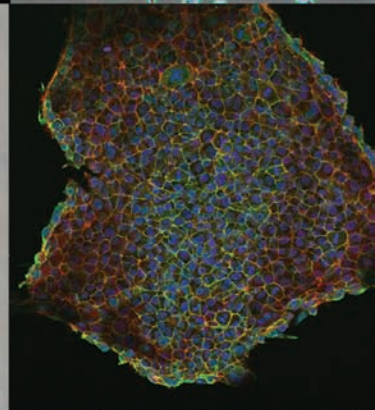
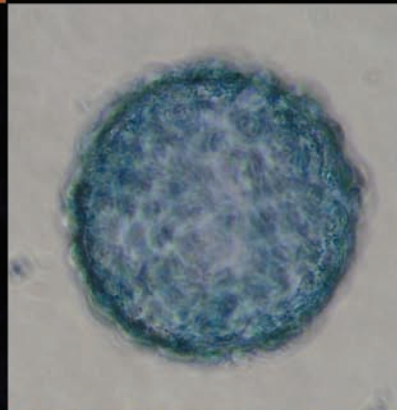
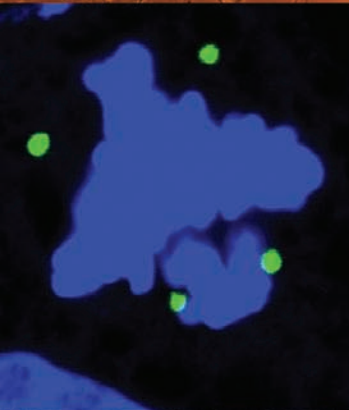
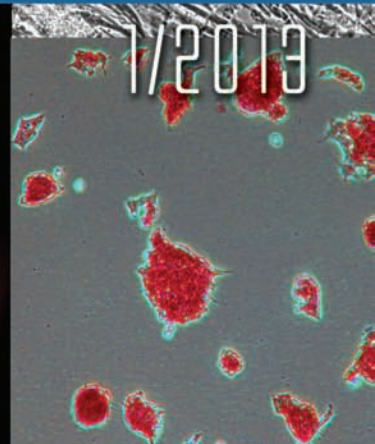
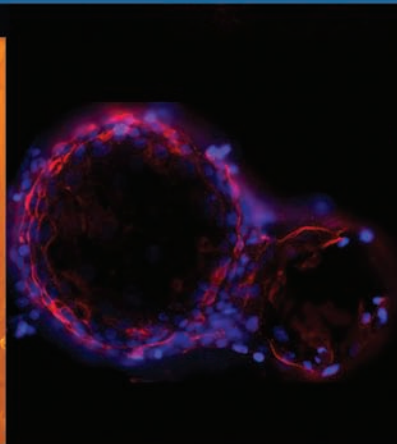


# TECNOSCIENZA

Italian Journal of Science & Technology Studies

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## SPECIAL ISSUE

**Re-conceiving Life in the Labs:  
The Emerging Meanings of Cells  
in the Italian Reproductive  
Biomedicine and Beyond**

### *Smile of a Stem Cell: A Dialogue between Science and Society*

The exhibition *Smile of a Stem Cell* comprises 54 pictures collected from scientists working in the research network ESTOOLS ([www.estools.eu](http://www.estools.eu)).

Supported by the European Union's Sixth Framework Program, ESTOOLS investigated embryonic stem cell, science, ethics and law across 10 different European countries. Aiming at improving integration and coordination in the European area, geographically dispersed research institutes shared their experience to foster development in both science and ethics. As part of the project, a large emphasis was placed on the production of outreach tools able to match and mingle with different cultural and religious contexts.

Scientists involved in the project selected their pictures following aesthetic criteria. The caption of each image is comprised of a fantasy title and a condensed scientific detail. Scientists looked at their everyday research from an external and unusual perspective. They imagined something beyond the meaning they attribute to pictures in their everyday laboratory activities: a cell or a fluorescent marker might become a fairy, an astronomical phenomenon or a mundane urban activity. The focus of the exhibition was to present science in a neutral way. Each picture is expression of a scientific activity and contributes to foster debate, promote enthusiasm and perplexity, though purposely avoiding influencing the observer from an ethical perspective. *Smile of a Stem Cell* tries to use art as a universal form of communication and – just like art does – it makes visible what the naked eye would not usually see, highlighting the role of interpretation. One of the aim of the exhibition was to attract the lay public to a scientific event. In these occasions, people often fear they will face complicated and incomprehensible scientific data, something bound to remain in the domain of few experts. *Smile of a Stem Cell* does not require any scientific background: whoever is interested or attracted by either science or art can appreciate it.

Art and science cannot be the same thing but both work as lenses or mirrors to know more about the universe. The exhibition triggers the power of imagination and displaces the perspectives of observers making them aware of the need for interpretation, in an attempt to deal with the issue of visibility and to pave the way for public debate.

Gianfranco Munizza (Project Manager at Cattaneo Lab)

Cover Pictures are reproduced with permission from Estools's photo exhibition "Smile of Stem Cell" (<http://www.estools.eu>).

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# TECNOSCIENZA

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The Emerging Meanings of Cells in the Italian  
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Three years after the release of its first issue, *Tecnoscienza* looks at itself in the mirror, and starts a new three-year cycle with some notable accomplishments and a few novelties.

In recent years the journal has gained great visibility at both national and international level (it currently has about 1,500 registered users and an average of 750 downloads upon the release of each new issue), establishing itself as the only Italian academic journal specifically devoted to social studies of science and technology, as well as one of the only one coming from a southern European country. At a national level, this achievement has also been symbolically acknowledged by the awarding of *Premio Filosofico Castiglioncello*, a prize awarded last year to *Tecnoscienza* as the “best online academic journal in 2012”.

The Journal has also strengthened and consolidated its position in the international debate, thanks to the publication of original materials in English and its ability to carve out for itself an increasingly central role in the international academic community (see for example the special issue dedicated to the 2010 EASST conference: <http://www.tecnoscienza.net/index.php/tsj/issue/view/18>). The reputation of *Tecnoscienza* has also been enhanced by the contributions included in the Cartography section, which have so far focused on the STS debate in several European countries (i.e. Spain, Germany, Norway and Croatia) and the review section, which includes in-depth analyses (in English) of STS books written in other languages.

In the perspective of a more incisive positioning of the Journal both nationally and internationally, we have implemented various actions in preparation for the next three years, aimed at enhancing *Tecnoscienza*'s institutional recognition and reputation. We have recently participated in the processes of accreditation and evaluation promoted by Italian academic and scientific institutions, having been included by the National Agency for the Evaluation of Universities and Research (ANVUR) in the list of scientific journals. Moreover, *Tecnoscienza* has also been selected by the Italian Association of Sociology as a candidate journal to be listed among the A-class publications recognized by ANVUR. Finally, we sub-

mitted the Journal to the attention of leading international databases for assessment and indexing purposes.

To further position itself as a benchmark in the national and international debate, in the next three years *Tecnoscienza* will annually dedicate a special monographic issue to an emerging topic in contemporary STS. This is the first of these special issues and on the Journal's website it is already possible to find the call for papers for the one scheduled for 2014 ("From Bench to Bed and Back: Laboratories and Biomedical Research", edited by Federico Neresini and Assunta Viteritti). We look forward to receiving your contributions, whether you wish to propose specific themes for an upcoming special issue or you would like to send your contribution as an open submission.

Another novelty of this issue is that it also inaugurates a new Board Coordination and, above all, sees the expansion of the Editorial Board itself. This expansion has not only to do with the number of members, but also with the Journal's geographical grounding. Some of the new members of the Editorial Board actually carry out their research activities outside of Italy and will therefore contribute to maintaining *Tecnoscienza* as even more anchored to a variety of international debates and networks.

One last innovation, albeit perhaps the most evident to our readers, concerns the change of format and graphics. Abandoning the traditional magazine layout, *Tecnoscienza* is now characterised by a new format, in some ways more attuned with academic publishing and also (hopefully) easier to handle. As widely known in STS, changing infrastructures may pose unexpected problems, which require a surplus of work. So it was in our case, but the result pleases us. We hope it is the same for you.

Enjoy the reading.

Attila Bruni, Paolo Magaudda and Assunta Viteritti

# Creating Human Life Itself

## The Emerging Meanings of Reproductive Cells among Science, State and Religion

**Manuela Perrotta**

*Norwegian University of Science and Technology*

**Abstract** In the past decades, reproductive biomedicine has quickly developed and become widespread, producing a number of new options that have challenged the definition of kinship and parenthood, bodies and gender relations and even of nature and life itself. Reproductive biomedicine is embedded in the ongoing construction of our wider social imagination, producing a re-imagining of the “facts of life”. Here, we can see how biomedical knowledge fosters a reframing of material bodily tissues. The same biological material can assume a different ontological status according to the socio-material processes in which it is embedded. Exploring the process of bio-objectification of embryos in an Italian context, this introduction describes how the equation between embryos and human life itself emerges inside and outside of labs and illustrates how the biomedical conceptualization of embryo is strongly dominated by moral and ethical concerns.

**Keywords:** Assisted reproductive technologies, embryo, ontological shifting, bio-objectification, human life itself.

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### I. Introduction

In August 2006 I participated in my first EASST (European Association for the Study of Science and Technology) Conference in Lausanne, Switzerland. The title of the conference was *Reviewing Humanness: Bodies, Technologies and Spaces*, and I thought this would be the perfect place to present a piece of my then ongoing PhD work in the field of Assisted Reproductive Technologies (ART). It was one of my first presentations at an international conference and my colleague Roberto Lusardi and I presented a joint paper on the construction of the body in ART centres and intensive care units (Lusardi and Perrotta 2006). At the end of our

presentation, a feminist British scholar (this is how she introduced herself) asked me: “You have talked a lot about this *embryo*, Why do you call it embryo? Are you a Vaticanist? I see just a clump of cells”. Aside from the shock, I answered that it was a fieldwork-related effect, since all of the professionals and patients I met referred to “embryos” in their narratives. However, this question pointed out what I had taken for granted in my research. I want to thank this (unknown) colleague, because her comment fostered my reflection on what an embryo is and how its meanings are relatively stabilized both inside and outside of clinics. In fact, although during my fieldwork I became familiar with the biological nomenclature – which refers to zygotes, blastomeres, morulae, blastocysts and so on – spending time with biologists in reproductive labs I also absorbed what in the Italian context is taken for granted, and is indeed quite widespread around the globe: an embryo is a fertilized egg after cellular division (even though it is almost never specified in ART discourse when an embryo stops being an embryo and becomes something else, like a foetus). Moreover and more relevantly for this special issue, “the embryo” is conceptualized as the first stage of human life, and this notion is so stabilized in some contexts – such as the Italian one and others – that it had become unchallenged and even unquestioned in Italian public debate.

Taking an STS perspective, this special issue aims at challenging this conceptualization of embryos as well as the emerging meanings of reproductive cells, using the Italian case as a prime example for the study of how a *bio-object* emerges from a network of heterogeneous elements and becomes relatively stable.

In the introduction to a recent edited book evocatively titled *Bio-Objects: Life in the 21st Century* (Vermeulen *et al.* 2012), Andrew Webster defines the bio-object as “a useful conceptual device or heuristic to refer to socio-technical phenomena where we see a new mixture of relations to life or to which ‘life’ is attributed” (Webster 2012, 6). Through the bio-objectification process, novel socio-technical – including political – relations are made possible. At the same time, the possible assemblages can be more or less robust and different bio-objects are more or less able to take their shape through time and space.

To put this in Actor-Network Theory (ANT) terms, studying the bio-objectification process means studying how the durable orderings are achieved, how bio-objects become such, how they are put in place and stay that way and how change comes about. On the other hand, following the so-called ecological approach (Star and Griesemer 1989; Fujimura 1995), what is interesting in this process is the construction of hybrid arrangements in which bio-objects move, being constantly renegotiated through an ecology of actions. Susan Leigh Star and James Griesemer, in their seminal article published in 1989, propose to take into account the coexistence of complex “multiple translations”. They stress the collective work of coordination, alignment mechanisms and translation chains between the different actors and worlds involved. To study the embryo as a

bio-object, therefore, we should be able to describe its translations by different actors, including ART professionals, patients, politicians, scientists, bio-ethicists and social movements (supporting patient rights or moral and religious instances). Moreover, to explore the multiple translations we need to follow the intricacies of actors' relationships and pay greater attention to powerless actors or "dissidents" within the enrolled actors (Star 1991). The Italian case illustrates how the construction of the bio-object embryo, with its current shape, produces a demarcation between those interested in keeping embryos as an abstract model of human life in a nutshell, and those who see embryos as future possibilities and hope, both for reproductive purposes and biomedical research.

The Italian embryo is an excellent example of how a bio-object is made. How does the special ontological status of human embryos come about? How is this ontological status constructed inside and outside of reproductive laboratories? How is the idea of human life itself "created"?

To answer these questions, the core idea is to explore what Charis Thompson (formerly Charis Cussins) defined in *ontological choreography* (Cussins 1996; Thompson 2005). With the term "ontological choreography", Thompson refers to:

The dynamic coordination of the technical, scientific, kinship, gender, emotional, legal, political, and financial aspects of ART clinics. What might appear as an undifferentiated hybrid mess is actually a deftly balanced coming together of things that are generally considered parts of different ontological orders (part of nature, part of the self, part of society). These elements have to be coordinated in highly staged ways so as to get on with the task at hand: producing parents, children, and everything that is needed for their recognition as such (Thompson 2005, 8).

Therefore, the notion of ontological choreography aims to stress the dramatic ongoing change in the ontological statute of human gametes and embryos, which in ART centres changes from potential person to element of the reproduction of a person and, eventually, to a non-person. An embryo, for instance, can be a potential person when it is part of the treatment, or a suspended animation when it is frozen, or a biological source selected for research purposes, or biological material of poor quality when it is unsuitable to any of the available purposes. Therefore, ART practices become loci of achievement, multiplication and coordination of ontological variations.

Here the focus is not on the choreography (i.e., the coordinated action of ontologically heterogeneous elements), but on the *ontological shifting*: how multiple translations generate a network able to crystallize biological substances into a specific shape with a specific array of meanings, producing bio-objects. The empirical case under analysis in this special issue is the current changes in the ontological status of cells in Italian reproductive biomedicine and beyond. In other words, how did a clump of cells

become the beginning of human life and even a proto-person?

Answering this question will provide a twofold opportunity. From an empirical point of view, it will allow exploration and explanation of many paradoxes that characterize the Italian case, where embryos have more rights (or at least, they had for a while, as we will see) than foetuses and even mothers; where some practices are illegal in the country (such as gamete donation) but people who go abroad to undergo the same practices are not blamed; where the State openly discriminates against some of its citizens, such as singles or homosexual couples (who are not allowed to undergo treatments in Italy), but people are still willing to cross the border for the benefit of treatments that are illegal in their own country (if they can afford to go abroad); where surplus embryos cannot be donated to research or other patients for reproductive purposes, or be destroyed (since embryos are considered people at the cellular stage), but they can be “abandoned” and kept frozen; where the State forbids research on national embryos, while allowing scientists to import foreign stem cell lines.

This special issue aims at exploring the bio-objectification of reproductive cells in an Italian context, from the perspectives of a multitude of actors. The material and regulatory aspects of life have already been under investigation in STS (Hauskeller *et al.* 2005; Waldby and Mitchell 2006; Sunder Rajan 2006; Franklin 2007; Cooper 2008 – to mention just a few examples of this strand of research), and this special issue represents an interdisciplinary enrichment of the STS literature on the study of the relationship between life and technoscience.

The first contribution is a lecture by Sarah Franklin on In Vitro Fertilization (IVF) as a visual culture. The conversion of the human embryo into both a tool and a lens allows the author to revisit a series of broad sociological questions concerning technology, reproduction, genealogy and the future of biological control.

The *Essays* section offers four contributions. The article by Patrick Hanafin, exploring the relationship between biopolitics, law and reproductive citizenship, proposes an interesting excursus of the Italian regulatory path on ART after the establishment of the Italian law in 2004, focusing on how different individuals and groups challenged the regulation in local, national and international courts. Alessandra Gribaldo’s article focuses on the concept of “micro-reproduction”, on the relevance of visual tools in this domain and the processes of constant re-signification that involve professionals as well as prospective parents. The contribution by Giulia Zanini illustrates the variable meaning of donor embryos for Italian cross-border reproductive travellers approaching donor conception, analysing how they make sense of different embryos’ trajectories. The article by Lorenzo Beltrame discusses the cultural meaning and political uses of ethical stem cells in Italy, following the embryo and its conceptualization in the biomedical research domain.

The *Conversations* section presents two contributions that pave the

way for the debate on the ART-stem cell research interface; the first contains three comments by Laura Lucia Parolin, Ingrid Metzler and Alexander Schuster on the book *Fecondazione E(s)terologa* by Carlo Flamigni and Andrea Borini; the second collects two interviews with top Italian scientists in the field of stem cell research, Elena Cattaneo and Giuseppe Testa, introduced by a reflection on the Italian pathways of stem cells by Assunta Viteritti.

In the following pages I shall introduce the main issues converging in this special issue, and try to provide a framework that makes the Italian case more understandable to an international public. First, I shall introduce the Italian national regulation on ART and the moral monopoly imposed by the Catholic front. Although the attempt to create a new moral order in the country failed, it created a gap between politics and lay people, and moral arguments and daily life. Secondly, I shall discuss the process of bio-objectification of embryos that causes *in vitro embryo* to become *embryo as the beginning of life* and *embryo as a proto-person*. Finally, I will discuss the construction of “the embryo” as an abstract representation of (human) *Life Itself* (Franklin 2000). Regarding word use, I do not use the word “creation” to refer to the production of embryos in ART labs, but to the sociomaterial construction of the equivalence between embryos and human life itself, both inside and outside of labs.

## 2. The Moral Monopoly and the Italian Regulation on ART

The introduction of the law on ART in 2004<sup>1</sup> was the result of a long negotiation process carried out by numerous political and social actors, which deployed different rationalities and resources to support diverse proposals for change. The debate on the ethical aspects of ART was extremely heated, with radically opposed moral and religious stances being taken. On the one hand, the Catholic front – highly influential in the Italian debate – proposed that restrictions should be imposed on therapeutic treatments by virtue of the (moral) argument that an embryo is not only a life-form but also a future person. On the other hand, there were those who argued that it was necessary to go beyond biological limits in order to adjust reproductive capacity to the life-choices typical of contemporary society.

The position of the Catholic Church was expressed in 1995 by John Paul II in the evangelical letter “*Evangelium Vitae*”, in which the Pope argued that biomedical technologies (here referring to the manipulation of gametes in the lab) go well beyond a reasonable dominion over nature. The main criticism was directed at non-therapeutic research on human embryos and their destruction or cryopreservation, the selection of char-

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<sup>1</sup> Law No. 40, February 19, 2004, *Regulations relating to medically assisted procreation* published in the Official Gazette No. 45, February 24, 2004.

acteristics or gender of the newborn, heterologous fertilization and all cases of surrogate motherhood.

After a long line of attempts, Law 40 forbade surrogate motherhood of any kind, the insemination of homosexual couples and singles, insemination after the partner's death and of women in non-precocious menopause. Moreover, Law 40 increased penalties for all violations<sup>2</sup> and introduced "new" restrictions in addition to those already present: heterologous fertilization (i.e., with gametes from donors external to the couple), the production of more than three embryos per cycle, the cryoconservation of embryos, the pre-implantation diagnosis (for a discussion on the limitations operating in Italy before Law 40 see Parolin and Perrotta 2012). Moreover, the law ordered that all embryos produced (no more than three) must be transferred to the uterus in any circumstances. What is peculiar is that the law gave embryos rights that not even a foetus has, since Law 194 of 1978 on abortion has not been overturned or modified to create further restrictions on abortion (for a discussion on the differences among the debate on ART and that on abortion see Metzler in this issue).

Furthermore, by equating the embryo with a person, Law 40 made its rights prevail over those of the mother. The law was widely discussed and criticised in regard to both its ethical and clinical aspects. Scientific procedures were paralysed, while the clandestine market and the search for assisted reproduction in other more permissive countries were stimulated. A broad political movement developed around these criticisms and mobilized public opinion for some months, leading to a referendum to abrogate the law. However, the referendum was not successful, because a quorum (50% plus one of those entitled to vote) was not reached (just 25.3% voted).

The bioethical position expressed by the law accommodates the conservative and patriarchal models of gender and familial relations, creating a moral monopoly that impedes a pluralist development of multi-ethical frameworks. Defining the rights of embryos as those of proto-citizens was in fact meant to establish a monolithic view of bio-ethical issues (Hanafin 2007). However, this does not seem to correspond to the uses and customs in place. Referring to the year 2010, the annual report<sup>3</sup> of the Health Ministry to the parliament argues that 69,797 couples have undergone In Vitro Fertilization (IVF) or IntraCyttoplasmic Sperm Injection (ICSI) treatments, and through these techniques 15,274 pregnancies were ob-

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<sup>2</sup> The law stated that breaches of its provisions were to be punished with imprisonment for up to 6 years and a fine of up to €150,000 for operators, as well as immediate closure of the center.

<sup>3</sup> *Relazione del Ministero della Salute al Parlamento Italiano sullo stato di attuazione della legge contenente norme in materia di procreazione medicalmente assistita* (Legge 19 Febbraio 2004, n. 40, articolo 15) – Anno 2010 – issued by the Ministry of Health on 12 June 2012.



tained. Moreover, the limitations imposed by the law have generated reproductive tourism to countries with more liberal regimes.

A recent study by the European Society for Human Reproduction (Shenfield *et al.* 2010) claims that Italians are first in the world for procreative tourism (31.8% of all foreign patients) and that the main reason why couples are turning to centres abroad is the national law (70.6% of cases among Italian patients). Some authors refer to this phenomenon as “cross-border reproductive care” (Inhorn and Gürtin 2011) to avoid the negative connotation related to the word “tourism”, and emphasize that there is an element of “forced necessity”. Interestingly, cross-border reproductive care in Italy is not socially stigmatized in the public debate. It saw considerable development in recent years and gave cross-border patients many new choices regarding conception practices, disclosing how prospective parents understand reproductive cells and embryos as elements of their parental project (see Zanini in this issue).

Finally, several couples, often supported by fertility centres and associations, appealed to local courts, to the Italian Constitutional Court and, most recently, to the Court of First Instance of the European Court of Human Rights in Strasbourg to modify some of the restrictions (for a detailed discussion on the judicial interventions see Hanafin in this issue). Many of the limitations imposed by the law lasted till 2009, when the Italian Constitutional Court declared the law partially unconstitutional. Beyond surrogacy, which is not even on the public agenda, two main prohibitions still remain in force: heterologous insemination and access to the treatments, which is still not permitted to homosexual couples and singles. On the one hand, the lack of willingness of the main political parties (both the right and left wings) to revise the law is due to the fact that this is still a highly sensitive issue for Catholics. On the other hand, the heterogeneous alliances that crystallized the embryo as a proto-citizen are aligned with the dominant narrative of a conservative Catholic-oriented morality and ethics, which remove, cover and annihilate all antagonistic narratives, fostering a monolithic view of bioethical issues.

### **3. What is an Embryo? Embryos-in-the-making**

Sarah Franklin and Celia Roberts (2003) have shown how the embryo represents a social material actor playing within a set of technologies and social practices, and how it is setup through these practices (like making a picture of the embryo, or selecting, transferring and freezing it). The embryo’s social life, as it is called in the scholars’ wording, becomes important as well as its life in the public and political debate (Mulkay 1997).

Referring to the work of Donna Haraway, Sarah Franklin remarkably notes that the embryo is a cyborg:

[It] is as much a product of high-tech procedures, such as ovulation induction and cryopreservation, as it is of hope for a child and the desire for technological assistance to overcome infertility. (Franklin 2006, 173)

The embryo is at the same time a product of biomedical knowledge, lab procedures and patients' alignment to the treatment, as well as the hope for a child, an essential element of the parental project, and the material production of the desire for parenthood. As many other kinds of cells, *in vitro* embryos have a limited "life" in culture. The extracorporeal embryos cannot reach the foetal stage outside the womb. They could not exist as we know them without visualization devices (Franklin in this issue) that make them available to professionals (Perrotta 2008a), patients (Gribaldo in this issue) and the lay public (Lie 2012). As Merete Lie (2012) has shown, these images represent reproductive cells as autonomous and independent entities. Similar to what happens when the foetus is detached from the womb and presented as an individual, embryos have an appearance detached from the body, seemingly independent of it.

What I want to claim here is that the embryo as a bio-object, emerging from multiple translations, is multiple itself: abstract and concrete, material and conceptual, general and specific. However, conceptualizing the embryo as an immaterial entity or as the product of biomedical technologies, reproductive knowledge and (unpredictable) bodies results in extremely different consequences. For instance, a regulation built on a general, conceptual and abstract embryo fails to take into account the complex heterogeneous network from which material, specific and concrete embryos emerge. Wombs, bodies and their reactions to hormonal treatments, as well as patients' lives, affective relationships and their ability to match the treatment schedules disappear in front of a purified idea of an embryo.

The autonomous life of the embryo is built in reproductive centres as well as in other loci. ART centres enable infertile couples to achieve their goal by means of technology. But while the couples' objective is pregnancy ('the babe in arms'), the technoscientific objective becomes the production of the embryo (for a detailed discussion see Perrotta 2008b). More precisely, the production of a reasonable number of embryos (or the three permitted by law between 2004 and 2009), if possible belonging to the best class (according to a classification scale in use), or at least ones which are implantable or cryoconservable. When the process comes to an end (positively) and the embryos have been produced, they are transferred to the "natural" site of reproduction, i.e., the womb. The embryos' reintroduction into the patient's uterus mark the completion of the organizational process, although two weeks later might yield to a completely different result from the patients' point of view (a pregnancy or a failure).

However, in the need to manage the pressure of high rates of failure, the ART centres frame their success as their ability to "give embryos back

to patients". As I have argued elsewhere (Perrotta 2008b), the transfer is a key stage in the reproduction process in the sense that it is the moment when responsibility for a successful outcome passes from the ART centre to the patient. If there are embryos (and usually there are some), the centre has done its duty and the team must wait and see if the patient's body will let the embryos implant themselves. Responsibility is not explicitly attributed, but it is clear that everything "technically" possible has been done, and now "nature" must take its course.

To "give embryos back to patients" is not accomplished solely with embryo-transfer; embryos are showed on monitors, their pictures are often attached to the clinical records and even commented on by the personnel with utterances such as "*look at your little embryos!*" (Perrotta 2008a). As Franklin argues in her lecture, witnessing a live human embryo is "special". These images merge highly specialized scientific imaging apparatus with intimate human biological substance. Moreover, as Gribaldo and Zanini show in this issue, the possibility of watching one's own embryos, in addition to the patients' expectations, produces different understandings of embryos themselves, according to the configurations of elements in which they are embedded. Anyhow, for reasons related to the organizational work of ART centres, in several circumstances the lab is one of the loci where the ontological shifting from the *in vitro embryo* to the *embryo as the beginning of human life* is accomplished.

### 3.1. The Personification of Embryos

With the introduction of Law 40 and its prohibition on freezing embryos (that lasted until 2009), it was necessary to take action to resolve some ethically controversial issues: what was to be done with the embryos produced before the law, which every centre kept in storage? How could the principle of equating the embryo with a person, and therefore guaranteeing it the same rights, be applied retrospectively to the already-existing embryos?

When Law 40 was enacted, in Italy there were around 30,000 cryoconserved embryos stored in several centres spread around the country. Some of these embryos were supposed to be used by aspiring parents in further attempts to obtain a pregnancy. But what would have happened to those belonging to couples who had already had children and did not want any more? Or in cases where the couple did not intend to procreate further (because of separation, adoption, age)? In this case, the law states that the embryos produced and frozen before its enactment must be kept in their actual state at the expense of the couple, or they must be declared "abandoned" or "neglected" (*in stato di abbandono* is the expression used in the law). Couples were therefore required to pay for the maintenance of their own embryos (the costs relative to the cryoconservation of embryos varied from centre to centre, but they range between 500 and 1000

Euros a year), or sign an abandonment form with which they lose all rights over their embryos. Law 40 required the establishment of a national embryo bank, which has never been created (for an updated discussion of the failure of the National Biobank, see Zanini, this issue). Instructions have not yet been issued on what is to be done with abandoned embryos, which are currently awaiting conservation in what are now often called “orphan embryo banks”. What is certain is that other options – such as donation to other couples or for research purposes, or disposal, which represented 77% of choices before the enactment of the law (Cattoli *et al.* 2005) – are still illegal.

Although expressions like “orphan embryos”, “abandoned embryos” and “adoption of embryos” recall the principle of the law which equates them with people, these definitions reproduce and embed the ontological shift from the *in vitro embryo* to the *embryo as a proto-person*. On the one hand, this is an expression of the moral monopoly I have presented in one of the previous sections. On the other, this understanding of embryos is problematic and morally controversial, especially in relation to the effects it produces on the ART stem cell research interface. Even though embryos produced before or after the introduction of the law cannot be used for research purposes, Law 40 (nor other laws) does not forbid stem cell research in the country. Nevertheless, the prohibition on embryo research envisaged by Law 40 is not a legal preclusion of research on embryonic cell lines created in other countries – also because EU legislation stipulates the free circulation of goods and therefore makes it impossible to prohibit the importing of stem cells. Therefore, Italian scientists are allowed to do stem cell research in Italy, as long as they are not “killing Italian embryos” (Melzner 2011).

Since the ambiguity of banning research on embryos by virtue of their alleged sacredness (for a discussion on the tension between the sacred and the profane that characterizes embryos, see Thompson 2005), the scientists who work with human embryonic stem cells (hESCs) are considered “unethical”, and are tolerated but not publicly supported. As the interviews with Elena Cattaneo and Giuseppe Testa in this issue illustrate, the Italian public debate reflects this ambiguity reproducing an ethical contrast between the research on adult stem cells (especially iPS – Induced Pluripotent Stem Cells) and embryonic stem cells.

### 3.2. Embryo, or Non-embryo: That is the Question

The process of bio-objectification of an *embryo as a proto-person* fostered the proliferation of forms of non-embryo. In his contribution to this special issue, Lorenzo Beltrame, analysing the debate on “ethical stem cells”, presents an interesting analysis of the advent of several forms of quasi-embryos, deployed to circumvent the Italian regulatory regime and allow research on stem cells. Another case of non-embryos as a residual

category created to sidestep the meanings attached to the notion of embryos has been the creation of pre-embryos, symbolic in nature and linguistically justified in opposition to the law, which had the distinctive feature of not being subject to the same restrictions imposed by the law.

In the months before the enactment of Law 40, the Italian public debate turned to the issue of the “beginning of life” as the new main ethical and moral issue. The debate, moreover, was framed as a controversy promoting two adverse factions: the so-called “pro-life” movement (summarized by the slogan “the embryo is one of us”) and those who did not accept the classification of an embryo as a person and wanted to put the rights of the mother before those of the unborn child.

These positions brought different legal and technical decisions, particularly regarding the possibility of freezing surplus embryos: the first group clearly rejected embryo cryopreservation in order to defend human life; on the contrary, the second group was in favour of embryo freezing, seeing it as a valuable tool to limit the negative effects of repeated hormonal treatments and surgery for oocyte collection. As we have seen, the position that prevailed in Italy (until the intervention of the Constitutional Court in 2009) was that of the pro-life movement.

In the first months after the enactment of the law, to avoid these restrictions operators of the reproduction centres, and their professional associations, questioned the term embryo used in the law: when can a fertilized oocyte be considered an embryo, therefore constituting the beginning of human life and a person? Some scientists proposed a technical distinction between embryo and pre-embryo on the basis of a medical interpretation of the law, which enabled them to circumvent its provisions. According to this interpretation, as a zygote the embryo should be a cell with a single nucleus (of 46 chromosomes) in which the fusion between the male and female gametes had already taken place, usually 36 hours after the moment when the oocyte and the spermatozoon come into contact. Otherwise, an oocyte fertilized less than 36 hours previously should be considered a “pre-embryo” (or “pre-zygote”).

The strategy of differentiation between embryo and pre-embryo – in use in countries like Germany and Switzerland – had a technical basis: pre-embryos had almost the same rate of survival as embryos, while freezing oocytes (the only other option available to avoid wasting biological material from female patients in each treatment) at the time had a very low rate of survival after thawing. However, the notion of pre-embryos assumed fundamental significance in the Italian bioethical debate on the question of life, and the various stages of embryo development have been used in the public debate to “establish” when life begins.

The overlapping of biomedical and moral/ethical meaning produced the failure of this strategy (for a deeper discussion see Perrotta 2011). The pre-embryo became an example of how even in the bio-medical community the moral and ethical categories were dominant in the reproductive discourse. The bio-medical community was not rejecting the equation be-

tween embryo and human life itself, but trying to negotiate the postponement of the beginning of human life. This turn to the language of biology (that in other circumstances would be viewed as “the natural” language of ART) has been considered as a manipulatory attempt. The term embryo, in fact, was (and still is) widely used inside and outside of the scientific community, because it is considered a simpler and more comprehensible language in order to communicate with personnel external to the laboratory (doctors, nurses, anaesthetists, and so on) and with patients. The generic expressions “fertilized oocyte” and “embryo” are often used as commonplace terms, while biological nomenclature (zygote, blastomere, morula, blastocyst and so on) is often set aside in ART centres.

The attempt to negotiate the limitation imposed upon the medical practice by redefining the category of embryo was subsequently blocked by ministerial circulars and guidelines establishing that, although Italian law made reference only to embryos, the restrictions also applied to pre-embryos, since it had clearly been the intention of the legislators to protect potential “life” from its beginning: namely, the moment of encounter between oocyte and spermatozoon, seen as the beginning of an unstoppable process that would lead to the birth of a child.

#### 4. Conclusions: Creating Human Life Itself

Through this introduction I have aimed at illustrating the process of bio-objectification of embryos, looking at the ecology of actions through which embryos are moving and which constantly renegotiate their meanings. These multiple translations, for partially planned but also fortuitous reasons, produce ontological shifts, crystallizing biological substances (the *in vivo embryo*) into a specific shape (the *embryo as the beginning of life* and as a *proto-person*) with a specific array of possible meanings (the protection of embryos, the donation of embryos for reproductive purposes, the sacrifice of embryos for research, to mention just a few). Sarah Franklin (2000) explored the emergence of the concept of “life itself”. Here, I tried to illustrate how ART in the Italian setting has taken an active role in the sociomaterial construction of *embryo as human life itself*. The excursus of examples I have presented in the last few pages had the purpose of exploring how the ontological shift from *in vivo embryo* to *embryo as human life itself* emerged from the entanglement of State, Science and Religion, in which ART is embedded.

The Italian regulation of ART, whose main aim seems to be protecting the embryo, can be read as the effect of the alignment of powerful actors like Catholic hierarchies and the Conservative front, which built a moral monopoly around these issues. I proposed here a framework that is able to take into account a more complex ecology of actions, including those of dissident actors – who actively participate in the different ontological

shifts. My purpose was to show how the myth of the “creation of life in the lab”, which is based on the equation between embryos and human life itself, is partly supported in the ART centres for organizational reasons. The production of embryos in the labs, their conceptualization as the end of treatment and the beginning of a possible pregnancy, which translate the presence of embryos into the core element of hope, participate in the socio-material construction of the equivalence between embryos and human life. Moreover, I have analysed how the medical conceptualization of embryos is highly dominated by moral and ethical categories, even when the equivalence between embryos and life is discursively denied. The use of categories of non-embryos to sidestep the moral status of embryos unintentionally and unwittingly reinforces the overlap between embryos and human life itself.

The contributions to this special issue further articulate this overlap.

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# Embryo Watching

## How IVF Has Remade Biology

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**Abstract** In addition to being one of the most iconic of the new reproductive technologies introduced in the late twentieth century, in vitro fertilization is also a technology of representation – a looking glass into conception, a window onto early human development, and as such a new form of public spectacle. Still a rapidly expanding global biomedical service sector, IVF technology is also the source of new images of human origins, and thus offers a new visual grammar of coming into being. This lecture explores these connections, and argues that the micromanipulation imagery associated with IVF, and now a routine feature of news coverage and popular debate of NRTs, also introduces a new connection between cells and tools, thus returning us to one of the oldest sociological questions – the question concerning technology. Moving between IVF as a technology of reproduction, and a visual technology, enables us to revisit a series of broad sociological questions concerning technology, reproduction, genealogy and the future of biological control from the unique perspective offered by the conversion of the human embryo into both a tool and a lens.

**Keywords** IVF; micromanipulation; human embryo; biological control; visual culture.

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## I. Introduction

Although its first human offspring were not born until the 1970s, in vitro fertilization is now at least a century old, and is itself the product of many generations of accumulated scientific expertise. Early efforts to achieve fertilization in glass included the novel experiments on parthenogenesis undertaken by Jacques Loeb at the turn of the century, but his use of the sea urchin body as itself a kind of translucent container hints at an even longer history of embryo watching (Loeb 1913; Pauly 1987). A

key to understanding the eventual success of IVF in higher vertebrates in the post-war period is the shift that occurred in the study of embryology, from the late nineteenth century onwards, whereby the study of the earliest stages of biological development changed from being a largely descriptive project into one that involved forcing new kinds of life out of manipulated cells and organisms (Franklin 2013). This shift, described by both Philip Pauly (1987) and Hannah Landecker (2007) as a process of “taking life in hand”, cannot be separated from the evolution of technique in the context of embryology, for example the development of new culture media, micromanipulation methods, visualisation technologies, and new model organisms. It is also a shift that marks a turn from watching into more explicit forms of making, and the ultimate ‘designer baby’ to emerge out of this line of thought would be a fully synthetic embryo – a prospect toward which the functional iPS cell (named for the iPhone) gestures. The merging between what Ian Hacking (1983) describes as “representing and intervening” to produce what Evelyn Fox Keller has called “the biological gaze” (1996) are both central and indispensable to what we might call, after Sharon Traweek (1988), the culture of embryo culture. Like all scientific cultures, this project is at once local and international, personal as well as professional, and today it is increasingly orientated toward the development of new translational technologies such as stem cell research and regenerative medicine.

Notably, atypically, and for complex reasons that are beyond the scope of this lecture, the professional scientific culture of embryo research has increasingly become more prominent both within and outside of the scientific laboratory in the midst of biology’s ‘big bang’. As the Norwegian anthropologist Merete points out in her cultural analysis of contemporary cellular imagery, “cellular images have gained aesthetic as well as dramatic appeal, as they have moved out of the laboratory and become available for the public” (2012, 475). As she also notes, “images of (...) cells related to techniques of assisted reproduction” are central to this process. Indeed, there is no doubt that IVF is the primary technique through which the most famous of the newly mediagenic human cells, the human embryo, has become increasingly public visible, legible and even iconic. The unexpectedly dramatic and rapid expansion of IVF technology as a form of both reproductive biomedicine and basic scientific research is both exceptional and arguably under theorised in general, as well as in relation to the question concerning technology, or more specifically, the technics of visualisation. In addition to becoming both a platform technology and a way of life, IVF has been implanted into popular consciousness over the past three decades as a set of visual images and narratives depicting ‘live’ embryological procedures such as fertilization, micro-injection, embryo biopsy, genetic diagnosis, stem cell propagation, mitochondrial replacement therapy, and nuclear transfer, to name only the most recent and well established genres within what we might call the bioptical imaginary. The rapid routinization of IVF has been central to

the introduction of a new visual language of reproduction that is particularly striking in its vivid depiction of the merger between reproductive cells and hand held tools. Like the language of genes and DNA, the images and idioms through which IVF has come to be understood as a “helping hand” (Strathern 1992a; 1992b; Franklin 1997) have travelled far and wide, introducing a new version of ‘the facts of life’ as a union of cells and tools. Part of the way IVF has become more comfortable and familiar is through a kind of mass public education in reproductive biology so that the human gamete in a Petri dish now recognizably codes for a celebrated arena of medical scientific innovation and capacity as well as for a “miracle baby” and a “hope technology” (Franklin 1997). Indeed, these increasingly familiar visual images have arguably become the dominant visual signifier of the expansion of the IVF platform over the past half century, if not for ‘the age of biology’ in general. Like ultrasound imagery, with its ability to convey the live action of pregnancy as a screen image, IVF offers privileged visual access to the previously unseen events of early human life – and indeed is popularly associated with precisely this capacity.

This lecture explores the emergence of a new visual culture of manipulated reproductive cells, and their circulation as a highly public spectacle that refigures sex as something that is made. Visual imagery is essential to this process. In order to be taken in hand, the IVF embryo must first be made available to the eye, and once it has been transformed into an image, it can be circulated across the increasingly broad range of media that include newspapers, magazines, the internet and the scholarly literature. Unlike in the nineteenth or early twentieth century, the technological means of broadcasting high quality colour images, and their easy reproducibility, enables them to proliferate within the vast digital networks of contemporary culture, and thus to establish a new ground state for what I am calling the ‘global biological’. The interface between IVF technology and its worldwide audience, who are increasingly literate in its language of visual form, reveals how ‘live IVF’ circulates as a different kind of shared technological substance, and virtual life, as an iconic spectacle of artificial biology. IVF is thus a ‘culture media’ in more than one sense of the term. IVF is an example of a local biology that has become a global one, and this lecture explores this interface<sup>1</sup>.

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<sup>1</sup> I have used the term “global biological” elsewhere to describe stem cells, using ‘global’ in two interlinked senses. Stem cell science is both part of a global biological enterprise, and is dedicated, as was the human genome project, to the depiction of global aspects of the biological, as in their totality. The vast banks, registries and depositories of substances ranging from human blood and genes to stem cells and mouse models comprise global biological projects both in their reliance upon a high degree of global cooperation among scientific teams and their goal of better characterizing the global properties of phenomena such as cellular potency. See further in Franklin (2004, 60-62).

IVF is of course (and among other things) a very famous technology – perhaps even a technology that to a certain extent epitomizes what a technology is imagined to be and to do, and images of IVF are thus also a sign of the technological (especially where it meets the biological). The difference between conception via IVF and unassisted, natural, or ‘spontaneous’ conception is precisely what is celebrated by the adjectives ‘precious’ or ‘miracle’ commonly used to mark IVF babies as ‘special’. As Stewart Brand (2010) observes in his manifesto for synthetic biology, *Whole Earth Discipline*, what is also iconic about IVF babies is that despite their artificial or ‘test-tube’ origins, the viable offspring of IVF are indistinguishable from ‘regular’ children. This is another of the unifications IVF can be seen to perform, by linking the normal and the technological biologically. In this lecture, I explore the public face of IVF as a set of visual images to explore the question of how this technology of re-making sex has itself become conventional – a new reproductive norm that is based on taking biological reproduction ‘in hand’. The turn here, to IVF as a technology of representation as well as reproduction, adds another crucial layer to the question of why it is so popular despite the fact that it, still, usually fails in a majority of cycles.

## 2. The Baby in the Bottle

As Susan Squier points out in her analysis of the twentieth century history of the image of the baby in the bottle (1994), IVF technology has a powerful visual and literary genealogy which can be read, among other things, as a series of reflections on the reproductive politics of gender and sex filtered through the lens of artificial conception. Looking back to the nineteenth century, Squier points, for example, to feminist readings of Mary Shelley’s *Frankenstein* and its critique of “the new male birth of fraternal contractual democracy” with its “male monopoly on political creation” as well as her “powerful critique of the newly revised institution of mothering.” Together these themes have been argued to converge in Shelley’s creation of “a nightmare image of scientific procreation that anticipates IVF” (Squier 1994, 15). In the early twentieth century, she argues, these themes continued to proliferate in a host of tales, fables, novels, and children’s stories featuring technologies of embryology and reproduction, and the moral, scientific and political questions they raised. From Charles Kingsley Amis’s *The Water Babies*, to Julian Huxley’s *Tissue Culture Kings*, John Burdon Sanderson Haldane’s essay on *Daedalus, or the Science of the Future*, the prolific writings of his sister Naomi Mitchison, and their close friends and colleagues Aldous Huxley, Vera Brittain, John Desmond Bernal, and Herbert George Wells, in whose writings the figures of ectogenesis, cloning, and artificial reproduction conspicuously serve as the lens through which definitions of the future, and future technologies, are both imaged and imagined. As Squier notes,

these stories produced by a highly scientifically literate group of friends and kin (many of whom were closely biologically related as well as related through the study of biology) typically wove together elements from the history of embryology with science fiction, even sometimes very accurately predicting the future, as in Haldane's account of the young Cambridge undergraduate who successfully develops IVF (1924). As Squier (1994, 71) notes:

Haldane's story of the development of in vitro gestation parallels the actual story of the development of in vitro fertilization, as told in Dr Robert Edwards's autobiographical account. Both narratives move from successful animal embryology to advances in human embryology.

And yet, as she points out, Haldane's story – first delivered as a lecture in Cambridge to the Heretics Society – is also couched in the language of myth, narrating the victory of Daedalus over Prometheus as confirmation that biology has become the “pivotal” science for the twentieth century. Thus, “Daedalus looks cheerfully ahead to a future in which the invention of ectogenesis enables the control of human reproduction, the improvement of the human species, and finally the emancipation of mankind” (Squier 1994, 73).

In the same way that Squier argues the complex interwoven plots of Haldane's vision of ectogenesis united British biofuturists, humanists, and socialists with their detractors throughout the 1920s and 1930s in a debate over reproductive technology, so too can this period be understood in Foucauldian terms as an extension of the “entry of the phenomena peculiar to the life of the human species into the order of knowledge and power [and] the sphere of political techniques” (Foucault 1990, 141-2). Except that, to be precise, it is not merely sex, or even sexuality, in these debates that serves as the “pivot of the two axes along which developed the entire political technology of life”, as Foucault (1990, 145) suggests, but a more literal technologization of reproduction in the form of taking it ‘in hand’. It is artificial reproduction and ectogenesis that are pivotal in this debate about the future of the human – just as they have continued to be since.

Squier's account can help us to move more explicitly into the realm of IVF as a contemporary, twenty-first century representational field, or what I will describe as the visual logic of IVF, and in particular its role as a symbolic image coupling biology and artifice. What is notable in Squier's account is the sheer amount of imaginative reconstruction of sex, gender, kinship and reproduction that is occurring through the lens of ‘the baby in the bottle’ in this period. New possibilities of regeneration as well as recombination, in the form of chimeras, hybrids and mosaics, as well as cloning, transhumanism, and ectogenesis, are in free play amidst the questioning of traditional gender and kinship (and economic) orders

in the early-twentieth century. As Squier herself suggests, the history of the baby in the bottle supplies a prehistory for IVF in which this technique plays a far more radical role than its use as a ‘renormalizing’ technology in the present might suggest.

### 3. Screening IVF

As it is crucial to the history of in vitro fertilization that it provided a technological platform through which reproductive substance could be both seen and handled, so too is it equally crucial for IVF as a representational technology that it has, in this sense, a ‘natural’ visual interface with the mainstream media – among other things, it is a screen-based technology. As we have seen with the dramatic success of the iPhone, the introduction of the hand-held screen is in itself an iconic moment for the history of human technologies, enhancing the hand-tool relation by intensifying its depth as well as scale. IVF too is a powerful hand-held screen window onto early life that achieves a similar, if less portable, marriage between visualization and manipulation – and one that is greatly amplified by the capacities of micromanipulation harnessed to digital reproduction.



Fig. 1 – IVF. This author photo of an iPhone photo of a hand-held camera photo of an iPhone photo of a textbook reproduction of a digital photo of an IVF embryo illustrates the easy reproducibility of the digital embryo online, on screen, and thus a new version of Benjamin’s “work of A.R.T. in the age of mechanical reproduction”.



Crucial to the visual logic of IVF on screen is the fact that what we are looking at when we observe a fertilized egg, or embryo, in a Petri dish – or the manipulation of an egg or embryo in one of these handy chambers – is no ordinary sight. For many people, scientists, clinicians, and patients alike, witnessing a live human embryo is ‘special’. Images of early human life – be they of gametes, embryos, or foetuses – are distinctively media-genic in that they merge highly specialized scientific imaging apparatus with intimate human biological substance, condensed into a spectacle of shared origins. This makes of such images an especially suggestive primal scene of the new reproductive mechanics brought about by assisted conception, and it is not surprising much has been written about embryos as visual objects (Franklin 1999; Hopwood 1999, 2000, 2009; Dubow 2009; Morgan 2009)<sup>2</sup>. As many artists as well as news editors and lobbyists have recognized, contemporary embryological imagery is a potent contact-zone uniting scientific research, high tech laboratory apparatus, biological substance, and powerful visualizing techniques with the promissory future of ‘the age of biology’. These images at once sign the beginnings of human life, and shared human futures, while also depicting a shared, and uniquely human, technological legacy manifest as highly specialised craft (thus a second sign of being-ness as human technological agency). The images both reproduce and model a fusion of accumulated scientific knowledge, human reproductive substance, and technological artifice, multiply overdetermining the viewer position of witnessing ourselves, our technology, our future, and our obligations to one another. In this sense, and as the artist Suzanne Anker has poignantly suggested, the *in vitro* lens is also a mirror (Anker and Franklin 2010).

