
Material agency in the laboratory and the clinic

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Abstract:

Concepts such as 'moral landscape', 'ethical boundary work', and 'moral work object' have been used in relation to understanding embryos in the context of the social relations of the clinic and the laboratory. In this paper, we draw on actor-network literature to consider the extent to which in-vitro embryos might be considered to act as agents within the social worlds of the clinic and the laboratory. The question we are specifically interested in is the following: if we think of embryos in terms of their material agency, how might this be significant for on-going social science research into these social worlds? In particular, how might this help us to understand why some professionals in human embryonic stem cell research express qualms about working with human in-vitro embryos?

Keywords: human embryonic research, actor-network theory, sociology of biomedicine, science and technology studies, social studies of science.

Resumen:**Agencia material en el laboratorio y la clínica**

Conceptos tales como 'paisaje moral', 'trabajo de límite ético' y 'objeto de trabajo moral' se han utilizado en relación a la comprensión de los embriones en el contexto de las relaciones sociales de la clínica y de laboratorio. En este documento, nos basamos en la literatura de actor-red para explorar en qué medida los embriones in vitro podrían ser considerados actores dentro de los mundos sociales de la clínica y el laboratorio. La cuestión que nos interesa específicamente es la siguiente: si pensamos en embriones en términos de agencia material ¿cómo podría esto ser significativo para la investigación social en curso sobre estos mundos sociales? En particular, ¿cómo podría esto ayudarnos a comprender por qué algunos profesionales en la investigación de células madre embrionarias humanas expresan reparos en trabajar con embriones humanos in vitro?

Palabras claves: investigación embrionaria humana, teoría del actor-red, sociología de la biomedicina, estudios de la ciencia y la tecnología, estudios sociales de la ciencia.

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Introduction: 'Moral qualms' in the context of human embryonic stem cell (hESC) research

Recent research in the social studies of science has focused on addressing what happens in clinical and laboratory research involving human embryos. One of the authors of this paper has been involved in some of this research and has turned up an interesting conundrum in her fieldwork that we thought worthy of further reflection: that some of the professionals interviewed for a project on pre-implantation genetic diagnosis and a subsequent study of embryo donation for stem cell research expressed a certain level of unease about their work with human embryonic material. On the one hand, this unease links into ongoing social science research into IVF and stem cell research in the clinic and the laboratory that has documented how clinicians and researchers negotiate the moral minefield of working with embryos. Yet on the other hand, we would also argue that the unease itself bears reflecting on for the way it implies some kind of ongoing relationship with the material of research itself that has not yet been addressed in the growing body of sociological analysis of laboratory and clinic practices involving embryos.

Within this emerging tradition of social science research, a range of practices have been identified that highlight the ways individuals relate to the materials which they use in the clinic or the laboratory. We use the concept of 'social worlds' (eg. Strauss, 1978; Unruh, 1980) here to describe these ethnographic sites as a means of drawing attention to the inherently collaborative and relational way in which scientific and clinical work is conducted by human actors. Notably, much of the research we are referring to here has focused on speaking to practitioners about how they feel about the work that they do. Consequently the results of each of the studies we cite below refer to human decision-making processes in the contexts of controversial scientific and clinical work.

For example, in their work on the views and experiences of scientists involved in hESC research in the UK, Wainwright et al (2006) employ the concept of 'ethical boundary work' (Wainwright et al, 2006, Williams et al, 2008) to describe how scientists negotiate ethical issues and dilemmas when using human embryos for stem cell research. Wainwright et al found that professional actors (in this case, scientists) are engaged in complex calculations around where they see ethical grey areas and places where they 'draw the line' regarding the use of embryos for stem cell research. Ultimately, ethical boundary work involves making distinctions between more or less acceptable sources of embryos, choosing between particular national regulatory frameworks or the kinds of scientific work they are prepared to conduct, and consideration of the question of whether three to five day old embryos are 'just cells' or should be thought of as something more (Wainwright et al, 2006; Williams et al, 2008).

