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**Mario Biagioli and Jessica Riskin (eds.)**

*Nature Engaged. Science in Practice from the Renaissance to the Present*  
New York: Palgrave Macmillan, 2012, pp. 301

**Marco Bresadola** *University of Ferrara*

This collection of essays edited by Mario Biagioli and Jessica Riskin includes the contributions of some of today's major historians of early modern and modern science. These authors have at least two things in common: they all acknowledge that their work has been influenced by the historical approach developed by the American historian of science John Heilbron, to whom the book is dedicated, and they all adopt a pragmatic view of the history of science. As Riskin claims in her introduction to the book, historical pragmatism has emerged as a third way out of the opposition between two radical conceptions of science: a "rationalist" or "realist" view against a "relativist" or "constructivist" one. Here Riskin refers to the so-called "science wars" that involved many, but by no means all, practitioners of science studies at the end of the last century, after the emergence of cultural and social trends in the interpretation of science and scientific knowledge. These wars, which concerned issues such as the source of scientific credibility and trust, the truth value of knowledge claims and the alleged specificity of scientific activity, were a new development of a lasting confrontation between scientific and humanistic cultures, indicated as the "two cultures problem" after Charles P. Snow's famous essay of 1959.

Historical pragmatism aims at overcoming the opposition between irreconcilable ways of looking at science, either as a specific epistemic enterprise quite distinct from other forms of human culture, or as an activity with no peculiarities or differences with other kinds of social practices. For the contributors to this book, science is a mingled yarn, "no more separable into discrete parts (natural vs. social, objective vs. subjective) than the thread of life" (p. 3). Their approach is profoundly historical in terms of focusing on the contextual and contingent aspects of scientific knowledge, and it is pragmatic in terms of understanding the mutual engagement and permeation of scientific activity with society and culture at large. Hence the great variety of topics dealt with in the essays contained in the book.

The book is divided into four parts, which focus on different aspects of the mutual engagement of scientific activity with other dimensions of human life such as social conventions, legal affairs, historical practices, and worldly objects. Part I, titled "Conventions", includes a contribution by Ken Adler on the political and social aspects of the transition from 18<sup>th</sup> century cosmopolitanism, realized by the idea and reality of a Republic of Letters, to 19<sup>th</sup> century scientific internationalism. The papers by Hasok Chang and Michael Gordin offer an original reconstruction of the history

of two scientific results – the establishment of the boiling point of water and the birth of the periodic table – showing not only their conventional character, but also the complex and contingent nature of their history. In his contribution, Dominique Pestre relates the development of information-processing practices in Britain during World War II to the specific needs of the military and their collaboration with academic scientists.

Part II is dedicated to “Laws” and its essays examine the mutual shaping of legal and scientific concepts and practices. Matthew Jones deals with the origins of modern patent law through the case of Leibniz’s calculating machine, which played a major role in challenging traditional legal conventions related to scientific inventions. Mario Biagioli’s paper retraces the legal roots and rhetorical value of Kepler’s notion of eye-witnessing, as it emerged from his familiarity with inquisitorial law and was displayed in his astronomical observations. Focusing on a much more recent subject, Daniel Kevles examines the present regulation of property rights to genes, for which he makes a striking comparison with the history of a regulatory regime for railroads established in 19<sup>th</sup> century America. Remaining in the American context, Tal Golan deals with the mutual influence between epidemiology and law in courtrooms of the late 20<sup>th</sup> century.

Part III, titled “Histories”, is less rich in number of contributions but not in interest for the reader. It includes a paper by Anthony Grafton, who focuses on how astronomy and history mingled in Mercator’s work in the field of Renaissance chronology, and one by Paula Findlen, who re-examines the well-known history of Galileo’s trial from an original angle, namely the correspondence between one of his disciples and a Jesuit mathematician about the biography of Galileo and the meaning of this tragic event.

Finally, Part IV is devoted to “Things” and the material culture of science. Jessica Riskin deals with the role and epistemic scope of automata in Descartes’ mechanical philosophy, while Jim Bennett focuses on another type of early modern objects, the sundials, and describes how the design and construction of these instruments affected the knowledge and practice of cosmography. The last chapter of this part, and of the book, is written by Giuliano Pancaldi, who shows the complex and hybrid nature of William Thomson’s work in electricity and magnetism through the reconstruction of the history of his mirror galvanometer.

Taken together, these essays reveal the variety of topics and interests cultivated by current historians of science who share a historical and pragmatic approach to the discipline. In this regard, *Nature Engaged* is primarily addressed to young practitioners of science history, as well as to a broader readership interested in science and technology, who can have a grasp of what doing history of science means after the example of scholars like John Heilbron and after what Hans-Jörg Rheinberger (in his book *On Historicizing Epistemology. An Essay*) has recently called a “practical turn” in the study of science and its history.

**Dominique Bourg, Pierre-Benoit Joly, Alain Kauffmann  
(eds.)**

*Du risque à la menace. Penser la catastrophe [From risk to threat. Thinking about the catastrophe]*

Paris: Puf, 2013, pp. 252

**Silvia Bruzzone** *Tours University*

The book edited by Dominique Bourg, Pierre-Benoit Joly and Alain Kaufmann is a collection of articles presented at the Colloque of Cerisy, which took place in September 2011. After 35 years from the publication of Beck's *Risiko Gesellschaft*, the conference questions the appropriateness of the expression "risk society" to explain contemporary dynamics. The book is divided in four parts.

In the first one, historians contest Beck's main thesis of the existence of a break between the present and the past. According to them many characteristics, which have been attributed to the risk society, were already present at the beginning of the XIX century. In particular, they question the supposed virtues linked to the risk society. In the past, the acknowledgement of the dangerousness and of the potential damages in the development of techno-sciences has not led to a limitation of their expansion. This has rather brought to the development of measures of accompaniment. So, while according to Beck, the risk society would be more reflexive and conscious of the side effects of its production, the authors in the book claim that this avowal goes in the sense of a risk acceptance rather than risk criticism.