Importantly, and unlike other reproductive screening technologies, such as ultrasound, IVF imagery establishes a viewer position that is only made possible by the direct manipulation, or handling, of what is shown. In the very fact of these images’ existence is the structuring presence of the technologies that make them possible, the hands that hold the tools, the tools that manipulate the cells, the dishes that contain the materials, the knowledge of how to do all of these things, and the screens that display these scenes. All of this equipment depends upon the histories of technique that have been passed down as part of the still artisanal culture of laboratory labour, and the logics that make such scientific interventions both possible and desirable. The sense of being hands on is irrevocably part of what IVF imagery reveals, from a spectator position that reproduces the point of view of the manipulator. Thus the viewer of these images is always-already visually implicated in the substantive and con-

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<sup>2</sup>For a superb online resource on the visual culture of embryology, see Hopwood and Buklijas (2008) *Making Visible Embryos*, <http://www.hps.cam.ac.uk/-visibleembryos>. Bioartists have also made use of human embryos in projects such as Helen Chadwick’s *Unnatural Selections* (1996).

ceptual connections they establish: the double-grip of the hand-held tool securing the manipulated cell in place, and the screen that holds the image in focus within its frame, 'grip' the object the viewer is shown<sup>3</sup>. Hence, in addition to the practical or scientific questions posed by these primal scenes (how does life begin, what are its mechanisms, how do they work), and their "special" content (early human life, shared origins, potential offspring, cures for disease, etc.), there is an additional visual significance to the form of spectatorship Evelyn Keller (1996) describes as "the biological gaze", because the very ability to witness these objects references a prior series of interventions that has 'allowed us in' as viewers; looking, as we inevitably must, through the keyhole science has provided into a formerly hidden domain. It is impossible, in other words, to view an image of an *in vitro* embryo without inhabiting the position of its handler.

The popular version of the reproductive gaze inaugurated by the foetal photography of Lennart Nilsson in the 1960s, and now manifest as the contemporary imagery of IVF, stem cells, cloning, is derivative of IVF's history as a research tool, both in its logic and its logistics. In the same way that IVF was dependent upon earlier forms of embryo watching, so have later forms of this art come to depend on IVF. However an important shift has occurred since the 1960s, when both the images of the earth taken from outer space, and the images of inner space published in *Life* magazine, provided unprecedented visual access to aspects of the human condition that were previously unwitnessable. As noted in the extensive literature on the Nilsson images (Petchesky 1987; Franklin 1991, 1999; Hartouni 1992; Stabile 1992; Duden 1993; Kaplan 1994; Newman 1996; Michaels 1999; Franklin *et al.* 2000; Dubow 2009) and the 'blue planet' photographs (Kelley 1988; Duden 1993; Macnaghten and Urry 1998; Franklin *et al.* 2000; Cosgrove 2001; Poole 2008), part of the sense of awe generated by these now iconic twentieth century images derives from the absence of any visible technology within the photographic frame. The power of these photographs thus derives in part from the combination of their inferred technological potency and its absence from view. The only 'handle' these photographs offer is their frame.

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<sup>3</sup> Focusing the camera lens is essential to capturing a sharp image, and in the production of high quality cinematic images in the film industry the focus puller is assisted by the dolly grip, who moves the camera dolly to a preset mark while the focus puller adjusts the lens in tandem. A dolly grip will also assist a camera operator shooting through a hand-held device in order to guide him or her along a predetermined path. To make images of embryos, the camera operator in the laboratory (who would normally be working alone) captures a sharp image by moving the plane of focus up and down. The 'grip' that is provided by the focal plane is so narrow that is essential the equipment is bolted to the floor, often onto a heavy stone or metal surface, without the stability of which micromanipulation imagery is much more difficult to produce.

In contrast to such ‘portrait’ images, the relationship of technology to its objects in the visual culture of IVF is all about the explicit intimacy between tools and cells. Far from absent, the technological ‘handles’ through which cells are manipulated are not only often prominent in imagery of reproductive cells in glass: the tools are also often moving, as if alive, as in the signature image of micro-injection. Like ultrasound imagery, which gains in vividness what it loses through lack of focus through its ability to convey the live movement of the foetus in utero in real time, the newly iconic imagery of micromanipulation, like the popular short clips of beating stem cell colonies (the poster image for regenerative medicine), relies on a different visual vocabulary to the poignant still portraiture of the Nilsson foetus. The enlivening of tools, especially in contrast to the immobilisation of the cells with which they share the amber limelight, comprises a significant departure from earlier forms of reproductive imagery, as will be discussed in further detail below.

If the Nilsson imagery introduced a form of reproductive witnessing, or spectacle, which heralded the emergence of the public human embryo and foetus, the early twenty-first century equivalent of embryo watching can be found in images of micromanipulation. The ‘taking in hand’ of reproductive substance is now both familiar and quotidian in the form of publicly broadcast ‘live’ images, such as those used to illustrate news stories about cloning, stem cell research, and new reproductive technologies such as IVF. The now increasingly common flat-screen image of micromanipulation, for example, routinely displays a cell secured in place by a holding pipette on one side being penetrated by a micro-injection needle, a biopsy pipette, or some other micro-tool on the other.

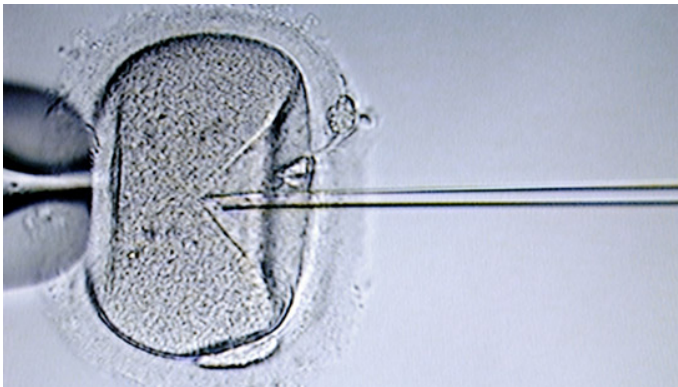


Fig. 2 – Micromanipulation. A Google image search of IVF quickly reveals dozens of micromanipulation images, such as this one, from a BBC website, where it is subtitled “IVF – in vitro fertilisation” (<http://www.bbc.co.uk/schools/gcsebitsize/science/aqa/nervesandhormones/controlinthehumanbodyrev5.shtml>, accessed 20 November 2012).

Such imagery has become a powerful and ubiquitous contemporary visual shorthand for union of technology and biology in the name of re-making life across a wide range of techniques from somatic cell nuclear transfer and transgenic animal production to preimplantation genetic diagnosis and aneuploidy screening.



Fig. 3 – Embryo biopsy. Image of embryo biopsy from 11 March 2011 coverage of mitochondrial disease testing from the Daily Telegraph subtitled: “A controversial IVF technique involving the DNA from three people is to be assessed by Government regulators”.

The familiar micromanipulation scene typically appears as a horizon, the pipette-cell-pipette fusion bisecting the frame in an assemblage that now codes for biotechnological investigation writ large. As Merete Lie (2012, 478) argues: “With a combination of new medical imaging technologies minuscule parts of the body, like cells and even the interior life of a cell, are materializing. Imaging technologies can transform human cells into astonishing and aesthetically appealing images.” It is these explicit images of cellular manipulation, greatly magnified and often shown in live motion, which have inaugurated the mass witnessing of new flows of reproductive and genetic substance in a spectacle of re-engineering at the ground zero of built biology. Already iconic, micromanipulation imagery is used in advertising, corporate logos, and on fashionable club wear and CD covers, as well as being featured on the evening news, in mainstream films, and documentary accounts of new reproductive technologies such as cloning.

Although, as noted above, it differs from earlier reproductive portraits in important and distinctive ways, the image of micro-manipulation shares a visual kinship with earlier iconic images uniting the logics of life and technology with the question of human obligations to the future, ethical horizons, and questions of “life itself” (Franklin *et al.* 2000). Like the foetus and the blue planet images, the cell at the center of the micromanipulation image glows with a radiant light – often blue or amber -- combining the ethereal beauty of life’s innate mystery with the power of the bioscientific gaze. Unlike such earlier images, however, the distinctly planetary cell becomes a window onto the ability to re-engineer biological interiority. With its faintly visible cumulus, or corona, the cell appears to emit vitality, or energy, as a kind of bio-luminescence, but it is not ‘floating in space’. The cell is at once bounded and permeable, ‘captive’ and already joined with the tools that hold it in place. Translucent, it is also somewhat opaque, with an obscure and grainy interior, lacking depth of field, while at the same time the tools convey a sense of reach ‘beyond’ the visible frame, or edge, of the image. Structuring the image is the shallow plane of focus, which, like the holding pipette, positions the cell securely in flat visual grip. Like a living Petri dish, the micromanipulation set-up handily presents a visually engaging biopic of tools that are the source of new life and poised to grasp, probe and penetrate the cell’s interior. In particular, the image of micro-injection, in which a needle is shown penetrating an egg cell, recapitulates the familiar ‘moment’ of conception, restaging the conventional denouement of the sexual union of egg and sperm, and thus life’s beginnings (Martin 1991). Instead of the agency of fertilization being carried by the substance ‘itself’, however, micromanipulation images of fertilization depict the helping hands of science as the active agents, which assume the activity formerly assumed to be merely biological, self-acting, or naturally automatic. Here, then, are the new mechanics of making sex – replacing and extending biological action in the form of hand-held tools.

In contrast to the still portraits of the foetus or the blue planet, the scene of micro-injection is cinematic, and the movement of the micromanipulation tools is the main ‘story’ these images convey, and emphasize<sup>4</sup>. Notably, these are more evidently ‘working’ screen scenes than the earlier images of inner and outer space, often linked in newsreel footage with scenes of white-coated scientists at work in their labs<sup>5</sup>. The cell in these

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<sup>4</sup> As both Lisa Cartwright (1995) and Hannah Landecker (2006) have documented, the history of the cinema has its origins in the effort to explore the mechanics of cell biology.

<sup>5</sup> The contrast is particularly evident in relation to Nilsson’s photos, the work of preparation for which is noticeably absent, as it is only the finished object in the form of a photograph he sought to produce, much as an earlier generation of specimen collectors artfully arranged their display objects in glass containers (another important lineage of *in vitro* imagery, see Anker and Franklin 2010).

images is tightly coupled to its tools, engaged in a process of itself being re-tooled, whereby its internal mechanics will be recomposed, reprogrammed, and remade. This is the bespoke wet life of the biotechnology lab in the making – no longer the pristine, untouched, ‘natural’ life of the planet or the foetus, part of whose grandeur lay in the autonomy of their inherent and ultimately mysterious life-giving properties, which exceed and predate even our most powerful means of technological creation.

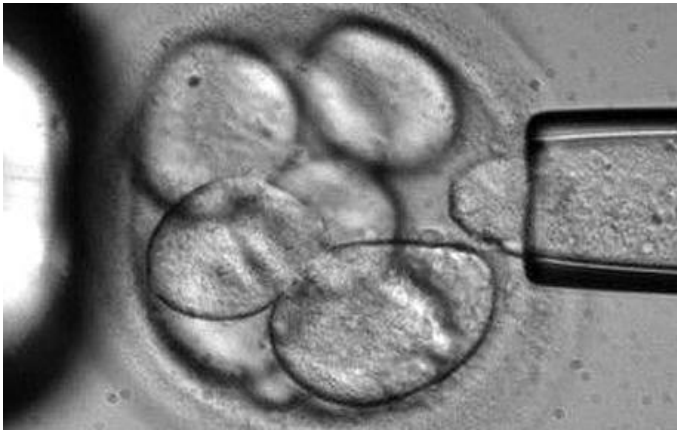


Fig. 4 – Stem cell research - The Telegraph 19 October 2010 ‘Stem cell research: a new age dawns in healthcare’<sup>6</sup>

The new animated digital embryological imagery also differs from earlier photographic reproductive portraiture in not being self-contained: this imagery does not remain within the frame. Whereas Nilsson’s foetal portraits employed the margins of the photograph to foreground the captured object alone, thus delivering visual set pieces which speak for themselves partly through the autonomy of the foetal body, the scene of micromanipulation always extends off-screen, breaking through the frame of the image along the trajectory of the handles of the micro-tools. These tools, and the camera, thus become the connections linking the cell to the modus operandi of the micromanipulation station, and the guiding hands and eyes of its live operator. The manipulation tools are scaled precisely to cellular dimensions to create a workable fit between the microscopic object and the prosthetic hands of the operator who will delicately reconstruct it, and so the tools are also magnified. So too are their movements, creating the slow, jerky, groping drama of connection between tools and

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<sup>6</sup> <http://www.telegraph.co.uk/health/8072484/Stem-cell-research-a-new-age-dawns-in-healthcare.html>, accessed 20 November 2012.

cells depicted in the now-familiar genre of animated films that unite cells and tools against the blurry background and the flat light that is only barely gripped or visible within an almost impossibly thin plane of focus. These effects of scale, dimension, perspective, framing, and context reproduce the scientific gaze, its instruments, and its object – as well as its labour ‘exactly’ while at the same time rendering fragile and tentative the very connections they depict.

The confident-yet-ambivalent message these images communicate is particularly pronounced in the blurring of the tool and object they so vividly reveal. In the magnified image of micromanipulation, the aqueous environment of the cell is evident in the viscosity of its contents, which can be seen and sensed in the flows of substances within the hollow glass tools themselves. Like the cell, the instruments are transparent, enabling us to both see and see through this multi-layered scene of fertile coupling between tools and cells. In a kind of respiratory movement, the injection needle appears to inhale cellular contents for removal, and to exhale new material into the cell’s interior. In this sense, micromanipulation imagery mechanically imitates a metabolic symbiosis of parts. And indeed this is precisely what is occurring. Micromanipulation takes place on cells that are typically submerged in clear sterile oil, using tiny glass tools as thin as strands of hair. The micro-tools are secured with small clamps that attach them to hydraulically-driven ‘joy sticks’ that allow the manipulator to conduct various procedures, using touch as much as sight to guide his or her movements. The eyepieces are connected to a video lead that allows the manipulator to view the ‘bed’ of the machine on a monitor, and to record, transmit, or display and further enlarge these processes on screen. To view the contents of a cell takes a practiced eye, as there is little contrast, for example, between tiny semi-transparent organelles, such as the multiple pro-nuclei, and the rest of the cell contents, consisting largely of cytoplasm (Franklin 2003). It is for this reason that a colour filter is often used, to aid the manipulator in identifying the various parts of the cell by increasing resolution through contrast.

For both clinical and scientific procedures, there are five basic micro tools, which are used for manipulating eggs, embryos and sperm:

- 1) The holding pipette to fix and position the oocyte or embryo during a procedure;
- 2) The sharp microneedle to create an opening in the zona pellucida or shell of the egg;
- 3) The blunt-edged biopsy micropipette 15-16  $\mu\text{m}$  in diameter for polar body removal;
- 4) The angled micropipette 25-30  $\mu\text{m}$  in diameter for blastomere biopsy;
- 5) The finely pulled micropipette of 7-8  $\mu\text{m}$  inner diameter bevelled to a 30 degree angle with the tip pulled to form an ICSI insertion tool.

Additional varieties of micropipette for human embryonic cell line procedures are commonly forged by hand by softening a glass capillary tube over a burner and pulling it to form the desired width and tip to serve a particular purpose. Mechanical pipette pullers can also be used, and increasingly commercially prepared micropipettes are used in order to conform to industry standards. Two additional instruments, a microforge and a beveller, are used to fashion specialized features of these glass tools. In addition to controlling for the diameter of the end of the micropipette, and sharpening, bevelling, or flame-polishing (blunting) of the tip, micro-tools are bent at the attachment end to an angle commensurate with the bed of the micromanipulator, so that they can be positioned parallel with each other, and with the machine. As well as precision and pre-preparation, sterility is essential to the practice of micromanipulation techniques such as microinjection or embryo biopsy. For example, newly made tools may be exposed to ultra-violet radiation before use for up to 20 minutes to sterilize them, and cells are immersed in sterile equilibrated mineral oil during manipulation procedures. Purity has become more important to micromanipulation technology as the IVF platform has expanded various kinds of genetic testing, screening, and diagnosis, and the derivation of human ESC lines. The presence of male gametes adhering around the cumulus cells of the ova is potentially the cause of misdiagnosis when an embryo needs to be screened for molecular abnormalities, or contamination of a cell line<sup>7</sup>.

The most common micromanipulation procedure in the context of contemporary reproductive biomedicine is ICSI, intracytoplasmic sperm injection, now used both to enhance the purity of IVF embryos (by eliminating excess, potentially contaminating sperm), and to increase the fertilization rate of the limited egg supply by ensuring that the sperm penetrates the tough outer coat of the egg. Scenes of ICSI dominate the micromanipulation imagery made available to a wider audience, both because they are readily available, and perhaps because they replay a “familiar scene” of conception, involving penetration of the egg with the sperm-containing injection needle. This refiguration of the ‘moment of fertilization’, however, is, like IVF in general, both like and unlike its unassisted counterpart. As the following instructions for ICSI emphasize, the roles of the egg and sperm are significantly altered in this new, technologically assisted, version of the ‘drama’ of life’s beginnings:

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<sup>7</sup> The reliance on microinjection in the context of assisted conception has become more routine due to the increasingly standardised use of ICSI, intra-cytoplasmic sperm injection, in IVF in order to avoid contamination of the egg’s environment during fertilization. ICSI is also used in order to avoid sperm cell contamination when performing polar body removal or blastomere biopsy.



Under control of the stereomicroscope the washed sperm are added to the drop containing 10% PVP [polyvinylpyrrolidone], to slow down sperm movement, facilitating selection of morphologically normal sperm for injection. This also minimizes sperm adherence to the glass surface once it is inside the micropipette. .... A sperm is immobilised by gently rubbing its tail on the bottom of the dish and aspirated into the pipette, tail first... Once the oocyte is brought into focus, the ICSI micropipette containing the immobilized sperm is lowered and brought into focus; once again, the fluid control and sperm movement within the pipette are assessed. Should the sperm become stuck in the pipette, it is expelled and another sperm is retrieved, or if necessary the microtool is changed.

The holding pipette is lowered and the oocyte is rotated so that a slit opening in the zona pellucida is at the 3 o'clock position. The outer edge of the oocyte is brought into focus and the sperm is brought to the tip of the micropipette. The micropipette is guided through the slit opening in the zona pellucida into the center of the oocyte, and a small amount of ooplasm is aspirated into the micropipette to ensure breakage of the membrane by slow turning of the micrometer of the microinjector. Once the membrane has been broken, the contents of the micropipette, i.e. ooplasm and the immobilised sperm, are expelled slowly into the oocyte and the micropipette is slowly withdrawn. Complete control over aspiration and expulsion are needed to diminish the amount of medium deposited along with the sperm (Verlinsky and Kuliev 2005, 22).

As is evident from this technical description of ICSI, fertilization in the context of assisted conception is not narrated as a journey, an adventure-romance, or an epic quest, but as a difficult feat of manual control of tiny glass tools. Thus, although the ICSI penetration scene is legible as an analogy to 'normal' fertilization, the procedure is clearly quite different in terms of both form and content. Indeed, other than the fact that a sperm ends up inside an egg, almost nothing about the means of achieving this legendary union is analogous to the conventional narrative of the biological union of egg and sperm. Indeed, as in the case of IVF, for which artificial menopause is the counter-intuitive ground state required of the female patient, ICSI is in many respects the opposite of its unassisted corollary. Far from being an all but automatic natural process ensuring the flow of reproductive substance across the generations, ICSI imagery depicts a skilled manual feat of precision micro-engineering to achieve successful fertilization. Deliberately prevented from being either self-acting or automatic, the egg and sperm are forced into a microtooled union via manual assemblage. Formerly imagined as unstoppable, the sperm cell is firmly taken in hand by the micro-manipulator: first it is 'immobilized', then immersed in ooplasm, and 'expelled' into the egg – its tail having been cut off to make it more easily manageable and 'cleaner'. No longer a

heroic gamete-Olympian, the sperm must be brought under 'complete control'. The only active agent in this union is the handler.

What is just like 'normal' conception in the context of ICSI remains its purpose, namely the unification of egg and sperm – thus activating the process of fertilization leading to potential biological offspring. It is only from the point of view of ensuring the continuity of biological relations between parents and offspring that the logic of ICSI is identical to that of 'unassisted' conception. It is the aim of reproducing the familiar kinship pattern of bilateral descent, through which the offspring inherits an equal amount of shared substance from both parents, that drives this manual imitation of a biological union. And it is precisely the fact that this union did not occur naturally that makes the technological 'seconding' of this process appear commonsensical. Reversing the usual logic, according to which it is the biological facts of life that determine parenthood, ICSI is only isomorphic with the standard model of 'unassisted' conception if biological action is superseded by the very logic it is imagined to underpin. Consequently, it is a different union to that of the natural, biological merging of egg and sperm which defines the visual and technical logics of these images, namely the merging or fusion of substance and tool, or hand and cell. The ICSI coupling, it turns out, is comprised of several inter-related pairs: egg and sperm, camera and screen, tool and hand, viewer and manipulator, and substance and tool. The reproduction of this screen scene via the mainstream media adds yet another level to the distinctive visual logic of these images too, as it is the images themselves that come to comprise a kind of shared cultural frame of reference for witnessing the remaking of sex – or even a shared culture medium for understanding them. This layering of techno-logics – whereby ICSI might be viewed on television, for example, or downloaded onto an iPhone – in turn introduces a new convention of witnessing the 'exact mechanisms' of reproduction live on screen.

What is on display in such a spectacle is thus not only the logic of IVF, but the biological relativity implicit in making biological relatives. The relativity of the biological to the technical could hardly be made more explicitly visual than in the scene of microinjection, in which cells and tools engage in the complex intercourse of merging with a purpose. Beyond the frame, beyond the invisible hands, beyond the camera and its monitor, beyond the lab are all of the other important contextual elements through which this novel composition makes sense – such as the conventional understanding of what a parent should be, as well as the expectation of what technology can do, and the logic that puts these two forms of conventional thinking together to come up with ICSI as the obvious answer. But like IVF, the sense this equation makes may be superficially obvious in ways that obscure what is implicitly contradictory and even queer about its origins. For in addition to everything legible and ordinary about the logics of biology, kinship, reproduction, technology, progress, and hope (among others) are the counter-logics the ICSI primal

scene has the potential to suggest or imply – such as the fact that the difference between cells and tools has become irrelevant.

#### 4. Conclusions

It is in the convergence between the prevailing logics and conventions of biological kinship and those introduced by new reproductive technologies that IVF, ICSI and their ilk that confirm a new relativity of the biological that remains to be charted as the “age of biology” unfolds. There is no reason not to assume that the remaking of nature as technique will remain largely compatible with the logics of unassisted nature, or natural procreation, or of the ‘automatic’ flow of genealogy – nature has long been cultured up, after all, and biology has arguably always been a relative condition. Moreover, nature and biology are highly plastic categories, and as kinship theory confirms, biological parenthood has never been left to its own devices. To the contrary, the logic by which biological parenthood is understood to create a natural tie, or a biological relation, is highly dependent on specific forms of labour, including the crafting of substantial connections, family norms, kinship systems, inheritance patterns, marriage prohibitions, and other social technologies.

The way in which these new dimensions of reproductive experience stretch the frame of existing conventions is both paralleled and demonstrated in the imagery that has accompanied the rise of IVF over the past thirty years, and specifically the rise of micromanipulation imagery, in its very explicit staging of the mechanization of reproductive substance. If micromanipulation has become an increasingly recognizable visual shorthand for the fusion of tool and substance, and if ICSI introduces a new figuration of conception that is more strongly defined in visual terms than in narrative ones, what are the consequences of these shifts for understandings of ‘the facts of life’? Or with what we might call IVF? How do these new images interact with older, more established, representations of reproductive substance, such as the traditional egg and sperm narrative? How do they refigure the meanings of the biological, the technological, or the relationship of reproductive biology to new forms of digital representation? To understand the formation of an emergent global biological culture, and to interpret the ways in which IVF works not only as a technology of reproduction, but a culture medium, IVF is an excellent case study that will repay further investigation.

One defining feature of the imagery of retooled reproductive substance is its introduction of a new genealogical model, in which it is not only reproductive substance, but its directionality, orientation or ‘flow’ that is redesigned. In the familiar tree models of natural history, so favoured by Darwin, and still a basic tool of genetics today, reproductive flow is always one-way. It is also always brachiating, binary, and bilateral, but contained, and limited, in its irrevocable path. This arboreal pattern

of biological flow is superseded in micromanipulation images both by new conduits for the transmission, in the form of the tools, and the possibility of open-ended dissemination. These are the new coordinates of micromanipulated life. Extending beyond the frame, the micro-tools point not only to the genealogical terminus that is their object, but to the termination of the conventional genealogical model (so familiar to kinship studies) that was their predecessor. The rotation of its regenerative axis to a horizontal position re-orientates the genealogy of flat screen life, while detaching this scene from it from its genealogical 'trunk', and leaving it literally open-ended as a conduit. The new 'stem' of life in the flat screen world of cultivated human cells is the inner cell mass – the totipotent source of cells that can be amplified into regenerative lines. In the context of flat screen life, genealogy is an open-door.

The visual grammar that holds the micro-manipulation image in place, then, is not derived from the logic of sex or genealogy belonging to natural history, but rather to modern scientific technique. It might be difficult to find a more explicit visual representation of Rabinow's (1992) claim that life "will become technique" in a manner that reverses the order of Darwinian evolutionary time and *telos*, by making culture the origin of biology. The fact that the cells on the bed of the micro-manipulator are submerged in culture medium reminds us of the etymological roots of the term 'culture' in cultivation, that is, in the art of technique. What micromanipulation imagery provides is the kind of horizon-altering perspectival shift described by Barbara Duden (1993) in relation to fetal photography – offering an instrumental reframing of reproduction as technology. This is how micromanipulation imagery has become, in Duden's words, "part of the mental universe of our time" (1993, 1) in its depiction of the production of new life in ways that are detached from the orders and logics of living things that have structured far more than biological categories in the past.

It is the relativity of these former biological categories that IVF arguably makes more visible – both in its use as a clinical procedure, and as a research tool in science. To describe IVF as a technological platform has a literal meaning in relation to micromanipulation imagery that is both technically and metaphorically apt (as is the common description of the micromanipulation table as its 'bed'). The mental universe in which both IVF and flat screen life are legible – their grammar – is increasingly widely shared, and help to contextualize the question of why IVF is so popular in spite of all its difficulty, and why it is so curious despite having become more regular and normal. The same logic that makes IVF useful for clinical purposes – as a tool to aid in the overcoming of the obstacle of infertility – applies to the remaking of biology as technology more generally, and thus also to the newly conventional visual logic of micromanipulation, with its vivid depiction of taking living tools in hand. To the extent this logic also grounds a new understanding of technology as biology,

through the recomposition of reproductive substance, so too has it already reshaped the future of kinship.

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# Law, Biopolitics and Reproductive Citizenship

## The Case of Assisted Reproduction in Italy

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**Abstract** In 2004, the introduction of a restrictive law on assisted reproduction in Italy sees the privileging of a conservative model of family relations and a misogynist view of society by the political elite. This backlash politics excludes many individuals from full reproductive citizenship. In this regard what the Italian case allows us to see is the operation of a biopolitics which both governs and excludes. The 2004 Act excludes gay couples, single people and people who are carriers of genetically inherited conditions from access to assisted reproductive technologies. Such an exclusionary biopolitics has provoked a counter-politics of resistance against the legislation. This article examines the manner in which individuals have contested the legislation's prohibitions, and, in so doing, looks at how this might constitute an example of what Nikolas Rose has termed an *ethopolitics*. The concept of *ethopolitics* allows us to visualize the potential of an active counter-politics of resistance for restoring reproductive citizenship to those deprived of it by legislative interventions of this nature.

**Keywords:** assisted reproduction; biopolitics; reproductive citizenship; reproductive rights; bioethics.

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### I. Introduction

In this article I examine Italy's 2004 Act on Assisted Reproduction as an example of the operation of a biopolitics which both governs and excludes. The exclusionary consequence of biopolitics has been well defined by Didier Fassin as “about inequalities in life which we could call bio-inequalities” (Fassin 2009, 49). Such a notion of bio-inequality includes a “withholding [of] recognition from the other” (Fassin 2009, 57). It is precisely this withholding of recognition from individuals affected by

the prohibitions created by the Act (couples who are carriers of genetic conditions, gay couples, and single people) that has led to a counter-politics of resistance against the legislation. The legislation, Legge 19 Febbraio 2004, n. 40, '*Norme in materia di procreazione medicalmente assistita*', narrowed the scope of reproductive citizenship in that it accorded symbolic legal recognition to the embryo and prohibited embryo research, embryo freezing, and donor insemination, and prevented gay couples, single women and those couples suffering from a genetically inherited condition from gaining access to assisted reproduction services (for a full account see Hanafin 2007, 49-80). The Act while purporting to regulate the assisted reproductive sector is in effect a means of promoting a conservative notion of family formation and of excluding individuals who do not fit into this model from access to assisted reproductive services. The legislation is not an appropriate model for governing assisted reproductive technologies in a pluralist manner. As Krause and Marchesi rightly observe:

The [...] legislation suggests the “proper way to have children” is within the bounds of the heterosexual family organized around traditional gender roles and a cohesiveness borne of homogeneity (Krause and Marchesi 2007, 358).

The 2004 Act is the result of a long campaign by the Vatican and conservative Catholic politicians and pressure groups to re-impose Roman Catholic moral values in law following a period of liberalisation in the 1970s and 1980s. As Krause and De Zordo have noted in this regard:

The rigid politics of life operating in Italy supported by the Catholic Church and sympathetic politicians defends the ‘life’ and the rights of the embryo and the ideal Catholic family at all costs. As a result, women who do not have children or who postpone motherhood are stigmatized, as are infertile women and couples who confront a restrictive law on medically assisted technologies, which excluded single women and same-sex couples (Krause and De Zordo 2012, 143).

The introduction of the Act creates a paradox in that the pre-existing protections of rights in the area of human reproduction contained in the Italian Constitution and in the Abortion Act of 1978 now share legal space with a dissonant embryo protection model which values an abstract model of life as sacred and devalues individual lives and their right to choose. In this model the embryo is constructed as a subject independent of the woman in whose womb it exists. Such independent embryonic subjects are as Ingrid Meltzer (2011, 117) has put it: “framed as the embodiment of a vulnerable nature that was under attack, and as – lacking their own voice – in need of the law’s protective intervention”. For Meltzer this

leads to the construction of the embryo as “a new citizen subject” (Meltzer 2011, 118).

The 2004 Act has been the subject of continuous contestation both at the political level (in the form of an ultimately unsuccessful citizen initiative referendum in 2005) as well as the subject of numerous legal challenges (at the level of local courts, the Italian Constitutional Court and, most recently, in 2012 a successful challenge at the Court of First Instance of the European Court of Human Rights in Strasbourg). The cumulative effect of the many court challenges has led to a gradual judicial reworking of the Act. However, despite such judicial intervention, the Act itself still remains on the statute books due to a lack of willingness on the part of the main political parties of the centre right and centre left to revise it.

This article focuses on the manner in which groups and individuals affected by the Act’s prohibitions have contested the legislation’s prohibitions, and, in so doing, examines the extent to which this might constitute an example of what Nikolas Rose has termed an *ethopolitics*. Rose’s notion of *ethopolitics* can be seen as a form of affirmative biopolitics in which citizens claim for themselves rights to make decisions about and over their bodies (Rose 2001, 19). The concept of *ethopolitics* allows us to visualize the potential of an active counter-politics of resistance for restoring reproductive citizenship to those deprived of it by legislative interventions of this nature. This resistant biopolitics of living citizens calls for a continuous struggle to maintain and win rights. It allows us to move from “a rigid politics of life” to adopt Krause and De Zordo’s term to a “power of life as such” (Fassin 2009, 49). In other words it demonstrates the power of individuals acting in concert to contest draconian state action and allows us to see in Fassin’s terms that “another politics of life is possible” (Fassin 2009, 44). This is all the more important when politicians refuse to provide a facilitative and fair framework for the governance of assisted reproductive technologies.

## 2. Law, Religion and the Emergence of Embryo Protection

The 2004 Act can be described as an embryo protection law in that its overriding objective is the protection of the embryo at the expense of women’s right to exercise reproductive choice. The idea of giving an embryo legal recognition immediately sets up a conflict between this particular ‘subject’ and living citizens who may want access to reproductive services. The embryo is deployed in the legislation as a weapon to protect an imagined notion of the Italian family, one which is based on a Roman Catholic marriage between heterosexuals. All other family formations are seen as a threat to such an imagined dominant Italian family model. The Act is the apogee of a concerted campaign by the Vatican and conservative politicians to reclaim a narrow, patriarchal conservative notion of the

nation. This is a politics which lessens the freedom of living citizens in the interest of an abstract notion of Life. This curious form of biopolitics uses the apparatus of personhood to give symbolic life to the not yet living and devalues the lives of living citizens. As philosopher Roberto Esposito (2011, 185) has put it: “the concept [...] of the ‘sanctity’ of life is often used as an apparatus of exclusion or suppression of other lives, considered as not as relevant”. Indeed, as Franca Bimbi has noted, the legislation is based on a politics of fear and security. As she has observed, the law drew: “on fears, on the need for security, on the need to identify the internal from the external” (cited in Marchesi 2007, 12).

In order to see how such a restrictive law managed to achieve such widespread elite political support it is necessary to examine the history of attempts to govern assisted reproduction and the influence on elite political culture of traditionalist Roman Catholic thinking on the family. Until 2004 the only instrument which governed assisted reproductive technology in Italy was a ministerial circular, introduced in 1985 by the then Minister for Health, Costante Degan. The Degan Circular specified that assisted reproduction with donor eggs and sperm was prohibited, and also prohibited the creation and cryopreservation of embryos for deferred implantation, industrial use and scientific research. Under the Circular access to assisted reproductive services was permitted only to married couples. These prohibitions did not apply to clinics in the private sector (see further, Valentini 2004, 95-109). The Degan Circular of 1985 was a misguided attempt at partial regulation of the field. Regulation was partial in that it applied only to the provision of assisted reproductive technology in Italy’s national health service. As Ramjoue and Kloti have observed, the Circular resulted:

in unequal access to ART. Wealthy patients [could] afford faster access to a wider range of ART than those who depend[ed] on the [Italian National Health Service] for treatment and financial coverage. In the absence of a comprehensive regulation on ART, many techniques [were] available to a few, and few [were] available to many (Ramjoue and Kloti 2004, 59).

As a result, a two-tier system of assisted reproductive services developed, one private and free from regulation, the other public and subject to great restrictions. The medical profession added a further layer of prohibition in 1995 with the introduction in that year of a revised version of its Code of Medical Ethics which prohibited all medical practitioners from using surrogate motherhood of any kind, insemination of gay and lesbian couples and single people, post-mortem insemination, and the insemination of women with non-precocious menopause (see Parolin and Perrotta, 2012). This partisan anti-scientific approach was to provide a foretaste of the way in which the issue of assisted reproduction would be addressed by political elites in Italy for the coming twenty years.

This is not to say that attempts had not been made to fill the legislative void in the years between 1985 and 2004. However none of these attempts were successful. In 1989 a number of Bills were introduced which would provide a legislative framework for the new reproductive technologies. These included one which would extend the provision of IVF to single women; another which would allow embryo cryopreservation and gamete donation and which would have extended provision of ART in both public and private clinics, and a third which would have given the embryo legal protection from the moment of conception. None of these Bills was successful given the lack of political will to legislate on the matter. In 1995, a Commission was established by the Ministry of Justice, under the chairmanship of Francesco Busnelli, to look into the area. This Commission recommended that donation of gametes be permitted but that single women not be allowed access to assisted reproductive services. The Report of the Busnelli Commission was not implemented by the Government (Flamigni and Mori 2005, 28). The next attempt to address the question of regulating the assisted reproduction sector came in 1997 when a centre-left coalition government was in power. In 1997 the President of the Parliamentary Social Affairs Committee, Marida Bolognesi, announced that the Committee would begin an inquiry into the feasibility of legislation in the sector. In 1998 the committee presented a draft Bill which limited access to assisted reproduction to heterosexual couples who were either married or in a stable relationship but allowed both donor insemination and embryo research for therapeutic purposes. It also provided that the number of embryos produced in each treatment cycle should be limited to that amount strictly necessary for a single implantation, and in any case not more than four.

However, during its passage through both houses of the Italian Parliament, the Bill was subject to several amendments, which would transform its structure and tone radically. The amendments were added by a cadre of Roman Catholic conservative parliamentarians whose aim was to ensure that the rights of the embryo be inserted in the Bill. The Bill was amended to include a stipulation that in the carrying out of assisted reproductive services, medical practitioners should take into account the interests of the embryo as well as the rights of the woman involved. The Bill was further amended by the introduction of a ban on the freezing of embryos, a limit of three embryos to be produced and implanted in any one treatment cycle, and an amendment was added which would allow for the adoption of embryos as if they were children. Marida Bolognesi resigned as the sponsor of the Bill, as she felt that, in its transformed state, she could no longer support it. She was replaced by Alessandro Cè of the Northern League, whose sympathies were of a far more conservative nature. The Chamber of Deputies approved the amended Bill by a majority of 266 to 153 on 26 May 1999. Once the Bill arrived in the Senate for approval, the role of sponsor was taken over by Francesco Varella of the Green Party. He attempted to undo some of the more extreme

amendments made in the lower house. The passage of the Bill through the Senate was delayed by the decision to suspend discussion until after the administrative elections scheduled in several regions for April 2000. Once the Bill resumed its passage through the Senate, certain parts of the text, which had been amended in the lower house, were further amended. This included the removal of the reference to the embryo as being possessed of rights. However, the proposed legislation was eventually abandoned due to the fall of the coalition government (see Cirant 2005, 182-184).

After the failure of the centre-left government's attempt to pass legislation on assisted reproduction, the new centre-right government led by Silvio Berlusconi reopened discussion of such a law after coming to power in 2001. With a centre-right majority the conditions for the passing of a more restrictive embryo protection law were more favourable. By 2002 the new Government had secured the approval of a revised draft of the previous Bill in the Chamber of Deputies. The revised Bill granted the embryo symbolic legal recognition, and prohibited both embryo freezing and donor insemination. After its initial approval, the Bill remained in limbo awaiting further discussion in the Senate. The Government did not appear to be in a hurry to speed the Bill through to final approval. However, the Vatican decided to expedite matters. In February 2003, on the occasion of the anniversary of the signing of the Lateran Pacts of 1929, representatives of the Government attended a meeting with Vatican officials.<sup>1</sup> On this occasion, the Pope's displeasure at Government policy in relation to its support for the war in Iraq, the implementation of discriminatory legislation on immigration, the so-called Bossi-Fini law (named after its instigators, respectively the leaders of the separatist Northern League and of the former neo-fascist National Alliance), and the Government's opposition to the introduction of a system of clemency for prisoners, was communicated to the Government. The Vatican pointed out that the swift approval of a law on assisted reproduction in line with Roman Catholic thinking would go some way to winning back its approv-

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<sup>1</sup> The Lateran Pacts were concluded between the Vatican and the fascist regime on February 11, 1929. The pacts gave official recognition to the special position of the Church in Italian politics. The Pacts recognised Roman Catholicism as the state religion as well as giving many concessions to the Vatican, including, tax exemptions for employees of the Holy See, exemption from jury service for the clergy, and providing for the teaching of Christian doctrine in primary schools. The Pacts were given continued recognition in the post-fascist republic by virtue of Article 7 of the Constitution of 1948 which provides as follows: "The State and the Catholic Church are, each within its own ambit, independent and sovereign. Their relations are regulated by the Lateran Pacts. Such amendments to these Pacts as are accepted by both parties do not require any procedure of Constitutional Revision."

al and, more importantly, its political backing (see Valentini 2005, 39-42). After this meeting the Government's position on assisted reproduction legislation changed. By December 2003, the Government had obtained approval of the draft legislation in the Senate, without any significant amendments. The Bill became law on 10 February 2004 after final approval by the Chamber of Deputies.

Significantly, the centre-left opposition did not act to oppose the legislation in spite of its blatantly unconstitutional and anti-pluralist nature. In fact, there seemed to be no major difference between the opposition and the Government on the issue when it came to the final vote. They seemed to have a common interest in pushing the law forward based on shared patriarchal values (Cirant 2005, 190-204). Francesco Rutelli, then leader of the centre-left *Margherita* party, declared that his party members should be allowed to vote according to their conscience on the law. Rutelli's conscience and those of many of his party colleagues led them to vote for the Act, leading to the absence of any effective parliamentary opposition (see Lalli 2004, 163-165; Valentini 2005, 123-136). The centre-left argued that any legislation, however flawed, was better than none. However, in this case, it was obvious that they had their eyes on the Roman Catholic vote which is still a substantial one for political parties seeking an electoral majority.

### 3. The Biopolitics of Reproductive Citizenship

The legislation gives implicit legal recognition to what is termed the *concepito*, literally 'that which is conceived'. This broad term encompasses all stages of pre-natal development including both the embryo and the foetus. However, the term *concepito* is employed only in Article 1 of the Act. In the rest of the Act the object of legal protection is named as the *embrione*, the embryo. In this case using the term *concepito* could imply that all unborn life once conceived is deserving of protection. This notion of embryo protection goes beyond the existing balance drawn in Italian law between the mother and foetus in the case of abortion. Under a ruling of the Constitutional Court of 1975 it was held that the welfare of the foetus does not override a woman's right to health. This was later confirmed by the introduction of the Abortion Act of 1978, which allows for pregnancy termination up to the twelfth week of gestation. There is therefore a stark contradiction in Italian law in relation to the question of reproductive rights. On the one hand the Constitution and abortion legislation provides a liberal framework in which reproductive choice is legally valued. On the other hand, the 2004 Act introduced into law a limitation on individual choice in relation to reproduction in favour of a symbolic recognition of the embryo as legal subject.

The 2004 Act limited access to in-vitro fertilisation to those categorised as infertile or sterile couples. Significantly, couples who are carriers

of a hereditary genetic condition could not as a consequence gain access to assisted reproductive services in Italy. This aspect of the Act has been the subject of numerous court challenges, culminating in a successful appeal to the Court of First Instance of the European Court of Human Rights in August 2012. The Act in Article 13 provides a general prohibition on any form of embryo experimentation. It does however allow clinical research on embryos only when exclusively therapeutic and is used to advance the well-being of the embryo. However the 2004 Act does not explicitly prohibit pre-implantation genetic diagnosis. This ambiguity was further compounded when the Government introduced the Code of Practice pursuant to the Act in 2004, which explicitly prohibited pre-implantation genetic diagnosis. This was beyond the statutory powers of the Minister for Health who introduced the Code of Practice as it created a prohibition which did not exist in the Act itself.

The Act allows only assisted reproduction using the egg and sperm of the couple involved and prohibits the use of donor gametes. This reflects a particular ideological narrative, which sees *homologous* reproduction, (that is, reproduction using genetic material from the couple), as natural, and *heterologous* reproduction, that which uses donated genetic materials, as offending against nature (see further Marchesi 2012). In addition the Act limited access to assisted reproductive services to adult heterosexual couples who are either married or in a stable relationship, are of a potentially fertile age and are both living. Moreover, the Act only permitted consent to the procedure to be withdrawn up to the point at which the egg is fertilised. This could have the consequence of women being forced to go through with the procedure once the egg is fertilised. This forced consent measure breaches Article 32 (2) of the Italian Constitution which states that no person shall be subjected to medical treatment without legal sanction and that the law can in no manner violate the limits imposed by the need to respect human dignity.

The conservative model of family relations inherent in the legislation has been subjected to judicial challenge in a series of cases in the lower courts and the Constitutional Court in Italy as well as a successful appeal to the European Court of Human Rights in Strasbourg. These cases have been taken by a coalition of medical and scientific associations, reproductive rights interest groups and individuals affected by the law's provisions. Many of the individuals who have challenged the legislation's provisions have been supported in doing so by reproductive rights interest groups such as *Amica Cicogna*, *Luca Coscioni*, and *Cerco un Bimbo* as well as medical and scientific interest groups such as WARM (World Association for Reproductive Medicine) (see Gallo and Lalli 2012, 85). Such a practice of what Nikolas Rose and Carlos Novas call "rights bio-citizenship" (Rose and Novas 2005, 442) has led to courts redefining the terms of the 2004 Act and dismantling some of its prohibitions. Rose and Novas (2005, 442) define "rights bio-citizenship" as: "forms of activism such as campaigning for better treatment, ending stigma, gaining access to ser-



vices". This practice of rights bio-citizenship also has an ethical dimension which Nikolas Rose, writing elsewhere, terms *ethopolitics*. This term brings together an active campaigning politics with an ethical dimension which allows individuals to improve their position in society through an active working on the self in relation with others. This thinking of Rose's is indebted to Michel Foucault's later work on ethics as care of the self (see Foucault 1978, 1985, 1986). This is an active thinking of citizenship which makes of the citizen more than a mere object of state governance but, rather, an active participant in political affairs.

In Rose's interpretation of Foucault's thought one can see the emergence of a politics of resistance which works to counter the construction and governance of individuals as objects of political power. It could be called an affirmative biopolitics which allows individuals to engage power and act in a collective manner to resist their exclusion from full citizenship. As such, *ethopolitics* for Rose, refers to:

ways in which the ethos of human existence – the sentiments, moral nature or guiding beliefs of persons, groups, or institutions – have come to provide the 'medium' within which self-government of the autonomous individual can be connected up with the imperatives of good government. In ethopolitics, life itself, as it is lived in its everyday manifestations, is the object of adjudication [...] ethopolitics concerns itself with the self-techniques by which human beings should judge themselves and act upon themselves to make themselves better than they are. While ethopolitical concerns range from those of lifestyle to those of community, they coalesce around a kind of vitalism: disputes over the value to be accorded to life itself, "quality of life", "the right to life" or "the right to choose", euthanasia, gene therapy, human cloning and the like" (Rose 2001, 18).

Thus, for Rose (2001, 19), *ethopolitics* enables individuals to: "use their individual and collective lives, the evidence of their own existence [to] demand civil and human rights [...] They call for recognition, respect, resources [...] control over medical and technical expertise".. Rose's notion of *ethopolitics* allows us to visualize the potential of deliberative participative politics within the context of reproductive rights and citizenship.

In the current battle for reproductive citizenship in Italy one can see the play between the *ethopolitics* of movements of individuals who are attempting to self-style their reproductive choices, and what I have called elsewhere the *vitapolitics* of politicians and the Roman Catholic Church who attempt to prevent the creation of this right (Hanafin 2007, 5). This *vitapolitics* is based on rigid moral beliefs and refuses to recognize contra-

ry views<sup>2</sup>. In reaction to the 2004 Act there has been an instantiation of an *ethopolitics* by groups and individuals affected by genetic illness who see the Act as a major obstacle to gaining access to assisted reproductive technologies and to the development of medical research to identify treatments for genetically inherited conditions. As Ingrid Meltzer (2011, 111) has observed: "Speaking in the name of their physical vulnerability and mobilizing their damaged bodies, they acted as "biological citizens"". Such biological citizens use their bodies as a strategic means of achieving full reproductive citizenship. The notion of the biological citizen is an interesting one in that it brings together both the reality of contemporary political regimes in which we are all the subjects of governance, with the co-existing ability to resist such governance in the mode of an affirmative biopolitics. It creates a space of resistance in which citizens take on an active role in contesting the manner in which their citizenship is constructed. In challenging the law, such ethopolitical resistance has taken two forms, one fought on the political plane in the form of a citizen initiative referendum, and the second, fought in the courts by individuals contesting the act on the grounds that it interferes with and is incompatible with pre-existing constitutional rights to privacy, health, and freedom from discrimination.

