, where relationships of intercorporeality emerge as an outcome of the long years of

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18 Cf. Ivan Tchalakov, "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, 1996; Tchalakov, "The Object and the Other in Holographic Research."
19 Cf. Maurice Merleau-Ponty, *Signes* (Paris: Gallimard, 1960); Maurice Merleau-Ponty, *Visible et Nonvisible* (Paris: Gallimard, 1964).

'apprenticeship' in the lab, of the assimilation of the materiality of scientific practice and the 'materiality' of scientific language in the particular area of research.[20] These relationships lead scientists to take nonhumans as qualified 'others,' and thus to manifest the peculiar 'humanism towards the Other' Emmanuel Levinas is talking about (rather a 'humanism towards the *non-human* Other').[21] In the *relationships of solidarity and mutuality* the research methods and procedures are secondary, they are 'a mere tool,' staying at the back plane of research.

In her studies of laboratory practices, Karin Knorr-Cetina has directed our attention to this type of phenomena engaging with 'unity' and 'sharing' as well as the 'disappearance of self-consciousness' and 'subjective fusion' of the researcher with her 'knowledge objects.'[22] She claims that the main characteristic of these objects is "a lack of completeness of being that takes away much of the wholeness, solidity and the think-like character they have in our everyday conception."[23] The 'knowledge objects' McClintock or Methodius faced were of such an extreme type, which according to the *normal science*'s view of their colleagues *lacks not only 'completeness of being,' but being itself.* It is important to note that Knorr-Cetina characterizes this everyday viewpoint with looking "at objects *from the outside* as one would look at *tools* or *goods* that are ready to hand [...]."[24] This is exactly my claim about the difference in the basic human-nonhuman relationships, dominating the 'entrepreneurial' and 'enduring' sciences.

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20 Cf. Tchalakov, "The Object and the Other in Holographic Research;" Tchalakov, "Language and Perception in the Coupling between Human and Non-Human Actors," *Yearkbook of the Institute for Advanced Studies on Science, Technologies and Society* 52 (2004): 193–215. During the interviews, Methodius unequivocally related his hint on the possibility of designing unknown 'deep-relief lenses' with his decades-long research experience in linear and diffraction optics, and especially with his experimental researches on holographic computer memory project. Describing this experience, his closest friend from optical high technical school and then from Faculty of Physics at Sofia University used the following expression: "Methodius infested a lot in optics!"

21 Cf. Emmanuel Levinas, *Humanism of the Other*, transl. Nidra Poller, introduction by Richard A. Cohen (Urbana and Chicago: University of Illinois Press, 1992).

22 Cf. Karin Knorr-Cetina, "Objectual Practice," in *The Practice Turn in Contemporary Theory*, ed. T. Schatzki, Karin Knorr-Cetina and E. von Savigny (London and New York: Routledge, 2001), 175–188.

23 Ibid., 181.

24 Ibid., 181 (italics mine—I.Tch.).

Building on Steven Shapin's important reminder about *the close link between vocation (calling) and amateurism* in the development of modern science, I would, in the following, like to further explore the idea of an 'enduring' science based on solidarity, mutuality, and on relationships of intercorporeality.

Some recent studies of science practices have revealed that *amateurs are not an early modern phenomenon*, and that *they continue to play an important role in a number of scientific fields.* Analyzing the history of holography, Sean Johnston reveals how a different context of research, with specific political, cultural and emotional values, contributed to the invention of a radically different technology in the early 1970s—*the low-cost sandbox holography*, which allowed artists and science amateurs to carry out research in holography and produce valuable works of art.[25] Another interesting example were research activities initiated and carried out in the past twelve years by the *Mars Society* at its *Desert Research Station* in Utah, USA. Organized entirely on a basis of volunteers and sponsored research, this truly amateur project has been able to produce research results of interest to NASA and other public research institutions.

Callon, Lascoumes and Barthe also stress the "fruitful exchanges between professional astronomers and amateurs" in their study of contemporary trends in scientific research, both accounting for their inherent risks and uncertainties and the increasing role of what traditionally was called 'public' or 'amateurs' in confining these risks and uncertainties.[26] During the 2012 STS Summer School with my students of sociology from Plovdiv University carried out at the Bulgarian National Astronomical Observatory at Rojen, Rhodope Mountains, we witnessed the collaboration between professional astronomers and astronomers-amateurs, some of whom—being wealthy entrepreneurs, IT experts, etc.—possessed sophisticated astronomic equipment that their professional colleagues envied.

In his study of the collaboration between professional researchers from the Luxembourg Museum of Natural History[27] and science

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25 Cf. Sean F. Johnston, *Holographic Visions. A History of New Science* (New York: Oxford University Press, 2006), ch. 4.

26 Cf. Michel Callon, Pierre Lacombe and Yannick Barthe, *Acting in an Uncertain World* (Cambridge, MA: MIT Press, 2009), ch. 1.

27 Meyer describes the research situation at Luxembourg Museum of Natural History in the following way: "[T]here are, on the one hand, staff members involved in scientific research. For these staff members doing research is a profession. On the other hand, many, so-called 'scientific

amateurs, Morgan Meyer insists on the *relative* difference between the two groups, claiming that it is "a matter of power and authority, rather than a matter of truth." The distinction between professional scientists and amateurs is negotiable and the line of demarcation between them is continuously re-established through what Meyer calls 'boundary work':

> In STS it is commonplace to argue that what demarcates science from non-science is not some set of essential or transcendent characteristics or methods but rather an array of contingent circumstances [...]. The boundaries between amateurs and professionals are not only negotiated in discourse. They are also revealed through temporal, spatial and material processes. There are, in fact, many places where boundary-work takes place; boundary-work is interconnected with objects, tools, bodies, and specific spaces and places... When they do science, where they do science, how they do science and with what tools they do science is what differentiates collaborators from Museum staff members and, more generally, amateurs from professionals. Time, space and materiality come into play when identities are constructed, when they are compared, opposed, and entangled. Identities are, then, located in space, articulated in discourse, related to materialities, expressed as temporalities, and situated as practices. *Defining oneself as an amateur or a professional is not merely a matter of individual or human attributes; it is about situating oneself in relation to these interconnected elements.*[28]

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collaborators,' work with the Museum. These scientific collaborators work on a voluntary basis and most of them are amateurs; for them, practicing science is a (serious) leisure activity. Among these scientific collaborators there are all sorts of people: a bank employee interested in astrophysics, a school teacher fascinated with beetles, a teenager interested in—and even publishing about—fossils, and so forth. Rather than being produced only by professional researchers, science in the Museum originates from a close cooperation between specialized people and laypersons—a model termed 'co-production of knowledge' by Callon [...]. At the Luxembourg Museum of Natural History, as I discovered, amateurs seem to be doing similar things to those that we expect of professional scientists: they publish articles, do fieldwork, give talks, present posters at conferences. As a consequence, they too come to belong—at least partially—to the world of the professional." (Morgan Meyer, "On the Boundaries and Partial Connections Between Amateurs and Professionals," *Museum and Society* 6/1 (2008): 38–53: 38.

28 Ibid., 48–49.

In a recent article on the rising amateur science movement called "do-it-yourself biology" (DIYbio) that is spreading in the US and other developed countries, Meyer describes it as "a diverse set of places in which laboratories, associations, and networks around do-it-yourself biology have emerged. DIYbio, created in the Boston area in 2008, describes itself as an 'Institution for the Amateur Biologist'. It now counts around 2000 members and has a website (www.diybio.org) which is arguably the worldwide focal point for people interested in DIY biology. Associations like DIYbio are today present in many countries across the globe."[29]

These are just few examples of contemporary amateur science, which are enough to witness the lasting relationships between professional scientist and amateurs, although now—unlike in the 18th and 19th century—professional scientists are at the core, while amateurs are believed to be at the 'periphery' of research. What is important, however, is *the persistence of these relationships, which somehow preserve and transfer over the centuries the initial sense of doing science as 'calling' and deep personal involvement*—a phenomenon we identified in the core of the 'enduring type' of science. In search of better conceptual and methodological tools

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29 Morgan Meyer, "Build Your Own Lab: Do-it-yourself Biology and the Rise of Citizen Biotech-economies," *Journal of Peer Production* 2 (2012), http://peerproduction.net/issues/issue-2/invited-comments/build-your-own-lab/. Accessed July 7, 2014. Meyer recalls the famous story of the private laboratory created by Kay Aull, a PhD student at the University of California, San Francisco, that has been widely covered in the media (*Le Monde*, *Sky News*, *Wall Street Journal*, etc.) and academic journals: "For the price of around 1000 dollars, Aull set up a laboratory in the closet of her apartment in Boston. Aull built many devices for her experiments herself [...]. She uses a rice cooker to distil water. Instead of buying an incubator, she put one together out of a polystyrene packaging box, a thermostat from an aquarium, a fan, a heating pad, and a digital thermometer. In order to be able to separate DNA, she constructed an electrified box out of a picture frame and a plastic box lined with aluminium foil. A blue Christmas light serves her to produce blue light to be able to see DNA. But she also bought some tools from eBay: a thermo cycler and an electrophoresis supply. Using these rather basic tools she was even able to build a hemochromatosis test. Her father was in fact diagnosed with the genetic disease called hemochromatosis and she wanted to find out if she also carried the mutation (which she does). Commenting Aull's story about this test, Wohlsen [...] writes: 'Aull's test does not represent new science but a new way of doing science. A practical piece of biotechnology based on the most sophisticated science available was built in a closet using tossed-off gear.'" Ibid., 3.

to account for this phenomenon, I will, in the last section of the paper, explore some recent findings on the activity of amateurs, carried out by Antoine Hennion under the rubric of what he calls 'sociology of taste' and 'sociology of attachment.'

ANTOINE HENNION'S NOTION OF AMATEUR'S ACTION AND ITS 'REFLEXIVITY'

Affiliated with the famous Centre de Sociologie de l'Innovation (CSI), Mines ParisTech, Hennion was hardly known as a STS scholar even though he had published valuable analysis of innovations.[30] For many years, the focus of his research was music, which he considered as a 'rather unstable object of study,' approaching it from the point of view of a 'sociology of musical passion.'[31] For more than a decade, he described his works as "sociology of taste" (*sociologie du goût*). Based on what he calls 'pragmatics of taste,'[32] he considers the taste (taste in music, in art, in wine, etc.) as a king of 'activity' with its particular characteristics.

At one of our meetings with him, I pointed out that most of his findings about the activity of amateurs were directly applicable to the activity of scientists in the laboratory, citing the 'fruitful exchanges between professional and amateur,'[33] the above mentioned analysis by Steven Shapin and other recent studies. I was surprised by his response that '[...] the topic of amateurs in science is an old one and enough explored. [...] [These studies] deal with the opposition between amateur and professional and the consequent problems of norms, institutions, carrier, money, etc., as opposed to the libido of knowing, to the freedom or ingenuity of amateurs. It is often quite bland."[34]

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30 Cf. Antoine Hennion, "L'innovation comme écriture de l'entreprise," in *Encyclopédie de l'innovation*, ed. Philippe Mustar and Hervé Penan (London: Economica, 2003), 131–152.

31 Cf. Antoine Hennion, *La Passion musicale. Une sociologie de la mediation* (Paris: Métailié, 1993).

32 Cf. Antoine Hennion, "Pragmatics of Taste," in *The Blackwell Companion to the Sociology of Culture*, ed. Mark D. Jacobs and Nancy Weiss Hanrahan (Oxford/Malden, MA: Blackwell Publishers, 2005), 131–144.

33 Cf. Callon, Lascoumes and Barthe, *Acting in an Uncertain World*, 61–67.

34 "[C]'est un vieux thème, les scientifiques amateurs, souvent étudié, *c'est assez différent de ce qu'on cherche quand on se penche sur l'activité* (y compris

What I meant, however, was precisely 'la libido de savoir, [...] la liberté ou [...] l'ingénuité' in the field of science, as well the peculiar inter-corporeal relationships between the amateur (i.e. the scientist!) and object of his passion (i.e. his 'knowledge-objects'!). I am still convinced that Hennion's findings, seemingly 'disentangled' from STS, are of key importance for the research on scientific and engineering practice if we want to better understand the process of 'coupling' between humans and (untamed, wild) objects of research, where the relationships of inter-corporeality, mutuality and solidarity are an inextricable part of the process.

Antoine Hennion's 'sociology of taste' pushes forward the critique of the traditional sociological notion of human activity—a process the Actor-Network Theory began more than twenty years ago, but discontinued midway through. It is highly significant that the '*pragmatic phenomenology of taste*' as the methodological framework for his analyses (which could perfectly also be named 'pragmatics in inter-corporeality') is an interesting synthesis between American philosophical pragmatism and the non-orthodox phenomenology of the late Merleau-Ponty. I told him in our conversation that, had I known his text ten years earlier, I could have described the 'heterogeneous couples' in research labs I studied in a rather different manner—at least I would have paid more attention to the *problem of reflexivity in (innovative) human action* he elaborated with remarkable ingenuity.

HENNION'S METHODOLOGICAL PRINCIPLES

Hennion develops an original approach to a specific type of human activities, those of amateurs of given art (music), sports (rock-climbing), or products (wine, artworks, etc.). He prefers the term 'amateur' because of its wider meaning compared to other related terms such as 'fan' or 'enthusiast,' while at the same time finding it less pretentious than the term 'connoisseur' (as used, for example, by Karl Mannheim).[35] He defines the

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la leur, pour le coup). Là, le thème central est plutôt l'opposition amateur/professionnel, avec ces problèmes de normes, d'institutions, de carrière, d'argent, par opposition à la libido de savoir, à la liberté ou à l'ingénuité de l'amateur, c'est assez fade, souvent." (Personal communication with Hennion, February 2010).

35 Cf. Karl Mannheim, *Structures of Thinking* (London: Routledge and Kegan Paul, 1982), 215–216.

activity of amateurs as a "systematic activity, which makes them develop, in various degrees, their sensitivities or abilities in a given domain."[36]

Approaching the amateurs' activity through the 'lense' of his *pragmatic phenomenology of taste*, he is able to unfold the 'stacked layers' of some minute gestures of human actors, thus surfacing their attachments to other people, to instruments and objects, and—maybe most important of all—to the materiality of language (speech, the language of music, the 'language' of the human body). Here is a typical excerpt from one of his papers:

> The pragmatics of taste I am trying to develop has meaning only if it succeeds to tell us something about objects [...]. Considered experts in the art of allowing themselves to grasp the differences in the world, the amateurs show us that the objects are not "already there," with their natural properties, waiting to be taken by a relevant practice, cultural or social. *This is not a matter of values; it's a matter of existence, of presence in the world.* The curious practices of amateurs are not simply an acquisition [apprentissage] of the given properties of the objects of their passion, nor a kind of folklore needed to warm up by way of a collective of objects that are *a priori* cold, neutral, and contingent. *The objects of our passion have to be made to emerge, with their differences, and we have to develop a susceptibility for these differences.*[37]

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36 Antoine Hennion, "Those Things That Hold Us Together: Taste and Sociology," *Cultural Sociology* 1 (2007): 97–114: 112.

37 Antoine Hennion, "Affaires de gout. Se render sensible aux choses," in *Sensibiliser. La sociologie dans le vif du monde*, ed. Michel Peroni and Jacques Roux (La Tour d'Aigues: Éditions de L'Aube, 2007), 35–36. "La pragmatigue du goût que j'ai essayé de developer n'a de sens que si elle edit aussi quelque chose sur les objets [...]. Ce que montrent les amateurs, si on sait les voir comme des experts dans l'art de faire venir à eux les differences du monde, c'est bien que les objets ne sont pas 'déja là', minus de leurs proprieties naturelles, en attente d'être saisis par une pratique relevant, elle, de la culture ou du social. *Ce n'est pas une affaire de valeurs, c'est une affaire d'existence, de presence au monde.* Les curieuses pratiques des amateurs ne sont ni un simple apprentissage des proprieties données de leur objet de passion, ni un folklore nécessaire pour réchauffer par le collectif des objets *a priori* froids, neutres, arbitraries. *Il faut les faire surgir, ces objets de notre plaisir, avec leur differences, et nous render sensibles à ces differences.*" Ibid., 35–36; italics mine—I.Tch.

I claim that there is a direct link between my analyses of scientific practice as presented in the publications cited above, and Hennion's analyses of the 'emerging (arising) objects' of amateurs' passion, of amateurs' bodies and reflexivity, and of the collective nature of their taste. In the remainder of the paper I will try to outline these findings in more detail, relying most of all on his paper on 'sociology of taste and the attachment,' published in English in 2007, and his paper on the reflexivity of the amateur, published in French in 2009. It is worth combining these two papers, as they reveal his efforts to cope with the 'resistance' of subject-matter and his experimenting with different, if related, conceptual apparatuses. My aim here is to selectively arrange these findings, stressing their relevance for the study of the practices in the 'enduring science' outlined above —especially to the problem of resistance and endurance of scientists to the pressures from the scientific community, and to the relationships of *solidarity*, *mutuality*, and *intercorporeality* with their 'knowledge-objects.'

THE TASTE OF AMATEURS AND THE PASSION OF SCIENTISTS

Hennion defines taste as a 'natural attraction' amateurs experience to the object of their passion. The French use of the term stresses its pragmatic aspects, as revealed by phrases like 'cultivation of taste' or 'development of an affinity' to the objects of taste (works of art, wine, etc.). Such expressions indicate the presence of a long tradition in which taste is not taken for granted but considered something to be produced and developed. This tradition makes it easier to apply the notion of taste to the field of science, where we could similarly analyze the 'passion to knowledge' by its practitioners, whether professionals or amateurs.[38]

Developing his notion of taste, Hennion distances himself from the critical sociology of Pierre Bourdieu and his followers which also paid special attention to taste in their research and where the relationships of amateurs to the objects of their passion was considered as 'socially constructed via the categories of description and frames of appreciation used, institutions, authority of the leaders, imitation of the others, or "through the social game of identity making and differentiation." Instead

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38 Hennion himself points to the 'wider sense' of the notion of amateur he uses, which covers a number different practices and activities, and distances himself from the "negative English sense of *amateur* as 'non-professional'" (Hennion, "Those Things That Hold Us Together," 112).

of transforming 'preferences into signs,' however, he elaborates a frame of analysis that respects the 'amateurs' own understanding of their tastes as well as that of 'the practices they undertake to reveal these tastes to themselves': the elaboration of procedures that detect the taste of things and that 'put amateurs' taste to the test'; their relying on the properties of objects that have yet to be deployed, the training of their own abilities and sensibilities to perceive the objects' properties, the support of a collective of amateurs and of the appropriate devices and techniques for feeling the things in a particular situation. Critical sociology, insists Hennion, neglects these practices or denounces them as 'rituals' whose principle function is less to make amateurs 'feel,' than to make them 'believe.' Gestures are said to produce the collective belief that what is preferable lies within things, while the sociologist knows full well, since Durkheim and Bourdieu, that preferences are but a collective production of this very belief."[39]

According to Hennion, the widespread popularity and persistence of critical sociology's views on taste are partly due to the modalities of the very practices of amateurs, which frame the ways amateurs experience the objects of their passion—unlike the situations in which we face an unknown object (a default situation in 'enduring science' research!); in the 'normal times' of everyday life there is a remarkable correspondence between us and our own senses, where we are generally able to account for what we are experiencing and feel, that is to articulate and describe it. Although this 'clear and defined taste' is precisely what Pierre Bourdieu deals with in his analysis of musical taste,[40] it is NOT the subject of Hennion's analysis. Rather, he is fascinated by the "[...] *act of tasting, the gestures that make it possible, the skills that are related to it, the support an amateur is looking for in others or in handbooks and other texts written for beginners, as well as those minor tuning to the responses of objects to those who are genuinely interested in them, and the efforts to explain to yourself what is happening* [italics mine—I.Tch.]."[41]

After many years of studying amateurs, Hennion said he realized that, for them, 'the things have no taste in itself.' Instead, they 'leave themselves to the taste of things' constantly developing procedures to challenge it,

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39 Ibid., 97–98.

40 Cf. Pierre Bourdieu, *La distinction. Critique sociale du jugement* (Paris: Minuit, 1979).

41 Antoine Hennion, "Réflexivités. L'activité de l'amateur," *Réseaux* 153 (2009): 55–78: 58–59.

to 'put the taste to the test.' Testing their tastes, he claims, *the amateurs rely both on the things themselves and their properties, and on the sensibility and capabilities a man had to develop in order to notice these properties.* The things are not given to the amateurs, *they are to be deployed* and only then to be noticed. This is not at all a process of making someone believe in 'collective representations,' nor can it be reduced to physiological or psychological determinants on the side of the objects themselves (for example the aromatic hydrocarbons in wine).

The situation thus described is very similar to that of Methodius, Barbara McClintock and other 'enduring science' researchers: when facing their enigmatic, under-defined and slipping 'knowledge objects' they also have found that *the theories, instruments and experiments they have employed until now are of no use anymore and have to be re-written, readjusted and even invented anew.* And in doing this they have to endure the critique and sometimes even hostility of their colleagues. We still lack an elaborated conceptual apparatus to describe this process, and here Hennion's findings indeed open a promising direction to follow.

The main challenge in the elaboration of such a conceptual frame, sensitive to the practices of 'ordinary' amateurs and 'enduring science' researchers is to brings back to their own hand the determinism in the name of which the experts—biologists, chemists, physiologists, psychologists, sociologists, etc.—are pretending to speak. To succeed, Hennion claims, we need to focus our attention to some lesser known and still neglected issues such as the *bodies* of amateurs, the '*circumstances*' of their activity, and the specific '*reflexive work* on their own attachment.' None of this can be explained by hidden social, psychological, etc. causes. It can, however, be considered "*a collective technique, whose analysis helps us to understand the ways we make ourselves sensitized, to things, to ourselves, to situations and to moments, while simultaneously controlling how those feelings might be shared and discussed with others.*"[42]

CO-PRODUCTION OF THE BODY (OF THE AMATEUR) AND THE OBJECTS OF HIS PASSION

Who is the 'subject' and who is the 'object' of the taste?—Here is an example of Hennion's own experience as a cliff (rock) climber:

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42 Hennion "Those Things That Hold Us Together," 98.

> What could be simpler? Below, there are climbers who want to reach a certain height. In front of them there is a rock, hard, inert, and quietly installed in the expansive timeline of geology. Between the two, the necessary tools are present—a guide of the approximate itinerary, the nails and rope for security, the super-adherent rubber boots. Does not all this seem to fit the good old theory of action? Here, we find human beings endowed with clear intentions, codified competencies, and technical means, attempting to attain an objective by putting into motion plans, plans which they are able to correct as they encounter the incidents that the route will lay before them, by and by.
> And yet, does this description give a relevant account of what is occurring? What kind of action is it, what subjects bring it into being, and with what results? The goal most certainly is not to reach the top, for having barely attained it, the climber re-descends [...]. Are they following a plan? Nothing happens as they would want it to. Progress is defined by the gestures that enact it. One might say that the object of the climb is really in the achievement of the route. But even in this, the attempts they make fail, and there lies all the pleasure. A route made is a route already forgotten, to the benefit of the next one, different, more difficult, the route which another climber just attempted in vain. A curious action, in which defeat is more interesting than success [...].[43]

He insists that in order to understand what is going on here, we have to reverse the classical sociological theory of action and instead of a focus on the subject and its goals and plans, to focus on the *instrumental aspects* of action, to the"gestures, holds, movements, passages—all the words, between the two, that attach one to the other, the climber to the rock, that speak their uncertain contact, and that have no meaning if we attribute them to only one or to the other."[44] Climbing cannot be defined without all these words, pointing to the 'contact between the hand that grasps and the fold in the rock face,' and to the "indistinct composition of both the miniscule rugged edges of the rock, which design the movement's possibility and the immediate capacity of the climber's body." Hence we cannot put the route and the climber, each with its own properties, at the beginning of the analysis—just the opposite, they are 'mutually defined in the course of climbing itself.'

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43 Ibid., 98–99.
44 Ibid.

The traditional sociological vocabulary of human action makes impossible the grasping those primary characteristics of climbing ('the double erasure of the climber and the rock' and the 'transition that defines one by the other'), which holds its essence and its beauty:

> How will I get by, what is going to happen, what will I feel, how is my body going to react? There is nothing passive about this erasure [...]. In no way does it signal a reduction to the here and now of the situation, to an interaction without ties and without a past. Quite the contrary: preparation, obstinacy, and training are needed to condition oneself and to allow one's body to guess at a movement, to slide itself into its accomplishment, and to surmount in a supple fashion thus, what at first seemed to require a brutal effort.[45]

Cliff climbing in the analysis of Hennion emerges as a 'reservoir of differences, which only the climb reveals and makes emerge'. It can neither be reduced to its physical properties (a geological mass), nor to some 'socially constructed' object of passion. The rock and the climbing are mutually co-defined in an evolving process, yet the differences are 'in the rock, and not in the 'gaze' brought to it': "*The 'object' is not an immobile mass against which our goals are thrown. It is in itself a deployment, a response, an infinite reservoir of differences that can be apprehended and brought into being.*"[46]

Compare this to the following excerpt from the protocols of my observations of the practices in the holographic laboratory, when Margarita, one of the researchers in the lab, was describing her experiments with so-called 'photo-refractive crystals':

> A few years ago, I took a crystal from my colleagues at the Solid State Physics Institute and decided first to look at its parameters—I recorded a hologram and measured its diffraction efficiency, spatial frequencies, etc. These were standard, tiresome procedures, which we had performed thousands of times. Nevertheless we made the measurements *because we had to* and because *we considered it necessary* to know these parameters. Then I noticed that alloying the crystal with certain microelements allowed the phase grating [the simplest

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45 Ibid, 100.
46 Ibid., 101.

> possible hologram—I.Tch.] to be recorded with very high diffraction efficiency. It results from the interference between two laser beams—those we apply to the crystal and its reflection from the back surface of the crystal. This phase grating causes heavy losses in the light passing through the crystal [...]. Eventually we found out that it also shifts the vector of polarization of the light, which caused quite interesting effects. It was a most peculiar case—*we had expected one thing, while we arrived at something quite different*!
> A colleague of mine studied photo-chromatic effects measuring the ability of the crystal to propagate polarized light beams. However, when he illuminated the crystals with these beams, which normally should not pass through them, he registered light behind the crystal! *He believed the cause was the photo-chromatic effects in the crystal—but this was NOT the case*, because of the phase grating we discovered [...]. Eventually we modeled all this on the computer and solved the problem mathematically.
> [...] One must know the material very well. One should measure almost everything possible in order to be able to determine the relationships [...]. *In our field, a newcomer* [a young scientist] *needs an "introductory period" before he enters the real research work.* [He needs] *to touch* the crystals, *to see* what will happen under various conditions, *to record*, *to delete*, *to illuminate*, *to apply a magnetic field*, *to read* what has been recorded—to analyze the crystallographic orientations, to calculate a little and hence to try seeing the vectors [...]. So he/she needs to know all these things in advance, in order to interpret the phenomena correctly.[47]

Can we say that scientists also develop a 'taste' in the objects they study?—Considering the abundance of infinitive verb forms Margarita uses to describe a newcomer gaining experience in her research field, it is not difficult—following Hennion—to imagine her developing her 'taste' by 'dancing' around optical tables, her careful gestures when putting together the experimental setup, then focusing the laser beams, her eager gaze at the screens and displays of the devices; then the careful checking of the data at her office, on the desk and on the computer, the numerous calculations and the endless comparisons between various

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47 Interview held in 1994.

samples; followed by her coming back to the laser and the experimental setup, the careful modifying of the setup, then new experiments... This is a living body which, similarly to the cliff climber, vibrates and pulsates, which at some points extends like an octopus covering with its breathless 'kinesthesia' the nearby objects and then suddenly going still, thoughtful and silent.

What, then, is the taste, the 'natural affinity' between amateurs and the object of their passion?—Just like in the climbing, it is not an attribute that is ascribed to the objects, to the personality of the amateurs or to both. The taste and its object are not given in advance; they emerge simultaneously in the repeating, progressively adjusted trials: "the meticulous activity of amateurs is a machinery to bring forth through contact and feel differences infinitely multiplying [them] 'within' the objects tasted and 'within' the taster's sensitivity."[48] So it is not the amateur who 'has' a taste—rather, the taste 'has' both the amateur and the object of his passion. And yet the taste is not a mysterious accomplishment, but rests on what every amateur knows quite well: procedures, methods, and circumstances; it requires time, it needs the uncertain support in others' opinions, sharing of impressions, etc.

Tracing the co-production of the amateurs and the objects of their passion, Hennion offers a profound critique of reductionism (both reductionism of physics and that of sociology) and its inability to grasp *the process of becoming*, thus ending with 'the objects and their effects' and 'the social construction of taste.' His pragmatic solution is quite different: the things do have effects, but only when we allow them a chance to reveal it! His examples: the gesture of a tennis player who is 'free' and 'natural,' depending on the efforts and time invested in training; the opera singer who reveals his originality to the extent that he masters a new technique, helping him overcome endless blockings and find out his own, 'natural' voice; or the the cliff climber's route with his sequence of seemingly meaningless movements and grips, considered as imposed only by the rock itself or as a 'trace' left by the climber. In all these cases we have not a replacement, but rather an 'addition' of what is 'natural' and what is 'socially constructed.' This is not 'the taste one has,' but an *emerging taste*, taste as 'de-gust-ation': 'an open-ended test of tasting, where one leaves himself to the things in order to find out 'their taste.'

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48 Hennion, "Those Things That Hold Us Together," 101.

THE TASTE AS ACTIVITY AND REFLEXIVITY AS ITS KEY ATTRIBUTE

> As dinner advances, each person is more giddy, they talk, they interrupt one another. A guest serves wine to his neighbor, who takes his glass, drinks and sets it back down, all the while continuing the conversation. He eats, looks over, and speaks to another neighbor. Cut to a second scene. It is the same, the same guests, the same ambience, the same gestures. The man takes his glass, he begins to drink. At this point, he stops an instant, takes two small sniffs, drinks again, makes a "moment" with his lips while replacing his glass and before taking up and continuing where he was in the broken thread of conversation.[49]

This simple example introduces the issue of reflexivity as a key element of taste. The minor difference between the two scenes—the slight shift of attention and brief focus on the wine—reveals the reflexivity in the core of taste as an event, without any explicit gesture or announcement on the side of the amateur, for example to publicly declare how unique the wine is and to congratulate the host. This inherent reflexivity of the amateur's action neither requires an assumption about his 'clear awareness' during the tasting, nor that he give himself an account of the interruption of the course of the dinner and his taking a different stand to the wine, nor him consciously inspecting his own senses during the degustation.[50] 'We do not cease to perform these little controls,' adds Hennion, since this is 'the normal state of spontaneous management of multiple relationships to our body, to others, to things, to events.'

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49 Ibid, 104.

50 Adopting the 'reflexive stand' that is predominant in social sciences here means to apply "a very heavy descriptive apparatus, weighing down the instance with too burdensome a charge, the drinker with too precise an intention, the course of the action with a rupture that nobody felt. It is an ordinary displacement, like those through which we ceaselessly operate in all situations without awareness. No need to isolate two courses of contrasting action as though in reality we were not permanently gripped in a whole tissue of states, of modes of being present to ourselves, to the situation, to others and to objects, that interlace, superimpose, that encase themselves like parentheses" (ibid., 104–105).

Similarly to the analysis of knowledge, when analyzing taste, sociologists are inclined to take for granted the conscious control, the 'clear awareness' of a situation. Hennion claims such control exists in rare situations only, in which we are indeed able to identify such conscious efforts and focus on a determinate object which 'presumes intention and will, a temporal and material framework, training, time, and favorable conditions.' However, the barely noticeable gesture of the guest in the second scene above does not need such frame—he just 'opens one of these multiply enfolded parentheses without disturbing the course of affairs any further.'

In his 2009 article, especially devoted to the problem of reflexivity, Hennion provides a penetrating analysis of the seemingly minor details of the guest's behavior in the second scene in order to reintroduce the distinction between the amateur and the layman. Barely noticed, these gestures signal a different attitude—not just having a sip of wine, but *degustation*, an attention that makes the presence of the tasted object stronger, the attention and the presence of the object reinforcing each other without a primary cause. Yet the guest does not simply have a drink, he drinks *wine*—there is no taste, insists the author,

> without this minimal ordering of experience that makes the experience appear, this light shifting of self that opens a parenthesis in the course of what is happening, modifies it, orients it, makes it enter into a frame, even if all these small events are adumbrated, occurring without effort or calculation. I drink and "I drink," I feel effects and I stop and reflect for an instant on what "it" does to me. There is also no taste in the other direction without this intensification of the object, which itself responds or provokes.[51]

Instead of a rock-solid and inert object, when testing his taste, the amateur faces an object that 'rises its presence,' that 'shifts, advances a notch, to deploy itself and deliver its richness.' The analysis of taste has to focus on these 'minute displacements' that indicate the establishment of a 'more marked contact.' Citing Merleau-Ponty, Hennion points out that this 'marked contact' provokes both my shifting towards the object and the shifting of the object out of itself: "what the minimal word 'attention' expresses so lightly and so well—in a single movement, like the taster's gesture—these two displacements which make contact, grant attention

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51 Ibid., 105.

to, capture the attention of ..."[52] Yet these minute displacements and their 'minimal ordering' are complex enough: on the part of the taster we have his *reflexivity*[53], while on the part of the objects, their capacity to interrupt, to surprise or to respond.[54] Curiously enough, Hennion calls this right of objects to advance '*their* reflexivity, their power to make themselves more present.' Thus, *the notion of reflexivity ceases to describe a property of the subject and acquires a 'symmetrical,' or rather an 'ontological' dimension.*

One of the key findings of Hennion's analysis of reflexivity in taste—and the peculiar form of 'attention' related to it—was the specific passivity of amateurs in which they leave themselves to be 'affected' by the object, "offer themselves to beautiful things."[55]

THE PRIMARY FORM OF REFLEXIVITY THAT LANGUAGE PRESERVED

In the social sciences, reflexivity is considered as a key characteristic of the subject and has, especially over the last decades, been one of the most studied topics. Providing a brief summary of these studies, Hennion outlines three prevailing meanings of the term: the first, used mostly in political science and anthropology, refers to the subject's capacity of constant self-evaluation, to assess the attitudes of the others or to project his own characteristics onto them; the second major meaning concerns the ability of the studied subjects to react to the observers and to modify their behavior over the course of the study, including integrating the results of research into their own activity; and the third meaning, developed especially in the critical sociology of Pierre Bourdieu, is the awareness that researchers should be 'reflexive,' i.e. they should apply the results of

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52 Ibid.

53 "'Hey, this wine's not too bad ...'—to whom other than oneself as the yet undefined subject of experience is this curious interjection addressed, this 'hey' which invites the required attention?" (ibid., 105).

54 "Objects [...] deliver themselves, un-probe themselves, [shy away], impose themselves on us. Language is, thankfully, less exacting than the philosophies of the subject and of intentionality. Language unscrupulously authorizes objects this use of the reflexive (we say that one must let the wine 'express itself'), that *amateurs* know so well: beautiful things offer themselves only to those who offer themselves to beautiful things" (ibid.).

55 Ibid.

their research to themselves as well.[56] His conclusion is that these meanings of reflexivity are in tune with the classical reasoning in sociology and consider it most of all in an epistemological frame, as a problem of our knowledge of the world, and not as a phenomenon (or an event) in the world itself.