In the second, part, different contributions, mostly from philosophers, elaborate on the concepts to think about the actual society. The necessity to overcome the notion of risk and its connected idea of control and capacity of evaluation leads them to propose a substitution of it with the term "threat". Here we find the reason for the title of the book. The "society of threat" would better convey the idea that we live in a society made of potential damages which are out of our capacity of evaluation, prediction and control. In Beck's work, science plays a central role. Different contributions give account of the limits connected to the notion of risk and provide some elements to frame a new epistemological paradigm. The need of controlling incertitude has been increasingly left to mathematical models and cost and benefit analysis. As side effect, the excessive "mathematization" of society has led to the eviction of sense and to all interpretative work. Attention is then addressed to post-normal science (Funtowitz and Ravetz, 1990) which is based on a pluralism of perspectives, on a critical distance towards models and on a new attention to in-

terpretation. This brings to a reconfiguration of knowledge itself, whereby its ultimate goal would not be prediction but “care”. Moreover, the notion of risk does not seem being adapted to cover so called “transcendental damages”. The term risk entails in fact an individualist and monetary dimension. Thus damages connected, for instance, to the degradation of the biosphere could not be acknowledged under the category of risk. The proposal is to take the incertitude for serious and to adopt a cognitive approach, which recognizes the limits of human action. This should be based on a “logic of clues” (in French “*logique indiciaire*” that is based on “*indices*”, clues), which is close to judicial enquiry or to police investigations. The logic “of clues” is linked to a situated type of knowledge and to a way of proceeding by analogy. This would allow overcoming the idea of the principle of precaution as cost and benefit analysis. The assumption of the incertitude by the principle of precaution entails a change in the way of thinking, which does not aspire to tell what is “true” but just what is “right”. Moreover, with the development of the techno-scientific society, new legal questions arise. If new subjects (non-humans, animals, etc) long for rights, this goes beyond the traditional class framework, which has structured society and law. Lastly, the language of catastrophism – natural and social - seems well adapting to acknowledge the contextual framework.

The third part gives account of how social sciences have mobilized and have appropriated the concept of risk. Through a sort of *mea culpa*, French researchers admit of not having taken many risks in analyzing the “risk society”. They have remained in much legitimated areas of research – such as controversies on risk, public debates, etc. - and have not adventured themselves in more uneasy domains: for example the analysis of the risk where it is produced or of risk perception. In the same line, few works have engaged in theorizing risk in connections with the new transformations of the State action. A parallel is then made between technical democracy proposed by STS, on one side, and the sub-politics proposed by Beck, on the other. If both approaches are interested in the new forms of democracy and to the development of participatory processes beyond the institutional ones, some differences in scales and temporalities are offered. Most importantly, while for STS, the affirmation of fora of hydrides is a result on its own, Beck rather tends to lay emphasis on the *apories* of power in the new circuits of sub-politics. The space dimension represents a category, which is embedded in the notion of risk. By taking into account some of the last Beck’s works and the global spreading of some health diseases, authors propose a new grammar of spatiality of risk which overcomes the traditional cartography. The proposition is a “navigation” form of cartography permitting the connection of the different locations where the risk manifests itself. After space, time. If the sociology of risk is connected to predicable and calculable time, the pragmatic tradition lays emphasis on other notions of time which are meaningful in the acknowledgment of risk. The activity of prediction is not based just on

models but on different argumentations that people mobilize in their experience of time.

In the fourth part, studies give account of the fact that the technological risk has not replaced the social risk. In the analysis of the trajectory of tuberculosis, the phenomenon of resistance to antibiotics is not qualified as “iatrogene” by health institutions but it is connected to a misuse of the technology by users and to problematic social contexts. In another example, which compares two experiences of epidemiological crisis in XVIII century and at our time, the human conditions seem to be at the base of the epidemics, beyond any rational technical tool of risk management. Finally, climate change represents the greatest challenge to the notion of risk and to the research in social science. Its exceptional character consists in its planetary dimension, its irreversibility and its close link to governance questions.

Even though some of the argumentations mobilized in this text are not completely new and despite a certain difficulty in finding a *file rouge* among all the texts, the readers of *Tecnoscienza* may appreciate the polysemy of contributions stemming from different disciplinary approaches. Beyond all criticisms and attempt to overcome the notion of risk society, the expression introduced by Beck still represents one of the *grand récit* of our time and this book provides a further confirmation of it. At the same time, this contribution speaks for the difficulty of finding a new coherent *grand récit*, under the banner of “threat”, “catastrophe” or something else.

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### **Peter Keating and Alberto Cambrosio**

*Cancer on Trial. Oncology as a New Style of Practice*

Chicago and London: The University of Chicago Press, 2012, pp.

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**Stefano Crabu** *University of Padova*

What do prizes donated by General Motors, oncomice, molecules, patients, the acronym VAMP, statisticians and oncology have in common? Apparently very little. They are, however, some of the elements and objects that, throughout a complex and articulated convergence process, laid the foundations for the birth of the composite and diverse biomedical transnational movement for cancer research and treatment.

The history of this particular and heterogeneous convergence is the subject of the latest book by Alberto Cambrosio and Peter Keating, two of the most eclectic and prolific authors who have worked at the inter-

stice of history and social studies of science and technology. Without ever giving in to the illusion of producing a teleological narrative that subsumes, as in a “total history”, the emergence and development of scientific research in oncology, the authors describe, in a detailed and meticulous way, the genealogy – in the sense conferred by Foucault (1963) – of a portion of contemporary biomedicine that has significantly contributed to innovate and transform biomedical practice *tout court*.

Through a narrative comprising 12 dense chapters divided into 3 different sections, the volume offers an interpretation of the practices, the economic, institutional, organisational, epistemological and technological dimensions, and the political implications of scientific research in support of cancer care and treatment. These are dimensions that give depth to the analysis of the pillar, now taken for granted, of contemporary oncology practice: cancer clinical trials, which the authors define in terms of a new “style of practice”.

This latter concept is discussed in the introductory chapter of the text and is inspired by a well-known article published in 2007 in the *Bulletin of the History of Medicine* by the authors themselves (Keating, Cambrosio 2007). In this sense, the introductory consideration to the volume constitutes the theoretical framework of the empirical analysis that runs through a plot which is densely populated by human and animal actors, biological entities, technical objects and epistemological assumptions.