### 3.1. The Citizen Initiative Referendum: A Failed Ethopolitical Intervention

The citizen initiative referendum failed in large part due to successful negative campaigning on behalf of the Roman Catholic Church. The repeal referendum (*referendum abrogativo*) is a form of citizen initiative referendum which requires that the petitioners for a referendum obtain at least 500,000 signatures of citizens with the right to vote and allows the petitioners to outline their proposals for either partial or total repeal of the legislation in question. In opposition to the 2004 Act, a referendum committee was formed, which was made up of an alliance of the Radical Party, representatives of parties of the centre-left, the Green Party, and other interested parties, including scientists, doctors, and patients' groups. Once the requisite number of signatures is obtained the referendum proposals are then scrutinized for admissibility by the Constitutional Court (see further Barbera and Morrone 2003, 11-27). The referendum

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<sup>2</sup> The notion of *vitapolitics* refers to the manner in which conservative Roman Catholic interests in Italy (and in other jurisdictions) struggle to insert in public policy a definition of life as sacred from the moment of conception. Such an ideology valorizes the abstract notion of life over the actual rights of living citizens, particularly women. Such a model would criminalize abortion and limit severely access to in-vitro fertilization. (see further Hanafin, 2007, pp. 4-10).

committee called for the total abrogation of the legislation. In addition, and in the event that the Constitutional Court would reject this proposal, four proposals, which would partially repeal the legislation, were also proffered. On obtaining the requisite number of signatures, the Constitutional Court decided to allow four out of the five proposed referendum proposals. The proposal that was rejected was that which called for the total repeal of the Act. The main opposition to the referendum came from the Roman Catholic Church. The Church set up an anti-referendum committee called 'Science and Life' (*Scienza e Vita*) to campaign on its behalf. The anti-referendum campaign instead of calling for a 'no' vote called for voters to abstain, so that the required quorum of 50% plus 1 of voters would not be reached and the ballot would be declared invalid. This tactic was seen as a far more effective way of allowing the law under question to remain untouched but was also a subversion of the so-called deliberative democratic process.

The anti-referendum campaign proved to be successful. The quorum was not reached with only 25.9% of voters turning out (Luigi 2005). The reason for the large abstention cannot be attributed simply to the Church's call for a boycott of the polls. The issue of assisted reproduction was not one which excited the enthusiasm of many voters. They saw it as an issue which affected a minority of the population. Moreover, the recent history of referendum in Italy had been marked by a large rate of abstention. In the years immediately preceding the referendum on the assisted reproduction law (i.e. between 1997 and 2003) eighteen referendums were held and not one of these achieved a quorum (Barbera and Morrone 2003, 209-251). In addition there may have been a further explanation for the lack of a quorum in the particular case of the assisted reproduction referendum. The feminist writer Silvia Ballestra has astutely observed that there was an unwillingness on the part of a large section of the Italian electorate to engage with the vital issues raised by the referendum campaign. Instead, drained of curiosity or civic responsibility, in a polity which had become a mediocrity, many Italians simply could not be bothered to inform themselves of what exactly was at stake in this referendum (Ballestra 2006, 30-31).

#### **4. Rights, Resistance and the Bio-Constitutional Reframing of Assisted Reproduction**

On the legal plane cases challenging the Act have been fought at courts of first instance, the Italian Constitutional Court and the European Court of Human Rights in Strasbourg. This legal *ethopolitics* demonstrates the ability of citizens affected by the Act in coalition with reproductive rights interest groups and scientific and medical groups to win back rights within the context of assisted reproductive technologies by harnessing pre-existing constitutional rights which support a liberal mod-

el of reproductive citizenship. In this sense, what such legal contestations demonstrate is a form of, what Sheila Jasanoff has called, 'bioconstitutionalism'. For Jasanoff (2011, 290), 'bioconstitutionalism': "displays the power of human subjects to articulate new claims vis-à-vis governing institutions, thereby demonstrating the productivity of constitutional ideas as resources for bottom-up self-fashioning". Thus the ethopolitical encounter with the law involves precisely an enactment of 'bioconstitutionalism'. It undoes the imposition of a biopolitical ordering on individuals and allows them, through their own continuous action, to perform an active and contestatory form of citizenship. As such, as Jasanoff (2011, 290) reminds us, 'bioconstitutionalism' is: "a dispersed and active process of reordering – indeed reconstituting – knowledge and society". These cases allow for another more pluralist voice in relation to reproductive citizenship to be listened to and heard in the public domain.

The initial cases to challenge the Act were heard almost immediately upon its introduction with the first heard in Catania in May 2004 (*Tribunale di Catania, 1 sezione civile*, 3 May 2004), followed by another in Cagliari in 2005. In the Catania case, a couple, who were both healthy carriers of the genetic condition *beta thalassaemia* (a blood disorder that reduces the production of haemoglobin leading to a lack of oxygen in many parts of the body), requested approval of pre-implantation embryo selection to ensure that the child born as a result would not suffer from this condition. The judge ruled that this was not permissible under the Act, and noted that the fertilised eggs be implanted whether or not there is a risk that they may carry this disease. This ruling was based on an interpretation of Article 14 of the Act which prohibited the creation of a number of embryos greater than that strictly required for one contemporaneous transfer. The number created should be no greater than three. The couple argued that the 2004 Act was incompatible with the rights guaranteed in Article 2 (the guarantee of inviolable human rights) and Article 32 (2) (the right not to be forced to submit to unwanted medical treatment) of the Italian Constitution. The judge dismissed these claims, noting that the obligation to transfer three embryos into the womb simultaneously did not constitute unconsented to medical treatment contrary to Article 32 (2) of the Constitution. The judge also rejected the claim that the couple's inviolable human rights were being interfered with, noting that there was no fundamental right to have a child of one's desires. The judge argued that the child in this case is a potential child rather than an actually existing one. If the couple were to continue with the embryo transfer and subsequently discover that the future child would suffer from such a condition, the only option left open to them would be a therapeutic abortion. The process would then have to start over again with no guarantee that a similar outcome would not occur.

In the Cagliari case in July 2005 the *Tribunale Civile* of Cagliari referred the question of the constitutionality of Article 13 of the Act to the Constitutional Court (*Corte Costituzionale*) for review. The Act in Article

13 provides a general prohibition on any form of embryo experimentation. Here, a couple who had been refused access to pre-implantation genetic diagnosis by their consultant claimed that this refusal was contrary to Articles 2, 3 (equality and non-discrimination) and 32 (1) of the Italian Constitution. The female partner had, on a previous occasion, undergone IVF treatment and had discovered in the eleventh week of her pregnancy that the foetus was affected by *beta thalassaemia*. As a result she decided to undergo a pregnancy termination. On this occasion the couple wanted to make sure that the embryo was not affected by the condition before implantation. They refused to go ahead with the embryo transfer before undergoing a pre-implantation genetic diagnosis. The doctor involved refused this service on the grounds that Article 13 of the 2004 Act prohibited it.

The judge in this case noted that the question of the constitutional legitimacy of the law was not manifestly without foundation. In referring to decisions of the Constitutional Court in relation to abortion, the judge noted that the Constitutional Court had always declared in favour of the right to health of the woman when it came into conflict with the protection accorded to the foetus. In addition, the judge spoke of the right of a woman in such a case to receive the fullest information on the state of health of the embryo. In this case the general right to receive information in relation to medical procedures would apply to information obtained via pre-implantation genetic diagnosis in relation to the state of health of the embryo. The judge noted that this was the case in relation to determining the health of a foetus *in utero*. Therefore, if couples in the position of the applicants were to be refused access to pre-implantation genetic diagnosis then this would place them in a different position to couples who had a right to obtain access to tests to determine the state of the health of the foetus *in utero*. This raised the question of whether this ban was in accord with the equality provisions in Article 3 of the Constitution, as well as the human rights provisions of Article 2 and the specific provisions in relation to the right to health in Article 32 (1). The judge referred the matter to the Constitutional Court for a consideration of the constitutionality of this aspect of the law.

The matter was heard by the Constitutional Court on 24 October 2006 (Corte Costituzionale, Ordinanza 369/2006). The Court declared inadmissible the question of the constitutional legitimacy of Article 13. The written decision was produced on 9 November 2006 wherein the Court stated that the Cagliari court's assumption was contradictory in that the constitutionality of the impugned article could be deduced from other articles in the 2004 Act and in the light of the interpretation of the entire Act against the background of its stated intent. In other words, for the Court, the 2004 Act had as its objective the protection of the embryo and, as such, any procedure which would harm the embryo is not legitimate. However, the Constitutional Court refused to measure the constitutional validity of Article 13 against the principles of equality and the right

to health in the Constitution. It merely stated that the law itself was justified by its legitimating principles. Clearly unwilling to judge the constitutionality of the issue, the Court (in a decision which was not unanimous) stated that the law is legitimate because of its ideological premise.

Since this dispiriting and irrational decision of the Constitutional Court in 2006, there have been several successful challenges to the Act in both the lower courts and the Constitutional Court, culminating in a declaration of incompatibility of the Act with the *European Convention of Human Rights and Fundamental Freedoms* by the European Court of Human Rights in 2012. In this phase of judicial interpretation of the Act a more robust and interventionist style emerged in which courts declared several parts of the Act incompatible with rights protected by the Italian Constitution. One of the most important of such cases was the decision of the Regional Administrative Tribunal of the region of Lazio in January 2008 (Sentenza n. 398, reg. ord. n. 159 del 2008, 21 January 2008). This Case was initiated by the World Association for Reproductive Medicine (WARM), a not-for-profit organisation which represents the interests of professionals working in the area of medically assisted reproduction. The action challenged the legitimacy of the Code of Practice introduced by Ministerial Decree in 2004, as being beyond the powers of the Minister of Health, as well as the constitutionality of Article 13 (the ban on embryo experimentation) and Article 14 (the transfer of no more than three embryos to the womb simultaneously) of the 2004 Act. WARM also contested the conflation of the terms sterility and infertility in the Act and the legal status accorded to the embryo in the Act. This challenge, which also had the support of a number of other reproductive rights organisations (namely *Amica Cicogna*, *Luca Coscioni*, and *Cerco un Bimbo*), was opposed by the Italian government together with a number of conservative civil society organisations, such as the Movement for Life.

The Court in its decision overruled parts of the Code of Practice introduced pursuant to the 2004 Act (Ministerial regulations – Explanatory notes on assisted reproductive technology – introduced by Ministerial Decree n. 15165 of 21 July 2004). The impugned provisions related to Article 13 (5) of the Act, which prohibits experimentation on human embryos. The decision also raised doubts over the constitutionality of Article 14 (2) of the Act. In effect, what the decision did was to overrule the limitation on pre-implantation genetic diagnosis of embryos for observational purposes only, on the basis that such a provision could not be enacted by secondary legislation. The Minister of Health had therefore exceeded his powers in introducing this measure by ministerial regulations. As a result of this decision, the guidelines on assisted reproduction were revised on 11 April 2008 to remove the limitation on pre-implantation genetic diagnosis for observational purposes only.

The Regional Administrative Tribunal of Lazio in its decision of 21 January 2008 also referred the question of the constitutionality of Article 14 of the Act to the Constitutional Court. The Constitutional Court, in its

decision of 1 April 2009 (Corte Costituzionale, sentenza n. 151/2009, 1 April 2009) reversed the prohibition contained in Article 14 of the 2004 Act on the transfer in any one cycle of a maximum of no more than three embryos. In addition to the referral from Lazio, the Constitutional Court, in the same decision, also considered two referrals from the *Tribunale Ordinario* of Florence from its decisions of 12 July 2008 and 26 August 2008 (see Tribunale Ordinario di Firenze, ordinanza del 12 luglio 2008, reg.ord. n. 323 del 2008 and Tribunale Ordinario di Firenze, ordinanza del 26 agosto 2008, reg.ord. n. 382 del 2008). In both of these decisions the Florence court questioned the constitutionality of Article 14 of the Act insofar as it prohibited the freezing of any excess embryos which were not used in any one cycle of IVF, and imposed a maximum limit of three embryos which could be created in any IVF treatment cycle and the need for their simultaneous transfer to the patient's womb. In addition, the Florence Court questioned the constitutionality of Article 6 (3) of the Act which decreed that once a woman had consented to the simultaneous transfer of these three embryos she could not withdraw that consent. The Constitutional Court in its decision held that Article 14 (2) of the Act was unconstitutional in that it breached Article 3 of the Constitution in relation to equality and Article 32 of the Constitution which upholds the right to health. The Court observed that the prohibitions contained in Article 14 of the Act ignored the individual personal and medical circumstances of women who underwent IVF and as such treated widely diverse medical situations in a similar manner. The idea that one size fits all in reproductive medicine ignores the highly particular and individual treatment required in different cases. As such this article fell foul of the equality provisions of the Constitution in that it proposed that the same medical solution should be applied to different cases. Moreover, such a blunt prescription also interfered with a woman's right to health in the Constitution. As a result of this decision, Article 14 (2) of the 2004 Act is no longer to be interpreted as placing a limit on the number of embryos to be transferred. The Court held that the number of embryos transferred in any treatment cycle should be based on individual expert medical opinion based on the facts of each individual's case. The decision also overruled the ban in Article 14 (1) on the freezing of embryos. As a result of the decision, embryos which might not be used in a treatment cycle may now be frozen for use in a later treatment cycle. The Court, in referring to Article 1 of the Act, noted that the interests of all parties (not just the embryo) should be considered, citing the Constitutional Court's previous jurisprudence on abortion in which the rights of the woman to self-determination and health should be given priority. The Court thus affirmed the autonomy of individual women as well as the professional autonomy of medical practitioners who should be allowed to decide independently on the treatment to be followed depending on the individual's medical history and needs. The Court observed that the principle of medical autonomy and responsibility as well as the principle of patient auton-

omy should prevail in such cases and not the interests of the embryo.

In October 2010, the *Tribunale Civile* of Florence (Tribunale civile di Firenze, 6 October 2010) overturned the ban on IVF with donor eggs or donor sperm contained in Article 4 of the Act and referred this aspect of the Act to the Constitutional Court for review. On 21 October 2010 the *Tribunale Civile* of Catania made a similar ruling, questioning the constitutionality of the ban on IVF using donor gametes (Tribunale civile di Catania, 21 October 2010). In the decision of the *Tribunale Civile* of Salerno of 13 October 2010 the limitation in Article 1 of the 2004 Act on access to in-vitro fertilisation to only those people categorised as infertile or sterile was successfully challenged (Tribunale civile di Salerno, 13 October 2010). The Court ruled in favour of access to pre-implantation genetic diagnosis in the case of a couple who were neither sterile nor infertile. The couple suffered from amyotrophy, a genetically inherited condition, which causes the progressive wasting of muscle tissues.

The 2004 Act was the object of a third Constitutional Court decision in May 2012. This case concerned the question of the prohibition of IVF using donor gametes under Article 4 of the Act. The decision however turned out to be more of a non-decision in that it held that the cases should be referred back to the regional courts from which they issued for re-hearing. The case involved references from three lower courts, in Florence (Tribunale Ordinario di Firenze, 6 September 2010), Catania (Tribunale Ordinario di Catania, 21 October 2010), and Milan (Tribunale Ordinario di Milano, 2 February 2011) in relation to Article 4 (3) of the Act (which bans IVF using donor gametes), on the grounds of potential constitutional incompatibility. The Florence case involved a couple of whom the male partner was infertile and, as a result, the couple required access to donor sperm. The clinic they attended could not carry this out as the Act prevented it from doing so. The Court was of the opinion that Article 4 of the Act was unconstitutional but noted that it needed to refer the matter to the Constitutional Court as lower court judges do not have the power to declare a part or whole of a statute unconstitutional. The reference from the court in Catania concerned a couple where the female partner suffered from premature menopause and who attended a clinic in order to request an egg donation. However, she was prevented from doing this by the prohibition contained in Article 4 (3) of the 2004 Act. The Court noted a possible breach of the Constitution and observed in addition that this procedure was medically necessary. Again, due to the inability of lower court judges to declare statutes unconstitutional, the case was referred to the Constitutional Court. In the Milan case a couple required sperm donation as the male partner suffered from azoospermia. In this case the prohibition contained in Article 4 (3) of the 2004 Act prevented the couple from gaining access to such a procedure. All three courts noted that there was a potential constitutional violation.

The justification given by lawyers on behalf of the Government in the argument before the Constitutional Court for such a prohibition was the



right of the child to know the biological identity of their parents. This justification had more to do with a conservative mentality in relation to family relations rather than any rights of the child involved. Indeed this was clearly manifested in the parliamentary debates on the legislation where those who supported the law likened donor insemination to adultery, resulting in the birth of a child which was not that of the husband (see Lalli 2005, 129-171). On hearing the references before it the Constitutional Court decided to refer the matter back to the three lower courts, using as a justification for this, the then recent decision of the Grand Chamber of the European Court of Human Rights in the case of *S.H. and others v Austria* (Application n. 57813/00, Grand Chamber decision 3 November 2011), which had occurred after the lower courts had made their decisions. The decision of the Grand Chamber overruled a decision of the Court of First Instance of the European Court of Human Rights in *S.H. and others v Austria* of April 2010, on which the three lower courts had based their decisions. In its decision the Grand Chamber held that there was no violation of Article 8 of the *European Convention of Human Rights and Fundamental Freedoms* in a case involving a challenge to the provision of the Austrian *Assisted Procreation Act* of 1992 which prohibits the use of sperm from a donor for IVF and ova donation in general. The Austrian *Assisted Procreation Act* only allows IVF with gametes from the couples involved. Even though the Grand Chamber noted that there was a clear trend across Europe in favour of allowing gamete donation for IVF, it added that an emerging consensus was still under development and so was not, as yet, based on settled legal principles. The Grand Chamber held, by a majority of thirteen votes to four, that there had been no violation of the Convention. The Grand Chamber further noted that the Austrian legislation was not disproportionate as it had not banned individuals from going overseas for infertility treatment unavailable in Austria. This assumes, without thinking, that couples are in a position to engage in such reproductive tourism.

The decision of the Grand Chamber was entirely at odds with the First Instance ruling in the same case (*S.H. and Others v Austria*, Chamber judgment 1 April 2010). The Court of First Instance had held that the impugned section of the Austrian legislation breached Article 8 of the *European Convention of Human Rights and Fundamental Freedoms* as this prohibition interfered with the couple's right to access treatment which would allow them to found a family. The lower courts had noted, based on the Court of First Instance decision, that the prohibition in the 2004 Act of IVF using donor gametes constituted a breach of Articles 8 and 14 of the *European Convention of Human Rights and Fundamental Freedoms*. The Constitutional Court observed that as the Grand Chamber had overruled this decision the referring courts should re-hear these cases based on this new development (Corte Costituzionale, Ordinanza n. 150, 2012, pp. 11-12).

In August 2012, the Court of First Instance of the European Court of

Human Rights handed down a decision against Italy in relation to the prohibition of pre-implantation genetic diagnosis in the case of a couple, who are carriers of a genetically inherited condition. In the case of *Costa and Pavan v Italy* (Application n. 54270/10), a couple, Mr. Pavan and Ms. Costa, both carriers of a hereditary illness, cystic fibrosis, wished to prevent this condition being inherited by any second or subsequent child they might have together. In September 2006 they gave birth to a child with cystic fibrosis, only then becoming aware that they were both carriers of the disease. The couple have a one in four chance of having a child born with the condition and a one in two chance that any future child of theirs will be a carrier of the condition. They want to ensure that any further child they might have would neither have, nor be a carrier of, cystic fibrosis. The 2004 Act prevents access to pre-implantation genetic diagnosis to couples suffering inherited genetic conditions. It only allows access to screening for infertile couples or where the male partner has a viral disease which can be transmitted through sexual intercourse, such as HIV, or Hepatitis B and C. Since these exceptions did not apply to this couple, the only option open to them as the law stood was to have an abortion on discovery via foetal testing that the future child was either a sufferer or carrier of the condition. In fact, Ms. Costa had conceived a child with cystic fibrosis so decided to undergo an abortion in February 2010.

In their application to the European Court of Human Rights in Strasbourg, the couple relied on Article 8 in conjunction with Article 14 of the *European Convention on Human Rights and Fundamental Freedoms*. Their complaint was that their right to privacy and family life protected by Article 8 had been infringed in that they were not allowed access to pre-implantation genetic diagnosis to allow them to prevent the birth of a child with cystic fibrosis. They also claimed that they suffered discrimination, contrary to Article 14, compared to infertile couples or those couples in which the male partner has a sexually transmitted disease. In its decision of 28 August 2012, the Court of First Instance of the European Court of Human Rights held unanimously that the ban on access to pre-implantation genetic diagnosis for couples with genetically inherited diseases infringed Article 8 of the Convention. The Court found that there was no breach of Article 14. The Court held that the desire of the couple to have a child who was not affected by a genetically inherited disease of which they were healthy carriers and to undergo pre-implantation genetic diagnosis and IVF in order to do so was protected by Article 8 as it formed part of their right to private and family life (*Costa and Pavan v Italy*, (Application N. 54270/10) at paragraph 57). The Court unanimously declared that the 2004 legislation was incoherent in that on the one hand it prohibited the transfer of only embryos which were not affected by cystic fibrosis and on the other hand it allowed the couple to abort a foetus affected by this condition. There was a clear impact on the couple's Article 8 rights in this case as a result.

In its judgment, the Court of First Instance in *Costa and Pavan v Italy* held that this case should be distinguished from that of *S.H. v Austria* in that it did not concern donor IVF, as the gametes of both partners would be used in the procedure. As a result, the Court in *Costa and Pavan v Italy* was obliged to measure the proportionality of the prohibition of pre-implantation genetic diagnosis in light of the fact that therapeutic abortion is a possibility in such a case. For the Court this was a specific and unique situation and it noted that only two other member states of the Council of Europe prohibited such a procedure, namely Austria and Switzerland. The Court also noted that the Swiss government was currently considering the lifting of such a ban in its legislation. The Court concluded that the interference with the applicants' right to privacy constituted by the ban in the 2004 Act on pre-implantation genetic diagnosis to such couples was not proportional (*Costa and Pavan v Italy*, (Application N. 54270/10) paragraphs 67-71). In particular, the Court focused on the contradictory position which the prohibition on pre-implantation genetic diagnosis for couples such as *Costa and Pavan* created. The court observed:

The consequences of such a system for the right to respect for private and family life of the applicants is evident. The only means by which they can exercise their right to give birth to a child who is not affected by the illness of which they are healthy carriers is to undergo a pregnancy by natural means and to then undergo a therapeutic abortion once a prenatal screening reveals that the foetus is affected by the condition [...] the Court [...] recognizes the anguish caused to the female applicant who unable to gain access to pre-implantation genetic diagnosis has as her only means of becoming a mother having a child affected by the condition of which she is a carrier, and also recognizes the suffering provoked by having to choose to proceed with a therapeutic abortion to prevent such a pregnancy (*Costa and Pavan v Italy*, (Application N. 54270/10) paragraphs 67-71)

The Italian Government had contested the applicants' arguments and argued that the prohibitions in the 2004 Act of which they complained were necessary to protect the health of the "child", and of the woman as well as the dignity and freedom of conscience of the medical professions and the need to prevent eugenic practices. The Court was not convinced of these arguments and noted that one could not claim that an embryo was a "child", and pointed out the contradiction of the Act's protection of the embryo which was the basis for the prohibition on access to pre-implantation diagnosis and in-vitro fertilization for such couples while at the same time allowing such couples to have access to therapeutic abortion (*Costa and Pavan v Italy*, (Application N. 54270/10) paragraphs 61-62). The Court also wondered why the Government did not think that the perfectly legal practice of therapeutic abortion could not also lead to

eugenic practices or interfere with the dignity and freedom of conscience of the medical professions. In other words, there was a clear contradiction between the arguments in favour of the 2004 Act and its prohibitions and the freedoms contained in the Italian Abortion Act of 1978.

Despite the clear exposure of the incoherence of the Act by the Court, the Italian Government nonetheless entered an appeal against this decision. In February 2013, the Grand Chamber of the European Court of Human Rights did not allow this appeal, noting that the Italian Law on Assisted Reproduction was clearly incoherent and in breach of Article 8 of the *European Convention on Human Rights and Fundamental Freedoms*. The decision of the Court of First Instance of August 2012 is now the final word on the matter as far as the compatibility of the 2004 Act with the *European Convention on Human Rights and Fundamental Freedoms* is concerned. The Act has now been declared incoherent and incompatible with the *European Convention of Human Rights and Fundamental Freedoms* and the Italian Government is under an obligation to address this. This decision strengthens the hand of those groups in Italy campaigning for the legislation to be reviewed. The decision requires the Italian Government to revise the 2004 Act to make it compatible with the *European Convention on Human Rights and Fundamental Freedoms*. However given the lack of willingness of successive Italian governments to move in this direction it is unlikely that such a review process will begin immediately. Nonetheless what one can guarantee that will continue to happen will be individual court challenges to the Act, which will gradually have the cumulative effect of nullifying the Act's prohibitions. It will then be imperative even for unwilling politicians to act to introduce a law which is both coherent and compatible with the *European Convention of Human Rights and Fundamental Freedoms*.

#### **4. Conclusion: Reclaiming Reproductive Citizenship Through Ethopolitics**

This episode in Italian legal and political history displays a deliberate attempt by political elites to resist a pluralist model of legal governance of reproductive technologies in favour of a conservative model which favours embryo protection over the rights of women. This legislation was passed despite the existing constitutional protections for women's reproductive rights as well as the right to reproductive freedom contained in the Abortion Act of 1978. The political élite deliberately ignored these freedoms in order to return to a traditionalist conception of Italian national identity based on a heteropatriarchal model of family formation. In such a case we are faced with what Roberta Dameno (2004) has termed a 'manifesto law' which has for its real objective the upholding of a traditional idea of the family rather than attempting in any way to facilitate access to assisted reproduction. The introduction of such a restrictive law

was facilitated by the existence of a relatively stable right-wing coalition, which was willing to adopt the Roman Catholic Church's position on this issue in a wholesale manner for pragmatic political gain. The fact that opposition parties of the centre-left aligned with the Church's position allowed for the easy passage of the legislation through both chambers of the Italian legislature. This displays an unwillingness on the part of political elites to engage in open deliberative consensus politics on issues of bioethical controversy, particularly where Roman Catholic ethical values are at stake.

The series of court challenges to the 2004 Act and the continuing civil society political organisation against it demonstrate the need for continued political action on the part of citizens to win back what were once thought to be established rights such as a right to decide in relation to reproduction. This active citizen politics allows us to see how the abstract control over Life exercised by the State in the name of religious ideology can be contested successfully. As I have identified earlier in this article, this form of citizen resistance falls into the model defined by Nikolas Rose as *ethopolitics*. Such ethopolitical resistance has utilised the resources already present in the Italian Constitution and the *European Convention on Human Rights and Fundamental Freedoms* to enact a 'biocostitutionalism', a means of undoing the paradigm in which citizens are defined as objects of power but instead take active control of their lives and win back a space of autonomous decision-making in relation to reproductive matters. Such a mode of ethopolitical intervention allows us to imagine another politics of life which has been aptly defined by Didier Fassin (2009, 49) as: "the power of life as such".

This model of *ethopolitics* is intimately related to an ethos of collective action. Such a model stresses the need for continuous political engagement to make real the merely declaratory nature of rights. It is an active engagement with the promise contained in constitutional bills of rights to enable citizens to access rights in reality. This is a continuous process. As such, this recent episode in Italian political life has universal resonance in that it demonstrates clearly the need on the part of citizens to resist in contemporary regimes of biopower when their material lives are devalued and their full citizenship is threatened in the name of a totalizing narrative of Life. As Krause and De Zordo (2012, 148) have put it: "the struggles around reproductive policies are articulated in juridical terms [...] and produce rights-bearing citizens pitted against each other [...] These new moral regimes generate social and political spaces for ongoing negotiation".

In such a series of ongoing negotiations one comes to see that "another politics of life is possible" (Fassin 2009, 44). In this campaign of ethopolitical resistance to the 2004 Act an alternative more pluralist model of community has emerged which is not based on defending the nation from imagined enemies. This undoes the symbolic conservative notion of the self-sufficient nation under attack from others seen as enemies. This

points to the possibility of an “affirmative biopolitics” which is not a “politics over life” but a “politics of life” (Esposito 2012, 185). It is a politics which does not valorise an abstract ideologically rigid notion of Life which restricts individual lives but which is driven by actions of individual living beings acting in relation with one another.

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# Substances, Knowledge, Gaze

## The Bio-aesthetics of Reproductive Technology in a Sicilian Fertility Clinic

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**Abstract** The article is based on an ethnographic investigation and interviews to patients and medical personnel of a private fertility clinic in Sicily. An element that emerges as a peculiar characteristic in this specific context is the importance given by the prospective parents to the possibility of “seeing” and following visually the reproductive process, where the aesthetic dimension is central. It is through a complex network of translations within the practices surrounding reproductive techniques (where professionals comments and indications, medical practices, patients interpretations and visions are intertwined) that image/objects of reproduction (embryo and gametes) are made, becoming the focus of considerable emotional and corporeal investment. Knowing and watching reproduction through “bio-aesthetics” means getting the chance to manage and to produce contested possible spaces of agency, making up new different and unexpected comments and interpretations in the supposedly unquestionable domain of kinship and nature.

**Keywords:** reproductive technologies; vision; ethnography; kinship; Sicily.

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### I. Introduction

The first anthropological efforts to address the nexus of technology and reproduction have focused on how the naturalized language surrounding kinship and gender begins to fracture, losing stability and becoming rearticulated (Strathern 1992a; 1992b; Franklin 1997). In the face of reproductive technologies the evidence of the “facts of life” (Schneider 1968) – and the whole symbolic system that carries forms of knowledge articulating a certain relationship between natural facts and social constructions – has come through a complex process of explicitation and resignification (Strathern 2005; Thompson 2005). This process is deeply

interwoven with forms of representation, gaze and imaginary.

In this article I discuss the imaginary related to assisted reproduction – or, in other words, a form of knowledge that is largely constituted by images (of the ovaries, uterus, oocytes, spermatozoa, embryo and fetus) – and how it plays a major role in the articulation of discourses. I will approach the issue by focusing in particular on the novelty represented by the patients' view of gametes and embryos, the constant link between the medical interpretation and the look of the prospective parent on the reproductive "objects", the relation between the distant scientific imagery and a gaze charged with affection, and finally the implications that these "visions" bear to the construction of kinship.

To build my analysis, I draw on a specific research context: a fertility clinic in Catania, Sicily<sup>1</sup>. Research was carried out between December 2000 and June 2003 through extensive observations at the clinic, informal conversations with patients, doctors, and employees<sup>2</sup>.

Although being asked to wear a white coat while in the clinic, I always introduced myself as an anthropologist interested in reproductive issues. I interviewed 31 patients (17 couples, and 24 women) and 12 doctors<sup>3</sup>. Interviews lasted one to three hours and almost always took place at the patients' home. The fieldwork was carried out just before approval of the Italian law on assisted reproduction in 2004, forbidding heterologous fertilization, denying access of reproductive technologies to single women, embryo cryo-conservation, and pre-implantation genetic diagnosis<sup>4</sup>.

## 2. Narrating the (micro)Reproductive Process

The relaxed and rather confidential relationship I could obtain with the people I met during the research is partly due to the fact that, as I was told, I was from Sicily, of the same age as the patients (in the middle of their thirties), and I had no children. Nonetheless, the willingness to explain and narrate such a private and often painful experience is due to the peculiar history and characteristics of the clinic and to the relationship between patients and doctors.

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<sup>1</sup> See Gribaldo (2005) for the complete ethnographic account.

<sup>2</sup> My research has been carried through a PHD program in "Methodology of Ethno-Anthropological Research" of the University of Siena, Italy.

<sup>3</sup> Of the 31 women interviewed, 16 were being followed for the first child, 12 already had a child by assisted reproductive techniques (of whom 2 were trying again for the second child), 2 were pregnant, one had given up and decided to adopt. One couple had a child through pre-implantation diagnosis in order to avoid thalassemia. Except this last couple, infertility was due to the woman partner in 13 cases; to the couple in one case and to the male partner in the remaining 16 cases. Eight cases necessitated heterologous donation: 7 with a male gamete donation and one with female gamete donation.

<sup>4</sup> See VV.AA. (2004) for an overview of the debate and critical stances.

The fertility clinic, Hera, was built in Catania in the mid 90s on the initiative of a gynecologist and an embryologist, based on a non-profit organization for infertile patients. At that time, the public offer of reproductive technologies in Sicily was very poor and adversed by private interests. The clinic offered markedly lower rates<sup>5</sup> than other private Sicilian clinics and thus attracts patients from all over the region, mainly from the middle and working classes. The organization has a policy of proactive openness and actively participates in public debates on reproductive techniques by organizing gatherings, community meetings, seminars and conferences as well as demonstrations. The members of the association also meet every month to discuss various issues, both organizational and beyond. The meeting rooms are used almost every day, even for events such as brief gatherings when couples come to celebrate their newborns, greet the doctors and the staff, what creates a particularly informal atmosphere. In particular, the procedure for assisted reproduction techniques produces groups of women who tend to meet up regularly every time they visit the clinic for the various “steps” of the procedure: medical tests, ovules aspiration and embryo transfers. Patients not only create shared narratives about sterility and the hope of “potential reproduction”; they also experience all together the steps of the reproduction process as part of a group of women sharing a common problem. These steps, all elements of the “standard procedure” of assisted reproduction, warrant a uniquely collective dimension to the usually extremely private reproductive event.

The clinic allows creating an unusual relationship among infertile couples as they embark on a process of deciding to give birth to children, to “make reproduction happen”; this possibility becomes particularly valuable in the Sicilian context (many couple come from small towns in the region) where a couple without children represents an anomalous case suffering from heavy pressure from relatives, and potential sterility problems tend to be kept hidden. In this context, perceptions of femininity remain strongly linked not only to maternity but also to the idea of sacrifice (the form of “female martyrdom” -as some of the women refer to- entailed in assisted reproduction techniques), and procreative and familial settings are of crucial importance in relationships (doctors use local dialect, for instance, and patients use familial metaphors when “relating” with the facility and its doctors).

A somewhat surprising element that emerged during my research is the way patients talk about reproductive techniques: their tendency to linger on the phases and the very process of reproduction. In fact, the majority of the interviews narrated at length the entire process leading to ovulation induction, oocyte aspiration and embryo formation.

In comparison with other studies carried out in Italy (Pizzini and Lombardi 1994; Bonaccorso 2009) and abroad (Lasker and Borg 1989; Edwards

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<sup>5</sup> Treatment prices are approximately one third compared to other private clinics. In Sicily there are 35 facilities offering reproductive techniques, 8 in Catania (Hera included). At the beginning of the years 2000 Hera provided about 800 cycles per year, out of 1500 in the town of Catania.

*et al.* 1993; Franklin 1997; Becker 2000; Kahn 2000; Inhorn and Van Balen 2002; Thompson 2001; 2005), in my research this special level of attention paid to the biological process of reproduction in itself – what we might call “micro-reproduction” – is particularly marked. In addition to describing the experience that women (and, to a much lesser extent, men) underwent, patients narrated in greater detail what occurred *inside* the body: specific problems or responses to pharmaceuticals, the quality of the gametes and embryos produced and what they looked like. We witness here of a markedly biomedical vision of the process of reproductive techniques that is “filtered” through the patients. The way patients narrate their experiences is entirely focused on the reproductive process in biomedical terms, comprising a sort of phenomenology of conception. This particularity is partly due to the way the staff deals with information about the medical-reproductive process: the way they invite patients to become involved in their treatment and seek to make them responsible for their choices and aware of the kind of treatment they are undergoing, the importance they place on medical information and their use of visual aids no doubt leads the couples to experience the process *through* a medical language and vision. Couples have the opportunity to follow and visualize the reproductive process in a way that completely changes the historical perspective through which reproduction has been thought and represented. This interest in a scientific observation of the biological event of procreation signals a possible shift in the conceptualization of reproduction.

A young woman from a disadvantaged neighborhood in Catania, standing next to a blow up picture of her wedding and with one hand resting on a medical tome about reproduction, provided me with a very precise explanation of what constitutes a karyotype; another woman, busy mending her husband’s fishing net, spoke with passion about gametes: these instances reveal a novel way of understanding the body, reproduction and biomedical knowledge. In these narratives the visual element is essential. A natural event and individual experience (for the couple) becomes an event in which nature, medical and visual technology, images, and forms of scientific knowledge variously interconnect to form a new and complex experience.

### 3. Watching Reproduction

The people involved in reproductive techniques that I have interviewed underline the importance of the monitors and visual tools, from microscope to sonography, that make it possible to watch the invisible protagonists of the reproductive process and follow the development of the fetus in the mother’s body.

Emanuela’s<sup>6</sup> account, provided below, reveals how the form of control that is exerted through visualizing the reproductive process provides proof that conception has actually taken place: what is novel about the experience is the meaning attributed by couples and professionals to this

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<sup>6</sup> All names are fictitious.

“event”, where transfer and conception overlap. Watching the embryo transfer in real time means seeing one’s own child being conceived. On one hand, being able to view the series of events that lead to pregnancy on a monitor, “just like watching TV,” involves the couple as participants in an act of reproduction that is no longer driven by chance (as with conception through sexual intercourse); on the other hand, this “proof” allows recognizing failure even before pregnancy occurs: pregnancy – here, simply the successful transfer of embryos – is defined in an entirely new way. It involves not so much the embryo’s (here called oocyte) attachment to the female body with its unmistakable indicators, but rather the visualization of a process through a monitor.

Emanuela: They turned the monitor on so I could see what was happening inside me...

Me: And what did you see?

Emanuela: Well, I saw the whole inside of my uterus, obviously black because it is in black and white, and then the needle going in, a kind of catheter the oocyte passes through and is placed down. And then I saw all my three oocytes, all placed in the uterus, obviously floating there in my uterus: that was the proof that they had transferred all three of them... then you can say, “no, this can’t be true, I saw the technique but I didn’t see anything.” “Of course you did,” says [the doctor]: “You left this room being pregnant.” I was actually pregnant when I walked out of there, but then I don’t know where they [the embryos] ended up along the way...

The answer to the woman’s doubts underlines the peculiar meaning given here to visuality by the doctor: the very moment the technique is displayed through the visual instruments proves that the transfer has occurred and the woman is pregnant. It is no longer relevant that this pregnancy is only potential: from the moment the transfer has been monitored, certified and *witnessed*, it becomes a fact – or even better, it has *technically* occurred. In addition to holding a privileged place in current bio-medical research, this viewing technique that in turn produces an effect of “realism” is conveyed through popular media (such as television and popular scientific magazines) and bio-medical information.

Not only is there “nothing to hide”, as Ester remarks, but there is actually a great deal to see.

Ester: They show you any kind of things. When I went to them, when they made the ultrasound, they showed me: this is a follicle, this is the endometrium, and so on. I mean, there is nothing to hide. (...) Then, when you do a transfer, (you’re) always awake, (the embryo) is injected with a syringe and then they show it to you through the monitor, you watch it, you can already see the embryo, you can see exactly where it is placed, just like watching TV, you know, how they show it... (...) They let

you watch the transfer on video, and even if (the result) is not successful, at least I got to see something, and do you know what that's worth, don't' you?

The importance to watch the embryo transfer is related to the fact that, as described above, it has been given the powerful meaning of conception. This visual event can give the perception that something really "happened" inside the body, a body that significantly in this circumstance can be described by a woman, as "almost pregnant".

The particular characteristic of assisted reproduction techniques that make it possible to visualize and follow the *micro-reproductive* process is often indicated as a key element of physical and emotional involvement in the reproductive act. Maddalena's story is significant: through the beauty of the embryos ("like gardenias"), the strength of visual power allows the patient to actually *see* her future child.

Maddalena: We went back to the room where the retrieval had been done two days before. I sat down and at a certain point the gynaecologist goes: "the embryologist had a gift for you today". I say: "what is it about?". "She will show you under the microscope". Believe me, when I saw the first embryo shaped like a gardenia, in four parts, she said, you see, it is all like this... then the fourth embryo, which was smaller, opened up and closed down again. From two cells it became four. Right at that moment when it opened up and closed down I really could see it, and the doctor said: "You were very lucky cause it is hard to see things like these..." and I answered: "No, I was lucky 'cause that is my child..."

We assist here to a shift into a fully visible embryo that is at the same time a broadcast image, a living segmented flower that opens up and develops to finally close down again: a baby that grows up even prior to its transfer to the mother womb.

Such importance given to the visual element is a constant in all reports of experienced assisted reproduction. To watch means at the same time to judge the "biological matter" in terms of its quality, development and perfection. The medical field defines oocyte quality through a rating system from one to five, or through letters, starting with A for the highest quality obtainable. Patients come to learn the rating system through communication with medical professionals: doctors, biologists, and nurses. All medical and paramedical personnel, as well as patients, know the system; the classification for ova and embryos is commonly used and taken for granted. This is a code specifically related to the style of communication at Hera: albeit being known to the doctors in the domain of assisted reproduction in Italy, these classifications of oocytes or embryos are not always shared with the patients in other clinics, at least not in these precise terms.

Oocytes are central to the success of the reproductive techniques. Ovulation is controlled through minute variations in pharmaceuticals as well as constant and attentive monitoring. What patients spend most time talking about is the aspiration of the oocytes, but what concerns them the most is the quality of the oocytes. However, the production of good quality ova does not always lead to the formation of good and “usable” embryos; on the contrary, it is precisely because of this sort of disconnection that the quality of oocytes is identified, in order to highlight how chancy and unpredictable these techniques can be, even when the reproductive process sequence had worked perfectly up to that point. Even if produced “perfectly” by the patient’s own body through clinical work, this biological reproductive material does not lead to the formation of equally perfect embryos.

Ester: ... “beautiful oocytes”, they drew them... I haven’t seen anything, I just felt pain. They drew this oocytes and they said they were the best ones, but none of them got fertilised. (...) [then regarding a different cycle] “Here there are copybook oocytes!” they drew a lot of oocytes I don’t remember how many, 19...

On the contrary, as Teresa told me, while we are looking at her three one year old kids in the living room of a home in the suburbs of Catania, “miserable ovules” can lead to a triplet at the very first attempt.

Teresa: We made the retrieval [she laughs] it was such a mess!

Oocytes were not good at all, the embryologist did not want to try to fertilise them, because they were black and ugly...

Me: How do they know?

Teresa: They watch them through the microscope, they said they were black, sort of rotten eggs (...)

What we see here is an aesthetic of female gametes (beautiful, picture-perfect ova) in which only the “beautiful” and “top quality” ones are designated for the fertilization process. The more the ova look like the images in scientific and informational texts, the more “beautiful” they are.

Cristiana, who has some trouble in “producing” gametes and who manages to produce a single oocyte, talked about her experience this way:

Cristiana: He [the gynecologist] says: “You had such luck!” ... and I got pregnant. (...) There’s a picture in the operating room, of an ovum and the embryonic development... “Your ovum is top quality: it’s like that!” they told me, pointing at the image...

Only these oocytes are the good ones, the perfect oocyte is the one that matches the colorful image hanging in the surgery room. Associated with embryos in both language and practice, for couples seeking assisted reproduction treatment the female gametes represent microscopic parts of the self, invisible to the naked eye but yet observable, appraisable and

selectable through the use of video technologies: they have their own histories and represent the individuals from whom they originate. It is no longer their existence or lack thereof that might be problematic but rather their form or, even better, their effectiveness and productivity. Ovules are also living matter, and therefore subject to death.

Emanuela: They extracted one on Saturday, and on Monday they had to put it back, but they called me and told me that the ovule couldn't make it and it was dead.

It is a matter of biological life, but not human yet: in the "microreproduction" of oocytes, the idea of human life does not exist, and it is not by chance if ethics are not discussed in this context. Only embryos are object of ethical issues. Oocytes are a sort of pre-embryo: last products of the microreproductive process that still can be "treated" and frozen, biological matter that is still possible to manipulate, oocytes do not represent the relationship between male and female, as embryo do. But just like the embryo, they already are virtually a child (even if "half of a child").

Sandra: To me the simple fact that my oocytes are potentially my children and because I wanted children of mine and couldn't have, well, that other people could have children with my oocytes...in any case, I consider oocytes my children, I mean, potentially they are half children of mine, I am open to accept them from someone but not to donate them.

We could hardly think the spermatozoon as playing the same role of the oocyte as "half of a child": none of the interviewee refers to it this way. Unlike the analogous withdrawal of oocytes, on which the process dwells at length, patients do not linger on the "withdrawal" of semen: this is considered almost pornographic, rarely mentioned and with some embarrassment. I would suggest that the role of semen in procreation disappears not only because people are uncomfortable discussing solitary sexuality in a totally desexualized context; it is almost as if its contribution was irrelevant. Unlike the discursively excessive ovum, semen is surprisingly lacking in characteristics, visual qualities and classifications. There is no classification scheme for sperm, as one of the biologists briefly says: "the more motile sperms are chosen from the seminal fluid, and those that have a modified morphology are discarded". The spermatozoon, in the narratives I collected, is immaterial, impossible to classify, not the center of discourse: it is either available or not. This lack of focus on semen is due to a way to conceive paternity as a sort of secondary form of parenthood: as a young man declares about male donation: "motherhood is the fact, fatherhood is always a sort of adoption".<sup>7</sup>

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<sup>7</sup> As stressed by Carol Delaney in a review of the historical "Virgin Birth debate" in anthropology (Delaney 1987), the idea of paternity implicitly mirrors a vision of



The “romance” between oocyte and spermatozoon analyzed by Martin (1991) in textbooks for students in medicine, does not seem to be present in the narratives that I gathered on Icsi and Fivet cases. Once the oocyte is shown through the microscope, detached from the female body, it becomes the main actor of the reproduction process, the semen being always under-narrated. The woman’s body is the stage for a performance where the man’s role is underplayed. The role of male is to fertilize, an essential but paradoxically not “substantive” act: it is the oocyte that “makes” the embryo as the woman “makes” the child. Just like oocytes, embryos too are classified by identical “quality” degrees. There is often a semantic shift from embryo to oocyte: the two terms are interchangeable and the embryo is frequently defined as a “fertilized oocyte”. In the Sicilian context the act of watching reproduction in its material making is definitely shifted toward the “she-gamete”.<sup>8</sup>

#### 4. Visibility and the Process of Interpretation

Reproductive technologies may offer an example of how technology enters into the very process of knowing one’s body, where forms of knowledge-power are produced. In his critical analysis of how and where the truth of the subject is constructed and produced, Foucault (1976) highlighted how, in the era of bio-power, emerging between the end of the eighteenth and the beginning of the nineteenth century, issues surrounding the body and sexuality came to constitute privileged discursive domains. It is a process that was accompanied by the birth of the “natural body” as the object of practice-based knowledge and control. The form of knowledge borne by the field of biology is particularly recent:

Historians want to write histories of biology in the eighteenth century; but they do not realize that biology did not exist then, and that the pattern of knowledge that has been familiar to us for a hundred and fifty years is not valid for a previous period. And that, if biology was unknown, there was a very simple reason for it: that life itself did not exist. All that existed was living beings, which were viewed through a grid of knowledge constituted by *natural history* (Foucault 1966/2002, 139).

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reproduction where “paternity” is not the semantic equivalent of “maternity”, and refers to the idea of “creative act”, as opposed to the maternal “materiality”. On “Virgin Birth” debate, started by Edmund Leach at the end of the sixties, and its relevance for reproductive technologies issues, cfr. also Franklin (1997) and Shore (1992).

<sup>8</sup>On gender issues related to the same research and the difficulties to identify male infertility as responsible of the couple infertility, cfr. Gribaldo (2005).

The discipline of natural history did not set out to segment and probe into nature, but rather to classify living beings: the object, therefore, was not so much nature in the abstract as it was the multiplicity of natural beings. The “living” as an object of modern biology belongs to a more recent episteme.

The very conditions to the development of natural history and modern biology have been dictated by a specific interest in vision as a means of understanding nature, privileging the gaze above all other senses. The representational and classificatory practices of eighteenth century science were based on a process of simplifying and reducing natural elements:

To observe then is to be content with seeing –with seeing a few things systematically. With seeing what, in the rather confused wealth of representation, can be analyzed, recognized by all, and thus given a name that everyone will be able to understand (...)  
(Foucault 1966/2002, 146).

Up to the eighteenth century, classification of the body was based on excluding certain visual elements from representation on the basis of their not being usable, and therefore on a “visibility freed from all other sensory burdens and restricted, moreover, to black and white” (Foucault 1966/2002, 145). If vision has historically represented a privileged path to scientific knowledge in the West (Fox Keller 1990), contemporary visual knowledge, in continuity with those classification and visual representation schemes mentioned by Foucault, presents some novel characteristics with respect to the past. Although Foucault’s analyses remain valid in many ways, it must be noted that an additional shift has been taking place in recent decades concerning the social production of the “natural” body. Technology is literally what reveals the body, recounting what still cannot be known about it. In the contemporary practices surrounding reproductive medicine, nature undergoes further alteration: in addition to being segmented and probed, it is also enhanced, helped, in other words, produced.