Distancing himself from this tradition, Hennion discovers an ancient form of reflexivity in the taste that points to the "[...] originary state where things, persons, and events have just arrived, with no action, subject or objects yet decided." He found this primary meaning in the *reflexive verbal forms* often used by amateurs themselves (for example when saying that 'one has to leave a wine to pronounce itself') but which have been lost in most of modern languages:

> This is what was expressed by the "middle" Greek form... The middle form is not a secondary form which would be neither active nor passive, but it is primary and foundational, that from which beings and events arrive. The middle form precedes these all too voluntary regimes, for which it is the matrix: it arrives to itself as it arrives; it passes itself as it is passed [...]. Becoming, knowing, arriving, existing, desiring [...]. most of these verbs which the Greek employed in the middle form designate something that emerges forth, which we would be hard pressed to distinguish as active or passive [...]. This middle form [...] has been chased out by this very division in most modern languages, and they have to invent various grammatical ways of restoring it, when needed. In English, it is by the invading use of the gerundive (becoming, etc.). It is not by chance that the reflexive form took it over in French, with great inventiveness, giving birth to many untranslatable formulas, like "cela se passe," "cela ne s'invente pas," "l'affaire se présente mal," etc.[57]

The sociology of taste as developed by Hennion welcomes this reflexive form of language since it reveals the key aspect of the attachment between amateurs and objects of their passion ("en effet, une musique, cela s'écoute; un vin, cela se boit"), pointing out to the primary state where no action, subjects and objects are yet decided. Its use reveals the taste as 'de-gustation,' the initial heterogeneity of the event—the listening to the

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56 Cf. Hennion, "Réflexivités. L'acitivité de l'amateur," 64–65.

57 Hennion, "Those Things that Hold Us Together," 106.

music, wine-tasting, rock-climbing, etc., where one cannot distinguish *a priori* the music and its fan, the wine and the wine-lover, the rock and the climber. Here we deal with bodies, devices, states, duration. "After all, outside of laboratories and schools, what else is music?," Hennion asks.

Most of the analyses of reflexivity in social sciences in fact simplify the problem, reducing it to the endless self-inspection of the subjects, coupled with the corresponding inspection of the objects. However, no activity could be defined beyond its own accomplishment and achievement, beyond its inner frames, points of support, etc., which make possible the single gesture out of which a subject of action and its object emerge. Hennion reminds us that ethnomethodology is still one of the few exceptions in the social sciences sensitive enough to this problem of action, as expressed in its formula that "'activities provide their own accountability,' their own aptitude to present themselves, they give a grasp on their own reporting."[58]

THE COLLECTIVE NATURE OF TASTE; ACTIVITY AND PASSIVITY

Hennion's analysis of the reflexivity reveals in taste 'an attention to, a suspension of, a stopping at what is happening—and symmetrically, a stronger presence of the object being tasted [that] also advances, takes its time, unfurls and exhibits itself.' His example of two short scenes from a dinner marks the thin difference between the casual link of a layman in the first case and the amateur's attachment in the second.

His next step is to relate the reflexivity thus understood "to a *double historicity, both personal and collective*, and more generally to a space of its own, in which the activity was able to give itself locations, moments, and the means of constituting itself as such."[59] The taste itself is also reflexive, it is a 'framed activity' that points to its past: "One does not appreciate wine or music as though one has tripped over a rock. One likes wine AND one 'likes wine' (or this or that wine), in quotes: one drifts lightly away from oneself to 'enter' into this activity, which has a past and a space."[60]

The collectivity of the taste as activity 'is demarcated by its *objects, its other participants, its ways of doing, its locations, its movements, its instructions*.' They constrain the novice in his way to becoming an amateur, but

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58 Ibid., 108.
59 Ibid., 108.
60 Ibid.

precisely with their help he produces his taste; they steer his attention, guide his training and gestures and 'make people, little by little, become amateurs.' Eventually they become sensitive to the wine, to the challenges of the cliff or the specific kind of music. Then the amateurs can talk about these things as objects of their passion, but—insists Hennion—it cannot be reduced to the talking itself.

This 'emerging nature,' this 'becoming' of the taste makes so difficult the 'external' description of the specific knowledge and know-how of the amateurs. There exist inherent limitations in an observer-sociologist's understanding of the taste of amateurs. It is rather difficult for him to make sense of the way the amateurs perceive a work of art or of the way astronomer-amateurs look at the stars—precisely because the objects of their passion are not 'given,' they are the outcome of the 'performance' of the listeners, wine-lovers, star-gazers, etc. These performances rely on previously acquired techniques, training of your own body, repeating (often unsuccessful) experiments. This takes time, it evolves over time and the success takes place in the course of these events.

We can easily identify the collective nature of taste thus defined in the large excerpt from the interview with Margarita, the scientist from the holographic laboratory we cited above—here, too, one senses the hidden presence of the community of fellow researchers in the field, both in the establishment of the set of commonly selected, commonly tested and commonly evolving ways of 'tasting' their research objects, and as adherence to the common language and ways of communicating the results of the 'testing of [researchers'] taste.'

Like amateurs, scientists too are 'the primary sociologists of taste' and, as STS practitioners know quite well already, our only chance as researchers is to follow them:

> With taste and pleasure, the effects are not exogenous variables, or automatic attributes of objects. They are the results of a corporeal practice, collective and instrumented, settled by methods that are discussed endlessly, oriented around the appropriate seizing upon of uncertain effects.[61]

'Attachment' is the right term to use, since it 'splits the opposition between a series of causes that would come from without, and the elusive

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61 Ibid., 106.

and inexpressible instantaneousness of a present that cannot be reduced to analysis.' It stresses the 'activities' and 'states' on the side of amateurs, while on the side of the objects 'it leaves open their right to respond, their capacity to co-produce 'what is happening' and that which will emerge from contact.[62] Far from being agents manipulated by forces of which they are unaware, Hennion says, the amateurs are 'masters of esthetic, social, technical, bodily and mental experimenting.'

The reflexive, yet collective and instrumental nature of taste also directs our attention to the 'thousands of devices' invented by amateurs. Hennion's 'pragmatics of taste' discovers a fascinating world

> [...] full of objects and tools, devices, frames, confrontations and references, of all kinds of supports, collectives and material equipment. They permit taste to deploy itself beyond the here and now of the interaction. These are at once instruments and the traces, ceaselessly mobilized, of the presence of others. There are other options for deciding one's taste than either determinism or spontaneity [...] far from fleeing determinisms, the taster is replete with them: his problem is not to escape determinisms, but to refine their quality. Determination is a synonym of attachment—it is what links us, constrains us, holds us, and what we love, what binds us, that of which we are a part.[63]

One could claim that 'objects and tools, devices, frames, confrontations and references' in laboratories are much more complex and elaborated compared to those in the communities of amateurs and indeed a lot of work needs to be done to correctly apply Hennion's analysis of taste to research practices. Yet it should be valid in principle, especially if we take into account the practice of science amateurs described above by Morgan Meyer.

By exploring the collective aspect of taste, Hennion is able to grasp the transition from a local, 'minute' point of its emergence and becoming

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62 Cf. ibid.; Emilie Gomart and Antoine Hennion, "A Sociology of Attachment: Music Lovers, Drug Addicts," in *Actor Network Theory and After*, ed. John Law and John Hassar (Oxford/Malden, MA: Blackwell Publishers, 1999), Bruno Latour, "Factures/fractures. De la notion de réseau à celle d'attachement," in *Ce qui nous relie*, ed. André Micoud and Michel Peroni (La Tour d'Aigues: Éditions de l'Aube, 2000), 189–208.

63 Hennion, "Those Things that Hold Us Together," 109.

as well as from the reflexivity in its primary sense to the wider (and in this sense 'global') level of reflexivity, operating in any given field of taste or among amateurs as a group: in musical passion, among wine-lovers, cliff climbers, and—for sure!—among the amateurs in science. When a certain type of amateurship grows, this leads to a differentiation inside the community of amateurs—wherein different kinds of authorities appear and gain prestige—critiques, guides, receipts, prescriptions and norms. This process includes debates about what can be done and what cannot, with different types of 'self-describing discourses' emerging.[64] Taste emerges when it is pronounced, and it is pronounced in the process of its becoming; and since this is a historical process, the primary local reflexivity gradually adopts the classical form of description and of discourse:

> In each field, the amateurs develop a specific vocabulary, more or less developed, which takes place between a psychological and technical description of objects on the one hand and poetic descriptions of the amateurs' emotions. The taste is supported by these expressive descriptions (as, for example, in wine-tasting, one speaks about red fruits, roots, mushrooms and truffles, tongue, nuance, etc.) that are neither purely technical nor simply a product of imagination—they make the taste instrumental and shared with the others. The critiques elaborate this intermediary language that often upsets both amateurs and professional experts, but which also has its own merits that neither purely subjective comments, nor technical analysis of the experts can achieve—it allows to express "what happens," and not just to point out the result of it or express the "free float" of our imagination.[65]

Once this process advances enough and stabilizes, we enter a state where the traditional sociological study of taste is at home and can easily reduce it to its double language of 'objects with their properties' and the 'socially produced preferences and meanings.' But we already know that this would simply be an 'external' description that misses the essence of the amateurs' engagement with the objects of their passion.

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64 Cf. Marilyn Strathern, "What is Intellectual Property After?," in *Actor Network Theory and After*, ed. John Law and John Hassard (Oxford/Malden, MA: Blackwell Publishers, 1999), 156–180.

65 Hennion, "Réflexivités. L'acitivité de l'amateur," 68.

CONCLUSION

Hennion ends his analysis of taste with a discussion of the strange intertwining between activity and passivity in the amateur's action. As noted, taste is a matter of sensing, of being taken, of feeling. Instead of being something passive, however, the taste "*passes through an intense mobilization of one's abilities, it is backed up by skills and traditions, objects and tools. It has a history, it defines a collectivity.*" It is not just an act of sensing, he says, but of "making aware of" and thus active. Yet at the same time,

> contrary to an action, [taste] is entirely turned toward availability to what comes [...]. [It is] an active way of putting oneself in such a state that something may happen to oneself [...]. [I]t is *a passivity actively sought* [...] letting oneself be carried away, overflowing with the surprises that arise through contact with things.[66]

Transferring Antoine Hennion's results from his 'sociology of taste' to a 'sociology of scientific practices,' that is from studying amateurs to studying scientists, will not be a simple endeavor and in fact is a research project of its own. My task in this paper was to present those of his findings I consider especially valuable and to provide a research context—that of the 'enduring science'—to which they seem relevant.

So instead of a concluding summary, I end my paper with a bit of empirical evidence, derived from the studies I started this paper with and which I believe illustrates in yet another way the relevance of Hennion's *pragmatics of taste* for the study of scientific practice.

In the beginning of this paper, when I presented the case of Methodius as typical for the 'enduring science,' I cited him as saying that his earlier work on holographic optical memory and the difficulties he met stemming from the very nature of linear and diffraction optics 'suddenly' made him disbelieve these centuries old research traditions. So he began to wonder what there actually was *between* the wave and the corpuscular nature of light. This 'wondering' determined his destiny for the next ten years of his life, full of pitfalls and suffering. Here is the answer to my

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66 Hennion, "Those Things that Hold Us Together," 109.

question in 1997, after the successful end of the story, about his reasons to not have given up, even though left on his own:

> It is important to believe that the thing (the new lenses) is "there," 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 tools and then prove through experiments that what you claim possible is actually possible.

As it turned out, he was not entirely correct in this claim, because little later in the interview he recalled one important detail:

> First I browsed through related studies but found nothing. Then I discussed the matter with academician K. Roussinov, a prominent Russian specialist in optics, and he told me that there neither was a theory, nor a mathematical mechanism, nor did we know how this could be practically effected [...]. Later I came across an article on *"magic mirrors," whose making had been zealously guarded as a tradition in the emperor's courts of India, China and Japan. The author of the article described them as magnificent optical devices (optical correlators) that operated by daylight.* These were ordinary bronze mirrors, on the back surface of which the ancient masters had engraved a likeness of Buddha or of some other deity with a relief on the scale of 10–15 micrometers. It was an ordinary mirror, but as soon as one centered a sunbeam on the wall, the image of Buddha could be seen on the lit spot. In case of sunspots, atmospheric changes, etc., the image of Buddha would change, and the ancient people used it to predict their future. When the last masters of magic mirrors died, these skills likewise disappeared with them. *Then, all of a sudden, these long forgotten skills of working on sunlight proved to me that there could be something in the gap between diffraction and refraction optics.*

This is telling evidence for one of Hennion's findings, which he summarizes with a phrase popular among the amateurs he studied: "beautiful things offer themselves only to those who offer themselves to beautiful things."[67] These magic mirrors had been there for centuries, but none of the modern scientists had 'left themselves' to them until a virtuous

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67 Ibid., 105.

researcher came along with his specific 'taste' and let himself to these mirrors to save him in his loneliness and provided him a point of support to endure the distrust of his fellow scientists.

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STOYAN TANEV

ACTOR-NETWORK VS ACTIVITY THEORY

Dealing With the Changing Nature of the Asymmetry in Human-Technology Inter-Actions

ABSTRACT

The paper discusses how Actor-Network Theory (ANT) and Activity Theory (AT) handle the symmetry/asymmetry between human and non-human agents. The intention is to focus on using the comparison as a methodological tool in a conceptual exploration that could potentially benefit the ANT research field. The suggested topic builds on a long prehistory. *First*, ANT has been firmly associated with the principle of symmetry (ANT symmetry) between human and non-human objects or agents. According to Callon, "[t]he rule which we must respect is not to change registers when we move from the technical to the social aspects of the problem studied."[1] Latour, on the other hand, pointed out that this principle of generalized symmetry was the "most important philosophical discovery" in ANT.[2] At the same time he explains that for ANT scholars the symmetry principle "simply means not to impose *a priori*

1 Michel Callon, "Some Elements of a Sociology of Translations: Domestication of the Scallops and the Fishermen of St. Brieuc Bay," In *Power, Action, and Belief: A New Sociology of Knowledge?*, ed. John Law (London: Routledge and Kegan Paul, 1986), 196–233.

2 Bruno Latour, "One Turn After the Social Turn," in *The Social Dimensions of Science*, ed. Ernan McMullin (Notre Dame, Ind.: Notre Dame Press, 1992), 272–294.

some spurious asymmetry among human intentional action and a material world of causal relations."[3] *Second*, AT *a priori* "posits an asymmetry between humans and things" (AT asymmetry) and considers it essential for the conceptualization of intention, imagination, and reflection as a key part of human cognitive processes.[4] This is why AT considers any tendencies to symmetrizing the inter-activity between people and technology artifacts as a deflection from its core principles. It is not by accident that AT scholars have been clearly and systematically expressing their discomfort with respect to ANT's symmetry principle. *Third*, the symmetry vs asymmetry discussions have provoked ANT scholars to both clarify and refine the meaning of the symmetry principle. The understanding of asymmetry suggested by Tchalakov and Kapriev[5] (TK asymmetry) should be considered as part of these refinement efforts. At the same time, the TK asymmetry is not at all similar to the AT asymmetry. This is why the comparison between the TK asymmetry within the context of ANT and the AT asymmetry will be very fruitful as a source of valuable insights.

I. ACTIVITY THEORY APPROACH (AT ASYMMETRY)

Activity Theory (AT) is a conceptual framework originating from the socio-cultural tradition in Russian psychology. It was originally developed by the Russian psychologist Aleksei Leontiev.[6] A version of activity theory, based on Leontiev's framework, was suggested in the 1980s by the Finnish educational researcher Yrjö Engeström.[7] Currently, both

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3 Latour, *Reassembling the Social: an Introduction to Actor-Network Theory* (Oxford, UK and New York: Oxford University Press, 2005), 76.

4 Victor Kaptelinin and Bonnie A. Nardi *Acting with Technology. Activity Theory and Interaction Design* (Cambridge, MA: MIT Press, 2006), 10.

5 Georgi Kapriev and Ivan Tchalakov, "Actor-Network Theory and Byzantine Interpretation of Aristotle's Theory of Action: Three Points of Possible Dialogue," in *Yearbook of the Institute for Advanced Studies on Science, Technology and Society* 57 (2009): 207–38; Ivan Tchalakov and Georgi Kapriev, "The Limits of Causal Action: Actor-Network Theory Notion of Translation and Aristotle's Notion of Action," in *Yearbook of the Institute for Advanced Studies on Science, Technology and Society* 47 (2005): 389–433.

6 Alexei Leontiev, *Activity, Consciousness, and Personality* (Englewood Cliffs, NJ: Prentice-Hall, 1979). The original work was published in Russia in 1975.

7 Yrjö Engeström, *Learning by Expanding: an Activity-theoretical Approach to Developmental Research* (Helsinki: Orienta-Konsultit Oy, 1987).

variants of activity theory are being widely used, not only in psychology, but also in other fields. The summary of AT provided here is based on a framework that was developed within the context of conceptualizing human activity as it is expressed in the design and use of technology.[8] In fact, there seems to be a growing interest in the adoption of activity theory among those who are interested in studying human-technology interaction. There are several AT points that are quite relevant to the context of human-technology interaction, including: an emphasis on human intentionality; an emphasis on the asymmetry between people and things; the importance of human learning and skill development; the idea that culture and society both shape human activity. For AT, the act of design has a clear intentional component since it is impossible to decouple design from the intention of the designer. On the other hand, in acting with technology, people deliberately commit very specific acts with particular technologies. AT has therefore clearly posited an asymmetry between humans and things (AT asymmetry). For AT, human abilities to learn through the interactions with other people and artifacts are distinctive from any sort of agency that could be assigned to artifacts. In AT, it is essential to theorize intention, imagination, and reflection as core human cognitive processes. In this way, any theoretical accounts based on the assumption for a similarity of agency between people and artifacts are considered as inappropriate. Another principle of AT is the notion of development with a commitment to understanding how human activity unfolds over time in a historical or temporal frame: "we cannot understand activity if we do not watch it cycle, grow, change."[9] The adoption of the development principle aims at establishing a practice of design in which the ability of users to grow and change with technology is essential.

The concept of *activity* is the most fundamental concept in AT.[10] Activity here involves not only human activity, but the activity of any object involved in a purposeful interaction of a human subject with the world.[11]

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8 Victor Kaptelinin and Bonnie A. Nardi, "Activity Theory in Nutshell," in *Acting with Technology. Activity Theory and Interaction Design* (Cambridge, MA: MIT Press, 2006).

9 Kaptelinin and Nardi, *Acting with Technology*, 11.

10 It emerged mainly in psychology aiming to understand individual human beings, as well as the social entities they compose through the analysis of their activities.

11 Cf. Leontiev, *Activity, Consciousness, and Personality*.

The fundamental insight here is the primacy of activity over the subject and the object. Activity is considered as the most basic category and the analysis of activities is considered as the way of properly understanding both subjects and objects. This is a key difference with respect to traditional analytical thinking which most often operates under the assumption that to understand an activity it is necessary to first understand the subject and the object separately, and then conceptualize their interaction. AT scholars challenge this assumption claiming that its apparently flawless logic could be misleading.[12]

AT distinguishes between the processes of internalization and externalization which are considered to operate continuously at every level of human activity. Internalization is related to the reproduction of culture[13] or the internal reasoning and reconstruction of external objects (a new user observes a mobile phone being used and learns to how to use it).[14] Externalization is the process of the creation of new artifacts.[15] Human beings internalize existing standards and rules of activity by appropriating the intended use of newly created artifacts but also externalize them by inventing new ways of use. Internalization and externalization are highly integrated and continually iterating. AT also distinguishes between collective activity and action emphasizing that humans engage in goal-orientated actions that do not necessarily directly contribute to the attainment of an object of activity through the mediation of tools (tool mediation is a key concept in AT). But eventually the actions lead to the satisfaction of a need (the motive) through the attainment of the object. Therefore, activities satisfy a need, and actions constitute the activities. The hierarchical structure of activity should be considered dynamically since it explicitly recognizes that activities, actions, and operations change over time. An activity is part of a wider network of activity systems and sometimes the outcome of a particular activity is not intended for the same collective which produces it, but to be consumed by some other

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12 Cf. Kaptelinin and Nardi, *Acting with Technology*, 31.

13 Cf. Yrjö Engeström and Reijo Miettinen, "Introduction," in *Perspectives on Activity Theory. Learning in Doing: Social, Cognitive and Computational Perspectives*, ed. Yrjö Engeström, Reijo Miettinen and Raija-Leena Punamäki-Gitai (Cambridge, UK: Cambridge University Press, 1999), 1–17.

14 Cf. Yunjie Xu, "The Dynamics of Interactive Information Retrieval Behavior, Part I: an Activity Theory Perspective," *Journal of the American Society for Information Science and Technology* 58/7 (2007): 958–70.

15 Cf. Yrjö Engeström and Reijo Miettinen, "Introduction."

collective in another activity system.[16] An important element of every activity system is that its activities are constantly developing as a result of contradictions, tensions, and instability, and the systemic needs of both subjects and communities. Examining the tensions and contradictions that exist in an activity system provides a lens to understanding (i) the development and change taking place within the activity, (ii) the need for creative efforts of both subjects and communities in trying to deal with tensions and contradictions, (iii) the dynamic nature of the circumstances enacting the emergence of the specific attributes of the human subjects and non-human objects.

The last point is of particular interest since, for AT, the properties (qualities, attributes or characteristics) of the subject and the object do not exist before and beyond activities.[17] Not only do these properties manifest themselves in various circumstances; they actually emerge and truly exist only in activities, when being enacted. The specific way an abstract attribute is manifested can depend critically on the specific circumstances of the situation at hand.[18] On the other hand, activities are considered as a source of development of both subjects and objects. For example, the activities of a subject may cause substantial changes in the subject's properties (home owners' skills of using air conditioning systems improve over time in a way that minimizes energy consumption and maximizes the home comfort). Therefore, defining activities in a static way and merely through their components may not be adequate. On the other hand however, according to AT scholars, the notion of activity cannot be extended to all types of interactions. For them, any activity is bound to a subject and not every entity is a subject. Subjects live in the world; they have needs that can be met only by being and acting in the world. Computers, for example, do not have "needs" in the same way we have and cannot be considered subjects. The interaction between the subject and the object therefore is not a symmetrical relationship between two components of a larger system and can be described as "acting-in-the-world."[19] Agency can be described as the ability to act in the sense of producing effects; it

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16 Cf. Mikko Korpela, H.A. Soriyan and K.C. Olufokunbi, "Activity Analysis as a Method for Information Systems Development: General Experiments From Nigeria and Finland," *Scandinavian Journal of Information Systems* 12 (2000): 191–210.

17 Cf. ibid., referring to Leontiev, *Activity, Consciousness, and Personality.*

18 Cf. ibid.

19 Ibid., p. 32.

is a fundamental attribute of both the subject and the object. However, the agency manifested by the subject of activity is of a special character; it can be defined as the ability and the need to act. AT therefore makes a difference between activity and agency.

Studies focusing on human-technology interaction may appear to focus on the same unit of analysis as AT—on the interaction between human beings (users) and technological objects (products or systems). However, while the 'user-technology' interaction can be considered as part of activity, the purposeful interaction with the world cannot be limited to the interaction with the user interface of a technological product. User-technology interaction models usually deal with lower-level interaction limited to mere 'tasks' and tasks are typically described in terms of the functionality of a system rather than the purpose and meaning for the subject. In this sense, using a technological product or system does not necessarily have a purpose on its own; its meaning is determined by a larger context of human activities carried out to accomplish things that are important regardless of the technology itself, such as enjoying the relationship with a close relative, communicating an urgent message to someone who is waiting for it etc. AT extends the scope of analysis from the specific tasks to the specific context of a subject's purposeful interaction with the world, including the social and cultural context. The boundary of the 'objective world' is not limited by the user-technology interface. People are interacting with the world through this interface, and vice versa.[20] For AT, 'user-technology' interaction is a phenomenon that is too narrow and does not count as a genuine activity. Activities should include not only the interaction between people and technology, but also the objects (and other subjects) in the world with which subjects are interacting in their everyday lives via technology. One should also pay attention to developmental changes by focusing on the activities of people using technology rather than on specific "user-technology" interaction at a given moment of time. The focus on developmental includes: (i) extending the scope of analysis to include higher-level, meaningful tasks that can be supported by the interaction between diverse technologies; (ii) studying technology in use instead of focusing on users and systems separately; and (iii) taking into account long-term developmental changes in users, technology, their interaction, and the overall context of interaction.[21]

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20 Cf. Susanne Bødker, *Through the Interface: A Human Activity Approach to User Interface Design* (Hillsdale, NJ: Lawrence Erlbaum, 1991).

21 Cf. Kaptelinin and Nardi, *Acting with Technology*, 35.

Studies using AT to investigate the adoption of technology in a dynamic user environment have developed and validated the concept of user readiness—how prepared and willing an individual is to interact with a technological product or system that was made available for a certain purpose.[22] The concept could be related to the user characteristics that were already discussed—consumer innovativeness or the adopter categories in the innovation diffusion model, as well as to other relevant concepts such as technology use experiences and task situations. Compared to the traditional socio-psychological perspective, the AT perspective of technology adoption yields a different understanding regarding the nature of these factors. For example, when a technology product or system is defined as the object of adoption, technology use experiences such as perceived ease-of-use and perceived usefulness are usually conceptualized to reflect its overall properties. From an AT perspective, however, the user's perceptions related to a technological product or system are not an overall systemic effect but rather reflect his or her actual experiences with it in the very specific context.[23] User perceptions of the task setting have rarely been included in technology adoption research. From the AT perspective, however, such situational perceptions need to be considered because it is the task context that defines the nature of the specific activities (AT's unit of analysis). User experiences with a specific technological product are embedded within a context and the corresponding task situations and use experiences are interrelated. The important question is how task situations and use experiences together influence users' attitude towards adoption. In addition, users' perceptions of task contexts (e.g., stressfulness, frustration from a high degree of complexity, excitement from novel and useful features) are likely to influence their use experiences and should be included in AT's approach to technology adoption.[24] Compared with use experiences and task situations, user characteristics are relatively stable and mainly make individual differences in user attitudes toward the same technological products or systems. "For example,

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22 Cf. Jun Sun and Marshall Scott Poole, "Capturing User Readiness to Interact With Information Systems: an Activity Perspective," *Data Base for Advances in Information Systems* 41/2 (2010): 89–109.

23 Cf. Jun Sun, "Why Different People Prefer Different Systems for Different Tasks: an Activity Perspective on Technology Adoption in a Dynamic User Environment," *Journal of the American Society for Information Science and Technology* 63/1 (2012): 48–63.

24 Cf. ibid., p. 50.

a person who is anxious about using computers would be less ready to interact with the systems available for a task than would another who is more comfortable."[25] Thus, user-, technology-, and task-related factors interact with each other in influencing users' adoption efforts.

II. ACTOR-NETWORK THEORY APPROACH (ANT SYMMETRY)

Actor-Network Theory (ANT) emerged in the early 1980s at the Centre de Sociologie de l'Innovation of the École Nationale Supérieure des Mines de Paris.[26] It is usually associated with the names of Bruno Latour, John Law and Michael Callon. John Law has recently referred to ANT as a set of "tools, sensibilities and methods of analysis that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located. It assumes that nothing has reality or form outside the enactment of those relations."[27] ANT analyzes how all things—natural, conceptual, textual, social or technical, could be more accurately considered as equally or symmetrically present and equally relevant in the web of relations defining the reality around us. It "advances a *relational materiality*, the material extension of semiotics, which presupposes that all entities achieve significance in relation to others"[28] and has been seen by some scholars as a way of intervening, i.e. as a methodology, and not as a theory of what to think.[29] It has not so far been considered as a design approach but it definitely represents an opportunity for design research.

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25 Ibid.

26 Cf. Madeleine Akrich, Michel Callon and Bruno Latour, "The Key to Success in Innovation, Part I & II," *International Journal of Innovation Management* 6/2 (2002): 187–206, 207–225; Bruno Latour, *Reassembling the Social: an Introduction to Actor-Network-Theory* (Oxford, UK and New York: Oxford University Press, 2005).

27 John Law, "Making a Mess With Method," in *The Sage Handbook of Social Science Methodology*, ed. William Outhwaite and Stephen Turner (London and Beverly Hills: Sage, 2007), 595–606.

28 Cassandra S. Crawford, "Actor Network Theory," in *Encyclopedia of Social Theory*, ed. George Ritzer (Thousand Oaks: Sage Publications Inc., 2004).

29 Tara Fenwick and Richard Edwards, *Actor-Network Theory in Education* (London: Routledge, 2010), 2.

The *symmetry* principle between humans and non-human artifacts promoted by ANT scholars has become the subject of multiple discussions, critics and confusion (ANT symmetry). It has been usually considered as a reaction against any *a priori* assumptions about the sources, the nature and the ownership of agency within a specific research context. For ANT scholars, it is particularly important to annihilate any *a priori* difference between social and non-social factors, actors or agents.[30] In every specific situation the identification of all relevant acting subjects (or actants[31]) is continuously and dynamically performed and the specific agencies are ceaselessly debated. Non-human artifacts are also considered to be active which is another expression of the fundamental principle of symmetry between human and non-human agents. Any asymmetry of acting resources does not mean that they are generated by social asymmetries alone. "It just leads to the opposite conclusion: if inequalities have to be generated, this is proof that other types of actors than the social ones are coming into play."[32] Asymmetries therefore are seen as a manifestation of the effects of multiple agency and hidden or composite actors. The ultimate conclusion is that "the type of actors at work should be increased"[33] and that objects should be made "participants in the course of action."[34] This is one of the key aspects of the ANT symmetry principle—objects should be included as equally present and relevant in the course of action; they have equal rights with respect to other subjects involved the course of action. Including non-human objects in the course of action shifts the focus away from the identity and the nature of the actors to the interactions and the associations (interdependencies) between them. In this way the 'fabric' of the social acquires a rather dynamic nature

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30 Cf. Crawford, "Actor Network Theory," 1: "Actors are combinations of symbolically invested 'things,' 'identities,' relations, and inscriptions, networks capable of nesting within other diverse networks."

31 Cf. ibid.: "The 'volitional actor' for ANT, termed actant, is any agent, collective or individual, that can associate or disassociate with other agents. Actants enter into networked associations, which in turn define them, name them, and provide them with substance, action, intention, and subjectivity. In other words, actants are considered foundationally indeterminate, with no a priori substance or essence, and it is via the networks in which they associate that actants derive their nature. Furthermore, actants themselves develop as networks."

32 Latour, *Reassembling the Social*, 64.

33 Ibid.

34 Ibid., p. 70

emerging within the context of all influential interactions and associations including any emerging non-human sources of agency. Suddenly, it is the interactions and the associations that become sources of ontology or active ontological resources.

"Most of the far-reaching and long-lasting associations are made by something else that could not be detected as long as the notion of social force was not submitted to scrutiny."[35] It seems therefore that the main insights of ANT are related to answering the question about the meaning(s), the nature or the fabric of 'the social.' For ANT, the social

> doesn't designate a domain of reality or some particular item, but rather is the name of a movement, a displacement, a transformation, a translation, an enrollment. It is an association between entities which are in no way recognizable as being social in the ordinary manner, except during the brief moment when they are reshuffled together. [...] Thus, social, for ANT, is the name of a type of momentary association which is characterized by the way it gathers together into new shapes.[36]

The advantage of dissolving the notion of social and replacing it either by short-lived interactions or by new associations is that it makes it possible to distinguish between what pertains to its durability and what pertains to its substance. Strum and Latour[37] discuss the meaning(s) of the social by promoting a performative, instead of an ostensive model. In the *ostensive definition of the social*[38] society exists and actors enter it

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35 Ibid.

36 Ibid., p. 65.

37 Cf. Shirley S. Strum and Bruno Latour, "Redefining the Social Link: From Baboons to Humans," *Social Science Information* 26 (1987): 783–802.

38 Strum and Latour summarize the *Ostensive definition* as follows: 1) It is, *in principle*, possible to discover the typical properties of what holds a society together, properties which could explain the social link and its evolution, although *in practice*, it may be difficult to detect them. 2) These properties or elements are social. If other properties are included then the explanation of society is economic, biological, psychological, etc. 3) Social actors (whatever their size—micro or macro) are *in* the society as defined in 1). To the extent that they are active, their activity is restricted because they are only part of a larger society. 4) Because actors are in the society, they can be useful informants for scientists interested in discovering the principles of society. But because they are only *part* of society, even if they

adhering to rules and structures that are already pre-determined. The overall nature of the society is unknown and unknowable to the actors. It is however accessible to external observers such as scientists who, as if standing outside of society, have the capacity to understand and see it in its entirety. In the *performative definition of the social*[39] society is constructed through the many efforts that are being used to define it; it is something achieved in practice by all actors. This shifts the emphasis from looking for the social link in the *relations between actors* to focusing on *how* actors emerge and achieve this link making it durable. The shift was made possible by the introduction of the concept of 'actant.' Actants emerge in a given network by virtue of the emergence of their relations with other actors and other actants. The introduction of actants helps emphasizing the fact that nothing lies outside the network of relations and that there is no difference in the ability of technology, humans, animals, or other non-humans to act leading to change.

For example, in a heavy traffic mountain road a stone on the road has the potential to entirely change human lives and not just to disturb traffic flow. A customer in a user newsgroup for a specific product may emerge in a new role as a product marketer—it is still the same actor but emerging in a completely new role as a new actant having the ability to influence the purchase decisions of other potential customers. These examples bring

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are "aware," they can never see or know the whole picture. 5) With the proper methodology, social scientists can discover the principles of what holds society together, distinguishing between actors' beliefs and behaviors. The picture of society as a whole, thus devised, is unavailable to the individual social actors who are within it (cf. ibid.).

39 Strum and Latour summarize the *Performative definition* as follows: 1) It is impossible, *in principle*, to establish properties which would be peculiar to life in society, although, *in practice*, it is possible to do so. 2) A variety of elements or properties contribute to the social link as defined by social actors. These are not restricted to the purely social and can include economic, biological, psychological, etc. 3) *In practice*, actors (no matter what their size—macro or micro) define, for themselves and for others, what society is, both its whole and its parts. 4) Actors "performing" society know what is necessary for their success. This may include knowledge of the parts and of the whole and of the difference between beliefs and behaviors. 5) Social scientists raise the same questions as any other social actor and are themselves "performing" society, no more and no less than non-scientists. They may, however, have different practical ways of enforcing their definition of what society is (cf. ibid.).

in another important distinction in ANT—between intermediaries and mediators.[40] Intermediaries are entities which do not make any difference to a given state of affairs to the extent that they can be ignored. In a way, they simply transport the force of some other entity more or less without transformation and by so doing become invisible. Mediators are entities which enhance or reduce differences. They are the ones that potentially lead to change, thus becoming the main object of study since their outputs cannot be predicted by looking at their inputs.[41] From an ANT point of view, the social must constantly be performed or re-constructed through complex engagements with various composite mediators.

III. THE APPROACH SUGGESTED BY TCHALAKOV AND KAPRIEV (TK ASYMMETRY)

Tchalakov and Kapriev have articulated another approach to the symmetry/asymmetry issues in ANT by using insights from Byzantine philosophy.[42] The main message in their joint works emphasizes the fact that some of the key achievements of Byzantine philosophy and, more specifically of the Byzantine theory of activity and action, "are in striking correspondence" with some of the contemporary critiques of the understanding of activity in the social sciences, especially with the critiques emerging from within the adherents of actor-network theory and the sociology of regimes of engagement. The key achievements of the Byzantine philosophical tradition are articulated through the contributions of three key Christian saints and great thinkers Maximus the Confessor (c. 580–662), John of Damascus (c. 645 or 676–749) and Gregory Palamas (1296–1359). Their theory of action is based on the notion of 'nature' which is identified with 'essence.' However, these two notions are used in a quite different manner in comparison to the philosophical lexicon of the Latin tradition which is in the roots of modern philosophy and sociology. In the Byzantine philosophical tradition reality is perceived as active but the essence or nature of every single thing is unknowable in itself. The essence or nature of a thing is never considered in itself, but

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40 Cf. Latour, *Reassembling the Social*, 37.