The authors, approaching the tradition of social studies on science and technology, take up the classic concept of *style of reasoning* in an innovative way. Proposed by Ian Hacking in the early '90s, the notion of *style of reasoning* (1992a; 1992b) indicates a particular configuration of institutions and organisations in relation to scientific practices and technologies aimed at investigating specific research questions, elaborating convincing answers, evaluating and disseminating the results to the scientific community, and regulating research activities. In reference to the thought of Hacking, however, Cambrosio and Keating suggest a semantic shift by proposing the term *style of practice*, in order to clear the notion of *style of reasoning* from its particular “cognitive” connotation. Furthermore, while Hacking's analytical perspective has a long-term historical reference, the volume proposed by Cambrosio and Keating seeks to explore the processes of innovation in the biomedical field through a few decades.

Each of the three sections making up the text explores in great detail the three historical moments identified by the authors, through which the methodology of conducting cancer clinical trials has emerged, developed and partially stabilised as the new style of practice in the biomedical disciplinary domain. Although the boundaries between the three main historical periods when this new style of practice was developed are relatively unclear, the authors identify peculiar elements of discontinuity that allow a precise and clear characterisation.

The first historical phase (chapters II-V), which evolved from the mid-

50s to the mid-60s of the last century, saw the emergence of chemotherapy as a potential third treatment course for the cure of cancer, in addition to surgery and radiotherapy. 1955 is perhaps to be considered as a landmark year for cancer research, which in previous decades was rather characterised by a “scientific Tower of Babel” where simple qualitative observations wouldn’t go beyond medical anecdotes. In this first part of the text, the authors thoroughly analyse the emergence and development of chemotherapy practice, medical oncology and clinical experiments incorporated in *clinical trials*. This first phase is marked by what Cambrosio and Keating define as the experimental *turn* that led to the emergence of a new style of practice generated by chemotherapy, which would soon involve all aspects of cancer treatment and care (radiotherapy, chemotherapy and surgery).

While avoiding the banal empiricism that regards clinical research as a mechanism of linear implementation of “objective” laboratory results, the authors take into account two important experimental protocols (so-called VAMP and 6313 protocols) in order to show how, since the mid-50s, a new and completely unique style of research has emerged. This is based on a highly experimental design that lays its roots in biostatistics, careful selection of patients and treatment procedures, and unequivocal criteria of correlation between variables. In this sense, VAMP and 6313 protocols offer a privileged analytical perspective on the complex institutional and cooperative network that allowed the emergence and implementation of clinical trials. In the first section of the book, the authors emphasise the cooperative nature that marked the beginnings of clinical research in oncology. As a result, Cambrosio and Keating coined the term “epistemic organisations” in order to stress the importance of integrating experimental and clinical research and the organisational methods developed in support of the research itself. It is a fact that, despite the great interest among historians and sociologists in the subject of oncological trials, only few studies mentioned the key role of cooperation. Historians mainly based their work on archives and investigated institutions such as hospitals, professional associations or commercial enterprises that produced and filed such records. Furthermore, the distributed/fragmentary, flexible and provisional nature of the cooperative activity of cancer groups and the lack of records that testify its importance, led social sciences as a whole to overlook this specific method of carrying out scientific investigation. As a matter of fact, in the attempt of establishing a strong link between science and industry and self-verifying the sterile paradigm where “science discovers” and “industry applies”, social sciences have traditionally seen chemotherapy and cancer research as the outcome of a well-defined industry research program. However, the first part of the volume shows how cooperative groups from both sides of the Atlantic were particularly differentiated and quite far from the organisation of industry research as it was conceived, for example, in the making of the atomic bomb.

The second section of the book (chapters VI-IX) is dedicated to the analysis of the development processes taking place from the mid-60s through the 80s that involved some of the most significant institutions arising from the birth and stabilisation of cooperative groups – such as ECOG (Eastern Cooperative Oncology Group) or EORTC (European Organisation for Research and Treatment of Cancer) – as protagonists of cancer research in the previous decades. This second historical stage is dominated by large-scale clinical trials having the objective of comparing the potential of new therapeutic regimens based on the combination of several pharmacological substances, and recursively problematising neoplastic diseases against which these regimens were designed. These trials shared the fractional efficacy of chemotherapeutic drugs to hinder the replication of cancer cells (the cell kill hypothesis) along with a number of assumptions about the growth and replication of cancer cells (cell kinetics).

Accordingly, the authors focus on how the design and experimental implementation of the clinical trials discussed in the first part of the volume have changed. Cambrosio and Keating describe the transition from a first phase, mainly characterised by clinical screening of anti-tumour substances being tested on a relatively small number of patients, towards clinical research on a very large scale. Although the clinical protocol analysed in this section (ECOG 0971) differs from the previous protocol (VAMP), it cannot be considered as a novelty in itself, since it took over and showed standard features of the new practice style that had already emerged in the previous phase. This new phase, whose importance is symbolically expressed by the ECOG 0971 protocol, is seen as part of a broader research strategy based on the alignment of a number of related institutions within a transnational network, including data centres and protocol review committees that helped streamline the work of cooperative groups. In addition to these innovations, there is the development of new strategies for statistical analysis (sequential statistics, centralised randomisation) in support of experimental design and analysis of data produced by cancer clinical trials. This contributed to the development of a complex distributed network involving a range of different professionals, such as doctors, data managers and biostatisticians, who gave the impulse to further strengthen the emerging evidence from clinical research with the aim of reshaping anticancer therapeutic practices. Keating and Cambrosio describe the development of a clinico-experimental network going beyond the rigid institutional and national borders and establishing a new biomedical space where oncologists and biological entities cooperate within the framework established by the new style of practice. The authors show how the methods of cooperation and partnership involving researchers from both sides of the Atlantic has become extremely complex and varied through the incorporation of an increasing number of stakeholders, including, for example, the pharmaceutical industry. This led to the emergence of new organisational processes subjected to the

production of scientific knowledge in oncology and constituting what has been called *oncopolitics*, described as the method for governing the processes of production and sharing of knowledge about cancer(s).