Vision of the human body anatomy, via passage through photography and video, returns color to representation and transforms it into an element that is not only about classification but is actually even more aesthetic than were past images. As far as reproductive micro-actors (gametes and embryos) are concerned, the color in question is the fruit of a form of graphical processing that adds elements to the visual image rather than removing them. It is no longer relevant, however, what relationship the color added to photographs of the micro-reproductive process might have to the reality of gametes and embryos – the color does not add information. In addition to seducing the observer’s gaze, the added color allows viewers to distinguish elements and see “better” and, ultimately, to create *ex novo* a new object of vision. New image-related technologies and digital reproduction techniques have led to the emergence of a dis-

course that simultaneously constructs and instructs the visible, wherein images contain and deploy a measure of knowledge and, at the same time, bear an aesthetic dimension (Renaud 1989, 12).

In this way, the video-technologies of reproductive medicine take part in the rhetoric of the natural body and the strategy that Haraway defines as a “technology of vision” (1997) that exceeds the limits of science to preside, in every visual setting – from science and advertising to visual art – over the formation of a symbolic and scientific imaginary about the truth of our existence.

The issue of vision in reproductive technologies has been dealt especially relating to sonographic fetal images. Feminist literature has drawn its history (Duden 1993) and analyzed the consequences for female identity and reproductive choices (Petcheski 1987; Newman 1996; Haraway 1997; Taylor 1998; Mitchell 2011; Rapp 2000). In this perspective, the fetus as constructed by images has been a main object of analysis, a new object of vision, a key player of reproduction.

The visual image of the fetus is like the DNA double helix – not just a signifier of a life but also offered as the-thing-in-itself. The visual fetus, like the gene, is a technoscientific sacrament. The sign becomes the thing itself in ordinary magico-secular transubstantiation [...]

It does not seem too much to claim that the biomedical public fetus – given flesh by the high technology of visualization – is a sacred-secular incarnation, the material realization of the premise of life itself. Here is the fusion of art, science, and creation. No wonder we look (Haraway 1997, 178-179).

The black and white pictures of the sonography have largely been used by anti-abortion campaigns and Petcheski (1987) notes as the image of the human fetus in the amniotic fluid have become an icon reminding the astronaut in the space, a decontextualised abstract figure, independent from the mother’s body. Techno-scientific practices are saturated with visual communication: the inner space of the natural body is constructed as the interstellar space is. Although we watch graphic elaborations and electronically-manipulated pictures, images are displayed (and perceived) as self-evident realities. Around the sixties, the time of emerging sonographic techniques, “‘looking’ was mainly the point, since, as in many medical technologies (and technologies of visualization), physicians seem to have applied the technique before knowing precisely what they were *looking for*” (Petcheski 1987, 65).

The foetus is no longer the primary or sole object of the reproductive technological gaze; rather, it is replaced by the invisible micro-particles of reproduction. Barbara Duden (1993) in a comparative analysis between

the popular pictures by Nillson<sup>9</sup> published on “Life” in 1965 (illustrating a foetus) and another picture series of the same author on the same magazine, 25 years later (illustrating an embryo), detects a push towards abstraction and a much greater readers’ disposition “to see on command”.

By 1990 the illustrative function of the picture has been inverted. In this issue, the pictures confront the onlooker with a cloudy chimera for which one has no simile. Without the instructions from the writer, one cannot read anything into these shapes. Nothing seen, perhaps nothing ever dreamt, gives a clue to what has been photographed here. The text in 1990 is further from one’s experience than that in 1965, but the sentences are more apodictic. We are told what we see; we are told that these clouds and masses were recorded by a scanning ultramicroscope *and* that they represent a human being. Our readiness to see on command has grown tremendously in the intervening twenty-five years. (Duden 1993, 12)

The gap between the two kinds of images that illustrates the shift from the image-fetus to the image-embryo is not only due to the color addition, but also to the impossibility for the image to mean for itself, to be self-evident without a comment, a caption, that goes with the images.

If, as Duden seems to suggest, the question of distance in the present day is crucial inasmuch the image is not *immediately* recognizable anymore – or as Baudrillard puts it, the image is “located at a very special distance that can only be defined as *insurmountable by the body*” (Baudrillard 1989, 34, my translation) – nonetheless the relationship between gaze, technological images and reality can be read in a more complex way.

The operation of distancing and displacement in creating objects of knowledge, as Latour – following Foucault’s suggestions – has stressed about visualization and cognition processes, is decisive in making “immutable mobiles” (Latour 1986), i.e. objects circulating in a potentially endless chain on translation through different actors’ mediations. This process of “inscription” (Latour 1999) involves a material series of acts, images and classifications that gives coherence and continuity to mobile entities. The ethnography of medical reproductive practices can give an example of how this process works. It is exactly through this “risky intermediary pathway” (Latour 1999, 40) within the practices surrounding reproductive techniques (in which professionals’ comments and indications, medical practices, patients’ interpretations and visions are intertwined) that this image/object –not exceptionally alien anymore – is made, becoming the site of considerable emotional, corporeal we could

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<sup>9</sup>The photographer’s pictures are used also in the Hera brief brochure and are hung in the hallway (embryo) and in the operating room (oocyte).

say, investment. What future parents see is not only “life itself” (Franklin 2000) but something that is very peculiar. Here, watching life means watching a unique life, a part of oneself, a virtual child: prospective parents gaze declares its non-objectiveness, bringing its aesthetic, ethical and affective component. This component is crucial in the making of the object of knowledge.

As Perrotta, among others, states: “the use of digital images as evidence in the research practices and communication can bring the non-scientific audience to embrace the idea that these instruments are able to pick up the ‘reality’” (Perrotta 2012, 170). Through the aesthetization process the objectivity of the scientific representation meets the beauty and mystique of disembodied life in its making (Haraway 1997; Lie 2012). It is a process of “entification” based on the use and dissemination of images that “literally make human cell materialize” (Lie 2012, 477). The “reality effect” in the field of reproductive techniques is loaded with investment and emotional involvement inasmuch gametes represent a part of oneself: in particular it is the part that *makes* kinship, regarding the notions of continuity and identity through time.

Nevertheless, this same affection is constantly remarked by the prospective parents to stress the foundational role of the decision to being parents. What makes the relationship between the prospective parent and the “fertilized cell” is not, or not only, biological connection, but it is the choice, the desire and the effort reproductive techniques entail. Therefore, reproductive cells are *everything* to reproduction, but are *nothing* without this emotional and material investment. Gametes represent life, the child, the magic of bio-technology and at the same time they are *just* images.

What seems to make the difference is the work of interpretation, in other words the action played by the patients through which images of reproduction are subject to the choice of emotional and identity related investment.

The relationship between interpretation (or decodifying) and representation is extremely complex; indeed, these two dimensions are constantly present in the microscopic images of the body. The visual experience, so fundamental in contemporary times, is based on the activity of interpreting. As Lury documents, during the nineteenth century there was a marked increase in viewers’ tendency to incorporate and subjectify vision: the simple spectator ceased to exist, giving way to an active observer in that the observer’s eye began to see not only the object itself but also a subjective perception of his or her own vision (Lury 1997).

In this context, the space that images give to explicitation and interpretation opens up avenues for a re-thinking of reproduction through an ambiguous and unpredictable process of interpreting kinship relationships.

If both views, the biomedical one and the one by the prospective parents, keep a close relation with “biological truth” through the device of

vision, I nonetheless wish to stress the agency that is entailed in the gaze: the interpretation needed to give meaning to it and the possible alternative “negotiated reading” (Lie 2012, 482).

The origin of the cells moves to the background: “we think of it as an adoption”, “children are always different from their parents”, how the children will be both physically and in temper is said to be imponderable: the relationship over time is what kinship is primarily made of.

The main issue is how you “live” reproduction, how much love and desire you put into the reproductive process, how strongly you wished to be a parent, which way you *decide to see* the child: as a woman states, “I will see him with a mother’s eyes”. Bio-genetic relation is re-thought through an evidence filtered by emotions, desire, conscious choice. We could say that the evidence itself conveyed by images is virtually resignified.

## 5. Conclusions

The attention of the Sicilians I interviewed to the production of gametes, the dynamics of conception and the visualization of the “reproductive parts” are powerfully affected by processes of constant resignification.

The importance of the visual dimension in narrating reproduction, and the marking of the experiences dimension of the relationship with the offspring are only ostensibly in contradiction with each other. Vision is always referred to in its ambivalent component: truth to disclose, but also partial, deceiving truth, the logics of which can be avoided through the relational job of kinship, where kinship not simply *is*, but *makes*: kinship is, kinship appears, but in the last instance kinship *does* through relationships.

The visual experience of reproduction is characterized by an element that is, and is represented as, *also* corporeal. If “biology is never the full story” (Edwards and Strathern 2000, 160; Edwards 2012) kinship is produced through bodies by a genealogical matrix of crossed lines of visions, practices, substances and stances.

The Sicilians I met could be described as even more “Euro-American”<sup>10</sup> than Anglo-Saxons themselves when defining procreation and kinship: the attention put on the gametes, on the dynamics of conception, on the view of reproductive parts, is all the more present with

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<sup>10</sup> The Euro-American kinship way to conceive reproduction has been analysed in depth by Strathern (1992a, 1992b, 2005), taking on from Schneider’s ethnography on American Kinship (1968). It is a model assuming a direct continuity from social reproduction, physiological conception and sexual intercourse, a model that anthropological literature on reproductive technologies has contributed to consider specific and deeply cultural.

respect to other ethnographic works in the Anglo-Saxon field, which are more focused on the narrative of the experience.

At the same time, the narratives that focus on the plasticity of the discourses linked to the construction of parenthood all belong to a post-modern Euro-American thinking. A reflexive attitude emphasizing prospective, vision, knowledge, desire and choice has become the main feature of discourses on the body, gender and kinship relations: the decreasing relevance of the concept of nature in favor of a reflexive dimension constitutes the trade mark of post-modernity (Franklin *et al.* 2000).

The people that I met during this research take very seriously the techniques as a valued space of science and knowledge: as put forward by a young lady of a small village of inner Sicily, involved in the public debate on assisted procreation: “We are not like those that make babies without even knowing how it works!”.

Through lingering on the “facts of nature”, talking extensively about reproduction and what happens *inside* nature, prospective parents stress, more or less consciously, the core issue. It is exactly that ongoing process of object-making – producing the “readiness to see” mentioned by Duden, that nevertheless requires a comment – that has to be re-thought. In this respect, vision, evidence and interpretation are metaphors “good to think with”, into a complex network of translations.

Knowing and watching reproduction through “bio-aesthetics” means getting the chance to manage and to produce contested possible spaces of agency, making up new different and unexpected comments and interpretations in the supposedly unquestionable domain of nature.

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# Neither Gametes nor Children

## Italian Prospective Parents and the Variable Meaning of Donor Embryos

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**Abstract** “Sperm donation”, “egg donation”, “double donation”, “embryo donation” and “embryo adoption” are the main terms that prospective parents in Italy employ to refer to donor reproductive practices, which are forbidden within Italian national territory since 2004. Italian residents who think of donated gametes or embryos as viable ways to parenthood currently need to address assisted reproduction centres abroad. Drawing on a four-year ethnographic research on Italian cross-border reproductive travellers approaching donor conception, this paper aims at investigating the ways in which prospective parents choose and make sense of different kind of donation practices that consist in the use of donor embryos and explores their understanding of such practices with reference to the notions of personhood and parenthood in a context of transnational reproduction. In particular, this paper explores how they make sense of different “histories” of embryos, included the way in which reproductive cells have changed owners according to different trajectories.

**Keywords:** Italy, cross-border reproductive care, embryo adoption, embryo donation, donor conception.

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### I. Introduction

Since February 2004, when the first Italian law on assisted reproduction, known as Law 40, came into force, Italian residents who aim at becoming parents with the use of donor gametes and embryos have to look beyond national borders and to possibly seek assisted reproductive treatments abroad. Donor conception was, in fact, banned by this law, on the basis of principles such as the protection of heterosexual family unity and the right of children not to be abandoned by their genetic parents.

Strenuously supported by the Catholic Church and catholic “pro-life”

movements, which heralded the law as a necessary step to put an end to the perceived reproductive “far west” (Hanafin 2006) which at the time hold sway over Italy, the law explicitly introduced a particular protection of the *concepito*<sup>1</sup> that was new to Italian existing jurisprudence.<sup>2</sup> Among the most important novelties brought in by this law, there was the ban of cryopreservation of embryos which had been normally performed by Italian fertility centres before.

The destiny of these already cryopreserved embryos has sparked an interesting discussion that has brought to the forefront the different understandings of life, right, ownership, human dignity, kinship and progress, and transformed the fate of these embryos into a matter of contention around which different legal, medical, political and cultural perspectives have clashed.

In July 2004, a Ministerial decree established that all fertility centres storing cryopreserved embryos were compelled to contact all the people whose assisted reproductive treatments produced such embryos and ask them whether they wanted to keep them stored for transfer or relinquish them. All the relinquished embryos and all those for which no answer was received were to be considered *in stato di abbandono* (“neglected embryos”). The decree gave instructions to establish a National Biobank at the “Ospedale Maggiore” in Milan where to store all the cryopreserved embryos that had been declared *in stato di abbandono*.

Despite the around 450.000 Euros which have been so far spent to make a census of these embryos and to prepare the National Biobank, no embryo ever joined the Biobank. In 2010 a special commission called by the Ministry of Health with the task of examining the possibility of finally transporting these embryos to the National Biobank recommended against this operation, claiming, among other reasons, the high risk of legal cases and the high cost of transportation. Moreover, since 2009, a verdict by the Constitutional Court indirectly opened up again to cryopreservation of embryos, leading to a continuous increase in the number of stored embryos and fuelling the large debate about the ways in which embryos are to be considered ethically and from a juridical viewpoint. As a result, no decision has been taken yet regarding the relinquished cryopreserved embryos stored in the fertility centres all over Italy.

While this debate has been going on in the public sphere, where dif-

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<sup>1</sup> A detailed definition of *concepito* (conceived being) is lacking both in the text of the law and in the ministerial guidelines. This is alternatively referred to as “embryo” and “baby-to-be” (*nascituro*) according to the context.

<sup>2</sup> Among the measures introduced, there was a limitation on the access to infertile heterosexual couples of age; the prohibition of fertilizing more than three ova and of withdrawing from consent after the embryos were produced; and the obligation to transfer all embryos that were produced at any cycle immediately and at once. In addition, the law hampered the performance of preimplantation genetic diagnosis, ruling that no selection of embryos was allowed.

ferent ontological status of embryos have been confronted and different possible uses of existing cryopreserved embryos discussed, a number of Italian prospective parents seeking donor conception practices have privately embarked on reproductive travels abroad. Being exposed to different procreative options, including the use of donor gametes and embryos, they have produced their own understandings of both reproductive cells and embryos and brought about different narrative and practical ways to accomplish their own parental project.

By focusing on Italian prospective parents who address donor conception practices as cross-border reproductive travellers, this paper aims at presenting how the intention of becoming parents and the choice of addressing donor conception interact with people's understanding of reproductive cells and embryos as part of their parental project. In particular, this paper does so by exploring the cases of Linda,<sup>3</sup> a single woman, and Camilla and Michele, a heterosexual couple, who are exposed to the option of employing donor gametes and embryos for their own reproductive purpose at different points of their reproductive experience. These people's approach to what they call "embryo donation" and "embryo adoption" is analysed in order to highlight the "boundary-making practices" (Barad 2003) by which a shift in the ontology of gametes and embryos is operated by prospective parents during their assisted reproductive experience.

## 2. Donor gametes and embryos

Several terms may be employed to describe practices involving the use of donor gametes and embryos and their use is yet another marker of the different moral, legal, medical and social concerns that surround donor conception. Donor conception is a general expression that refers to the practice of conceiving children with the use of reproductive cells coming from people who do not plan to participate in and are not allowed to take on any legal or social parental role with regards to children who will be born from this act. Donor conception practices include a rather vast array of techniques that go from non-clinical sperm donation to clinical sperm donation, egg, and embryo donation.

Non-clinical sperm donation may be self-arranged by women who make informal arrangements with male friends or other male donors who provide their semen for insemination outside the clinical settings. This practice is known as being especially common among lesbians (Nordqvist 2011; 2012) since the 1970s (Luce 2010). In clinical sperm donation, and in medicalized donor conception in general, donors are recruited by sperm banks and/or fertility centres, who organise collection of sperm

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<sup>3</sup> All the names that will appear in this paper are pseudonyms.

and retrieval of eggs within clinical settings and play as mediators between donors and recipients, managing both technical and legal relationships among the parties and actively participating in the “ontological choreography” (Thompson 2005) that makes the transfer of reproductive cells from one subject to another productive of new kinship realities.

While conception with donor sperm may occur both through insemination, namely the insertion of semen in the woman's womb, and through *in vitro* fertilisation (IVF), which consists in the fertilisation of eggs in a petri-dish, conception with donor eggs necessarily requires IVF. In sperm donation, sperm is usually cryopreserved at the time of collection and thawed at the moment of insemination or IVF, while in egg donation, eggs are preferably fertilised immediately after being retrieved. In both cases, the embryos that result from IVF are either transferred in the womb of the prospective mother or surrogate, otherwise cryopreserved in order to be thawed and possibly used some time in the future.

Individuals and couples may have access to conception with donor reproductive cells under different rulings which control recruitment and match of donors and recipients and the ways in which information may circulate among all the actors involved in the process. Sometimes, recipients may ask to attain conception with both donor sperm and eggs. In these cases, they may be offered to choose what kind of embryos they prefer to be transferred.

Embryos that are available for donation may be fresh or cryopreserved embryos that result from the combination of sperm and eggs produced by donors who were separately recruited (*ad hoc* embryos) or have been stored in behalf of individuals or couples as a result of some previous treatments and appointed for being given to other prospective parents (relinquished embryos). Such practice, which we will refer to as embryo relinquishment (Blyth *et al.* 2011) emerges from the combination of clinical protocols, regulations and negotiations between prospective parents and doctors, which aim at reducing the risk of multiple pregnancies while maximising the chance of safe pregnancies and living births and the possibility of cryopreserving unused embryos for successive implantation. Afterwards, prospective parents may be asked to take a decision about unused cryopreserved embryos and are usually offered to choose among four main options, which consist in (1) keeping the embryos stored; (2) allowing their destruction; (3) giving them away for research; (4) or donating them to other prospective parents. In some cases, the embryos that individuals or couples decide to place for donation after having undergone their own treatments may have not been produced with their own reproductive cells but rather with donor sperm and/or eggs.

The availability of such options and their applicability depends on different national or local legislation or on clinics' policies.

### 3. The variable meanings of reproductive cells and embryos

Fertility centres are places where human reproductive cells are isolated, manipulated and stored in order to fabricate parenthood. In these reproductive medical settings an “ontological choreography” (Thompson 2005) takes place every day to transform the coexistence and interplay of ontologically different kinds of things into actors of a highly coordinated dynamic process that produces parents, children and kinship. Sperm, eggs and embryos are expected to play crucial roles in the accomplishment of such choreographic goal and the time and way in which these entities enter and take part to the process represent important elements in defining these roles. Reproductive cells and embryos are given special meanings and are manipulated in different ways according to the purpose of their use and to social and cultural contexts (Almeling 2006; 2007; 2009; 2011; Franklin and Roberts 2006; Franklin 2006).

In sperm and egg donation practices, reproductive cells by donors are forced into an evaluation and manipulation process that makes them especially suitable for reproducing prospective parents. This process involves measures of de-substantialisation and re-substantialisation (Bestard and Orobigt 2009) of gametes and consists in depriving donated reproductive cells of their original meaning as kinship-carriers (desubstantialisation) and in re-conceptualising them as substances which allow kinship to take place (resubstantialisation). In other words, donor gametes are recognised as substances that do not carry kinship ties but make kinship ties possible.

The selection and manipulation of gametes by sperm banks and fertility centres contribute to this process inasmuch as they generate new products that are proposed to their clients and patients as untied and highly specialised body parts. These products are “technosemen” (Moore 2007) and eggs which are presented to the public as especially selected gametes, which have been prepared to enhance the chances of healthy conception.

The circulation of reproductive cells through medical donor conception is affected by and affects the ways in which people think of and address donor conception as a reproductive and parental project. Rene Almeling (2007; 2009; 2011) has argued that economic, cultural, structural factors interact in shaping the market of reproductive cells as they lead to a different evaluation of reproductive cells and reproductive bodies in unexpected ways. Although both sperm and eggs are equally needed to produce embryos, in fact, they have attached a different economic value according to located cultural norms. Speaking about North America, Almeling observes that reproductive cells are especially turned into means to market and purchase “visions of middle-class, American femininity and masculinity and [...] motherhood and fatherhood” (2007, 336). Moreover, reproductive cells may be expected to carry race and ethnicity (Almeling 2007; Fox 2009; 2011; Moore 2007; Tyler 2007) and their circula-

tion between donors and recipients be affected by or/and organised according to these principles (Khan 2000; Nahman 2006; 2013; Thompson 2005) in order to reproduce (or avoid to reproduce) supposed race or ethnic phenotypical and ontological characters.

More than simple combinations of separate egg and sperm, embryos are considered “good spokesperson[s]” to shed light on the “enduring tension between the sacred and the profane that characterize biomedicine” since the treatments and understandings of embryos account “for patterns of interactions that together make up a 'biomedical mode of reproduction'” (Thompson 2005, 247). In the context of assisted reproductive technologies (ART), embryos may be considered “protopersons or even full persons by some people at some times in some places, when they are maintained by certain kinds of equipment” (Thompson 2005, 250). Although they are manipulated and stored as “material objects” (Thompson 2005, 259), in fact, they may be considered as sacred entities insofar as their viability represent intended parents' possibility of becoming parents and allude to the future child's possible future life. The same embryos may stop being reproductive and loose their sacred character when they are not considered as leading to a pregnancy any longer. In this case, they may be seen as viable but not reproductive entities and may be used for research. In other cases, like in Catholic doctrine, embryos remind of religious sacredness independently of their reproductive potentiality. In Catholic religion, in fact, human embryos represent the sanctity of human life and cannot be used or manipulated in any way.

In fertility centres, prospective parents are expected to take decisions about the embryos that are created or are assigned to them throughout their own treatments. In agreement with their practitioners they take decisions about the embryos that are transferred and are asked to choose what to do with the remaining ones.

In particular, some fertility centres offer the possibility of giving one's own embryos away for other people's family building purposes. Studies about disposition decisions by prospective parents concerning their unused embryos show that “relinquishment of embryos for family building is frequently -although not invariably- the least-favourite alternative” (Blyth *et al.* 2011, 267) among those offered by the centres.<sup>4</sup> Moreover, people's declared intentions on this subject seem to differ from their actual behaviour, resulting in a much lower number of relinquishments for family building than what expected.

Chantal Collard and Shireen Kashmeri (2009; 2011) illustrate that the question of the use of other people's cryopreserved embryos in assisted reproduction is a problematic one not only because it brings back to the moral and ethical contentious around the definition and disposal of “life”

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<sup>4</sup> Blyth *et al.* (2011) review existing literature on the matter, published between 1995 and 2010 and concerning studies undertaken in Australia, Belgium, Brazil, Canada, Denmark, France, Germany, Italy, Spain, Switzerland, UK and USA.



(Franklin 1997) but also because it challenges the very ontology of kinship. The ethnography by Collard and Kashmeri focuses on the participants in a particular program of assisted reproduction with donor embryos which is based on the assumption that prospective parents who have unused embryos from their own reproductive treatments put them at the disposal of other prospective parents and call it an “adoption” of embryos. This captivating work on the “embryo adoption” program called The Snowflakes® run by the Californian Nightlight Christian Adoptions sheds light on the ways in which “placing” and “adopting” embryos, parents make sense of their adherence to the program and show how they mobilise different logics for supporting the circulation of such embryos.

In particular, a comparison between this ethnography and that by Elizabeth Roberts (2007) in fertility centres in Ecuador, highlights that different logics work in favour and against relinquishment or destruction of embryos by prospective parents. Roberts argues that instead of being only “embroiled in the politics of life” (Roberts 2007, 182), embryos may be subject to different understandings. Especially, two different rationales emerge in the context of possible embryo relinquishment, one supporting life ethics, which considers embryos interchangeable living beings, and the other supporting kin ethics, which imagine embryos as belonging to a given network of kinship relationships. This last logics is, according to Roberts, the one that leads some Ecuadorian to throw out embryos instead of cryopreserving and giving them away, on the basis that these were rather “conceptualized as 'family members' who required protection from temporal discontinuity and uncontrolled circulation beyond family boundaries, not as 'life' to be preserved.” (Roberts 2007, 182). Collard and Kashmeri (2009) observe a different scenario, where prospective parents draw both on life ethics and on kin ethics in order to support their decision to “place” their embryos for adoption, considering embryos their own “potential preborn children”, for which they need to find another worthy family. Eric Blyth and colleagues (2011) account for studies whose findings confirm that both attitudes are present in different national contexts.

Interestingly, Christopher R. Newton and colleagues (2003, 883) observe that people who are more likely to relinquish their cryopreserved embryos for family building tend to consider their act as part of a process of “embryo adoption” instead of a “traditional medical donation”. Blyth and colleagues (2011) agree that the model of gamete donation does not fit embryo relinquishment for family building as motivations and perceptions of the people who create the embryos may be very different. They conclude that, although different ways of understanding embryo relinquishment coexist, the majority of people participating in existing studies mobilise kin ethics more than life ethics when making disposition decisions about their embryos.

For what concerns prospective parents who receive embryos relinquished by other people, Collard and Kashmeri (2009) illustrate that life

ethics and kin ethics are differently combined in the approach by embryo receiving parents of their population. In fact, receiving parents seem to be still moved towards these embryos by a life ethics, as they declare to be interested in preserving “life” of embryos. Nevertheless, they result less keen to maintain close live kin relationship with “placing” parents and biological siblings.

Other studies about prospective parents using already cryopreserved embryos in the UK compare the way in which these parents relate to donors to the ways in which infant adopting parents relate to children’s biological parents (McCallum 2009) and the ways in which parenting criteria change for embryo receiving parents and infant adopting parents (Widdows and MacCallum 2002). The main result of such studies is that less interest for donors is demonstrated by embryo receiving parents than the interest in biological parents shown by infant adopting parents and that pregnancy constitutes a crucial biological argument that supports activation of kinship for embryo receiving parents.

The accurate contribution of these studies opens up interesting routes for more exhaustive research about embryo reception, which is presently lacking especially because of the low number of people who address donor embryo conception in comparison to the number of those who address single gametes conception; the prohibition of such procedure by many legislations; the difficulties that are encountered in many countries and centres to support this practice; and the relatively recent appearance of “embryo adoption” programmes. Further research on this topic is strongly needed for a more comprehensive understanding of kinship formation processes in contemporary societies.

#### **4. Methodology**

This paper draws on a four-year research project (2007-2011) focusing on Italian residents in different stages of their reproductive experiences abroad. This investigation was based on multi-sited ethnographic work (Marcus 1995) and comprised recorded in-depth interviews and life stories, unrecorded informal conversations, blogs, on-line diaries and forums. It finally involved, in particular, 24 cases, among which there are single women, heterosexual and same-sex couples living in different parts of Italy. Unfortunately, no single men have responded to any call to participate in this study. Informants were contacted through specialized websites and online forums, homosexual family associations, word-of-mouth advertising and during a 1-month ethnographic stay in a private fertility centre in Barcelona, where incoming Italian patients were interviewed. When possible, both partners were interviewed separately; in other cases, they participated jointly in interviews, and some women in heterosexual relationships were interviewed without their partners. Recorded interviews were held at people’s homes, at the author’s home and

in the fertility centre while informal conversations occurred in various circumstances. All people had an experience of donor conception reproductive assistance at one point in their life.

For the purpose of this paper, two of these cases are especially presented in details, as they illustrate how two similar experiences of embryo reception may lead to different understandings of embryos within the reproductive process. The choice of presenting a deep analysis of these very cases reflects the intention of retracing the process through which prospective parents may relate and take part to the ontological shift that characterises gametes and embryos in the context of donor conception and, in particular, of unpacking the complex intertwining of elements that characterises different reproductive experiences of donor embryo reception for procreative purposes.

## **5. Embryo reception: an affordable and suitable way to parenthood**

All the people who have taken part in this study consider to become parents through assisted reproduction only after having gone through what they describe as a confusing, challenging and sometimes very hard time when they realised that their chance to have a child through (hetero)sexual intercourse was very little or non-existent (because of medical reasons, marital status or sexual orientation). Turning to assisted reproduction corresponds for all of them to engage in a reflection about the meaning of parenthood and to evaluate in what way ART and donor conception may affect their chance to become parents, both at statistical and symbolic levels (Becker 2000; Gribaldo 2005; Thompson 2005). In particular, people embark on a reproductive process where they become parents through a constant negotiation between every technical and clinical procedure they are proposed or come across and their expectations about what moral, cultural, biological and social elements might constitute parenthood. Camilla and Michele and Linda do not constitute an exception. Their cases are presented below as they represent two interesting examples of reproductive strategies where the use of already cryopreserved embryos is valued and differently perceived.

Around the age of 20 Camilla is diagnosed with endometriosis and learns that she will probably need to address assisted reproduction to have babies. In 2005, she and Michele receive the news that he presents a chromosomal translocation, which makes conception very difficult. Although being suggested to address immediately donor conception abroad, Camilla and Michele want to try to conceive with their own gametes.

Camilla feels that the same kind of relationship should link her and her husband to their future child and thinks that this might be reflected genetically in the fact that both or none of them provide their reproductive cells. The use of donor sperm and Camilla's eggs would have jeopard-

ized her attempt to respect this principle.

In need of a preimplantation genetic diagnosis (PGD)<sup>5</sup>, which is not performed in Italy at the time, Camilla and Michele decide to contact a well-known fertility centre in Belgium. They fail two treatments of PGD with their own reproductive cells and turn to donor conception. In the meantime, they take infant adoption into consideration, but they finally abandon it, because Camilla is convinced that the pain of infertility may better be overcome with a pregnancy:

[In adoption] the main subject is not you, it is the child. And I wasn't feeling enough strong to deal with it. [...] And we, as a couple, were not ready for it. [...] I got a picture about it, maybe I am wrong, but I got this picture that adoption [...] does not repair this wound that you have inside. And why? I have seen many mums and dads of children from donor conception or from ART anyway [...] and in front of other people's pregnancies they felt healed. [...] Then I saw two episodes where...for example my aunt, she got an adoption that is really, I mean, she is grateful day and night, she has been so happy, she had a national adoption of a 20 days healthy little-girl [...] she had so little problems, my cousin is wonderful [...]. But when my other aunt has recently got pregnant of her second child, she said something stupid about her pregnancy [...] and the other aunt started crying. And I thought: maybe this feeling does never go away.

Camilla speaks about infertility as a disease and understands pregnancy as an experience that might heal the pain provoked by such a condition. Prospective parents approaching ART tend to consider pregnancy a first important success of their reproductive treatments (Thompson 2005). Pregnancy may represent the success of their reproductive project and hopefully evoke the accomplishment of their parental plan. Moreover, some women describe it as an experience that rehabilitates their body as a reproductive body after that infertility has challenged their reproductive expectations and called into question their perception of gender in relation to reproduction (Becker 1997; 2000). Camilla is one of them. She believes that pregnancy might make up for the deep sorrow and the feeling of inadequacy and helplessness that infertility has provoked to her while infant adoption might not have the same effect.

Camilla comes to the conclusion that trying to get pregnant with the use of donor eggs and donor sperm would be a better choice for her than both infant adoption and sperm donation, as it would guarantee that the child is equally genetically unrelated to both parents and she would not be deprived from the experience of pregnancy.

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<sup>5</sup> Preimplantation genetic diagnosis (PGD) refers to the "screening of cells from preimplantation embryos before transfer, for the detection of genetic or chromosomal disorders" (Zegers-Hochschild *et al.* 2009).

Linda, on the contrary, does not have the same understanding of pregnancy and would prefer to access infant adoption rather than seeking donor conception abroad. At the age of 44, Linda decides to have a baby as a single mother and, unfortunately, she is excluded from infant adoption by the Italian adoption law, which allows infant adoption only to heterosexual stable couples.<sup>6</sup> Linda puts forwards her understanding of parenthood as being neither biologically nor genetically defined:

Well, I deeply believe that parenthood doesn't have anything to do with genetics... moreover I think that the case of children who are exchanged in the cradle is something that can happen and that until somebody tells you that the one who grew up with you as your child is not your child nobody would think it, and I don't think that this would lead to love him less than what you do. [...] I don't consider a donor-conceived child different from your genetic child, in the sense that a child is a child and that's it, either if she/he comes from assisted reproduction, or in a natural way, or as an adopted child, a child is a child, in the sense that she/he is someone you take care of. [...] If could, I would have adopted a child in the first place.

The ban of donor conception in Italy leads Linda to explore the possibility of seeking reproductive assistance across national borders. Before leaving for treatments, she collects information about different destination options in Europe. In the meantime she sees a gynaecologist who assures her that she may try some treatments implying the use of her own egg cells. Linda reads statistics about success rates which make her think that at her age a simple donor insemination would not give her many chances to get pregnant and that she would need to apply for *in vitro* fertilisation (IVF).<sup>7</sup> Linda likes this option and contacts a fertility centre in Belgium. In the end she considers it too expensive:

If I had a lot of money I think I would have tried with my own genetic material. But I was forced to choose: I mean, either I did one attempt like that and that was it, or, if I wanted to have the chance to try at least two times, then I had to try in another way.

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<sup>6</sup> Italian law on infant adoption (Law 149, 28th March 2001) identifies only four special cases where singles can access infant adoption - excluding the case of death of one spouse after adoption has been already authorised. These include cases where (1) a parentless minor is linked to an adult by kinship or by a stable and long-lasting relationship; (2) the minor is the child of one's spouse; (3) pre-adoptive foster care is impossible; or (4) the case where a parentless minor presents a physical, mental or sensory disability.

<sup>7</sup> IVF, *In vitro* fertilization: "an ART procedure that involves extracorporeal fertilization." (Zegers-Hochschild *et al.* 2009). In this procedure, sperm and eggs are put in a petri-dish, where they are expected to unify and produce embryos.

Like the majority of reproductive travellers, Linda must pay for the treatments abroad herself, because reproductive assistance abroad is not covered by national health insurance. As a result, the cost of treatments affects people's choice not only about possible destination countries (Inhorn *et al.* 2012; Zanini 2011) but also about the kind of treatment they decide to apply for. Linda is very much concerned by this dynamic. She judges the almost € 5000 asked by the centre in Belgium too burdensome and decides to address another centre in another country and another reproductive route, hoping in a cheaper offer. She realises that renouncing to the IVF with her own eggs and turning to the use of embryos that have been left from other people's previous treatments may cost much less and possibly increase her chances of getting pregnant.

Managing one's own or the couple's budget in order to optimize every assisted reproductive attempt is crucial to all prospective parents who address private fertility clinics and to reproductive travellers at the point that economic factors may deeply affect the technical and symbolic process through which people become parents (Inhorn *et al.* 2012; Zanini 2011). Linda finally turns to a procedure that she calls "embryo adoption" in Czech Republic, finally spending around € 1500, including all the expenses (i.e. medical exams, travels and accommodation).

Camilla and Linda eventually aim at getting pregnant using other people's reproductive cells, because they believe that this option may make them parents in an affordable way that all in all respects their understanding of parenthood. In particular, Linda appreciates embryo reception for its similarities with infant adoption while Camilla finds in embryo reception a response to her need of experiencing pregnancy and of creating equivalent genetic distance between her, her husband and their children.

## 6. Embryos as kinship carriers

The decision by Camilla and Linda results in the transfer into their womb of embryos which are created through IVF with the use of other people's reproductive cells. However, the way in which they think of these embryos and relate to the treatments that they are undergoing is different.

Linda chooses a procedure that consists in using relinquished embryos which are cryopreserved and stored in a clinic in Czech Republic and calls this practice "embryo adoption". This choice recalls the experiences described by Collard and Kashmeri (2009; 2011) where "embryo adoption" is a specific programme that proposes the use of embryos that are relinquished by prospective parents for other prospective parents' family building projects. Nonetheless, Linda's reproductive treatment is not advertised in such terms by the fertility clinic that she addresses and Linda is the responsible for this calling. Interestingly, though, she is not moved

towards these embryos by a “life ethics” but by the affordability and accessibility of this procedure in comparison to others. Differently from the people interviewed by Collard and Kashmeri, Linda does not think of these embryos as of “potential preborn children” (Collard and Kashmeri, 2011, 308) to bring to life and does not share the decision by the Italian Ministry of Health to call such embryos “neglected embryos”. When I meet Linda after her first successful treatment with cryopreserved donor embryos in Czech Republic, she is very clear on this point:

An embryo is nothing, and it is me saying that and I have one in my belly, but it is a clot of cells. According to me “life” is something else.

Although Linda does not consider embryos as living human beings, she has multiple feelings about embryos representing her chance of becoming mother. One day Linda is told by the centre in Czech Republic that two cryopreserved blastocysts are ready for her treatment. In embryology, blastocyst represents a certain stage of embryonic development that corresponds to an embryo of around 150 cells after approximately five days from egg fertilisation (Concise medical dictionary 2010). Prospective parents are often very eager of information about the embryos they will be transferred (Thomson 2005; Gribaldo 2005) and the stage of development of embryos is something they may want to know. After being told about the availability of embryos for her treatment, Linda feels so much that her own reproductive process has started as to feel already pregnant:

Well, the third of December I got the e-mail saying: “There are two blastocysts”...that are extremely small things, but, in my head, it was as if I was pregnant from that moment. In the same day, then, in the night I had a phone call with a friend of mine who was telling me that she was pregnant and I told her: “me too!”

Some months later, though, Linda gets the same embryos transferred and does not feel that seeing these embryos generates a sense of motherhood:

I saw my blastocysts, because they let you see them. They told me: “these are your blastocysts” and I said, laughing: “They are really nice!”, because you only see two small dots in the fog. No instinct of maternity turned on in me, nothing at all... you see two little dots. That’s it.

The difference made by Linda between considering herself pregnant and developing an “instinct of maternity” in front of the embryos that she will be transferred sheds light on the meaning that she attaches to embry-

os in her own reproductive experience. On the one hand, in fact, acknowledging the existence of the embryos for her treatment leads Linda to project herself into pregnancy, which she considers the next step of her reproductive experience. On the other hand, this is not sufficient to make her feel a mother, as the reproductive process that she has undertaken has not come to an end yet.

Moreover, as seen, she defines parenthood according to intentionality, love and care rather than by genetics or pregnancy. Linda values embryos in the same way in which she values reproductive cells and pregnancy for the indispensable place these occupy within the reproductive process that she has undergone and confers all of them the power to lead her to parenthood. On the contrary, she does not think of embryos as of her own children-to-be since she does not perceive the ontology of embryos as being related to personhood. Embryos are rather understood as necessary steps towards kinship formation.

Consequently, Linda's reference to her treatment as to "embryo adoption" seems to evoke infant adoption in relation to the non-genetic ties that will link her to her donor-conceived children and to the model of parenthood that is relevant to her.

Camilla and Michele make three attempts of assisted reproduction with embryos created with other people's reproductive cells and, in particular, two with *ad hoc* embryos and one with embryos which are stored in a fertility centre in Spain. They do not do it for "life ethics" either, since they do not attribute "life" to *in vitro* fertilised embryos. Instead, Camilla places the boundaries of "life" in other moments of embryonic development:

Having a child in your womb. [...] Everyone has his own limits, science has 14 days, Catholic people have the moment of conception, to me [...] from the moment in which the embryo has implanted into the uterus it is life.

A the moment of implantation<sup>8</sup>, which is also the moment in which pregnancy can first be technically detected and medically confirmed, the ontology of embryos changes for Camilla from being the development of the combination of reproductive cells into potential living human beings. People's concern about embryos possibly being and meaning "life" refers to public debates going on in Italy, where a growing form of "vitapolitics" (Hanafin 2006) mobilises embryos to ontologically signify "life" in relation to immortality and survival and embryos are recognised rights as unborn coming citizens (Hanafin 2006; 2007; Fenton 2006).

When it comes to experience, though, Camilla finds that blastocysts have some human character even before being implanted in the womb:

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<sup>8</sup> Implantation means "the attachment of the [...] embryo to the lining of the uterus" (Concise Medical Dictionary, 2010).



And then [the doctor] showed us [the blastocysts] on the monitor and this was the first time we saw them and, I swear, seeing blastocysts is striking because, I don't know [...] They make something to me that...they seem already human, I don't know how to explain it, [...] they have some aesthetic consistency, [...] and my God, when I saw them on the monitor, I said... well, it seemed to me that they were staring at me. It really seemed they were staring at me.

Linda and Camilla show that prospective parents may have very different reactions in front of embryos and especially in relation to their belonging to the domains of life, humanity and kinship.

None of them openly addresses the question of embryonic personhood (Thompson 2005, 250) but they both state that embryos outside the womb are not “life”. However, the ontological nature of embryos remains different to their minds as they do not agree about the very moment in which embryos shift their status from cells into “life” and about embryos in relation to humanity. Camilla argues that embryos turn into “life” at the moment of implantation in the womb but she recognises some kind of human character in the embryos that reach a certain stage of development even outside the human body. On the contrary, Linda never refers to embryos as “life” or human entities and refuses to do so.

In the meantime, both Camilla and Linda value embryos as potential kinship carriers insomuch as their use may lead to the accomplishment of their reproductive plans and parental projects.

The very process through which each embryo created with other people's reproductive cells produces kinship, though, is a concern for prospective parents, who elaborate on this point especially taking into account the “history” of such embryos and of the people who provided the reproductive cells.

## **7. Disambiguating kinship**

Linda feels comfortable in referring to the treatment that she has undergone as to an “embryo adoption” without knowing who were the people who provided the gametes. Differently, Camilla changes her attitude towards using embryos created with other people's reproductive cells according to who these people are and to the ways in which embryos are made available. She applies three different terms to what she perceives as three possible scenarios that prospective parents choosing this option may confront. These terms are “double donation”, “embryo donation”, and “embryo adoption”. Camilla distinguishes these practices on the basis of the following principles: whether the people who provide the reproductive cells have undergone reproductive treatments themselves or not; whether other embryos created with the same people's reproductive

cells have been already used for procreative purposes or not; and whether embryos are stored in fertility clinics or not yet created at the moment in which prospective parents decide to enter treatments.

Camilla calls “double donation” a programme in which prospective parents approach a fertility clinic where an egg-donor is recruited to provide eggs for fertilisation with donor sperm and *ad hoc* embryos are made available for possible immediate transfer and/or for cryopreservation and future transfer. With “embryo donation” she refers to the possibility for prospective parents to access the embryos that have been cryopreserved by other prospective parents during what she calls a “double donation”. Finally “embryo adoption” is the term that she uses to allude to prospective parents who receive embryos that have been created during the assisted reproductive treatments of other prospective parents with their own reproductive cells or with donor gametes.

Camilla and Michele exclude the last option and address the other two in different moments of their reproductive experience, travelling first to Belgium and then to Spain and to Czech Republic. When I ask Camilla where the cryopreserved embryos that she is transferred in the fertility centre in Spain come from she answers:

Ours is an embryo donation with cryopreserved embryos, because they come from a donor who did egg sharing, so probably half of the eggs had gone to a couple who had fresh embryos with the sperm of the husband, while the other half were fertilised with sperm from the sperm bank by the fertility centre, which kept them stored and gives them away for double donations. [...] When I started reasoning about it I had thought that taking embryos from another couple was more...ethical, let's say. It made me feel better, instead of having an egg-donor [...]. But then there are other problems coming up like [...] you set your mind on the idea that your child has siblings around, who are 100% blood relatives. According to me this would have been difficult, psychologically I mean, in the sense that... in order to make me feel better I would have put my child in a messy position. And then those who undergo assisted reproduction have always problems, so there was much more chance to run into [...] a woman with endometriosis like me, so I was a bit afraid.

According to Camilla, the embryos that she and Michele are given in Spain have been created by the fertility centre from donor eggs and donor sperm that had never been combined together before, with the purpose of cryopreserving them for upcoming prospective parents. Interestingly, these embryos cannot be called *ad hoc* embryos nor relinquished embryos. Camilla prefers this option to the possibility of getting some embryos which were relinquished by other prospective parents and perhaps created with these people's own gametes.

In fact, Camilla is afraid that the embryos which have been relin-

quished by other couples may share their genetic material with other existing embryos or children. Moreover, she does not feel comfortable with the fact that the embryos had been produced for the reproductive intention of other prospective parents. On these bases, Camilla imagines the potential children resulting from implanting these embryos to have some genetic siblings somewhere and to share with them some sort of family history. Consequently, she evaluates that the option of getting an embryo that was left over by another couple would put the child possibly resulting from that embryo in a complex psychological condition and in a difficult position in relation to potential existing siblings and finally chooses against it. Moreover, she fears that the child may have some bad health condition if resulting from reproductive cells by infertile prospective parents under treatment.

Drawing on the assumption that making children is, for parents, to be recognised as parents (Bestard *et al.* 2003) and that fertility centres are places where parents are made (Thompson 2005) through a complex combination of practices, symbols, technologies, performances, knowledges and actors, we may say that considering a particular procedure not suitable for the development of one's children is probably not satisfactory for the production of parents either. The choice by Camilla and Michele reflects, in fact, their preference for a reproductive experience that benefits as much as possible from the enactment of biomedicalized anonymous donor conception which aims at disambiguating kinship relationships among actors involved in the reproductive process by keeping them at distance and mediating their relationship to each other. Fertility centres play an important role of mediation between donors and recipients (Orobitg and Salazar 2005), since they act as warrants of reciprocal reliability and anonymity (where necessary) and promote a process of de-substantialisation and re-substantialisation (Bestard 2004) of gametes. To describe this effect, Irene Théry (2011) proposes the expression *don d'engendrement* (gift of begetting) to highlight that what is given away by donors and taken on by prospective parents in the process of donor conception is not only reproductive cells, but rather the chance of giving birth to and fathering a child through the use of donor's reproductive cells.

Camilla and Michele opt for a procedure that, although involving the use of stored embryos, emphasises the role of the fertility centre in the creation of these embryos, resetting to zero any parental intention on the part of those who provided reproductive cells and counting on two anonymous donors whose gametes had never been combined for any reproductive purpose before. Camilla and Michele choose on purpose a procedure that excludes the presence of other potential prospective parents promoting the production of these embryos. Before and after this experience in Spain, they did and are going to do the same accessing what Camilla calls a "double donation" first in Belgium and then in Czech Republic. In all these attempts they aim at applying the same kinning strategies (Howell 2006) instead of adventuring into the field of re-negotiating kin-

ship relationships, which is, to their mind, peculiar of infant adopting practices.

Especially, Camilla and Michele do not want to exclude donors from their reproductive story, but rather to save for them the auxiliary role of generous and indispensable people who provided the reproductive cells for their parental project. Camilla is aware that donors might have other children on their own and that other children might have been born thanks to their donation. Although declaring herself ready to mother a child who is genetically related to two anonymous donors, she judges too difficult to mother a child who comes from an embryo that has been created by another couple of prospective parents. Moreover, elaborating on the genetic ties that may link her own donor-conceived children to donors' own children and children who have possibly been born from their donation, Camilla concludes that she would be comfortable to mother children who are genetically linked to other children born from either of the donors but not from both donors at the same time.

By doing this, Camilla seems to imagine a sort of scale of potential intensity of kinship relatedness that may be possibly brought about by embryos. Such a scale is based on the degree of overlapping on a given subject or embryo of elements that may constitute kinship relationships and, in particular, she identifies two of such elements: reproductive parental intention and genetic relatedness. In this scale, relinquished embryos represent the highest degree of kinship relatedness as they embody the reproductive parental intention of two previous prospective parents and are possibly genetically linked to them and their offspring. *Ad hoc* embryos, instead, are created by will of prospective parents and are genetically related to people who do not have other offspring together. In Camilla's terms, these embryos carry less intense kinship ties and are easier to kin to prospective parents.

The elaboration of such scale confirms Collard and Kashmeri's finding that "the circulation of genetic material does not automatically make kinship relations nonexistent" (2011, 319). On the contrary, it may make siblingship appear even among people who do not know each other and/or whose binding tie is not legally recognised. Camilla and Michele's reaction to that is to put into action a strategy that does not diminish the chances that their donor-conceived children have genetic siblings somewhere but rather limits the intensity of the ties that can relate their donor-conceived children to other children. In addition, they exclude to use embryos that have been created after the parental intention of other prospective parents as they perceive that a kinship-like tie is potentially present between these embryos and those people.