41 Cf. ibid.

42 Cf. Kapriev and Tchalakov, "Actor-Network Theory and Byzantine Interpretation of Aristotle's Theory of Action;" Tchalakov and Kapriev, "The Limits of Causal Action."

rather as a source of energetic manifestations and dynamism. *An essence can be known only through its natural energies.* The variety of the natural attributes of a thing can be known only through its energies or actions. That is why Tchalakov and Kapriev believe that the Byzantine philosophical tradition could easily agree with most of ANT's basic principles such as "existence precedes essence" and the rejection of actions "with a point of origin." It would also refuse attributing competences to an actor prior to the actualization of action itself by insisting on the "surprise" and the "under-determination of action" as well as its characterization as an "event."[43] By emphasizing the notion of *hypostasis*, this tradition has also no difficulties to admit the 'actantial' character of the objects considering them as autonomous agencies in their different interactions.

According to Tchalakov and Kapriev, there are three key achievements of Byzantine philosophy that can be summarized as follows.[44]

First, this is the *two-fold nature of action* or the fact that the course of action of any agency, be it human or non-human, could in principle be described by means of two major types of actions: 'causal actions' and 'existential actions.' In the original Aristotelian terms these two types correspond to '*movements*' and *actions in a proper sense* or *energies* (*energeia*). This distinction emerges from the different way (as compared to the way of the Latin tradition) the Byzantine philosophers have interpreted the Aristotelian concepts of *dynamis* and *energeia* (translated in Latin as *potentia* and *actus* or, respectively, as *possibilitas* and *actualitas*). Applied to the contemporary critiques of the traditional sociological notions of human action, the above distinction provides an additional good reason for ANT to introduce semiotic notions that symmetrically account for the activity of both human and human agencies.

Second, this is the *unique and original language*, which allows describing the way for different acting agencies to mutually influence each other in the course of action. The most important concepts here are *hypostasis*, *persona/prosopon* and *perichoresis* (interpenetration or co-inherence). In the Latin tradition the first two concepts have been commonly used as synonyms. However, recent studies have clearly pointed out that that, while *persona* denotes only rational beings (God, angels, human beings), the Byzantine concept of *hypostasis* has a universal meaning—*every being*

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43 "Action should remain a surprise, a mediation, an event." Latour, *Reassembling the social*, 45.

44 Cf. Kapriev and Tchalakov, "Actor-Network Theory and Byzantine Interpretation of Aristotle's Theory of Action."

has its hypostasis, including inanimate objects such as stones, machines, threes and houses. By emphasizing this point Tchalakov and Kapriev suggest relating the concept of hypostasis to the ANT notions of *actant* and *agency.* In turn, the fact that the concept of *perichoresis* denotes the mutual penetration and co-inherence of two (or more) different natures (together with their own properties and energies) while preserving their proper otherness, opens the possibility for the description of specific circumstances associated with the emergence of composite hypostases including or combining multiple sources of agency as well as circumstances associated with the inclusion of multiple inhomogeneous natures (for example, human and non-human, but also the radically different non-human natures of technological and non-technological artifacts) under the guidance of a seemingly single actants.

Third, this is the ability to explicate the empirically observable differences between different hypostases (or acting agencies) having the same nature, i.e. the ability to explain how hypostatic or actant uniqueness emerges from within the same resource of natural energies. Byzantine philosophy addressed this issue by elaborating on another category of Aristotle—*hexis*, which defines the personal, or rather, the uniquely hypostatic factor in the actualization of the natural energies or actions. From the point of view of Byzantine scholars, the dominant understanding of *habitus* (even within the context of ANT itself[45]) operates at the level of 'movements' and appears to be unable to incorporate the complexity of the Greek notion of *hexis.*

According to Tchalakov and Kapriev, these three achievements could clearly expand the resources and increase the sensitivity of ANT towards a more comprehensive understanding of human actions, especially in the case of some little studied or highly neglected phenomena such as *resistance*, *suffering* and *endurance* in the course of particular scientific endeavours. It is within this context that they discuss the need of reintroducing the concept of asymmetry (TK asymmetry) between human and non-human actors, yet on a different (non-Cartesian) ground. They have two basic claims. *First*, the traditional sociological theories of human action have greatly reduced it to the type of *causal* actions. *Second*, in addition to its major advantages (symmetrical treatment of human and non-human agents and a more comprehensive understanding of the dynamics of their relationships) ANT needs some further conceptual

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45 See for example Latour, *Reassembling the Social*, 210–211.

developments in order to be able to cover some important and unique aspects of human behaviour.

The need for further conceptual development becomes particularly necessary when studying the emergence of stable and long-standing heterogeneous micro-communities based on the human association with the particular properties of specific non-human agents, an association that could be described as a unique relationship of inter-corporeality. The specific context of this asymmetric insight goes back to the work of Tchalakov focusing on the scientific outcomes of long years of apprenticeship in research labs including the human assimilation of materiality and the materiality of scientific language in a given area of research.[46] Scientists describe this process using specific verbal forms referring to the bodily, practical engagement in research, which enables the human body to gradually become sensitive to the invisible realities of the subject of scientific practice and to the apophatic challenge of using scientific language to articulate the experience associated with these invisible realities.[47]

According to Tchalakov and Kapriev, it is impossible to describe these empirically observable relationships of sharing, mutuality and fusion between human and non-human actors only by using ANT's language of translation. ANT needs a concept of asymmetry between non-human and human actors so that it could describe such unique human behaviour as the one described above by using categories such as moral obligation, endurance, struggle, dedication, responsibility, duty, passion and, why not, love. Such characteristics are difficult to ascribe to non-humans but it is equally difficult to ascribe them to all humans. They should be considered as an expression of uniquely personal existential predispositions that could be described through the concepts of existential actions, hypostatic particularity, and perichoretic synergy. This is why they cannot be easily hidden under the guise of intentionality. This is a key difference between AT and TK asymmetries.

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46 Cf. Ivan Tchalakov, "Language and Perception in the Coupling between Human and Non-human Actors," *Yearbook 2004 of the Institute for Advanced Studies on Science, Technologies & Society*: 192–215; Ivan Tchalakov, "The Object and the Other in Holographic Research—Approaching Passivity and Responsibility of Human Actors," *Science, Technology and Human Values* 29/1 (2004): 64–87.

47 Cf. Tchalakov, "Language and Perception in the Coupling Between Human and Non-human Actors," 199–203.

IV. CONCLUSION

One of the motivations for this paper was to emphasize the fact that we are currently witnessing a change of human condition due to the unprecedented increase of complexity of everyday technological artifacts. The technologies around us are becoming more complex, more intelligent and more autonomous as compared to what has been known before. This trend goes in parallel to an increasing scale of society which amplifies different societal pressures from a number of different perspectives.[48] *First*, having more people in society increases the weight of the reputational pressures driven by the necessity for the majority of people to follow dominant group norms due to fear from bad reputation. *Second*, having more people in society means more interactions among people. The more interactions among people cause the emergence of new societal dilemmas and interdependencies among them. Handling the interdependencies require new and more complex social management systems that need to rely even more heavily on technology. Uncertainty is a key component of new technology development and more technology means that the new systems will have more flaws and more possibilities to fail in surprising and unexpected ways which additionally complicates the entire socio-technological environment.[49] *Third*, there is a growing variety of new technological systems. As more and different technologies permeate human lives and society in general, there are new areas of concern that need to be addressed, new societal dilemmas, and new possibilities for social system struggles.[50] There is increasing number of social aspects which are controlled not by people but by automatic systems. Unfortunately, the automation of social systems is paralleled by a process of depersonalization of the interaction between people which creates additional problems due to communication ambiguities. *Fourth*, globalization has brought the opportunity for people moving at much greater distances across national borders, across nations and continents.

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48 See the insightful discussion provided by Bruce Schneider, "Technological Advances," in *Liars & Outliers. Enabling the Trust that Society Needs to Thrive* (Indianapolis: John Wiley & Sons, 2012), 225. Schneider however focuses on the issues of trust and security.

49 Cf. ibid.

50 Just as an example, Internet fraud requires the Internet.

The greater mobility of people with weaker social ties weakens the efficiency of moral and reputational norms and diminishes the strength of institutional pressures. This creates a necessity for more control and more monitoring, not only of people, but also of the flow of unprecedented amounts of goods and services which additionally enhances the need for more complex technological solutions based on wireless, sensing, information and communication technologies.

The point here is that many technological "solutions" are emerging as independent autonomous actors in our lives. Yes, computer viruses and antivirus programs do not have intentions; yes, there were designed by a programmer, but it does not really matter who this programmer was if, for example, the antivirus program will consistently remove the attachments from my e-mail because of the suspicion or 'fear' of potential virus activities. Such type of consistent activity could consistently affect and completely disturb my activities for an entire weekend before I can speak to someone who could help me fixing the problem. In the meantime, the only face, *persona* or *prosopon* before me is my computer screen. Behind this "persona" emerges the hypostasis of the computer with all of its functions, interactive features, messages, pop-ups, failures or 'user friendliness.' The personalization of technological artifacts or assigning personality to active objects is part of human nature. It was Rodolphe Töpffer (1799–1846), the inventor of the comic books who came to realize that assigning personalities to specific images is not difficult. Actually, "He found that it was impossible *not* to do so."[51] Focusing on Töpffer's insight Gombrich framed a law which he called Töpffer's Law: Any image that we can interpret as a face will have a distinct individual personality. "The most astonishing fact about these clues of expression is surely that they may transform almost any shape into the semblance of a living being."[52] In this sense non-human actors around us acquire a definite character and expression; they are endowed with a life on their own and with a presence. One does not need to be an ANT scholar in order to recognize that. At the same time, accounting for such emerging presences is not a mere act of assigning intentionality to objects. I would also agree (as Tchalakov and Kpriev did) with Michel Callon and other

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51 Punyashloke Mishra, Michael D. Nicholson & Steven K. Wojcikiewicz, "Seeing Ourselves in the Computer: How We Relate to Technoloyies," *Journal of Adolescent & Adult Literacy* 44/7 (April 2001): 634–41.

52 Ernst Hans Gombrich, *Art and Illusion: a Study in the Psychology of Pictorial Representation* (London: Phaidon Press, 1972), 289.

ANT representatives that "demanding that the non-humans should have intentions *in the same way as humans* is in itself an anthropocentric or sociocentric demand" that does not fit the spirit of ANT.[53] It is important however to realize that there is great potential for ANT in accounting for the potential impact of the increasing complexity and autonomy of everyday technological artifacts.

In concluding, I would like to make two final comments about the difference between AT and TK asymmetries. *First*, I should emphasize the fact that the idea of asymmetry is not absent from ANT in the first place. I would emphasize the point made by Strum and Latour that, by embracing the performative framework, ANT admits the existence of two sets of inverse relationships: the first one revealing *a strange symmetry* among all actors since "the more active the actors, the less they differ from one another;"[54] the second one revealing *a new asymmetry* since "the more actors are seen to be equal, *in principle*, the more the *practical* differences between them become apparent in the means available to them to achieve society." I see this new asymmetry as an anticipation of the articulation of the TK asymmetry which focuses on the uniqueness of the personal/*hypostatic* factor as an additional aspect in distinguishing between different human actors. The introduction of this additional aspect provides additional exploratory resources for ANT and should be acknowledged as a distinctive scholarly contribution.

Second, I can see how easily this contribution could be claimed by AT scholars as part of their focus on intentionality. This is why I believe that in order to establish it as part of common scientific usage it has to be radicalized even further by emphasizing the universality of the concept of *hypostasis*.[55] In other words, I would suggest exploring the articulation of the TK asymmetry within the context of non-human objects. This suggestion appears to be highly justified within the context of the increasing complexity and autonomy of everyday technological artifacts.

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53 Michel Callon and Bruno Latour, "Don't Throw the Baby Out With the Bath School! A Reply to Collins and Yearley," in *Science as Practice and Culture*, ed. Andrew Pickering (Chicago, IL: University of Chicago Press, 1992): 343–68. I am grateful to Dr. Domen Bajde, Department of Marketing Management, University of Southern Denmark, who in an informal private discussion reemphasized this specific point.

54 Strum and Latour, *Redefining the Social Link*, 785.

55 See the text by Prof. Georgi Kapriev included in this volume.

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CHARLOTTE JAEKEL

JACK-OUT-OF-THE-BOX

Literature's Knowledge About Malfunction, Interference, and Waste

Curiously enough, Bruno Latour's work is shaped by an optimism towards technology, serving to isolate himself from Heideggers compelling thoughts on this particular matter. For Latour, composition, connection and operativity is the basic matter of practice, especially when interferences or "malfunctioning artefacts"[1] emerge. Take the prominent anecdote from the sixth chapter of *Pandora's Hope*, entitled *A Collective of Humans and Nonhumans.* Here, Latour tells us a fictional story about an interrupted lecture when an overhead projector suddenly breaks down. While the projector was perceptually absent before it stopped working, the instantaneous crisis of that "intermediary" brings up the projector's "individual existence."[2] The crisis immediately calls for the repairmen to open the black box called *overhead projector* which itself consequently raises the numbers of actants: "Whereas the moment before the projector scarcely existed, now even its parts have individual existence, each its own 'black box'."[3] The actants multiply, shifting our attention from the solitary object to "a group of people *around* an object."[4] For Latour, this mediating process moves from the initial disinterest towards the black box (i.e. *overhead projector*) to the newly emerged dissipation and alignment of the actors in the so called "obligatory passage point"[5] (OPP), where the

1 Bruno Latour, *Pandora's Hope. Essays on the Reality of Science Studies* (Cambridge, MA et al.: Harvard University Press, 1999), 184.

2 Ibid., 183.

3 Ibid.

4 Ibid.

5 Ibid., 184. Obligatory passage points can be understood as institutions of actor-networks, commonly associated with the primary process of

assembly of artifacts reintegrate and restart a new *blackboxing*. But what happens to broken black boxes and loose elements which had lost all of their proliferate functions and therefore are no longer available for any further coordination of interest? How can these entities be reconnected to the chains of operations and the assembly of humans and nonhumans? Things along these lines simply lost their way. No one keeps track.

The aim of this essay is to retrace the things that left the 'assembly-line,' way beyond any obligatory passage point. However, these things are far from being neutral. Quite the opposite: Like an unleashed Jack-in-the-box their clamour herald against the schism between man and things, denying successfully the assembly and the collective. Whereas Latour does not explicitly talk about things of that kind in his 'science'-fictions, literature does.

Latour picks up literary patterns, creates fictional narratives as the detective story in *ARAMIS or the Love of Technology*, which, due to its hybrid character between socio-technology and literature,[6] introduces the new literary genre named "scientifiction."[7]

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translation. At this particular point goals, questions, or any matters whatsoever are forced to merge. Consequently, the OPP serves as a necessary element when it comes to the formation of networks and their programs of action. It mediates between all the actors of a network. According to Michel Callon and John Law it works like "a single locus to shape and mobilize the local network." Michel Callon and John Law, "The Life and Death of an Aircraft: a Network Analysis of Technical Change," in *Shaping Technology/ Building Society: Studies in Sociotechnical Change*, ed. Wiebe E. Bijker and John Law (Cambridge, MA: MIT Press, 1992), 31.

6 This is about the failed project ARAMIS, an innovative idea of civil transportation for taxi cabs which never came to actualization. A young student of math and physics attains the teachings of a "laboratory Sherlock" —a professor of sociology called Norbert—in order to resolve the issue "Who Killed Aramis?" Bruno Latour, *ARAMIS or the Love of Technology*, trans. Catherine Porter (Cambridge, MA et al.: Harvard University Press, 2002), 2. At first glance, we find an exception from the claim that defect objects can not be tracked since the scientific research focuses on a technical object that failed. Failed objects, as we know, left the assembly. However, the reasons for the project to have failed are of large concern, without any interest in the material remains of the project. Therefore the *post-mortem*-research on ARAMIS suddenly turns into an observation *in statu nascendi*. Cf. Christoph Neubert, "Innovation, Mobilisierung, Transport. Zur verkehrstheoretischen Grundlegung der Akteur-Netzwerk-Theorie in Bruno Latours *Aramis, or the Love of Technology*," in *Verkehrsgeschichte und Kulturwissenschaft*, ed. Christoph Neubert and Gabriele Schabacher (Bielefeld: transcript 2013), 93–142: 105.

7 Latour, *ARAMIS*, IX.

What is striking though are the bright moments in which Latour reveals his strong interest in literature, namely the homogenization of the dysfunctional elements: For Latour, defects, transforming things into waste, do not account for a suitable option for observation. This becomes evident especially in Latour's reading of a comic strip whose hero is called Gaston Lagaffe—a proficient virtuoso when it comes to the mastery of transliterating the effects of things, the strange assemblages and the consequential chaos. The relevant essay can be found in *La clef de Berlin et autres leçons d'un amateur de sciences* and is called *Portrait de Gaston Lagaffe en philosophe des techniques*.

Before turning to Latour's reading, please allow me a little detour. The fact that knowledge is extracted from a literary genre like a comic strip is in no way of small concern here. At first, socio-technological premises seem to allow to bring literature and theory together. Therefore, we can say that the questions about the possibilities of *any* literature's knowledge or poetology of knowledge[8] are not at stake anymore. This brings us to Michel Serres, himself also well-known to Latour, who, rather than eliminating them, stresses the differences that lay in the engagement of interference and collectivization. In the chapter *Rires: les bijoux distraits ou la cantatrice sauve* from his book *Hermes II. L'Interférence* Serres starts with a suspicion.

Analyzing *Les aventures de Tintin*, he remarks:

> Et si la philosophie ne résidait plus là où on l'attend d'ordinaire? Quand elle se tort d'agonie dans la nuit de l'ésotérisme, la bande dessiné montre au grand jour et sans détour les plaies de nos discours [...]. [...] sachez enfin où vous instruire et sur quoi méditer. [...] Oui, la monadologie contemporaine, c'est *Les Bijoux de la Castafiore*.[9]

In his work *The Parasite*, the subject-matter in charge for uncovering the truth of the parasite and its interference shifted from tales to fables—and now to comic strips. Thus it seems we find no need to differentiate between heavy and light literature as well as to exclude literary fictions from the realm of knowledge.

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8 For an overview on the studies concerning literature and knowledge, see the chapter "Ansätze," in *Literatur und Wissen. Ein interdisziplinäres Handbuch*, ed. Roland Borgards et al. (Stuttgart and Weimar: Metzler, 2013), 3–54.

9 Michel Serres, *Hermès II. L'Interférence* (Paris: Les Éditions de Minuit, 1992), 223.

The comic strip does not share any of the established paradigms of official philosophical theory. Much more, his dazzling and colorful animations shine a bright light of what is hidden in the dark of the discourse: *interferences*—the phone connection fails to contact the caller[10]—, *chatter*—a third party, Castafiore's parrot, intrudes and causes confusion[11]—, *technology* and its distortions[12]—Professor Tournesol invents the color TV, which happens to be an immature project causing visual impairment—and *parasites*, causing all their clamor and noise until the stocks are fully exhausted—the members of the local orchestra who heard about the presence of the famous singer Castafiore are getting royally drunk, serenading, stumbling noisily their way out of the room[13]—and of course broken *mediators*, for example the stairs which ceased to serve its initial means to transport up- and downwards without ever being repaired.[14] This particular knowledge, ever displayed and negotiated, is essentially attached to the literary genre of the comic strip. The strip and literature create the topology of diabolic interference and secession: either the collective disassembles or it has hardly ever been an assembly before.

By also turning his attention closely to the literary genre of the comic strip, Latour performs a crucial shift within the production of knowledge from academic philosophy to the minor form of the narration, as does Serres. By the way, this issue was more than once object of his conversations with Michel Serres.[15]

However, the outcomes are diametrically opposed: Latour points out in his reading of the story called *Lagaffe mérite des baffes*[16] [*Lagaffe Deserves Some Slapping*] the conditions of felicity in any mediation; dysfunctional elements regain their functions in favor of a new collective. Gaston's problem was the lack of a present delegation: his superior coincidentally

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10 Cf. Hergé, *Les aventures de Tintin. Les bijoux de la Castafiore* (Luçon: Castermann, 2007), 5.
11 Cf. ibid., 19.
12 Cf. ibid., 48–50.
13 Cf. ibid., 29–30.
14 Cf. ibid., 7; 62.
15 Cf. Michel Serres, *Éclaircissements. Cinq entretiens avec Bruno Latour* (Paris: Éditions François Bourin, 1992), 41–43. In his interviews with Bruno Latour Michel Serres states that "[l]a philosophie est assez profonde pour faire comprendre que la littérature est plus profonde qu'elle." Ibid., 42.
16 André Franquin, *Gaston. Lagaffe mérite des baffes* (Luçon: Dupuis 1979).

turned into his pets' concierge, a situation that forced him to sudden building conversions. He puts up a kitty door, arousing jealousy for the seagull, his other pet, that wants to reclaim her right to freely leave and enter the room as she pleases. Consequently, he cuts a hole into the upper half of the door. Yet, the hole in the door is too permeable when it comes to little puffs of air, a quality conversely owned by the kitty door's flap, which then gives reason for Gaston's boss to be immediately upset. The outcome of that peculiar chain of actions is a permeable door. In fact, the door has by now lost its original purpose of being either left open and permeable or closed and therefore non-permeable. Latour's observation does not concern the door's functional disorder but rather a finally successful collectivization: All's well that ends well, since as Latour claims "il n'existe qu'une porte et qu'une seule qui soit telle quelle permette de tenir ensemble les lubies de Gaston, de Prunelle et de leurs animaux familiers."[17] This might surprise us if we think about his boss Prunelle's angry red head who, after the building conversions, is asked by Gaston "Sois pas de mauvaise foi: Cette porte est fermée, oui ou non?" Prunelle, snorting with rage, is displayed as a disgraded superior, asserting merely undefined noises ("RÂÂÂH!").[18]

It surprises us even more if we focus on Latour's further thoughts on the nature of doors taken from *Mixing Humans and Nonhumans Together: The Sociology of a Door-Closer*.[19] Here, a door-closer declares a strike. Latour describes the resulting issue as follows: "There is a problem with doors. Visitors push them to get in or pull on them to get out (or vice versa), but then the door remains open." An open door however is—like Gaston's 'door' after having cut the gap for his seagull—nothing but "a gaping hole in the wall through which, for instance, cold rushes in and heat rushes out."[20] Gaston's remodeled door is no longer a mediator between the exterior and the interior. Its tragic fate, like anything he has been in contact with, will be replacement or displacement.

It is precisely these things, that are primal actors of literary fictions: condemned, impractical material, obsolete entities that escape from their

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17 Bruno Latour, *La clef de Berlin et autres leçons d'un amateur des sciences* (Paris: La Découverte, 1993), 23.

18 Franquin, *Gaston*. 15.

19 Cf. Jim Johnson [a.k.a. Bruno Latour], "Mixing Humans and Nonhumans Together: The Sociology of a Door-Closer," *Social Problems* 35/3 (1988), Special Issue: The Sociology of Science and Technology: 298–310.

20 Johnson, "Mixing Humans and Nonhumans Together," 300.

initial functions, removed from office like waste and junk. The reasons for that, I claim, lie in the fact that goal and potential of interference is consubstantial.

Studying the practices of disposability became a fashionable field of interest in the social studies, and more recently in the cultural studies. Strangely enough that literary theory has only hardly tackled the relation between literature and waste—a literary history of waste still holds. At that point, this essay is working on and negotiating the intersection between literature and waste and has its primary focus on three literary examples. They all share a common ground by distinctively taking waste as an actor into account rather than ignoring it: Franz Kafka's *Cares of a Family Man*, Don DeLillo's *Underworld* and thirdly E.L. Doctorow's *Homer and Langley*.

Concerning Kafka's *Die Sorge des Hausvaters* [*The Cares of a Family Man*], published in the Chanukkah-edition of the journal *Selbstwehr* in 1919, we will have to face an odd thing called Odradek, an object far from any possible categorizations. Whatever left the box now haunts the *Hausvater*, with *Hausvater* maintaining its economical connotation: The head of the house, a strong guarantee for the financial efficiency, the wealthy legacy and the systemic and environmental boundaries of the *oikos*. This particular character is now challenged by a thing that pays him regular visits and furthermore shares a familiar circle.

The narration starts with a linguistic question, shifting into a hermeneutical and phenomenal description of that peculiar thing.[21] The sign ODRADEK is here transparent and non-transparent at the same time, same as its essential structure whose mode of movement is closely attached to its inherent technology:

> Die einen sagen, das Wort Odradek stamme aus dem Slawischen und sie suchen auf Grund dessen die Bildung des Wortes nachzuweisen. Andere wieder meinen, es stamme aus dem Deutschen, vom Slawischen sei es nur beeinflußt. Die Unsicherheit beider Deutungen aber

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21 For a short summary of the range of hermeneutical and etymological interpretations of the word "Odradek" cf. Renate Werner, "Die Sorge des Hausvaters. Ein sprachkritischer Scherz Franz Kafkas," in *Literatur und Leben: anthropologische Aspekte in der Kultur der Moderne. Festschrift für Helmut Scheuer zum 60. Geburtstag*, ed. Günter Helmes et al. (Tübingen: Narr, 2002), 185–87.

> läßt wohl mit Recht darauf schließen, daß keine zutrifft, zumal man auch mit keiner von ihnen einen Sinn des Wortes finden kann.[22]

The search for meaning comes to nothing, same does the attempt to decompose the word itself. It is compact, it follows Slavonic or Germanic morphological rules. However, it seems impossible to isolate the elements that lead to the word's emergence. In the case of Odradek, these elements reveal themselves to the analytical gaze without being detached from the whole:

> Natürlich würde sich niemand mit solchen Studien beschäftigen, wenn es nicht wirklich ein Wesen gäbe, das Odradek heißt. Es sieht zunächst aus wie eine flache sternartige Zwirnspule, und tatsächlich scheint es auch mit Zwirn bezogen; allerdings dürften es nur abgerissene, alte, aneinandergeknotete, aber auch ineinanderverfilzte Zwirnstücke von verschiedenster Art und Farbe sein. Es ist aber nicht nur eine Spule, sondern aus der Mitte des Sternes kommt ein kleines Querstäbchen hervor und an dieses Stäbchen fügt sich dann im rechten Winkel noch eines. Mit Hilfe dieses letzteren Stäbchens auf der einen Seite, und einer der Ausstrahlungen des Sternes auf der anderen Seite, kann das Ganze wie auf zwei Beinen aufrecht stehen.[23]

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22 Franz Kafka, "Die Sorge des Hausvaters," in *Drucke zu Lebzeiten*, ed. Wolf Kittler, Hans-Gerd Koch and Gerhard Neumann, in *Schriften. Tagebücher. KA*, ed. Jürgen Born et al. (Frankfurt a.M.: Fischer, 2002), 282. ["Some say the word Odradek is of Slavonic origin, and try to account for it on that basis. Others again believe it to be of German origin, only influenced by Slavonic. The uncertainty of both interpretations allows one to assume with justice that neither is accurate, especially as neither of them provides an intelligent meaning of the word." Franz Kafka, "The Cares of a Family Man," *The Complete Stories*, ed. Nahum N. Glatzer (New York: Schocken Books, 1983), 282.]

23 Kafka, "Die Sorge des Hausvaters," 282–83. ["No one, of course, would occupy himself with such studies if there were not a creature called Odradek. At first glance it looks like a flat star-shaped spool for thread, and indeed it does seem to have thread wound upon it; to be sure, they are only old, broken-off bits of thread, knotted and tangled together, of the most varied sorts and colors. But it is not only a spool, for a small wooden crossbar sticks out of the middle of the star, and another small rod is joined to that at a right angle. By means of this latter rod on one side and one of the points of the star on the other, the whole thing can stand upright as if on two legs." Kafka, "The Cares of a Family Man," 428.]

If one takes a closer look at the components mentioned here, one can evidently observe a common direct relation to waste: the thread seems endlessly knotted and torn, hence a typical case for the trash when things are no longer of any use. Or, even worse; twisted, tangled like an outcast member of the collective. A new problem is at stake: On the one hand, the entity constantly reveals its possible functionality or at least raises suspicion for *any* past function whatsoever. But at the same time, the whole remains closed and everything is engaged with each other in a seamless flow. Any further persecution would end in a wild goose chase since the tiny useless actor became a transparent black box, eluding from himself:

> Man wäre versucht zu glauben, dieses Gebilde hätte früher irgendeine zweckmäßige Form gehabt und jetzt sei es nur zerbrochen. Dies scheint aber nicht der Fall zu sein; wenigstens findet sich kein Anzeichen dafür; nirgends sind Ansätze oder Bruchstellen zu sehen, die auf etwas Derartiges hinweisen würden; das Ganze erscheint zwar sinnlos, aber in seiner Art abgeschlossen. Näheres läßt sich übrigens nicht darüber sagen, da Odradek außerordentlich beweglich und nicht zu fangen ist.[24]

The characterization suits two particular approaches. Firstly the conceptualization of a "groupement[ ] non productif[ ],"[25] as it is displayed by Gilbert Simondon, whose work *Du mode d'existence des objets techniques* was more than a profound inspiration for Latour, especially the inherent political implications. The function of these *groupements non productifs* can be understood as a "couplage," as "un enchaînement réglé de médiations organisées"[26] between man and nature, between the interior and the exterior: notably, Odradek turns up in transitory spaces as "auf dem

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24 Kafka, "Die Sorge des Hausvaters," 283. ["One is tempted to believe that the creature once had some sort of intelligible shape and is now only a broken-down remnant. Yet this does not seem to be the case; at least there is no sign of it; nowhere is there an unfinished or unbroken surface to suggest anything of the kind; the whole thing looks senseless enough, but in its own way perfectly finished. In any case, closer scrutiny is impossible, since Odradek is extraordinarily nimble and can never be laid hold of." Kafka, "The Cares of a Family Man," 428.]

25 Gilbert Simondon, *Du mode d'existence des objets techniques* (Paris: Editions Aubier, 1989), 246.

26 Ibid.

Dachboden, im Treppenhaus, auf den Gängen, im Flur"[27] or migrates into other houses. These technical objects seem to be useless as far as their observation is under the spell of the "paradigm de travail:" "qui pousse à considérer l'objet technique comme utilitaire; l'objet technique ne porte pas en lui à titre de définition essentielle son caractère utilitaire."[28] It is exactly this subordination of technical objects under the paradigm of utility, practicability and labor that can be easily ascribed to the *Hausvater*. He does not succeed to value the self-contained object. It needs to obey. But that is precisely why from an informational point of view, as indicated by the linguistic and hermeneutic speculations from the exposition of the narration, we are faced with a problem, because:

> l'objet technique peut être lu comme porteur d'une information définie; s'il est seulement utilisé, employé, et par conséquent asservi, il ne peut apporter aucune information [...]. L'object technique apprécié et connu selon son essence [...], pénétré d'intelligibilité fonctionnelle, valorisé selon ses normes internes, apporte avec lui une information pure. On peut nommer information pure celle qui n'est pas événementielle, celle qui ne peut être comprise que si le sujet qui la reçoit suscite en lui une forme analogue aux formes apportées par le support d'information.[29]

This very information is our problem. The linguistic and hermeneutic issue from the story, shifting from naming to meaning, tries to extract significance. We face the problem of transmitting information twice, at the end of Kafka's narration, when Odradek justifies itself:

> Manchmal, wenn man aus der Tür tritt und er lehnt gerade unten am Treppengeländer, hat man Lust, ihn anzusprechen. Natürlich stellt man an ihn keine schwierigen Fragen, sondern behandelt ihn – schon seine Winzigkeit verführt dazu – wie ein Kind. „Wie heißt du denn?" fragt man ihn. „Odradek", sagt er. „Und wo wohnst du?" „Unbestimmter Wohnsitz", sagt er und lacht; es ist aber nur ein Lachen, wie man es ohne Lungen hervorbringen kann. Es klingt etwa so, wie das Rascheln in gefallenen Blättern. Damit ist die Unterhaltung

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27 Kafka, "Die Sorge des Hausvaters," 283. ["in the garret, the stairway, the lobbies, the entrance hall." Kafka, "The Cares of a Family Man," 428.]
28 Simondon, *Du mode d'existence*, 246.
29 Ibid., 247.

> meist zu Ende. Übrigens sind selbst diese Antworten nicht immer zu erhalten; oft ist er lange stumm, wie das Holz, das er zu sein scheint.[30]

Instead of information, *Rascheln* prevails, which phonologically and semantically very much resembles *Rauschen* [engl. noise]—the domination of *noise.*

Or, we do not detect any flow of signals, the object's hush, noise is absent, the channels are shut. The flow of information is blocked since no further formations exist anymore. However, Simondon's quotation spares a crucial aspect: Simondon's appreciation of the essence of the inherent-coherent technical object issues from the appreciation of the human invention hiding behind the discourse of essence.[31] The hermeneutical problem behind this formulation, namely that any invention has to be understood as such before it turns into information, can be easily ignored for a moment. Assuming Odradek as a *creature of creation* might in fact exemplify the problem mentioned above, he still recollects and recombines the dysfunctional and useless cloth to a whole new totality. The negation of the impractical *valuelessness* of their elements turns them into a creative artifact. Now, everything *has* purpose while neglecting its purposiveness, just as the actants who break free from the operative chains in order to reassemble.

The coined phrase of a "purposiveness without purpose" does not only transform the text into a commentary on nonhuman things and their missing human formations, but also—as a second approach—to a self-commentary on art. Since Kant, we know of this phrase to have been one of the most prominent definitions of a work of art. Independent of any pragmatic or functional relations we conceive the work of art as

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30 Kafka, "Die Sorge des Hausvaters," 283. ["Many a time when you go out of the door and he happens just to be leaning directly beneath you against the banisters you feel inclined to speak to him. Of course, you put no difficult questions to him, you treat him—he is so diminutive that you cannot help it—rather like a child. 'Well, what's your name?' you ask him. 'Odradek,' he says. 'And where do you live?' 'No fixed abode,' he says and laughs; but it is only the kind of laughter that has no lungs behind it. It sounds rather like the rustling of fallen leaves. And that is usually the end of the conversation. Even these answers are not always forthcoming; often he stays mute for a long time, as wooden as his appearance." Kafka, "The Cares of a Family Man," 428.]

31 Cf. Simondon, *Du mode d'existence*, 247.

being genuinely complete and inherently purposive. In fact, the Kantian work of art, the creation of an artistic genius, is similarly embedded like Simondon's technical object, that is to say as a mediation between man and the totality of nature. This, by the way, reminds us largely of a trademark conception coined by the German Classicism as can be found in the work of Karl Philipp Moritz:

> Der Begriff vom Unnützen nämlich, insofern es gar keinen Zweck keine Absicht außer sich hat, warum es da ist, schließt sich am willigsten und nächsten an den Begriff des Schönen an, insofern dasselbe auch keines Endzwecks, keiner Absicht warum es da ist, außer sich bedarf, sondern seinen ganzen Wert und den Endzweck seines Daseins in sich selber hat.[32]

This immediate proximity of artificial artifacts and technical objects lead to a clear rejection of art being subordinate to technology.