During the 80s, however, a sense of crisis pervaded the international community of oncologists. Some of them even argued that cancer research had come to a *plateau* and no trial could significantly increase the chances of curing and treating cancer. The end of the 80s, with the so-called molecular turn, marks the beginning of the third historical phase, which is dealt with in the last part of the volume (chapters X-XII). The authors show how the innovations in the field of molecular biology reinvigorated cancer research, transforming the epistemological assumptions and the management of experimental practices. In 1984 the first human oncogene was isolated and, at the same time, that complex and controversial process that would then lead to the sequencing of the entire human genome began (M'charek 2005). These are the elements peculiar of the third phase identified by the authors of the book, which is characterised by the hybridisation of different disciplines for the consolidation of oncogenic theory within the study, prevention and treatment of cancer. In particular, clinical research would no longer focus, as was the case in previous decades, on strategies for the prevention of cancer cells replication. The episteme passes from a cellular level to a sub-cellular one, in order to develop new therapeutic regimens capable of interfering with the biochemical processes that take place in sub-cellular interactions. Therefore, the hybridisation between cancer clinical trials and molecular biology gave rise to the idea that the ever-increasing gap between basic and clinical research could be further reduced. Under the aegis of what was defined as *translational research* in biomedical circles, a number of researches and new funding programs had reinstated the rhetoric of the so-called “unity between care and clinical research”, expressed by the all-embracing concept of *biomedicine* (Clarke *et al.* 2010). Therefore, the consolidation of the oncogenetic theory opens the doors to new research strategies and new ways of treating cancer patients. Biomedical strategies regard *translational research* and *targeted therapies* as the two most interesting approaches so far available and encourage the redefinition of the new style of practice, in order to achieve a greater synergy between research laboratories and the clinical domain.

Overall, the work of Cambrosio and Keating is difficult to categorise with a specific disciplinary label. The book is mainly a work of history of science that also examines the processes of innovation in the biomedical field from a distinctively sociological perspective. Of particular interest for STS researchers is that both the historical and sociological perspectives are fully involved in the narrative and provide theoretical thickness to a work with a strong empirical structure, which is based not only on the traditional archive sources generally accessed by historians, but also on biomedical literature, interviews to leading names in the field, as well as an interesting and innovative bibliometric analysis of scientific produc-

tion. For this reason, this book shows a renewed methodological option that STS should take into careful consideration: the genealogical perspective.

While contemplating a genealogical approach and a particular sensitivity to the social dimensions of science and technology, this book also stresses the importance of complementing a processual and contingent analysis of the production and sharing of scientific knowledge (typical of ethnographies) with a diachronic dimension. This would allow to account in an articulated way for the historical dimension of how different genealogies of actants converge, diverge and rearrange, creating a technoscientific balance, as precarious as it may be.

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**Tom Boellstorff, Bonnie Nardi, Celia Pearce and T.L. Taylor**

*Ethnography and Virtual Worlds: A Handbook of Method*  
Princeton and Oxford: Princeton University Press, 2012, pp. 237

**Giacomo Poderi** University of Trento

As the title clearly anticipates, the book offers, in the form of a methodological handbook, a sound reflection on the use of the ethnographic approach in/for virtual worlds research.

The handbook arrives in a time in which, on the one hand, ethnography-based research are increasingly spreading through and contaminating with fields other than the traditional ones of anthropology and sociology (such as new media and communication studies, ergonomics, design, HCI, CSCW). On the other hand, research on virtual worlds has continuously proliferated in the last decade and showed a growing affinity with qualitative research design and ethnography, in particular. The four authors' effort is praiseworthy and the result of their work a valuable one, precisely, because in times of methodological appropriation and disciplinary contamination, the re-assessment and the update of what it means to do ethnographic research in/on virtual worlds were sorely missing. Furthermore, the many years of experience that Boellstorff, Nardi, Pearce and Taylor share over the handbook topics shine throughout the book making it a sound and authoritative source.

Authors' commitment to a clear definition of "virtual world" as "object" and "field" of research is a remarkable aspect of the handbook, as well as it is their attempt to maintain clarity between what constitutes virtual world research and what not. Indeed, for instance, they clarify more than once, throughout the book, that games with multi-player capabilities, online communities and most networked environments that are usually studied nowadays are not virtual worlds. Virtual worlds "are *places* and have a sense of *worldness*. They are not just space representation, but they have object-rich environments with which is possible to interact. [...] They are multi-users in nature. They exist as shared social environments with synchronous communication and interaction. [...] They are *persistent* and continue to exist even when participants log off. [...] virtual worlds allow participants to *embody* themselves, usually as avatars" (p. 7; original emphasis). Furthermore, in my opinion, the fulfillment of the handbook's main goal – "to provide ethnographers with a practical set of tools and approaches for conducting successful fieldwork in virtual worlds" (p. 1) – is successfully pursued through the handbook's sought-after design as a manuscript that (*i*) is concise and agile: to be held in one hand, in opposition to most handbooks; (*ii*) is compact and practical reference guide: not just to be studied, but to be carried and used while doing ethnography; and (*iii*) identifies with the greatest possible precision the key tenets of ethnographic research (p. 7-9).

In compliance with the principle of a lightweight and agile instrument, the handbook is composed of twelve, relatively brief, chapters each one addressing a key aspect of ethnographic research. The book is not divided into parts, but it is easy to identify the macro areas covered by the chapters.

The first two chapters ("Why this handbook; Three brief histories")

deal with the framing of ethnography as a method for researching virtual worlds. In this initial part, the authors provide an explanation of the rationale behind the handbook and a recount of the emerging research trends on virtual worlds and methods. Chapters three and four (“Ten myths about ethnography; Research design and preparation”) justify the choice of method and its place in the research design. This part proceeds by explaining how the choice of an ethnographic approach can be grounded against the typical objections that researchers could face in this regard and how such choice can be seamlessly integrated into a sound research design.