Similarly, using the concept of 'moral landscape' (Helgason and Pálsson, 1997), Svendsen and Koch (2008) describe how clinical and laboratory staff in Denmark negotiate pathways around the ethical obstacles of the IVF-Stem Cell interface. Some of the issues considered in these contexts include distinguishing between which fresh embryos to use for research and which ones to use for treatment, and how particular embryos are constituted as 'spare' when moving from a clinical to a research context. Svendsen and Koch found that clinicians practise 'moral pathfinding' when they classify embryos, trying to strike a balance between, on the one hand, carrying out successful fertility treatment with the minimum of stress to the couple, and on the other hand, contributing to research and science by helping to provide embryos for stem cell research. Questions that clinicians might ask themselves tended to address the ethics of deciding which embryos should be used for reproduction and which ones should be used for research, and the kinds of decision-making frameworks that might be adopted for clarifying this position.

Similarly, reporting on the views of staff on ethical and social dilemmas involved in pre-implantation genetic diagnosis (PGD) in clinics in the UK, including the issue of 'spare' and 'affected' PGD embryos being donated for stem cell research, Ehrich, Williams and Farsides (2008) also argue that staff construct in-vitro embryos in a variety of ways as 'moral work objects'. Ehrich et al built on Monica Casper's (1998a, 1998b) concept of 'work objects' to focus on how the social order in a morally contested field like PGD is negotiated. 'Moral work objects' in this context are special entities that are determined by social, political, cultural, religious and personal views as objects requiring carefully defined rules and regulations for how they might be handled. Embryos are particularly susceptible to this kind of framing because of their distinction in social and cultural imaginaries as different to other biological materials as deserving of special legal protections. This relates closely to ongoing research in science studies that is focused on investigating the social relations that shape the different margins placed on the relationships between human biological, non-human biological, human non-biological and non-human non-biological research materials (cf. Hoeyer, 2009; Haraway, 2008; Barad, 2007; Franklin, 2007; Rock et al, 2009).

It would seem that the qualms experienced by some clinical and research staff mentioned earlier are based on quite well-established views about the position that embryos inhabit in the multiple social worlds that they/we occupy. That is to say for some of the researchers interviewed, their qualms are based on the fact that PGD and stem cell research involve *destruction of embryos*; for others, their qualms arise because of the *unknown future uses* to which ongoing stem cell lines may be put; and for still others again, qualms are raised by the problem that *choosing between embryos* for transfer to a woman's womb (as part of assisted conception procedures and PGD) or to use in research raises significant ethical issues

(Ehrich et al, 2006, 2007a, 2007b, 2008; Ehrich and Williams, 2009; Scott, 2006, 2007a, 2007b; Scott et al 2007). Significantly, not all staff experienced any of these concerns and some staff also indicated that their feelings tended to change depending on the context in which they were considering the reproductive/research materials. Furthermore, the views of participants also tended to be shaped by the roles that they occupied in relation to IVF or genetic diagnosis. For instance, staff members who empathised strongly with an infertile couple's infertility per se, rather than their desire to have an 'unaffected' embryo transferred, could find it especially problematic selecting embryos either for research or reproduction. Nevertheless, the fact that these qualms exist amongst individuals working in these contexts highlights the complexity involved in engaging with human embryos as both clinical and research materials.

One of the reasons we are interested in the persistence of moral qualms in professionals who work with embryonic material is because moral qualms are not the same as outright objections to using embryos in research. This in itself is an interesting point to consider, because much of what we know about embryo research is framed through ELSI (ethical, legal and social issues) perspectives that seek to identify *community* attitudes and responses to human embryonic stem cell research at the expense of individual feelings about the nuances of working with embryos (cf. Wert and Mummery, 2003; Sandel, 2004; Juengst and Fossel, 2000; McLaren, 2001; Annas, Kaplan and Elias, 1999; Holland, Lebacqz and Zoloth, 2001; Walters, 2004; Nisbet, 2004; Prainsack, 2006; Halliday, 2004; Plomer, 2004). Briefly, the substantial body of ELSI literature can be characterized in the following way: ethical perspectives tend to focus on the general question of whether or not, and in what circumstances, research using embryos is appropriate and where we *should* draw ethical lines; legal analysis tends to address concerns about how regulation of research involving human embryos reflect and *protect* a given community's ethical decisions; and social issues research generally focuses on specific concerns emerging out of how stem cell research is to be conducted and with what implications for the community, or sectors of the community, at different levels of social interaction. What we propose here is to focus on the question of the social relations with and in relation to embryos in the laboratory or the clinic. We do not take a position on whether embryo research is right or wrong, or what legal implications of such research are, or even what any emerging social issues are for patients or embryo donors. The question that we want to consider is how we might think about the ways in which we might think of the material agency of embryos in relation to researchers and clinicians who work with them, such that these people continue to feel qualms in using them as research materials.

