Ethnography, Medical Innovation and Neonatal Care: A critical engagement

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The Neonatal Intensive Care Unit (NICU) is a unique medical site. Inherent within it’s walls and practices are the extremes of life’s experiences. Life and death, celebration and mourning, hopes and loss are encountered in the bodies of children amongst the dizzying array of frontier medicines and technologies. In many senses it is a strange landscape, yet for those who work or inhabit that space - even if just for a while - the extremes can become familiar and a particular everyday ethics must be negotiated on a regular basis. Dr Jessica Mesman, a senior academic in the Department of Science and Technology, Maastricht University, has spent many years inhabiting this space in both the Netherlands and the United States. Her elegant ethnography, Uncertainty in Medical Innovation: Experienced pioneers in neonatal care (2008) provides a unique glimpse into this world and was awarded the 2009 Sociology of Health and Illness Foundation Book Prize1. At the 2011 BSA Medical Sociology Conference, we celebrated this Award by hosting the inaugural ‘Author meets Critics’ session with Dr Mesman. Dr Alex Faulkner (Kings College London), Dr Dawn Goodwin (Lancaster University) and Dr Paul Martin (University of Nottingham) acted as critics to the book on this occasion.

What follows here are the papers by Dr Alex Faulkner and Dr Dawn Goodwin with a response by Dr Jessica Mesman. The following papers are brilliant expositions into the methodological, theoretical and empirical strengths and weaknesses of this text. They highlight the historical tradition of ethnographic work in medical sociology, the complexity of ‘doing’ and writing ethnography and they question methodological choices. They illustrate the complexity of the field of medical sociology by exploring the conceptual engagement with science and technology studies through discussions of policy, international case studies, medical devices and the lives of children. They challenge both the text and its’ author, but also as we read and respond with Dr Mesman, they challenge each of us as we engage with our own research in our chosen branches of medical sociology.

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1 The BSA Sociology of Health and Illness Foundation Book Prize is now open for nominations for 2012. A prize of £1000 is awarded annually to the author(s) or editor(s) of the book making the most significant contribution to medical sociology and having been published over the three years preceding 1st January of the year in which the award is made.
Uncertainty in Medical Innovation: Experienced Pioneers in Neonatal Care by Jessica Mesman

A commentary by Alex Faulkner

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SOCIAL ORDER, DISRUPTION AND STRUCTURE IN TECHNOLOGICAL NEONATAL CARE SETTINGS

In the era of evidence-based medicine (EBM) and health technology assessment (HTA) medical sociology’s traditional concern with how healthcare is actually accomplished by practitioners is given an even sharper edge. Bearing in mind our understandings of the informal, recipe-based, and repertoire-shaped ways with which health professionals do the work that they do, it becomes, in the context of EBM/HTA, of even greater concern to ask how healthcare professionals interact with each other and with patients and carers, in a world increasingly full of clinical guidelines, protocols, evidence-oriented practices, research representations, not to mention trends in commercialisation, privatisation and globalisation of medical technologies and healthcare knowledge.

Jessica Mesman’s (JM) book is based on ethnographic fieldwork in two neonatal intensive care units (NICUs), one in the US and one in the Netherlands, and was conducted in the mid 1990s. We are told that it was updated in the mid-2000s and that observations would not have changed significantly.

Medical sociology has benefited from a line of classic hospital-based ethnographic fieldwork studies, much of which were originally focused upon work and the profession of medicine (Freidson, 1988) as well as doctor-patient interaction. One thinks amongst others of Glaser and Strauss’s Awareness of Dying (1965) with its emphasis on the effects on work interaction of different modes of awareness amongst staff, Phil Strong’s Ceremonial Order of the Clinic, Paul Atkinson’s Medical Talk and Medical Work (1997), and Strauss et al’s Social Organisation of Medical Work (1985), which is cited by JM, who adopts their ‘trajectory’ concept to describe the pathway taken by patients through the care process. The latter, with its identification of different types of work – sentimental work, machine work, comfort work, safety work, points to many of the same concerns that JM addresses in her data-rich book. It is worth noting also that Strauss claims that their book contributed to opening up the ‘sociological study of technology’, and interestingly it was published in the same year as the seminal ‘social shaping of technology’ volume on this topic edited by MacKenzie and Wajcman (1985), which marked the emergence of major debates and controversies about sociological approaches to understanding the human-made material world of technology, which, of course, has become an important strand of concern in social studies of medicine, and in terms of which JM’s book is explicitly framed.