But there is another element in Kafka's narration that leads us from *noise* to *waste*, to what cannot be further utilizable, and therefore exceeds itself from the realm of application and utility, from socio-technological collectives to its renewed access to nature. For though Odradek's neat innocence might have persuaded us, he employs a dark threat.[33] The *Hausvater* puts it like this:

> Vergeblich frage ich mich, was mit ihm geschehen wird. Kann er denn sterben? Alles, was stirbt, hat vorher eine Art Ziel, eine Art Tätigkeit gehabt und daran hat es sich zerrieben; das trifft bei Odradek nicht zu. Sollte er also einstmals etwa noch vor den Füßen meiner Kinder und Kindeskinder mit nachschleifendem Zwirnsfaden die Treppe hinunterkollern? Er schadet ja offenbar niemandem; aber die Vorstellung, daß er mich auch noch überleben sollte, ist mir eine fast schmerzliche.[34]

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32 Karl Philipp Moritz, "Über die bildende Nachahmung des Schönen," in Karl Philipp Moritz, *Werke in zwei Bänden. Vol. 1*, ed. Jürgen Jahn (Berlin and Weimar: Aufbau 1973), 261.

33 Cf. Hartmut Böhme, *Fetischismus und Kultur. Eine andere Theorie der Moderne* (Reinbek/Hamburg: Rowohlt, 2006), 50–53.

34 Kafka, "Die Sorge des Hausvaters," 284. ["I ask myself, to no purpose, what is likely to happen to him? Can he possibly die? Anything that dies has had some kind of aim in life, some kind of activity, which has worn

Its stable being was a result of the constant extraction of purposes, aims and goals. It is simply worn out. Its relief from temporality though is the factual matter of concern.[35] At the same time, its strange constitution, a hybrid state of neither being regarded as a functional thing nor as a composting and steadily resolving waste makes it so hard to grasp conceptually. The task seems to be a hard one to tackle, especially for a theory like the ANT which is at work with chains of operation and mediation. This problem could be easily put aside to the realm of literary theory if it were not for the task of all the theoretical and para-theoretical approaches to conceptualize these particular *non-things* while giving us the same evidence as does our ordinary experience beyond any assemblage. In his book *Rubbish Theory. The Creation and Destruction of Value* Michael Thompson points out that the "covert rubbish category is not subject to the control mechanism (which is concerned primarily with the overt part of the system, the valuable and socially significant objects)."[36] Qualified as an invisible and worthless object, it successfully escapes from observations and

> in an ideal world, free of nature's negative attitude, [it] would reach zero value and zero expected life-span at the same instant and then [...] disappear into dust. But, in reality, it usually does not do this; it continues to exist in a timeless and valueless limbo.[37]

Whereas most of the theoretical approaches start out from an *ideal world*, the worthless and displaced object persists somewhere in the realm of culture. Vilém Flusser's portrayal of São Paolo, the city of dirt, smell and waste and its carelessly discarded bottles is a compelling work in that context.[38] The shattered bottles transform into broken fragments and

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out; but that does not apply to Odradek. Am I to suppose, then, that he will always be rolling down the stairs, with ends of thread trailing after him, right before the feet of my children, and my children's children? He does no harm to anyone that one can see; but the idea that he is likely to survive me I find almost painful." Kafka, "The Cares of a Family Man," 428.]

35 Cf. for the linking between temporality and care Martin Heidegger, *Sein und Zeit* (Tübingen: Niemeyer, 1979), 180–234.

36 Michael Thompson, *Rubbish Theory. The Creation and Deonstruction of Value* (Oxford et al.: Oxford University Press, 1979), 9.

37 Ibid., 10.

38 Cf. Vilém Flusser, "Aus der Stadt der Erstinkenden. Eine Flaschenpost," in Vilém Flusser, *Nachgeschichten. Essays, Vorträge, Glossen* (Düsseldorf: Bollmann, 1990), 181–84.

linger on in between nature and culture; turned into waste, not valueless and formless, but in itself *anti-value* and *anti-form*: "Wir können überall beobachten," claims Flusser,

> wie sich Unrat, Schmutz und Fäulnis zu Bergen häufen, wie sie aus allen Kanälen quillen, unsere Schritte hemmen, in unsere Körper und Geister dringen, immer weniger vermieden werden können, wie die in ihnen sich mehrenden Pestträger uns immer mehr infizieren und wie die darin verborgenen Scherben, zum Beispiel weggeworfene Flaschen, uns immer tiefere Wunden schneiden.[39]

In this case one can definitely speak of a certain kind of agency, although with a negative quality, which itself restricts human agency. By doing so it diminishes the human faculty of freedom in the same way as do the regular technical objects who were assigned *legitimate* agency. A theory that ignores these particular objects would mean to shutter important parts of the network. Yet, this cannot be the answer to our problem.

The general ignorance of waste has eliminated its subject matter from the cultural matrix in order to maintain its clear cut realm of what can be defined as culture. But not only has it stabilized its scope—as a result we might gain another fictional theory: We can track down our discussion to Jesse Detwiler, a prototypical "waste-theorist" and "visionist"[40] from Don DeLillo's 1997 *Underworld*.

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39 Vilém Flusser, *Dinge und Undinge. Phänomenologische Skizzen. Mit einem Nachwort von Florian Rötzer* (Munich and Vienna: Hanser, 1993), 21. ["We can easily observe the filthy, rotten debris, piled up, becoming mountains of waste, pouring out of the channels, hindering us to move along, invading our minds and bodies, impossible to avoid, increasingly infecting us, plague-ridden; and how the shattered glass of thrown away bottles that lies beneath cuts deeply into our flesh." Author's translation.] There is also a prominent literary example for shards which cause injuries: The *Pfahldorfgeschichte* in Friedrich Theodor Vischer's paradigmatical thing-novel demonstrates how the garbage in a village of neolithic stilt houses turns into a new actor, who—in the shape of shards—cuts wounds into the villagers' feet. Cf. Friedrich Theodor Vischer, *Auch Einer. Eine Reisebekanntschaft* (Frankfurt a.M.: Insel, 1987), 157.

40 Don DeLillo, *Underworld* (London, Basingstoke and Oxford: Picador, 2011), 285.

Is literature able to draw connections that theory fails to see? Detwiler's teaching, which he usually spreads at the UCLA, sounds familiar and emphasizes the superiority of agency of garbage towards the agency of humans:

> Detwiler said that cities rose on garbage, inch by inch, gaining elevation through the decades as buried debris increased. Garbage always got layerd over or pushed to the edges, in a room or in a landscape. But it had its own momentum. It pushed back. It pushed into every space available, dictating construction patterns and altering systems. And it produced rats and paranoia.[41]

DeLillo's novel introduces an epistemological problem: it is this hybrid, which is excluded from the act of cognition. This is mainly because cognitive systems are designed to exactly reduce complexity by ignoring waste for the sake of mere self-defense—causing philosophy and civilization to split. Both are solid corporations of waste. While philosophy successfully keeps the matter of waste a best kept secret—Plato's *Parmenides*[42] is an early non-literary evidence—civilization is genuinely waste-modeled. If one keeps in mind philosophy's ignorance of waste, the reading of the following passage might become plausible. The discourse of the "waste-theorist" continues:

> Civilization did not rise and flourish as men hammered out hunting scenes on bronze gates and whispered philosophy under the stars with garbage as a noisome offshot, swept away and forgotten. No, garbage rose first, inciting people to build a civilization in response, in self-defense. We had to find ways to discard our waste, to use what we couldn't discard, to reprocess what we couldn't use. Garbage pushed back. It mounted an spread.[43]

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41 Ibid., 287. Cf. Torsten Hahn, "*Im Absturz*. Kafkas Beobachtung der Gegenseite oder Von Resten und Medien," in *The Parallax View*, ed. Markus Krause, Arno Meteling and Markus Stauff (München: Fink, 2011), 105–121.
42 Plato, "Parmenides," in *The Dialogues of Plato in Four Volumes*, *Vol. III*, trans. Benjamin Jowett, (New York: Scribner, Armstrong, and Co., 1878), 244–300. Whoever is philosophically concerned with waste is in danger of "fall[ing] into a bottomless pit of nonsense, and perish," as Socrates replies to the question if there are ideas about "things as hair, mud, dirt, or anything else which is foule and base." Ibid., 247.
43 DeLillo, *Underworld*, 287.

This garbage needs management. However, the waste-theorist does not call for traditional waste-management facilities. His politics are quite the contrary: "[B]asic household waste ought to be placed in the cities that produce it. Bring garbage into the open. Let people see and respect it."[44] The garbage is meant to be turned into a tourist attraction in a district with "georgeous buidlings to recycle waste,"[45] where parties of tourists can dispose their garbage, "[b]us tours and postcards"[46] guaranteed. This counter-program calls the roll to *translit(t)erate* the "covert rubbish category"[47] to an 'overt' category as Michael Thompson puts it. "Don't hyde your waste facilities. Make an architecture of waste."[48] As opposed to philosophy, literature encourages to reinstall waste into society. Here, one can perfectly see how "[l]e summum de la philosophy peut tenir dans un petit récit,"[49] as Michel Serres puts it.

The topology of the discourse of the properly moving garbage, the kind which does not elude itself from observation, seems to be that of literature. Our last example is supporting this thesis in a similar fashion. Here, we find another, yet quite idiosyncratic case of an *architecture of waste*: Edgar Lawrence Doctorow's *Homer & Langley*, fictionalizes the story of two brothers from New York, written in 2009. During the course of their lives, the historical characters Homer and Langley Collyer collected tons of refuse: dishes, books, instruments, curtains, rugs, weapons, or furniture. Over the years, Langley compiled these objects by collecting jaunts in New York. Certainly, after the brothers' death their flat was in danger to collapse so the vast collection of things needed to be removed under extraordinary circumstances. Doctorow's novel begins with the blind Homer who is forced to leave his passion for playing the piano because of an advancing deafness. To compensate his loss, he starts to write his memoirs on an old Braille machine. In his memoirs, his brother's passion becomes evident: Langley is a manic collector of cultural debris, objects which became useless, worthless and superfluous to society. He passionately amasses old military equipment which he bought cheaply since it has lost its value after World War I: gasmasks, guns, and so forth. He is similarly proliferate when it comes to piling

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44 Ibid.
45 Ibid.
46 Ibid., 286.
47 Thompson, *Rubbish Theory*, 9.
48 DeLillo, *Underworld*, 286.
49 Serres, *Éclaircissements*, 42.

up daily newspapers, though we know that nothing is as old as yesterday's news. With this in mind, he aims to reassemble the fragments to establish the only timeless "eternal always up-to-date-newspaper"[50] in order to replace every future news reports.

Categories of the useful and the useless do not matter. This becomes evident when he plans to buy a *Model T*, a car nobody but him seems to be interested in anymore, because, as we learn from Homer: "At this time, the end of the thirties, early forties, cars were *streamlined*. That was the word for the latest up-to-date thing in auto-design. Streamlining cars meant warping them, not showing a right angle anywhere."[51] But precisely the purchase of an outdated car model no person is interested in is the core of his very motivation. His motivation is even curiously extended when he places this car in the center of the family property's dining room. This would not have been a problem, had not Miss Robilaux, the family's cook, been wondering "why something made for the outside is inside."[52] Miss Robilaux had already been employed while the brother's parents were still living and their house had not been witness to the ubiquity of garbage in society. As Homer recalls: "a glorious elegance prevaled [in the house], calming and festive at the same time."[53] Miss Robilaux has been transformed into "the last connection to [their] past."[54] Of course the ongoing havoc in the patrician house set her thinking. However, Langley cannot quite follow Miss Robilaux's concerns: "How can you make an ontological distinction between outside and inside? On the basis of staying dry when it rains? [...] The inside is the outside and the outside is the inside."[55] By eliminating the ontological difference of the interior and the exterior which accompanies the distinction between waste and the practical and also its cultural demarcation, the house more and more favors the 'worthless,' as Michael Thompson puts it, hence these objects whose biography remains unwritten since they are rendered categorically invisible. Garbage as it is folds its way back from the outside into culture itself, and in addition to that is being amplified by Langley with the greatest effort possible. It reclaims its own politics.

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50 E.L. Doctorow, *Homer & Langley. A Novel* (New York: Random House Paperback Edition, 2010), 136.
51 Ibid., 80.
52 Ibid.
53 Ibid., 207.
54 Ibid., 100.
55 Ibid., 80–81.

In the course of the novel, this third nonhuman actor increasingly captures the house: The waste, the langleyan "accumulation of decades"[56] is now in complete domination. This leads to Homer, blind and by now completely deaf, only communicating with his brother via his Braille machine, becoming *included* by the culturally *excluded*: "Langley's defensive strategy has made it unwise if not impossible for me to try to get around the house. For all practical purposes I am imprisoned."[57] Langley's *defensive strategy* is nothing else than political separation from intruders and enemies. A necessity which derives from the fact that the messy twins' house at Central Park gained popularity due to several news reports; it even became "a greater attraction than the Empire State Building."[58] The house is attacked by stone-throwing children, prowlers are eager to get in possession of some stored money, the latter based on the newspapers' rumors. Threatened by that, Langley becomes paranoid and sets traps: "Each room has its punishing design of our things. Washboards greased with soap are laid on the floor for the unweary to step on."[59] Langley begins to reassign meaning to the useless objects as if the waste only ever had just one designated meaning: to defend from intruders. Doing so, he tries to reinstall waste into the collective in order to be in control of it: "[H]e began to devise from the horded materials of our life in this house—as if everything here had been amassed in response to a prophetic intelligence—the means of our last stand."[60] Langley, the "solemn investigator of useless things,"[61] turns into the creator of his own work: as an hermeneutician of waste, he assigns meaning to all the useless things in the house, yet ignoring or misinterpreting a crucial point—via their own powerful agencies and their sovereign qualities as an actor, things are able to resist Langley's urge to attach meaning.

Awaiting a fight for one's last stand, the aging Langley not only constraints his brother Homer but also himself. He finds himself confronted with the increasing threat of immobility: "Langley is also constrained. He has established himself in the kitchen with access in and out of the house through the back door to the garden. The front hall is completely

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56 Ibid., 205.
57 Ibid.
58 Ibid., 203.
59 Ibid., 206.
60 Ibid., 201.
61 Ibid.

blocked with boxes of books stacked to the ceiling."[62] Even these stacks are only narrowed down to one sole meaning: "he has piled things up in pyramidal fashion that the least nudge of any one thing [...] and the whole assemblage will fall on the interloper, the object of Langley's stratagems."[63] The "labyrinth of hazardous pathways, full of obstructions and many dead ends"[64] contained in that *architecture of waste* is, as opposed to the remarks of the waste-theorist, not at all designed to attract tourists, but to keep away intruders. Yet, the architecture hides a fatal problem, Langley's fallacy: he overlooks the fact that the enemy is not out there in the streets, but right in the middle of his own house. To a considerable extent and with enormous effort[65] he invited the very actor to his home who is largely emancipated and far away from letting himself be integrated into the assembly. This actor will finally have put a nail in the brothers' coffin: the impractical debris, the garbage gone wild, too powerful to be ever put back into the box again. All that, is rendered visible by Doctorow's novel.

The blind and deaf Homer eventually realizes that he could not possibly survive without Langley's support. Nobody is left to feed him and to help him get along navigating through the labyrinthine piles of waste. It is him who declares what both already knew: "My brother and I were going down."[66] Finally, in the tragic ending of the novel we read his last words emphasizing the clairvoyance of his vision: "[F]or how many days have I been without food. There was a crash, the whole house shook. Where is Langley? Where is my brother?"[67]

He was not able to foresee the astonishing consequences of his notorious collection of waste: things acted upon their agencies. The "comfort of things"[68] can turn into a horror of things unless we bring the agencies of things to our minds and start to successfully collectivize objects and their

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62 Ibid., 205.
63 Ibid., 206.
64 Ibid., 158.
65 Homer describes the vast extent of his brother's waste-collection: "the guts of pianos, motors wrapped in their power cords, boxes of tools, paintings, car body parts, tires, stacked chairs, tables on tables, headbords, barrels, collapsed stacks of books, antique lamps, dislodged pieces of our parent's furniture, rolled-up capet, piles of clothing, bycicles." Ibid., 158.
66 Ibid., 200.
67 Ibid., 208.
68 Cf. Daniel Miller, *The Comfort of Things* (Cambridge, UK: Polity Press, 2008).

remains. In this respect, Flusser's demand for a "philosophy of waste"[69] perfectly highlights the epistemological gap which needs to be filled if we do not want to become overrun by garbage and waste.

Literature is conscious about that problem. Therefore, it should matter to take literature's knowledge into account as Michel Serres and Bruno Latour do. In his recently published work *Enquête sur les modes d'existence*, Latour describes fiction from a whole new perspective. Here, the "êtres de fiction"[70] may claim "ubiquité,"[71] without them, neither one of the disciplines like technology, politics, religion or law[72] can be able to construct sufficient models of communication: "Pas de science possible, et surtout pas de science abstraite, sans peupler le monde de ces petits êtres capables d'aller partout, de se rendre partout."[73]

Out of this very love for fiction in general and for literary fiction in particular we can open up the possibilities for literature to create and negotiate a type of knowledge operating far beyond any scientific discourse—a knowledge, capable to unveil the epistemological gap. The texts introduced in this paper did precisely that: to show that literature could lay bare the blind spot by focusing on things with a genuine quality. Things existing beyond obligatory passage points, operative chains and mediation.

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69 Flusser, *Dinge und Undinge*, 10.

70 Bruno Latour, *Enquête sur les modes d'existence. Une anthropologie des Modernes* (Paris: La découverte, 2012), 246.

71 Ibid., 253.

72 Cf. ibid., 253.

73 Ibid., 254.

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MICHAEL NIEHAUS

WANDERING THINGS

Stories

I. INTRODUCTION

Under the plain titel *Wandering things. Stories* I want you to pay attention to a specific manner how things can become actors or can be considered as actors. Quite simply, if you say that things are *wandering*, you must consider them—*somehow*—as actors. In this regard, the wandering of things can be represented only in stories. But—as I want to point out—this simplicity holds an enigma, because our relation to the things in general is at stake. What about our relation to the things? If we try to get an answer to this question we maybe deposit a specific thing in front of us to observe it, or we may bring a thing to mind, as a matter of theoretical reflexion. In both cases, the subject-object-relation is already presupposed, as Martin Heidegger has declared. Under this circumstances, the thing being present-at-hand (*vorhanden*) is something, of which the readyness-to-hand (*Zuhandenheit*) is granted. The thing is something at our disposal, it is an object of pleasure or consumption, or it is a willing object of contemplation.

Philosophical theories of things are insofar unbalanced as they focus on a thing under the precondition it can be considered by itself. It is supposed that the thing is either ready-to-hand or, in the contrary, deprived, not ready-to-hand (*unzuhanden*). The axis in question is that of presence and absence, but this presence and this absence take place only between me and the thing. The *others* have nothing to do with this affair, with this thing. The presence of the thing is not thought of as a belonging, as a possession or property; and the absence of the thing is not thought of as the belonging of an other. In this perspective, the thing as a social fact remains hidden.

II. TRANSACTION

The forms in which things can be possessed or not possessed become conspicuous in the transactions, that can be executed with them. A thing is an object of possible transactions. This is true especially for the things called *mobilia* in accordance with the Roman law and *Fahrnis* under the Germanic law: In the case of movable properties, the transactions become observable. Movable things can actually pass from hand to hand. To speak of wandering things does not refer to the physical space, but to the social space. A culture in which different ways of having a thing don't exist is hardly to imagine. The transaction is more than a *Fort-Da* as Freud describes it in *Jenseits de Lustprinzips*.[1] It connects me with another in the mode of swapping, buying, donating, delivering, lending, stealing, bonding etc. But this is only the first step. In order to talk about wandering things (and not only about movable properties), an important additional condition has to be introduced in the following.

As long as there is only *one* transaction, I am connected with *one* other person. The function of the thing—apparently—is reduced to define this one connection. By the thing, I am referred to this other. So, if am cheated in purchasing something I have to adress myself to the salesman; if I am stolen I have to catch the thief; a gift should be responded by a gift in return; a souvenir should be preserved.

Under this circumstances, it is not yet clear what a movable thing in fact can be. Therefore, a *second* transaction is necessary bringing a *third* party into play. This second transaction is implied in the first already. It is always possible: What I have got from somebody I can pass on to another. This happens continuously, and only at the first glance gift and exchange are more fundamental. Members of a culture connect themselves under the sign of objects being passed on. In this respect, the social bond exists because everybody is in the position of someone who may pass on movable things. In the same way, *human* communication is not based on mere signals to be exchanged (like in the case of the famous bees of Karl von Frisch), but on the possibility of passing on the words that are

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1 Cf. Sigmund Freud, "Jenseits des Lustprinzips," in *Psychologie des Unbewußten*, by Sigmund Freud, vol. 3 of *Studienausgabe*, edited by Alexander Mitscherlich, Angela Richards and James Strachey (Frankfurt a.M.: Fischer, 2000), 213–273, especially 224–226.

spoken to me.[2] The third party is the precondition of speech. Human speech is something to circulate.

In this regard, wandering things are *not* described as a part of a structure or an element in a network as in the Actor-Network-Theory. The movable thing may function as an actor because it circulates *inside* a network, but it may also overstep and transcend the network. It is something that can be *displaced*. So, in comparison with the Actor-Network-Theory, this is a different point of view. This point of view is only available by telling stories in which things get another kind of actor-status.

III. POSSESSION AND OWNERSHIP

In order to differentiate the various types of having a thing, there is the distinction between possession and ownership or proprietorship (*Besitz* und *Eigentum* in terms of the german law). Is it possible to imagine a culture *not* making a difference between rightful and wrongful possession? What kinds of options do I have, if someone denies my rightful possession of a movable property declaring he himself to be the legal owner? I can explain, where I got it from—for instance who gave or sold it to me. So, I can refer to a warrantor (*Gewährsmann*). The former owner becomes a third party, who guarantees the rightfulness of my possession.

In the ancient germanic law this was a judical procedure called *Dritthandverfahren*. According to this procedue, the tried property right virtually releases the so-called "Zug auf den Gewähren"[3], because my warrantor also needs a warrantor to testify *his* property right and so on. This is the best way to demonstrate that the others are implied in the thing that I hold in my hands.

But law also shows that the *possession* of a thing is not as simple as one might think. Possession means the de facto power over a thing (in German law: "tatsächliche Sachherrschaft"), but a *will* to possess the thing ("auf den Besitz gerichteter Wille") is also required. Insofar, not only the category of ownership, but also the category of possession implies an immaterial and a little mystic dimension. Of course you don't need to know all the things stored in your cellar in perticular, but a possession

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2 Cf. Jacques Lacan, "Fonction et Champ da la Parole et du Langage," in *Écrits*, by Lacques Lacan (Paris: Éd. du Seuil, 1966), 237–323: 297.

3 Cf. Adalbert Erler and Ekkehard Kaufmann, eds., *Handwörterbuch zur deutschen Rechtsgeschichte*, vol. 1 (Berlin: Erich Schmidt, 1971), p. 160.

of a thing you don't have the slightest idea about, is not a possession any more. For example, from a legal point of view I don't possess the drugs deposited in my cellar without my knowledge.

Every child can possess something. In the textbooks of this matter you can read that a child having forgotten his bicycle on the playground, still is the possessor of this bicycle, as long as the relation between the person and the object still has a certain intensity.[4] If I am still aware of the place where I have left something, there remains a kind of bond between me and the thing. But this bond—paradoxically—can be cut by someone without my knowledge, if somebody else takes the property and stuffs it in his own pocket without respect for the other's possession.[5]

Such considerations are important, because they show that possession is a strange thing. On the one hand possession is characterized as the actual control over an object—and therefore implies a power relationship (*Gewaltverhältnis*)—, but on the other hand it consitutes a protected legal position.[6] In principle, the thief even is allowed to use force to protect his piece of booty against the offense of the legal owner, because with the seizure he acquires a claim that his possession is protected (*Besitzschutzanspruch*).

The reason for this is the legal certainty (*Rechtsfrieden*), which is a great value. Only the presumption, that the possession is legal, allows legal certainty. If someone can be seen possessing something he effectively *exhibits* himself as the proprietor. This is the publicity function (*Publizitätsfunktion*) of possession. Of course, you may not only hold an object lawfully in your hands without being it's legal owner, you can also hold it in your hand without possessing it. For instance, if you are a baggage porter you are not a possessor, but an agent in possession (*Besitzdiener*).

Of course, the category of property is rather complicated, too. According to the German property law proprietorship is a comprehensive right of disposition (*umfassendes Herrschaftsrecht*). But that doesn't mean that it is *unlimited*—just like the possessor, the proprietor of an object is not *alone* with it. So, at first the limit of the right of disposition results from the rights of a third party. At second, as it is articulated in the German *Grundgesetz* in Article 14, the social obligation of property (*Sozialbindung*

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4 The relation "zwischen Person und Sache" has to be "von einer gewissen Intensität" [Walter Gerhardt, *Mobiliarsachenrecht. Besitz – Eigentum – Pfandrecht* (München: Beck, 1976), 15].

5 "ohne Achtung vor fremdem Besitz" (ibid.).

6 "rechtlich geschützte Rechtsposition" (ibid., 17).

des Eigentums) has to be taken into account. At third, and particularly relevant in this context, the boundedness of ownership becomes obvious, if the property turns into waste. Having turned into waste, the 'thingness' of the object becomes insisting. Of course, there exists the abandonment of movable property as a special act in the law, but it cannot be performed *ex parte*, because in our society, there is no such thing as a no man's land, but a waste deposal law instead.

The wandering of things, insofar it can be described in terms of legal transactions, normally takes place without attracting attention. The things don't manifest themselves as actors. Therefore, one could say: they remain properties. This changes if the things produce unforeseen *feedbacks* during their wandering or if the things are *observed* what they *cause* during their wanderings. Under this circumstance, it seems as if the things had their *own way*, as if they owned a *self-will* subjecting the participants to a structure or a relation. If a thing causes or uncovers relations behind the back of the participants, it appears as an *actor* that remains totally *passive* at the same time.

Such a wandering consists in succeeding incidents or transactions. So, it is object of a narration. It appears only in stories. To turn towards wandering things therefore means to talk about stories containing wandering things which occur as actors—prominently or unimposingly. A "story" has to be understood as something having a plot causing relationships between different subjects. People are linked and brought into a constellation by the wandering thing. It becomes a signifier beyond the importance that the thing may have for one single person in an exclusive relationship.

IV. THING-STORIES

Strictly speaking, a narrative with a thing as an *actor* will not be the story of this thing. Such pure thing-stories are rather borderline cases because they are hardly something else than the episodic stories of their following possessors and owners who are only externally related to each other. Of course, there are many narratives with this underlying structure. In British literature, so-called *it-narratives* were a temporary fashion especially between 1750 and 1830.[7]

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7 Cf. Mark Blackwell, ed., *British It-Narratives (1750–1830)*, 4 volumes (London: Pickwering & Chatto, 2012). This anthology contains a large number of thing-stories of different kinds of things, many of them are wandering things.

With regard to twentieth century literature, for instance Heinrich Bölls *Abenteuer eines Brotbeutels* (*Adventures of a Haversack*) tells the story of a haversack owned by different soldiers living and dying in a world of various wars until it turns back to the place where it started half a century before. Or, concerning novels of epic dimensions, in *Accordion Crimes* by Annie Proulx (1996), a particular accordion wanders through a twentienth-century Northern America in eight episodes. It crosses different minorities of immigrants and their various musical traditions dedicated to dwindle away. The thing, losing material and symbolical value during this journey, is thrown away as waste out of a truck in the end. The accordion's journey is an *odyssee*: The thing is in the position of a completely passive epic hero only with the function to connect and disclose various rooms, social environments.

Stories are always dealing with subjects. Therefore, the thing of a thing-story virtually receives subject-status. But this subject-position is only one of suffering, whereupon this suffering is paradoxically a suffering without organs, so its story will be a passion without pain. Perhaps, this becomes most obvious in Hans Christian Andersen's unfathomable and horrible fairy tale *The Steadfast Tin Soldier*. The story follows the voiceless and unflexible tin soldier on his little odyssee until he melts with his beloved puppet dancer in the fireside, being a subject without acting.

This ambivalent position of the thing in a thing-story becomes manifest, if the thing actually is ascribed subject-status—if it really does what we like to impute it to do hypothetically: to tell his *own story*. Many of the it-narratives in British literature have things as narrators, beginning with the satirical *Adventures of a Shilling* by Joseph Addison in 1710. In the eighteenth century, many pieces of money tell their adventures that take place when they pass from hand to hand.[8] Often they function as spies who disclose the intimate secrets of their owners, because things allow 'unperceived perception'.[9]

If the thing becomes a narrator—may it be a coin as in Hans Christian Andersens fairy tale *The Silver Shilling*, a handkerchief as in James Fenimore Coopers Book *Autobiography of a Pocket-Handkerchief* or a car

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8 The first volume of the *British It-Narratives* ist dedicated to money, most of the texts name themselves as "adventures" (*The Adventures of a Halfpenny, The Adventures of a Silver Penny, The Adventures of a Bad Shilling in the Kingdom or Ireland, Adventures of One Pound Bank Note* and so on).

9 Cf. Mark Blackwell, "General Preface," in *British It-Narratives (1750–1830)*, ed. Mark Blackwell, vol. 1 (London: Pickwering & Chatto, 2012), xx.

as in the film *In jenen Tagen* by Helmut Käutner—the thing always tells his story detached from his materiality as a thing. It has no organ to tell its story, no mouth. It tells its story exclusively for us, the readers.[10] So, the shilling in Addisons story can be coined newly, the handkerchief in Cooper's Novel can be embroidered elaborately, the silver shilling in Andersen's fariy tale can be speared in the middle and the limousine in Käutner's film can be cannibalized without affecting its position as a thing *delivering a speech without acting.*

V. THE THING AND THE INTERSUBECTIVE TRIANGLE

In the it-narratives, precisely because the story is told by the thing itself, the thing appears as a *non-actor*. It is impossible for it to *observe* itself *as* an actor. On the other side a thing in a story may not only function as a *subject*, but also as a *signifier*. Since Jacques Lacan's famous lecture on Edgar Allan Poe's *The Purloined Letter*, this letter has become a paradigm of a thing functioning as a signifier and therefore it belongs to nobody. A letter is not a coin; it is not exchangeable.[11] According to Lacan, the letter in Poe's story is the "*sujet véritable*," because it has a route or a path *of its own* "un trajet *qui lui est propre*."[12] As long as it is not on its right place (that means: as long as it is inside the story) the letter circumscribes a way where those who grasp the letter consider themselves to be *empowered* on the one side, but on the other side they cannot display themselves as the empowered possessors. On the contrary, they are in a powerless position, because they can't prevent the letter being taken away from them.

Lacan analyzes Poe's text as a story that exposes the pure materiality of the (subjecting) signifier without the signified: undoubtedly the content of the letter is something that can be cancelled down. Nevertheless, the letter only can *appear* in the story invented by Poe because it is *more* than a signifier. It's just a letter with peculiar characteristics that are important

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10 In some of the stories the things, especially in the eighteenth century, may also be able to talk to each other and share their experiences, but certainly they cannot talk to human beings.

11 As Lacan declares, with respect so signifiation, money is the most annihilating signifier (the "signifiant le plus annihilant que soit de toute signification." Jacques Lacan, *Écrits* (Paris: Édition du Seuil, 1966), 37.

12 Ibid., 29.

in the story. Only if the letter is a removable thing in a story it can have a way of its own and become a "a dramatic allegory of psychoanalysis."[13]

Only insofar the signifier is a thing, it can be regarded as an *actor* that may signify someone. It can be an indication in a chain, in which I am a link. In Germany there's a children's game called *Ringlein, Ringlein, du musst wandern* (in Britain, there's a similar game called *button, button, who's got the Button*). In this game, a ring is strung, and the string runs through the fists of the children forming a circle. The ring is handed over by waving the fists until they get into contact to the fist of the neighbour. In the middle, there is the guesser—in some way the 'eye of the law'—who after a while has to say who is the possessor of the ring at this moment. To deceive the guesser, the other children who don't have the ring, move their fists too, as if they would transport the ring. The ring itself belongs to nobody. It owns to the bond represented in the string that connects the players making common cause against the 'eye of the law'.

In this children's game, the thing circulates in a regulated way without generating a story. All participants (except the guesser) are in the same position. But things wandering inside of stories may also function as signifiers of a chain-linking. Such stories tell about people that are moved into a subject-position by the thing that has nothing do with their actual physical authority. In these cases, things indicate constellations between subjects they didn't know about. The crux is an intersubjective chain-linking of at least three persons. No doubt, from the legal point of view the path of the thing doesn't need to be a wrong way at all. The thing doesn't need to be purloined, defrauded, stolen or robbed. But one can also say that, from the point of view of the wandering thing, *every* way is a wrong way, a meander. This becomes obvious, if the thing returns to the first one opening his eyes about his own position in a triangle.

In Gottfried Keller's story *Die Berlocken* the young French soldier Thibaut de Vallormes donates his famous trinkets he had robbed from various women and girls to an indian child of nature in hope for a wedding coming soon, but during the grand feast with the French soldiers and the indians, he is shocked when he recognizes his beloved gift suspending on the nose of the dancing "Donner-Bär" ("thunder-bear") who is the true fiancé.

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13 Shoshana Felman, *Jacques Lacan and the Adventure of Insight. Psychoanalysis in Contemporary Culture*, (Cambridge, MA and London: Harvard University Press 1987), 11. Cf. also Michael Niehaus, *Das Buch der wandernden Dinge* (München: Hanser, 2009), 364–384.

Certainly, the triangle may be imaginary or perhaps latent. In *The Arabian Nights. Tales of 1001 Nights* Shahrazad tells the story of the three apples.[14] A young wife gets dangerously ill and begs her husband, a merchant in Bagdad, to bring her an apple. Unfortunately, apples are not available in Bagdad, so the merchant travels to Basra and brings back three apples. But when he returns, the weakness of his wife has grown worse and she puts the apples aside. So the young merchant leaves his home and goes to the basar in his shop. After a while, he sees a black slave passing by holding one of these three apples in his hand and playing with it. He asks him about the apple and the black slave tells him that he has got it from his sick mistress, and that the husband of his mistress has bought three apples for her in Basra. The young merchant, out of his mind with anger, returns home and finds only two apples. His wife cannot say something about the third apple, and so the merchant kills his wife immediately. But later, it is proved, that the little son of the married couple fetched the apple to play with it in the street where the black slave took it away in spite of his urgent requests that this apple would be one of three apples belonging to his sick mother.

The deception by an evidence of jealousy is a literary topos. It's not a surprise that the most famous tragedy of jealousness, Shakespeare's *Othello*, unfolds this topic quite systematically. At first, Desdemnona gives the embroidered handkerchief to Othello to alleviate his headache, but he lets it fall down inadvertently. Then Emilia, Jago's wife, picks it up. Jago demands it from her and places it in the chamber of Cassio. Cassio finds it and gives it to Bianca, his mistress begging her to make a copy. This handkerchief connects all six characters and characterizes the three couples of this tragedy until it catches Othello's eyes again, becoming the decisive "ocular proof."[15] Certainly, after this acquittal the handkerchief makes its exit. Its only function is to *configurate* the involved subjects of the drama.