If a core of the handbook shall be found then, in my opinion, it is in chapters five, six and seven (“Participant observation in virtual worlds”; “Interviews and virtual worlds research”; “Other data collection methods for virtual worlds research”), which tackle in depth the key ethnographic tenets of data gathering: participant observation, interviewing, and the use of virtual worlds specific data (e.g. screenshots, chatlogs, audio, virtual artifacts). The authors give incisive explanations about the meaning of *participating in/for* the fieldwork and about the establishment and upkeep of fulfilling relationships with the informants. More importantly, they clarify the differences and the similarities for (participant) observation and interviewing as conducted in virtual worlds research and physical worlds ones. The eighth and ninth chapter (“Ethics”; “Human subjects clearance and institutional review boards”) enter into the details of research ethics, both in terms of principles and practical matters. Chapters ten and eleven (“Data Analysis”; “Writing up, presenting and publishing ethnographic research”) deal with the challenge of analyzing and presenting the data within the frame of ethnographic research. In this part, they are particularly helpful the practical tips over the drafting of the research results through different ethnographic genres, as well as the considerations over the styles and the target venues for submitting research outputs. The last chapter (“Conclusion: arrivals and new departures”) is a small, conclusive reflection on the rationale of the handbook’s design and the authors’ expectations over its usefulness and outreach. Finally, as an overall framework, the handbook also includes: an initial “Foreword” by George Marcus, a very rich “References” section and an “Index” one.

The critical remarks to address to the handbook are very few in my opinion. An issue worth mentioning is that, despite being a methodological book, it includes no examples of the practical application of the techniques that are introduced and explained in general terms. For instance, the sections “Taking extensive fieldnotes” (p. 82) or “Keeping data organized” (p. 85) discuss very well the tenets and principles of fieldnotes taking and of their coherent organization, but the book provides no fieldnote excerpt neither an organization scheme for the data as examples. Similarly, when explaining the use of chatlogs and screenshots as data, no examples of how to use, organize or subsequently analyze this kind of data are provided. Another, minor, issue I feel to highlight relates to the choice of

keeping the book light while covering a large spectrum of methodological topics which, of course, come at the detriment of the depth of analysis for each topic or sub-topic. As this is an explicit choice made by the authors it can be hardly criticized, also because it is well pursued. However, certain chapters really make the reader wish the authors had dwelled deeper into the matter. A clear example is in chapter five where the handbook touches on a sub-topic such as “Making Mistakes” (p. 79-82). From the practical point of view of doing ethnography this is a very interesting theme, but it is treated for no longer than a couple of pages. The same issue goes for chapter seven, where the use of different data types and gathering techniques that are specific to virtual worlds research are mentioned, but not fully treated. Truth be told, to cushion both of the issues mentioned here, the authors often provide an account of how they tackled the specific topic at hand in their own respective research works, which is a very interesting and pleasant way to establish affinity with the reader, or provide references to specific literature that allowing those who would be interested in, to dwell deeper into the topics.

About the style of the handbook, I certainly appreciated its narrative and fluid tone that manages to establish a direct and somewhat informal conversation with the target audience. Statements, key arguments and examples are clear and never convoluted. Furthermore, the use of virtual worlds' jargon and of theory-laden terminology is kept to the minimum, which makes the book easily accessible for researchers who are starting to approach either the methodology or the field of virtual worlds. A few words shall be spent also about the audience the book is addressed to. Indeed, I believe that, regardless of the fact that the authors' explicit intent was to provide a useful instrument for graduate students and early stage researchers who are not necessarily acquainted with the handbook's subject matters, “Ethnography and Virtual Worlds: A Handbook of Method” can be useful for more experienced ethnographers too. The main reason for this is that the handbook itself grew out from the authors' direct experiences and challenges with ethnographic research and it is the result of an ongoing conversation among the authors about such challenges. Therefore, despite being written in a simple, accessible and lightweight way, it certainly touches the key methodological issues that any researcher entering this field will have to face, regardless of his or her experience.

One final aspect I want to raise in this closing sentence may be of interest for some STS scholars. Indeed, I believe that through its design, its style, the scope of its arguments and the framing of its specific elements, the handbook manages to make looking as outdated the whole set of methodological and epistemological challenges that were raised by the study of the computer-mediated, the second self, the online and the virtual during the past two decades. These past great challenges appear here as “normal” and integrated elements that are common to any research journey, ethnographic or not, striving for discovering a world, virtual or not.

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**Francisco Tirado and Daniel López (eds.)***Teoría del Actor-Red. Más allá de los Estudios de Ciencia y Tecnología [Actor-Network Theory. Beyond Science and Technology Studies]*

Barcelona: Amentia Editorial, 2012, pp. 398

**Claudio Ramos-Zincke** *University Alberto Hurtado, Chile*

Over 30 years, actor-network theory (ANT) has evolved from a proposal for the study of science and technology to a theoretical approach about reality in general, questioning the basic notions of modernity, challenging sociology and other social sciences, and involving explicit ethical and political implications. Throughout this journey, ANT has sustained an intense dialogue and self-criticism. Today, it is an internationally recognized approach with institutional consolidations but nevertheless maintaining a spirit of inquiry and questioning. This book, product of a group of researchers from Spain and Latin American countries, is an expression of that spirit. It consists of twelve chapters, one introductory, sketching some highlights of the trajectory of ANT, and eleven containing research results or reflections based on ANT. They innovatively explore realities in which science and technology are involved, appealing to the conceptual and theoretical tools provided by the ANT, but revising them and relating them to other approaches and adding new conceptualizations.

The three chapters that follow the introduction are directly based on empirical investigations and are extremely interesting. In a long and substantial chapter, Jorge Castillo & Francisco Tirado analyze the new reality of cancer. Through the practices and technologies of the current biomedicine, especially of the genetic analysis, a cancer has been constituted that extends itself beyond human tissues, a cancer that even exists in healthy people. It is a presymptomatic cancer, constituted in a probabilistic way, and identified through the results of the oncological genetics. Now, cancer patients are also those who have risk of contracting it and that could be intervened in a preventive manner. In this way, the disease incorporates several superposed levels: an individual, bodily level; a family, genealogical level, and a population level at which statistical calculations are made. The cancer is, therefore, a phenomenon extended at those three levels or scales that are folded in the individual patient, involving a multitude of actors and practices of very diverse nature. In spite of that complexity, the network of medical operations enact, according to the authors, a well harmonized and non multiple disease. Castillo & Tirado also argue that the medical protocols play a central role in the coordination of the diagnostic processes, technological handling, treatment and monitoring. These protocols would be a central force harmonizing the disease,

avoiding a differentiated ontology, despite the existence of multiple scales. It would be possible to discuss if the integrative force that Castillo & Tirado attribute to the protocols is so powerful and effective as they assume, and if this is the main integrative factor, but their exposition is well argued. The authors conclude that this type of cancer represents a peculiar type of object that they call “potential object”. It is the result of calculations in an extended field that are instantiated in a specific body. This would reflect a variety of objects and processes of enactment different from those habitually treated by the ANT.