Camilla and Michele do not experience the presence of donors as non-existent as such and rather embody the "relation of non-relations" described by Monica Konrad (2005) in her work on anonymous egg donation in the UK. In fact, Camilla and Michele acknowledge the existence of donors both in their own perception of reproduction and in the family

and personal history of their children. However, the anonymity of donation makes the relationship between them and the donors a “non-relation” as it is based on reciprocal images of each other (Jackson 2002; Orobítg and Salazar 2005). Camilla finds that although anonymity is respected, in what she calls “embryo adoption” the narrative presence of previous prospective parents would be too invasive and powerful, and the non-relationships to them too full of kinship symbolic meanings to be disambiguated by their own reproductive process, parental intentions and kinning practices.

## 8. Conclusions

The case of Linda and that of Camilla and Michele suggest that the ways in which prospective parents approach embryo reception shall be put in relation with one’s reproductive experience and with the understanding of kinship and assisted reproduction that one has developed along the way.

In both cases, in fact, the resort to already cryopreserved embryos is depicted as a second or third option in comparison to other existing reproductive practices. First of all, the choices by Linda, Camilla and Michele show that the economic aspect of reproductive practices shall not be overlooked as a side-effect of transnational reproduction, as it may determine the practice that people choose and the strategies that they put into action to make sense of it in relation to their parental project. Moreover, people’s preference for other reproductive practices may guide their understanding of embryo reception. In particular, Linda shows that her appreciation for infant adoption, which is prevented to her as a single woman, provides her with convincing arguments for deeming embryo reception an appropriate way to parenthood. Reminding adopting parents’ experience, Linda evaluates that parenthood is especially activated by intentionality and care.

On the contrary, Camilla and Michele reject what they call “embryo adoption” for the affinities that it has with infant adoption, a procedure that they do not want to address. Specifically, Camilla accepts embryo reception insofar as it responds to two of the main requirements that she demands to reproductive practices: producing pregnancy as a way to overcome the suffering provoked by infertility, and generating parenthood. Especially, Camilla judges that kinship relationships produced by the use of embryos which have been relinquished by previous prospective parents would be difficult to disambiguate in terms of parental intention, genetic relatedness and family history. In fact, she makes room for donors in her reproductive experience by choosing to transfer *ad hoc* embryos. With this practice she removes previous parental intentions by other prospective parents, scatters genetic relationships among different donors whose anonymity and distance is warranted by the fertili-

ty centre and cuts out for them a small, although important, place within her own and her child's family history. All these strategies are especially common to gamete recipients, although they may be partially shared with adopted parents too.

Using the terms of reference proposed by Roberts (2007), it can be said that neither Linda nor Camilla and Michele address embryo reception inspired by life ethics. Instead, the arguments that especially Camilla moves are indeed ascribable to kin ethics. Her choice is, in fact, driven by the attempt to reduce the risk of ambiguous kinship relations by selecting the circumstances in which the embryos were produced. The understanding of embryo reception as a medical practice (and not only as a family building strategy like adoption) and the emphasis on the producers of gametes as donors (and not as previous prospective parents) help Camilla to keep at distance the people who are genetically related to the embryos that she is using for her own parental plan.

The way in which Linda makes reference to embryos does not support life ethics either. Moreover, it cannot be said that she is concerned about possible kinship relations between the embryos that she has been assigned and donors or previous prospective parents. Although not being ontologically understood as potential children or donors' kin, these embryos represent for Linda the starting point of her own parental experience. Differently, Camilla recognises the humanity of the embryos that she is transferred, even if she does not consider them human life in itself. Both these circumstances show that an understanding of embryos which is distant from life ethics does not prevent people from considering embryos symbolically relevant for the development of human life and the achievement of their reproductive goal.

The analysis of these two cases ultimately highlights that an account of the ways in which prospective parents address embryo reception may provide additional knowledge on how the circulation of embryos in the context of assisted reproduction is perceived by all actors involved. The result of such analysis supports Blyth and colleagues' (2011) conclusion: there is no such thing as a unique model of reference for the understanding of embryos circulation. This paper shows that both donor gametes and infant adoption provide significant arguments for people to make sense of reproduction with embryos created by other people's gametes; that the assimilation of this practice to the one or the other depends on people's attitude towards reproductive practices as a whole; and that the socio-economic condition of prospective parents shall be taken into account as a possible driving motive, especially if this practice is addressed in a context of cross-border reproductive care.

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# 'Sidestepping the Embryo'

## The Cultural Meaning and Political Uses of Ethical Stem Cells

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**Abstract** In many countries, stem cell research is embroiled in heated ethical and political debates because the most valued stem cell types are human embryonic stem cells (hESCs) taken from a few-days old human embryo which is destroyed during the harvesting procedure. 'Ethical stem cells' is the label commonly used to denote an array of cellular reprogramming techniques, biological artifacts, and somatic stem cells which make it possible to obtain pluripotent stem cells while avoiding the use of human embryos. This paper, by focusing on the Italian case, analyzes the cultural meaning and the political uses of these bio-objects which incorporate in their ontology the social and ethical quandaries raised by stem cell research in order to sidestep them. The debate on ethical stem cells shows a new way to deal with ethical commitments in biosciences and throws light on the process of regulatory ordering and normativity production in regard to biotechnological innovations.

**Keywords:** ethical stem cells, human embryo, bioethics, biotechnologies, Italy.

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### I. Introduction

In many countries, stem cell research is embroiled in heated ethical and political debates because the most valued stem cell types are human embryonic stem cells (hESCs) taken from a few-days old human embryo which is destroyed during the harvesting procedure. The ethical dilemma springs from the fact that hESCs are highly valued because they are *pluripotent* (i.e. able to develop into almost any cell type) and thus regarded as able to yield a renewable supply of organs and tissue for the treatment of degenerative diseases (Hauskeller and Weber 2011), while the destruc-

tion of the human embryo is morally condemned by those who grant it the status of a human being. The political debate revolves around the management of these two opposing values: that of the 'therapeutic promise' of hESCs, and the so-called 'embryo question' (Rubin 2008).

One of the political means most widely adopted to deal with the moral dilemmas raised by stem cell research has been the development of bioethics committees (Gottweis *et al.* 2009). Bioethics has emerged as the main way to fulfill 'the political need to reconcile the promise of new health technologies with the cultural costs of scientific advance' (Salter and Salter 2007, 555) and as 'a new language of deliberation, geared to the analysis of human values' (Jasanoff 2005, 172). In its interplay between institutional mechanisms and expert discourse, bioethics seemed to provide a solution to both the 'moral problematization' and the 'more general problematization of scientific governance in terms of public trust' (Moore 2010, 202). Another way to cope with ethical issues related to bioscientific innovations is what Wainwright and colleges (2006) call 'ethical boundary-work', a process of social demarcation between more or less ethical ways of conducting scientific research which involves a set of perspectives, processes and practices referring to a 'practical ethics' which 'takes the form of a number of choices over how to conduct oneself in a complicated political, moral and epistemic context' (Wainwright *et al.* 2006, 745).

In this paper I shall explore a third way to deal with ethical issues in stem cell research; one in which, instead of delegating the moral evaluation to expert bodies or to the direct commitment of scientists in their practices, the moral problematization is incorporated in the biological objects themselves, whose ontology would be constructed precisely in order to solve ethical quandaries through an epistemic discourse, thereby challenging or reinforcing an existing regulatory regime on stem cell research. I refer to so-called 'ethical stem cells', which is the label introduced both in scientific literature and in mass media discourses to denote an array of cellular reprogramming techniques, biological artifacts, and somatic stem cells which would make it possible to obtain pluripotent stem cells while avoiding the use of human embryos. Indeed, the embryo question has dominated the public debate, overshadowing other ethical and social concerns (Prainsack *et al.* 2008). Especially (but not only) in countries such as Italy, where the human embryo has been legally defined as possessing the status of a fully human subject, the embryo question has monopolized the ethical debate, becoming *the* ethical issue in stem cell research. Therefore, ethics has come to coincide with avoiding the use of human embryos, and pluripotent stem cells harvested from non-embryonic sources have been publicly defined as 'ethical'. Both in the scientific literature and mass media discourses, it has been hoped that ethical stem cells would defuse political and moral conflicts. Italy provides a paradigmatic example to study of the cultural significance of ethical stem cells and their political use in challenging or reinforcing the cur-

rent Italian stem cell regulation. By focusing on the Italian case, I shall explore what can be learned from the debate on ethical stem cells in regard to the making of regulatory orders in biotechnologies in general.

In this paper I critically develop some insights of Sarah Franklin, in particular her claim that in our biotechnological era ‘the social is literally being reinstalled within the biological’ (Franklin 2001, 342), and also that ethics ‘can be “built in” to new life-forms’ because one way to allay public anxiety ‘is to re-engineer an ethically sensitive biotechnology’ (Franklin 2001, 342). I shall similarly consider the work of Giuseppe Testa, who has defined ethical stem cells as attempts ‘to solve ethical quandaries through technological means’, since they ‘must be constructed, genetically and conceptually in such a way that [they are] visibly, self-evidently ... biological artefacts’ (Testa 2008, 441). In this regard, I consider ethical stem cells and their sources to be what Webster terms ‘bio-objects’, that is, technoscientifically created life forms and ‘technologically enacted vital materiality’ emerging from the process of bio-objectification in which the boundaries of life ‘are questioned and destabilized, though sometimes can be re-established or re-confirmed’ (Webster 2012, 1-2). Ethical stem cells sources as bio-objects have ‘considerable fluidity and mobility across different socio-technical domains ... or even contrasting cultural meanings’ (Webster 2012, 3), and they leave many questions open, rather than simply solving problems. This paper aims to address some of these questions. In particular: have ethical stem cells been successful in defusing political and ethical quandaries in Italy? Or has their ontology (i.e. as non-embryonic sources of pluripotent stem cells similar to embryonic ones) been called into question? Have they allowed a research trajectory conjugating the therapeutic promise of pluripotent stem cells with the safeguarding of the human embryo? Or have they instead simply changed the terms of the debate, by inaugurating a new language and moving ethical and political quandaries to a different terrain? In other words, what have been their cultural meanings and political effects in the Italian stem cell debate and regulation?

In order to answer these questions I shall trace the trajectories of the different kinds of ethical stem cells from scientific journals to the Italian public sphere. Indeed, even if ethical commitment is at the core of scientific work, it is not circumscribed to the social space of laboratory practices, since the discussion on ethical stem cells is also pursued in the public sphere and is involved in attempts to modify or reinforce existing regulations. The mass media are considered an important arena for the construction of policymaking in biotechnologies (Nisbet and Lewenstein 2002; Kitinger and Williams 2005). Here, however, I shall follow the network of interconnections from the laboratory to the public discourses and regulations (Horst 2005). My purpose will be to trace the evolution and transformation of definitional work on the ontology of ethical stem cells in different social spaces: from its construction in the scientific literature, through its discussion in the public sphere, to its implementation in

regulatory and normative devices. In this sense the paper also follows a second trajectory: from the framing of scientific and ethical issues in the worldwide scientific literature, to their translation in the public debate and the regulatory process in Italy. The Italian debate it is used as a paradigmatic example of the problems arising from the development of novel stem cell technologies. The discussion will then return to the more general meaning of ethical stem cells, and to the questions left open in the debate on stem cell research regulation in general. This paper is based on discourse analysis carried out on articles published by scientific journals, policy texts and documents produced by bioethical advisory committees, as well as newspapers articles. I collected articles published by the three most widely circulating Italian newspapers (*Corriere della Sera*, *La Repubblica*, *Il Fatto Quotidiano*), the main fora of hESC opponents (*Il Foglio*, *L'Osservatore Romano* and *Avvenire*), and other relevant journals (e.g. the left-wing *L'Unità* and *Tempi*, the magazine of the Catholic movement *Communion and Liberation*). Using the electronic archives of these newspapers, I collected all the articles published in their printed version from 16 October 2005 (the publication date of the first scientific articles on ethical stem cells) to 8 October 2012 (the announcement of the Nobel Prize awarded to Shinya Yamanaka, the discoverer of the induction of pluripotency technique), on which I conducted qualitative discourse analysis.

## **2. The political meaning of ethical stem cells in the Italian stem cell debate**

According to Gottweis and colleagues (2009), the ethical reasoning implemented by bioethics committees has played an important role in the political management of the regulatory challenges of hESC research. Public bioethics is defined as ‘a complex of institutions, practices and discourses, whose purpose is to connect policy making with ethical considerations... in order to improve political decision-making’ (Moore 2010, 198). Bioethics, as a neutral and authoritative discourse on ethical conflicts concerning biomedical innovations, presupposes that the tensions among different normative views, values and worldviews may be resolved through the formulation of a unifying and consensual normative culture. Moreover, bioethics, with its reference to scientific knowledge, claims to be a device producing normativity, that is, a typical truth discourse which legitimates political decisions in modern biopolitics (see Foucault 1976; Rabinow and Rose 2006). Therefore, bioethics bodies are institutions and bureaucratic devices – established as state-sanctioned authorities – which through the deployment of an expert discourse set the decision-making agenda and legitimize governments’ regulatory decisions (Salter and Salter 2007; Gottweis *et al.* 2009).

However, bioethics is not always able to resolve conflicts, and the re-

sulting regulations are contested rather than being consensual. In many countries, the tension between the therapeutic promise of hESCs and the embryo question has not been settled through the adoption of a normative framework harmonizing the competing standpoints. Rather, it has been resolved through arbitrary decisions whereby hESC research is forbidden or seriously hampered, so that the emerging regulations are strongly challenged. Furthermore, the conflict has not been merely ethical, regarding the moral and ontological status of the human embryo – and therefore the underlying normative views of the society deemed desirable – but in most cases also the scientific knowledge on which the regulation is grounded has been seriously contested as not having sufficient epistemic robustness.

When the controversy on hESC research has become intractable, ethical stem cells have been presented in scientific articles as a suitable means to circumvent the impasse. Indeed, under the umbrella of the label ‘ethical stem cells’ it is possible to gather a wide array of bio-objects whose aim is to obtain pluripotent stem cells avoiding the destruction of human embryos. In the case of ethical stem cells, the commitment to ethics is not delegated to an institutionalized moral expertise, nor to the practical choice and the conduct of scientists; it is instead incorporated directly into the biological objects. It would thus be the ontology and biological features themselves of these objects that solve the ethical quandaries of stem cell research by sidestepping the passage through the biological entity which embodies the moral dilemma: the human embryo. As Testa (2008) pointed out, these bio-objects offer a technical solution to political problems and ethical quandaries, since controversies would be resolved not through the outcome of a confrontation between ethical stances and political choices, but through the alleged neutrality of a biotechnological procedure which depoliticizes the ethical quandary through the ‘belief in the power of objective facts’ (Testa 2008, 441). Moreover, the discussion on such bio-objects, as will be shown in more detail in the next sections, does not take the form of an ethical confrontation on the morality of the biotechnological procedure employed; rather, it is an epistemic evaluation of the ontology, the scientific reliability and therapeutic effectiveness of these objects. In other words, these bio-objects avoid the problem of developing a consensual normative culture – by embedding ethical and political quandaries into their ontology – and they delegate the question of normativity to the authority of the truth discourse on stem cell biology. But, as we shall see, this is not an unproblematic process, since the ontology of ethical stem cells is not *hic et simpliciter* accepted; rather, it entails complex and contested definitional work on both their biological ontology and their ethicality.

Italy is a suitable case for studying the cultural meaning and the political uses of ethical stem cells. Italy, in fact, has enacted one of the most restrictive regulations on stem cell research which seriously hampers hESC research (Metzler 2007; Gottweis *et al.* 2009). Notwithstanding the re-

course to bioethics, the resulting stem cell research regulation has been strongly contested as the outcome not of a shared consensus, but of merely political decisions based on scientific knowledge not regarded as authoritative.

Indeed, at the beginning of the debate in August 2000, the Italian government delegated the task of formulating policy suggestions for the regulation of stem cell research to the National Bioethics Committee (Comitato Nazionale di Bioetica, henceforth CNB) and to an *ad hoc* commission appointed by the former Health Minister Umberto Veronesi and chaired by the Nobel-prize winner Renato Dulbecco (known as the Dulbecco Commission). The delegation to expert bodies – usually seen as a way to de-politicize complex issues and to obtain authoritative knowledge for policy-making – failed to solve the conflicts over stem cell research. Both committees were accused of ideological partisanship, and both of them split on the embryo question because the Catholic members of both committees opposed the use of human embryos for stem cell research (CNB 2000; Dulbecco Report 2000). The policy suggestions contained in the two documents were never discussed by the Italian parliament.

The Italian stem cell regulation emerged in the period 2001-2005 during government of the centre-right coalition. Firstly, in 2001 the former health minister Girolamo Sirchia decided to allocate public funding only to research on non-embryonic stem cells (the so-called adult stem cells, ASCs henceforth). Secondly, enacted in 2004 was the Italian law on medically assisted fertilization (Law 40/2004), which forbids the use of human embryos for research purposes, the somatic cell nuclear transfer (SCNT) technique, and the production of hybrid and chimeras mixing human and animal gametes. Therefore, Italian stem cell scientists cannot derive embryonic stem cell from embryos left over from IVF treatments, nor can they produce embryos via SCNT for research purposes (Metzler 2007). Finally, in 2005 the Italian government, together with the ministers of other European countries opposed to European Union financing of hESC research, and, if this decision had succeeded, Italian researchers in the field of the hESCs would have excluded from not only national but also EC funding. The entire Italian regulatory regime of stem cell science is grounded on a particular declination of the dilemma between the embryo question and the therapeutic promise. On the one hand, law 40/2004 considered the human embryo to be not only a human being but also a public citizen subject (Metzler 2007, 417) protected by the law; on the other hand, the research funding policies stated that ASCs were the most credible therapeutic promise in regenerative medicine.

The ASC/hESC opposition in the competition for the most credible future source for therapies is common across countries (Parry 2003; Kitzinger and Williams 2005; Hauskeller and Weber 2011), but in Italy it has assumed a distinctive central role (Beltrame 2012; Testa 2012), entering into the lay/Catholic cleavage – one of the most performative socio-



political oppositions in Italian public life (Rusconi 2000). By prohibiting the use of human embryos and research on hESCs, Catholic actors used this debate as a means to affirm the Christian roots of the polity and to shape the social and political order according to their worldview. But they also affirmed that ASCs were more effective in clinical applications and, albeit non-pluripotent, perfectly able to fulfill the therapeutic promise of regenerative medicine (Beltrame 2012). The biological discourse on ASCs clinical effectiveness has been the scientific basis for the Italian regulation, firstly because it conjugates the principle of the defense of human dignity with the value of protecting and improving the health of the population, secondly because it provides an epistemic justification for political choices grounded on ethical orientations.<sup>1</sup> As a consequence, the struggle for hESC research has been framed as a fight to assert the secular nature of the Italian social order, and the hESC/ASC opposition has overlapped with the lay/Catholic cleavage: the struggle between two different views of the normative culture underpinning the social order has been embedded in an epistemic discussion on the most credible therapeutic promise in stem cell research.

Because the Italian regulation did not emerge from shared consensus but instead from contingent power relations in the parliament and key institutions (the centre-right coalition was in power and it was close to Catholic positions), and because its scientific base was considered not epistemically robust, it was strongly criticized. In 2005 a popular referendum was held to abrogate some articles of the Law 40/2004, including the ban on the use of human embryos for research purposes. The referendum failed because the turnout was only 25.9%, very distant from the *quorum* required by the Italian Constitution for a referendum to be considered valid (i.e. 50% plus one of the Italian electorate must have cast votes). Given the political strength of the actors who opposed the use of human embryos and supported ASCs, as well as the failed challenge against the regulation, the advent of ethical stem cells seemed a way to circumvent the Italian regulatory regime in order to make research on pluripotent cells possible while avoiding a direct confrontation on the legal status of the human embryo – whose outcome appeared inevitable amid the power relations of the time.

### 3. The advent of quasi-embryos in the Italian public sphere

In exploring the cultural and political meaning of ethical stem cells in the Italian public sphere, it is useful to draw an analytical distinction between two main groups: the first comprises cellular reprogramming tech-

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<sup>1</sup> The improvement and protection of health and life itself is the central value in modern biopolitics, and (scientific) truth is the legitimizing principle of contemporary (bio)power (Foucault 1976; 1980; Rabinow and Rose 2006).

niques involving biological entities with a contested status because they appear similar to an embryo but are defined as not proper embryos (i.e. parthenotes, cytoplasmic hybrids, and embryoids produced by altered nuclear transfer); the second includes non-embryonic stem cells characterized as pluripotent, as well as so-called induced pluripotent stem (iPS) cells. This distinction is necessary because in the Italian public debate the former group has been proposed and defended by hESC research supporters, while pro-ASC actors have strongly criticized it and promoted the second group. Therefore, the overlap between hESC/ASC and the lay/Catholic cleavage reappears in the opposition between these two groups of ethical stem cells.

The starting point of the debate on ethical stem cells can be dated to 16 October 2005 when *Nature* published on-line two papers reporting two famous experiments: one concerning the Altered Nuclear Transfer (ANT) technique – a procedure of somatic cell nuclear transfer which silenced the *Cdx2* gene to produce an embryo unable to implant in the uterus (Meissner and Jaenisch 2006) – and the other – carried out by a research team led by Robert Lanza at the biotech company Advanced Cell Technology (ACT) – presenting a single cell embryo biopsy which would make it possible to establish embryonic cell lines without interference with the embryo's development (Chung *et al.* 2006). Both experiments were conducted on mouse embryos and both directly addressed the ethical commitment to avoiding the embryo question and the need to obtain pluripotent stem cells. Indeed, in *Nature* the two experiments were presented in these terms:

In this issue are two new methods for producing pluripotent stem-cell lines — the great future hope of regenerative medicine ... The protocols each aim to satisfy the religious, ethical and/or political objections of groups that are opposed to some of the methods used in embryonic stem-cell research. (Weissman 2006, 145)

The ANT technique was described as ethically sensitive because, whilst the conventional nuclear transfer produces a '*reconstructed human blastocyst*' which 'lack[s] the potential to develop into normal human beings', ANT 'further cripples an *already compromised blastocyst* and eliminates the developmental potential to implant into the uterus to establish the fetal-maternal connection' (Meissner and Jaenisch 2006, 214, *emphasis added*). Here we can observe careful definitional work in which the cloned embryo is renamed a '*reconstructed blastocyst*', and the human status is identified with 'embryo development' and 'the fetal-maternal connection'. Since the bio-object produced morphologically fails to fulfill these two aims, according to its proponents, it cannot be considered an embryo, so that its deployment appears to be ethical. The ANT paper is particularly interesting because it was encapsulated in a discursive reper-

toire replete with cultural implications which could be named the ‘discourse on quasi-embryos’. Indeed, ANT produces an entity which pro-HEsCs actors define as a quasi-embryo because it lacks the capacity to develop.

The discourse on quasi-embryos in Italy was first developed with the release of the Dulbecco Report (2000). As Testa (2012) noted, the most important epistemological contribution of the Dulbecco Commission was its unanimous endorsement of somatic cell nuclear transfer (SCNT). This technique was deemed exempt from ethical problems because its product was defined as ‘*an oocyte reconstituted with the nucleus of an adult somatic cell*’, which ‘cannot be considered a zygote in the usual sense in that it does not derive from the union of two gametes’, and it ‘is proven by the fact that *such a reconstructed oocyte does not develop spontaneously into an embryo*, and this happens only following artificial stimulations that force it to develop into a blastocyst’ (Dulbecco Report 2000, 8, emphasis added).

Similarly, this discourse was deployed also in the case of an experiment in artificial parthenogenesis – a technique that forces an oocyte to develop into an embryoid without sperm fertilization – conducted by an Italian research team led by Fulvio Gandolfi (Paffoni *et al.* 2007). Parthenotes were defined ‘*embryo-like structures that develop from eggs without the need for fertilization*’, and since mammalian parthenotes ‘always die before implanting in the womb, but they survive long enough to be a potential source of stem cells’, they appeared to be ‘an ethically acceptable source of stem cells’ because they do not involve the human embryo (Marchant 2006, 1038, emphasis added). Gandolfi’s team defined human parthenotes as ‘parthenogenetically activated oocytes’ (Paffoni *et al.* 2007, 81) and the newspaper *La Repubblica* presented this bio-object as a ‘mock embryo... entirely formed from stem cells... [and] incapable of growing in the uterus and generating a new life’, according to the principle that ‘If it does not initiate a new life, it cannot be defined an embryo in every effect’ (*La Repubblica*, 29 June 2006). In 2006 the stem cells obtained by Meissner and Jaenisch, and by Lanza’s and Gandolfi’s teams, were labeled ‘ethical stem cells’ (see Marchant 2006; Abbot 2006), and this definition entered scientific and public discourse as well.

Another case of quasi-embryos deployed to circumvent the Italian regulatory regime has been that of human-animal cytoplasmic hybrid embryos (cybrids). These are biological entities created through SCNT in which a human cell nucleus is implanted in a previously enucleated animal oocyte, so that the resulting embryo has a human nuclear DNA and an animal cytoplasmic DNA (mitochondrial DNA); or, in other words, it is 99.9% human. The Italian debate was sparked by the corresponding debate in the UK, where the Human Fertilisation and Embryology Authority (HFEA) and then the British parliament allowed the creation of transpecies cybrids under license, defining them as prevalingly human in order to permit their creation under the British law (Brown 2009). In Ita-

ly, by contrast, since the Italian law prohibits the use of human embryos for research purposes, these entities should be characterized as not properly human. Moreover, because the Italian law 40/2004 also bans 'the insemination of human gametes by gametes from different species and the production of hybrids and chimeras' (Law 40/2004, art. 13 sec. d), the proposal of cybrid research required more complicated definitional work. The proponents had to demonstrate that cybrids are simple biological artifacts incapable of embryonic development – that is, they are quasi-embryos. Developmental biologist Carlo Alberto Redi declared that 'the cybrid is a kind of *laboratory in miniature, a fantastic tool*' (*Corriere della Sera*, 6 September 2007, emphasis added), and geneticist Giuseppe Novelli explained that cybrids are simple biological artifacts as 'the incompatibilities between the cell's nucleus and the surrounding part, the cytoplasm, are too great: the foetus would never develop' (*La Repubblica*, 6 September 2007).

In general these bio-objects were constructed and defined as artifacts permitting research on pluripotent stem cells similar to embryonic ones without involving human embryos. Their ontology was constructed both materially (in the lab) and discursively (from scientific journals to mass media and policy documents) to emphasize their non-embryonic nature. These various objects – SCNT reconstructed oocytes, ANT embryos, parthenotes, and cybrids – share a common feature: the lack of a biological component, which configures them as not proper embryos because it impedes the normal embryo development. According to Testa (2008), these quasi-embryos could solve the ethical quandaries, by presenting themselves as merely technological means, since they are 'genetically and conceptually' constructed, as 'biological artifacts' (Testa 2008, 441), skipping the living entity around which the controversy revolves: the human embryo. The focus on embryo development is the centre of the quasi-embryo discourse and, therefore, the cornerstone of its contestation.

Indeed, in the Catholic and pro-life discourse the humanness of the embryo is located in its capacity to develop into a human being: for example the Pontifical Academy for Life (PAL 2000) defined the human embryo 'a *human subject* with a well defined identity' which from the union of the gametes 'begins its own *coordinated, continuous and gradual development*'. Therefore, sidestepping the embryo question implies avoiding natural fertilization and embryo development. According to Testa (2008), in the quasi-embryo discourse, embryo development is decomposed into the biological components and organized structures which make it possible. The lack of one of these components implies an entity which cannot be defined as a living human being because it is incapable of the 'coordinated, continuous and gradual development' characterizing the *true* embryo in the pro-life discourse. These quasi-embryos are intentionally constructed in the lab with these features, and they are discursively presented in the public sphere through a definitional work emphasizing a particular ontology, that of artifacts created only to allow the establishment of plu-

ripotent cell lines sidestepping the embryo. There is an awareness of the set of social issues, ethical stances, and power relations involved in the stem cell debate which is reflexively embedded in the construction of these bio-objects. According to Testa (2008, 442), this 'what component part question' is 'epistemic in nature' and an 'attractive route to depoliticize the conflict over nascent human forms'. With these bio-objects, the stem cell controversy would not be solved through negotiation on ethical stances and political choices, but instead through the alleged neutrality of a biotechnological procedure.

However, these bio-objects were not undisputed: the debate took the form of an epistemic evaluation of the ontology, scientific reliability, and therapeutic effectiveness of these objects. The ANT technique was criticized on the grounds that the silencing of Cdx2 was not sufficient to solve the ethical problem because, according to molecular biologist (and priest) Roberto Colombo, ANT produces 'a *human embryo* with a deficiency artificially and intentionally made by the researcher' (*Avvenire*, 18 October 2005, emphasis added). In the case of the SCNT technique presented in the Dulbecco Report, Vatican spokesperson monsignor Elio Sgreccia declared that the fact that SCNT does not produce embryos is 'a simple hypothesis not yet corroborated by any research published in a scientific journal' (*L'Osservatore Romano*, 10 January 2001). The human-animal cybridization technique was discussed in 2009 by the CNB and the majority opinion discarded it doing so on the grounds that, since SCNT creates living entities with 'developmental defects and anomalies' when applied among the same species, inter-species cybridization would increase these problems. It would generate 'cells with genetic anomalies' which would be 'useless... as models for the study of a disease, and they could not have any therapeutic application', and 'owing to their contamination with animal material... they would have limited or no importance for the study of diseases ... with the risk of interspecies transmission of viral agents' (CNB 2009, 22).

Since the proposal of SCNT contained in the Dulbecco Report was never discussed by the Parliament, the majority opinion of the CNB rejected the human-animal cybridization technique, and since Law 40/2004 prohibited 'cloning procedures through nuclear transfer' and the 'creation of hybrids and chimeras' (Law 40/2004, art. 13, sect. 3c), we can conclude that these novel bio-objects failed as means to circumvent and defuse ethical quandaries, as well as to challenge the existing Italian stem cell research regulation. Also their ontology as quasi-embryos was called into question, as well as their ability to produce therapeutically useful pluripotent stem cells for human clinical settings. Nevertheless, these bio-objects introduced a new language in which the ethical dimension was incorporated into bio-objects, so that the public discussion took the form of an epistemic discourse.

#### 4. Non-embryonic pluripotent stem cells and the significance of pluripotency

Whilst the prospect of carrying out research on quasi-embryos was proposed mainly by supporters of hESCs, the other group of ethical stem cells seemed to pertain to ASCs proponents. The second group of ethical stem cells comprises non-embryonic pluripotent stem cells (i.e. discovered in somatic tissues) and cellular reprogramming techniques which, through genetic manipulations, reverse somatic cells into embryonic-like pluripotent stem cells. Even if ASC supporters justified the Italian regulation by stating that ASCs were more clinically effective and useful than hESCs – to the point that during the 2005 referendum campaign hESCs were defined as therapeutically useless and dangerous (Beltrame 2012, 219) – the discourse on pluripotency remained a critical and contradictory point in this discursive articulation. To be sure, during the referendum campaign, while pluripotency was being defined as therapeutically useless and dangerous, stem cell scientist Angelo Vescovi (one of the most important spokespersons for the anti-hESC front) favorably cited two techniques of cellular reprogramming developed by Douglas Melton's and Yuri Verlinsky's research teams (Cowan *et al.* 2005; Strelchenko *et al.* 2006), which had used hESCs cytoplasm to dedifferentiate somatic cell nuclei in order to transform somatic cells into pluripotent stem cells. In other words, the same scientists and commentators who criticized pluripotency acclaimed cellular reprogramming techniques aimed at transforming ASC into pluripotent cells similar to hESCs. Hence, pluripotency regained primacy, and hESCs indirectly became the 'gold standard' for evaluating the potency of any kind of stem cell.

The most discussed and relevant source of non-embryonic pluripotent stem cells – i.e. opposed to contested quasi-embryos – were the pluripotent stem cells discovered in the amniotic fluid (De Coppi *et al.* 2007) and the famous induced Pluripotent Stem (iPS) cells (Takahashi and Yamanaka 2006). Amniotic Fluid-derived Stem (AFS) cells were defined as representing 'an intermediate stage between pluripotent ES cells and lineage-restricted adult stem cells' (De Coppi *et al.* 2007, 103); but, in another part of the article, the authors sought to blur the boundary between multipotency and pluripotency by stating that 'AFS cells are indeed broad-spectrum multipotent (*that is, pluripotent*) stem cells' (De Coppi *et al.* 2007, 101, emphasis added). Nevertheless, AFS cells failed to 'overcome the ethical obstacle blocking this strand of research' (*La Repubblica*, 9 January 2007). Some contested their ethical status by highlighting the fact that the amniotic fluid is obtained through amniocentesis, a prenatal genetic diagnosis criticized as risky for the fetus and as a new form of eugenics. But the most interesting controversy concerned the biological status of these cells. Whilst Catholic actors and pro-ASC newspapers defined AFS cells as pluripotent, hESC research supporters highlighted the

definition of a ‘intermediate state’ between hESCs and ASCs. Finally, in March 2008 *Nature Biotechnology* published an article in which the Italian research team led by stem cell scientist Elena Cattaneo explained that the results of Atala and De Coppi’s work (De Coppi *et al.* 2007) were not sufficient to demonstrate that AFSc ‘can give rise *in vitro* to neurons’ (Toselli *et al.* 2008, 269). The boundary between pluripotency and multipotency, made porous and flexible by the definitional work on AFSc cells, was thus re-established, restoring these cells to the rank of multipotent stem cells. As in the case of quasi-embryos, the discussion rotated around the biological status, and ethical and political implications were embedded in an epistemic discourse.

Publicly considered to be ethical stem cells *par excellence* are iPS cells. Indeed, the cellular dedifferentiation technique developed by the Japanese team led by Yamanaka consists in reprogramming somatic cells into pluripotent stem cells similar to hESCs by artificially forcing the expression of certain genes. In 2012, Yamanaka was awarded the Nobel Prize in physiology and medicine ‘for the discovery that mature cells can be reprogrammed to become pluripotent’ (Nobelprize.org 2012), and not only Catholic newspapers and magazines, but also secular newspapers carried the headline ‘ethical stem cells awarded Nobel Prize’ (e.g. *Il Fatto Quotidiano*, 8 October 2012). This testifies to how, in the public imagery and discourse, iPS had come to coincide with ethical stem cells and moved to the centre of public discussions on this non-embryonic source of pluripotent cells.

The first breakthrough came on 25 August 2006, when the journal *Cell* published a famous article on the induction of pluripotency in mouse somatic cells (Takahashi and Yamanaka 2006), but the public’s attention was directed to iPS cells on 20 November 2007 when *Cell* and *Science* published two articles – one by the Yamanaka team (Takahashi *et al.* 2007) and the other by a team led by James Thomson (Yu *et al.* 2007), which in 1998 had derived the first hESC line (Thomson *et al.* 1998) – reporting the induction of pluripotency on human cells. The fact that one of the research teams was led by the person who had given rise to hESC research was seen as the end of the stem cell war and as the capitulation of hESC research. Indeed, the newspaper *Il Foglio* commented: ‘The cultural war on embryos has probably ended’ (*Il Foglio*, 23 November 2007).

Nevertheless, another article in *Il Foglio* highlighted that, in Italy, the discovery of iPS cells did not defuse the struggle over stem cell research. Indeed, as Hauskeller and Weber (2011) have noted, iPS cells were subject to a debate on the legacy of hESC research. While ASC supporters argued (and continue to do so) that iPS cells belong to the family of ASCs,<sup>2</sup> hESC scientists highlighted that the discoverers of iPS cells had

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<sup>2</sup> For example, when Yamanaka won the Nobel Prize, the Catholic news magazine *Tempi* carried the headline: *Nobel Prize to adult stem cells* (“Tempi”, October 8, 2012).

'longstanding experience with and in-depth knowledge of culturing and experimenting on hES cells' that rendered 'hES cell researchers as a privileged epistemic group in the study of iPS cells and present iPS cells as a direct follow-on from hES cell research' (Hauskeller and Weber 2011, 424). Indeed, whilst for *Il Foglio* the discovery of iPS cells belonged among 'results that arrive from the adult stem cells front' (*Il Foglio*, 21 November 2007), geneticist Giuseppe Novelli declared that 'research on embryo stem cells is still indispensable, for without it these results would not have been achieved' (*La Repubblica*, 21 November 2007). Although *Il Foglio* declared that iPS cells rendered the use of embryos obsolete (*Il Foglio*, 13 December 2007), Yamanaka stated that 'the recent advancements in iPS cell research would not be possible if it were not for the many years of dedicated hES cell research that preceded them' (Hyun *et al.* 2007, 368) and, therefore, 'it would be a serious mistake to conclude that recent developments in iPS cell research (or, for that matter, any other so-called "alternative" source of pluripotent stem cells) avert the need for ongoing research on hES cells' (Hyun *et al.* 2007, 367). HESCs remained the gold standard with which to evaluate the real pluripotency of any given stem cell, because several studies had shown that the factor-based reprogramming used in iPS method can leave an epigenetic memory of the tissue of origin that may influence efforts directed at the differentiation of the reprogrammed cell (Kim *et al.* 2010) and there were doubts about the equivalence between iPS cells and hESCs (see Hanna *et al.* 2010). Moreover, on discussing the human-animal cybridization technique, even though the majority of the CNB stated that iPS cells 'appear more promising and effective than SCNT', it also recognized that 'these are not cells identical with embryo stem cells ... they raise safety problems from a therapeutic standpoint because all the significant factors in the reprogramming are oncogenic' (CNB 2009, 18).

Despite the doubts concerning the biological ontology of AFS cells and the controversy on the legacy of hESC research in iPS technique – both centered on the significance of pluripotency – these ethical stem cells were enlisted in political controversies. Indeed, in the summer of 2006, the new University and Research Minister Fabio Mussi (a member of the centre-left political coalition which won the 2006 national elections) removed Italy's signature from the document which excluded research projects involving human embryonic stem cells from financing under the EC Seventh Framework Programme (FP7). This decision provoked a heated parliamentary debate with demands that the so-called Mussi Act should be withdrawn and that the Italian Government should impose limits on hESC research under the FP7. However, these demands were rejected. The discovery of AFS cells was used in this debate. For example, the left-wing Catholic politician and activist Luigi Bobba declared: 'In light of this discovery... Minister Mussi should draw the consequences from the breakthrough. The EU must not finance the destruction of embryo cells' (*La Repubblica*, 8 January 2007). Similarly, on 21 November



2007, in a leading article in *Avvenire*, Eugenia Rocella (a pro-life activist and future Deputy Minister in the centre-right government in 2008) used the announcement of the discovery of human iPS cells to call for a five-year moratorium on embryo research in Europe. The moratorium was promptly supported by pro-life advocates, Catholic actors and centre-right politicians, and it was proposed to the European Parliament by Deputy Mario Mauro (centre-right), although the response of the European Commissioner for Science and Research Janez Potocnik was negative. For Catholic actors and members of the centre-right political coalition, AFS and iPS cells served both to defend the previous Italian legislation and to challenge the new policy choices, because they demonstrated that there existed non-embryonic pluripotent stem cells which rendered hESC research obsolete. By contrast, for lay activists, such as the bioethicist Maurizio Mori, the fact that ‘Yamanaka developed a method to bring back adult cells to an embryonic state’ was proof that ‘embryonic cells are better than adult ones’. Hence the previous Italian Government’s decision to fund only ASC research was completely wrong (*L’Unità*, 23 November 2007).

Like other ethical stem cells, rather than defusing the stem cell war, also AFS and iPS cells generated conflicts and were used as weapons in the political confrontation. In particular, iPS cells entered into the hESC/ASC opposition, first with demonstration that pluripotency is the most prominent and promising feature of stem cells (on which depends the hope of therapies and clinical applications), and second with the controversy on the role of hESC research into the lineage of iPS cells. Therefore, the struggle between hESCs and ASCs to define the most effective and promising research trajectory in stem cell research did not end but continued through iPS cells.

## **5. Conclusion: the cultural meaning of ethical stem cells and their political significance**

What, therefore, were the cultural and political effects of ethical stem cells? Their ability to defuse political, ethical, and social conflict appeared to be scant; rather, as we have seen, they became the subject of new quarrels and controversies. Likewise, if we consider their function of conjugating the therapeutic promise of pluripotent stem cells with the safeguarding of the human embryo, their general effect was marginal. Especially in the case of the first group of ethical stem cells, i.e. that of quasi-embryos, the attempt to circumvent the embryo question failed, because their ontology and scientific reliability was called into question. Similarly, also the other group of ethical stem cells – apparently less controversial – was unable to defuse the stem cell war because it created a debate on their pluripotency. In part this was due to the fact that these techniques and artifacts were (and still are) in the experimental stage, even if they were pre-

sented in the mass media as 'just around the corner' technologies. On the other hand, debates and quandaries both on their biology and their ethicality reveal to the extent to which their ontologies were instable and open to discussion and contestation.

Does this mean that the effect of ethical stem cells was pointless? No it does not. On the contrary, they were victims of their own success. Indeed, ethical stem cells have incorporated social issues to such an extent that previous controversies have been translated into the more epistemic language that they introduced. This has deep cultural significance. It testifies to the capacity of biotechnologies and the life sciences to create new forms of life which challenge established cultural categories such as life and death (Franklin and Lock 2003). Indeed, a substantial group of techniques to produce ethical stem cells fabricate entities producing living *things* (such as cell lines) without creating living *beings*. According to Testa (2008, 444), this means that 'molecular biology is recruited to reinforce pre-existing moral commitments'. The debate on ethical stem cells shows how cultural values and moral commitments can be embedded, camouflaged and implicitly evoked in epistemic and technological practices and in the discussion on them. The fact that the debate takes the form of an epistemic evaluation of the ontology of these bio-objects – indeed, their moral evaluation depends on and follows their stabilization as non-embryos or as functional and effective sources of pluripotent stem cells – shows how, in modern societies, 'truth is centered on the form of scientific discourse', and how the 'battle for truth', and for 'power attached to the truth', (Foucault 1980, 131-132) is conducted through the deployment of scientific discourses. Moreover, this embedding of ethical issues in epistemic practices, by 'rebuilding embryonic cell lines *without embryos*', testifies the reinstallation of 'the social' within 'the biological', since ethical stem cells appear as epitomizing the re-engineered 'ethically sensitive biotechnology' with which ethics 'can be "built in" to new life-forms' (Franklin 2001, 342; see also Franklin 2005). In the case of ethical stem cells, the therapeutic promise of pluripotent hESCs 'has installed itself so firmly in the discourse on hESC research that ethics is repositioned as a discourse guiding the conduct of embryo/hESC research' (Rubin 2008, 25). In ethical stem cells, the tension between therapeutic promise and the embryo question is not resolved by a moral trade-off (Salter and Salter 2007) between the two values; rather, both are incorporated into bio-objects which are constructed and defined to solve the tension by fulfilling both purposes at the same time. A side effect it is that the moral status of the human embryo as a fully human subject is not called into question. In other words, the attempt to sidestep the embryo question takes for granted the moral status of the early human embryo, so that the embryo question remains the cornerstone of the debate. Indeed, what I have called quasi-embryos are constantly compared to the human embryo, and if their definition fails to denote them as non-embryos they are also regarded as non-ethical sources of stem cells (i.e. they are not ethical

stem cells providers).

The Italian case then throws light on the general problem of regulatory ordering in the field of biotechnologies. On the one hand, it shows how bioethics mediation appears to be insufficient: ethical values and worldviews may be so irreconcilable that they cannot be included in a common and more general normative framework. On the other hand, it suggests that the foundation of such a framework on an alleged natural normativity is equally problematic. The attempt to incorporate ethical quandaries into bio-objects which bypass social conflicts generates new conflicts, because these objects are hybrids (Latour 1991) which constantly switch between nature and culture (Brown *et al.* 2006) and display how the normativity of the natural, the meaning and the boundaries of life are called into question and are open to intervention and manipulation (Nowotny and Testa 2010; Webster 2012). Contrasting definitions and discussions on the ontology of ethical stem cells reveal how Agamben's (1995) problem of the demarcation between *zoé* and *bios* – that is, the inclusion of bare life in the realm of politically qualified existence – is at stake for these bio-objects as well: are they simple artifacts and living *things* or are they living *beings* which have to be included in the bios? This is a problem that cannot be solved simply by invoking the alleged neutrality and authority of epistemic practices. Indeed, according to Nowotny and Testa, in the biotechnological era, nature can no longer be seen as a source of authority – so that 'what is natural is from then on subject to the contingency' of biotechnological intervention, to the point that it 'is becoming a substantially political issue' (Nowotny and Testa 2010, 6). Therefore, how can a biological ontology defuse conflict and underpin a social order only by the objectivity of scientific knowledge about 'the natural', if the natural has lost its moral authority?

Contrary to the idea of the possible emergence of a unifying and consensual normative framework grounded on common values (e.g. the protection of life) and on cognitive categorizations of the natural world (Parsons 1961), this debate supports the Weberian contention that the general ideals of life and the universe which rule human conduct can never be the products of empirical knowledge, but are always and only formed in the struggle with other ideals (Weber 1949). The process of regulatory ordering thus consists in what Jasanoff (2004) terms 'co-production': that is, the mutual process by which knowledge of the (natural and social) world and social formations come symmetrically into being, influencing and reinforcing each other. In particular, we witness the emergence of novel objects whose stabilization in the epistemic domain is strictly connected with the ordering of society because they embed ethical, cultural, and political issues: in this sense, 'solutions to the problem of knowledge are solutions to the problem of social order' (Shapin and Shaffer 1985, 332). Hence, insofar as the scientific (truth) discourse remains the (epistemic) source of legitimacy of any political ordering, the natural order and the normativity of 'the biological' are only evoked as the bedrock un-

derpinning the regulatory order of 'the social'; instead, politics fabricate political-epistemic normativities that simultaneously order 'the social' as well as 'the natural'. The Italian debate on ethical stem cells has tried to shift itself to the terrain of a merely epistemic discussion, but its outcome displays how the regulatory order in biotechnology is nothing but a temporary and local arrangement of tightly intertwined ethical values, worldviews, power relations, epistemic practices, and bio-objects.

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# (Not) Making “Heterologous” Fertilization

The Italian ART Law and its paradoxes

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**Abstract** The Italian law regulating ART approved in 2004 is at the centre of this conversation, which departs from the book ‘Fecondazione eterologa’ (2012) written by two prominent Italian professionals in the field. The three contributors of this conversation analyse different profiles of the law: the contradictions between Catholic moral order and a scientific rationality which is not fully aware of its heteronormativity (Parolin); the macropolitics of information along Italian history and the moral economy surrounding fertilization techniques (Metzler); Law 40 in the context of the EU landscape of reproductive rights (Schuster). All the three voices of the conversation emphasize the paradoxes of ART in Italy and the perverse effects of the prohibition of heterologous fertilization, namely the medical exodus of Italian couples outside of the Italian territory.

**Keywords:** heterologous fertilization, Law 40, moral order, scientific rationality, reproductive rights.

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## I. Parenthood: Between Catholic Hegemony and Heteroscientific Rationality

*Laura Lucia Parolin*

The book by Carlo Flamigni and Andrea Borini *Fecondazione eterologa* aims to be a useful instrument for Italian citizens who need accurate information on assisted reproductive technologies (hereafter ART). According to the authors, both well known professionals in the biomedical field, Italy suffers from an informative deficit on these issues, mainly because of the strong influence of the Vatican hierarchies on the

social and juridical environment. The authors claim that: “The ordinary Italian is not particularly religious, even attentive to the rules of Catholic morality. However, especially when they have to take position on ethical issues, [ordinary Italians] still tend to be inspired by bishops and priests, who seem to maintain a particular prestige even in a historical moment in which the religion they represent is troubled by a serious crisis of credibility” (Flamigni and Borini 2012, 9).

The approval of Law 40 in 2004, which regulates the access to ART, has to be located in this social and political context. The Authors argue that the law regulates ART according to the ethical logic of the Catholic Church rather than to the biomedical rationality and the scientific debate. In the book they show how, focusing on avoiding embryo surplus, the law ends up being harmful from the point of view of the biomedical rationality – which is understood as the efficacy of treatment for the birth of a healthy baby and the prevention of risks related to pregnancy.