A key concern of this paper is that although the studies referred to above add an important contribution to the more traditional ELSI considerations of the creation, status and use of embryos, they do not address directly how embryos themselves might be imagined to

shape the experiences of clinicians and researchers who come into contact with them. In countering the universalizing tendencies of the ELSI literatures to view embryos, researchers and clinicians as abstract entities functioning within a much larger community, the social worlds literature seeks to locate and identify the specificity of the experiences of practitioners obliged to work within the ethical, legal and moral frameworks of communities which often have strongly conflicting ideas about how embryos should be treated. For us, of interest here is that embryos are defined and used in most cases as though they are entirely passive objects on which the processes of human cultural institutions act. In other words, we are arguing here that the 'moral landscapes' that researchers, clinicians and other professionals engaged in the conduct of embryo research adopt seem to arise without consideration of how such landscapes could be influenced by the actual topology of the material facticity of human embryos. We thus propose here that instead of seeing in-vitro embryos as passive objects of culture they may rather be imagined in terms of their material agency.

The core issue at the heart of this paper is the following: in what ways might we be able to think about the ways that embryos inspire moral qualms in the clinicians and researchers who work with them? We offer this analysis as a reflection on the question of how embryos have taken centre stage as important objects that require special legal protection, provoke rigorous ethical debate, invoke specific regulations, require a license to use, and require that we obtain consent to work with them from the people to whom they 'belong'. In the next section we discuss some of the sociological literature that has been written about embryos in order to develop a theoretical framework that might allow us to consider embryos as somewhat more than the passive objects on which human values act. We draw specifically from actor-network theory to discuss the idea of the material agency of embryos.

In-vitro embryos as objects of nature

In *Icons of Life: A Cultural History of Embryos* Lynn Morgan (2003) writes that

"...embryos take their meanings from the scripts they are asked to read, rather than from features of the embryos per se or from an unambiguous reading of sectioned specimens. Embryos do not create social controversies; rather, social controversies create embryos." (p.289)

Here Morgan is describing how what we know about embryos is generally seen to be a function of the practices of the social and political contexts in which they are found. More specifically,

Morgan argues that "...embryos never 'speak' for themselves..." (p.269), rather they "...are always affected by context-specific meanings, which explain why they 'read' differently in a jar of formaldehyde than in a commercial for long-distance telephone service" (p.269). We want to take this further however, and argue that while resisting anthropomorphic ideas about embryos speaking for themselves, there are other ways in which embryos can be thought of as exerting influence that challenge the persistent perception that embryos are inarticulate blobs framed by the social contexts in which they appear.

Given that absolute divisions between the categories nature and culture are impossible to maintain, and are, moreover, unhelpful to the progress of science (Latour, 1993; 2007), the premise that nature is somehow pre-given and absolute, belonging to the material world that exists outside the entirely cultural processes of science, is inaccurate. As Bruno Latour argues, perceptions of such clear-cut relationships are themselves cultural productions that obfuscate the real processes of the everyday world and hide the mutually constitutive mechanisms that operate between society and culture and which produce order out of chaos. Latour proposes instead that non-human and human actors collaborate in the creation of all knowledge systems. For Latour, there is no science that interprets nature as though it exists outside of culture, but rather a system that relies on maintaining the distinction between science (and culture) on the one hand, and nature on the other.

The idea that embryos are special entities in our cultural framework reflects their positioning within a system that relies on maintaining that they possess a particular moral status. While the embryo is different to a foetus, embryology has facilitated a very specific understanding of the transitions that take place such that an embryo becomes a fetus, becomes a baby, and becomes a person at childbirth. Given this, embryos are seen to have special qualities but only because the scientific knowledge that underpins this belief is an integral part of the moral and cultural system which accommodates the view that an embryo is a precursor to a fully human subject. Moreover, it has been documented that in other cultural contexts the embryo is not the special entity that it is presumed to be in the Anglo-Celtic world (cf. Prainsack, 2006; Sleeboom-Faulkner, 2008).