In the next chapter, Blanca Callen studies another particular type of technological, scientific objects: computer programs built using free software (FS), whose constituent code is released and may be copied, distributed, used and modified by anyone, contrasting with the restrictive logic of commercial circulation. Unlike what is usually raised by the ANT, the effectiveness and success of these objects based on FS does not derive from their black boxing but precisely from the opposite: from its openness and transparency. The construction of socio-technical objects using FS proves, according to Callen, that the stabilization and proper functioning of an object do not necessarily require its closing and blackening. The sustainability and quality of these products based on FS are provided by the users' collaboration and appropriation of the products. This openness of the productive process rather than destabilize it, contributes to its improvement and reinforcement. These objects, instead of “immutable mobiles”, in terms of Latour, are “mutable mobiles”, fluid objects, whose advantages lie on such character. In a larger perspective, this proposition supports the benefits of using ample collaboration in the construction of facticity and can be read in the perspective of an ontological democratization.

Tomás Sánchez Criado studies how the user of telecare services for seniors is constituted and maintained. His investigation is in continuity with the approach of the co-construction between users and technology, and incorporates Mol's notions of multiple reality and their articulations. The user is understood, therefore, as an effect of multiple material and semiotic processes; as an assemblage developed through diverse practices. These practices include a certain type of legal, bureaucratic work and the management carried out by the suppliers of the service regarding relatives and acquaintances who can inform about the user and help him. Along with this, Sánchez Criado seeks to address the psychosocial domain and subjective process involved, to which the ANT has not paid attention. He recognizes, thus, in that process of user enactment, a particular semiotic and material articulation allowing the constitution of a singular subjective dominion, habitualized, located and dynamic.

In the remaining chapters the authors present different reflections, more tentative, connecting approaches and making conceptual discussions around the ANT. In six of them, the main center of attention is the relation of ANT with politics, giving special value to Stenger's notion of

“Cosmopolitics”, assumed by Latour, and to the derived proposal of “ontological democratization”. Such notions propose a configuration that is not actual, involving a normative concern. This means, as Yann Bona and Salvador Rodríguez say, to take care of several different cosmos, without the universal rules and possibilities of convergence expected by a Kantian cosmopolitanism. This raises the need for mediation, for which role science has special conditions as a connecting “diplomacy”. It is a political - diplomatic and scientific work with a prospect of future construction, which deviates from the direction assumed by the original ANT. Besides, part of this diplomatic work would be with the own “sociologists of the social” who have been questioned and fought relentlessly by Latour based on his “sociology of associations” approach. Such “internal” diplomacy would also be a new direction for the ANT, not easy to carry out. Paloma García expands on this diplomatic role of the social scientist who seeks to communicate different worlds or cosmopolitics among themselves. This is a scientist who seeks to connect worlds, from within and not from some external point of reference, promoting an ontological pluralism. However, according to García, Latour particularly addresses the interpretive descriptive work and not the intervention mechanisms that such diplomatic perspective requires; he does not elaborate proposals on how to enhance the ontological democracy that involves a complex relationship with various publics, in many cases conflicting among them. Latour's method, according to this author, it would not be sensible to a “heterogeneous public opinion”, which would limit its practical impact. The transformative potential of this line of work would be limited by its lack of attention to the socio-technical mechanisms of agency involved in such diplomatic mission. In this matter, it would have been helpful that Garcia included further discussion and assessment of approaches such as Callon, Lascoumes & Barthe (2009) on Hybrid Forums and its practical applications, where it is taken care of such plurality, addressing specific mechanisms to be used.

In his text, Israel Rodríguez draws up the trajectory of the network concept in ANT and some of the criticism it has received. He highlights the increasingly prominent political orientation of ANT, with its ideas of des-ontologization and ontological politicization. He also shows a special concern for the spatialization of networks and the resulting complex configurations. In this regard, he explores connections with other concepts, such as Peter Sloterdijk's notion of “spheres”, which could be understood as strong networks of relations that operate protectively. There are many and varied stabilizations, such as these spheres, resulting from the movement of the networks; one could conclude that the ANT's emphasis on the movement and circulation perhaps should be balanced with further study of the crystallizations that are being generated and that contribute to the ever-growing complexity of networks.

The text by Ignacio Farias provides a theoretical perspective useful to frame several lines of inquiry that arise from the book's chapters, for ex-

ample on potential objects or on the stabilization of complex configurations. His central question is how the complex social plurality is formed, how to reconcile the logic of networks with the existence of configurations that traditional sociology has identified as social subsystems, fields and value spheres: politics, economics, science, art, etc. In fact, the same Latour (2013), in his last book, arrives at similar distinctions, now understood as “modes of existence”. Farías, based on Niklas Luhmann's theory, argues that ANT, with its emphasis on ongoing practices, leaves out the “virtual”, which may serve as background for the actual. Social reality depends on communication, and each communication introduces a difference between what is indicated and a horizon of possibilities. Social meaning is inevitably a combination of presence and absence; it is based on differences and anticipations. Luhmann shows how different forms of semantic accumulation and communicative configuration, such as the economic, legal, political, artistic and scientific systems, have been constituted historically. These configurations, or networks of meaning, operate in a world of possibilities with respect to any specific practice. To the extent that, in each wave of practices, neither all those elements of meaning nor all those connections are actualized, Farías attributes to them the character of virtual. These virtual stocks of meaning have a procedure of selection, accumulation and maintenance, which is based on the constant local application of a general criterion or code. The recursivity in the application of such a code, around the reference problem, gives form, through historical evolution, to social differentiation. This is a theoretical perspective of exploration that is very suggestive. Along with its potentiality, however, it contains a number of aspects that require clarification or deepening. To begin with, the apparent dissociation between a practical-material-actual dimension and another semantic-virtual dimension would require to be specified, in order to avoid confusing it with the ontological separations and purifications that precisely Latour questions.

This book is aimed mainly at an academic audience already interested in the study of science and technology, and especially at an audience with some knowledge of ANT. This public can better appreciate the questions, comparisons and new conceptualizations. However, for those who have less knowledge on ANT, several chapters include illustrative syntheses and reviews about it that will facilitate them to approach this theory.