Given such a regulatory framework, the authors are not surprised that many Italian couples choose to go abroad to undergo ART. Presenting data from the Observatory on Reproductive Tourism – a private organization led by Borini, created in 2005 to monitor Italians’ access to assisted reproductive centres abroad – the authors describe the flow to countries with more permissive regulations on ART. In particular, they reveal an exodus of Italian citizens to countries where it is possible to use donor gametes and embryos. After the introduction of Law 40 this amount of couples is tripled. The authors argue that, surprisingly, this flow does not decrease despite recent rulings revoked some of the law major limitations (see also Hanafin and Schuster in this issue). According to the authors, this depends on the strong interest in maintaining a strategic ambiguity on ART-related issues, defined as “ethically sensitive” to uphold the hegemony of the Catholic Church’s voice. At the same time, they point out that providing specific and customized advice to Italian citizens who intend to use ART abroad might be considered an illegal activity, according to a literal interpretation of Law 40. In order to address this lack of information and ambiguity, the volume aims to provide a broad range of information on ART and related debates. In this respect, the core argument of the book is summarized in its title: the neologism ‘e(s)terologa’, meaning the connection between (the prohibition of) gamete donation and the need to go abroad.

The central part of the book deals with the analysis of ethical and juridical issues related to gamete and embryo donation. Although the authors seem to associate the desire for kinship with the will (taken for granted and socially prescribed) to transfer genes, they introduce the notion of social kinship (i.e. kinship based on desire and responsibility rather than blood ties) to challenge (in some extreme cases) the overlap of genetic bounds and kinship. As they underline: “What happens to most of these couples, which allows them to make choices precluded to many other people, is discovering that there is a parenthood that has nothing to

do with genetics and the transfer of their own chromosomes to another individual; a parenthood based on responsibility, on the promise to care about and to love a child who is not born yet. A parenthood of great moral value, which is still unacceptable and even perverse for many people” (Flamigni and Borini 2012, 29-30). This kind of kinship is not yet socially legitimate and still needs full social acceptance. The discussion on the secrecy of donation is still ongoing among people involved and many couples who went for gamete donation choose to not reveal it to the child and their relatives and friends. However, the debate on children’s right to know their genetic identity, which varies from country to country on the basis of different national laws on donors’ anonymity, could be widely re-configured adopting a perspective that privileges social kinship.

The book, therefore, stresses two main interrelated features about ART in Italy. On the one hand, the restrictive national legislation is bound by the ethical issues imposed by the Catholic Church. Law 40 is driven by an ethical logic that limits ART, reducing its effectiveness (in terms of children born) and security (for the mother), on the basis of a traditional notion of family, which reduces parenthood to genetic ties. On the other hand, the moral and ethical values embedded in Italian politics, institutions and health care professionals inhibit the access to technoscientific information, which citizens would need in order to perceive themselves as subjects deprived of their reproductive rights. The Authors claim that this phenomenon is particularly evident with reference to the lack of accurate information on recent repeals of the law, which balance the restrictions and allow Italian centres to use ART more effectively. In fact, They argue that the “proven Catholic faith” of people in charge of the Ministry of health has deterred centres for assisted reproduction from making communication campaigns on the opportunities that have opened up thanks to the intervention of the Constitutional Court. This ambiguity in the public debate marks the bounds of biomedical expertise and the (alleged) rationality of the scientific discourse.

Law 40 has been sharply criticized as technically inappropriate and inconsistent with the Italian legal framework (for example, the ban of pre-implantation diagnosis contrasts with the regulation on abortion). Surprisingly, however, the authors root their criticism on arguments related to social and human dimensions. Their experience with prospective parents leads them to challenge the alleged natural basis of parenthood as desire to transmit genes. Moreover, using the term “citizens” to refer to patients the authors emphasize the right to access ART. However, it seems that the rhetorical device that builds ART patients as multiple and collective bodies – the “hermaphrodite couple” (Van der Ploeg 1995)<sup>1</sup> – limits the range of those who have the right to access. Authors have in

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<sup>1</sup> “Hermaphrodite couple” is a concept proposed by Irma Van der Ploeg (1995) to refer to a figure of discourse that presents the heterosexual couple as a body-subject of assisted procreation.

mind exclusively heterosexual couples – which are probably their ideal readers. Therefore, even though this might be expected from the critique of parenthood based on genetic ties, their arguments do not challenge the question of heteronormativity in ART. This narrows the authors' point of view and weakens the powerful effects of interpreting parenthood on the basis of desire, rather than genetic ties. The latter, for instance, normalizes the compulsory medicalization of women who have sterile partners, considering this a more “ethical” choice than using donor gametes. Similarly, the stigmatization and social exclusion of ‘other’ bodies (Parolin and Perrotta 2012), not having reproductive citizenship according to Law 40, are just taken for granted along the volume as part of the medical and organizational practices of the health care system.

The authors deal with the scientific debate on homosexual parenthood, emphasizing the social and situated character of the scientific discourse. Quoting Macdougall and colleagues (2007) they seem to recognize the complex nature of parenthood when donor gametes are used, which is constructed through technical as well as narrative elements for accountability. Moreover, they acknowledge the ‘scientific’ arguments illustrating that there are no substantive differences in the psycho-affective development of children raised by homosexual parents. However, they root their biomedical scepticism about the inclusion of homosexual couples in ART referring to the fear of “social reactions to these events and the inevitable repercussions on the child of people hostility and critique” (Flamigni and Borini 2012, 65). Authors are not unaware of some of the links among biomedicine, rhetorical devices and social phenomena in ART. However, the heterogeneous elements that shape the range of individuals’ and couples’ reproductive choices (whether assisted or not) are only partially addressed. Although the authors recognize the social elements embedded in reproductive choices, they use naive categories to explain the heterogeneous aspects of these choices. For instance, discussing the tendency to postpone parenthood they introduce bizarre analytical categories, such as “the age shown in the mirror”, which is supposed to affect the delay in parental choice.

To sum up, the first part of the book is focused on the consequences of the ethical hegemony of Catholic values on issues related with ART. Particularly, the limitations introduced by the law are discussed, highlighting their impact on medical practices and access to techniques. Throughout the book the authors aim at illustrating the contrast between the law and the biomedical and scientific rationality. However, it emerges from the book that the call for biomedical and scientific rationality is deeply entangled with political and social aspects, perhaps even more than the authors seem to be aware of.

## 2. The Politics of Information in a Nation State Wrestling with its Moral Order

Ingrid Metzler

Carlo Flamigni and Andrea Borini's book begins with a well-chosen and deceptively succinct title. *Fecondazione eterologa* combines the term *eterologa* (heterologous) with the term *estero* (abroad), labelling something that does not quite belong because it is not "homologous." Fusing two different yet related types of alienations into a single neologism, the wonderfully suggestive title indicates that a steady number of ART are not only linguistically marked as far-fetched in Italy (e.g., drawing on the reproductive powers of other bodies is not referred to as a solitary act of "gamete donation" but as the disruptive act of bringing something into a space where it should not be), but a portion of them are also exiled from Italian territory. Each year, a number of Italians travel abroad for fertility help, to neighboring Switzerland or Austria, to geographically more distant and scientifically more prestigious spaces, such as Spain or Belgium, or to an unspecified "East" that the authors leave strangely black-boxed in their book.

Flamigni and Borini do not seem to be surprised that this phenomenon has taken shape. An "exile" of patients – or, using the term that appears throughout the book, of "citizens" – seemed to be an appropriate and rational choice for patients, once the Italian Parliament passed the (in)famous Law 40 in February 2004, 'expatriating' a number of techniques and practices, and imposing tight restrictions on all practices still legally available. Yet, the authors seem to be puzzled, intrigued, and at times also worried that the flow of patients has not slowed, once Italian courts in general and the Constitutional Court in particular began to "free the hands" of Italian bio-medical professionals, relaxing the tight norms that were also never "as severe as they seemed" (Flamigni and Borini 2012, 145). The authors note that some parts of the law were formulated sufficiently ambiguously to allow scientists to work around them.

Flamigni and Borini make no attempt in this book to fathom why so many Italians continue to travel abroad for fertility services. Instead, they seek to endow Italian citizens with the kind of information that will help them to make an informed choice, somehow assuming that they would make different choices if they only knew better. In roughly 160 pages, Flamigni and Borini take their readers, whom they envision as patients and certainly not as social scientists, through the kind of information they deem necessary for Italian citizens to make informed decisions. In doing so, they clearly show that providing information is not an easy job. For instance, they note that the higher IVF (*In Vitro* Fertilization) success rates that U.S. fertility centres pride themselves on come with the hidden cost

of “excessive hormone stimulations” and “embryo reductions,” both of which are “considered very critically in Europe” (Flamigni and Borini 2012, 30, author’s translation) and which are nonetheless silenced in these figures. At other times, though, they reveal those difficulties in a less voluntary or deliberate way, leaving informed readers amazed by the sheer number of things that the authors take for granted, and what they deem “evident” and not in need of explanation or justification.

The authors are two Italian bio-medical professionals. In light of this, it might not be surprising that they privilege their bio-medical perspective, taking for granted that readers will accept the supremacy of their knowledge over, say, the knowledge of other patients who share their experience in an internet forum. So, instead of discussing the “micro-politics of information,” and unpacking what they leave out, I prefer to discuss some of the macro-politics of information, embedding this book in the moral economy of a debate that it both describes and engages in.

Let me begin by going back a bit in time. The book itself invites such a step. It is the fourth issue in a series sponsored by the AIED, the Italian Association for Demographic Education, whose honorary president is the coauthor Carlo Flamigni. Today, the association’s name sounds anachronistic. Yet, back in 1953, AIED began to assemble a range of moral pioneers who provided information on sexuality, reproduction, and contraceptive devices. At that time, disseminating such information was criminalized by one of the pro-natalist provisions enacted during Fascism to ensure that the Italian population would multiply. With the end of the fascist regime, the demographic dream of a rapidly growing Italian “stock” quickly devolved into a nightmare in the face of a postwar reality, in which food was scarce for those already born. Nonetheless, many of the provisions enshrined in law during the fascist period still remained in force.

One of the reasons for this was something of a “tacit contract to silence” between the Roman Catholic Church and the then-emerging new elites. In this tacit contract, contraception, abortion, and indeed all matters that involved human sexuality and reproduction were excluded from the realm of issues that the then-young republic would address. In this context, disseminating information on these forbidden matters was tantamount to an act of civic disobedience that empowered individual citizens and the entire nation at once, disrupting the tacit contract to silence and shoving ignored issues onto the political agenda from below. Throughout the 1960s and 1970s, matters of reproduction not only became matters that started to be spoken about, but they also became subjects of a series of legal innovations, the last of which was the abortion law of 1978.

Today, sixty years after the establishment of the AIED, the moral economy that Flamigni and Borini seek to enlighten is slightly different. At issue is no longer the dissemination of suppressed knowledge on how to limit reproduction; today, the more immediate issue is providing in-

formation that could give ailing reproductive bodies a helping hand. Nor is it a matter of providing information where none is available. Today, it is not a lack of information, but – perhaps – an excess of information, which presents patients and consumers with the difficulty of not knowing whom to trust, in a situation in which political authorities actively “muddy the waters” (Flamigni and Borini 2012, 30). It is not ignorance through silence that the authors seek to challenge but “confusion” through an excess of public claims (Flamigni and Borini 2012, 12).

Shifting back in time once more might help us understand this contemporary confusion better. The story that moral pioneers such as the AIED kicked off in the 1950s culminated in a series of legal innovations, the last of which were “norms for the social protection of motherhood and on the voluntary interruption of pregnancy,” namely, the Italian Abortion Act of 1978. This law had been many years in the making. The process involved nasty controversies between those who drew on the Italian Republic’s commitment to protect the “inviolable human rights of man,” as enshrined in Article 2 of the Italian Constitution, to argue that embryos and foetuses belong to the moral community of human subjects, that the right to life is the most fundamental of all human rights, and that there could be no choice other than to continue to outlaw abortions. These arguments were challenged by those who argued that unborn human life could not be meaningfully endowed with personhood. These were parts of women’s bodies, and any civilized nation must realize that decisions about what to do with their bodies belong to the range of civil rights that an enlightened nation bestows on its (female) citizens.

With the first position articulated in particular by members of the *Democrazia Cristiana* (the catholic party which governed Italy for almost half a century) and the second one tied to members of the Radical Party, the moral economy of the abortion debates in the 1970s was very similar to the structure of contemporary disputes on the techniques of assisted reproduction. Today, there are those who lend their voice to defend the rights of those “who have no voice” – that is, embryos – with the difference that, in the meantime, the list of the rights of embryos has grown and now also includes a “right to identity”. On the other side of the debate are those who assert that the rights of embryos are not equal to the civil rights of full-fledged adult human beings, and who are now fighting not just for women’s rights to refuse an unwanted pregnancy but also for women’s rights to access to technology to have a (healthy) child.

And yet, historically, there is a striking difference. At the time of the abortion debate, a third collective of actors and arguments bridged these two positions. These actors – many of them members of the Communist and the Socialist Party – framed the abortion debate not as an ethical debate, nor as a debate on civil rights, but as a social issue. They argued that the question was not whether abortions were good or bad, nor whether women should be allowed to abort or not (they would abort, anyway); instead, the question that politics – that is, parliament – had to address was

*how* and *where* Italian women should interrupt pregnancies: in clinics abroad; or in clandestine spaces in Italy where the economically well-off risked their health and at times their lives; or in openly regulated spaces in Italy where state authorities would ensure that if women, any women, chose to abort, they would not have to pay with their health, their bodies, or their lives. I do not see such actors today who attempt to bridge the two positions on assisted reproduction.

Back in the middle of the 1990s, when these debates begun in earnest, those blessed with Catholic certainties were opposed by women such as Marida Bolognesi who admitted that these matters were difficult, that no answers were readily available, and that a different kind of politics, a politics that is ready to listen to the reasons of others, was needed. Yet, over the past two decades, such humble positions have disappeared. Today, Catholic truths, camouflaged as scientific ones, are challenged by technoutopians (if I dare to simplify it that much). They presume that to undo political and religious interferences into bio-medicine is the major problem. Today, both sides pretend to speak from nowhere. A ‘dialogue between deaf’ has emerged, that might well be the reason for all the “confusion” that the two authors seek to address.

In this context, providing the kind of information that the two authors assemble in their book might be empowering and enlightening. But it would be even more enlightening for individual patients and the entire nation, if Flamigni and Borini did not take for granted that others – patients traveling abroad or politicians making irrational choices – behave in irrational ways because they ignore the facts. Those others might well behave differently because they are motivated by other facts, concerns and wishes or phenomena that we – and not they – ignore. Making such an effort to understand the others better, or retreating from the assumption that science (or religion) contains all the answers, might be an act of moral pioneering of different kind, one that revitalizes the spirit of the AIED of the second half of the 20th century yet making it fit the needs of a nation wrestling with its moral and technological order as it confronts the 21st century.

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### **3. The Challenges of Pluralism in Reproductive Rights**

*Alexander Schuster*

Hardly do any other fellow Europeans suffer legal constraints in seeking medical assistance to fulfil their desire of parenthood as Italians do. The law that for the very first time regulated assisted reproductive techniques in Italy was passed by a parliament that held strong ideological



views (Law 19 February 2004, no. 40, *Norms related to medically assisted procreation*). It certainly filled a legislative *vacuum*, yet the matter was not at all previously unregulated. There were and still are professional rules of conduct. Their legal classification in the Italian context is debated, but they are undisputedly considered at least effective parameters for assessing medical negligence and conduct overall. The Ministry of Health had issued some administrative circulars as well as orders on specific points, such as importation and exportation of gametes (see also Hanafin in this issue).

The outcome of this law is still shaping the reproductive landscape of Italy. Cross-border medical assistance has since boomed. As the book underlines, the Italian Constitutional Court set aside most of the controversial provisions of the parliamentary act in its 2009 judgment. A key aspect that was found unconstitutional was the limitation on the maximum number of three for embryos that could be produced. It encompassed the obligation to transfer all embryos, notwithstanding the will of the woman, who, however, clearly never became victim of coercive measures. The law did indeed leave no margin of medical appreciation as to how many oocytes it was fit to fertilize given the age, the health history and the conditions of the couple, nor would it grant the possibility to freeze supernumerary embryos. Although some limitations have been neutralized by the judiciary, couples are not aware of the current situation and seek abroad what in some cases is or has become available again.

There are limitations that still obtain today. Section 4, paragraph 3 of the law prohibits heterologous insemination. The book went to print before the Grand Chamber of the European Court of Human Rights reached a different conclusion than the first section on 1st April 2010. The 17 judges overturned “S.H. et al. v. Austria” (application no. 57813/00) and found against the applicant couples that Austria acted within its margin of appreciation in permitting sperm donation *in vivo*, yet not *in vitro*. Following this, the Italian Constitutional Court remanded on 22 May 2012 the issue on the constitutionality of the legal prohibition entrenched in the law of 2004 to the referring courts. They were asked for a new evaluation of their doubts on the legitimacy. In March and April 2013 three new preliminary rulings from the courts of Milan, Catania and Florence were lodged and will be decided in 2014 (see Hanafin in this issue). Along with the prohibition on heterologous insemination two major obstacles still remain in force. The first one is surrogacy, the second is the subjective limitation. Only opposite-gender couples, either married or cohabitating, who are considered either infertile or sterile may revert to ART. As the book points out, the two terms used by the law bear a different meaning in the medical jargon. Infertility allows virtually any couple to access these techniques, for it is broadly construed as including those situations where, despite sexual intercourse, no pregnancy is reached within 18-24 months. It should also include *de facto* infertility, i.e. when

couples do not engage in sexual intercourse due to diseases such as HIV or genetic diseases that may be passed on to the child.

There are of course other prohibitions, such as embryo donation or the exclusion of scientific research on embryos. For a long time preimplantation genetic diagnosis (PGD) was excluded from the guidelines that are issued approximately every three years. While the first edition allowed for examinations solely for the purpose of observation, the 2008 guidelines removed that part and allowed PGD for avoiding sexually transmissible diseases on the side of the man. Nevertheless, embryo screening remained a contentious issue for other diseases, especially hereditary ones. Some judges ruled in favour of couples affected by this situation (see Hanafin in this issue). The book could not cover the decision by which the Strasbourg court declared the prohibition of PGD in violation of article 8 of the European Convention on Human Rights, which protects the right to respect for family and private life (judgment *Costa and Pavan v. Italy*, application no 54270/10, 28 August 2012). The provision has been considered inconsistent with Italian law in “prohibiting the implantation of only those embryos which were healthy, but authorising the abortion of foetuses which showed symptoms of the disease”.

This update on the Italian legal situation shows that significant parts of the law have been demolished by either Italian or European judges. Yet severe obstacles remain and the book retains all its usefulness. It will not be easy for many fertility clinics to quickly regain excellence in PGD and the significant high number of clinics on the national territory – as pointed out by the authors – impacts negatively on the average success rate of treatments. But certainly what forces thousands of Italians every year to expatriate is the limit to heterologous insemination and to the persons that may access ART. There was somehow a way-out. The regulation on importation of gametes was not renewed in 2004. The couple is not subject to any fine if insemination is carried out by them directly. *In vivo* fertilization becomes *de facto* possible. The possibility to purchase online from sperm banks self-insemination kits and have them shipped to Italy relied on a loophole and could be a more convenient in a cost-benefit analysis option if compared with travelling abroad. Only lately a new government order issued in relation to Directive 2004/23/EC (ministerial decree of 10 October 2012) toughened the rules for importation and exportation of embryos and gametes, placing them within the tight boundaries of Law no 40/2004 and its prohibition of heterologous insemination.

Whereas the focus of the book is on the medical data and the possibilities available abroad, there are other aspects that could be mentioned in relation to “cross-border reproductive tourism”. The authors could have focused on how a couple may take advantage of screenings and medical counselling in Italy so to reduce the services needed abroad. It would have been interesting to learn more on how a couple can bring with them reproductive cells to a foreign clinic. Cryopreservation of gametes is not forbidden in Italy and actually even foreseen as a medical protocol if

therapies may endanger the reproductive health of the patient. Besides well-known cases such as tumours, one may now think even of preservation of ovarian tissue or egg-cells of a transsexual person wishing to have her gonads removed for gender-reassignment surgery. The person should be entitled to withdraw the gametes and carry them abroad. The recent change in the Italian law on importation and exportation does not affect the intra-EU dimension and overall does not apply when the person is the owner of the gametes and these are intended for personal use. Yet the question arises: could Italy ban the importation of reproductive cells, which could be used for *in vivo* fertilization without any medical assistance? Do economic freedoms play a role?

The authors highlight the legal constraints that explain expatriation and the opportunities abroad. The law has, however, more to say than that. Among the matters that deserve further academic exploration we should mention the principle of extraterritoriality of legal prohibition, which can be found for instance in relation to surrogacy in some Australian legislation; the whole array of problems deriving from the non-recognition by the country of origin of children born abroad (for instance because surrogacy is against national public policy or because what is at stake is same-gender parenthood), which should ideally be part of the information Italian citizens are given when travelling abroad for reproductive purposes. Both legal and psychological counselling, along with medical counselling, should not be underestimated either. Stress increases dramatically when a desire for children faces obstacles, especially if they are not just legal, but biological as well. It is unfortunately not unusual that psychological tension has a disruptive impact on the couple's life and often even existence. Couples should also become aware that there has been at least a case in Italy where the child allegedly adopted or commissioned with surrogacy in Russia by an Italian couple has been taken away and given up to adoption. The case is currently pending in Strasbourg.

The title of the book by Carlo Flamigni and Andrea Borini is a play on words and could somehow transferred into English with *Hexternologous fertilization*, a mix of "heterologous" in relation to gametes and "external" in relation to the territory or jurisdiction. On a closing note, we can say that "*he(x)ter(n)ologous*" fertilization will lead to increasing case law at the European level. Europe is called upon to strike a fair balance between national pluralism in matters of reproductive rights and a common market and space of liberty and freedom.

Are services related to medically assisted reproduction economic services? In *Society for the Protection of Unborn Children Ireland Ltd. v. Grogan*, Case C-159/90, [1991] ECR I-4685, the Court of Justice of the EU dealt with domestic proceedings against Irish students associations which distributed information about the identity and location of clinics abroad where voluntary termination of pregnancy was lawfully carried out, and held that medical termination of pregnancy, performed in accordance with the law of the State in which it is carried out, constitutes a

service within the meaning of Article 60 of the Treaty (now Article 57 Treaty on the Functioning of the European Union).

How far can rules on goods extend to reproductive cells and tissues? What will be the impact of directive 2011/24/EU on the application of patients' rights in cross-border healthcare when its transposition by Member States is completed by 25 October 2013? Is information on what is available abroad protected by freedom of expression? This was the position of the Strasbourg Court in relation to abortion in *Open Door v. Ireland* (application no. 14234/88; 14235/88, 29 October 1992). Whereas counselling pregnant women in Ireland to travel abroad to obtain an abortion or to obtain further advice on abortion within a foreign jurisdiction was found unlawful by Irish courts, the European Court of Human Rights held that the restraint imposed on the applicants from receiving or imparting information was disproportionate to the aims pursued and was in breach of the Article 10 of the European Convention, which protects freedom of expression.

Can foreign economic actors such as EU clinics or US agencies advertise in Italy heterologous insemination and promote surrogacy in California by meeting interested parties on the Italian territory? Can an Italian lawyer assist a lesbian or gay couple willing to become parents according to the UK legislation? The clash between the State's willingness to protect public morals and everyone's right to build a family will soon write new chapters in both the Luxembourg and Strasbourg case-law, for it will remain a legal and political minefield for a very long time.

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# The Italian Pathways of Stem Cells

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**Abstract** In this contribution, we take a look at the future of stem cell research, with particular emphasis on human embryonic stem cells and induced Pluripotent Stem Cells (iPS). Their implications in terms of ethical and social issues are discussed through interviews with two top Italian scientists, Elena Cattaneo and Giuseppe Testa. In light of their answers, the introduction reflects on how stem cells research, interpreted from an STS perspective, allows us to observe the mutual adaptation between scientific practices which generate multiple biological artifacts, and the many ethical implications which characterize our biotechnological societies.

**Keywords** ethics; stem cells; standardization; bio-object; symmetry.

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## 1. Introduction<sup>1</sup>

In 2008, Geesink, Prainsack and Franklin affirmed that: “For stem cells, the future is now”. This sentence, written 10 years after the publication of James Alexander Thomson’s article (1998) about ES (Human Embryonic Stem Cells) in “Science”, became even more explosive in 2009 thanks to the discovery of iPS (Induced Pluripotent Stem Cells) by Shinya Yamanaka. Stem cells represent what Giuseppe Testa and Elena Cattaneo build on and call the “Holy Grail” of scientific research. Stem cells research allows researchers to intervene in the development of cells in all directions, and this means being able to change the destiny of the cells – the dream of every scientist.

As in the best tradition of studies of scientific controversy, the worldwide picture of stem cells research sees science and society at loggerheads. Some scientists, together with those sectors of society who pro-

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<sup>1</sup> Assunta Viteritti wrote the introduction and carried out both the interviews.

mote and sponsor adult stem cells research, believe that these cells produce results similar to those of embryonic stem cells. On the contrary, other scientists and sectors of society maintain that only human embryonic stem cells are capable of pluripotency, which allows them to differentiate into all types of cell. The juxtaposition between adult and embryonic stem cells seems to have been integrated, and in some ways overcome, with the emergence of iPS and the even more promising framework of cellular reprogramming. However, as the two scientists affirm in the interviews, many aspects of this important discovery still need to be perfected, and because of this, alternative pathways have not been set aside yet.

Today, many teams focus on the various pathways in stem cells research (adult, embryonic, amniotic, iPS, etc.), which do not exclude each other. In Italy, where embryonic stem cells cannot be produced, but can be used (by importing them from abroad), the debate has usually seen on the one hand the scientific community in favour of experimentation, and on the other religious authorities mostly against the use of embryonic stem cells. A similar situation can be found in Austria and Germany, while in the U.K. their use is legal (though limited to embryos no more than 14 days old). In 2011, the European Court of Justice defined the use of embryonic stem cells “immoral”, and it appears likely that patenting the discoveries deriving from experimentation with this type of cells will eventually be forbidden (although up to now approximately 100 patents have been produced in Europe). There are no limitations, however, regarding experimentation with (and the use of) iPS. In the U.S., on the other hand, stem cells research is gathering *momentum* and producing results and patents, while in the rest of the world Universities and Asian research teams, encouraged also by the Nobel prize awarded to Yamanaka, are entering the field. All this recently prompted two English academics to speak of *experimental ethics* (Sleeboom-Faulkner and Simpson Durham 2013).

In the two interviews, we wish to offer a panorama of the research in this field from an Italian viewpoint, through the words of two top Italian scientists working in their home country. Their work testifies to the differing, potential pathways which stem cells research has taken throughout the world. Giuseppe Testa focuses on the iPS perspective, while Elena Cattaneo points out the use of embryonic stem cells in the neural field, also observing iPS and their prospects in the diagnostic and clinical field. The two scientists’ narratives, far from being in contrast, are situated in an ideal *continuum*, where the cells’ ethicality is not assumed as a starting point, rather as an ongoing outcome, an open issue able to pose further questions.

Drawing on the two interviews, several aspects concerning the relationship between stem cells and their social and ethical standing can be observed from a STS perspective. Firstly, the many types of stem cells, which have come to the fore in research and literature in the last few

years, pose a question crucial to STS, namely how to standardize what is not yet fully known. As Eriksson and Webster (2008) point out, standardizing stem cells is an exercise in standardizing different things, which are as yet unknown: here we are dealing with standardizing unstable knowledge to be used in biomedical research.

Another interesting issue posed by stem cells research – a core theme in laboratory studies and one examined by Karin Knorr-Cetina (1999) – is that of the *artificialization of the natural*, meaning a naturalization of research objects in the laboratory. Experimental conditions have an epistemic function, in which the nature of biotechnological objects is transformed into different states in order to be produced, observed, handled, codified, formalized and standardized.

Stem cells are not ‘natural objects’, but they reach such a status while being artefacts-in-the-making within biotechnological laboratory practice, where they assume their second *nature* as bio-objects. In their diverse versions, stem cells are, from time to time, *epistemic objects* (Knorr-Cetina 1999), *bio-objects* (Vermeule, Tamminen and Webster 2011) and *boundary objects* (Star and Griesemer, 1989; Bowker and Star 1999), in relation to the role they play and the ontology they assume in the scientific practices in which they are generated and involved.

A different aspect regards the impact post-genomic research and translational medicine have had on stem cells (particularly, but not only, iPS), strengthening genomic research at clinical, molecular and protein level. As Elena Cattaneo says, the innovation is that: “you take the patient’s genome into the laboratory, and if you speak with the clinician you have all his clinical data”: the link is no longer between the scientist and cells only, as there is much more. Testa tells us that for the first time in the history of medicine, iP allows scientists to “tackle human genetic variability experimentally at molecular level”. With the post-genomic phase, on the one hand the study of cells is placed in a wider context; on the other hand, the distance separating basic research (the workbench) and regenerative medicine (the cure) is reduced. In this process, the patient becomes a kind of *active experimenter of knowledge*. All this opens up unimaginable ethical scenarios, which go far beyond the issue of saying ‘yes’ or ‘no’ to the embryo. Such scenarios connect the ‘do-it-yourself’ of local practice in many laboratories all over the world, with ethical and political issues yet to be conjectured.

In conclusion, two issues seem to emerge: firstly, the quest for stabilization of stem cells knowledge; secondly, the type of *symmetry* between stem cells science and the social issues that arise.

Stem cells research contributes to produce a variety of experimental studies, various artefacts and many research questions. This plurality of scientific resources sustains and fosters diverse issues, being them scientific and technical, ethico-social or a mix of both. These are closely related to the specific fields to which stem cells are anchored, from the viewpoint of their use and development. Among these are the study of cellular

and genetic processes, the modelling of particular diseases, the experimentation of differentiating protocols and cellular reprogramming, cellular transplantation and others. Therefore, no single field of stem cells knowledge exists, rather there are multiple fields producing *rhizomatic* segments, all in search of experimentation, reliability, recognition and standardization. This happens because stem cells, in all their biotechnological inscriptions, activate multiple, non-converging research questions and diverse forms of stabilization (or non-stabilization).

Given their impact on *sensitive and ethical knowledge*, stem cells are especially linked to the issue raised by Giuseppe Testa regarding the *value-based commitment* to which science is subjected. Scientific knowledge, as directly and explicitly motivated by an external value-oriented customer base, attempts to manoeuvre, and to solve, the ethical and political issues which emerge on a technical level. However, according to the two interviewees, it does not seem that this element alone succeeds in contributing to the development *tout court* of stable, reliable, exportable and converging knowledge in the biotechnological field. Further issues arise when knowledge is commissioned from scientific practice by external ethical requests, as in the sensational case of the stem cells produced by Altered Nuclear Transfer. These issues are not easy to address, because it becomes necessary to demonstrate both the ethical nature and the achievable results of the knowledge, no simple task in a practical context. The combination of these and other stem cells research pathways, stimulated by scientific and ethical cases from within scientific practice (such as the case of embryonic stem cells, rather than iPS), contribute to producing fields of knowledge which, far from being alternatives or juxtaposed, imply a plurality of technoscientific options with multiple potential applications in the biomedical field.

These pathways open up scientific panoramas which are perhaps not immediately applicable, but which attempt to answer ethical issues, multiply research questions and to build future scenarios. One without the other is *unthinkable*, one calls out to the other, and generates it. The plurality of research into stem cells is activated in reply (or posed as a question) to the plurality of ethical issues the bench puts to the test: it is knowledge in search of stabilization which in the meantime opens up prospects, questions and visions of the future.

As Geesink, Prainsack and Franklin affirmed in 2008, “for stem cells, the future is now”, but it can also be said that, at the same time, the future has not been written yet. We are taking part, or will take part, as our interviewees say, in a mutual adjustment of scientific practice capable of generating multiple biological artefacts and their multiple ethical implications. Perhaps this will contribute to building a more biotechnologically mature society.



## 2. iPS, Bioscience and Value-oriented Customer Base

*Giuseppe Testa received a PhD in Biology and Molecular Genetics from the European Laboratory of Molecular Biology (EMBL) in Heidelberg with a thesis on genetic engineering. He runs the epigenetic stem cell laboratory at the European Oncological Institute in Milan. His research focuses on the mechanisms which regulate stem cells differentiation in order to develop new regenerative therapies. He has done scientific work at the Max Planck Institute of Molecular Biology and Genetics at Dresden University and in other leading research centres in Europe, the US and Japan. In 2002, he founded the Science and Society Forum at the Max Planck Institute with a view to promoting awareness and debate on social implications of biotechnology. He went on to achieve a Master's degree in Bioethics and Biological Law at Manchester University. At the John Kennedy Faculty of Political Science at Harvard University, he was visiting fellow lecturing on the legal and political implications of biotechnologies. Author of numerous publications on genetic engineering and human disease models and studies of science and technology, he has received significant recognition including an honorary PhD in Biotechnology awarded by the European Association of Higher Education in Biotechnology (HEduBT) for his excellent research in the biotechnological field.*

**AV** – *Can you tell me how you came to tap into stem cells in your scientific work?*

**GT** – It happened in 1997, after graduating, when I began my doctorate in Biological and Molecular Science at the University of Milan (the EMBL). At the time, stem cells were fundamentally a tool for producing mice with which we could study illnesses and reconstruct the functionality of genes. My PhD project involved leukaemia in mice, and I used a series of new techniques which adopted embryonic stem cells to produce mice. In that phase, the stem cells were a tool linked to man in a very indirect way. Up to '98-'99 embryonic stem cells fundamentally remained a working tool for research on mice. A lot of people thought that they would remain a kind of oddity, for a whole series of reasons including ideological ones, an idiosyncrasy in mice which wouldn't necessarily be found in other species. In '98-'99, though, human embryonic stem cells burst onto the scene, with all their new potential. An ethical/political controversy (which has also produced a wealth of STS literature) erupted and brought the bioethical conflict in western society to almost unheard-of levels of prominence. The day after the news about the Dolly cloning was announced, Clinton declared: "We must stop this from happening". There's a political investment in this we've never seen on other occasions. Naturally, those years were filled with great ferment, in the quest for that which I would have called in an article some years later the "Holy Grail": everybody hoped to get an embryonic stem cell without having to start from the embryo – some for ethical reasons, some for reasons of mere feasibility. Many said it would be impossible, that you would need to change

too many things to take a differentiated cell from our body, like skin or neurons, and make it into an embryonic stem cell. So in 1996, when I was at the first conference in which Yamanaka presented the data on iPS before it was published...I remember as if it were today the mix of excitement, sheer bewilderment and also great disbelief on the part of some. Then, too, the experiment had been carried out on mice. Ten years later, in 2007 (after Dolly), human iPS are generated. In ten years the prospects of regenerative medicine changed completely, and above all also changed the prospects regarding the role of medicine in making models for the disease. Today, fifteen years later, I find myself running a laboratory in which human iPS are used to model diseases.

**AV** – *So you switched your focus from embryonic stem cells to iPS...*

**GT** – Yes, we have never used human embryonic stem cells in the laboratory, but murine embryonic stem cells as scientific objects to be studied in themselves, their differentiation, above all in the neural line. After Yamanaka's work, we moved on to reprogramming through mouse iPS to study the epigenetic mechanisms which allow a cell to change its identity – surprising at that time, but not anymore. The other passage was moving on to human iPS. This time we don't use them to study the reprogramming mechanism, but as models for diseases. We reprogram patients' fibroblasts in iPS cells and we differentiate them into neural stem cells of the cortex, because cortex neurons are involved in autism and mental deficiency, the two illnesses we study.

**AV** – *In your opinion, do iPS solve the ethical problems arising from embryonic stem cells, or do they create new ones?*

**GT** – iPS don't solve the ethical problems, they pose several. They certainly allow us to do practically everything we want with our body, at least potentially. They open up a whole scenario of social, political and ethical options. For example, according to the Athens Group's last Consensus Conference, which I took part in some years ago, based on the results we have already obtained it's highly probable that in ten years time (bearing in mind the limits which always invest scientific prophecy and all necessary caution) we shall be able to produce functioning gametes from iPS cells. This means that we can take reproductive cells from the skin, for example. Given that the cost of sequencing DNA has fallen dramatically, we can hypothesize for the first time the mass production of embryos *in vitro* and the screening through sequencing. It's therefore difficult to say whether iPS either solve or create ethical problems. In the first place, I should say that there are technical issues. For example, they present a security problem linked to how they are generated. Our laboratory, for example, is one of the seven or eight in the world chosen as a reference point and where we use only the technique based on mRNA. This means

that we don't use viruses anymore...and this is an enormous step forward because we avoid integrating the virus into the cells, so we avoid a whole series of risks to the genome's integrity linked to the use of viruses (...) Furthermore, the more profound aspect is: how well do we know how to control iPS *in vitro*? If we want to use them to understand certain illnesses at specific stages of cells development, how do we know that these are the right ones? A lot remains to be done on this, because it's a job which involves the standardization of cellular models, to use the correct terms (...).

**AV** – *What's the story behind ethical stem cells? How was this term coined and how is it used in Italy?*

**GT** – It's talked about a lot in Italy. Every so often articles are published. There has even been talk of the Italian pathway to stem cells, but I've rarely heard the word "ethical" associated with stem cells in America. Of course, people speak of ethical solutions to the issue of stem cells. This story started in America, and was an attempt on the part of some bioethicists, politicians and investors to solve the bioethical controversy (...). A first example of what became known as ethical stem cells were the cells produced through Altered Nuclear Transfer (ANT), which became well-known also thanks to my work. In the American bioethics committee appointed by George Bush, there were people who opposed embryonic stem cells research and among them was a bioethicist doctor who called for the production of ethical pluripotent stem cells. He would never call them "embryonic" because they possess a certain type of genetic breaker which removes a gene from the future embryo. Without this gene the placenta does not develop. You start from the oocyte, the nucleus: at the time, there was talk of cloning. You remove this gene from the nucleus of a somatic cell, from the skin, for example, and then you insert an oocyte. Development commences, but it can never be successful because an essential component is missing. In my opinion, this example appears very interesting, this first triangulation is extraordinary: a bioethics committee (which in America is appointed by the President and is, therefore, a direct emission of executive authority) explicitly delegates to science the finding of a technical solution to a moral issue. In this, the U.S. have been very honest: a political solution cannot be reached, so let's seek a technical solution which can also solve our political problems. An artefact which is not an embryo, because it has never become an embryo and will never do so, is therefore produced. This idea from the bioethics committee is commissioned and translated into fact in the laboratory and subsequently published in *Nature* and this artefact is rendered morally legitimate by imitating nature, which is elected as the source of responses to dilemmas regarding values. We know that many episodes of natural insemination are unsuccessful because the embryo develops but does not take root: these precocious failures are a part of nature. In the ANT project we pro-

pose a kind of imitation of these natural failures in the laboratory. This brings us to an interesting point: who can say that also the end product of this strategy is never an embryo? What if I were to tell you that it starts off as an embryo, but then on the fifth day it dies because it needs that gene and it can't find it because it has been removed? As a matter of fact, this doubt induces the American bioethics committee to fly over from Germany one of the greatest scientists in the stem cells field and ask him: "How many genes need to be altered in order to be sure that this thing we've produced is no longer an embryo?". To me, our whole era lies in this question...

*AV – Has the knowledge gleaned from Altered Nuclear Transfer (ANT) become accepted? Does anyone work with them?*

**GT** – The work was published, and in 2005 ANT became a technological object. However, this was in 2005, and one year later, in June 2006, Yamanaka began to speak of iPS. I would say that the ANT story is well and truly over, even though it's an interesting one, rich in implications. Today nobody works with ANT anymore, but the idea of "value-oriented customer base", of scientists who are more and more engineers for commission, has become more of a reality, to a point where Yamanaka affirms in his first article that the driving force behind his accomplishing what everyone thought impossible, i.e. iPS, is also an answer to the ethical issues surrounding embryonic stem cells. That's what he says today.

*AV – So there's also a kind of value-oriented customer base research? A demand which doesn't arrive directly from the workbench, but arrives at the workbench...*

**GT** – I've cited the stem cells case as an example of how scientists become the executors of a value-oriented customer base, like an engineer or an architect who builds a bridge or a prison to order, in various articles. Of course, according to whether you build a prison or a bridge, the value-based commitment to helping people communicate or keeping them locked up is materially inscribed into that work. The political establishment says to the scientist: "Create a stem cell according to value-based criteria, using the latest biogenetic engineering techniques, so that your product doesn't give me any moral problems". The scientist goes into the laboratory, does this and publishes the outcome in the most prestigious journals in the world, also conferring an official stamp of recognition to his/her discovery. In my opinion, this is an example – not necessarily the only one, but surely absolutely unprecedented in this field – of explicit value-oriented customer base. The bio-scientist or biologist, however you want to call him/her, becomes the executor of a program of values. This is the most interesting aspect of iPS, over and above whether we've solved the ethical issues or not...

**AV** – *But today it's iPS that have this ethical label...*

**GT** – I don't think that embryonic stem cells present any ethical problem whatsoever. There are vast segments of our society that don't think so either. Undoubtedly, iPS don't need a human embryo produced by *in vitro* fertilization. There's a huge ongoing debate about this, and I've taken part in it with an article written together with two of my students in the "American Bioethics Journal". The classic argument of the bioethicists who oppose the use of embryos is that of the potential: "It's not the embryo itself that needs to be respected, but we must respect it because potentially it could become a person". However, Yamanaka's experiment definitively demolishes the argument of the potential, as I demonstrated in my article in "Stem Cell", and shows how it is open to attack in many ways. After the Dolly cloning and Yamanaka's work, some bioethicists raised doubts. If every cell has this potential and all that's needed is to make it manifest, this is the tombstone on the argument of the potential, unless you want to maintain the necessity of taking care of all our cells because they're all potential people. Therefore, I and others maintain that rather than closing the bioethics issue, as many would have wished, Yamanaka's experiment opens it up because it poses a problem linked to potentiality, transforming it into a property which is not associated with a certain type of cell, but with a cellular state which is somehow interchangeable. Of course, ethical problems have also been posed regarding embryonic stem cells. One of these was the De Coppi case, which Elena Cattaneo also mentioned in an article. This regards the theme of amniotic liquid stem cells, which were declared to be ethical by their discoverer. Before Yamanaka, embryonic stem cells bore the stigma of immorality, not only in Italy but worldwide. Therefore, any attempt to do the same things with other types of stem cell, including amniotic stem cells, was hailed as the 'Holy Grail'. These stem cells have been criticized too, though, by Elena Cattaneo herself and other scientists: although they are said to have the same properties as embryonic stem cells, it seems that with amniotic ones it is not possible to differentiate neurons.

**AV** – *This multiplicity of bio-objects would seem to allow and give voice to the articulation of a multiplicity of ethics as numerous as the multiplicity of ontologies produced with stem cells...*

**GT** – Exactly. One thing is certain: there is a plurality of ethics. At a time in which life sciences become more and more a kind of engineering do-it-yourself, assembling and disassembling, evidently an even greater plurality of customers becomes possible. If I think that the human embryo possesses a moral dignity right from the first day, I'll ask the scientist to imitate natural failure *in vitro*; or, for example, believing according to Muslim precepts that the soul arrives on the fortieth day, I'll ask for an em-

bryo that stops developing on day forty.

**AV** – *But do you believe that iPS are replacing embryonic stem cells in the laboratory?*

**GT** – Mainly, yes, but there's still a need for standardization and to have embryonic stem cells as a reference point, both for some demands of basic biology and for many prospective applications, to have the possibility of comparing iPS with Human Embryonic Stem cell. Having said this, there are many human stem cells, and many lines in the world. Some of them are well-known and standardized, so they are used as a reference point. Embryonic stem cells can be taken from embryos *in vitro*, generated in the majority of countries during assisted insemination attempts when the couple involved permits the donation of embryos. This limits the choice of the type of stem cell which can be obtained: the number of embryos is very limited, above all in the case of rare diseases such as Huntington's, for example. For this, iPS are extraordinary: if you want to study diabetes, you select fifty patients with diabetes so that they have the clinical characteristics which correspond to the requirements for the study, and produce the iPS from them. Therefore, in the study project you have a possibility of prospects which you can never have with embryonic stem cells. Today, iPS are both a point of arrival and departure. Human embryonic stem cells represent a *gold standard* reference point, but undoubtedly the further we go on, the more and more important iPS will become. In a context of STS sensitivity, embryonic stem cells represent a *gold standard* today in that they are a natural model but produced in the laboratory, given that the embryo is *in vitro*, transited in culture. Pluripotency, which is a property of the embryo *in vivo*, is captured *in vitro*. They seem more natural, while others (iPS, for example), seem more artificial, and for certain aspects they are: even though they are extracted, cultivated, etc., they undergo a process which is in itself unnatural. Therefore, embryonic stem cells are the *natural gold standard*, but as we go on, the more problems we pose regarding this notion, the sooner the day will come when we use only iPS. It's a natural process, and as Latour said, it's both a point of arrival and departure.

**AV** – *In your opinion, which of the stem cells pathways is the most promising today?*

**GT** – I should say that the first road is that of modelling diseases. In the history of medicine, our capacity for understanding human diseases has until now been limited by one important factor: that of accessing the patient's tissue, for obvious reasons, because it's in a person's body. Furthermore, the problem is accessing it in phases which make sense: for example, there are many brain banks, but of course of brains *post-mortem*. Obviously, for some illnesses this lack of material is less serious: blood

disorders, for example, which historically are those where the greatest progress has been made. But as far as disorders of the brain or other organs are concerned, we have been unable to gain access for a long time, and our only tool for modelling diseases has been the mouse. However, it's obvious that the mouse as an organism is intrinsically limited, above all because it doesn't give us the possibility of studying how human genetic variability contributes to diseases, unlike iPS (and this represents the great innovation of iPS). For the first time in the history of medicine, iPS allow us to tackle human genetic variability experimentally. For the first time, you can take an unlimited number of people with the same pathology, or differing degrees of the same pathology, and finally ask the question: "What contribution does their genomic variability make to this pathology?" (...). Of course, as this intellectual and practical challenge goes on, large-scale experiments for the pharmacological screening of these cells have already begun, and this is perhaps a sign of our times. In these cases, the area of application is certainly most promising. Then there's the other story, making Prometheus' dream come true: the idea that with iPS research we can make our skin a bank of replacement organs. One day we'll be able to take skin cells, or even hair cells, and produce *in vitro* cells, then tissue, then one day organs, which at that point – being genetically identical to us – can repair, replace or maybe in the future even improve parts of our body without any problems of rejection. Obviously, there are a series of motives which can easily be understood and which are linked to the security of these approaches and an all-important level of regulation, as well as the feasible application of all this in a healthcare system. Let's say, however, that this future prospect, Prometheus' frontier, is what I can certainly see on our horizon, *albeit* one which is still far off.

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### 3. Scientific Reasoning and Plurality of Ethics

*Elena Cattaneo, PhD in Biotechnology from Milan University, studied stem cells and brain progenitors at MIT in Cambridge, USA. On her return to Italy, she continued her stem cell research and started up new lines of research into Huntington's disease. In 1994 she founded her laboratory at the Faculty of Pharmacy in Milan, where she has been full professor since 2003. She founded the Unistem Stem Cell Research Center at the University of Milan. For many years her laboratory has been a member of the "Coalition for the Cure" promoted by the Huntington's disease Society of America (H.D.S.A., New York) and has taken part in research activities on behalf of the Hereditary Disease Foundation (H.D.F., Santa Monica, California). She has published many works on stem cell research and Huntington's disease, and among the numerous awards she has been given are the "Science award for Medicine" (2001) and the Italian Presidential Medal, which she received from Carlo Azeglio Ciampi. In 2002, she was nominated National Representative at the European Union for Genomic and Biotechnological Research (2003-2006) by the Ministry for*

*the University and Research. In 2007 she took part in the National Committee for Bioethics both as a member and Vice-President. From 2009 she has been coordinator of the European NeuroStemcell project funded by the 7th European Research Framework Program.*

**AV** – *Was your laboratory the first in Italy to use human embryonic stem cells?*

**EC** – I believe so: in 2005, and later on with the EuroStemCell project, we were the first in Italy to receive ethical approval regarding the use of these cells at Milan University. Then, still in 2005, there was a referendum on medically assisted procreation, which set limits for embryonic research and posed some problems. At that time I was vice-president of the National Bioethical Committee, and I think the fact that I stated we used embryonic stem cells in my laboratory didn't go down well. In Italy, the limitations regarding the use of stem cells have always been those imposed by Law 40 on medically assisted procreation, which states that we cannot derive them ourselves, but we can obtain them from abroad and import them, as we did, in the context of the several international collaborations and EU-funded research consortia we belonged to. What really annoyed me for some time at the beginning was the code of silence, even among several of my colleagues: some of them came to my laboratory to try, understand and learn to use these cells, but when they should have spoken out and said that they used them in their laboratory work in Italy, most of them kept their mouths shut. I didn't want to be the one who got around the law and went abroad, but I wanted to eradicate the idea that a good scientist doesn't use stem cells and an unethical one does. In my opinion, this was and remains a trivialization of values. Therefore, with the referendum in 2005 I engaged with the Italian Radical party as I wanted to help them getting things the right way (...) initially in public they were declaring that it wasn't possible to work with stem cells in Italy and it wasn't true. Instead, I wanted people to know that we could legally work with these cells and I wanted people to know why I wanted to work with these cells.