In effect, this means that embryos have no essential nature. In-vitro embryos may be either more or less appropriate for implantation, may or may not carry particular risks for genetic diseases, or may be suitable for using in research. So too, embryos that have only ever existed in-vivo may be interpreted as the product of a complex cultural process of human reproduction. Yet these kinds of embryos are more commonly essentialized as different, *more natural*, than embryos created in vitro. The ways that embryos are positioned, on either side of the nature culture division is a process of ongoing negotiation. Yet if there is no distinction between nature and culture, and the facts of nature and the facts of culture are co-produced

(Jasanoff, 2004), the force that governs the contingency of the relationship between in-vitro and in-vivo embryos must be accounted for in some way that can account for how some embryos are suitable for use in research and some others aren't. We also suggest that the inherent instability of such a distinction is what leads some clinicians and researchers to continue to experience qualms about how embryos are treated in the laboratory and the clinic, despite the existence of legal and policy frameworks that would assert that these issues have long since been resolved in these professional and wider constituent communities.

Embryos as actors: Thinking through resistance, performance and agency

At this point we want to consider the idea that embryos might be thought of as possessing a kind of agency that enables them to resist the easy classification of raw material to be manipulated by the cultures of science. For this we turn to the history of actor-network theory in geography and science studies to highlight some of the configurations of agency that might possibly be seen to belong to embryos.

In *Rule of Experts* (2002), for instance, geographer Timothy Mitchell argues that social science has been

“Founded upon a categorical distinction between the ideality of human intentions and purposes and the object world upon which these work, and which in turn may affect them. There is little room to examine the ways they emerge together in a variety of combinations, or how so-called human agency draws its force by attempting to divert or attach itself to other kinds of energy or logic.” (p.29)

The point Mitchell makes is that there are always certain effects that defy the calculations, certain forces that exceed human intention. Although Mitchell's work was concerned with the role of the mosquito in the history of events in Egypt in 1942, we want to adopt his way of thinking about different kinds of objects interacting with human intention and purposes. Mitchell argues that the political history of what happened in Egypt focuses only on human actors and thus fails to account for all the possible relevant factors available to consider in a different kind of analysis.

In re-examining the crisis of a malaria plague that occurred at the time, Mitchell writes: “The mosquito... is said to belong to nature. It cannot speak.” (p.50) Yet Mitchell argues that “overlooking the mixed way things happen” (p.52), and focusing only on human actors, was a central part of the twentieth century techno-power that needed to construct a narrative

of progress as occurring in a certain way. Mitchell advocates a new method of thinking through the interactions and relationships between war, famine and malaria by exploring the different kinds of power, agencies and resistances that operated at the time. Hence his focus on how the mosquito might be understood as an important vector in the social history of Egypt.

For Mitchell: "To put in question these distinctions, and the assumptions about agency and history that they make possible, does not mean introducing a limitless number of actors and networks, all of which are somehow of equal significance and power" (p. 52-53). Rather, it means we can ask "...what kinds of hybrid agencies, connections, interactions, and forms of violence are able to portray their actions as history, as human expertise overcoming nature?" (p.53). In the story of the mosquito epidemic, Mitchell suggests that it was precisely such hybrid agencies that affected the region. Following Mitchell, we are interested then in the question of the agency of embryos, not in an anthropomorphic way, but in a way that resonates with the staff who continues to feel the distinctness of human embryos as special research materials that demand a particular ethical relationship and dignity of treatment.