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**Niki Vermeulen, Sakari Tamminen and Andrew Webster (eds.)***Bio-objects: Life in the Twenty-first Century*

Farnham, Burlington: Ashgate, 2012, pp. 226

**Mauro Turrini** *University of Paris I*

Techno-scientific breakthroughs have generated a process of representation of, and intervention on, life at molecular scale. The ability to decompose and recombine, create and modify, stock and circulate living-objects has dramatically increased. This has stimulated many academics to write about an objectification of life, particularly evident in the case of DNA codification.

This book intends to contribute to this wide debate by providing the analysis of contemporary reconfigurations of life with “a useful conceptual device or heuristic” (p. 1), *bio-objects* (hence the title). The thirteen case studies presented in this book span a wide range of subjects, including patients, foetuses, embryos, gametes, stem cells, genes, transgenic animals, genetically modified plants, artificial silicon cells and water. As implied by this Borges-like list, the authors are not concerned with providing a complete catalogue of “life in 21<sup>st</sup> century”, as implicated by their subtitle. Their aim, rather, is to introduce a new methodological approach, grounded on the dynamic processes of bio-objectification, which is understood is marked by a fundamental ambivalence. On the one hand, living-objects are controlled, processed, hybridized, collected and exchanged at a unprecedented rapid-pace. On the other, this reification process is not wholly new, complete or definitive, in that it draws upon the traditional processes of the domestication of life. While rendered highly malleable, these living-objects are not rendered inert, not even when codified in genetic sequences, or replaced by artificial *in silicio* models.

In a Foucauldian way, bio-objectification implies necessarily the creation of subjects. As highlighted by the oxymoronic relationship between *bios* and *thingness*, the similarity to a living-object raises issues about the moral status and the position of these new entities in a similar manner to animal/human, organic/inorganic, subject/object dichotomises. Sketched in a brief theoretical introduction, and then resumed and enriched in the empirical analysis that follows, this fascinating conceptual backbone basically follows the trajectories of these “out-of-place entities” through multiple levels of analysis. In particular, they address the interplay between the epistemic and the ontological dimensions of these entities, not only their moral status, but also the regulation of their substance in terms of traceability.

The 13 case studies are organised in three different sections. In the first section, “changing boundaries of human, nonhuman and society” are

analysed through the discursive and concrete shaping of bio-objects in relation to the attribution of life. Radically new forms of life, like transgenic mice, are represented through a contradictory process, in which both the comparison with ordinary forms of life, and the demarcation of their exceptional value, are aimed at silencing their suffering (Tora Holmberg and Malin Ideland). Likewise, *pluripotency* of embryonic stem cells is depicted through an analogous strategic insistence on homogeneity and heterogeneity, as compared to adult stem cells (Lena Eriksson). Even more traditional subjects/objects are also included. Clinical research patients are translated in interdisciplinary data assemblage by algorithms (Conor M.W. Douglas), while water is excluded from the designation of life in that it acts as an external vector for successful attribution of life (Ragna Zeiss).

The second section illustrates the way in which governance practices affect, and are affected by, the configuration of these entities as a result of their position in the living hierarchy or their proximity with the life itself. In the United Kingdom, the reaction against transpecies or chimeric embryos, leading to their prohibition in 2008, has created a discursive and material process of purification. Paradoxically, the production of new epistemological and material embryos, different from “true hybrids”, reinforces the boundary between human and animal (Nik Brown). In the case of prenatal screening and diagnostic test, technologies have participated in the construction of a new bio-object, the foetus, which in turn has shaped new moral responsibility regarding the normal/pathological divide (Nete Schwennesen). The crucial role that the relationship between genetically modified crops and traditional ones has played in the policy-making process is addressed (Janus Hansen). We also find the new responsibilities and care protocols implemented by the genetic analysis of susceptibility to pathologies (Aaro Tupasela).

In the third section, the “generative relations” of bio-objects are explored, particularly in the field of reproduction. In Germany and in Italy (studied respectively by Bettina Bock von Wülffingen and Ingrid Metzler), the discursive and regulative processes that separate the embryo from kinship and familial projects, which have justified the strict limitations on assisted reproductive technologies, are then put into question through a process of re-connection interpreted as a “fruit-of-love”. Even when the paradigm of life-as-information is taken to its extremes, as in the case of an *in silicio* model of a cell, the generative capacity of life has an influence on the organisation of science (Niki Vermeulen). The last two studies concern the potential for genes to assemble biosocial solidarities, such as requests for non-discriminatory measures in insurance policies (Ina Van Hoyweghen), and the implications of the frozen gametes market in the significance and governance of suspended, cryopreserved life (Sakari Tamminen).

As stated in the introductory chapter, the concept of bio-object needs further development. However, it seems very promising particularly con-

cerning methods. The strongest contribution that this book offers the field is precisely the introduction of an effective tool for the study of this epochal change, conceived within a conceptual framework that is clearly inspired by Foucault. Here I am referring to the authors who developed aspects of the “molecularization/geneticization thesis” (in particular Rabinow, Rose and Novas), but also materialist analysts of biomedicine (such as Sunder Rajan and Cooper), or biopolitical philosophers (such as Agamben and Esposito). According to this perspective, the present must be read in the light of an epochal change displaying the intensification of control over life. This search for belief and power systems (*épistémé*) is useful for drawing connections between laws, epistemic apparatus, governance, economic circuits, social relations, representations, and so forth. Simultaneously, the willingness to find out the spirit of an epoch expresses a tendency towards the whole and the structure. A willingness that is complemented with a sensitivity, proper of Science and Technology Studies, toward objects, their agency, their ability to mediate, as well as their discursive and material trajectories. The conceptual framework of bio-objects is an analytical tool that is as malleable, flexible and generative as the forms of life (or non-life) that it aims at studying. Above all, it is capable of combining a detailed analysis of case studies with a broader perspective on the transformation of life within and beyond biomedical research.