**AV** – *Because it wasn't true that it was impossible to work with embryonic stem cells in Italy, and at that point you stated your position publicly.*

**EC** – Yes, of course they could be used in Italy and I didn't want to be branded with the mark of the unethical scientist. I wanted to express my opinions, explain the whys and wherefores. There was a vote and the referendum was lost and then immediately afterwards I was appointed to the National Committee for Bioethics in 2006. I believe I was chosen because I represented a certain stance, a scientist who both stated she used them and declared herself to be a Catholic. In the course of that year I organized a convention here in Milan and a public issue arose. I was vice-



president of the National Committee for Bioethics and Casavola, a Catholic jurist, was still president, and at a certain point he fired the three vice-presidents, including myself. I read in a newspaper that I was dismissed. I remembered talking with the president on the phone when I was nominated, as I wanted to make sure that he regarded as valuable for him and for the Committee to have a scientist as vice-president. Acting as vice-president was not a favour, for me. I remember approving the fact that the president of the Committee for Bioethics was a jurist, it gave me the feeling he was principled, someone who would seek the truth. I thought, however, that after being on the receiving end of a public attack at the convention in Milan, a plot hatched somewhere to make me bear the brunt: I was the one who used stem cells in my laboratory (...). I remember that one day, the Catholic jurist Francesco D'Agostino arrived at a meeting and said: "Scientists have published this article on amniotic stem cells. That's it! Embryonic stem cells get shelved!"

*AV – How many scientists sat on the Committee?*

**EC** – Myself, the pharmacologist Silvio Garattini and Emilio Piazza, a geneticist from Turin. In February 2007, there was an international workshop on embryonic stem cells in Milan and patently organized pandemonium ensued. I was harshly attacked by some Catholic students whom I later met and clearly understood to be incapable of having done everything by themselves. The message was directed straight at me, I knew I was their target because the convention had been organized by Fulvio Gandolfi<sup>2</sup> and myself. Had the convention itself been the target, the letter which was later made public would have been sent to the organizers, but I think I was their target because at the time I was the only declared Catholic who was both a member of the National Committee for Bioethics and worked with embryonic stem cells. The public letter, which also appeared in the press asked "How can you work with embryonic stem cells without asking yourself what an embryo is? Isn't it human life?". After becoming publicly involved I remained silent for weeks before replying in the national press. I consulted a lawyer and tried to understand whether there was anything I needed to protect myself from: he told me that at that moment there were no grounds for appeal, to stay alert. We spoke again, I paid his fee and stop. The story then appeared in the press and continued to circulate because something like this is fairly unusual in the university environment. And when you are in the middle of something like this you immediately realize that you are alone and that some people

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<sup>2</sup> Expert in embryonic stem cells and the reproductive sphere. Full professor at the Faculty of Veterinary Science where he teaches Embryology and Genetic and Cellular Therapy, head of the Laboratory of Biomedical Embryology and one of the four founders of the Interdepartmental Center for Stem Cell Research – UniStem – at the University of Milan.

were enjoying this. I felt sick. I had colleagues accusing me of having brought politics into the university. I felt really left out in the cold but I received support from colleagues from different departments in Italy. This happened in February, then came March, April... I went back and forwards to the Committee in Rome every month and then in July Casavola fired the three vice-presidents and a month later I appeared before the Committee and asked to make a speech. I said that although I had decided to leave the Committee, before doing so I wanted to speak my mind. My speech can be found on the net<sup>3</sup>. I began by saying that I failed to understand how nothing should be said about us being dismissed: I had offered my services to the Committee without payment, taken on a lot of extra work as well as taking part in the meetings. Then I was thrown out of the vice-presidency on my ear and for no clear reasons, to my view, and nobody had anything to say. I started my speech and I went on to speak for 45 minutes. I said all I had to say, trying to reason things out, I mean, why what the President had done that wasn't right, then I resigned according to a text, which has since become public knowledge. This was in October 2007.

**AV** – *There was another story which saw you in the public eye, one also linked to the embryonic stem cell research theme ...*

**EC** – This second story dates back to 2009, when a public tender notice regarding stem cells and their therapeutic prospects was issued by the ministry. My colleague Giuseppe Testa summarized all this in his contribution<sup>4</sup> in a curious way, as he linked our case (I carried it out along with two other scientists, Silvia Garagna e Elisabetta Cerbai) with that of two American researchers who opposed the Obama administration because it had come out in favor of embryonic stem cells. He put the two cases together and said that here in Italy there are researchers who aim to open up the research field to stem cells, while in the US those two researchers were tending to close it. A good piece. It was a tender notice from the Ministry of Health on stem cells and their potential application which included this phrase: “No embryonic stem cells”. We contested this<sup>5</sup>. In any case, why should a government decide what scientific means can be used to achieve a goal? The government defines the aim, the means are up to the specialists, also because Law 40 permits the use of human embryonic stem cells. They are scientifically relevant, and blocking a scientist from

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<sup>3</sup><http://159.149.74.38/webpage/Scandali/Cattaneo%20CNB%2026%20Ott%202007.pdf>

<sup>4</sup> Testa, G. (2012) *Stem Cells and the Structuring of the Italian Biopolity*, in R.G. Mazzolini and H.-J. Rheinberger (eds.), *Differing Routes to Stem Cell Research: Germany and Italy*, Bologna and Berlin, il Mulino/ Duncker & Humblot, pp. 225-249.

<sup>5</sup> [http://www.unipv-lawtech.eu/files/Appello\\_staminali\\_finale\\_CdS.pdf](http://www.unipv-lawtech.eu/files/Appello_staminali_finale_CdS.pdf)

doing research that is scientifically relevant and legal to me is an abuse of power. Anyway, we took legal action, we appealed to the court. Silvia Garagna is from Pavia, and she told me this issue cost her a lot. Together with colleagues at Besta Neurological Institute and Stefano di Donato<sup>6</sup> I had prepared a project and submitted it to that tender notice. In the meantime, we had requested a suspension, so you have to go to the Regional Administrative Tribunal to get the tender notice suspended and they decide whether it is valid or not. The Regional Administrative Tribunal refuses our request for a suspension, so we take it to the Council of State where it's refused again six months later. In the meantime the tender notice is published, and on expiry the money is assigned and we are left with our ideas in the drawer (...).

**AV** – *And was the project you presented ever evaluated? Did anybody ever tell you anything?*

**EC** – We never heard a thing. I had also written an accompanying letter in which I said that we were submitting, but were aware that, etc., etc. From a legal viewpoint, the two steps we took (Regional Administrative Tribunal and Council of State) requesting a suspension never got as far as the Tribunal, so the issue is still open. Six months ago our lawyer told me that they've got five years, and just continue to postpone it. I don't know whether this is because they've got better things to do, at this point the tender notice has already expired, the money has been assigned, the projects carried out and we haven't heard anything (...). I want my lab reimbursed by the State, as the State has prevented our ideas from being evaluated. The absurd thing is that in another national tender, a PRIN call for proposals, we stated that we use stem cells for our research... and we were funded. This aspect reminds me of the case of a German colleague, Oliver Brüstle, (this story too is narrated well in the book containing the article by Giuseppe Testa). In 1997, before the discovery of human embryonic stem cells, Oliver submits a patent for one of these differentiation methods. However, he had also foreseen the use of other cells, and the patent was extended to cover human embryonic stem cells, which in the meantime had been discovered. The patent process goes ahead, and when it reaches the European Patent Office it's blocked because in the meantime Greenpeace has sued Oliver because his patent is contrary to public order with reference to the EU directives on biotechnologies, which state that the human embryo cannot be patented. But these aren't human embryos, they aren't even cells, but only a differentiation method (...). Greenpeace sues and the case arrives in the German Federal Court, which decides not to make a ruling but to consult the European Court of

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<sup>6</sup> Dr Stefano Di Donato, MD, was Chairman of the Department of Research, and Director of the Division Biochemistry & Genetics at the Istituto Nazionale Neurologico Besta, Milan.

Justice in order to find out what an embryo is. The European Court of Justice rules that the embryo and its derivatives cannot be patented. Therefore, following this logic, neither can anything connected with the product of conception, neither can you research and patent contraceptive methods (...). In any case, from a patent point of view, Germany still has to decide what to do, they're agonizing over this, there the case is proceeding, like in every other State (...). In Europe we may lose 300 patents, I believe all the European patents will expire: just think how happy they are about this in the US. They've killed off all the European patents linked to cultivating human embryonic stem cells, so obviously you can decide to patent them in the US or Japan. Oliver's story sure is crazy.

*AV – At a certain point, research fields which try to get around the embryo issue developed. There's talk of ethical stem cells. What can you tell me about this?*

**EC** – The story starts in the US in 2004, I believe, with some senators...I think the first was a senator or an expert from the ethics committee...and he says: "What if we create a blastocyst which has mutated?". It was a senator who clearly had an interest in the matter. So if we create a blastocyst which is mutated and can't take root in the uterus, this is ethical, it doesn't involve the embryo, we can isolate embryonic stem cells from such an entity. This issue was linked to therapeutic cloning, and the aim was to get the cells you want, so embryonic stem cells too, from a source believed not to be a person. Therefore, you modify this source so that it can never become a person. This was right in the middle of the Bush administration. Some scientists take cells from the skin of a mouse mutated for the gene which would make the blastocysts take root, they extract the nucleus, they put this nucleus in an oocyte with the nucleus removed, so now this is like therapeutic cloning. However, this oocyte with a new nucleus develops a blastocyst, which is mutated because the gene, which would make that blastocyst take root, has been cancelled from the original nucleus. They extract the embryonic stem cells with the idea that these are ethical because they're derived from a de-nucleated oocyte (...) there was a good commentary on this in the "New England Journal of Medicine" in 2004, which spoke of disaster in the distorted relationship between science and politics.

*AV – Does this ethical stem cells theme involve other research teams, perhaps also Yamanaka's?*

**EC** – Yes, of course, also Yamanaka. He has always said that an experiment published by others made him curious. At that moment people were looking for solutions, to my view not because they were ethical or non-ethical, but because they weren't able to go ahead with therapeutic cloning. If you take the stem cells, the fibroblasts and you unite them

with embryonic stem cells by using an adhesive, then you get bigger cells. However, the most interesting thing is this nucleus – that is, you pretend you have two nuclei – this nucleus is reprogrammed. So he says that when the two cells are placed in contact, inside there's stuff which reprograms the nucleus of an adult cell, and that's where he got the idea of reprogramming. He evaluated what can be in there, and started with 24 genes. Yamanaka says that reprogramming helps to avoid the ethical problem but he also says that we need human embryonic stem cells (...). When I travel around the world to conferences, this topic is not an issue, among scientists it isn't discussed like this, ethical stem cells and things like that are not spoken of. The so-called ethical stem cells are not an issue in the laboratory, but a public issue. Yes, maybe it's a topic for some scientists. For me, the ones that I have are ethical, and I don't know why I should have to find others. They are ethical and they produce the neurons we want to know more about Huntington's disease. No other stem cells can do it better nowadays. This idea of ethical stem cells assumes that some scientists are working with non-ethical stem cells, that some scientists are not ethical. That is, one can say that they don't work with embryonic stem cells because in his or her opinion they aren't ethical, but that doesn't mean they think that those who use them aren't ethical. Then again, in the application field no distinction is made between ethical and non-ethical. I can't remember a conference in which this was a topic for discussion, this is an ethical-philosophical debate, not a scientific one. I understand perfectly that society has the right to say ethical/non-ethical, or things like that, but in science we try to pursue things that work, that have reliable, rational prospects. And I see a lot of ethical values in this. That senator's famous experiment was binned despite the fact that it was published in "Nature", because it wasn't supported by scientific reasoning. It's obvious that if you mutate a gene from a blastocyst and you know from a whole load of experiments that it won't take root, where's the scientific strength in this? The value to be found in experiments is their scientific result: of course, if in future we have an amniotic stem cell, and they tell me it's ethical, and I can extract a wonderful neuron from it, I'll certainly work with it. Now, however, I certainly can't get the neurons I need for my studies on the disease from amniotic stem cells, and I want results, so I pursue them: if they're real, useful, credible results I pursue them (...).

*AV – However, some scientific objects have thus been labeled...*

**EC** – Whether they survive or not, it doesn't depend on their ethical label, but on their scientific value (...). In all sincerity, I find it difficult to imagine future scenarios, unlike many of my colleagues who are able to. I have to take one step at a time, and from what I see I should say that I think we still have to learn from methods of differentiating embryonic stem cells and they will continue. With regard to iPS, of course I'm very

curious to see how they behave. In my opinion, the key factor is that you take a mature cell and its genome and you can reprogram it into the laboratory and if you speak with the clinician, the clinician has all his clinical data. The innovation is in this combination of laboratory and clinician, more than in the cell itself. From a clinical point of view, they're really studying Huntington in a huge number of ways and they're coming up with extraordinary things with regard to symptoms (...) this means that in the genomes of different patients, there is something that distinguishes them, which is outside the gene: if you place their tissue, their cells, their genome *in vitro*, perhaps you find a method for studying things that you can't even imagine *in vivo*. You try to understand how they can be different as regards age at onset, because if you find this out you push the one with the first onset twenty years on, which is usually the timescale of the disease. If it's in the genome you take it to the laboratory and you study it with the iPS, differentiating the neuron, etc., and what distinguishes the two genomes and what functional aspects distinguish them: however, in order to work well with iPS, you must be familiar with embryonic stem cells (...). Then there's the big issue of cellular reprogramming as scientific knowledge, there's this DNA, which unravels and begins to talk. This is disturbing, aside from the therapies and the illness, this is scientific knowledge to be placed on a pedestal (...). With stem cells or iPS you can intervene in the process of cellular development in every direction. This means you can modify the cells' destiny. This word, destiny, is the one we'd all like to hold in the palm of our hand, and in the laboratory you can hold it in your hand and here they attack you saying you're a scientist who wants to modify cellular destiny so you become like Frankenstein.

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# STS in a (Post)Socialist Context

## Science and Technology Studies in Croatia

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**Abstract** This paper presents an outline of science and technology studies (STS) in Croatia in both the socialist period and the transitional (or post-socialist) period. Introductory remarks delineate the social and intellectual context of Croatian STS in both observed periods. A brief sketch of early STS follows - primarily philosophical, historical and economic studies. The central section of the article is a presentation of Croatian sociological studies of science and technology from the early eighties until the present. The interdisciplinary issue of Croatian STS is discussed in the conclusions.

**Keywords:** Science and technology studies; Croatia; socialist period; transitional/post-socialist period; interdisciplinarity.

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### I. Introduction: Social and Intellectual Frames

The presentation of science and technology studies (STS) in a particular country/society, rests on the presumption that this scientific field is precisely defined, which may be questionable. Two different publications, an older qualitative book chapter and a recent quantitative journal paper, claim that two distinct research streams have been simultaneously growing apart in this field - qualitative and quantitative science and technology studies (Edge 1995; Martin *et al.* 2012). The authors, contrary to more exclusive views, classify both streams in the same field: science and technology studies. Moreover, Edge (1995) pronounced and observed the beginnings of their creative reconciliation. Such a view, acknowledging the heterogeneity of the observed field, also underpins this paper on Croatian science and technology studies. The theoretical and methodological implications of that standpoint are reflected in the coverage, range and selection of the S&T studies analysed. Due to the author's own professional profile and interest, sociological studies of science and technology are the main subject of this analysis.

In line with the importance of the social framework of any meta-analysis of science and with the STS theoretical and methodological credo, the social and intellectual context of Croatian science and technology studies has to be delineated, even for a well-informed reader. A more relevant reason for this background is that in STS literature the specificities of post-socialist, transitional countries are often neglected and overlooked, in both a theoretical and an empirical sense. Theoretical models, such as post-academic science (Ziman 1996), the new mode of knowledge production (Gibbons *et al.* 1997), triple helix (Etzkowitz and Leydesdorf 1998), academic capitalism (Slaughter and Leslie 1997), and science in the agora (Nowotny *et al.* 2003) have been identified in the social and techno-scientific context of the most powerful economies, of comparatively huge investments in R&D and of competitive research systems. Therefore, these models are not theoretically appropriate for S&T studies in socio-culturally, politically, economically and techno-scientifically different, post-socialist societies (Prpić 2007), nor they are necessarily very inspiring for empirical verification in those societies.

The social context of Croatian STS should be described according to its three most relevant features. The first is basic and refers to the dominant characteristics of Croatian society in the socialist and post-socialist periods. The second concerns the intellectual, scientific and ideological influences on science, especially on social sciences and the humanities, and consequently on the development of STS in Croatia. The third operates at the mezzo societal level and is connected with the characteristics of the Croatian research system in both periods.

The broadest social and intellectual context of Croatian studies of science and technology in the second half of the twentieth century was to the highest degree formed by the socialist political and economic system in ex-Yugoslavia, which was not under Soviet control and consequently less oppressive and more liberal (Steindorff 2006; Goldstein 2011). In comparison with other socialist countries, the Yugoslav political and economic system was generally much more open to the developed Western countries and their cultural and intellectual influences, which was particularly important for the development of science and technology and STS.

At the same time, the specificities of the economic and socio-cultural development of Croatia also had an important impact on its scientific and techno-economic development. Croatia was the second economically most developed federal state. Due to the influx of foreign tourists into the country and the massive manpower emigration from it, Croatia had the most intensive communication with Western countries. There were also traditional intellectual and scientific ties with Austria, Germany and Italy, where the Croatian intellectual elite was educated for centuries before, but also after the establishment of Zagreb University in the seventeenth century.

At the beginning of the nineteen-nineties, the dominant social frame-

work was radically changed as a result of the political independence of Croatia and its social, economic and political transition towards a capitalist and democratic system. The transformation of Croatian society began in worse social, economic and political conditions than in most other post-socialist countries. It was characterised by the destruction of war, the collapse of economic activities, socially irresponsible and problematic privatization, and the formal democratization of the political system (Županov 1995). The social, economic and political consequences of these processes, in spite of the improvements in all spheres of life, are still felt in Croatian society.

The broadest socio-cultural context, especially the value orientations of the Croatian population, also changed over that long period of time, but it remained essentially dualistic. In spite of the differences between the value orientations of the population as a whole and its social elite, they show combinations of traditional and modern values (Hodžić 2002; Labus 2005; Sekulić 2011).

The intellectual background of Croatian social sciences (especially sociology) and S&T studies has also been changing during the (post)socialist period. One could agree with the claim that in 'the entire socialist period, sociology was marked by a Marxist perspective of social philosophy and critical social theory' (Tomić-Koludrović 2009, 154). However, there was a significant difference between the dogmatic Marxism that was characteristic for other socialist countries and the so-called creative Marxism which included some social criticism.

(Non)Marxist social science theories and approaches were also taught at Croatian universities, and there was tolerance towards many empirical studies that were inspired by such, especially narrow or middle-ranged theories.<sup>1</sup> Therefore one could not decisively claim that all social science research and output was ideologically impregnated or that sociology was just a "legitimising science", and that empirical research was dominated by a "positivist approach" (Tomić-Koludrović 2009, 162, 158). Naturally, the theoretical and methodological pluralism in social sciences have been fully promoted in the intellectually much more stimulating post-socialist years.

The Croatian/Yugoslav research system most certainly shared some essential features with other socialist countries – it was not competitive, it was dependent on public/state funding, and its industrial R&D was rather underdeveloped (Šporer 2004; Radošević 2004). It also showed some comparatively significant differences from those systems. It was not based on the Soviet tripartite model of science organisation, it was considerably less funded (and consequently not as hypertrophied), less centralized and more open to international scientific communication (Prpić 2007).

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<sup>1</sup> An analysis of sociologists' Ph.D. theses, for example, found that Croatian women sociologists more frequently carried out this kind of (non-ideological) research for their doctoral theses than their male colleagues (Lažnjak 1990).

Generally, the changes of the research systems of transitional countries have been difficult because of the lack of the appropriate institutions and instruments: primarily developed market economies and independent scientific communities (Šporer 2004). Most of them introduced competitive and decentralised systems of research funding and evaluation (Frankel and Cave 1997). The Croatian research system was also subjected to deep structural changes in the post-socialist period, but some of them had undesirable outcomes. One of them was the devastation of industrial R&D, manifested in a drastic reduction in research personnel in industrial institutes and units (Prpić 2002).

Contrary to most post-socialist countries, whose research systems underwent decentralisation of decision making, the Croatian system has been centralised (Prpić 2007). As a consequence of this process, the autonomy of scientific organizations, particularly public institutes, has been decreasing. The influence of Croatian scientific community (even suggestions and policy proposals) does not seem to be important in scientific policy-making and implementation, which indicates that the real interest of the political elite in science and technology studies, as a policy basis, might also be weak.

To conclude, these specificities of the Croatian social and intellectual context compared to the other socialist countries, but also to other Yugoslav states, create the framework for meta-analysis and an understanding of the character, development and scope of Croatian science and technology studies.

## **2. Early STS: The Predominance of Philosophical, Historical and Economic Studies**

Though philosophical and historical studies of science have a longer history in Croatia, the interest in science studies intensified in the nineteen-sixties and particularly in the nineteen-seventies. It was related to a global interest in science following the II World War, especially interest in the science of science, which was developing at the time in both the Western and the Eastern world (de Solla Price 1963; Dobrov 1969).

The early development of STS in Croatia was at the same time similar and distinctive in comparison with global patterns. Thanks to the intensive communication between Croatian natural scientists and the international scientific community, they were the first to focus on the philosophical, historical, quantitative and policy issues of scientific development in Croatia (Yugoslavia). The echoes of Kuhn's famous book on scientific revolutions were also of great interest to social scientists and humanists. Interest in studying science was not just a reflex of the international intellectual stream. It was also reinforced by the Croatian/Yugoslav social context, especially the economic and political liberalization in the sixties, which needed theoretical and pragmatic answers, and by the dominant

(Marxist) ideology and its concept of science and technology as a driving force of economic and social development.

Philosophy and history of science as traditional disciplines were given a new stimulus with the establishment of two specialized journals that had Yugoslav character but were published in Croatia: *Encyclopaedia moderna* (1966-1976) and *Scientia (Yugoslavica)* (1975-91). These journals were also open to the quantitative and bibliometric aspects of science, to science policy issues as well as popular topics of scientific and technological progress. Apart from these thematically specialized journals, papers on science and technology issues were also published in philosophical and historical journals, natural science and biomedical journals, general social science journals, as well as disciplinary (sociological, economic, political and information science) journals. Books, of course, have always been an esteemed form of publications in the S&T field. According to a complete bibliography of publications about science and technology from the fifties to 1985, almost 6000 books and papers were published in the former Yugoslavia (Milinković 1989). Although the bibliography includes translations of foreign authors' books and some selected newspaper articles by scientists, it still indicates the considerable interest of scientists in science and technology topics and shows their publication productivity on those topics during the socialist period.

The sixties and seventies were a period when philosophers, historians, political scientists, and economists were predominant among Croatian S&T researchers. There were also some natural scientists and scientists from other hard disciplines interested in quantitative analyses of science, primarily in S&T indicators and the use of citation analysis as an evaluative tool. Croatian sociologists began to join those specialized or occasional researchers in this field more intensively in the seventies.

Therefore, from the beginning there was parallelism between the two basic STS orientations based on qualitative and quantitative research. The former was preferred mostly by philosophers and historians of science (Supek 1964, 1974; Lelas 1969, 1979; Dadić 1962, 1975). The second was used by natural and information scientists (Maričić 1977; Ružić 1978; Težak 1976) and economists mostly, but not exclusively, interested in technoscientific progress and technology transfer (Mesarić 1969; Dubravčić 1970; Lang and Kanceljak 1975). Both orientations have continued until the present, particularly in philosophical and historical studies of science (Lelas 1990; Paušek-Baždar 1994; Dadić 2000; Kutleša 2007) and scientometric analyses (Šlaus 1980; Lacković *et al.* 1991; Trinajstić 1993; Klaić 1995). However, the foci of quantitative information and economic studies of science have shifted towards new social challenges. Information science has turned to comprehensive and long-term bibliometric comparisons of productivity in numerous (all) fields and whole scientific areas (Jokić *et al.* 2010; Macan *et al.* 2012). On the other hand, economic studies of S&T have focused on innovations (Aralica *et al.* 2008; Radas and Božić 2009; Radas and Anić, 2013).

The development of these disciplinary studies partially corroborates S&T analysts' claim that a tradition of scientometric, philosophical and historical studies of science was present in ex-socialist countries, which was not the case with the sociology of science or scientific knowledge (Balázs *et al.* 1995). The exception was Poland, with a long tradition of sociological studies of science. Ex-Yugoslavia and Croatia became another exception<sup>2</sup>.

### 3. The Sociological Turning Point in STS: the (Post)Socialist Decades.

Two kinds of Croatian sociological studies of science (and technology) appeared in the seventies – theoretical studies of scientific knowledge and of science (Marušić 1970, 1971; Šušnjić 1973/1982) and descriptive (social) studies relating to Croatian research personnel based on empirical investigations by the Institute for Social Research in Zagreb (Korićančić 1972; Previšić 1975; Benc *et al.* 1979)<sup>3</sup>.

The Institute was the first scientific organization in Croatia to initiate, start and organize systematic (empirical) research in the sociology of science and technology at the end of the seventies and the beginning of the eighties. At first, the Institute's engagement in the field was policy oriented, that is, it focused on the empirical analyses of the financial, institutional and personnel potential of science in Croatia/Yugoslavia as the bases of public/state plans for R&D development. Social, economic and techno-scientific development planning was obligatory in the socialist period, with the (ideological) aim of avoiding the chaotic effects of economic and social processes in the capitalist world.

The Institute even became a Yugoslav focal-point for this type of applicative research in the S&T field, but by the mid-eighties it became clear that neither exclusive policy orientation nor purely theoretical or empiricist orientation alone could offer a deeper understanding of the social roots, aspects and impacts of science and technology. Therefore the Institute's team of sociologists began to take interest in theory driven empirical investigations, covering three broader STS themes: a) the social role of science and science policy; b) the science system and scientific potential and profession; c) technological development and innovations.

This research agenda had its intellectual foundations in crucial con-

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<sup>2</sup> The most well known and productive sociologist of science in the former Yugoslavia was Vojin Milić, who also wrote a well-known overview of sociology of science in co-authorship with Mulkay (Mulkay and Milić 1980).

<sup>3</sup> Đuro Šušnjić was already an eminent researcher in STS when he came to the Institute for Social Research in Zagreb, where he was employed for more than a decade. His contribution to the development of sociology of science in Croatia was significant, especially in science system studies (Šušnjić 1988).

temporary techno-scientific issues, but it was also related to the problems of Croatian (Yugoslav) society in the late socialist period. In the late seventies and early eighties, the political elite (particularly the scientific establishment) tried to solve the long-term problems of the inefficient socialist economy and social development through intensification of S&T development, especially in Croatia, whose investments in R&D were even lower than the Yugoslav average (Petak 1991). Therefore the power elites were prone to finance S&T studies regularly (but not generously) in order to get some answers from them. At the same time, they were not willing to apply the STS findings since they implied radical economic and social changes.

Regarding theoretical orientation, Croatian sociological studies of science were not inspired by Merton's approach. The theoretical frameworks of empirical studies were, depending on their subject, derived from the relevant sociological theories, such as the theories of technological change, of social capital, of organizations, of professions, of brain drain, of gender and others.

A seminal sociological theory of science, the organizational theory of sciences or scientific fields (Whitley 1984) or the theory of scientific organizations (Fuchs 1992) was seen as the most promising theoretical framework. Its heuristic value for sociological studies of science was recognized in the postulated plurality and variety of the mutual dependency of the social and intellectual organization of different sciences. The impact of national science systems was presumed even before Whitley pointed it out in the introduction to the second edition of the book (2000) and in his recent work (Whitley 2007, 2010). The compatibility and complementarity of this theory with other relevant theories of science, the theory of disciplinary cultures (Becher and Trowler 2001) and the theory of scientific field (Bourdieu 1991, 2004) was also its great advantage as a source of hypotheses in the subsequent empirical research.

In the eighties, S&T research by the Institute's team was focused on the topics and issues of contemporary scientific and social relevance, both local and broader. Since the sociological studies of S&T were a new research field, there were no previous empirical insights into the local R&D characteristics and output. In addition to science policy issues, the main research problems arose from the late socialist social and techno-scientific context, which was showing systemic problems in its techno-economic and research performance and productivity.

International comparisons of Yugoslav/Croatian science indicators, especially of R&D funding and personnel, were crucial for establishing the place of national research system in global trends, while analytical overviews of science potential in Yugoslavia and its federal units had policy significance (Petak 1980, 1981). Empirical research into innovation activities by Croatian industrial organizations was carried out in order to understand the determinants of (unsatisfactory) technological development based on the import of foreign technologies (Čengić *et al.* 1990,

1991). The most relevant characteristics of science organization and potential in Croatia were analysed in the studies of the professional differentiation in science, of the recruiting and renewal of research personnel, of researchers' professional and other activities (time budget), and in the studies of scientists' migration abroad - the brain drain (Prpić 1989, 1990; Golub 1985, 1988).

With the political and social transformation of post-Yugoslav federal units which started at the beginning of the nineties, the relevant research issues shifted towards the problems of a transitional social and techno-scientific system. Deep political, economic and social changes transferred the stress to the transforming of pseudo-egalitarian, non-selective and inefficient science and techno-economic systems towards competitive, productive and efficient (sub)systems. Unfortunately, a limiting factor for STS in this challenging "social experiment situation" was the extremely low level of funding, resulting in very restricted possibilities for empirical investigations.

S&T policy studies turned to a comparative analysis of the main models of financing scientific research and experimental development, in order to establish a new Croatian funding system (Petak 1991). Research into technological development was primarily oriented to the process of privatization as an essential precondition of techno-economic development in a post-socialist society, and to the technological modernization of Croatian enterprises (Čengić 1996, 2000). The third line of research was focused on the real and potential actors of Croatian scientific and technological development. Therefore scientists' performance, including their productivity predictors, was studied, as well as their professional ethics, at both a value and a conduct level (Prpić 1994, 1996, 1998). Empirical investigations also dealt with the real and potential drain of scientists abroad and the social reproduction of the scientific elite (Golub 1996, 1998), and with the characteristics and values of the managerial elite (Krištofić 1999; Čengić 2000).

Relatively recent sociological studies of S&T show continuity in the new millennium, but they have also included new STS topics. The research continuity of STS is a stable orientation of these studies, at least at the Institute. Its scientific and social roots are related to the nature of social phenomena and the cognitive advantages of accumulating a comparative dataset from various investigations in order to study S&T changes and their trends. On the other hand, new topics and issues in Croatian S&T research have been inspired by the most interesting STS mainstream themes and by new or unsolved problems of national R&D development, especially those connected with evaluation system and the relationship between science and society.

As a result of this orientation to the continuity and novelty of research topics, in the last decade sociological studies of S&T have continued to investigate the deeper and wider aspects of scientists' ethics, the brain drain and waste, women scientists and young researchers, and the science



system and research personnel development (Golub 2005, 2010; Prpić 2002a, 2002b, 2005; Golub and Šuljok 2005; Brajdić Vuković 2012). At the same time, new research themes have dealt with a comparison of knowledge production in the natural and social sciences and a special accent has been on social science output (Prpić 2009; Prpić and Petrović 2011). A new research topic has also focused on perceptions of science by the Croatian public and the social elite - politicians, top managers and scientists (Golub 2009; Prpić 2011) and the media presentations of science (Šuljok 2011; Šuljok and Brajdić Vuković, 2013).

Although the Institute for Social Research was for a long time the only scientific organization in Croatia to continuously develop systematic (empirical) research into S&T, studies of S&T have also been undertaken by a few sociologists from other scientific institutions. Some of these studies have dealt with mainstream philosophical and sociological topics, such as genetic technology and eugenics (Polšek and Pavelić 1999; Polšek 2004) or science wars (Polšek 2009; Matić 2001) and SSK - sociology of scientific knowledge (Matić 1997). Other studies have been focused on the Croatian science and higher education system, the innovation system and the knowledge society (Polšek 1998, 2003; Švarc et al. 2004; Afrić *et al.* 2011).

Most studies of the latter type have been carried out at the Institute of Social Sciences Ivo Pilar, which is becoming the second institutional centre in Croatia for sociological studies of S&T, especially for innovation studies focused on the national innovation system and policy within the Croatian socio-economic environment (Švarc 2009, 2006; Švarc *et al.* 2009; Lažnjak *et al.* 2011; Bečić and Švarc, 2012).

Whatever their topics and theoretical approach and wherever it is conducted, the most valuable common trait of Croatian sociological studies of science and technology is that they have been trying to develop and preserve a critical approach to the social context of science and technology in both the socio-historical systems of Croatian society – the socialist and the transitional, post-socialist context.

#### **4. Interdisciplinarity in Croatian STS: A Feasible Perspective or an Illusion?**

Different disciplinary approaches in Croatian STS have not led to interdisciplinary research into S&T. There was an attempt in the second half of the eighties (1986-1990) to connect research into science (and technology) and researchers from various disciplines and institutions in a mega-project on science, called *Bases of long-term R&D development* (Petak 2004). Yet it did not result in true interdisciplinary studies, but was rather a mechanical agglomerate of various scientific investigations or sub-projects. Some of them focused on the philosophy and history of science (in Croatia), some were preoccupied by scientometric and biblio-

metric analyses of biomedicine and/or natural disciplines, some dealt with the economic aspects of technological change and development, while others were interested in sociological studies of S&T.

Although it is not my intention to analyse the (inter)disciplinarity of the Croatian STS, fragmentation, as observed by Martin and co-authors (2012), also seems to be an appropriate description of the Croatian case. Contrary to the thesis that local orientation generates interdisciplinarity while international orientation stimulates disciplinary orientation (Sørensen 2012), in Croatian case both orientations seem to produce the same outcome – disciplinary fragmentation. The (inter)national orientation differs across the main STS disciplines. In the philosophy and history of science it is more local than in scientometric and bibliometric studies, and especially in the sociology of science and technology. Its roots, in my opinion, are the different disciplinary research foci in the Croatian scientific community. It is a small community and, consequently, a much smaller number of scientists study science and technology within each discipline. They can barely cover disciplinary priorities, which leaves almost no space for dealing with problems that could be of inter- or trans-disciplinary relevance.

Croatian sociological studies of science and technology seem to have been productive in the last forty years, but they show a sort of cognitive self-sufficiency that is not very promising. Though not interdisciplinary in a strict sense of the term, innovation studies also included a few economists from the eighties onward. This indicates that interdisciplinarity in STS could become a productive perspective if and when it is the result and not just the mechanical application of various disciplinary approaches to different subtopics of a broader STS theme. It is to be hoped that inter-, multi- and trans-disciplinarity could also be the (albeit distant) future of Croatian STS.

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The rhetoric of community and user empowerment celebrated by popular discourse on social media tends to look at technology as a neutral means without questioning the social, organizational and design processes that constitute the architecture of participation. In addition, despite the pervasive presence of technical devices and web 2.0 platforms in social relations, many media scholars seem to underestimate the performative role of technology in shaping participative and convergent aspects of culture and society.

*Bastard Culture!* by Mirko Tobias Schäfer tackles this shortcoming in social theory and research, exploring the role of user participation in cultural production dynamics related to new media. Since the title, the book stresses the heterogeneous nature of participatory culture that mingles social, political, technical engagement and connects hacking practices, leisure and business models.

Schäfer's work developed within the context of Dutch media scholars community - as based at the Institute of Network Cultures in Amsterdam and at the Department for Media and Culture Studies, University of Utrecht - that since the 1990s investigated and reflected into the critical aspects of net cultures. The book, distributed with Creative Commons License, belongs to the series "MediaMatters", on "current debates about media technology and practices". The style is witty and fluent, the detailed notes enrich and extend the empirical analysis, although they can require to break the flow of reading. The two appendixes represent a useful resource both for digital media scholars and people unfamiliar with hacking and digital vocabulary.

The volume starts outlining the theoretical framework and describing the analytical components of the "hybrid 'dispositif' of participation". Schäfer's approach combines Media Studies and Science & Technology Studies, especially drawing on Actor-Network Theory. The author introduces the concept of socio-technical ecosystem that acts as a lens to explore and disassemble the black-box of participation. The purpose is to rethink participatory culture as built upon discourses, social uses and technologies that simultaneously involve technical affordances, appropriation and design processes.

The subsequent chapters analyze case studies which concern global corporations, emphasizing the relations between user communities, technological devices and business models. Participation processes are studied across the three domains of construction, accumulation and archiving that are constituted respectively by creative, re-mix and structural prac-

tices. Here the author follows the action of different socio-technical ecosystems involving game consoles and consumer electronic products, where user media practices are observed as an extension of culture industries. In fact, when culture industries shift from content creators to platform providers, users start populating such platform creating, modifying, organizing cultural products. Thus, participation takes place within a nebula of practices often interconnected although not necessarily compliant with corporate and legal framework: on the one hand, such practices are challenged by the global, emancipatory and conversational promise of computer, software and the Internet; on the other, they cope and struggle with the limitations, commodification and black-boxing of digital devices and infrastructures. As a result, spheres of production and consumption, expert and lay knowledge, professionals and amateurs, users and designers, interact and overlap generating new design solutions, grey markets, platforms for sharing knowledge, software and how-tos. The case of the popular Microsoft game console xBox as well as the case of AIBO, the dog-robot toy produced by Sony, are particularly emblematic of the complex entanglement of organized team of hackers, user communities, business strategies enacted by participatory media practices: whether devices are hacked in order to play cracked or homebrew software; whether hackers are motivated by playfulness, commercial interests or activism; whether corporate companies repress or allow specific forms of appropriation, the study shows how users are involved as agent of technological change and innovation that affect social relations, while companies engage in, learn from, and benefit of users' tinkering for further product development.

Having analyzed cases where participation is explicit, namely enacted by intrinsically or extrinsically motivated practices, the study uncovers implicit aspects where participation is delegated to technological devices, automated by information system design, embedded in software and Web 2.0 platforms. Here information management and software design channel media practices, thriving on massive participation and allowing specific participation regimes. Focusing on common media practices such as file sharing, social networking and tagging contents, the analysis sheds light on the agency of system wide infrastructures and Application Programming Interfaces (APIs) that track and learn from user generated data. Meta-information added by a plurality of users is thus organized to improve management of information retrieval and produce tailored advertising.

Going on with the book, the reader may notice that the more familiar media practices appear, the more design information management works in a complex way respect to media practices, rising relevant issues of privacy, exploitation and control. Thus, aside the explicit production and mashup of creative content, from the culture industries' point of view "the most profitable user generated content is data" (p. 107). However, the book rejects the "Orwellian" vision towards participatory culture as

well as the romanticized version of homebrew culture production. Rather, participatory culture emerges from the study as a contested landscape, an open battlefield where relations between company and consumers, lay users and professional designers, socio-political mindset, policy framework and technological engagement collide and are continuously reconfigured.

The author identifies different strategies at stake by culture industries. Confrontation strategies, mostly adopted by music industry, criminalize user production in the desperate attempt to defend old business models through copyright enforcement, aggressive campaigns and design affordances such as Digital Right Management. In a subtler manner, strategies of “implementation” aim to frame media practices into graphic interfaces as well as end user licenses and terms of use do, in order to control user participation: they are adopted – among others – by film producers and popular social network providers as well as by web storage repositories. Finally, the integration strategies thrive on open participation and are adopted by socio-technical ecosystems such as Wikipedia, employing transparent and responsible policies and information design in order to foster user participation.

*Bastard culture!* remarkably unfolds the complexity of popular discourse and media practices, producing a genealogy of participatory culture as taking place in multiple socio-technical ecosystems. The author weaves together history of computing, business strategies, common media practices and hacking practices in a well conceived account that insists in the controversial and ambiguous nature of participation. He offers an original contribution unfolding the dark side of implicit participation and taking symmetrically into account both explicit and implicit participation as blurred and intertwined components of participatory culture. Perhaps, the emphasis on user participation and design shades the aspects related to the organization of work inside global companies themselves, where practices of appropriation and design processes seem as controversial and relevant as those occurring in the wild markets.

To conclude, this fascinating book helps to critically reflect on the effective emancipatory potential of new media as well as on the role of design, technical affordances and appropriation in shaping collective action and in technological change. Within the battlefield of participatory culture, the book clearly advocates for rethinking corporate policies and for the importance of appropriation and participation in media practices, to hold the public debate and achieve social awareness of the political dimension of technology.

**Elizabeth B. Silva**

*Technology, Culture, Family. Influences on Home Life*  
New York, Palgrave Macmillan, 2010, pp. 227

**Michela Cozza** *University of Trento*

Elizabeth B. Silva examines how changes in both technologies and family life form part of processes of socio-cultural change. The trilogy in the title – technology, culture, family – sounded as a promising one, but the risk to read a rearrangement of known concepts was real. My hope was to find an attractive approach to technological transformation, able to match Gender Studies and Studies of Science and Technology analysing the connections between objects, bodies and mundane practices evoked in the title.

Silva's book is articulated in eight chapters based on an archival research of technology and gender relations since the early twentieth century, and an ethnographic study of uses of household technologies.

In the Introduction, the author sheds light on her lines of argument that generate three main areas of investigation: (1) the significance of ordinary home experiences; (2) the relation between the material and the social; (3) the resources involved in relationality. The development of these arguments is pursued through a “conversation” between the empirical material of UK contemporary home life and the work of Pierre Bourdieu and Bruno Latour together with some of their critics. This is a first interesting contribute for readers, mainly because – as Silva recognises – personal and relational matters in home contexts are not areas of interest to Bourdieu and Latour. Yet – Silva continues – their ideas are productive as they provide a framework for exploring the connections between the material and the social, and for directing attention to how ordinary practices connect and constitute the social world. From Bourdieu's work she takes the notion of practice. To capture “practice” empirically, Silva uses Latour's approach, in particular regarding a view of the social world embedded in technologies and in our relations with them.

It is exactly in Chapter 1 that Silva introduces the issues of materiality and the subjective of everyday cultures and family practices. She discusses the relations between things and people showing connections between Latourian and Bourdieusian thinking. In Silva's words, these approaches share the desire to make visible what is hard to pin down: those relationships that concern complex, messy, hidden and heterogeneous realities. However, the key concepts and frameworks provided by Bourdieu and Latour need to be modified when they are used to focus on families. For this reason, Silva anchors to Feminist perspective her review of the two French academics, embracing the critique to Bourdieu's deterministic concept of habitus and the scant attention paid by Latourian actor-



network theory (ANT) to gendering and empowering of technological development.

In Chapter 2 Silva considers the materiality of homes and the identity processes of individuals in relationality, and addresses claims about epochal social changes related to technological transformations. She suggests a combination of statistics, descriptions and case studies as a productive way of accounting for refined processes of change where – echoing feminist analyses – the economic, political and social changes at large are seen to “impact” upon the family. Counteracting such position she emphasises the interdependence and circularity of the public and private spheres. Silva refines Bourdieu’s concepts of practice and the habitus endorsing the claim that individual practices can be a lens for seeing what becomes invisible within collective practice. This emphasis on Bourdieu’s approach moves the discussion of Latour’s insights to the background.

The issue of social and technological change is further pursued in Chapter 3, where Silva outlines the theoretical concerns and findings of “classic” studies on household technologies, mostly centred on the use of women’s time in their homes. She takes into account also the more recent research on gendered uses of time, accounting for cultural diversity and contemporary changes in the ways that lives are lived in the home. I have appreciated Silva’s discussion about “time” in terms of the most routine and material aspects (like body maintenance or emotional nurturing) that happen over time and also happen all the time. This concern takes Silva’s work away from the blindness of grand theories where routines matter though remaining somewhat abstract.

The ways in which household technologies are constructed in relation to certain dispositions and practices related to normative expectations of gendered everyday life in the home are explored in Chapter 4 in relation to cooking. I believe that this part of the book is quite dense of relevant references and concepts. While Silva shares the view espoused by ANT of technology as doing, not as being, she also follows a perspective which regards gender as “doing”, originally defined as such by West and Zimmerman (1987). In Silva’s book this perspective incorporates a notion of practices through which contexts for changing gender subjectivities are captured by examining relationships between technology and users over time. This involves seeing how gender “appears”, or how gender is performed, in cooking practices.

In Chapter 5, practices of cleaning are investigated regarding the change over time in the instruments available for laundering and dish-washing. This analysis echoes extraordinarily the “visible and invisible work” discussed in Star and Strauss’ (1999) article. At the beginning of this chapter Silva maintains that cleaning has involved large amounts of the mundane work of women, much of it invisible in the home and also to scholars. From my viewpoint there is a “noisy” continuum between the “shadow work” in Star and Strauss’s article and their analysis of design implications, and the “invisible work” in Silva’s book and their investiga-

tion into industrial policies. This cross reference – that is not mentioned – could work as starting point for a further analysis of what counts as work from a Feminist-STS perspective.

Centred on a discussion of consuming and caring, Chapter 6 addresses questions of which resources are felt to be necessary for everyday domestic life and where these can be drawn from. Silva considers not only time and money as core resources, but also personal connections, emotional states and abilities. She mentions the distinction between care as practice, and care as disposition, which is also constitutive of Bourdieu's concept of habitus. However, she stresses his limitation in understanding the contemporary home and the domestic where emotional aspects of social actions matter. Practices and resources for consuming and caring shape the material environment mutually and acts as a sort of "script for action" in the terms developed by ANT. Silva's reasoning outlines this environment as the set where social positioning takes place. Gender imbalance becomes clear in consumption practices, which are in narratives and performances of selves linked to differential access to goods.

Positioning is evoked at the beginning of Chapter 7 as it involves domestic dilemmas, that is classification and judgements about how to act morally. Silva's understanding of morality points firmly towards practices and concrete actions – as her ethnographic study testifies - in line with the feminist literature on gendered ethics. She considers "morality" as an activity grounded in the daily experiences and moral problems of real people in their everyday lives, contesting Latour's loose and flat conception of the social and the determining aspects of Bourdieu's ontology.

Finally, Chapter 8 focuses on sexual lives in our technologically-drenched everyday culture. Silva sheds light on ordinary sexual practices as invisible within a politics of pleasure that gives primacy to danger and transgression. This operation connects the final chapter to the first where she noted that only recently the researchers have begun to explore the processes of unravelling the taken-for-granted by applying more sophisticated methods of "defamiliarisation". It is interesting how Silva uses the concepts of "noisy" and "muted" sexuality aimed at capturing the different registers in the politics of pleasure and that are referred – in this chapter – to new reproductive technologies and new communication technologies. Reproductive technologies have contributed to create new conceptions of relationships in the procreative sense as in the case where homosexual "reproduction" takes place. Communication technologies have enabled the wide circulation of intimate acts in public spaces.

I think that this work of Elizabeth B. Silva shares with *Tecnoscienza* readers and STS audience the effort to incorporate the material world of technology into the study of social change, particularly at the micro level of individuals, ordinary life and human interdependence. She recognises this contribution of Studies of Science and Technology. Yet, in my opinion Silva joins with Feminist STS in interrogating "the conceptual and empirical grounds of the collapsing but still potent boundary between

those most foundational categories of science and technology, that is, nature and culture” (Suchman 2008, 142). In conclusion, this book could be an inspiring reading mainly for researchers interested to further understanding of the multidimensional interplay between technology and culture.

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## Roberto Abadie

*The Professional Guinea Pig. Big Pharma and the Risky World of Human Subject*

Durham, NC, Duke University Press, 2010, pp. 184

## Stefano Crabu University of Padova

They call it the new economy, the informational economy. And the other side of this informational economy is the mild *torture* economy [...] (Spam, cit. in Abadie 2010, 2).

The book written by Roberto Abadie Ph.D (Graduate Center, CUNY) starts with the reflection above and presents the results of an ethnography of voluntary participation processes by human research subjects in phases I (screening for drug's safety), II and III (screening for drug's efficacy) of drug trials.

The quotation recalls the utterance of Spam, a resident in West Philadelphia and “professional guinea pig”, which was an informant during the research conducted by Abadie. Spam is one of the many healthy human subjects that, for a long time, have lent his own body for clinical pharmacological trials. Spam's words are evocative, and they have led the book's author through a clear and effective itinerary of research to dis-

close the controversial world of pharmacological experimentation on human subjects. Human beings, in fact, whether they are volunteers who are, or who are not, patients, are increasingly more and more involved in biomedical research processes, during which their bodies are exposed to risk, medical monitoring, the “clinical” gaze (Foucault 1963) by physicians and the “molecular” gaze (Clarke *et al.* 2003) by scientists.