Apart from work, Glaser & Strauss were also concerned, of course, with the issue of the ‘social order’ of the hospital. Strauss et al’s concept of the ‘negotiated order’ (in ‘Psychiatric ideologies’, 1964) is one that can be seen as underlying JM’s own concern with the ongoing negotiation of decision-making in the NICUs that she has studied. These she formulates in terms of a variety of more recent theorists in the Science & Technology Studies (STS) field, referring to concepts such as centres of co-ordination, scripts, structuring device, and styles of ordering. Theoretically, JM claims that her approach is one of ‘constructivist STS’, arguing for example that ‘case descriptions have consequences’ (p11, referring to ch6 – pointing to
the constructive part played by texts in processes of social ordering). She takes an approach to sociomateriality, described in a footnote, which distances her approach from Actor Network Theory's conception of human and nonhuman actors as existing as ontological equivalents, in order in her own approach to preserve a view of human actors as agents who act with motivations such as responsibilities, accountabilities and normative and moral goals.

A frontier spirit runs through the actors conjured up in JM's book about the risky, uncertain, emotionally and morally challenging, technologically complex, and socially intense environment of modern neonatal care (encapsulated in her subtitle of ‘experienced pioneers’ and first chapter heading ‘a permanent dynamic of change’). And this brings to mind a further reference point, though one not referenced directly by JM, which is Renee Fox’s early work, especially Experiment Perilous: Physicians and Patients Facing the Unknown (1959), which, like JM’s book, also started life as PhD research. Although Experiment Perilous was based on participant observation in a setting designed for research as well as therapy, the subject of this work implicitly informs one of the major themes of this book – that of professionals facing extreme clinical and moral uncertainty in settings of critical, life-threatening conditions. This is a classic topic of medical sociology’s concern with life-threatening conditions and is an intellectual heritage which JM brings to the fore in this book, raising important issues of the intertwining of ethical and moral dilemmas with the practices of highly skilled, technologically mediated work. (Again, there are important predecessors for this more specific focus in intensive care, which JM cites in her introduction.

So JM’s book in some senses at least joins a long tradition of important work that has shaped medical sociology as we know it today, where the ethnographic case study has been one of the main and most productive methodologies and the hospital the central location. JM’s prime focus is upon the care process, with a particular subject emphasis on work and interaction, and the dynamic relationships between imperatives of moral and ethical decision-making in situations of uncertainty in critical neonatal healthcare settings where premature babies are cared for. In formulating what she calls the ‘moral load’ of critical care, JM describes her approach as being neither a normative ethnography, nor evaluative of healthcare work, and she takes a stance against ‘rule-based’ ethics as a description of how physicians make critical patient decisions. This position leads her to a starting assumption of a need for a ‘situated morality’ (what do ethicists themselves make of this concept?), and JM argues that this in turn leads to a requirement for empirical study of custom-made ‘morality in the making’ (echoing the so-called empirical turn in ethics) (p10-11). Thus the aim is to focus on how decisions are actually arrived at, and is the reason why her focus is on: ‘the roles of actors, the meanings of data and the functions of devices’. Another formulation that we are given is that of the ‘co-ordinative resources’ that involve ‘a high level of complexity and medical and ethical uncertainty’ (p11). These terms resonate closely with Timmermans and Berg’s work on standardisation in healthcare, where, for example, they discuss protocols of various types as ‘co-ordinative devices’. So one of the difficult challenges that JM addresses is how to understand the production of ‘sentimental work’ and the negotiation of ethical and moral decisions in the context of an avowedly STS-based conceptual approach focused on day-to-day care processes, in two rather different healthcare and cultural settings.

In terms of epistemology, JM tells us that her book has a very specific focus that goes beyond mere (mere?) descriptive ethnography of life in neonatal care settings. Instead, or rather further, her aim is to understand ‘how actors succeed in acting promptly and adequately in situations of uncertainty and doubt...’ (p8). One can see that in this formulation a concern with the interactional maintenance of social order, reminiscent of ethnomethodology, is to the fore (Harold Garfinkel and David Sudnow are both referenced). In this context, one of the interesting stated aims of JM’s book is the intention to pay attention
to the ‘in-between zone’ or ‘intermediate zone’, the ‘hinge between the collective and the individual’ (p6-7), where, by an analytic tactic that she terms ‘exnovation’, she intends to uncover the hidden competencies that clinical staff bring to bear in their working practices. However, this seems to me an approach quite typical of sociological and anthropological ethnography, and I will return to this ‘micro’ level focus on the objective of understanding ‘how actors succeed in acting promptly and adequately in situations of uncertainty and doubt’ (p8) in my concluding comments.

Let me now turn to consider in a little more detail two themes in JM’s book in which I have a particular interest, namely material technology and law/regulation, in other words two forces strongly shaping contemporary health care processes, one deployed internally in the care process – technology and one produced externally and implemented or adapted into care processes - regulation.

Technology

The advance of new technology is a ubiquitous feature of contemporary healthcare whether in primary care, general hospitals or specialist centres. There is an evident trend toward an intensification of expertise and technology in complex, critical care setting generally, and NICUs are clearly an example of this trend. NICUs are technology-rich environments, having developed from the early incubators of the late 19C. They have undoubtedly been instrumental in the lowering of premature death rates of very low birthweight infants during the 20C, as JM notes. However, the increasing use of technology to make life-saving interventions, as she also notes, has given rise to both public and medical concern since the 1970s about the ethics of preserving extremely fragile children often with the probability of severe disability and poor quality of life.