Loaded with significance, enwraped with discourses, not for the enlaced characters of the tragedy, but for *us* this handkerchief may become an enigmatic thing. To appreciate it, its material qualities have to be considered: that it is handmade and worth to be copied, that it can

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14 Malcolm C. Lyons with Ursula Lyons, trans., *The Arabian Nights: Tales of 1001 Nights*, introduced and annotated by Robert Irwin, vol. 1 (London: Penguin, 2008), 122–129.

15 William Shakespeare, *Othello*, ed. Norman Sanders, (Cambridge, UK: Cambridge University Press, 1984), 129 (3.3.361).

drop to the floor without a sound, that it can be contaminated by use and abuse and so on. All these qualities transcending its character as a sign must be considered to analyze the specific way in which a thing can be predestined to become an actor in a story.

VI. MAGIC INSTRUMENTS

The specific qualities of a wandering thing are especially important, if the thing is of a kind we usually call *instrument.* One could think, that the purely intrumental relation to a thing effaces its history. If a thing can be used as we want it to use, its former owners are indifferent and not worth mentioning. But, concerning *stories*, it is in question, if such a totally instrumental relation is even possible. Let's look at the marvelous wish-fulfilment things in fairy tales which are surely instumental in an outstanding way. Some of them can be used for unspecific wish-fulfilment like Aladdin's magic lamp in *The Arabian Nights*, some of them are tailored to specific needs like the objects in *The Wishing-Table, the Gold-Ass, and the Cudgel in the Sack*.

In both cases, there is a problem with the instrumentality from a logical point of view. The character that possesses the magic thing becomes the protagonist of the story only because he possesses it. One could say that the magic thing is *attached* to its legitimate owner. If the wrong one lays his hands on the magic thing—like the sorcerer's apprentice on the broom in Goethe's famous ballad—the instrumentality quickly comes to an end. The faculty to operate the instrument may become the crucial attribute—only Ulysses is able to draw the bow, the suitors are unable to do that.

In fairy tales—and this may be the really magical—there is always only *one* person considered to *deserve* the marvelous thing (in legends however the marvelous things can be heirloom). This is the reason why magic things don't really change their owner in fairy tales. If they got lost in one way or another, they always return to the legitimate owner. In the fairy tale *Die treuen Tiere* (the loyal animals) by the Brothers Grimm for example the male protagonist deserves the white magic stone, because he has ransomed a mouse, an ape and a bear with his last money. The stone just floats along as he is abandoned in a box on the water. The helpful animals, who already have opened the lock, let him know that this is about a magical stone fulfilling wishes. Some time later, the man now owns a magnificent castle and so on, he—paradoxically enough—exchanges his

stone with some jewels offered by a few merchants coming to his castle. Immediately, he finds himself in the floating box again. Although the merchants have acquired the magic stone legally by all means, the three animals are allowed to help the man once more stealing the stone from the merchants and bringing it back to him. In fairy tales transactions are not ruled by the logic of proprietorship of the civil law. The merchants only have *acquired* the stone, but the protagonist *deserves* it. Is is *attributed* to him.

The attribution of protagonists to marvelous things can also be of an opposite kind. This can be demonstrated by a literary fairy tale in which the *obstinacy* of the marvelous thing—and therefore its status as an actor—insists in a very specific way. In Friedrich de la Motte Fouqué's story *Das Galgenmännlein* from 1812[16], the magic thing is a kind of creature with very specific qualities—a bottle imp.[17] It is not necessary to describe how the protagonist of the story, a young man named Reichard, who wanted to make his fortune as a merchant in Italy, has gained this diabolic thing. For now, he is the legal owner and has a problem. If you own the bottle imp, it's for instrumental use only: It fulfills all wishes for money, but if you own it when you die, you will burn for eternity in Hell. The 'comprehensive right of disposition' which is connected with the concept of property, here turns into the very reverse in the moment of death. The thing is not only indisposable, it is also indevisable. Insofar, one could declare the effects of this precept as a peculiar specification of the 'social obligation of property,' because the fear of an unforeseen death may provide that a maximum number of people become owners of this magic thing, that promises infinite properties. To some extent, such a bottle imp is expotentiated money, that is to say expotentiated potentiality.

In this manner, a wholly secularistic systemic logic is constructed and a pure *homo oeconomicus*, whose genealogical bonds are severed according to the undevisability of the thing. The dead is the one who is not further able to forward the circulation. The thing makes the money rolling. It fires the trade cycle. But this is not enough. In respect of the circulation of the bottle imp, there is a second basic condition. It is truly diabolic.

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16 Friedrich Freiherr de la Motte-Fouqué, "Das Galgenmännlein," in *Werke*, ed. Walther Ziesemer, vol. 1 (Berlin: Bong, 1908), 223–248.

17 The famous story *The Bottle Imp* by Robert Louis Stevenson (1891) has a very different plot (it's a love story), but the creature has the same specific qualities.

In a reversal of all economic principles the bottle bottle must be sold for less than its owner originally paid, or else it will simply return to him. Of course, the bottle may not be thrown or given away. And these commands must be transmitted from each seller to each purchaser. No tricks! All must take place according to the rules of legal economic transactions. Legal owner and possessor are always the same person.

This is the crucial condition of the transfer. Being unfertile, the domain of circulation expends itself. Each transaction makes the next one more improbable. Because of the growing risc not to get rid of the purchased bottle imp, the fate of the last owner is already casting its shadow.[18] Not only foresight is characteristic of human subjects, but also the consideration of the foresight of others.

The bottle imp is an in-between. Therein lies its obastinacy and its *diabolic* character in a literal sense. As a being in a undestroyable bottle it is composite, but indivisive. It does not bring *together* like the *symbolon* (originally the two fitting halves of a broken clay tablet in ancient Greece demonstrating the bond between coequals), but it *tears apart.* Concerning this paradigmatic thing, there's no community (and no communication), there's only the total legal position, the exclusive, unrelinquishable proprietorship, subjecting the proprietor.

What about the end of the story under this circumstances? Reichard is lucky to be a protagonist of a fairy tale. After having used the bottle to get rich with more or less fortune, he makes various unsuccessful attempts to get rid of the bottle by cheating the purchaser in one or another way. Every time he gets back the bottle, the price has become lower. At the end, our contrite hero strays through the not yet unified Italy, searching for a princedom with a coin less worth than a halfpenny to have a theoretical chance to sell his property. At last he encounters the rescuing *deus ex machina* who is a veritable *diabolus ex machina*: a blackguard from the *premodern* times of diabolic economy. Once upon a time this sinister guy has sold his soul to the devil for a fixed amount of money spent now. He buys the bottle imp, so Reichard can return to Germany where he will found a family and operate economically the rest of his life.

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18 In some philosophical papers, with respect to Stevenson's text, this is named the "bottle imp paradox." Cf. Roy A. Sorensen, "The Bottle Imp and the Prediction paradox," *Philosophia* 15/4 (1986): 421–24.

VII. THINGS OF POWER

In some way, Fouqué's story demonstrates by overcompliance: Things that prove themselves as actors exceed the logic of personal property. The wandering thing, which is neither completely absorbed in its sign character nor in its instrumental function to a certain extent can become a *mythical* thing. This becomes obvious when a *curse* is said to be lying on it. It is not by chance, that perhaps the 'greatest stories' of the last two hundred years (from the point of view of their effectiveness) have such a cursed thing in their title: Richard Wagner's *Der Ring des Nibelungen* and J.R.R. Tolkien's *The Lord of the Rings*.[19]

In fact, both of these synthetical myths are kept together by a wandering *thing of power*. From the beginning, it is evident that the category of personal property does not fit for the ring-thing in *Der Ring des Nibelungen*. Even before the ring enters the stage (if one can say so), there are *four* positions or parties raising a claim. At first, the claiming Rhine-Daughters, from whom the material, the gold the ring is made off was robbed; *secondly*, Alberich himself, who was able to build the ring, because he abdicated love, and who now uses it to suppress the underworld; *at third*, Wotan, who asserts a right on the ring, because he is the supreme god, and who needs the ring to stabilize the order of the world; and *at fourth* the giants Fafner and Fasolt, who are qualified to require the ring as an compensation for the denied goddess Freia.

None of these clains is totally wrong, none of them is totally right. So, this ring is dedicated wo be removed because there is no right place for it. At the same time, the ring is representative for a world situation in which all right places are arguable. With his powerful eloquent curse Alberich only makes explicit the curse that is lying on the ring anyway. The ring's master ("des Ringes Herr") will be the ring's slave ("des Ringes Knecht"), he exclaims.[20] Yet, one has to ask, whether this curse really is realized in the great story of the Nibelung's ring. According to the imagination of

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19 Cf. Michael Niehaus, "Dinge der Macht. Der *Ring des Nibelungen* und der *Herr der Ringe*," *Zeitschrift für Germanistik* 22 (2012): 72–88.

20 English translation of the passage: "and serve the ring / that he seems to rule." Alfred Forman, *The Nibelung's Ring. English Words to Richard Wagner's "Ring des Nibelungen" in the Alliterative Verse of the Original* (London: Schrott, 1877), 65.

Alberich, the self proclaimed legal owner of the ring, the return to the ring to himself would solve the curse. But, in the contrary, this *imagination* is in effect the *centre* of the curse. Alberich is the one who makes evident, that the proclaimed master of the ring is actually its slave.

The crucial point of the ring is, that it is standing idle nearly all the time, watched by the sleeping Fafner in his cave. With Siegfried's robbery the ring enters a completely new constellation, being totally independent from his instrumental function as a thing of power. As a love token, a symbol of a marriage and an aid to memory it becomes a *sign*. After having been robbed by Wotan and Mime, the ring is never more *applied*. This is also the reason, why it is completely nebolous, how this ring really works.

The Nibelung's ring has its place particularly in verbal and musical *discourse*. Repeatedly, the characters who are in the know point to him and broach the issue of its absence. Only the bearers of the ring don't know anything about that (or don't want to know). In this respect, the ring is similar to what Alfred Hitchcock has called a "MacGuffin." With this coinage Hitchcock named a plot motive that initiates the plot of the story and keeps it running, but which is finally revealed to be irrelevant. Only its absence, its inaccessibility is relevant—due to this inaccessibility, the MacGuffin becomes an actor. A typical example for a MacGuffin would be a suitcase everyone wants to have although the content of the suitcase never becomes clear. Actually, the philosopher and psychoanalyst Slavoj Žižek has called the Nibelung's ring "the greatest MacGuffin of all times."[21]

Concerning the ring-thing, which is so small that it is nearly invisible on stage, it is essential that it *represents* something that cannot be owned like an *object*. It is not possible to *have* power as a *property*. This is confirmed by the synthetical myth, when the ring is thrown back into the floods of the Rhine at last.

In a related, but also very different manner this theme is also developed in J.R.R. Tolkien's *The Lord of the Rings*, the synthetical myth *par excellence*. The fictional universe created by Tolkien is undoubtedly a unique form of a "Gesamtkunstwerk." In his trilogy, Tolkien unfolds a metaphysics of power. Unlike in Wagner's *Der Ring des Nibelungen*, the starting point in *The Lord of the Rings* is the *little*—the species of the

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21 "[D]e[r] größte[ ] MacGuffin aller Zeiten" (Slavoj Žižek, "Diese obskuren Objekte des Begehrens. Alfred Hitchcock als Wagnerianer – eine Hommage zum 100. Geburtstag des britischen Regisseurs," *Frankfurter Rundschau*, August 13, 1999, 10).

Hobbits inhabiting the idyllic "Shire," in maximum distance to the centre of power. By chance the hobbits have got the "One Ring:" "One Ring to rule them all, One Ring to find them, / One Ring to bring them all and in the darkness bind them." It was forged by the Dark Lord Sauron in former times in order to gain dominion over alle free people of Middle-earth and those who wore the other rings of power, especially the three rings of the elves. Creating this ring in Mount Doom in his empire Mordor, Sauron *transferred* much of his dark power into the ring. According to this plot, power therefore becomes an object that can get lost like a thing. So, on the one hand, this was necessary for him to rule the other rings, but on the other hand, he became *dependant* on the ring. With this objectification, power is executed by an *instrument.* Like in *Der Ring des Nibelungen*, the One Ring objectifies the faculty to *enslave* all alive, and like in Wagner's music drama this functions in an inscrutable, paranormal way.

In the antecedent age, Sauron was defeated in a decisive battle, and the hero Isildur was successful to cut Sauron's finger with the ring off. But instead of destroying the ring in Mount Doom, he keeps it. So, it goes astray. But unlike the Nibelung's ring, Tolkien' One Ring has supernatural qualities not only in respect to others, but also in respect to his bearer. The curse realizes itself in a supernatural way. The possession of the ring extends the life while the body of the bearer becomes more and more etiolated. This is to epitomize, that all thinking and aspiring of the bearer of the ring increasingly is focussed on his 'precious'. This obsession is not presented as enjoyment but as a curse. In the end, when Frodo, the little bearer of the ring, has to throw it in the fire of Mount Doom to neutralize this thing of power that shouldn't have come into existence, he refuses to do so: "I do not choose now to do what I came to do. I will not do this deed. The Ring is mine!"[22] This proves that he has become the slave of the ring. The destruction of the ring can take place only by accident, by a false step.

The *fantasy-genre*, for which Tolkien's *The Lord of the Rings* can be said having laid the foundation, is in a whole dominated by the question of power (as the *detective story* is dominated by the question of truth). There is always the problem how to gain power and how to gain the instruments to gain power, how to preserve power and how to overthrow a hostile power. And at all times it is the aim—generally within feudal

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22 J.R.R. Tolkien, *The Lord of the Rings. Part 3: The Return of the King*, (London: Harper Collins, 2007), 1237.

structures—to maintain the good power against the bad power that always appears as the force of *overpowering*. The One Ring is apparently a funcional equivalent for this kind of force.

Concerning the relation between this ring-thing and the story told by *The Lord of the Rings*, one has to assert that the ring is not an appropriate instrument. From a viewpoint outside of the fiction, Sauron creates the ring, *so that* the story of its loss, its appropriations and so on can be told. Indeed, this is something the ring has in common with many other magical instruments being so widespread in the world of the fantasy genre. Magical weapons for example are different from the correspondent skills (or parts of the body) not least because they can get lost, misappropriated and abused by others. The world of fantasy is not reigned by the conception of proprietorship of the Roman law we are underlying in our real life. Here—*mutatis mutandis*—the Germanic law prevails without the Roman idea of proprietorship as a comprehensive right of disposition. The important things are not received by purchase, but by by destination to be their finder, by capture in a struggle or by being recognized as the dignified heir (they are more than mere objects and affairs).

According to the relation between power and proprietorship, in Tolkien's One Ring there's a specific moment of reflection in comparison with the 'ordinary' important things in the fantasy-genre. Because the ring is *created* to be misused, *nobody* can be its legitimate owner, nobody can reveal himself to be its possessor. This would only prove its abuse. That is to say that nobody can own the *power* that is objectified in this ring. Accordingly, it is not the *own* power you gain when you grasp the One Ring—the power changes its possessor without being transferred. Power is presented as a *thing* (not an affair). This is the metaphysics of power (as complement to the microphysics of power according to Michel Foucault). And respectively the *thing* can be defined as something that is only supposed to be ones own. In the form of a synthetic myth we are reminded that the belief in proprietorship is also an effect of the habituation of the possessor and that the thing always remains a potential actor.[23]

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23 Gandalf, the good magician in *The Lord of the Rings* also tells the story of the One Ring this way: "The Ring was trying to get back to his master. It had slipped from Isildur's hand and betrayed him; then when a chance came it caught poor Déagol, and he was murdered; and after that Gollum, and it had devoured him. It could not make further use of him [...]." And: "[...] the Ring itself decided things. The Ring left *him*." Ibid., 73. In the case of wandering things having their own way, things always can be described this way.

VIII. JEWELS

To remind us of the circumstance that a thing is something else than an affair, it is not necessary that the things in question are magical things or supernatural things of power surmounting the logic of personal property. Obviously, this is the case with corpses that belong to nobody and may not be handed over as an affair.[24] Wandering corpses are also subject of a lot of stories.[25] Intead of turning over this dark leaf, I want to focus another kind of things which are in a way the opposite of putrescent corpses: the bright jewels. In our culture, especially the diamonds are considered to be the most exclusive and imperishable things. In all likelihood, they will outlive all the people who will have held them in their hands. Even more: All these hands leave no *marks*. The surface of a jewel is smooth and hard. The stories and history pass it without leaving a trace. It is mute. It is only its manifestation that captivates us.

But this also means: In itself, the proprietor cannot prove his comprehensive right of disposition by, for example, engraving his name or his initials as it is common with rings. Between the jewel and its proprietor, there's no visible relation. Of course, the are certificates and documents, but these are always auxiliary means only. In spite of the legal relationship jewels refer to an *archaic* order of stories where everything depends on the de facto power over the thing and the category of legal ownership remains problematically.

In most of the stories, the de facto power is not beneficial for the possessor. The curse laying on a jewel is a common topos. Therefore, at the end of the story they usually have to be deposited in a place, where they have ceased to be a personal property. In the complicated novel *The Moonstone* by Wilkie Collins (1868) the holy diamond has been brought from India to Great Britain a long time ago by a shady colonial officer. In Great Britain, the diamond causes confusion and trouble. The story can come to an end only when the Moonstone is returned to adorn the statue of the indian goddess. In the black humor-comedy *Der Diamant*

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24 Cf. Michael Niehaus, "Dinge in Bewegung," in *Handbuch materielle Kultur*, ed. Stefanie Samida, Manfred K.H. Eggert and Hans Peter Hahn (Stuttgart: Metzler, 2014), 132–140, especially 135–136.

25 Maybe the best one is the novel *The Wrong Box* by Robert Louis Stevenson and Lloyd Osborne (1889).

by Friedrich Hebbel (1841), the diamond is the questionable pledge of the legitimacy of a dynasty. But unfortunately it is erred, especially it has got into the belly of a jew who has swallowed it up to usurp it as his personal property. In consequence, a number of people is in hot pursuit of him to catch and disembowel him. Subsequently the diamond is defecated at the border of the stage. But nothing can harm its immaculateness, and so it can at last be returned to the sovereign.

Colonial misdeeds also are responsible that the diamond in Robert Louis Stevenson's *The Rajah's Diamond* (a part of his *New Arabian Night* from 1882) causes confusion for his various possessors. When the Rajah's Diamond—the sixthlargest diamond of the world—gets to hold of a young clergyman who has opened a found little case, the narrator comments, that this low-browed young man would not be acquinted with "precious stones"—"but the Rajah's Diamond was a wonder that explained itself; a village child, if he found it, would run screaming to the nearest cottage; and a savage would prostrate himself in adoration before so imposing a fetish."[26]

The finder is mistaken when he thinks that everyone owning this stone would be released from the "primal curse," because he "might follow his own inclination without concern or hurry."[27] Evaluating this diamond according to its exchange value, one would have to say, that "a man might as easily negotiate St. Paul's Cathedral."[28] This leads to the consideration of an opportunity always being implicit when singulary stones go from hand to hand: It would be possible "to cut it into three or four."[29] But in *stories*, this *sacrilege* never is executed. The everlasting diamonds will remain untouched. The jewel is acclaimed as mythical thing. And that's the reason why the stories are able to uncover its invisible reverse.

Finally, the hero of *The Rajah's Diamond*, Prince Florizel of Bohemia holds the diamond in his hands. He has stated before, that this "diamond would be better in the sea:" "Jewels so valuable should be reserved for the collection of a Prince or treasury of a great nation. To hand them about among the common sort of men is to set a price on Virtue's head."[30] As he declares, even Prince Florizel himself "could scarcely handle the

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26 Robert Louis Stevenson, "The Rajah' Diamond," in *New Arabian Nights. The Pavilion in the Link and other Tales*, by Robert Louis Stevenson, reprint of the Vailima ed (New York: AMS-Press, 1974), 170.

27 Ibid.

28 Ibid., p. 172.

29 Ibid.

30 Ibid., p. 179.

intoxicating crystal and be safe."[31] So, it seems to him as "if the Rajah," who gave this diamond as a gift, "desired vengeance upon the men of Europe."[32] Before he is capable of throwing the Rajah's Diamond from a bridge into the Seine in Paris, he incites himself to realize this heroic deed by a pathetic speech, declaring that the true character of this jewel would be the opposite of its appearance: "To me this nugget of bright crystal is as loathsome as though it were crawling with the worms of death."[33]

IX. OUR THING

What does all this mean in relation to the question of the thing wandering in stories? The wandering thing exceeds the actions the human subjects may perform with them. It is an actor itself insofar it has its *own way*. It may change its possessor and its owner, but from the point of view of the *story*, it will not have belonged to anyone. And—as everything that is wandering—it has not yet come in its place. That means, that if the attention is drawn to the wandering thing, in an enigmatical way it appears to be more than it is for the human subjects inside the story. Inside the story the thing may function as an indication, as a symbolical exchange-object, as an imaginary phallus, as an unattainable object of desire (*objet petit a* according to Lacan)—the thing iself as it appears inside the story is ever more than this.

As it cuts a figure of its own, it detaches itself from the characters, the human figures. Of course, this detachment already results from the fact, that the thing is not shown in relation to a single character only. But in the particular relation already there are many different ways to *have* a thing. If you show your possession or if you desemble it, if you carry it on your body or deposit it, if you consign it to someone or if you hide it—all this (and much more) will less depend on the possessor than on the others and on the thing itself. In these different ways to have a thing not least the *distance* is measured between the possessor and the thing, and the thing presents itself as something being on the mend to become independent.

If we take it well, the thing is nor an object, nor a subject. Even as a *sujet* of a story it is a *quasi*-subject only. As close as possible to be the

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31 Ibid., p. 180.
32 Ibid.
33 Ibid., p. 246.

subject of a story the wandering thing comes, when it is *nobody's* object. In the lapse time, when it is lost or forgotten and must be found again, it is exclusively *our* thing. It is not part of a network, it is not part of anything. We cannot avoid to think of a thing as something that, in case of being lost, is *waiting* to be found again.[34] Tolkien's One Ring has been waiting to be found in the depth of a river to become the curse for its possessor. Heinrich Böll's haversack is always waiting for the next combatant to pick it up. Poe's purloined letter has been waiting for Dupin to discover it. And still the Rajah's Diamond thrown into the Seine by Prince Florizel is waiting to be found again.

This finding which in some cases for the characters in the story, but in any case for us is a rediscovering, is not a transaction, but something that *falls to* by chance. In the abyssal moment of rediscovering, the thing flashes up as a our co-subject. Of course this chance is necessary since in stories it is the *destination* of things to be rediscovered. This means, that in stories things can be considered as something that is meant for arriving at a befitting place. Certainly, with its arrival the story comes to an end and the thing ceases to be *our thing*.

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34 In film's, by a "nobody's shot," it is possible to show the thing that is waiting to be found.

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HISTORICAL ASPECTS OF A/SYMMETRY

GEORGI KAPRIEV

THE BYZANTINE TRACE

I should start by admitting that I am sincerely inspired by actor-network theory (ANT) tendency to compromise the ratio-centric and anthropocentric scheme of the subject-object divide as well as by the reification of both relations and activities including the possibility to study new phenomena such as resistance, suffering or endurance. However, I should also admit that I am not ready to follow ANT in all of its variations and details, neither considering it as a kind of an emerging dogmatic basis for a new scientific religion.

I was introduced to the theoretical paradigm of ANT 10 years ago by Ivan Tchalakov who was suggesting that some of its constructs could be adequately considered and interpreted within the context of Aristotelian philosophy. Today, 10 years later, we know that Ivan Tchalakov was correct about that within the context of the concepts developed by Aristotle in book IX of his *Metaphysics* but, especially, within the context of efficiency of their Byzantine reception and upgrades. In the meantime we published our basic conclusions in two complementary papers.[1] I am not planning entirely to reproduce them here but rather to discuss the application of the Byzantine philosophemes to ANT conceptual framework.

In book IX of *Metaphysics* Aristotle distinguishes between the ways of speaking about essence (*ousia*) of every being through the categories and through the concepts of force (*dynamis*) and action (*energeia*).[2] Both Latin

1 Georgi Kapriev and Ivan Tchalakov, "Actor-Network Theory and Byzantine Interpretation of Aristotle's Theory of Action: Three Points of Possible Dialogue," *Yearbook of the Institute for Advanced Studies on Science, Technology and Society* 57 (2009): 207–38; Ivan Tchalakov and Georgi Kapriev, "The Limits of Causal Action: Actor-Network Theory Notion of Translation and Aristotle's Notion of Action," *Yearbook of the Institute for Advanced Studies on Science, Technology and Society* 47 (2005): 389–433.

2 Met. IX, 1, 1045b32–1046a2.

and contemporary translations tend to express the dyad *dynamis-energeia* as *potentia-actus* and, very often, as *possibilitas-actualitas*. Such kind of translations tend to associate the meaning of the signified within modal terms which obscures the original Aristotelian intentions, as Heidegger said too.[3] Aristotle defines the force as exercising influence on something else and of undergoing influence from something else. The capacity of every force to influence is called energy/action, which is defined firstly as movement/*kinesis*. Suddenly after that Aristotle distinguishes between two kinds of actions: movememets[4] and energies par excellence. The movements have a beginning and an end; they have a limit (*peras*), but they don't have an ultimate purpose/*telos*. They are actions initiated by a certain external cause and cease when the cause is no longer present. I nominate the movement's causal or instrumental actions.

The energies *par excellence* have *telos* and are identical with the existence of the essence / *to hyparchein to pragma*. This is the manifestation of the essence and its force, which is bound to the ultimate purpose of the essence. That is why Aristotle identifies moreover the energy with the entelechy/*entelecheia*.[5] The energy hold in its self the form or it is identical with the form.[6] It begins to give the definiteness of the life.[7] The energy is the existential action of the essence, but the energy does not have substantial character. This type of energy can be defined as existential. The network of energetic activities forms the reality of being and in this sense it is really actual or active.

The Neoplatonic reception of Aristotle distinguishes between the energy that is inherent in the essence and the energy which is directed outwards from the essence, accepting that the essence can be known only through its energies. It recognizes that beings could participate in each other through their energies and the participation is interpreted as synergy. It distinguishes between eternal and temporal energies (depending on the nature and status of the essences) and accepts the existence of beings possessing both eternal and temporal energies (human souls in particular).

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3 Martin Heidegger, *Aristoteles, Metaphysik 1–3: von Wesen und Wirklichkeit der Kraft*, vol. 33 of *Gesamtausgabe*, ed. Heinrich Hüni (Frankfurt a.M.: Klostermann, 1981), 3–11, 49–116, quot. 10.

4 Met. IX, 3. 1046b29–1047b2; IX, 8. 1049b8–10.

5 Met. IX, 6. 1048b22; IX, 8. 1050a7–10.

6 Nic. Eth. X, 4. 1174a17–28; 1174b8–9.

7 Met. IX, 8. 1050b1–2.

The Byzantine tradition considers essence/*ousia* and nature/*physis* as identical and interprets them as the common form of a specific being that is represented in multiple individuals. However the truly authentic manifestation of each essence, either finite or infinite, is in its constitutive force (*systatike dynamis*) and natural energy (*physike energeia*). It is impossible, points out Maximus the Confessor, to acknowledge an essence and, at the same time, reject its constitutive energy. Every essence has its moving force in itself (it is *autokinetos*) because it is expressed by its energy and it exists through its energy. The natural energy is the ultimate and most straightforward characteristic of the essence; a nature cannot exist without its constitutive movement.[8]

I am fully aware of the resistance of many, including many actor-network-theoreticians, against the concept of essence. I believe that such resistance is the result of a kind of terminological inertia which is typical of Modern Western philosophy and which tends to reduce the essence to an logico-epistemological abstractum—an essence understood as commonly and impersonally, but also 'really,' present in each individual.

Driven by an (understandable) nausea from the absurdity of such kind of being J.-P. Sartre, for example, uses the terms 'essence' and 'nature' as referring to the actual 'image' or 'figure' of the Self. He is however also fully aware that by means of his or her potential capacities every human being is a human and not "moss, mold or cauliflower." This is why Sartre is forced to accept the existence of conditional human universality (*une universalité humaine de condition*). He prefers to speak of 'human condition' (*condition de l'homme*) instead of 'human nature' (*de sa nature*). This is "the ensemble of the *a priori* boundaries drawing the fundamental human situation in the universe" (*l'ensemble des limites a priori qui esquissent sa situation fondamentale dans l'univers*). These boundaries are neither objective either subjective but have both objective and subjective aspects. The existential human project aims their redrawing and rearrangement, overcoming or adapting to them.[9] Very well!

One should also add the drawing of these boundaries does not delimit an empty space but the actual human potentialities, the potentialities of the human, which are realized and actualized through their activities. Interestingly, the Byzantine understanding of 'essence' and 'nature' could be

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8 Maximus Confessor, "Ambigua ad Thomam," in *Migne Patrologia Graeca* 91 (1865), 1052B.

9 Jean-Paul Sartre, "L'existentialisme est un humanisme," in http://www.danielmartin.eu/Textes/Existentialisme.htm, accessed June 3, 2013.

even described in a very similar way. The Byzantine thinkers distinguish between 'nature contemplated in a species' (*katholou*) which is used to form the general concept of any given nature, and nature contemplated as existing in a specific individual (*en atomo*). In the second case the nature is considered under the conditions of its actual existence. There is a difference between the two ways, for example, the living rational and mortal nature of a unique human being does not entirely overlap with the human nature of any other human being; it is characterized by its proper particularities and not the particularities of anybody else.[10] From the second point of view nature does not precede the different beings who are the carriers of its characteristics.

The concept of an individual being considered as *hypostasis* is the first significant upgrade in the art of Byzantine philosophy. The revolutionary aspect here, as well as in Christian thought in general, is giving priority to personality and existence, instead of giving priority to essence, nature and species. While the concepts of 'individual/*atomon*' is typically associated to the natural order and refers to the individual being which is seen from its commonly accepted valence within the context of a given species, 'hypostasis' is the kernel of a new conceptual order which stands on its own and without any relation of subordination to the natural one.

The hypostasis is the carrier of the essence but in a unique manner. It is 'what exists in itself and individually;' at the same time, it is an essence in association with unique properties, which distinguish a hypostasis from any other hypostases of the same nature, but not only in the numerical order.[11] The definition emphasizes its unique self-being, with which it is above the nature that is in the hypostase itself. If we could think the essence as actuality, then we must think the hypostasis as actualisation. Maximus describes the hypostasis as an acting subject (*energon*).[12] It not only contains the essence, but also irradiates the natural energies and because of that it leads to their variation. Existential action of a specific

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10 Johannes Damascenus, "De haeresibus," in *Migne Patrologia Graeca* 94 (1860), 745B–748C. Cf. Johannes Damascenus, "Expositio de fide orthodoxa," in *Migne Patrologia Graeca* 94 (1860), 1021D–1024A.

11 Cf. Basilius Magnus, "Epistula XXXVIII," in *Migne Patrologia Graeca* 32 (1857), 328BC; Maximus Confessor, "Opuscula theologica et polemica," in *Migne Patrologia Graeca* 91 (1865), 152A; Maximus Confessor, "Epistula XV," in *Migne Patrologia Graeca*, 91, 557D.

12 Maximus Confessor, "Opuscula theologica et polemica," in *Migne Patrologia Graeca* 91 (1865), 205BC.

hypostasis can be stronger or weaker, more dispersed or more concentrated; it can change its intensity and concentration in time and space. And there is no principal difference when speaking of the hypostasis or the energies of rational or un-rational beings.

All Christian thinkers since the second half of the 4th to the end of the 7th centuries seem to have considered *hypostasis* and *prosopon/person* as identical. John Damascene differentiates slightly between the concepts. 'Hypostasis' refers, above all, to the independent and self-determined being, while 'person/*prosopon*' communicates the unique actions ensuing from the personal properties in their relation to other persons. From this point of view, a person may possibly represent another person (like the perfect rules because he is representative of the emperor), whereas this is not possible with the hypostases. A person can be identified as a hypostasis only on the basis of its independent activity.[13] In this sense *person* signifies the faculty of the *hypostasis* to be in relation with other *hypostaseis*. I will consider later one effect of this differentiation.

Before going further I would like to address one very reasonable question that was posed by Bruno Latour several years ago. The question goes like this: If the hypostasis manifests specifically natural energies how exactly it makes them personally or hypostatically unique? Or how and in what sense can we claim that the specific way (*pos kai hopoios*) of manifestation of the natural energies depends on a specific hypostasis? On what basis can we claim that "the existential energies might vary in their intensity—not only across different hypostases, but also in a specific hypostasis according to its existential states and temporal periods"?

The answer to these questions was paradigmatically given by Maximus the Confessor: the hypostatic specificity can be explained by the concept of *hexis*. It defines the personal, or rather, the *hypostatic* factor in the manifestation of the natural energies/actions. Maximus understood the Aristotelian concept of *hexis* mainly as an 'inner personal state' in opposition to *thesis* which is translated as '*emplacement*' or '*position*' and describe the natural order of beings. *Hexis* is also different to *diathesis* which is usually translated as *disposition* and refers to the less stable attributes that are easy to remove and change. Mutatis mutandis the concept of *hexis* corresponds to *Gestimmtsein*, *Stimmung* and *Befindlichkeit* in Heidegger: he interprets the *Befindlichkeit* as a constitutive element

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13 Cf. Johannes Damascenus, "Dialectica," in *Migne Patrologia Graeca* 94 (1860), 596A, 613AB; Johannes Damascenus, "De haeresibus," in *Migne Patrologia Graeca*, 94, 749BC.

of the *In-Sein*.[14] The *hexeis* are described as potential and as mediators (*mesotes*) between forces and energies. Maximus defines *hexis* as "constitutive characteristic" (*systatike idiotes*)[15] for the activity of the *hypostasis*. The *hexeis* are the hypostatic factor in the direction and definiteness of the actions. They are the inner filters of the natural actualization. The teaching about *hexis* positions the problem of the being within a clearly hypostatic perspective. The *hexeis* are best understood as subject-carrying or psycho-morph mediators. In addition, they are in complete accordance with the requirement that "mediators are not causes and that without transformations or translations no vehicles can transport any effect."[16]

In his book from 2005 *Reassembling the social* Bruno Latour refers very positively to Marcel Mauss and his concept of *habitus*. Mauss considers the term *habitus* as a direct translation from *hexis* and refers to it as acquired ability or faculty pretending to follow Aristotle who is identified as "psychologist." However Mauss really wants to see the term in association with "the techniques and work of collective and individual practical reason."[17] I would firmly argue that the understanding of *hexis* in Maximus and in the Byzantine tradition is much deeper and much broader than the one suggested by Mauss. In addition, this tradition does not consider Aristotle as a 'psychologist.' As a matter of fact, the Byzantine tradition does not develop its own psychological teaching. It concentrates itself to an anthropology focusing on the psychosomatic unity of the human being.

Aristotle reduces all *dynameis* to one primary force which is defined as both the capacity for action and the capacity to undergo an external influence (*tou poein kai paschein*) without however confusing the two.[18] It is quite important that the hypostases do not only manifest their natural energies but also incorporate external energies that become part of their own hypostatic existence. In this way by means of their proper

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14 Martin Heidegger, *Sein und Zeit* (Tübingen: Niemeyer, 1979), 11.

15 Maximus Confessor, "Disputatio cum Pyrrho," in *Migne Patrologia Graeca* 91 (1865), 352A.

16 Cf. Bruno Latour, *Reassembling the Social: an Introduction to the Actor-Network-Theory* (Oxford, UK and New York: Oxford University Press, 2005), 214.