What happens when a new molecule – potentially therapeutic – overcomes the porous walls of the scientific laboratories and is tested for the first time on a human being? What are the perceptions and the representations of the sanitary risk correlated to the drug trials? How can the monetary compensation lavished by the pharmaceutical industries shape the perception of the risk? Can pharmacological experimentation on human beings – the weakest link of the pharmaceutical commodity chain – be considered a commodified form of the biological self?

These questions comprise the starting point that inspired the empirical research conducted by Abadie. They have long circulated in the social debate on biomedical research and, particularly, in the investigation of the pharmaceutical industry as it pertains to the wider scenario of technoscience in the neo-liberalist society. It is a complex literature that has often given unsatisfactory answers to these questions, focusing the attention on the uncontrolled professional power of scientists and physicians and on their collusion with the for-profit insurance industry. So, a critical social look towards the so-called BigPharma has more and more strengthened. Consequently, the pharmaceutical industry has been seen as an expression of a technoscientific branch responsible for the hyper-medicalization of the human experience. In this sense, human beings seem to be exposed to violent scientific manipulation through the subordination of the ethical dimension to the logic of profit (Conrad 2005). Such reflections are based primarily on institutional documents produced by public and private bodies (institutional archives, scientific magazines, different kinds of media productions and so on) and have contemplated the direct observation of the biomedical research practices in a very limited measure.

Abadie’s book, to the contrary, charts a discontinuity with these theoretical and methodological assumptions. Through a captivating prose, rather, the author searches for a theoretical bridge with the richer debate ripened in range to science and technology studies as they relate to the biocapital and to the commodification and commercialization of biological materials within the financial and industrial circuits (Sunder Rajan 2006).

The text represents an attempt to reconstruct the complex network of actors and relations through which the commercialization of a new drug or a new therapeutic regime is articulated. In particular, Abadie focuses on the professionalization processes of the volunteer human subjects involved in the drug trials (the so-called professional guinea pigs) and on the commodification of their bodies inside the biotechnological global

economy. It is about an empirical field that is particularly difficult to investigate since, both in the United States and in the rest of the world, the governmental agency responsible for supervision of pharmaceutical drugs (i.e. the FDA) publishes only a list of all drugs that receive approval. At the same time, the pharmaceutical companies do not publicize statistics related to the different typologies of the achieved drug trials or the demographic statistics of the enlisted human research subjects. So, the experimental subjects remain invisible and carefully hidden.

For this reason, Abadie has preferred to point towards an ethnographic methodology for the purpose of investigating motivations for participating in the trial economy, the professionalization practices and the commodification processes of the human subjects' bodies involved in the clinical trials. The ethnographic research led by Abadie occurred between 2003 and 2004, throughout 18 months of participant observation during which he lived in an anarchist community in West Philadelphia. The greatest part of the community's residents worked in the informal economy, and they voluntarily took part in the phase I trials. Abadie, through a first case study (chaps. I, II and III), investigated the life stories and daily-experience constructions of 18 healthy human research subjects, focusing his attention on motivations related to their participation in the phase I trials, during which they systematically exposed their bodies to risk in exchange for an economic reward. First, Abadie pays attention to the discursive productions and the risk representations promoted by the pharmaceutical industries. It is interesting to underline how the industries involved deny the clinical-experimental work to which the healthy human subjects – labelled "paid volunteers" – enlisted in the drug trials are submitted. In this regard, the monetary wage is lavished by the pharmaceutical companies, not so much as payment for the experimental activities to which the volunteers are submitted, but rather as mere symbolic compensation for travel expenses and the time spent within the boundaries of the experimental institute. Such elements are reiterated throughout the course of chapter VII (pp. 137-156), in which the informed-consent form is discussed as a tool that darkens and mitigates the risk through the use of euphemistic expressions and hypercryptic language.

Nevertheless, as shown by the author, the volunteers participating in the phase I trials dissent from this public representation, which is sustained by the pharmaceutical industry. They strongly refuse to be labelled as "paid volunteers," and prefer to represent themselves as "professional guinea pig". During the first three chapters of the book, the author describes the daily routine of a healthy human subject enlisted in the phase I trials. In a very complex way, he underlines how the profit perspective is the main motivation that pushes the professional guinea pigs to rent their own metabolism out to biomedical experimentation practices and to take unnecessary drugs. Like a refrain, many subjects clearly asserted that the drug trials represented an activity which is "better than a job at McDonald's" (p. 32). The risk, in this case, becomes a mere variable depending

on the proposed compensation. On the whole, it outlines what the author defines in evocative terms as “a weird type of work” (p. 47), directed not as much to produce something tangible, but rather to endure something throughout the subjection of one’s own corporeity to the disciplinary regime of the life sciences.

The second case study (chaps. IV and V) discussed by Abadie focuses, instead, on the experiences of HIV patients who voluntarily lend their biological selves to the final experimentations (phases II and III) of innovative drugs to treat HIV infection. As well illustrated inside the book, participation in the drug trials by this group of patients is not motivated by a mere economic purpose. In fact, their participation in the experimental processes is prompted by a desire to gain access to the best available therapies. Different from the “professional guinea pig”, these volunteers do not perceive themselves as having been inserted in the trial economy but rather as patients, and they feel treated as such by the biomedical staff members that manage the experimentation. The clinical trials of phases II and III, in this case, are not seen as strategic moments for collecting economic resources. They represent, rather, a complex process of empowerment in the wider collective struggle against the illness, a way for the subjects to better know their bodies and an attempt to remove them from the mercy of the pathology.

To fully understand the sociological importance of such complexity and ambivalence, in chapter VI (pp. 121-136), the author contextualizes his research work inside the ampler metropolitan setting where the ethnographic investigation has taken place. So, Abadie reconstructs the historical development of the pharmaceutical industry in Philadelphia starting from the ‘70s, a development that extends to the present day with an explosion of leading biomedical research organizations. Philadelphia represents, in fact, the second city in the United States – after New York – as a location for medical schools, with more than twenty-five hospitals and other ancillary health care institutions. The growth of a biomedical knowledge-based economy did not happen through a linear and neutral process, but it has been accompanied by a constant de-industrialization of the manufacturing compartment. Over the years, mass layoffs have followed one after another, and that portion of the population having a rather marginal social position has rapidly increased. This happened because, besides the emersion of an economy founded upon biotechnologies, the technical competences held by traditional industry employees revealed themselves to be obsolete and incompatible with the capitalist re-composition processes. Recalling Marxist analytical categories, Abadie reads this process as a typical reconstruction phenomenon of the neoliberalist capital that has caused the surfacing of an industrial reserve army of labour representing, to this day, an essential source of human research subjects. In the absence of alternative sources of revenue, the unemployed consider the lease of their body to the pharmaceutical companies as an instrumental action for their sustenance and reproduction.

Inside the text, on the whole, Roberto Abadie was able to investigate the ambivalence of the commodification processes and the exposure of the body to those associated with risk. Participation in the drug clinical trials is not only seen as a selfless act, but as a complex activity in which the boredom, the physical pain and the self-discipline supplant as exchange elements of a financial transaction within a disciplinary regime that the author – recalling the words of one professional guinea pig – defines as a “slow torture economy” (p. 46). Through this concept, Abadie emphasizes not only the logics of commodification of the body, but also the motivational elements that bring the subjects to mortify their own body, to expose it to risk and to submit it to pharmaceutical treatments for the purpose of receiving monetary compensation. These treatments leave their signs “embedded” on bodies. As Abadie tells us, many volunteers bring with them tangible signs of their participation in the drug trials, permanent signs caused by numerous needle punctures or by the removal of tissue to obtain samples for biopsies: signs, wounds and scars that show how such people have incorporated – carnally – their participation in the drug trials and their “rules of engagement”.

The author, by exploring the sociocultural processes that attempt to turn the body into a valued good, intends to contribute to the ampler social reflection about the body commodification (Sunder Rajan 2006; Lock and Farquhar 2007). In this sense, the most original contribution to the debate is represented by an attempt to hybridize social studies related to risk with anthropology of the body, for understanding how the commodification processes can shape, themselves, specific and peculiar perceptions of risk. Nevertheless, one must question the degree of persuasiveness of Abadie’s answers to the great questions that he put to himself at the beginning of his book. In my opinion, the main theoretical issue, or rather the relation between technoscience and capitalism, results to be one more time faced not in depth in its possible dimensions. Following the author’s principal reasoning, the human subjects involved in the experimentations seem to be mainly subjugated to a mere economic rationality that leads their options, strategies and preferences.

Such a reductionism leaves the reader feeling that this social world needs to be explored further, not only in its technoscientific dimensions, but also in relation to the process of subjectification. Besides, the recourse to a generalist-type literature is accompanied by the absence of a solid theoretical frame that is able to reflect the complexity of the relation between knowledge, technologies and bodies. Moreover, the scientific knowledge implicated in the experimental processes is often taken for granted by the author, and the technological dimension is omitted.

Nevertheless, science and technology studies researchers interested in the complex field of biomedical research can obtain a precious reconstruction of the ecology of social interactions that sustain the process of bringing a new drug to the market. Abadie’s work clearly demonstrates how such a process is far from neutral, but invests the entire body in a

way that appears to be flexible, ambivalent, restive and exposed to technoscientific and marketing logics that are strongly intertwined together.

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## **Ann Rudinow Saetnan, Heidi Mork Lomell, Svein Hammer (Eds.)**

*The Mutual Construction of Statistics and Society*

London, Routledge, 2010, pp. 314

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To read a book like *The Mutual Construction of Statistics and Society* for a social research methodologist who works daily with numbers, producing them, analyzing them, and then providing – sometimes – policy indications, is an interesting experience. This both for the estrangement approach, and the language and style of argumentation. Furthermore, this book forces us to deal with the "unsaid" and "taken for granted" typical in the use of "big data" or official data collected and organized at various levels, when using socio-economic indicators as those produced by national or international organizations, as well as large scale dataset based on big social surveys.

The construction of samples, of instruments created for data collection and their organization in matrix ready to be analyzed, their publication in the form of reports and indicators often used as a tool for "evidence-based" policies is a set of operations at the same time autonomous and connected with each other.



The networks of interaction between these phases and among the different actors, human and technological, involved in the process of data creation, have important effects on social life; to borrow the title of the book, in this mutual construction, the “experts” and the technicians (but also the discourses and the rhetoric that drive the research in a direction rather than another) build statistics which, in turn, through the processes of categorization and objectification, produces the “society”.

Statistics is everywhere. It permeates our daily lives, and often we do not realize it. The book edited by Ann Rudinow Saetnan, Heidi Mork Lomell, Svein Hammer shows where and how a variety of statistics, through a series of human decisions, becomes an “objective” description of the “society”.

The book is divided into four parts, the first (Overarching Themes and Approaches) related to the technical aspects and the role of statistics, techniques and indicators (especially in the processes of government); a second part (Visibility, Invisibility and Transparency) relating to how statistics shapes individual differences creating real social categories (the case of the definition of “ethnicity” and “racial” categories); the third and fourth part are based on different case studies (Accountability and Manageability; Reporting and Acts of Resistance).

What is immediately clear is the power and limitations of statistics and the dangers of it as a tool: these dangers lie in the routines through which statistics are applied, the discourses from which they emerge and into which they are deployed, the power relations created by those discourses, and the assumptions which statistic categories carry with them in those discourses.

The key point is probably that statistics and technical tools related to it (e.g. the difference between logistic regression and correspondence analysis, pp. 52-55) are not theoretically “neutral” but they are “theory laden”. These theories, when statistics is used as a classification tool, in the activity of “governing by numbers”, in decision making and policy-making processes, are sometimes not sufficiently taken into account. Statistics is a social product that responds to certain visions of the world, politically, ethically, and epistemologically oriented; in the use of statistical data, in their presentation, statistics incorporates these visions but they become “opaque” or even “transparent” for a user not able to manage the techniques or when a user decides deliberately not to consider them.

Often statistics are seen as simple, straightforward, and objective descriptions of society, but the way in which statistics and numbers are constructed, produced, gathered, and applied by different social organizations needs to be read, deconstructed, interpreted in its discursive, rhetorical and technical components.

Statistics is reified, materialized through the coding and implementation of a database; it becomes a “not inert” socio-material object, instead strongly characterized by its theoretical, ideological, technical and technological background. One of the key issues is that often statistics, indica-

tors and different methods, techniques, artifacts or routines of production and use, have the status of a “second nature” in which statistics is used as a self-evident object. The authors clearly show that the use of a certain technique of analysis incorporates a certain epistemic culture not automatically visible, because embedded in a socio-technical object as a software or an algorithm.

If we look at the profound degree of theoretical and technological “embeddedness” that permeates the tools of data collection (the example of the “Response Rate Accomodation” is really interesting, see p. 73), it becomes clear the powerful impact in terms of social effects produced by the data now naturalized and taken as objective. This interpretive key is fundamental to understand and underline the social nature of the data produced daily in large quantities by many collective actors.

One of the most important implications of this kind of use is linked, according to some authors in the book (Svein Hammer, Asuncion Lera St. Clair), to the neo-liberal strategies of government which rely heavily on ‘statistics’, and more particularly, on socio-scientific expertise. Another kind of implication is linked to the relationship between governmental structures (at different levels, global and local) in the creation of official numbers: for example, at global level, the diffusion and the progressive power of persuasion of the OECD-PISA in the government of education. Furthermore, at national or local level, the same thing happens for statistics on immigration, on crime, or the categorization of the condition of “health” and “disease”. Similarly to the process of categorization in everyday life, which allows the continuous production and reproduction of the “social reality”, statistical categories define the status of an individual in his relations with the State, the Law, or to a set of possibilities and obstacles, rights and duties and also, as in the case of the definition of health conditions, the self-representation or even the social stigma.

The main contribution of the text is, in my opinion, on the one hand, the invitation to reconstruct and always retrace the political and methodological genesis of certain data before using them as a “natural” fact. On the other hand, the need to consider the social effects that statistical data can produce through a distorted or ideological use. The point is not, therefore, a refusal of statistics that can be a powerful instrument to analyze large scale phenomena. Rather, a judicious use, self-critical and conscious of data and analysis techniques, being aware that these data could be used to justify actions of policy-making, and construction of public opinion, but also that they can have a strong effect on individual lives through the process of categorization.

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**Sophy Houdart and Olivier Thiery (Eds.)**

*Humains, non-humains. Comment repeupler les sciences sociales* [Humans and Non-Humans: How to Repopulate Social Sciences] Paris, La Découverte, 2011, pp. 368

**Anne-Sophie Godfroy Paris-Sorbonne & CNRS**

According to Sophie Houdart and Olivier Thiery, editors of the volume, the aim of the book is to present a handbook of French speaking Human and Social Studies over the last ten years. The book assumes the heterogeneity of the various twenty-nine contributions plus six introductions to the different sections. Beyond the diversity of the presented chapters, the common topic is the interactions between humans and non-humans, with the assumption that exploring those interactions will lead to a better understanding of human individuals and human communities.

The purpose of the book is not to challenge the importance of inter-human interactions, which remain an important part of social studies; rather it is to explore other relations in a heuristic way, assuming that interactions with non-humans are an essential part of human interactions and human reality. The authors explain the subtitle - How to Repopulate Social Sciences - as studying humans and non-humans and exploring multiple roles of non-humans in human interactions. The several contributions seek to provide a deeper apprehension of human reality using sociological and ethnographical methods, with a minimal ontological approach about the nature of the non-humans. Given the variety of non-humans represented in the book, the concept of non-human is more heuristic and methodological than ontological. In fact, the focus of the book is more on interactions with usually neglected actors who are not human beings, than on non-humans *per se*.

The edited volume is organized around six sections, corresponding to well-identified thematic fields in French speaking contemporary Social Science: Nature, Public policies, Markets, Science, Art, and Gods. Each one is opened by an introduction to present what is at stake when we try to repopulate Social Sciences in that specific field. The perspective is mostly empirical: the idea is to illustrate, through existing studies and fieldwork observations, how studying human and non-human interactions *in situ* can renew research perspectives. The diversity and plurality of the various contributions are one of the objectives of the handbook. In the presented studies, the non-humans may be animals (mollusks, cloned cows, Thai beetles, mammoth), vegetals (sugar beet), molecules (water molecules, virus, yeast cells), technical artifacts (Taser gun, sampler, echography, wheelchair, disposable wipes), supernatural entities (Christ, catholic god, genies), processes (statistics, risk management, web sites), art works (statues, paintings, music), buildings (supermarkets or museums layouts), and so on. Interactions between humans and non-humans

are diverse: some are created by humans, others pre-existed to humans, some are human assistants, others are source of trouble, some are visible, others not.

The editors also recommend transversal readings. To study controversies, taking into account interactions with non-humans leads to a better understanding of the materiality of controversies and of the values embedded in the non-humans participating to the debate. To study reconfigurations of human networks, taking into account connections, articulations, adjustments, contacts, interactions with non-humans and so on, is essential to understand the dynamics of mutations. Last example of possible transversal reading is the focus on micro level, ethnography, details, local situations to show how the different levels and scales are articulated.

Because of the rich content and the variety of the contributions, it is interesting to have an overview of all presented sections.

The first section “Nature and natural excesses” (*La nature et ses débordements*) is introduced by Philippe Descola. Descola claims that focusing on human and non-human interactions dissolves the traditional dualism nature *vs* culture, and challenges the cosmological anthropocentrism that followed Eurocentrism after the 19th century. He argues that it is urgent to “decolonize” concepts, through the analysis of human and non-human interactions. A first way consists in considering non-humans as a “total social fact”: the focus then becomes the system of interactions. A second way consists in studying “quasi humans”: when material devices become part of humans through the hybridization of human body and technical artifact, as with wheel chairs or prostheses. The chapters present studies on mineral water (Barbier), beetle fights in Thailand (Renneson, Grimaud and Césard), an exhibition around a disappeared mammoth (Houdart), echography creating a new frontier of humanity (Champenois-Rousseau), disabled people adapting and adapted to their wheel-chairs (Winance), H5N1 circulation and mutations (Keck and Manceron).

Bruno Latour introduces the second section on “Doing Politics” (*Faire (de) la politique*, which in French means at the same time “doing politics” and “doing policies”). He assumes that policy (or politics) can be object-oriented as a heuristic methodology. How to represent objects and to make them speak if we want to take them as political subjects is the key-issue of the following chapters, which deal with case studies as the Taser gun (Moreau de Bellaing), pandemic risks assessment (November and De Conto), statistical data to represent the nation (Didier), ecology and disposable wipes (Debourdeau) and lobbying at EU level through public demonstrations (Rosental).

The third section “Markets” (*Passer marchés*) is opened by Olivier Favereau, who underlines the gaps of the standard economical theory which ignores non-humans and is based on individuals as rational actors. Studying human and non-human interactions leads to the emergence of new descriptions and new coordination models. Mélard shows how eco-

nomical relations between humans around the sugar beet are reconfigured by sugar measures through polarimeter. Grandclément describes how the architecture of the layout changed the shopping experience and, in a way, replaced the salespersons, through the example of the first self-service shops in 1910 in the United States. Mellet's chapter studies the internet job market and the way it has changed job descriptions and created explicit mediations between the actors. Muniesa tries to understand the role of software in the quotation process of stocks and in the agents' strategies at the stock exchange.

In the introduction to the section "Edges of Science" (*La science en ses confins*) Sophie Houdart deals with human and non-human interactions in science studies, exploring how they contribute to the building of communities of practices and reveal the back side of science in the making. Brives' chapter on yeast cells culture in Petri dishes illustrates how scientists create the yeast cells as well as the culture of the yeast cells creates yeast cells biologists, even though the cells are invisible. Lœve explores the use of metaphors in nanotechnologies. Gramaglia and Sampaio Da Silva describe the collaboration of scientists with mollusks to assess water pollution on the long term with a historical perspective. The lexical study of the description of cloned animals by Rémondet unveils the evolution of the debate around their existence, from ethical issues questioning the nature of human reproduction to the "normality" of cloned animals, later from the legitimacy of cloning experiments to risk assessment and food security. Mialet analyses the complex interactions of Hawking, his statue and his collaborators.

The section "Shaking up works of art" (*Le bouleversement en art*) is introduced by Antoine Hennion, who tries to show how far we can go when we recognize the agency of the matter in the works of art. Actor-network theory is here applied to works of art. Hénaut analyses restoration of *The 'Wedding of Cana'* by Veronese and discusses how a specific setting produces its original character where the experts interact with the public and the matter of the painting. Yaneva describes through the setting of contemporary art installations how art is finally what happens to the participants to the on-going art installation. Vidal's text about Madame Tussaud Museum in London emphasizes that wax figures are successful if they abolish the frontier between human and non-human, and allow heterotopia and heterochronia. The artistic creation is systematically undermined to allow a personal relation between the wax figure and the spectator who travels across time and settings. Fourmentraux presents a robot as virtual actor in theater and circus. The role of sampler in musical creation and how it has changed our perception of music and the role of the music listener in the creation of music is analysed by Heuzé. The section ends with Stoichita's chapter on the interactions of the musical sentences played by professional Gipsy musicians in Romania with the public and the musicians.

The last section “Living with gods” (*Vivre avec des dieux*), introduced by Elisabeth Claverie, presents very interesting studies about non-humans who are gods or spiritual entities. This gives a new perspective on religious social facts and how humans interact with gods. Albert Piette's contribution on the modes of presence of god in the catholic liturgy is very insightful: god is present and absent at the same time and gives signs of presence through absence. “God is an hybrid, blurred and flexible, present and absent, produced and independent at the same time” (p. 331) writes Piette, quoting Latour. Pons describes the role of Jesus to change social structures through Newborn Christians in the Faeroer Islands, while Grandsard and Nathan explore the role of djinns in a study on Muslim women's world perception.

It is impossible to provide many details on the twenty-nine very different studies presented in the book. All have in common a focus on human and non-human interactions, pay attention to non-humans and demonstrate strongly the interest of such a heuristic approach. Although some studies are less convincing than others, as the methodological option to study human and non-human interactions may seem heavy and not very relevant in some cases, the overall impression is of a rich and inspiring handbook. When the descriptions of interactions are dense and unfold different levels, it may be very stimulating as in studies on mineral water, online job market or contemporary art. This approach renews and reconfigures the different topics and may be very different from traditional sociology. Usual categories such as nature *vs* culture and sciences *vs* politics are dissolved by the human and non-human approach. The agency of non-humans is clearly demonstrated.

A common characteristic of all studies is the attention to singularity, the micro level of analysis and the on-site investigation, which is fascinating. Nonetheless, it would have been helpful to provide more references to be able to go beyond the few pages of each study. Moreover, as each story is short, and the topics are very different, despite the insightful introductions to each chapter, the book lacks sometimes of a critical global perspective. Latour's influence and concepts are very perceptible in the whole book, he has even signed the introduction to one of the sections, but his approach is never questioned or challenged. As a conclusion, the handbook appears as a review of current French sociology but also as a tribute to Latour – there are references to his work in almost all contributions. It illustrates the fecundity of his legacy but some more critical perspectives would have been useful too.

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**Adrián Cannellotto and Erwin Luchtenberg (Eds.)**

*Medicalización y sociedad: lecturas críticas sobre la construcción social de enfermedades* [Medicalization and Society: Critical Readings on the Social Construction of Diseases]

San Martín, Pcia. de Buenos Aires, UNSAM Edita, Universidad Nacional de San Martín, 2010, pp. 189

**Roberto Lusardi** *University of Parma*

The book edited by Adrián Cannellotto and Edwin Luchtenberg presents the results of a research project sponsored by two Argentinian institutions, the Universidad Nacional de San Martín and the Observatorio Argentino de Drogas (SEDRONAR). The research topic and the book main issue is the process of medicalization and its correlation with the wider social scene. This common thread is stated in the title of the volume: "Medicalization and society. Critical readings on the social construction of diseases". However, the title hides some characteristic aspects of the book and contains a promise which is only partially fulfilled. Let's start from what is concealed. Two further aspects characterize this volume and they can attract the interest of specific audiences of readers: primarily, the context in which the authors observe the forms of medicalization is limited and relates to mental illness and mental health; secondly, the volume moves from the South American scientific debate, integrated with insights provided by international scientific literature, and it contains critical approaches to medicalization from this epistemic framework. These statements better define the objective of the book and make it more identifiable for readers. Instead, the partially unfinished promise refers to the expectation, contained in the title, of an analysis of processes of social construction of diseases and the practice of medicalization. This purpose, which makes the volume particularly appealing to an audience interested in the sociology of medicine, is only partially confirmed in the pages of the book. The book approach tends to be more descriptive and normative rather than analytic, leaving the generative dynamics of the cure process in the background. The book consists of six chapters, linked in various ways to the issue of medicalization. The first two chapters provide an overview of the forms that medicalization plays in contemporary society, starting from the definition of the object as a process of colonization of every sphere of human life carried out by medical professionals and institutions. The argument moves to reconcile the analysis of scholars in the field of sociology of medicine such as Engelhardt and Conrad, with the indications of international institutions such as the WHO, aimed at reducing inequality and poverty, and the experiences of the community model for the treatment of mental diseases. The crisis of the biomedical model, according to which any (mental or physical) health problem is reduced to biological or patho-physiological reasons, seems to leave the

possibility for new approaches of intervention in the area of health. However, the process of medicalization impedes such innovations due to the complex ramifications of power relationships and interests that it has established in contemporary society.

The next two chapters show how medicalization acts in two specific areas of mental health: drug abuse and Attention-Deficit / Hyperactivity Disorder (ADHD). These areas become contexts through which the interweaving social pressures, scientific knowledge, industrial interests and corporate policies are highlighted and through which the contemporary forms of the medicalization process are generated. The treatment of the abuse of psychoactive substances is defined as a paradigmatic case of social control of deviance. The medicalization of addiction is not only a means of control of consumption practices; it also produces forms of social segregation and confinement of certain social categories through the legislative criminalization of such conducts.

It is possible to speak of “medicalization of social problems”. Echoing Foucault, these processes meet the intent of neoliberal purpose to ensure social stability through the introduction of infrastructures and practices to limit the deviance. Medicalization thus constitutes one of the most important manifestations of “biopower”. The next chapter describes what the author calls the “medicalization of childhood” through the inclusion of attention disorders of children, which seem to become increasingly prevalent in contemporary society, in the field of medical and psychiatric diagnosis and treatment. The essay shows the tension between two main interpretations of inattention and hyperactivity: first, these aspects may signal the existence of a disease caused by a variety of organic causes, and second, these are reduced to signs of conflicts that transcend the child himself and concern his socio-cultural environment. The two interpretations give rise to two opposed courses of action: in the first case, the result is pharmacological intervention for the active management of behaviour; in the second, the result is educational intervention intended to remove the social causes that contribute to generating the conflict in the child. A confirmation of the weight exerted by the social dimension of the process of diagnostic labelling of the disease is given by the number of American studies that have shown that the diagnosis of ADHD is particularly common among the poorer classes of the population. Medicalization thus allows inclusion in the sphere of the “pathological” of certain behaviour which is deemed inappropriate. This also legitimizes actions of individual control through pharmacological containment targeted at restoring the social order.

The last two chapters do not deal directly with the process of medicalization, but the historical evolution of the organization of healthcare institutions in Argentina, with the reporting of relevant critical issues still unresolved. The historical excursus runs through a century of Argentinian health and social services, showing the complex articulation of a building process that has gone through the different stages in the history of the



South American country. In particular, it has been noted how the State and the public institutions have taken very different roles, depending on the different historical periods. This discontinuous evolutionary trajectory seems to have led to what the authors identify as the main unresolved problems in the country: the continuing phenomenon in wide areas of the nation of low degrees of integration between public services and private structures, which tends to exclude a large part of the population of Argentina from access to health services.

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**Helga Nowotny and Giuseppe Testa**  
**Naked Genes: Reinventing the Human in the Molecular Age**  
Cambridge, MA, The MIT Press, 2011, pp. 152

**Federico Neresini, *University of Padova***

This book – originally published in German in 2009 – is a good book for many reasons, but one of them prevails over all the others: it was written really together by two different authors, a crucial aspect for assessing the quality of the book, not so much in terms of style as in terms of content. There are obviously many other books written by two authors, but this one is a real novelty as the authors belong to two different fields of study, which are often, and wrongly, contrasting. It is also true that books co-written by authors coming from two different disciplinary fields are not so uncommon; however, those in which the two authors do not simply apply their own individual knowledge or offer the reader a mere juxtaposition of their points of view, and instead create a text that is the genuine result of amalgamation and harmonization free from compromise, that is a real rarity. And such is the case of this book.

Helga Nowotny, in fact, is one of the best examples of what happens when Science and Technology Studies (STS) take science seriously; Giuseppe Testa, on the other hand, belongs to the much smaller group of scientists that take STS seriously, considering them worthy of attention without superficially dismissing them with the accusation of being relativist and without unreasonably snubbing them as enemies of science. As Latour noted, to claim that STS scholars are against science would be the same as calling “biologists anti-life, astronomers anti-stars, immunologists anti-antibodies” (1999, 2).

STS being taken seriously by a scientist produces, among other things, a balancing effect that we are not used to, since STS are becoming an “object” of study the same way that science is an “object” of study for

STS. This is perhaps the only possibility to realize in a balanced manner the same principle of symmetry once introduced by Bloor: the sociology of scientific knowledge would be reflexive and “its patterns of explanation would have to be applicable to sociology itself” (1976, 7). This principle was often abandoned, as it appeared inconsistent and therefore inapplicable, causing STS to fall into an endless relativistic spiral. This spiral was interrupted, however, when a scientist and an STS scholar made the field of research of the other their own “object” of study, reaching a synthesis that surpasses them both. For this reason, *Naked Genes* may not entirely convince neither scientists nor STS scholars, but the book opens up the possibility for a genuine middle ground, precisely because it leaves both sides not completely satisfied.

So what is this book about?

The central theme of the book is biomedical innovation, and focuses on recording the coexistence of transition and continuity, with a strong emphasis on the latter to support the view – not always explicitly declared by the authors - that wishes to counterbalance the excessive emphasis usually given to transition when describing and discussing biomedical innovation. Some passages are enlightening in this regard, for example when it is stated that “the synthetic design of life orients itself toward the social design of society” (p. 83), or when it is pointed out that “the scientific superorganism that is composed of worldwide consortium, networks, companies, and universities with their private and public modes of financing, management, and governance has become astonishingly similar to the object of investigation – genetic organization” (p. 104).

The continuous cross-reference between transition and continuity in the process of innovation is persistently expressed in two dimensions: the temporal dimension (before/after), and the synchronic dimension (part/whole).

Biomedical innovation is, therefore, the guiding principle used by Nowotny and Testa to develop seven themes:

(a) the most important feature of molecular life sciences is that “they make things visible that could not previously be seen”(p. 1 ); (b) the “geneticization” of achievement; (c) the relationship between identity, property and affiliation; (d) the social integration of new forms of life analysed in the context of discussions on innovation, risks and values; (e) the contribution to the stabilization of social order through the standardization processes that accompany the introduction of both material and social technology; (f) the relationship between standards created by scientific research and moral standards.

The seventh theme - “the conviction that we stand before an epochal breakthrough with revolutionary possibilities is nothing new. It accompanies every technological vision” (p. 103) – represents, lastly, the application of the central theme to the common belief that regards innovation as an epochal transition.

The overall argument of the book is developed by combining and ex-

panding on the standardization processes from various points of view, processes that are an integral part of innovation and, as is well-known, a crucial element of STS.

It is also worth mentioning the special attention given to social technologies of standardization, such as law, governance and bioethics, especially when the authors argue that their success in stabilizing social order “is based mostly on a relatively successful standardization. It distances itself from pinning common goals and instead creates procedures that permit advances on many different paths” (p. 82).

This reflection offered by Nowotny and Testa is full of meaningful passages like those cited above and many other interesting ideas that make it a dense and stimulating reading, even for non-specialized audiences. Another merit not to be underestimated.

## References

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- Latour, B. (1999) *Essays on the Reality of Science Studies*, Cambridge, MA, Harvard University Press.

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### **Cécile Méadel**

*Quantifier le public. Histoire des mesures d'audience de la radio et de la television* [Quantify the public. History of audience measures of radio and television]

Paris, Economica, 2010, pp. 283

### **Paola Pallavicini, University of Torino**

The French scholar Cécile Méadel presents in this volume a first interpretative synthesis of over twenty years research work on the history of audience measurement in the French broadcasting system. Precious for many aspects, this study represents in some way the missing link between media studies and socio-technical studies, and a very useful key for media researchers to access the field of techno-science.

Méadel defines the audience measurement in the broadcasting field as a typical example of performative device (“object techniques performatif”). While this may appear as a normal statement in the young field of socio-technical studies, such is not in the field of media and communication studies, which founded their own theoretical apparatus

exactly on a clear and radical separation between technical and social dimensions in the media action, as we can see in the definition of "medium" still dominant today: "a medium is a tool to transfer contents".

By pointing out the action of transferring contents, this tradition has been able to assimilate into a single concept technical tools radically different in their technical basis. So it was, for example, for the key concept of "massmedia", shaped through the occultation of the technical basis of print, cinema, radio and television. And so it is still today for its ambiguous present form, deprived of the prefix "mass", which emerged historically, not surprisingly, along with the radical restructuring of the media system triggered by the Internet development in the mid-Nineties.

Focusing on audience measurement, Cécile Méadel's study enters in one of the key issues in the recent social history of the television system (not just of the French one) and crosses it with new questions and interpretations, opening the possibility of a deep revision of the theoretical background of media history, as well as of our current comprehension of the media system.

To consider audience measurement as a performative device – as Cécile Méadel suggests – implies that it cannot be reduced to a simple set of technical, methodological, and theoretical tools (as it is in the long lasting tradition of Marketing and Public Opinion studies, well known to media scholars), nor to a cultural practice, translated in a "power/knowledge device", as in Ien Ang's innovative proposal (*Desperately Seeking the Audience*, Routledge, 1991). Rather it implies to accept that audience measurement is something more than their synthesis and that its action transforms the medium as a whole.

As a typical socio-technical object, audience measurement is a performative device based on a principle of quantification, which is able to give an intelligible form to reality and by which reality is transformed at the same time, through the diffusion and uses of its output data. Today "share" and "rating" are, at the same time, concepts and core data in our television culture: they are basic references not only in our understanding of the social functioning of radio and television, but even in their processes of production and consumption.

On this basis Méadel aims to understand how the quantification principle, by means of audience measurement, has emerged historically as the dominant pattern in the work of media production. The history of audience measurement assumes in this perspective a shift toward genealogy: not a linear development of techniques and theories, marked by progressive success and improvements, but a continuous change in the mix of actors, networks, techniques, tools, goals, results, which identify measurement as a process and which define, time by time, its categories, objects, rules, and procedures.

In the opening chapters Méadel analyzes the genesis and development of the first devices used by French radio broadcasters in the Thirties to know, understand and qualify their public; and their extension to the tel-

vision viewership in the early Fifties.

Méadel notices that, until the end of the Forties, French broadcasters made use of non-statistical mediators to know and represent their audience: broadcasters collected and produced a knowledge about their listeners, that did not need to be "objectified". Listeners' letters, their participation in live programs, the activities of their associations, their advice and opinions on the programs, were considered by French broadcasters as opportunities for knowing their audience: they all concurred to give form to an idea of the radio audience that was negotiated with the audience itself.

At the debut of television system, the French national broadcasting organization assumed a more centralized model that implied a redefinition of the relationship between broadcasters and their audience. This new social and technical context gave form to a double process: it changed the broadcasters needs about their knowledge of the audience and it extended the perceived social relevance of radio-television audience, up to identify it with the whole nation. In France, like in the U.S., the radio system had rooted in the amateur radio operators' local communities: the television viewer was, instead, a radically new subject, with a strong national identity but de-localized (in respect to the broadcaster) and with no roots in previous cultures or practices.

Cécile Méadel identifies in this new socio-technical configuration of broadcasting (larger, centrally structured, and spread throughout the country), the new context in which new interests in audience measurement emerged, brought by new subjects external to the broadcasting system: public administration, governmental offices, advertising agencies and advertisers. All of them started to perceive the growth of broadcasting audience as an issue of more general and multifaceted relevance, both politic and economic. The first French television audience surveys were the answer to their new questions.

Méadel considers this change in the actors interested in audience measurement, as a key to understand how and why the audience surveys cannot be considered as a simple and linear improvement of previous "qualitative" devices. Although they are commonly regarded by media studies as a relevant step toward a more "scientific" approach in audience research, they caused a drastic reduction in typical aspects of scientific research, like the wide range of questions and interpretative hypothesis, or the experimentation in new methodologies.

Early audience surveys - ambiguous hybrid, cross between the national statistic culture and the international marketing culture - had their own techniques, which included a range of data collection tools (personal interviews, diaries and questionnaires), as well as methodological and theoretical assumptions connected to them.

Méadel brings the focus of her historical analysis on the combined and simultaneous change which invested their technical apparatus together with the group of subjects interested in its management. She is

able to show that audience survey gained its stable and homogeneous historical form, during over thirty years, because of the continuous negotiation among actors involved in its production, rather than its scientific coherence (which was often questioned).

Looking for temporary accords between their diverging interests and heterogeneous needs, these actors found in audience surveys an effective tool to transform television audience in an analytical entity: stable, homogeneous and quantifiable. Due to this new goal, the same act of "watching tv" (which identified the tv viewers) lost the participative components that had been peculiar to the concept in previous un-quantitative audience research, giving it a more abstract status, based on generic and comparable elements.

In this way the quantification principle becomes, historically, the cornerstone of the measurement device: distant from the traditional common sense which identifies quantification and objectification, as well from the constructivist assumptions which reduce quantification to a form of representation: here it is the "operational core" of the black box of audience measurement. "Quantification", Méadel says, "is a thin articulation between very different and heterogeneous actors and actions, compelled to work in the greatest instability, but kept close by the black box of measurement" (p. 8).

The last chapters of the book explore the emergence of the "audimeter" device in the French audience measurement system.

Traditional media studies still consider the audimeter as such as a "simple" and powerful mechanical instrument that replaced humans in the data collection for audience surveys. Away from the analytical frame of the socio-technical approach, this device is usually regarded, at the same time, as the "technical solution" to human errors in the data collection (made by either viewers or interviewers), and as the "cause" of the rapid and global diffusion of a unique and coherent audience survey method, governed by the advertising market and able to force the entire television programming to its own needs.

In Cécile Méadel's interpretation, instead, the "audimeter machine" is just one of the many components in the process of historical transformation of audience measurement as a whole, which took place in the Eighties, with the end of public broadcasting monopoly and the reorganization of the national television system. This was a change which invested the entire black box, in its analytic tools, techniques, and network of actors. In this context audimeter becomes the unique reference system, which produces data not only for the television market goals, but also for the governmental regulatory activity on the broadcasting system, (something like the price indexes or the national statistics produced by INSEE). The objectification of audience measurement produced by its entry in the black box was, therefore, something more complex than a simple effect of the "mechanization" of the device: it was rather the effect of a new social and institutional positioning of the device itself.

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**David Kaiser***How the Hippies Saved Physics: Science, Counterculture, and the Quantum Revival*

New York, W. W. Norton &amp; Company, 2011, pp. 372

**Assunta Viteritti** *University of Roma "La Sapienza"*

The book traces the hidden history of quantum theory from the 1930s to the 1970s – the years of World War II, the Cold War and the counterculture revolution – with some references to the present day. Divided into 10 chapters, it deals with one of the most intriguing fields of theoretical physics, which, according to Kaiser, benefited from the contributions of borderline scientists, as we may call them, who had a penchant for New Age philosophy. As the book shows, physics actually thrived on and fostered the 1970s counterculture in American college campuses, in a mish-mash of LSD trips, Eastern mysticism, spoon-bending psychics, charismatic activists and freewheeling researchers looking for new challenging routes.

In his rich, witty and humorous narrative, Kaiser identifies the connections and alliances between the founding fathers of modern physics – namely, Einstein, Bohr, Heisenberg and Schrödinger – and the quantum physicists in the Bay Area (such as Elizabeth Rauscher, George Weissmann, John Francis Clause, Jack Sarfatti, Saul-Paul Sirag, Fred Alan Wolf and Herry Stapp, among others). In the years between 1975 and 1979 (when the group split up), these researchers looked for a new approach to physics, defying the “shut up and calculate” attitude that had dominated it since the post-war period. Thanks to their work, in the mid-1970s, quantum physics took on new philosophical challenges, establishing fruitful connections with the theories of perception and New Age culture, and contributing to a new understanding of the universe (much of the spirit of the time is captured in Fritjof Capra’s famous book *The Tao of Physics: An Exploration of the Parallels Between Modern Physics and Eastern Mysticism*, published in 1975).

Kaiser argues that quantum information science, which is today used to securely transfer money and electronic votes, was born in a cultural context that was totally foreign to traditional academic or business schools, being rooted instead in the 1970s counterculture. It was in this context that an unconventional bunch of scientists went back to some of the theoretical issues posed in the 1920s – issues that some physicists had continued to explore during the Fascism, the Cold War and the Vietnam War.

David Kaiser reconstructs the hidden history of the Fundamental Fysiks Group in Berkeley, and its wide range of followers, by collecting a vast number of interviews with the protagonists of those years. He meticulously and humorously chronicles the lives of these non-conformist dreamers, who questioned the boundaries between science and consciousness and laid the foundations for a new theoretical physics, whose most recent application, still in development, is quantum cryptography.

In 2012, the book was selected as the “Book of the Year” by the prestigious *Physics World* magazine, which found the book “well written, scientifically interesting and novel” and described it as “a rollicking good read”.

The book is about network builders, groups, fluid alliances, convergences, opportunities that become projects, promoters, financial backers, journals, group conflicts and personal rivalries, controversies, search for experimental evidence. It tells the story of a handful of emerging physicists who dared to look into the borderline where physics and other disciplines meet, trying to solve age-old but still unanswered questions.

Kaiser tells this long story in an STS perspective, without making explicit references or turning it into an academic exercise, so that even non-expert readers may approach the subject and enjoy the reading, while a more experienced eye will notice and appreciate the hidden threads that weave the book to Latour’s *Science in Action*, Kuhn’s paradigm shifts and James Watson’s personal account of the discovery of the double-helix structure of DNA.

In the first chapter, Kaiser introduces the cultural climate in which the group was operating. At the end of the 1960s, the Vietnam War, the global economic downturn, energy crisis and “stagflation” led to massive cutbacks on spending for basic research, especially for physics. In 1967 military planners revoked draft deferments for undergraduates and, soon afterwards, for graduate students as well. As a consequence, at the beginning of the 1970s, student enrolments plummeted dramatically. Any interest in quantum mechanics and its philosophical implications had vanished after the Second World War. In the Cold War period, student enrolments in physics started increasing again, but the “shut up and calculate” branch of physics prevailed, turning physics from a broad-thinking science, open to discussions and interpretations, into a hyper-pragmatic enterprise. At the beginning of the 1970s, with the worsening of the economic crisis, the students joining the army for the Vietnam war and the rise of student movements, a ragtag crew of young physicists banded together and founded an informal discussion group “in a fit of pique and frustration”, as Kaiser puts it. They reserved a seminar room at Berkeley and met on Friday afternoons at 4 P.M. The founders were Elizabeth Rauscher, the only woman in the group, and George Weissmann, at the time both graduate students at the University of California, Berkeley. They started with informal brainstorming sessions, which in a few years became increasingly popular, and called themselves Fundamental Fysiks



Group. As Kaiser argues, the group was questioning Popper's demarcation theory and its sharp distinction between science and non-science. The physicists who gravitated toward the group in those years had a penchant for psychedelics and quantum physics, and trespassed the line of demarcation between the two.

Chapters 2 and 3 are dedicated to the development of the group and its research themes. Making the most of their New Age entrepreneurial spirit, they managed to secure financial backing and concentrated their interests, experimental practice, publications and conferences on the work of Irish physicist John Bell, who in the mid-1960s conducted a series of theoretical studies that had little to do with the "shut up and calculate" approach. The relevance and theoretical significance of Bell's work would be too long and complicated (and impossible for me) to explain here. Suffice it to say that his work, which became the source and the driving force behind the theoretical studies of the Berkeley's group, was deep-rooted in electromagnetism, and called into question some aspects of Einstein's theory. Bell's tests intended to demonstrate the non-local nature of quantum mechanics; the hypothesis he investigated at an experimental level was that there are hidden variables that do not operate in a deterministic way. Particles, according to Bell, are correlated by non-local and non-deterministic hidden entanglements. Non-locality and entanglement were a major source of inspiration for the members of the Fundamental Fysics Group, who in those years produced a vast number of publications on this subject. Their approach to science was a sort of "collage" combining experimental tests (as in the case of Clauser, who tried to disprove Bell's theorem and ended up confirming it) and theoretical reflections verging on metaphysics and consciousness expansion (such as those by Elizabeth Rauscher).

As Kaiser explains in Chapter 4, Bell's study of non-locality and quantum entanglement provided a common ground where scientists and hippies could join together. The road map of quantum physics ended up leading to New Age philosophy. Measurements gave way to speculations and paranormal experiments. In the same years, the Group established a significant relationship with the Stanford Research Institute (SRI), where a number of conferences were held on themes related to parapsychology and consciousness expansion. Although these physicists often ventured into psychedelic realms, they never pushed their ideas too far, basically recognizing – as Nobel laureate Wigner argued – that it was not possible to formulate the laws of quantum mechanics in a fully consistent way without reference to the consciousness of the observer.

Chapters 5, 6 and 7 examine the dissemination of their research findings through journals, conferences and seminars. In 1976 the first workshop on physics and consciousness was held at the Esalen Institute in Big Sur, California. The Institute became the place where different interests, groups, workshops and forums converged, integrating the development of human potential with Eastern religions and quantum physics. In this

place, researchers experimented with new ways of approaching science and consciousness. There were no chairs, only cushions, hot tubs, incenses, candles and LSD.

One of the foremost exponents of the counterculture operating in this context was Ira Einhorn, an environmentalist advocate and a friend of Kuhn, who promoted and sponsored a number of events, such as the Earth Day, bringing together quantum physics, ecology and pacifism, and was eventually convicted for the murder of his girlfriend.

*The Tao of Physics* by Capra was published in the same years, bridging the gap between science and consciousness, and becoming a true best seller as well as the ideological manifesto of a whole generation.

In the last three chapters, Kaiser wonders whether and to what extent the Fundamental Fysiks Group can be considered as a marginal phenomenon in the history of physics. In spite of their marginal position, they actually left a memorable mark, as they were actually able to connect psychedelic realms and mainstream science (Chap. 8). The author examines the impact of the group on the developments of a scientific research field that has today evolved into quantum cryptography (Chap. 9), and goes through their publications (such as Nick Herbert's work on the flash system) to retrace their critical reception and consider the most recent applications of their ideas of quantum and consciousness. In Chapter 10, he describes the end of the Fundamental Fysiks Group in 1979, their legacy and contributions to a series of cultural transformations that started in Berkeley and the San Francisco Bay Area and continue today in Silicon Valley, with biotechnologies and Apple.

In Kaiser's opinion, the cultural role of the group is related to its ability to foster a new approach to science, broaden physicists' research perspectives and expand our collective imagination. The Fundamental Fysiks Group may not have saved physics but has certainly renewed its visions and practices. Through the Fundamental Fysiks Group, the "Fringe" of physic research (to quote the title of a well-known TV series) established a fruitful connection between the most radical worlds of psychedelic New Age and institutional physics. The work of these intrinsically post-modern physicists has produced consequences in distant realities, which sound as a confirmation of the hidden entanglement and non-locality of Bell's theorem. While experiencing that fantastic moment of convergence between the 1970s Californian New Age and the attempts to go beyond Einstein's theory of relativity, those hippy physicists could not imagine that, 40 years later, their "entanglement" would arrive so far. As we said, this sounds as a confirmation of Bell's theory, which was actually verified in 2012 by a team of researchers led by Anton Zeilinger at the University of Vienna, who successfully performed a quantum teleportation experiment.

In his account, Kaiser follows the "anomalies" of science, as Kuhn would put it, and the new and multiple paradigms they produce through practice. Today, electronic money transactions can actually be carried out by using entangled photons to create an unbreakable communications

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code, and quantum cryptography is used by banks and financial institutions. Hippies may not have saved physics, but have certainly contributed to projecting it forward, paving the way for quantum-encrypted bank transfers, transmissions of entangled photons, and much more. In the final acknowledgments of the book, Kaiser states that writing this book was an amazing adventure for him. We bet it was.





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Special Issue:

**Re-conceiving Life in the Labs:  
The Emerging Meanings of Cells in the Italian  
Reproductive Biomedicine and Beyond**

**Cover** *Smile of a Stem Cell*

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