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### **Sarah B. Franklin**

*Biological Relatives: IVF, Stem Cells and the Future of Kinship*

Durham and London: Duke University Press, 2013, pp. 376

**Giulia Zanini** *University of Padova*

Thirty-five years after an In Vitro Fertilization (IVF) procedure has for the first time lead to the birth of a living human being and five millions test-tube babies later, ethnographic accounts witnessing how IVF has spread around the globe proliferate. In the meantime, a flourishing reproductive transnational industry has emerged and the use of human reproductive substance for regenerative medicine has become so much desirable and legitimate as it is profitable for global pharmaceutical and health services market.

Among this collection of works, Sarah Franklin's *Biological Relatives: IVF, Stem Cells and the Future of Kinship* surfaces to wisely refocus on the very scope of ethnographic accounts in theorizing socio-biotechnological dynamics and to make a point about the way in which the normalization

of IVF plays a role in the current reciprocal understanding of biology and technology.

The book has the urgent ambition to explore how we might think about reproductive substance as a technology, and technology as a reproductive substance; and the ways in which we might combine these approaches to make sense of the contemporary “age of biology”. Franklin’s approach resists and goes beyond the presumptive separation of domains characterising the theories of social embeddedness of IVF. To reverse such an approach, she elaborates a definition of technology that cuts through diverse disciplines and that emerges in its ambivalent and co-constitutive relationship with biology.

The author investigates the very meaning of “being after IVF” in its temporal, spatial, logic and qualitative terms. Without eluding the complexities of analysing IVF production and reproduction processes, Franklin rather scrutinizes contingent ambivalences, illustrating their cultural, political and technological powers. By exploring IVF socio-biotechnological life and legacy Franklin spans across a variety of contemporary pressing phenomena, including PGD, stem cells research, mitochondrial DNA, regenerative medicine, feminist reproductive politics, cybrid human-animal embryos, synthetic biology.

The introduction of a Marxist approach to highlight the very substantial value of the “hand-tool-embryo” allows Franklin to unfold and re-compose one of the very mechanisms by which biology is technological and technology is biological and to illustrate how new kinds of kinships are crafted through such mechanisms.

By investigating the IVF-stem cells interface, presenting the reader with an extremely accurate ethnography of the stem cell derivation lab at Guy’s Hospital in London and analysing some crucial moments of the history of embryology, Franklin wisely retraces the process through which IVF has set the cognitive and practical grounds for transforming human reproductive substances into a tool, establishing a new paradigm of biology as a technology which has gained increasing support in contemporary UK and which promises to be crucial to upcoming health industry.

Franklin successfully illustrates how IVF is a technology that exists and is thinkable and practicable through the work of other technological apparatuses, such as the technology of kinship and of sex. The author navigates across feminist literature on IVF to examine how IVF is simultaneously produced by and produces technologies of sex and gender; and how IVF is called to artificially create the facts of life that are thought to naturally ground sex and gender themselves. The resulting picture is one where technologies of sex and gender, more than biology, appear as driving the process of naturalization of reproduction.

Biology displays instead its relativity insofar as IVF is used to produce and reproduce biological relatives while the very content of biology is both taken as an *a priori* and reinvented by IVF. IVF owns a paradoxical mimetic character, which makes it both ‘the same’ and ‘not quite the

same' as the process it has been created to imitate and substitute.

The ambivalences emerging from IVF understandings and applications are multiple and strategic. While they allow its perpetuation as a technology that reproduces gender and sexual norms, they also create biological relatives, and favour its affirmation as a creative technology that brings about unprecedented biotechnological relativities (i.e. the condition of being "a little bit pregnant").

From this perspective, kinship is also looked at as a technology which organises and facilitates human reproductive capacity as much as IVF is a technology of kin making. If the very concept of kinship is a technology designed to chart and discipline human reproductive substances and outcomes, the process by which these substances are "taken in hand" in the lab produces new kinship in a double way: it both introduces new kinds of biological relatives and new modes of being biologically related. The way in which Franklin uses the term "substance" in this book is a very productive one, which includes the specific reference to gametes and embryos as well as the more extensive one which recalls the outcome of "relationships between embodiment, sociality, identity, material objects, and technology" (p. 17). The technological creation of biological reproductive substances and the technological use of reproductive substances for different scopes (i.e. stem cells derivation) leads to a blurred and wider meaning of the concepts of biological relations and biological relatives. In this context, where reproductive substances are biotechnological products and their relationships with people, tools and scopes vary, potentialities exist for the emergence of new kinships.

The mechanisms that make the technology of kinship work in the field of IVF are spectacularized through the diffusion of the iconic image of the ICSI procedure, which represents "not only the logic of IVF, but the biological relativity implicit in making biological relatives. The relativity of the biological and the technical [...] in which substance and tool engage in the complex intercourse of merging with a purpose" (p. 254).

Aware of the aesthetic value of diverse IVF-related images and visual forms, Franklin also dedicates very captivating pages to bioartistic interpretations of IVF ambivalences and presents a very detailed ethnographic account of the works by Gina Glover inhabiting the transition spaces of IVF clinical encounters at the Guy's Hospital in London and offering an aesthetic extract of the combined experience of IVF by different actors.

Franklin conceives her book as a mosaic, where a number of ethnographic encounters, historical inquiries, bioartistic displays and theoretical sources provide the instruments for the development of a thoughtful, composite and extensive analysis of the landscape of IVF.

The argument is not a circular one. Instead, Franklin's acute and detailed analysis unfolds and expands along a spiral path, which navigates across different domains of IVF history to explore the socio-biotechnological circumstances of its development and the development of the socio-biotechnologies that have emerged in its presence. Such a

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distinct approach to the study of IVF as a lens through which the coproduction of biology and technology can be unpacked, owns the creative power of extending its hermeneutical validity beyond the boundaries of the past and present of IVF to the future of kinship.

The author retraces the multiple intersecting meanings of reproduction in its historical and eclectic manifestations and interrogates the dynamics of intellectual academic knowledge dissemination and reproduction. As much analytic and precise as evocative and inspiring, the skilful assemblages of ethnographic evidences with literary sources, the perceptive combination of Marxist, Foucauldian and Latourian conceptualisations with feminist approaches and the narrative juxtaposition of chapters that Franklin elaborates constitutes itself an original written reproductive formula which develops along complex and non-linear trajectories.

This book constitutes a reference for all those who approach the study of technology or kinship and is inescapable for those who adventure into the intersections between these two concepts.