17 Cf. Marcel Mauss, *'Body Techniques' in Sociology and Psychology: Essays* (London: British Centre for Durkheimian Studies, 1979), 100–101; Latour, *Reassembling the Social*, 211.

18 Met. IX, 1. 1046a9–20.

energies different hypostases can interpenetrate each other or co-inhere in each other. It is the so-called '*perichoresis*', the mutual energetic interpenetration, the inter-communication of properties and energies (*antidosis idiomaton*). In this interpenetration or co-inherence both the natures and hypostases preserve their otherness. It is not a secret that all these concepts were first introduced in Christian philosophy order to explain the relation between the two natures of within the composite hypostasis of Christ. The term *perichoresis* describes the mutual inter-penetration or co-inherence of Christ's Divine and human natures together with all their properties and energies, preserving their otherness in relation to each other including their natural properties. Here it is strongly emphasized that in the hypostatic union does not absorb the human nature, but includes it in a synergy/*synergia*, co-action and co-activity.[19] The Byzantine tradition extends this understanding to all hypostases and natures, both finite and infinite, that are en-hypostasized within them.

In the byzantine tradition we should point out the emphasis on the relevance of the body for all contingent beings. In it the body has a very important place. This topic is quite different compared to Platonism and the theory of such platonizing philosophers as Augustine and Descartes, for example. Here the existential opposition is not between material and spiritual but between created and uncreated. The body and the soul are part of one human being, which is penetrated by all energies that are inherently manifested through the hypostasis. In addition, the body is the possessor and the coordinator of the hypostatic energies; it is the mediator of all energies that are both manifested and incorporated through the hypostasis. In fact, it is the body that manifests the energies outwards.[20]

It is quite interesting that the concept of *perichoresis*, with its inherent connection to *hypostasis* and *hexis*, could be associated with several positions that could be considered as central to ANT. If one elaborates on the meaning of *perichoresis* within the context of ANT, one would

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19 Cf. Maximus Confessor, "Ambigua ad Thomam," in *Migne Patrologia Graeca*, 91, 1053B; Maximus Confessor, "Opuscula theologica et polemica," in *Migne Patrologia Graeca* 91 (1865), 208AB; Maximus Confessor, "Disputatio cum Pyrrho," in *Migne Patrologia Graeca* 91 (1865), 337CD.

20 Cf. Georgi Kapriev, "The Body as Coordinator of Natural and Supernatural Energies in Human Beings in Maximus the Confessor and Gregory Palamas," in *The Wedding Feast*, ed. Paul Ladouceur (Montreal: Alexandra Press, 2010), 103–112.

easily see that there is no interaction that could be called isotopic, nor synchronic, synoptic, homogeneous or isobaric.[21] The concept relativizes the opposition between interior and exterior and enables the transition from speaking about 'actors' to thinking about 'attachments.' At the same time, it forces us to avoid speaking of actors as puppets that are manipulated against their own will. In such a way it becomes practically impossible to think of acting without actors and of subjectivity without subjects, which ensures certain interiority without the need for its reification.[22] Such perspective relativizes the sharp divide between 'being' and 'having' which is dominating the Western way of thought. The being self supposes to possess and to be possessed, to hold and to be held[23]. Within this specific horizon of meaning of the concept *perichoresis* it is impossible to think of actors as mere points or atoms. Indeed, an actor can be seen as a source, not in the sense of a monadic causality, but rather as a source possessing by necessity a specific star-like shape. In this way the meanings of actor and actor-network do not contradict each other but emerge in a mutual complementarity, since an actor-network is what is made to act by a large star-shaped web of mediators flowing in and out, where all the attention should focus on the mediators making other mediators do things.[24]

Here is the place where I should discuss once again and justify the introduction of the concept of 'asymmetry' that was introduced by Tchalakov and myself a few years ago. I believe that it was understood quite incorrectly. It does not at all assume the preexistence of a privileged and ontologized subject of action. The idea was borrowed from the 'Christological asymmetry' articulated by Georges Florovsky whose starting point was the initial non-hypostatic status of the human nature in Christ.[25] In Florovsky's case the notion of asymmetry emphasizes the fact that the process of *perichoresis* is initiated by the Divinity in a way that the Divine action enables the opportunity for human nature to acquire the real possibility to inter-penetrate or co-inhere with the Divine nature. It does not mean and does not lead to a radical dominance of the Divine nature. It means the existence of a specific kind of dialogical reciprocity

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21 Cf. Latour, *Reassembling the Social*, 200–202.

22 Cf. Ibid., 213–214.

23 Cf. Ibid., 217. Latour refers here to Gabriel Tarde.

24 Cf. Ibid., 216–217.

25 Георгий В. Флоровский, *Восточные отцы V–VIII веков*, Париж: YMKA Press, 1933 (repr. Москва, 1992), 26.

within the context of the co-inherence of the Divine and human natures.[26] What we (Tchalakov and myself) were talking about was an asymmetry emerging from the possibility for different actor-networks to take specific initiatives in different situations or contexts and in different moments of time. If you consider the 'social' connections in the specific case of 'a wall, a nail, a hammer and someone using the hammer to put the nail in the wall (for example I myself)' you will easily get a feeling about the reality and the painfulness of the transitions I am talking about.

I would like to summarize my understanding of the asymmetry by emphasizing two different aspects: First, this is the fact that in every practical situation there is someone or something that is the first in initiating a change and, by being first, this someone or something is in a stronger position to predefine the specific situational dynamics of the particular change. This is valid for every moment in the situation. Second, this someone or something possesses unique (as compared to all other actants) hypostatic and natural properties. This second asymmetric aspect is based on the hypostatic and natural specificity of the manifestation of the energies which also predefines the specific way a specific change will be actualized. The important point here is that the two aspects are equally applicable to both human and non-human agents.

Bruno Latour and most of the ANT authorities do not like the term 'initiative.' They associate it with the actor as "a source of initiative or a starting point, the extremity of a vector oriented toward some other end."[27] At the same time Latour insists that "ANT is not [...] establishment of some absurd 'symmetry between humans and non-humans.'" He explains: "To be symmetric, for us, simply means not to impose *a priori* some spurious asymmetry among human intentional action and a material world of causal relations."[28] I should point out that we (Tchalakov and myself) do not believe on such type of apriority either. Another one of Latour's question is: "How long can a social connection be followed without objects taking the relay?"[29] O.K., the asymmetry we are talking about consists exactly of the "taking the relay" in every possible moment of a specific "social connection," independently of who is the actor or the actor-network taking the relay. "There are divisions," with an almost

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26 Cf. Lars Thunberg, *Microcosm and Mediator. The Theological Anthropology of Maximus the Confessor* (Lund: Gleerup, 1965), 26–27.

27 Latour, *Reassembling the Social*, 216.

28 Ibid., 76.

29 Ibid., 78.

mystical tone continues Latour, "that one should never try to bypass, to go beyond, to try to overcome dialectically. They should rather be ignored and left to their own devices, like a once formidable castle now in ruins."[30]

Well, my job is to be interested in "formidable castles," especially if they are "now in ruins." I would like to return now to the difference between *hypostasis* and *prosopon* or *person* in the way it was articulated by John of Damascus. It is important to realize that the term *hypostasis* can be used for every self-existing being, while *prosopon* or *person* is used only for living rational beings. This distinction generates a paradox. If we accept that it is the hypostasis that radiates or manifests the energies belonging to the en-hypostasized nature (or natures), we should conclude that every single hypostasis is in a state of active energetic exchange with all other hypostases becoming by necessity part of a 'dialogical network.' On the other hand, obviously, every rational being can choose to communicate or not with others, consciously choosing a state of self-isolation. We should be therefore very cautious when speaking about the relational character of the human person. The state of rational contemplation is by definition the formal cancellation of any spontaneous action. Every act of consciousness or self-consciousness discredits all specific actions by introducing viable alternatives. Even Aristotle points out that every rational and sensory soul is in a certain sense 'part of all being' as far as it can consciously feel and think all knowable phenomena.[31] Rational beings can consciously 'put themselves in the place of' other beings and 're-present' them. What that means in the language of the teaching on the energies is that a person has the capacity and the ability un-spontaneously to direct, modulate, concentrate or disperse his own energies. This is the special way for humans 'to take the relay.' My point is that we should admit the existence of similar ways of 'taking the relay' for all other 'formidable castles' ('the black boxes:' and we know the black boxes are made to be open in case of emergency). We should not be trying to neglect them, but to seek them no matter how difficult that is. Otherwise, the degree of abstractness in ANT will remain too high.

As we have seen, the Byzantine trace could be highly valuable in solving problems within the context of the ANT. I am convinced it could also open new problems and new opportunities. This is a trace that is very delicate; neither very deep, either very sharp. But who in between the ANT adherent speaks of very deep and very visible traces?

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30 Ibid., 76.

31 Cf. *De anima*, III, 8, 431a20–23.

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ARTHUR TATNALL

ASPECTS OF THE HISTORY OF COMPUTING

An Actor-Network Perspective

ABSTRACT

This article tells the tale of two Australian computers. The first of these, CSIRAC, was designed and built in the late 1940s and became a successful first generation computer used for scientific purposes by the CSIRO. CSIRAC went on to continue its life, first at the University of Melbourne then as an exhibit at Museum Victoria. The second tale is of the Australian Educational Computer, for which detailed specifications were drawn up in the mid-1980s, but that was never actually built. The process of drawing up first 'Educational User Requirements' and then 'Technical Requirements' was instigated by the Australian Government and involved a number of meetings of expert committees. The only tangible result of these was the production of two reports, as a decision was then taken to halt the project. These tales both tell of examples of technological innovation, one successful in producing a useful product and the other producing only paper reports. Using an approach based on actor-network theory (ANT), the article discusses these two computers and investigates the networks of human and non-human actors involved in their design, construction and use. It considers the reasons why these machines were built (or not built), and the interactions and associations involved in this. It then looks at the consequences and the legacy of the use (or non-use) of these computers.

INTRODUCTION

CSIRAC (*Commonwealth Scientific and Industrial Research organisation Automatic Computer*) commenced regular operation in Sydney in 1951. It was Australia's first computer and is generally regarded to have been the world's

fourth or fifth stored-program electronic digital computer. Today, CSIRAC is the only surviving first-generation computer in the world and is on display at Museum Victoria in Melbourne.[1] Unlike a number of other computing developments around the world at the time, CSIRAC was built as a research machine to perform calculations for radiophysics, particularly in relation to cloud-physics, and not for military purposes. Its development depended on Commonwealth Government involvement, the work of its two principal designers working with other technicians and programmers, the technology of the time and a need to perform a massive number of research calculations.

In the mid-1980s the growth in availability of low-cost microcomputers presented Australian education authorities with a wonderful opportunity to improve school education. It also presented them with a considerable problem in how to support schools in the use of such a wide range of computers. Australia thus investigated designing and building its own educational computer.[2] As Canada, New Zealand, Sweden and the UK had all designed and produced computers specifically for educational use it was thought that a similar approach would be worthwhile in Australia and so work began on designing the Australian Educational Computer. This machine was, however, never built and an investigation into this must relate to the two Commonwealth Government departments involved, State Governments, educational needs, the initial design committees, other educators, specifications documents, technology, the Australian computer industry and lack of continued funding due to a change of Commonwealth Government funding priorities.

CSIRAC (CSIR MK1)

In 1926 the Australian Government set up the *Council for Scientific and Industrial Research (CSIR)*, with a charter to perform research focused on primary and secondary industries. Initially CSIR concentrated on agricultural issues such as animal health and plant growth but later extending its

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1 Cf. Doug McCann, and Peter Thorne, *The Last of the First—CSIRAC: Australia's First Computer* (Melbourne: The University of Melbourne, 2000).
2 Cf. Arthur Tatnall, "The Australian Educational Computer That Never Was," *IEEE Annals of the History of Computing* 35/1 (2013): 35–47; Arthur Tatnall and Ralph Leonard, "Purpose-Built Educational Computers in the 1980s: the Australian Experience," in *History of Computing: Learning from the Past*, ed. Arthur Tatnall (Heidelberg: Springer, 2010), 101–111.

interests into manufacturing. In 1949 it was expanded and renamed the *Commonwealth Scientific and Industrial Research Organisation (CSIRO)* with new interests such as radiophysics, radio-astronomy and industrial chemistry. Australia is a very dry continent and the Commonwealth Government was, at the time, interested in the possibility of inducing rain over important agricultural areas by cloud seeding. If it could have been achieved this would have revolutionised agricultural production in Australia.[3] CSIR was thus interested in researching the related physics. (It is interesting to reflect that in retrospect, radio-astronomy in Australia turned out to be highly successful while the rain-making project did not.)

In 1946 Maston Beard and Trevor Pearcey were working at the CSIR Division of Radiophysics in Sydney on research in the fields of radio-astronomy, rain-physics, cloud-physics and radio-wave propagation, each of which required a massive amount of computation; too much for the calculating machines available at the time.[4] In 1947 CSIR decided to abandon research into radio-wave propagation, to concentrate instead on the development of electronic computing and to build a research computer.

The initial design of the CSIR Mk1 Automatic Computer (as it was known at this time) was done by Beard and Pearcey, both of whom had been working on radar research during World War II—Beard in Australia and Pearcey in the UK. They thus came to CSIR with a good knowledge of electronic pulse techniques and data storage using mercury-delay lines. Pearcey was assigned to work on the logical aspects of the design and Beard the electronic and engineering requirements. Work began in early 1947 and the logical design was complete by late 1947. Construction followed at once using standard components from the well-developed Australian radio industry.[5] The CSIR Mk1 (CSIRAC[6]) ran its first simple test program in 1949, and became fully operational early in 1951.

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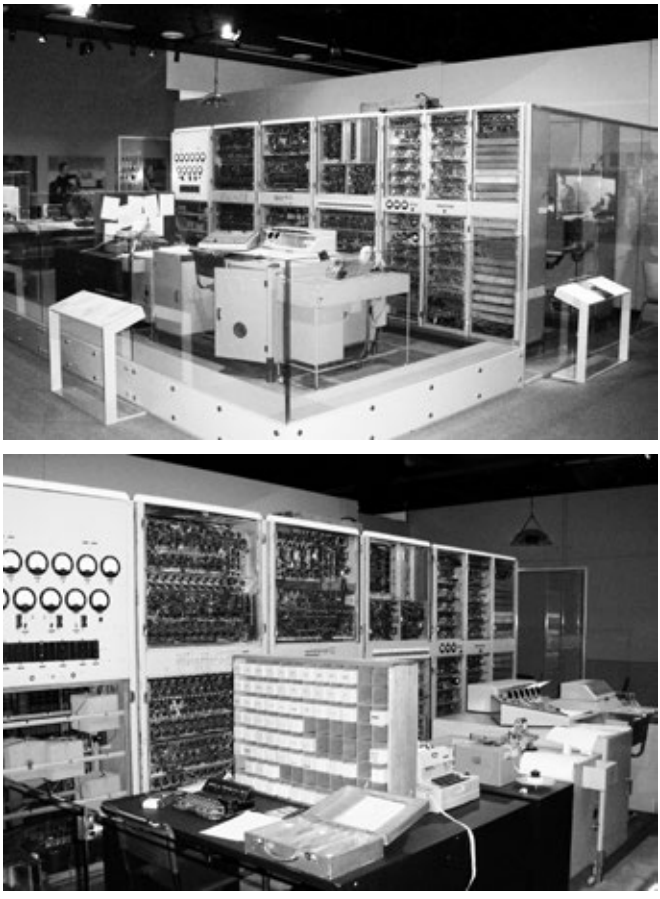
3 Cf. McCann and Thorne, *The Last of the First.*

4 Cf. Robert Pearcey, *A History of Australian Computing* (Melbourne: Chisholm Institute of Technology, 1988).

5 Cf. Arthur Tatnall, "History of Computers: Hardware and Software Development," in *Encyclopedia of Life Support* Systems, developed under the Auspices of the UNESCO (Paris: Eolss Publishers, 2012).

6 The machine constructed in the late 1940s was initially known as CSIR Mk1 and this name was used until the time the computer moved to Melbourne in 1955. It then became known as CSIRAC and it is known by this name today. To avoid confusion, in this article the name CSIRAC will now be used throughout.



1 CSIRAC at Museum Victoria, Melbourne

CSIRAC TECHNOLOGY

CSIRAC was what we would now call a first generation computer with over 2,000 thermionic (radio) valves that required a one-hour warm-up period each morning. It was a large and complex machine covering over 40m², consuming around 30kW of power[7] and requiring its own maintenance and

7 Cf. Museum Victoria, "CSIRAC," in http://museumvictoria.com.au/discoverycentre/infosheets/csirac/, accessed July 5, 2014.

programming technicians. It was essential for efficient operation that the power supply be kept stable, and the story is related that on one occasion the computer was overloaded and crashed when someone turned on an electric jug in a nearby tearoom causing a power fluctuation.[8]

Input of both programs and data was via either a switch-panel or by paper tape, and CRT displays were used to monitor the machine's operations. Main memory consisted of 32 acoustic mercury delay lines, each with the capacity to store 16 twenty-bit words.[9] This was later upgraded to 32 words per tube, giving a total storage capacity of 1024 words. Mercury delay lines could store data as a series of acoustic pulses and were developed for radar systems. They had to operate at a given temperature, and on hot summer days the computer sometimes needed to be switched off to prevent it from overheating.[10] Later, drum-based and disk-based secondary storage units were added. CSIRAC's logical design was less concerned with execution speed than with simplicity of engineering and programming and so with its 1024 word memory it used serial processing techniques.[11]

OUTSIDE INFLUENCES ON CSIRAC'S DESIGN

In the 1940s Australia was quite isolated by distance from the rest of the world and so while many developments in Australia paralleled those in Europe and the USA they were often to a considerable extent quite different. During the war Pearcey had worked with Douglas Hartree in the UK on numerical analysis and discussed with him the possibility that electronics might be used for high speed calculation.[12] In 1945 Pearcey visited Harvard and was shown Howard Aitken's Automatic Sequence Controlled Calculator and the Bush differential analyser at MIT, but decided that machines like this were too slow to be really useful. He was not aware of the existence of ENIAC or of Colossus.[13] There was no contact

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8 Cf. ibid.

9 Cf. University of Melbourne, "CSIRAC: Our First Computer," in http://www.csse.unimelb.edu.au/dept/about/csirac/, accessed July 5, 2014.

10 Cf. Museum Victoria, *CSIRAC*.

11 Cf. University of Melbourne, *CSIRAC*.

12 Cf. J.V. Daly, *Looking Back 30 Years to CSIRAC*, ed. University of Melbourne (Unpublished: Melbourne, 1996).

13 Cf. Pearcey, *A History of Australian Computing*.

made, either by Pearcey or anyone else at CSIR, with other computing groups until late 1948 when CSIRAC's design was almost complete. It must then be said that the construction of CSIRAC was essentially an Australian undertaking with very little influence from developments elsewhere in the world.

MANY PROJECTS AND TRANSLATION TO A SECOND LIFE IN MELBOURNE

In the late 1940s and early 1950s the UK and USA began to allocate large quantities of resources into computing, and Australia began to lose the leading position it then had. Contact was made in the early 1950s with several Australian electronic firms to see if they were interested in commercial production of computers based on the CSIRAC design, but these approaches came to nothing.

Even though CSIRAC could operate almost 1,000 times faster than a mechanical calculator of the time it could still take many hours to complete a task. While operating at the CSIRO in Sydney, CSIRAC filled the role of a computing service for many scientists and engineers whose programs were normally entered and then executed by CSIRO staff. Amongst other things, CSIRAC was used to simulate water behaviour for the Snowy Mountains Hydroelectric Authority, and in studies of car and air traffic congestion.[14] Another feature of CSIRAC, although not a very practical one at the time, was the production of music. CSIRAC had a speaker connected to the machine as an I/O device, the main purpose of which was to produce 'clicks' for debugging purposes. In 1951, however, some of the enterprising programmers worked out how to make it play a musical melody.[15]

In 1955 CSIR Mk1 was de-commissioned by the CSIRO in Sydney and moved to the University of Melbourne where it was re-named CSIRAC.[16] At the university it was used as a general purpose computer for over 700 projects including simulations of the Victorian power supply system, pattern simulations for the arrangement of atoms in crystals, evaluation of forestry growth rates for the Forestry Commission of Victoria, production of solar position and radiation tables for Australian cities, computation of

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14 Cf. Museum Victoria. *CSIRAC.*

15 Cf. University of Melbourne. *CSIRAC.*

16 Cf. Ibid.

radiation patterns of rhombic antennae used by the Army Signals Branch at Donnybrook[17] and rigid-frame analysis for 'high-rise' buildings.[18]

In 1964 CSIRAC had reached the end of its useful life at the university and was donated to Museum Victoria. For several years it was located in various museum stores before being put on display in the museum's new buildings in Melbourne.

THE AUSTRALIAN EDUCATIONAL COMPUTER

The first microcomputers were developed in the late 1970s and soon a wide range of these machines became available for school and home use, presenting both a marvellous opportunity and a significant problem for education authorities in how to provide support for such a wide range of available computers. Education in Australia is the responsibility of the State Governments while the Commonwealth's main role is in the co-ordination and funding of special projects. In 1983, the Commonwealth Schools Commission set up the 'National Advisory Committee on Computers in Schools' (NACCS) to plan a National Computer Education Program. NACCS' terms of reference were to provide advice on professional development, curriculum development, hardware, software, evaluation and support services.[19] In one of its first reports, NACCS articulated a need for Australia to develop an educational computer system of its own: "To meet the long term requirements of schools computing activities in Australia, it is considered essential to embark on a national research and development project that will ensure that appropriate computer systems are available."[20] To do this it recommended setting up first a committee to prepare a set of 'Educational User Requirements,' then another to develop of a set of 'Technical Requirements' based on these. This would be followed by a 'System Concept Study' and an 'Australian Design Specification' by the Commonwealth Department of Science and Technology for the construction, by an Australian company, of an appropriate system.

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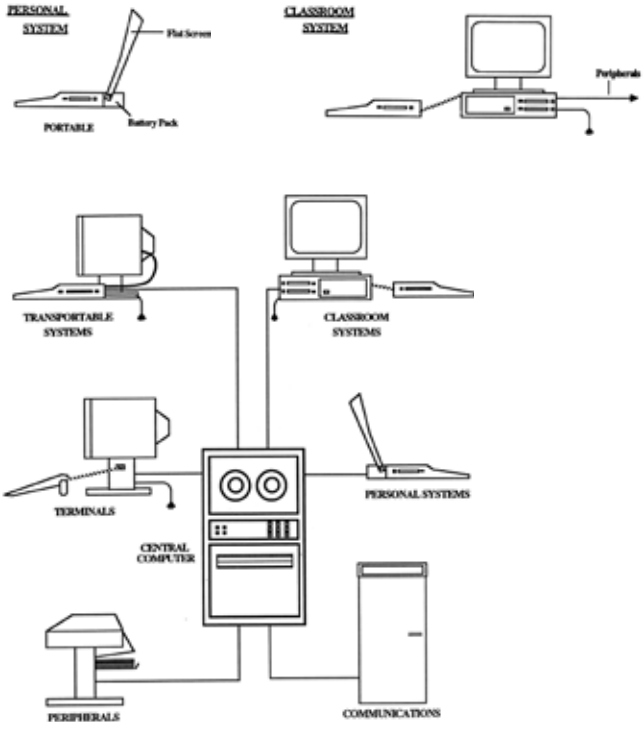
17 One of its few military uses.

18 Cf. ibid.

19 Cf. Tatnall and Leonard, *Purpose-Built Educational Computers in the 1980s*.

20 Commonwealth Schools Commission, *Teaching, Learning and Computers. Report of the National Advisory Committee on Computers in Schools* (Canberra: Commonwealth Schools Commission, 1983), 44.



2 Personal and Classroom Systems and one possible implementation of a School-Wide System (Commonwealth Schools Commission, *Australian School Computer Systems*, 37)

An Educational User Requirement Working Party was appointed early in 1985, and soon produced a report outlining the many and varied potential educational needs of computer users in schools, and the need for integration of information technology concepts into the curriculum. Their report saw a need for development of inquiry and problem-solving skills and an understanding of the concepts, symbolic terms and language involved [11]. It then listed learning situations in which computer use was considered appropriate, including: brainstorming, inquiry learning processes, 'dialectic' problem-solving, procedural/technical problem-solving and process writing, and attempted to draw user requirements from each of these.[21]

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21 Cf. Tatnall and Leonard, "Purpose-Built Educational Computers in the 1980s."

The Technical Requirements Working Party was set up in 1985 as an 'expert' committee with membership reflecting the range of relevant groups and interests from each Australian educational sector, State and territory. As Educational Computer Systems Analyst for the State Computer Education Centre in Victoria, the author of this article was a member of this committee. The committee's report to NACCS was published in March 1986 and contained two main sections:[22]

- A Technical Requirement, which gave detailed coverage to: user interface, input devices, output devices, processing resources, networks, telecommunications and system requirements, and
- A section dealing with possible implementations of these requirements to satisfy at least three types of use: Personal use, Classroom use and School-Wide use. The idea was that these could be catered for by a family of compatible systems having a common user interface, and that at some stage in the future the way should be left open to connect these systems to computing facilities at the district, regional, state or national levels.[23]

There were several stated reasons for developing an Australian Educational Computer:[24]

1. So that Australian school children would have access to well-designed computer equipment.
2. To reduce the problem that US-designed computers such as the Apple II and Commodore 64 came with the burden of imposing aspects of American culture.
3. To provide a development and manufacturing opportunity for Australian industry. It was generally supposed that an Australian company such as Microbee, which produced a CP/M computer used in many Australian schools, would be a likely manufacturer.

The next steps in the process should have been setting up a System Concept Study to be followed by a Development Proposal, but at this stage the project stopped. The three year Government funding for the National

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22 Cf. Commonwealth Schools Commission, *Australian School Computer Systems: Technical Requirements* (Canberra Commonwealth Schools Commission, 1986).

23 Cf. Tatnall, "An Australian Educational Computer That Never Was."

24 Cf. Tatnall, "The Australian Educational Computer That Never Was."

Computer Education Project was at an end and further development funds were not made available by the Department of Science and Technology. Work on the Australian Educational Computer then ceased[25] with only the two Schools Commission reports to show for the effort expended. Like Frankenstein's monster the Australian Educational Computer was never sufficiently 'real'[26] to be given a name of its own, but for the purposes of this article I will call it the Bunyip[27].

3 Australian stamp showing a bunyip

CSIRAC, BUNYIP, GOVERNMENTS, COMMITTEES, IDEAS AND FUNDS

To be successful, technological innovation requires the adoption and use of the new technology involved. Innovation can be defined as "the alteration of what is established; something newly introduced,"[28] but this should be distinguished from invention which is the discovery or creation of new ideas.[29] The process of innovation thus involves getting

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25 Cf. Tatnall, "The Australian Educational Computer That Never Was;" Tatnall and Leonard, "Purpose-Built Educational Computers in the 1980s."
26 Cf. Bruno Latour, *ARAMIS or the Love of Technology*, trans. Catherine Porter (Cambridge et al.: Harvard University Press, 2002).
27 A bunyip is a large creature from Aboriginal mythology that is said to lurk in swamps, billabongs and rivers.
28 William Little, ed., *The Shorter Oxford English Dictionary on Historical Principles*, 3rd edition, reprinted with corrections and revisions (Oxford: Clarendon Press, 1973).
29 Cf. Carmel Maguire, Edward John Kazlauskas and Anthony D. Weir, *Information Services for Innovative Organizations* (San Diego, CA: Academic Press, 1994).

new ideas accepted and new technologies adopted and used,[30] and a new technology will only be adopted if potential users make a decision to do so. A major issue in research involving technological innovation is how to understand and handle its complexities, and innovation translation, informed by actor-network theory, offers a useful way to do this.

In the cases described in this article, CSIRAC was designed, built and used to good effect by the CSIRO and the University of Melbourne, but the Bunyip project was never completed. It is worthwhile now to use ANT to explore some of the reasons for these adoptions, translations and non-adoptions.

CSIRAC

The initial idea for building CSIRAC (or CSIR Mk1 as it then was) came from a need to provide the computing power for calculations related to research work in radio-astronomy and rain-physics. This was reinforced by the Commonwealth Government's goal of assisting Australian agriculture by cloud seeding to produce rain. The problematisation[31] proposed was thus to find a means to assist with the huge number of complex calculations required for both radio-astronomy and rain-physics. There was little need for any interessement[32] here as this problematisation was readily accepted by all parties and led quickly to their enrolment.[33] It also led to mobilisation[34] in the subsequent building in Australia of several other first generation computers: SILLIAC at Sydney University, UTECOM at the University of NSW and WREDAC at the Weapons Research Establishment, South Australia.[35]

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30 Cf. Arthur Tatnall, *Information Systems Research, Technological Innovation and Actor-Network Theory* (Melbourne: Heidelberg Press, 2011).

31 Cf. Michel Callon, "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay," in *Power, Action & Belief. A New Scociology of Knowledge?*, ed. John Law (London: Routledge & Paul Kegan, 1986), 196–229.

32 Cf. ibid.

33 Cf. ibid.

34 Cf. ibid.

35 John Deane, "Australia's WREDAC—it was Rocket Science," in *Reflections on the History of Computing: Preserving Memories and Sharing Stories*, ed. Arthur Tatnall (Heidelberg: Springer, 2012), 1–21.

The actors that contributed to the conception, design and construction of CSIRAC included: Pearcey, Beard, radar technology, the Australian radio industry, radiophysics, rain-physics, the Commonwealth Government, Australian agriculture and the CSIRO. There was then little interaction with overseas computer scientists or governments so these could not be considered to be actors in this context. When CSIRAC began operation there would be a need to add to this list the radio valves and mercury delay lines as they most certainly made their presence individually felt.[36] The radio valves required sixty minutes to warm up in the morning and a stable power supply that could be disrupted by someone making a cup of tea.[37] The mercury delay lines were temperature critical meaning that the computer needed at times to be switched off on hot days.[38] Perhaps more than many other interactions these determined, and limited how CSIRAC could be operated. Another constraint on the operation of CSIRAC was the human programmers, technicians and operators who needed to be very versatile and also to be readily available when needed. Apart from the difficulties due to the 'fragile' technology it must be said that as a technological innovation, CSIRAC's use at the CSIRO Division of Radiophysics went remarkably well.

When its useful life at CSIRO in Sydney came to an end, new actors began to enter the picture as CSIRAC moved to the University of Melbourne. Very little was done to update CSIRAC's technology and it remained a valve operated first generation computer. This translation to a completely new role with new technicians, new jobs, new programs, academics and university students required CSIRAC (as it now became) to adopt new ways and adapt to a new purpose for its existence. This it did well and readily became an important part of the university.

After 9 years at the University of Melbourne (and 15 years after its construction) CSIRAC eventually did become obsolete and was retired when in 1964 it was donated to Museum Victoria. This move could be seen as another translation to a new function: to show people something of the progress of computing technology over the past sixty years. This translation, however, did not proceed quite as easily as did the previous

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36 Cf. John Law, "Technology and Heterogeneous Engineering: The Case of Portuguese Expansion," in *The Social Constructing of Technological Systems: New Directions in the Sociology of Technology*, ed. Wiebe E. Bijker, Thomas P. Hughes and Trevor J. Pinch (Cambridge, MA: MIT Press, 1987), 111–134.

37 Cf. Museum Victory, *CSIRAC*.

38 Cf. Museum Victoria, *CSIRAC*.

as the museum had no available space to display the computer and for several years it was put into storage, first in one location and then in another. For brief periods of time CSIRAC was on display at Monash University and the University of Melbourne but its final translation was complete only when it was put on display (in a non-operating mode) in Museum Victoria's new building in Melbourne. With another new set of human actors and a new physical location adjacent to other exhibits in the museum CSIRAC took on another new role as a means of showing school children and the public Australia's first computer, how it worked and also how much computers have changed over the 60 year lifespan of the stored-program electronic digital computer.

4 A (mythical) bunyip

THE BUNYIP

The development project for building the Australian Educational Computer, the 'Bunyip,' involved the Commonwealth Government, State and Territory Governments, the Commonwealth Schools Commission, the Department of Science and Technology, other State and Commonwealth education authorities, committee members, reports, specifications documents, the computer industry and changes in funding priorities. Various interactions between these actors led to the development of the specifications for this computer, but not to its construction.[39] This is an issue worth exploring further.

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39 Cf. Tatnall, "The Australian Educational Computer That Never Was."

In 'Aramis,' Latour[40] tells the story of a revolutionary guided-transportation system intended to become part of the Parisian Metro in the 1970s and investigates the parts played by both human and non-human actors and the associations and interactions between them. Latour argues that Aramis was not seen as being 'real' at the beginning of its development and nor was the Bunyip. It is difficult for an item of new technology to become real[41] when there is nothing concrete for people to see and to evaluate whether this might be something they could relate to or use. Latour suggests that Aramis failed for a number of complex reasons that involved technical problems, infrastructure issues, disagreements, lack of political will and many other factors.[42] It could be argued that the Bunyip also failed for a variety of complex reasons. Those of us involved in this project had tacitly assumed that the final version of our educational computer would be manufactured by an Australian company such as Microbee, as part of the idea of building this machine was to stimulate the Australian computer manufacturing industry, but this was not the case.

Getting a technological innovation adopted, or in this case even manufactured, involves convincing people of its value. Convincing people was almost impossible in this case as, outside the committees and the government, very few people knew about it. This project really was a team exercise and no particular individuals stood out or made their presence felt. Perhaps this was a factor in its demise. Perhaps if one or more prominent individuals had been prepared to speak out passionately for building the Bunyip their interessement could have assisted it in becoming real and its future might then have been quite different. This project was about technology, but technology itself had very little effect on its termination.

The problematisation by NACCS for the project was that Australia needed a good quality computer appropriate for use in schools, and that this should be built in Australia thus fostering an Australian computer industry. At the initial concept and design stage this seemed like a good idea to those of us involved and we accepted it. The difficulty was that there were only a small number of people involved at the beginning and interessement was not attempted to people outside this group. In fact, there was almost no information or publicity of the project to its potential principal users—schools, teachers and students. Bunyip itself was never even problematised

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40 Cf. Latour, *ARAMIS, or the Love of Technology*.

41 Cf. Margery Williams, *The Velveteen Rabbit, or How Toys Become Real* (London: Heinemann, 1922), 35.

42 Cf. Tatnall, "The Australian Educational Computer That Never Was."

for these people. Perhaps if such interessement had been attempted then this group would have tried to convince the government and the computer industry to become enrolled and so to continue its development.

Many accounts of political interactions between Government departments on matters like this highlight internal conflicts and political and ideological disagreements, but this does not appear to be the case here. The project funds came from the Commonwealth Government, but most of the decision-making came from representatives of State Governments who had ultimate responsibility for education in their schools[43]. If there were any internal government disagreements they may have been between the Commonwealth Schools Commission and the Department of Science and Technology which would have needed to pay for further development and to try to convince local industry to build it. Development of the Bunyip was almost entirely an education exercise. The local computer industry was not involved in producing either the Educational User Requirements or the Technical Requirements documents and had very little involvement with the early stages of the project. Had further development funds been available this might have been different.