In ethnographic work conducted on the social worlds of PGD, Sarah Franklin & Celia Roberts (2001) describe the following scene:

"Like all sociotechnical actors, the embryo always has connections and demands. It does not survive or even exist on its own. This became particularly clear when one of us went to the embryology lab to watch an embryo being biopsied. The embryologist described how she handles the embryos in the following way: 'So first of all, there's a couple of things that embryos require. They don't like a lot of light, so obviously they're in the dark. They like to be a particular sort of PH.'" (p. 2-6)

We would like to consider here that "liking" certain amounts of light, a particular sort of pH level and so on, could be interpreted as demands that embryos make of the embryologist who handles them. In other words, the embryos can be thought of as expressing needs that the embryologist interprets and does her best to accommodate. In interpreting the requirements of the embryos in her charge, the embryologist calls upon the technical knowledge and social practices of her profession to make decisions and create the conditions that embryos demand. In this way embryos are claimed to be "sociomaterial actor[s] existing within a broad set of technical and social practices" (Franklin and Roberts, 2001, p. 2).

Interestingly, while this might seem to be unnecessarily anthropomorphising embryos as entities that have *needs*; this is in fact quite a common way for scientists and clinicians to refer to embryos. In a recent stakeholder workshop for one of the author's ongoing projects, a research scientist with clinical experience in IVF routinely described embryos as "fickle",



“sensitive” and “unpredictable”; an opinion wryly acknowledged by the other IVF practitioners present. Indeed, evidence from the study that this research is part of also shows that some clinicians feel a kind of obligation towards giving embryos “the best chance” possible to become what they will, and that failure to fertilise in vitro, or failure to progress is embryos “deciding for themselves” what they will do with their best chance (Ehrich et al, 2010).

More obviously, and also more overtly anthropomorphising, is the evidence from research with IVF patients (cf. Carroll, 2010; Haines et al, 2008; Haines and Taylor, 2009) that they regard their embryos as “babies” or “potential children”, regardless of whether they progress to implantation or successful pregnancy. Most readers will similarly be aware of the long history of anti-abortion sentiment that makes the connection between in vivo embryos and children explicit, and has been more recently extended to include anti-embryo research arguments too.

While one reading of such identifications is that embryos in these different contexts are framed by individuals who reflect on them as special, another reading might be that these embryos themselves inspire a certain kind of acknowledgement as non-passive entities, that is, as possessing agency. Yet without anthropomorphising the ways that embryos assert themselves, how else are we to think of this agency? Scholars in science studies have been grappling with this question for a long time, and there are a number of paths we might consider.

In *The Mangle of Practice* (1995), for instance, Andrew Pickering proposes an elegant solution to this difficulty: he describes experimental science as the ‘dance of agency’ (p.22). In this ‘dance’ non-human and human actors interact and engage with one another such that each impacts and shapes the actions that the other might take in the form of both human and material agency. ‘Material agency’ works well for thinking about embryos in that it allows a consideration of embryonic material as different to the agency that a fully conscious human subject might have, whilst still acknowledging that there can be more than one type of agency. That is, by adopting the idea of material agency, as opposed to human agency, it is possible to avoid the trap of anthropomorphising the actions of embryos. Following Pickering, we would argue that ‘the world...is continually *doing things*, things that bear upon us not as observation statements upon disembodied intellects but as forces upon material beings’ (p.6).

Pickering writes:

“The dance of agency, seen asymmetrically from the human end ... takes the form of a *dialectic of resistance and accommodation*, where resistance denotes the failure to achieve an intended capture of agency in practice, and accommodation an active human strategy of response to resistance, which can include revisions to goals and

intentions as well as to the material form of the machine in question and to the human frame of gestures and social relations that surround it." (p. 22)

Significantly, human and non-human agency is not equal for Pickering, with humans in a much better position to accommodate the resistance of non-humans than vice versa. Pickering quite clearly differentiates here between agency and intentionality. For him, this is the crux of the distinction between human and material agency. We would argue that even if we think of in-vitro embryos as not yet fully human but not non-human either, we could say that in-vitro embryos perform precisely this kind of material agency; as entirely dependent on the humans who accommodate them, yet also resisting some human intentions to manipulate them.

Furthermore, using this analysis Pickering aims to develop "...a *performative* image of science, in which science is regarded as a field of powers, capacities, and performances, situated in machinic captures of material agency" (p. 7). While "performativity" might be read here as a concept with a specific intellectual lineage emerging from poststructural theories of identity developed in the 1990s, Pickering's usage of performativity here is somewhat different. Pickering's hope for a "performative image of science" would be to understand the interaction between the material world and the human knowledge systems that attempt to harness, understand and transform that world. Transcribed to embryos, we would argue that embryos "perform" their abilities within the human female body, the laboratory or the clinic.