If the project had proceeded further some new actors would have appeared and while some may have been supporters, others would probably have opposed Bunyip's continued development and deployment. The main opposition would probably have come from those supporting the existing microcomputers. At this time a large industry existed for the sale of these existing (mainly) imported microcomputers. (It is likely that Microbee, the Australian computer company, would not have been in opposition as if all had gone to plan they would probably have been involved in building the Bunyip). The opposing actors would probably have been: the existing computer companies, their salesmen, the available software and the computers themselves. They would most likely have acted to oppose the building and introduction of the Bunyip into schools. Another group of actors who may potentially have opposed the Bunyip would have been made up of some of the teachers at those schools already using other computers—many had invested a lot of time into working with them. On the other hand many teachers would have acted to support the project had they known about it. It is likely that the local computer industry would also have been a supporter. None of this, of course, happened as the project did not proceed to this stage.

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43 Australia is a Federation of six states and two territories. School education in Australia is a State responsibility with the role of the Commonwealth Government being restricted to an involvement with special projects.

Furthermore, at about this time the microcomputer technology situation changed dramatically with the entry of two new actors into the school market: the IBM PC and Apple Macintosh. When the project was dropped there was no public outcry—the public did not know about it. Although we all were disappointed by the decision not to proceed, in light of later developments we were perhaps relieved not to have created a white elephant like the Canadian Educational Computer—the ICON, which was neither PC nor Macintosh compatible and soon became obsolete. Today the decision Australian schools make in choosing which type of computer to use is between a Windows PC and a Macintosh. Although possibly representing a missed opportunity, the demise of the Bunyip had very little overall impact on computer education in Australia, but it was not entirely a waste of effort as the reports and the specifications documents published by the two working groups are still of value today. Would this project have helped to stimulate the Australian computer industry? Perhaps it would, but now we will never know.

CONCLUSION

This article has looked at two Australian computing innovations, one of which was successfully implemented while the other was not. The question should now be asked: what can we conclude about how these technological projects differed to produce this result? Both projects had government support. Both were, at least to some degree, exploratory in that they involved the creation of new technology. In each case both human and non-human actors were enlisted and in neither case were there strong voices in opposition.

Whereas CSIRAC was built for a quite specific purpose—to perform research calculations, Bunyip was designed to fulfil a need that was neither well defined nor well established. Having gained a place, CSIRAC was able twice to translate to new positions with the aid of a number of human actors. With CSIRAC, nothing like it had been built before, but with Bunyip there were many existing and potentially competing products. Perhaps the difference just comes down to government funding and the establishment of a need for the system. If funding had been available and a successful need established, would Bunyip have been successful? If it had been built, would Bunyip have been able to translate to a new form in the face of competition from the PC and Macintosh? Again, this is something we will never know.

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JONATHAN TUMMONS

CURRICULUM AS ACCOMPLISHMENT

Tracing Human and Non-Human Actors in the Delivery of Educational Curricula

I. INTRODUCTION

One of the key theoretical components of actor-network theory (ANT) is the principle of symmetry: the principle that both people and objects have agency. Human and non-human elements can come together and be held together in order to accomplish the performance of a social project. To attempt to separate human and non-human actors would be to create a false dichotomy.[1] In this chapter I provide an account derived from ethnographic research into the delivery of a teacher-training curriculum across a network of colleges in England. Through the use of ANT, and foregrounding the principle of symmetry as described, I demonstrate the ways in which this educational provision can only be satisfactorily accounted for through a consideration of both human and non-human elements. I conclude the chapter by arguing that any distinction between human and non-human actors would indeed be false, as the work done by both is inseparable within an actor-network.

1 Tara Fenwick and Richard Edwards, *Actor-Network Theory in Education* (London: Routledge, 2010); Bruno Latour, *Reassembling the Social: an Introduction to Actor-Network Theory* (Oxford, UK and New York: Oxford University Press, 2005); Jan Nespor, *Knowledge in Motion: Space, Time and Curriculum in Undergraduate Physics and Management* (London: Routledge-Falmer, 1994).

II. CONTEXT

Further education (FE) colleges in England are responsible primarily for the provision of technical and vocational education for 16–19 year olds, for some adult education provision (particularly relating to basic skills in English and Mathematics), and for a small proportion of university-level courses (approximately 10 % of university-level provision in the UK is delivered in FE colleges). Teachers in further education colleges gain their professional teaching qualifications (as distinct from their subject-specialist qualifications) in one of two ways. A minority of trainee teachers (perhaps 10 %) will study full-time for their teaching qualification at a university, over one academic year. During this year, they will not only attend university classes but also go on two or three teaching placements in FE colleges in order to gain practical classroom experience. Whilst on placement, the trainees are observed by university lecturers and also receive mentoring support from a designated member of college staff. The majority of trainee teachers study for their teaching qualification on a part-time basis. They commence their studies (which take two-years, attending either evening or weekend classes) after they have obtained employment. Almost all FE colleges offer part-time teacher-training courses such as these. That is to say, the majority of new FE teachers will study for their teaching qualification on a part-time basis at the college where they work. Some such part-time programmes are created and managed by qualifications awarding bodies (the largest and best-known of these is *The City and Guilds of London Institute*) and others are created and managed by universities. Colleges can choose which programme to offer, subject to meeting the quality standards of the awarding body or university in question.

All such programmes are required to follow a nationally established set of *professional standards* for teachers in the FE sector. Professional standards perform a number of inter-related roles.[2] They make public expectations regarding the expected behaviours, knowledge and practices of those people who are suitably qualified to work in the profession in

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2 Michael Eraut, *Developing Professional Knowledge and Competence* (Abingdon: RoutledgeFalmer, 1994).

question. They work as a source of information relating to these same behaviours, knowledge and practices for providers of education and training who offer, or seek to offer, relevant qualifications. And they are used as a mechanism for the endorsement and quality assurance of the curricular and assessment processes that these same qualifications rest on.[3] The professional standards for FE teacher-training courses were established in 2006 by a body called *Lifelong Learning UK* (LLUK), replacing an earlier set of standards (indeed, the first such set of standards for FE teachers in the UK) that had been established in 1999.

One such programme for training FE teachers, based at an institution that I shall refer to here as Holgate University which is in the North of England, has been the focus of much of my research during the last seven years. The Holgate FE teacher-training programme is one of the larger such part-time programmes in England. At any one point there are approximately 1,800 part-time students and 100 lecturers (although not all of the lecturers will be working solely as teacher-trainers: some will continue to teach in other curriculum areas), delivering the programme across approximately thirty different colleges in the North of England. The *resources* required for this programme are considerable. It is a complex programme, requiring an infrastructure of handbooks, meetings, websites, committees, academic staff and administrative staff in order to ensure that the programme is delivered across these many colleges in a broadly similar or comparable manner. Or, to put it another way, this teacher-training curriculum rests on a complex arrangement or network of both people and artefacts. My argument is that in order to understand properly how this curriculum is accomplished—how it 'gets done'—we need to draw on concepts that allow us to understand the relationships between the people (the lecturers and the trainee teachers) and the artefacts (the curriculum handbooks, course websites, textbooks and such like). We need to know how and why the people use these artefacts, what happens when somebody misuses or misplaces an artefact, what kinds of actions these artefacts permit, and so forth. An appropriate conceptual framework can be found in *actor-network theory* (ANT).

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3 Imogen Taylor, *Developing Learning in Professional Education* (Buckingham: Open University Press/Society for Research into Higher Education, 1997).

III. ACTOR-NETWORK THEORY IN EDUCATIONAL RESEARCH

> *For educators and educational researchers examining... learning, ... ANT approaches do not afford tidy accounts or generalisable conclusions.*[4]

Perhaps appropriately, bearing in mind its antecedents in post-structuralism, ANT defies a simple definition. It has been described in several ways: as a component or characteristic of ethnography (a methodology that will be discussed below) that is concerned with "the processes of ordering that generate effects such as technologies;"[5] as a "way of talking ... [that] allows us to look at identity and practice as functions of ongoing interactions with distant elements (animate and inanimate) of networks that have been mobilized along intersecting trajectories;"[6] and as a "sociology of the social and ... [a] sociology of associations."[7] That said, ANT literature allows three key themes to be teased out in such a way that a working definition of ANT can be established. Firstly, ANT is a *sociology of association*, or of *ramifying relations*. It is a way of exploring how social projects are accomplished, in ways that can be traced, across networks of associations or links. Such networks can consist of concentrations of all sorts of stuff: stories, people, paperwork, computer simulations, routines, texts and voices. Any social project will always create and embody characteristic forms of representation. These objects can be varied: they might be routinised processes such as meetings, or particular forms of clothing such as a uniform, or—of particular relevance to this chapter—text-based artefacts. ANT is not concerned with what such stories or routines might mean, however: rather, the focus of an ANT account is on what such stuff—people as well as objects—might do once they have been linked or associated into a network.[8]

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4 Fenwick and Edwards, *Actor-Network Theory*, 39.

5 John Law, *Organising Modernity* (Oxford: Blackwell, 1994), 18.

6 Nespor, *Knowledge in Motion*, 12–13.

7 Latour, *Reassembling the Social*, 9.

8 Cf. Fenwick and Edwards, *Actor-Network Theory*, 8; Steve Fox, "Communities of practice, Foucault and Actor-Network Theory," *Journal of Management Studies* 36 (2000): 864.

This emphasis, on doing rather than meaning, leads to the second key theme: ANT provides ways of thinking about how networks or associations both carry influence and influence each other, and foregrounds the ways in which people are made to do things across networks of geography or time or across institutional boundaries—such as the boundaries between the different colleges where the Holgate teacher-training course is delivered. "How to make someone do something" is a central concern.[9] In order for a social project to be accomplished, the network (of people and things) needs to be brought together. A network can be established through persuasion, inducement, coercion, or any combination of these. It is important to note that ANT is not concerned to explain or justify such networks, but simply to account for how they might expand or retract, so that the project that they wish to carry through can be successfully accomplished. A network can break down at any point or link. Consequently, the social project can be slowed down, misdirected or even lost, whether the broken link is an object (for example, a text-based document that has been lost or misinterpreted), or a person (for example, someone who has decided for whatever reason not to act in the way that the network requires). Both people and objects can make (or fail to make) other people do something; that is to say, both people and objects are granted *agency* within ANT.

ANT's insistence on analysing people and things in the same way introduces the third key theme: the principle of *symmetry*, which states: "humans are not treated differently from non-humans ... Humans are not assumed to have a privileged *a priori* status in the world but to be part of it."[10]In an ANT analysis, therefore, it makes no difference whether the network constituents being explored are people or things. Both human and non-human elements can come together and be held together in order to ensure the performance of the social project in question. Indeed, it may be the case that both human and non-human elements are *always* present and *need to be so*. This is not because such a mixture of people and objects makes a network seem to be more sustainable. Rather, this is a reflection of the fact that to attempt to bifurcate people and things when considering how the social is enacted creates a false dichotomy: it is simply the case that the one cannot be without the other.[11] If we are to apply the principle of symmetry to an investigation

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9 Latour, *Reassembling the Social*, 59.

10 Fenwick and Edwards, *Actor-Network Theory*, 3.

11 Cf. Latour, *Reassembling the Social*, 75–76.

of this teacher-training programme, therefore, we would need to consider the ways in which both the people (the students, the staff) and the artefacts (the handbooks, the meetings, the curriculum documents and so forth)—or, to put it another way, the human and the non-human actors—work with and alongside each other, move amongst and around, and react to and shape each other.

But at first look, the array of potential actors that might be worth exploring would seem to be overwhelming. The number of human and non-human actors—the resources described above—enrolled in the delivery of the teacher-training curriculum that is the focus of this chapter, is considerable. And the complexity of this arrangement is added to by the institutional, temporal and geographical distribution of these actors. The first problem for an ANT inquiry, therefore, is to find a starting point. But of all the many social interactions or practices that take place within this teacher-training course, which episodes or moments should be brought to the fore, and on what basis? The complexity generated by this richness of empirical detail is added to by the fact that overt statements regarding the possible methodology of any ANT inquiry are few in number. ANT scholars, it might be argued, spend more time deconstructing research methodology than they do proposing it.[12] So where should this inquiry begin? There are two elements to the answer of this question: a methodological element, and a conceptual element. I shall briefly discuss these in turn.

For the *methodological* element, I propose—following other ANT accounts—that an ethnographic framework is best suited to such an inquiry. Other ANT accounts have drawn on what can be termed an anthropological ethnographic framework. Here, I draw on data that was constructed as part of a *multi-sited ethnography*, fieldwork for which was carried out from 2005–2009 across four of the FE colleges at which the Holgate teacher-training programme is delivered, as well as at Holgate University itself. Multi-sited ethnography (MSE) can be seen as being particularly well suited to ANT.[13] This is because MSE proposes the

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12 John Law, *After Method: Mess in Social Science Research* (London: Routledge, 2004).

13 Cf. Mary Hamilton, "Putting words in their mouths: the alignment of identities with system goals through the use of individual learning plans," *British Educational Research Journal* 35 (2009): 221–42; Christine Hine, "Multi-sited ethnography as a middle range methodology for contemporary STS," *Science, Technology and Human Values* 32 (2007): 652–71.

use of multiple sites so as to afford the researcher multiple windows through which complexities might be observed and explored, but never artificially conflated to create a single field.[14] This is an approach that is straightforwardly aligned to ANT's rejection of over-arching schema, explanatory structures or sociological frameworks that attempt to provide 'single' or 'holistic' explanations that artificially conflate complex practices or events. A further shared concern between MSE and ANT can be found in the concern shared by both to problematise the 'global' and the 'local,' through a focus on how different social spaces—made up of both people and artefacts—are connected—by and to other people and other artefacts—and thereby enrolled within networks, rather that how different social spaces are rendered 'local' or 'global' through the attribution of *a priori* sociological categories.[15]

The *conceptual* can be addressed by focussing on the material, on the objects or artefacts that the teacher-training programme rests on. Any one of the artefacts that are enrolled within this network provides a starting point, a way to begin an exploration of what Latour refers to as "scripts of what (artefacts) are making others—humans or non-humans—do."[16] That is to say, by beginning our inquiry with a focus on the material, we can then begin to follow the network through which this teacher-training programme is made to happen, is accomplished. But where should the researcher begin? Latour suggests that the social ties that link humans and non-humans are only momentarily visible, but that this visibility can be enhanced through the researcher's fieldwork, and thus be rendered more useful for the researcher, in a number of ways. I shall describe these briefly.

The first way for the researcher to enhance the visibility of social ties through fieldwork is through a focus on "*accidents, breakdowns and*

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14 Cf. Matei Candea, "Arbitrary Locations: in Defence of the Bounded Field Site," in *Multi-Sited Ethnography: Theory, Praxis and Locality in Contemporary Research*, ed. Mark-Anthony Falzon (Farnham: Ashgate, 2009), 25–46.

15 Joanna Cook, James Laidlaw and Jonathan Mair, "What If There is No Elephant? Towards a Conception of an Un-sited Field," in *Multi-Sited Ethnography: Theory, Praxis and Locality in Contemporary Research*, ed. Mark-Anthony Falzon (Farnham: Ashgate, 2009), 47–72; George Marcus, "Ethnography in/of the World System: the Emergence of Multi-sited Ethnography," *Annual Review of Anthropology* 24 (1995): 95–117.

16 Latour, *Reassembling the Social*, 79.

strikes,"[17] those moments when things go wrong or when actors deviate from their anticipated trajectory. This is an approach that I have used elsewhere when researching the ways in which the marking of trainee teachers' assessment portfolios leads to unanticipated and unaccounted behaviours by the lecturers that are not anticipated by or responded to by the quality management systems that are used to evaluate the delivery of the teacher-training curriculum.[18] A second way is through the study of the impact of changes or *innovations* in the complex and multiple lives that actors lead.[19] This is an approach that I have used elsewhere when researching the ways in which lecturers and trainee teachers have responded (or not) to the establishment of the professional standards discussed above.[20] In this chapter, however, I am going to focus on two further ways by which Latour suggests that visibility can be extended. Firstly, I explore actors at a *distance*:[21] in this case, a distance generated through my position as an educational researcher coming into a network of colleges, observing the interactions between human and non-human actors and talking with the former in order to explore further the work of the latter. Secondly, I use various *documents* in order to reconstruct the histories of the non-human actors—the artefacts or objects—that are used within this teacher-training curriculum.[22] Both of these are achieved through ethnographic fieldwork according to the framework that I have described above.

Having established the conceptual and methodological frameworks of my inquiry, I shall now turn to an account that rests on my empirical data, constructed through observations of specific teacher-training

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17 Ibid., 81.

18 Jonathan Tummons, "Higher Education in Further Education: an Actor-Network Ethnography," *International Journal of Actor-Network Theory and Technological Innovation* 1 (2009): 55–69; Jonathan Tummons, "Institutional Ethnography and Actor-Network Theory: a Framework for Researching the Assessment of Trainee teachers," *Ethnography and Education* 5 (2010): 345–57.

19 Cf. Latour, *Reassembling the Social*, 80.

20 Cf. Jonathan Tummons, "The Textual Representation of Professionalism: Problematizing Professional Standards for Teachers in the UK Lifelong Learning Sector," *Research in Post-Compulsory Education* 19 (2014): 33–44.

21 Cf. Latour, *Reassembling the Social*, 80.

22 Cf. ibid., 81.

sessions, through semi-structured interviews with students, lecturers and course managers involved in the teacher-training curriculum, and through the documentary analysis of a range of curriculum, policy and other documents, such as student assessment portfolios, feedback sheets from lecturers, class handouts and such like, relevant to and derived from the curriculum. In this account, I focus on a specific episode of activity involving a variety of human and non-human actors within this teacher-training curriculum.

IV. MAKING SENSE OF ASSESSMENT

> *Every single interview, narrative, and commentary, no matter how trivial it may appear, will provide the analyst with a bewildering array of entities to account for the hows and whys of any course of action.*[23]

A common feature of this teacher-training programme—indeed, of higher education provision in England more generally—is the use of one or two classroom sessions, from time to time, to provide an explanation of the assessment task(s) that the students are currently working towards. This part-time teacher-training programme is divided into units or *modules*, one per term, and so once each term the lecturers deliver several iterations of what I shall refer to here as an *assessment session*—those sessions given over to providing students with advice and guidance relating to their next assessment task. Across the network of colleges that deliver the Holgate University programme, a small number of shared ways of running such sessions is apparent. The most common method is for lecturers to lead a short discussion and read-through of the assessment instructions, providing commentary relating to academic writing style, appropriate references, revision of relevant course content, common mistakes made by previous students and so forth.

Scarcroft College (this name is a pseudonym, as are all proper names used in presenting the data) is one of the larger FE colleges to deliver the Holgate teacher-training programme. It is a large college, situated in a large industrial city in the North of England, and it specialises in providing training for the catering and hospitality sectors, although

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23 Cf. ibid., 47.

it also offers more general technical and vocational curricula. It has been delivering the Holgate teacher-training course since 1992. Ruth, who is one of three experienced teacher-training lecturers at Scarcroft College (all three have been teaching the course for at least four years), has designed a format for *assessment sessions* that she uses across the several different units that she teaches within the curriculum. Instead of simply standing at the front of the classroom and talking her students through what they have to do, she turns the process around and asks her students to take the lead in explaining the assessment tasks. She provides them with a handout containing a series of prompts and questions, divides her students into small groups of four, five or six (there are usually between fifteen and thirty students in any one teacher-training class), and asks each small group to draw a poster that sets out what a particular element of the assessment is about and what each student would have to do within their assessment portfolio. For example: one small group might be asked to explain how to compile a variety of teaching resources within the portfolio, and another will be asked to provide guidance as to relevant essay topics, whilst a third will be asked to focus on providing a review of which textbooks and journal articles should be consulted. In effect, Ruth is asking her students to explain to each other what is required, limiting her own role firstly to facilitating this exercise and subsequently to correcting any misunderstandings and proffering any relevant information or guidance that the students have not anticipated.

This exercise involves a number of different artefacts or objects, many of them text-based. (Here, I am using a definition of 'text' that refers to a reproducible and relatively durable representation on the page or screen, which can be found in many different genres of document that are produced by institutions, lecturers and students). Students use the worksheets that Ruth has written, the curriculum handbooks provided by Holgate University, the textbooks that are in the recommended reading lists for the course, and laptop computers that can be used to access Holgate's virtual learning environment. In turn, students then create and/or manipulate other objects whilst completing the exercise that Ruth has given them. They scribble notes on the pages of their handbooks, draw posters, write notes in their diaries or in their smart phones, bookmark useful web pages on their laptops, and so forth.

This is at first look a simple activity: a workshop-style session that has been designed to help the students help themselves to an understanding of what they have to do for their next assessment. But it is

also a complex activity as well. Arguably, the ways in which the students complete their assessments is the single most important aspect of the entire teacher-training course. It is through successful assessment and hence successful professional accreditation that these students become qualified teachers and can enter the workforce.[24] And in many ways, this initial activity of exploring what the assessment is about and how it is to be done foreshadows the act of assessment itself. Both the assessment guidance session and the act of assessment itself involve a variety of text-based artefacts, texts of different genres and registers: handbooks, posters, web pages, journal articles, textbooks, PowerPoint slides and so forth. Students create some of these and edit others, write onto some and ignore others, critically explore some and quickly scan the rest. Teachers point some out and gloss over others, prefer some and ignore others, engage with some and dismiss others.

Some of these texts are created as a way of recording certain student behaviours, attitudes and understandings: essays provide a reflection of the students' theoretical understanding; reflective writing offers students the opportunity to write about and make sense of their own experiences as trainee teachers. Other texts are created by the teachers: feedback forms record the teachers' academic and professional judgements, allowing them to provide developmental feedback, and to pronounce the students ready for professional certification and full entry to the world of work. Through this multi-directional flow of texts and actions, one small part of the teacher-training curriculum can be seen to be being accomplished, to be being practiced in the social world. And this is not happening just at Scarcroft College, but at all of the other colleges that deliver the Holgate teacher-training programme as well. These guidance sessions will not be conducted in exactly the same ways; nor will they take place at exactly the same times. There will be any number of different conversations about, questions asked and responses to the particular assessment that is being discussed. But across all of these institutional, organisational and geographic boundaries, all of the students and teachers involved will all be talking about and coming to know about the same assessment process. And this happens through the use, creation and distribution of, and conversations around and about, a variety of different textual artefacts.

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24 Cf. Taylor, *Developing Learning*, 107.

V. THE TEXTUAL MEDIATION OF SOCIAL PRACTICES

> *If social ordering depended on voices alone, it would be a very local affair. Bodies travel better than voices and they tend to last longer [...] Texts [...] have their drawbacks. They can be burned, lost or misinterpreted. On the other hand, they tend to travel well and they last well if they are properly looked after. So texts may have ordering effects that spread across time and space.*[25]

Texts do not simply order what goes on at a local level: there is more to their ordering work than enrolling the students within a single classroom into the practices of their next assignment. And in turn, they can achieve more than simply (although there is nothing simple about it) ensuring that different student groups in different institutions are all working to the same assessment outline. Texts are able to do more than one thing at a time: that is to say, they can carry multiple meanings or intentions that can serve the interests of more than one actor. Through a study of the relationships between different texts and the ways in which one text rests on, relies on or otherwise supports another, a characteristic referred to as "intertextuality,"[26] we can explore how such multiple meanings can be transmitted across space and time.

Let me provide a single example in order to explain and explore this point (mindful of Latour's point, already quoted, that even a single example can raise a bewildering array of questions and issues for exploration). The example begins with a brief examination of one of the documents produced by Holgate University for the students: the *module guide.* The module guide is just one of the several other curriculum documents that Holgate supply to students (and to teachers as well). They produce a module guide for each module in the programme, and they follow a standardised format. The module guide contains the specifications for the particular module in question (the learning outcomes, indicative content and such like), details of the assessment task that students will have to

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25 Law, *Organising Modernity*, 102.

26 David Barton, *Literacy: an Introduction to the Ecology of the Written Language* (Oxford: Blackwell, 1994), 62.

complete, a recommended reading list and so forth, all laid out according to a template that is shared across all of the module documentation.

At the top of the specifications page, immediately underneath the title of the module, is a section of text that begins:

> Professional body requirements: Lifelong Learning UK/Standards Verification UK (formerly FENTO standards), including minimum core requirements for language, literacy and numeracy.

Lifelong Learning UK (LLUK) was a subsidiary organisation of Standards Verification UK, a non-governmental organisation that was established in order to establish and then monitor the professional standards for teachers in the lifelong learning sector—which includes FE colleges. These standards were published in 2007, and were designed to set out a list of the knowledge, attributes and competencies expected of any teacher in the sector. These replaced an earlier set of standards that had been produced by a predecessor organisation—the Further Education National Training Organisation (FENTO). The FENTO standards were first published in 1999. Their revision and replacement were initiated as part of a wider change in education policy by the UK government. In 2004, a policy paper called *Equipping Our Teachers For The Future* was published. This document not only led the way for the new LLUK professional standards, but also for wider curriculum reforms across the vocational and technical curriculum more generally. These reforms included changes to assessment regimes, changes to existing qualification structures and the introduction of new qualifications for 16–19 year old students, as well as planned reform of the training of teachers in the sector. All FE teacher-training courses have to be able to demonstrate that they are aligned to these professional standards. The content of the course has to reflect the standards, and in turn it can be assumed that if the assessments completed by the students are sufficient to merit a pass grade, then by default the students are demonstrating that they have met the required professional standard.

During the assessment session, the students and their teachers will all come across this reference to the LLUK professional standards in their module guides. So what might happen next? Some students may have come across the standards already, perhaps in the appendix of one of the recommended textbooks, and will contribute to a discussion in class about the purpose and functions of such standards. Perhaps the lecturer will ask the students to download a pdf of the standards to refer to both now and during the rest of the course. Other teachers might only discuss the standards briefly,

on the basis that they are implicitly covered by the curriculum and do not need further discussion. Some lecturers might even ignore them completely —and thereby encourage their students to do the same. Put simply, how people respond to the standards, at this moment, is variable, neatly illustrating the *relational* materiality that ANT ascribes to text-based artefacts.

VI. RESISTING OVERARCHING EXPLANATIONS

> *[T]he object of actor-network theory informed analyses is not to explain the size of any network, but rather to elucidate how any network grows in influence and/or contracts—the analytical interest is to illuminate the processes, rather than explain end results, such as the size of a network at any point in time.*[27]

Overarching sociological and political explanations of the initial introduction of and subsequent changes to the professional standards for trainee-teachers tend to focus on a number of themes (although we should note that the same arguments are used to critique processes of professionalization in other sectors as well, such as healthcare provision). One is the 'new professionalism,' a term used to describe discourses of professionalism and professional conduct that are imposed on a group from the outside and owned by an external body, rather than generated by a professional group and managed internally. Another is 'neo-liberalism,' a term used to describe the imposition of free-market, private sector models of governance on areas of activity that had previously been part of the public sector. A third is 'managerialism,' a term used to describe the growth of a 'management class' that is distinct from teachers, who cannot be trusted to manage themselves as autonomous professionals.[28] Within this context, successive changes to the professional frameworks for trainee-teachers can be seen as part of an on-going process of managerial control of the profession, further evidenced through the imposition of inspection regimes and other forms of quality assurance and management.

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27 Steve Fox, "An Actor-Network Critique of Community in Higher Education," *Studies in Higher Education* 37 (2005): 95–110: 102.

28 Denis Hayes, Toby Marshall and Alec Turner, *A Lecturer's Guide to Further Education* (Maidenhead, Open University Press, 2007), 7.

For the ANT researcher, however, such over-arching sociological perspectives are to be resisted in favour of accounts that focus instead on how the actors that make up a network behave in the ways that they do. For the researcher who draws on neo-liberalism or managerialism, the professional standards represent a problematic aspect of professional discourse: this researcher will be interested in how particular ideologies of professionalism might explain the discursive interpretation of the standards. For the ANT researcher, however, a more straightforward question must first be answered: how do the standards get to where they need to be in the first place? If these standards are going to make teachers in the FE sector behave in particular ways (although the extent to which any such set of standards can accomplish this is questionable from an ANT perspective),[29] then we need to begin by tracing their movements.

The professional standards begin their journey as a conversation, at policy level, about the work done within further education colleges, a process that with certainty can be seen as predating the publication of the first set of standards by five years.[30] Although not reified into a finalised text-based form for five years, the standards are already an actor: they are the focus of consultations, discussion, first drafts, trial periods and so forth. Once they are finally made concrete, then they can be circulated. But texts—for that is the form in which they are made concrete—have several particular properties, two of which are of interest to this analysis. Firstly, it is important to remember that a text has to be read in order to be activated. That is to say, people are needed for these text-based artefacts to work. People need to read them, to act on them, to discuss what they are about. And secondly, a text has the possibility of influencing the creation of another text: intertextuality. So as people use the professional standards, they may also enfold them in other texts as they use, read and otherwise manipulate them, by quoting from them, citing them in an assignment or referring to them in a curriculum document.

Thus, the standards come into being at the level of political discourse, and in turn are reified, are made concrete, as a published document—a

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29 Cf. Hamilton, "Putting Words;" Dianne Mulcahy, "Performativity in Practice: an Actor-Network Account of Professional Teaching Standards," *International Journal of Actor-Network Theory and Technological Innovation* 3 (2011): 1–16.

30 Cf. Norman Lucas, "The 'FENTO Fandango': National Standards, Compulsory Teaching Qualifications and the Growing Regulation of FE Teachers," *Journal of Further and Higher Education* 28 (2004): 35–51

pdf file that can be downloaded from the internet or a hard copy that can be picked up at a conference or workshop. Authors sometimes include them as appendices in their textbooks, perhaps as a response to requests from publishers, perhaps as the result of an authorial decision. In order to ensure that their curricula meets all necessary requirements, universities and awarding bodies have to demonstrate, often through a process of inspection and audit, that their curricula do indeed pay attention and respond to the standards. So they quote them—enfold them—within handbooks and refer to them in their assessment documents, including the module guides that are written for the students, perhaps to be studied in an assessment session such as the workshop designed by Ruth at Scarcroft College that I have already described. But it is important to remember that this materiality—the very fact of the standards consisting of 'stuff'—is *relational*: the standards might get read and acted upon, or they might not.

VII. CONCLUSIONS: THE PRINCIPLE OF SYMMETRY

Humans are not differently treated from non-humans …[31]

As we travel along this network of actors, we can begin to list the humans (government ministers, lecturers, students, textbook authors, academics and quality assurance officers, for example) and non-humans (policy documents, meetings, pdf files, curriculum handbooks and PowerPoint slides, for example) who are enrolled in the process of translating the professional standards from policy initiative to topic for classroom discussion and back again. And we can begin to understand the relationship that each has with the others. The ordering of professional standards cannot be accomplished solely through people and their voices: we need to use artefacts—texts, meetings, consultations, curriculum approval events—as well. In turn, none of these artefacts can work—can be—without people to write them, to attend to them, to discuss and sometimes dismiss them.

This process of ordering relies on humans and non-humans. It necessarily relies on both, but the precise ways in which each work can only be understood through reference to the other. Textual artefacts need to be read—by people. But they can only be read once they have been written—by people. People need to transmit their ideas, concepts,

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31 Fenwick and Edwards, *Actor-Network Theory*, 3.

discussions and doubts—but voices do not travel as far as textual artefacts can. People need to record their responses to these texts—which will require the creation of new texts. And so on. The different non-humans and humans who are enrolled in the establishment of the professional standards are interlinked in equally different ways. And the establishment of these professional standards is only one small example of the social practices that these actors are engaged in. Within all of this variety and complexity, it is not only not surprising that the chains that bind these actors together sometimes break, causing aspects of the network to break down, but also inevitable. There is no social order, only endless attempts at order*ing*.[32] There is no single, unambiguous response to such professional standards: rather, there are different responses, reacting to local vicissitudes, ambiguities and habits.[33] Some students will read them and quote from them, and some will not. Some lecturers will champion them and point them out to their students, and others will not.

Thus we find ourselves confronted by a complex, always imperfect, relational attempt at the ordering of one aspect of a teacher-training curriculum. From a piece of paper lying on a student's desk, we can travel to the level of government policy and back, drawing on discussions relating to UK national education policy, curriculum reform and the professional training of teachers—all from just twenty words on a module handbook. The only difficulty for the ANT-informed researcher is that this same module handbook contains a little over 3,000 words in total. And there are six more module handbooks after this one, following the same template. And after this, there are other universities and awarding bodies offering similar qualifications for FE teachers. Here I have followed Latour's advice and focused on just one small episode. Where else might an account of the many other episodes that make up this actor-network lead us?

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MARTA DOPIERALSKI

NO ACTOR ACTS ALONE

Some Reflections on ANT with Reference to the Film Set

INTRODUCTION

Lorenz Engell defines the three main agencies of cinematography as film studio, cinema and the moving image itself.[1] Film and media theory are predominantly concerned with the two latter branches and mostly focus on either the product (film) or the dispositif of perception (cinema). An analysis of the film studio on the other hand is bound to remain rather fragmentary due to very practical reasons: the production process cannot be traced back directly from the final product, and is accessible only to a very limited number of participants. This is possibly why theorists mostly refer to the movie as the final product. There is a vast amount of work on film and cinema as social phenomena. One of the first is Emilie Altenloh's dissertation from 1913, which, commissioned by Max Weber, had the title: "Zur Soziologie des Kinos. Die Kinounternehmen und die sozialen Schichten ihrer Besucher."[2] This scientific approach to cinema,

1 Lorenz Engell, "Kinematographische Agenturen," in *Medien denken. Von der Bewegung des Begriffs zu bewegten Bildern*, ed. Lorenz Engell, Jiri Bystricky and Katerina Krtilova (Bielefeld: Transcript, 2010), 137–156.

2 This work is mentioned here because it is considered the first scientific treatise referring to cinema. Altenloh describes the cinema as a relatively young cultural phenomenon und canvasses the combination of its public. Her leading question is to find out which professions and social groups the cinemagoers belong to and to question their expectations of the cinematic experience. Cf. Emilie Altenloh, *Zur Soziologie des Kinos. Die*

the world's first, has been notoriously followed by new works with different thematic priorities on its cultural, aesthetic or psychological characteristics that accompanied the ascent of film towards its dominating status in cultural and media studies.

In 1924, Béla Balázs argued that the—at the time still silent—film functions as the only universal language and marks a cultural innovation comparable to the invention of the printing press. According to Balázs, film is able to give back culture a *visible* which before was supressed by *terms*, that is the consistency of orality and textuality. The film industry has been continuously growing and feeding on technical innovations with film theory developing correspondingly. The modalities of production and their social coherences however seem not to have aroused much research interest. Whenever theories of production were undertaken they were, for the most part, psychologically interested and focussed on the relation between artist and work, especially since the beginning of the 20th century, when the work began to be taken as an index for the mental condition of its creator.[3] However, the discourse on Hollywood as *Dream Factory* already implies the industrial scale of this production: through the increasing degree of mechanization and the tight linkage of humans and technology, something is serially produced to satisfy a specific customer demand. This essay therefore touches on a production theory that in its first step will replace the singular creator/author with the notion of a multi-layered structure, which simultaneously determines and is determined by the mode of production of this relevant cultural product.

Of course, as no two productions are the same, universal conclusions are impossible. However, some suppositions about commonalities of such creatively working collectives can be allowed. Which dynamics are generated in this social situation and what are their consequences? In the context of this article three theses will be briefly put up for discussion. The first and fundamental assertion concerns the assignment of agency on the film set, or rather the contrary: the impossibility to do so, because, as I argue, nobody or nothing on the set acts alone. It is the collective that acts, a "set of features that, so to speak, march in step together, even

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Kinounternehmung und die sozialen Schichten ihrer Besucher (Jena: Eugen Diederichs, 1914).

3 James Monaco, *How to Read a Film: The World of Movies, Media, and Multimedia: Art, Technology, Language, History, Theory*, 3rd edition (New York: Oxford University Press, 2000), 32.

though it might be composed of radically different types of entities."[4] These types include objects, technical instruments and concepts, as well as other, more invisible factors that I will address later. The second assumption is that these non-human entities are significantly involved in the hierarchization within the given social network.

Following the explication of the first two theses, the third one completes them with a phenomenon that hypothetically appears wherever there is a group and there is power: the ritual. Since "no other creative enterprise of any kind requires anywhere near the amount of people, money, and organization (with their attendant risks) than filmmaking,"[5] one would think that the rigorously structured schedule of work and the highly efficient conditions of production should preclude processes that are not directly target-oriented or irrational. Upon closer examination however, the film set proves to be not primarily the sum of rational appositions of activities, but rather a space imbued with a variety of rituals and irrational behavioural patterns. The third thesis therefore claims that the collective tends to infiltrate the working structure with irrational patterns of behaviour that acquire a kind of secondary function in becoming operators of interaction and communication in the examined workspace; a necessary body of rules that imposes a rhythm, a hierarchy and an internal organization within this creative process.

ACTOR-NETWORK THEORY AND THE FILM SET

Intuitively, approaching the process of film production with the help of the Actor-Network Theory appears reasonable because its terms are borrowed from the stage world: why not examine the network around actors with Actor-Network Theory? Although even the French sociologist Bruno Latour, the main proponent of the theory, has emphasized his critical distance to the formulation, at first glance no term seems more accurate in the given case. As a result of several stays on film sets and an interest in the phenomenon of collective creativity, the *film set* occurred

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4 Bruno Latour, *Reassembling the Social: an Introduction to Actor-Network-Theory* (Oxford and New York: Oxford University Press, 2005), 43.

5 Gianluca Sergi, "Film Production," in *The International Encyclopaedia of Communication*, ed. Wolfgang Donsbach (Oxford: Blackwell Publishing, 2008), accessed July 7, 2014, doi: 10.1111/b.9781405131995.2008.x.

to me, more even than a place or a process, as a social situation. But perhaps not 'social' in a traditional sense: it is here that the path leads to Latour. In his sociology, Latour tries to free the loaded term 'society' from the implications previously attributed to it in social theory. In order to reflect it independently and critically, he firstly pointedly converts it into the term 'collective'. The term 'social' for Latour applies to "an association between entities which are in no way recognizable as being social in the ordinary manner, except during the brief moment when they are reshuffled together."[6] Latour tries to bypass the subject-object dichotomy artificially created by society and to include nonhumans into the collective.

Considering the enormous spectrum of networks that can be analyzed with ANT, this short article does not claim any degree of completion as an ANT-report, as established by Latour as a tool for examining social relationships. The film set as a collective is an exemplary and specific set-up for the inspection of which ANT can serve as both a tool of support and research language in order to split it up into its layers and groupings and to trace their relations to each other more clearly instead of generalizing it from above. But the bigger a film production is, the more institutions, levels and co-operations become involved and expand the structure. Latour views the complexity of a network with optimism and still claims that "instead of taking a reasonable position and imposing some order beforehand, ANT claims to be able to find order much better after having let the actors deploy the full range of controversies in which they are immersed."[7] The more complex a collective, the better it shows the hard work during the composition of the new entity.

One tool he provides us with is the concept of the *black box*, which allows for some simplification in the almost infinite rapports of entities. The process of blackboxing "facilitates the studying and description of networks as it allows the researcher or author to gloss over certain aspects of the network without having to detail the many nuances inside the black box."[8] Blackboxing thus is "the way scientific and technical work is made invisible by its own success. When a machine runs efficiently,

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6 Latour, *Reassembling the Social*, 65.

7 Ibid., 23.

8 Oli Mould, "Lights, Camera, But Where's the Action? Actor-Network Theory and the Production of Robert Connolly's *Three Dollars*," in *Production Studies: Cultural Studies of Media Industries*, ed. Vicki Mayer, Miranda J. Banks and John T. Caldwell (New York: Routledge, 2009), 203–213: 205.

when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity."[9] There is a very short case study by Oli Mould that underlines the advantage of the use of ANT as a language of analysis for an Australian feature film from 2005.[10] Mould emphasizes the project-based nature of film production and the common enrolment of numerous freelance workers. What he considers important within this approach is that "ANT describes and prioritizes *action* of production work activities and relationships over the structure of the industry's institutions and economies."[11]

It is a long and burdensome way from the development of the script to the film's projection in cinemas. Therefore, in this article, I will only refer to the actual filming phase which is chronologically placed between pre- and postproduction and which starts after the successful handling of all 'bureaucratic' proceedings and steps during the preparation stage. The situation of production is determined by the following parameters: the script is ready and approved, artists and crew are contracted and this group now collectively works according to an externally dictated time-frame in order to develop material that will become, over the course of editing, a movie. Each film production is unique and not entirely comparable to another. It depends on numerous factors, such as nationality, artistic aspiration, budget, as well as the quantity and quality of employees. Before a translation of text into images even begins, of textual signs into film language, a translation of figures to characters and descriptions into décor, costumes and objects takes place. Only then these interpretations are brought together in filmic images, for which the recording apparatus becomes a fundamental agent. The making of a film can be understood as a multi-step process of translation in which every entity updates or overwrites the results of the preceding one.

In this analysis I will call this process the *film set*. This term, like the related *studio*, firstly seems to give an indication of place. However, it effectively transcends this function in summarizing something that is not directly locatable and can take place at many different places each time.[12]

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9 Bruno Latour, *Pandora's Hope. Essays on the Reality of Science Studies* (Cambridge, MA and London: Harvard University Press 1999), 304.

10 *Three Dollars*, dir. Robert Conolly, Arena Films, 2005.

11 Mould, "Lights, Camera, But Where's the Action?," 203.

12 Even as a simple statement of place, the film set refers to the scene in front of and behind the camera. It includes both the decoration on set as well as the make-up room, exterior locations and the director's chair.

I use it as a generic term, symbolically, to describe the concomitance of numerous diverse factors: the temporal, spatial, technical and personal conditions of creative film work.

What are we analyzing if we are referring to the film set? In a first sense, a collective of persons of different professions, working, more or less involved, on the development of one final product. A complex framework including director, actors, sound and light technicians, assistants and nervous producers as well as the so called below-the-line professions.[13] The amount of people engaged in the production process in different relations to each other makes Erwin Panofsky compare the making of a film with the construction phase of a medieval cathedral:

> It might be said that a film, called into being by a cooperative effort in which all contributions have the same degree of permanence, is the nearest modern equivalent of a medieval cathedral; the role of the producer corresponding, more or less, to that of the bishop or archbishop; that of the director to that of the architect in chief; that of the scenario writers to that of scholastic advisers establishing the iconographical program; and that of the actors, cameramen, cutters, sound men, makeup men, and the diverse technicians to that of those whose work provided the physical entity of the finished product, from the sculptors, glass painters, bronze casters, carpenters, and skilled masons down to the quarry men and woodsmen. And if you speak to any one of those collaborators he will tell you, with perfect bona fides, that his is really the most important job—which is quite true to the extent that it is indispensable.[14]

Secondly, technical installations represent another rudimental component of the structure. The history of film and cinema in the making has always been a history of technology and its progress. In contrast

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13 The media and culture industry uses the above-the-line/below-the-line distinction in order to separate 'creative' from 'technical' labor. Cf. Matt Stahl, "Privilege and Distinction in Production Worlds. Copyright, Collective Bargaining, and Working Conditions in Media Making," in *Production Studies: Cultural Studies of Media Industries*, ed. Vicki Mayer, Miranda J. Banks and John T. Caldwell (New York: Routledge, 2009), 54–66.

14 Erwin Panofsky, "Style and Medium in the Motion Pictures," in *The Visual Turn. Classical Film Theory and Art History*, ed. Angela Dalle Vacche (New Brunswick, NJ and London: Rutgers University Press, 2003), 69–84: 81.

to theatre, film is based on its technical devices in two different ways, one enabling the recording of moving pictures and the other one their transmission. The invention of film within the scope of its technical history might already be considered a collective enterprise and depends on a whole series of innovations from different inventors, literally fighting about patents around the turn of the 20th century. From Edison's kinetoscope, the Skladanowsky brothers' bioscop to the cinematograph by the Lumière brothers, whose cinema showing went down in history as the birth of cinema, not due to the best-engineered technology, but simply because of the social situation: the projection of moving pictures in front of a paying audience. The priority of the projecting technology over the pictures becomes clear when considering that Louis Lumière did not consider copyright protection for the pictures, but merely kept the technical functions of the apparatus a secret. The film as product was not of the highest priority and, according to Thomas Elsaesser, only served to demonstrate the cinematograph's functions and amenities.[15] The steady focus on technical aspects clearly separates the discourse about cinema from the one about most preceding media. In 1936/37, Panofsky summarized this fact very appropriately, stating that it 'was not an artistic urge that gave rise to the discovery and gradual perfection of a new technique; it was a technical invention that gave rise to the discovery and gradual perfection of a new art.'[16] Continuously, in fact, there are new technological alterations, from sound and colour, wide screen, digital editing to today's 3D-recording process. That's why technical devices—camera, microphone, lighting—and objects in general—décor, costumes, properties—constitute a substantial component of the analyzed structure *film set.* They are integrated and variously assembled with the human entities in diverse working processes.

And thirdly, there is a whole range of invisible factors. Relatively quickly, film ceased to be considered a succession of pictures enabled by an apparatus and developed into an art form and a mighty tool of communication: it spreads various content and can be highly political or soaked with ideologies. The expectations of critics and customers, the reactions of the public and the immense financial pressure of a film production are forces that cannot be ignored:

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15 Thomas Elsaesser, *Filmgeschichte und frühes Kino. Archäologie eines Medienwandels* (München: edition text+kritik, 2002), 49.

16 Panofsky, "Style and Medium in the Motion Pictures," 69.

> Film, because it is a very expensive art, is especially susceptible to the distortions caused by economic considerations. The elaborate economic infrastructure of film—the complex rules of production, distribution and consumption that underline the art—set strict limitations on filmmakers, a fact that is often ignored by critics.[17]

This heterogeneously combined collective, working on a product that might furthermore claim to be art under the aforementioned circumstances, is regarded as the basis for the following considerations. Although, as James Monaco observes, when we consider all previously given factors, "the variety of forces that must conspire to get a film made, all the demanding economical, political, and technological factors (so few of which the individual poets, painters, or musicians need consider), it's a wonder that any 'art' survives the arduous process of moviemaking."[18]

For me, a very appropriate definition of the studio, as where the actual filming takes place, is given by Lorenz Engell, who describes it as an arrangement comparable to a laboratory, where humans and technical devices as well as expectations, reflections and habits collaborate and thereby produce a film in a model of authorship that is very complex and, until today, difficult to itemize.[19] At least in German, the fact that the filming process is referred to as the plural form 'Dreharbeiten' might be instructive because it naturally implies a multi-layered process.

THE COLLECTIVE AND ITS ACTIONS

A theoretical approach to the process of film production proves a specific challenge, because at the time of its distribution the film is already a mere trace of its own production process. Having gone through postproduction, it presents itself to the viewer as a selected amount of information. The viewer lacks the knowledge about which scene has been recorded how many times, which sounds are digitally added and in which cases he is

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17 Monaco, *How to Read a Film*, 33.

18 Ibid., 284.

19 My translation: "[E]ine Anordnung, die dem Labor vergleichbar ist, in der Menschen und technische Dinge, aber auch Erwartungen, Überlegungen und Gewohnheiten zusammenwirken und dabei in sehr komplexer und bis heute schwer aufzuschlüsselnder Urheberschaft einen Film hervorbringen." Engell, "Kinematographische Agenturen," 139.

actually seeing the double instead of the actor. The film positions itself as an entity and its making can only be indirectly guessed. Is it possible to subsequently disassemble its parts in order to comprehend the genesis of a film a little better? And why is the 'behind' of such interest? Because, as I would like to argue, it contains its very own dynamics, rules and problems that deserve a more detailed investigation.

The entertainment industry seems to have reacted much more willingly to the public's interest in the process of film making than to film theory. In various formats such as the 'Making Of,' documentaries from film sets and even motion pictures dealing with filmmaking, it sets one's sight on the production mode, partly enveloped in myths, and gives the viewer a glance behind the curtains of a usually hardly accessible system.[20] Latour also highlights this particularity:

> The "making of" any enterprise—films, skyscrapers, facts, political meetings, initiation rituals, haute couture, cooking—offers a view that is sufficiently different from the official one. Not only does it lead you backstage and introduce you to the skills and knacks of practitioners, it also provides a rare glimpse of what it is for a thing to emerge out of inexistence by adding to any existing entity its time dimension.[21]

But if the public—driven by passion, curiosity or boredom—exercises patience and stays in their seats after the last scene, it will encounter a trace of the whole collective engaged in production. By the time the filmgoer sees the end credits in cinema, this collective has long been dissolved and individual groups or persons are likely already parts of other production collectives. The credits contain job designations such as 'key' or 'dolly grip' and 'gaffer' that might not be very informative to the common filmgoer, but emphasize the intricacy and versatility of the technology involved. The end credits reveal the groups and forces involved in the process, but instead of providing any predications about

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20 The format of the 'Making Of' deserves a closer analysis since it has become an inherent part of the film industry. What in its origin was a collection of material that showed the work behind the camera and possibly broke the illusion of the film is now creating a new one. The viewer's look behind the scenes is very precisely steered. Now, mainly on DVD editions of films, the 'Making Of' fulfills functions within the logic of the supplementary.

21 Latour, *Reassembling the Social*, 89.

it, they rather illustrate a hierarchy. Names are arranged in a hierarchical order and lined up with their function within the production or in respect to the operated apparatus. The vertical order shows director and actors at the top, followed by unit managers, coordinators, decorators and electricians in the central portion, down to extras, set runners, consultants and even caterers. They constitute a community of practice. This definition refers to

> groups of people who share similar interests and objectives. In pursuing these interests and objectives, they make use of common practices, work with similar artifacts, and use a common language. (...)Each community develops a set of linguistic and interactional behaviours which function in somewhat different ways in other communities.[22]

Within this collective, the notion of absolute authorship is automatically excluded, because all work stages are explicitly based on a division of labor.

A range of complex conditions must be fulfilled to create a movie that is not the result of uncoordinated actions of single persons, but the organic, permanent work product of *one* creator—the film team.[23] How the collective creative process overshadows every independent action can be illustrated by the role of the cameraman. In a first sense, the cameraman does not act alone as he is invariably recording in coordination with the director and stage designer. Secondly, he is characterized and limited by his specific schooling, his skills and the ideas of his supervisors. And thirdly, he is inextricably linked with his apparatus, as it is with him. Here, the 'cold war between objects and subjects'[24] becomes

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22 Cf. Ana Cristina Ostermann, "Communities of Practice," in *The International Encyclopaedia of Communication*, ed. Wolfgang Donsbach (Oxford: Blackwell Publishing, 2008), doi: 10.1111/b.9781405131995.2008.x

23 My translation: "Eine Reihe komplexer Bedingungen muss erfüllt werden, unter denen ein Film geschaffen werden kann, der nicht das Resultat eines unkoordinierten Handelns von Einzelpersonen darstellt, sondern das organische, dauerhafte Produkt der Arbeit eines Schöpfers—des Filmteams—ist." Andrej Moskvin and Evgenij Michajlov, "Die Rolle des Kameramanns bei der Produktion eines Films," in *Poetika Kino. Theorie und Praxis des Films im russischen Formalismus*, ed. Wolfgang Beilenhoff (Frankfurt a.M.: Suhrkamp, 2005), 157–176: 158.

24 Bruno Latour, *Politics of Nature. How to Bring the Sciences into Democracy* (Cambridge, MA and London: Harvard University Press, 2004), 76.

obsolete, because a cameraman without a camera is as worthless as a camera without a cameraman. Moving pictures can therefore only be created through their interaction—a team effort, if you will. Managing this interplay of raised opinions, guidelines and limitations, the cameraman is now asked to unfold his artistic potential in dealing with the camera and its technical capabilities.

> The role and purpose of the cameraman, to whom a number of technical and artistic options are available, [...] lies in using them and blending them organically with all of the other elements of the film regarding pace, atmosphere and sound instead of letting them become an end in itself, as technology for technology's sake [...].[25]

A very similar argument could be developed for the sound engineer and his microphone, the composer and his soundtrack suggestions, and several other participants on the set. In general, as Latour puts it, once "we enter the realm of engineers and craftsmen, no unmediated action is possible."[26]

Although technology, or, more generally: a number of objects is significantly involved in the action on set, they are not automatically considered *actors*. In this context, Latour draws a distinction between *mediators* and *intermediaries*. While intermediaries merely transport their content without transformation—regardless of whether it is a force or a meaning—mediators "transform, translate, distort, and modify the meaning or the elements they are supposed to carry."[27] And it is their transforming power that should be subjected to the test and might grant them the status of actors. Thus according to Latour "*any thing* that does modify a state of affairs by making a difference is an actor—or, if it has no figuration yet, an actant."[28]

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25 My translation: "Die Rolle und Aufgabe des Kameramanns, dem eine ganze Reihe technischer und künstlerischer Möglichkeiten zur Verfügung stehen [...], besteht darin, diese – ohne sie zum Selbstzweck zu machen (Technik um der Technik willen) – anzuwenden und sie organisch mit den übrigen Elementen des Films in Tempo, Atmosphäre und Ton zu verschmelzen [...]." Moskvin and Michajlov, "Die Rolle des Kameramanns bei der Produktion eines Films," 158.

26 Latour, *Pandora's Hope*, 175.

27 Latour, *Reassembling the Social*, 39.

28 Ibid., 71.

The term actant is crucial here, because it focusses on the relations and actions and refers to an occurance or event rather than a subject or object. If any entity therefore does modify the course of events—with or without intention and with or without figuration—it will be considered an actant.

The only one who at first glance appears to be beyond judgement in this relation is the actor himself—the true *acteur*. He does not have to operate a technical device to be at the top of the hierarchy. Unfortunately, this observation too is deceptive, because the actor is always already instrumentalized. In a sense, he is an object operated by others and led to action; a collective creation. Shaped by his specific acting education, he speaks the screenwriters's words with the emotions required by the director. He mirrors the visions of the costume designer and make-up artist right into the camera. The acting in a scene is the result of the director's directives, light technicians and his own acquired techniques. He never speaks alone, because many voices speak through him. He functions as a summary and translation of several directives. And precisely because of this, he positions himself in the category of definition of the *acteur*, who is—or, as Latour puts it—"what is made to act by many others."

Latour himself points out this example from the stage world:

> Play-acting puts us immediately into a thick imbroglio where the question of who is carrying out the action has become unfathomable. As soon as the play starts, as Irwin Goffman has so often showed, nothing is certain: Is this for real? Is it fake? Does the audience's reaction count? What about the lighting? What is the backstage crew doing? Is the playwright's message faithfully transported or hopelessly bungled? Is the character carried over? And if so, by what? What are the partners doing? Where is the prompter? If we accept to unfold the metaphor, the very word actor directs our attention to a complete dislocation of the action, warning us that it is not a coherent, controlled, well-rounded, and clean-edged affair. By definition, action is *dislocated*.[29]

However, this is not yet the end of translation, since the actor's performance is not presented to the audience immediately, but through a technical device and this device, as Walter Benjamin's formulation appropriately shows, does not necessarily "need to respect the performance

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29 Ibid., 46.

as an integral whole. Guided by the cameraman, the camera continually changes its position with respect to the performance."[30]

NONHUMANS, POWER AND RITUALS

In *Pandora's Hope*, Latour addresses the interwoven rapports of humans and nonhumans using the example of a gun, confronting a *materialistic* approach with a *sociological* one.

According to the first perspective, the "gun acts by virtue of *material* components irreducible to the social qualities of the gunman," while the second perspective focuses on the intention and will of the subject and determines the thing as "a tool, a medium, a neutral carrier of human will."[31] What is important here—and particularly with regard to the film set— is not the dichotomy of subject and object, but the necessity of their collaboration. The dichotomy is resolved automatically if one concentrates on the relation that creates the basic condition for firing a gun or, more related to the topic at hand, for cinematic work. What becomes crucial is the *hybrid actor* that is only possible through the interplay of several entities and does not define action as "a property of humans" but as "*an association of actants*."[32]

The strong object-orientated relations on set are obvious. The final product can only be achieved through an interplay of heterogeneous elements. The objects therefore intensely influence the hierarchy of groups, arrange the collective and qualify or disqualify numerous people from being part of a certain work stage. Latour does not radically insist on equality or a symmetric arrangement of these heterogeneous entities, as he is often accused of in simplifying readings.[33] Quite the opposite, in

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30 Walter Benjamin, *The Work of Art in the Age of Mechanical Reproduction*, transcribed by Andy Blunden (UCLA School of Theater, Film and Television, 2005). Original: "Die Apparatur, die die Leistung des Filmschauspielers vor das Publikum bringt, ist nicht gehalten, diese Leistung als Totalität zu respektieren. Sie nimmt unter Führung des Kameramannes laufend zu dieser Leistung Stellung." In: Walter Benjamin, *Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit*, with commentary by Detlev Schöttker (Frankfurt a.M.: Suhrkamp, 2007), 26.

31 Latour, *Pandora's Hope*, 176.

32 Ibid., 182 (emphasis Latour).

33 At the utmost he demands an equal observation in the course of an analysis.

fact: the focus of his investigations lies upon asymmetries, hierarchies and power relations. The composition of the collective makes everyone and everything an actor or actant. But what happens if, as in film production, it is exactly the nonhumans that create the difference? Then their influence should be investigated more closely.

A finished film script is the starting point of the work on set. In his "The screenplay as a 'structure that wants to be another structure,'" Pier Paolo Pasolini describes the film script as an art form in and of itself. The formulation of the title is quite felicitous in our context, as it literally attributes the screenplay an own will and implies its intention to unfold its inherent visual character. This filmic text already integrates the upcoming process of translation into its new form and constitutes itself as a structure in motion. How many layers this translation will have was mentioned before. The script already unites a summary of several different visions and work processes. The author tried to accept as few changes as possible, the director possibly tried to enforce as many as necessary. The account manager and producer wanted it structured in a most effective way to avoid expensive shooting breaks, the set designer his vision of the décor included and so forth. The existing piece of paper is a trace and result of many power struggles, negotiations and compromises by countless parties. In Walther Killy's encyclopaedia of literature, the film script is described as tightly bound to its extra-literary function and that it is exactly this functional character that distinguishes it from every other literary source.[34] This passage suggests that the transformation process between script and film should not be analysed from an isolated perspective because it is unthinkable without its regulating economical, productive and cultural factors. The worked-out screenplay is essential for the translation from script to film—it contains technical details and camera directives, the sequence of scenes and shots. Once elaborated, it becomes more than an organizational tool—it has power: it determines and regulates both human and technical powers and their temporal concatenation. The working screenplay, one of the most important tools on set, unites the visions of entities which are partly not even engaged on set anymore and nevertheless exercise their power. In this context Latour uses the term *delegation*. Through the production plan and the working script, past actions and forces still have impact on the present ones.

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34 Walther Killy, ed., *Literaturlexikon. Begriffe, Realien, Methoden* (Gütersloh: Bertelsmann-Lexikon-Verlag, 1993), 192.

Latour's comparison with investment works very well for the transition between pre-production to filming phase: "a regular course of action is suspended, a detour is initiated via several types of actants, and the return is a fresh hybrid that carries past acts into present and permits its many investors to disappear while also remaining present."[35] But other technical objects or non-human entities also exercise power on the set. The producer's finance plan regulates the daily routine of countless persons. The continuously advancing recording capacity of the microphone silences the whole set once the recording signal lights up. The camera-control-unit—a combination of humans and various screens—monitors the reconciliation of colour, style and lightning between single shots. To be sure, we are not talking about a homogeneity of humans and nonhumans, but rather about the power of the objects to assign their human partner in action a place within the hierarchical structure:

> The most interesting aspect of technology [...] is the influence it has had on the division of labor within film-making. This can be seen, for example, in the fact that the introduction of sound to cinema altered the standing of sound engineers within the film crew. Similarly, the use of color film imposed new demands on photographers, set-designers, and others working with the external appearance of the film. One of the consequences of this was that the role of actors diminished in favour of the settings and general *prise de vue* of the film. Digital technology has, for its part, brought forth new professionals to central artistic roles, such as traditional and digital special effects designers. The role of the storyboard artist has expanded in connection with digital filmmaking.[36]

The more essential the technical device for the shot, the closer its operator is admitted to the occurrence.

It is quite simple: you are what you operate. And since the role of technology within film production is steadily increasing, the handling of specific technological devices receives more attention. More and more, films are digitally reworked or have computerized animations inserted

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35 Latour, *Pandora's Hope*, 189.

36 Marjut Salokannel, "Cinema in Search of Its Authors: On the Notion of Film Authorship in Legal Discourse," in *Film and Authorship*, ed. and with an introduction by Virginia Wright Wexman (Piscataway, NJ: Rutgers University Press, 2003), 152–178: 155.

afterwards. Hardly any fantasy or action movie can be thought without proceedings like keying or compositing, without the green- or bluebox and postproduction.[37] With increasing regularity, actors act in an empty room and are subsequently inserted into a computerized world. The actor plays with and against technology, he has face-to-face interactions with monsters he does not see but has to imagine, which, however, determine his way of playing. The virtual other has to be kept in mind constantly.

Because objects play such an important role within the bonds between different groups on the film set, they deeply affect the dynamics of these temporarily constituted orders. Objects often generate ritual-like dynamics. By being included in social interactions, their simple causal efficacy or virtue of material, as Latour calls it, is exceeded. They might even gain the status of a fetishized object. The clapperboard, for example, is a tool that is inevitably needed to guarantee synchronization of pictures and sound during post-production if recording takes place separately. The numbers of scene, shot and repetition are consistently actualized. The objects therefore at times also indicate the laborious recording procedure and the sometimes countless repetitions of one scene.[38] Its structuring function in many German film productions is complemented by a further function: if the numbers of scene/take/no. correspond (scene 7 / take 7 / no. 7), it is customary for the party that ordered this repetition (director/light/sound) to, in common parlance, buy everyone a drink. The endurance and clannishness of the group is rewarded and the triple constellation of numbers gains a quasi-magical character. Furthermore, in most—again, German—productions, the production plan that regulates financial organization and timing at the same time contains a ritual-like component. Traditionally, in the middle of production, the so called *Bergfest* is held which by now has become an inherent part of the production timetable. It manifests the temporality of the process and emphasizes the already absolved, arduous work. In a metaphorical sense, just as the name and its origins imply, it is supposed to work like a valve for work done, signalize an end point and promote social cohesion within the group for the

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37 Both terms are derived from post production modalities and refer to the subsequent insertion of visual effects. 'Compositing' means the combination and overlay of different pictures into a single new scene that did not previously exist. 'Keying' refers to the isolation of elements from the background for further editing.

38 One scene in Stanley Kubrick's *The Shining* made its way into the *Guinness Book of Records* as it was shot with 127 repetitions.

remainder of the way. But since the film set depends on rigorous temporal organisations due to its complexity, this originally informal event has made its way into the fixed order of the production plan.

Objects or things structure the timing and have influence upon the social fabric. Their weightiness especially strikes in one particular case, namely that of malfunction and breakdown. A broken technical device can no longer be considered a black-box, an entity, and while revealing its complex inner life, it strongly affects the actions of the network. The process of a production is greatly disturbed by the malfunction of a technical device and because of the hegemonic slogan 'time is money,' such an event has an impact on the entire working group. Then again, the breakdown of one single technical element also shows how many instruments have to be operational simultaneously for one take. This does not render the instruments social, but it can trigger something social: in some Polish productions, new cameras or lights are literally baptized before their first use. The camera does not become social, but its symbolic baptism, which is to protect the instrument from damage, creates a highly social situation. Through this borrowed ritual, the costly instrument is 'admitted' to the community as a full member and usually even given a name. The humans involved seem to be fully aware of their incatenation with the instruments and even if they maintain an ironic distance to this ceremony, it has entered the tradition of Polish film production and can no longer be foregone.

CONCLUSION

Historically, the cinema is the art form that always could be described with agency, in that man and instrument, human and non-human actors are of equal weight. This is of such importance that there has always been a history of technology in parallel with the history of directors and actors. But apparently, this antagonism between humans and instruments did not lead to questions about the balance between those elements. At the same time, it is this antagonism—which, somewhat simplified, can be seen as one between two creators (director vs. camera / light vs. operator)—that prevents us from describing technology as an ensemble of instruments and human actors: the opposition is not between human and non-human entities, but between a monolithically, monocausally thought creative power and scenes of distributed agency. Technology is only an indication of such agency which results in the dispositif of the cinema in order to distinguish it from art forms such as painting or writing.

A blind spot in this context, or a fundamental question that ANT does not want to or try to answer, concerns the talent of the human actors. While the object, due to its material state, always has the same abilities and limits, those of its human partners may vary enormously. In this sense, every human actor on set is a kind of black box with a very complex and individual inner life. Different cameramen can clearly achieve results of huge qualitative differences using the same camera. In this case, talent reveals itself as a hybrid maximization: the exploitation of the full purpose-oriented potential of the technical teammate. Perhaps ANT does not even have to reflect this question because, returning to the firearm, the question whether the victim was shot in the head or the back does not immediately affect the question whether it was the gun or the gunman that shot. However, upon a reflection of the hybrid-actor in film production, an approach to a solution should be attempted, because the result does make a difference. Otherwise there would not be as many good films as there are bad ones.

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CONTRIBUTORS

MARTA DOPIERALSKI (Media and Theatre Studies), M.A., Research Assistant at the Internationales Kolleg Morphomata at the University of Cologne. Master's thesis on intermedial translation problems between screenplay and movie. Member and teacher at the International association of theaters for children and young people (ASSITEJ) in Poland. Fields of Research: Media Theory, Collective Creativity, Rituals and Superstitions in Movie and Theatre.

CHARLOTTE JAEKEL (Modern German Literature), M.A., Studies in Literary Studies, History and Romance Studies at the University of Bonn and Cologne from 2005–2012. In 2012 research assistant at the the Open University of Hagen, since October 2012 research associate at the University of Cologne. Working on a doctoral thesis on alternative ontologies of a non-modernist literature: things, waste and media.

GEORGI KAPRIEV (Philosophy), Prof. D. Sc., Sofia University "St. Kliment Ohridski," is a graduate of the "St. Kliment Ohridski" University in philosophy. He has specialized in Cologne and Paris. He is a member of the International Society for Study of the Mediaeval Philosophy (S.I.E.P.M.), of the Society for Study of the Philosophy of the Middle Ages in Germany (GPMR) and a co-founder of the European Graduate School for Ancient and Mediaeval Philosophy (EGSAMP). He is the author of 19 books and editor of 21 editions. Editor-in-chief of www.philosophia.bg. Co-editor of: Archive for Mediaeval Philosophy and Culture, Bibliotheca Christiana, Christianity and Culture etc. He translates from Latin, Ancient Greek, German and Russian.

MICHAEL NIEHAUS (Modern German Literature), Prof. Dr., FernUniversität Hagen (since 2014). Dissertation 1993 on monological structures in 20th century prose literature. Habilitation: *Das Verhör. Geschichte – Theorie – Fiktion* (2003). Author of various books, especially *Das Buch der wandernden*

Dinge (2009). Fields of research: Narrative Literature from the 19th to the 21st Century, Narratology, Literature and Institutionality, Material Culture.

MARTIN ROUSSEL (Modern German Literature), Dr., Associate Director of the Internationales Kolleg Morphomata at the University of Cologne. Dissertation in 2007 on the 'Micrography' of the Swiss Author Robert Walser. Editor of the *Kleist-Jahrbuch* since 2007 and Board Member of the Directorate of the Heinrich-von-Kleist-Gesellschaft since 2008. Fields of Research: Literature from the 18th to the 21st Century, Writing Cultures, Theory of Figurations, Literature and Authority.

STOYAN TANEV (Industrial and Civil Engineering), Associate Professor in the Department of Technology and Innovation, Faculty of Engineering, University of Southern Denmark in Odense, and Adjunct Professor, Department of Systems and Computer Engineering, Carleton University, Ottawa, Canada. He has multidisciplinary research interests and background including: MSc in Physics (1989), University of Sofia, Bulgaria; PhD in Physics (1996), University Pierre and Marie Curie, Paris, France; MEng in Technology Management (2005), Carleton University, Ottawa, Canada; MA in Theology (2009), University of Sherbrooke, Canada; PhD in Theology (2012), University of Sofia, Bulgaria. Dr. Tanev is member of the Editorial Board of the *International Journal of Actor-Network Theory and Technological Innovation* and the Review Board of the *Technology Innovation Management Review.*

ARTHUR TATNALL (Information Systems), Prof. Dr., Victoria University, Melbourne, Australia. His PhD was an actor-network theory account of the adoption of the programming language Visual Basic into the curriculum of an Australian university. He is currently Editor-in-Chief of the *International Journal of Actor-Network Theory and Technological Innovation*, as well as the Journal of Education and Information Technologies. He has written widely and is active in the International Federation for Information Processing (IFIP) as Chair of WG9.7—History of Computing and WG3.4—Professional and Vocational Education in ICT. His research interests include technological innovation, history of computing, project management and computers in education.

IVAN TCHALAKOV (Sociology), Dr., Associate Professor in the Department of Institutional and Applied Sociology, University of Plovdiv, and in the Institute of Studying Societies and Knowledge, Bulgarian Academy

of Sciences. He received his MA in Sociology at the University of Sofia (1984) and PhD at the Institute of Sociology, Bulgarian Academy of Sciences (1988). His researches are in the field of science and technology studies. Between 1993 and1997 he has carried out an ethnographic study of holographic laboratory (CLOSPI) at BAS, where he developed the notion of heterogeneous micro-community, constituted on the relationships of passivity and responsibility between human and nonhuman actors. Currently he is elaborating these ideas, comparing Aristotle's theory of action and Antoine Hennion's notion of amateur and their relevance for understanding scientific and engineering practice. The transformation of innovation systems and entrepreneurship in East-European countries is another focus of his research.

JONATHAN TUMMONS (Education), Dr., Leader of the MSc Educational Assessment at Durham University, UK. Member of the British Educational Research Association, the Further Education Research Association, and co-convenor of the Oxford Ethnography and Education conference. He has published widely in the fields of education, assessment, teacher-training and professional learning. Currently co-investigator on "Higher Education in a Digital Economy", a three-year Canadian-UK ethnography of curriculum renewal in medical education, funded by the Canadian Social Sciences and Humanities Research Council.

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Georgi Kapriev (Philosophy), Prof. D.Sc., Sofia University "St. Kliment Ohridski." He is the author of 19 books and editor of 21 editions. Editor-in-chief of www.philosophia.bg. Co-editor: Archive for Mediaeval Philosophy and Culture, Bibliotheca Christiana etc. He translates from Latin, Ancient Greek, German and Russian.

Martin Roussel (Modern German Literature), Dr., Associate Director of the Morphomata Center for Advanced Studies at the University of Cologne. Fields of Research: Literature from the 18th to the 21st Century (among others Kleist, K. May, R. Walser), Writing Cultures, Theory of Figurations.

Ivan Tchalakov (Sociology), Dr., Associate Professor in the Department of Institutional and Applied Sociology, University of Plovdiv, BAS Institute of Studying Societies and Knowledge, and PAST Center, Tomsk State University. His researches are in the field of science and technology studies.

WILHELM FINK

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