In "Reframing and Grounding Nonhuman Agency: What makes a fetus an agent?", Monica Casper (1994) writes: "To talk about nonhuman agency raises multiple questions about the constitution of human, nonhuman and other positions and provides fertile ground for sociologists and others to explore diverse and often contested aspects of social life" (p. 840). For Casper, both "agency" and "human" are problematic terms that are too easily used uncritically in science studies. In her analysis, Casper points out that the "human is a constructed (and often contested) identity or subject position, rather than a fixed, natural state of being" (p.841). Casper writes about the contingency of agency as a way of pointing out that "distinctions between what we tend to think of as human and nonhuman are not only constructed but acted on in nontrivial life-and-death situations" (p.843), fetal surgery and the use of fetuses in research being the case studies she refers to here.

Consequently, if the equation of embryos with potential personhood is dependent on the contexts in which embryos are considered, then the sheer diversity of such contexts highlight the contingency of the relationship between human and non-human. This contingency makes easy distinctions between human and non-human highly problematic and, we would argue, is an important part of the moral qualms experienced by professional actors using

embryos in research. Here we have the crux of where social worlds analysis meets ELSI analysis within the context of clinical and laboratory work with embryos: the clinicians and scientists are encountering embryos not simply as inarticulate blobs to be separated from the physical environments in which they are located, but are instead socially contingent, material agents that cannot be regarded as entirely passive. Embryos themselves, as objects with needs, with the potential capacity to transform into a human subject, act in such a way that they claim special recognition as sensitive research materials occupying a risky and highly contingent subject position not blithely reconcilable as either fully human or non-human.

Conclusion: Some implications for social science research on embryo research

In thinking about the material agency of embryos we are particularly interested in the implications for future research into the social relations of the laboratory and the clinic. We offer this analysis as a theoretical account of how the material agency of embryos in the laboratory and the clinic provides a missing level of analysis for the growing body of social science research about the bioethical implications of the stem cell–IVF interface. Much of the extant literature on stem cell research either focuses on the “social worlds” literatures of the patients, clinicians and researchers in IVF clinics and stem cell research laboratories; or, on ethical, legal and social issues (ELSI) surrounding stem cell research at the community level.

One approach that follows from the idea of embryos as having material agency might be to examine the points of resistance created in the social worlds of the clinic and the laboratory. In the relationship between human and material agency described earlier, the process of resistance and accommodation that Pickering calls the ‘dance of agency’ demonstrates how this might potentially work. Such an analysis could be developed along the following lines: embryos are tricky materials to work with and the embryologists who handle them are forced to accommodate these difficulties; the resistances produced by embryos create tensions between human and material agency that pose difficult practical questions for professionals engaged in embryo research; and in some instances, these issues also become moral concerns. For instance, what can thinking about the material agency of embryos highlight about ongoing social science research on the classification of embryos in IVF contexts? Or; what does the consideration of material agency do for questions about viability and giving embryos a “fair chance” before donating them to research? This material not-quite-human agent also has, among its many other qualities, the potential to redefine the agendas of social scientists interested in the social relations of the laboratory. Instead of asking professional actors how they feel about using embryos in research as though they were straightforwardly

human-like material that deserves special consideration, we might be interested instead in unpacking the dynamics of how embryos are constituted as not quite human, but still special, material agents in their relationships with professional actors.

Overall, we are suggesting here that taking embryos seriously as non-passive research materials needs more thorough analysis than has yet occurred, and, more importantly, that thinking about the power relationships created between human embryos and the people who are responsible for them might contribute to further debates around how to treat all biological materials used in research. We consider here that attempts in science studies, from early actor-network theory to more recent configurations of material agency to think about the relationship between research materials and the cultures of science might be more profitably adopted in the social and ethical studies of stem cell science. We offer here some initial reflections on how the ethical questions that have preoccupied much of the Western world about the use of human embryos in research might benefit from the insights of science studies into concerns around agency, materiality and humanness. We do not claim to have all the answers, but we are interested in the questions that can potentially contribute to a more sophisticated understanding of embryos as special objects (or subjects?) of scientific research.

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Notes

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