JM discusses technology primarily in the context of what she calls uncertain ‘trajectories of care’ (ch4). In terms of trying to understand how her two fieldwork settings in the US and Netherlands differ from each other (a comparative aim that I felt was not greatly to the fore in the book although some comparative analysis is made), we should notice that she states that the technological resources deployed in the two units are essentially the same. This includes a large battery of monitoring equipment such as for lung and cardiac function, incubators, tests, ultrasound, record-keeping forms, parenteral nutrition, surfactant and steroid therapies, and so on. So JM documents the wide variety of uncertainties that staff are faced with in an NICU, and the strategies used for dealing with it, one of which is to use the technological aids that are available. Because of the constant chance of a sudden unpredictable event, we are shown how staff pay close attention to the information and alarms coming from the monitoring equipment. In the context of critiques of advanced medical technology as a de-humanising phenomenon, JM argues that the social dimension of NICU care is such that the technology acts as a ‘material passageway’ between staff and child in which the technology is simply part of the care rather than a distraction. The contingent nature of the multi-skilled team process in the context of staff rotations is illustrated here, for example in a fieldnote extract describing the changing presence and absence of the lead physician, junior, anaesthesiologist and cardiologist viewing the blood monitoring display at the incubator of one child (‘Robert’, the Netherlands) who is both a neonate and a cardiac patient.

JM takes the respirator as an example to examine the role of technology in influencing how a child’s treatment trajectory takes shape. Giving detailed description of how the respirator is used with a particular child, Tom, she shows how use of the device at least shapes but does not always determine the roles and specific tasks undertaken by staff, though at the same time frequently staff are described as having ‘no choice’ in responding to alarms in specified ways. The temporary nature of technology use is shown, where in Tom’s case the respirator,
originally a benign influence, later becomes an impediment to the range of treatment options otherwise available. Overall, JM argues, the negotiable malleability of the care process is limited by biological and technological boundaries (which accords with a co-productionist STS perspective). JM also shows how technological skills e.g. with intubating may cut across formal disciplinary or organisational statuses in the informal working environment. She shows how the incubator ‘constructs new categories of children’ and helps define boundaries in the care decisions (p100). Here she uses one of the family of STS concepts that have developed to understand sociotechnical relations and the ‘configuring of users’, namely the concept of the ‘script’ (Akrich, 1992), and her approach can be seen to chime well with what Timmermans and Berg have subsequently called the ‘technology-in-practice’ approach (Timmermans & Berg 2003). Children themselves are also, appropriately, included amongst the range of ‘users’ of the technology.

Law and regulation

Neonatal medicine is one of the areas of medicine where a mis-diagnosis can have serious legal implications for practitioners. Although the Dutch and US law, regulation and professional guidance in the 1990s showed some systematic differences, it is clear from JM’s introduction to this background that there was internal controversy in each country regarding the tension between case-by-case and rule-based philosophies.

In ‘Northeastern’, the US hospital setting, we learn, unsurprisingly, that there the over-riding principle is to intervene unless there is absolutely no hope of preserving a child’s life, so for example JM quotes a nurse practitioner as saying: ‘Once I treated a child that had very bad blood values. According to the books this child had to be doing very poorly. But the child was doing quite well….It only shows to tell that even medical knowledge is not fixed’ (p24). And the nurse goes on to mention that she would go on trying to reanimate a child for 20 minutes even with no heart rate in evidence and says that this puts ‘puts you in a stronger position in the case of a lawsuit’. So we can see here the acknowledged litigiousness of the wider society of the US entering into the considerations of actors in the NICU, especially in this instance following the famous ‘Baby Doe’ case. However, as JM states, illustrating the internal national controversy that I just mentioned, the Baby Doe Regulations were seen to contradict national professional guidelines that recommended case-by-case individualised decision-making. Thus we learn how a doctor can feel extremely uncomfortable asking parents to sign a ‘Do Not Resuscitate’ form because the US law requires it. Nevertheless, JM shows how in the case of the Dutch centre, the significance of external regulations are more matters of conflict and negotiation – e.g. providing extracts from discussion between different team members of the interpretation of an ultrasound scan (and the need for a radiologist or neurologist opinion). Here the analysis shows usefully how the use of case-oriented repertoires or ‘situation’ repertoires is not systematically tied to different disciplines or roles in the team.

Chapter 3 of Uncertainty in Medical Innovation identifies two sorts of performative vocabularies, also called ‘social orders’ – the juridical and psychosocial. Here JM points to systematic differences between the two NICUs, related to the legal context in each healthcare system. She argues that although both vocabularies are present in both settings, the ‘institutional order’ of the two settings is characterised by an ethic of individual responsibility on the one hand (US) and of shared responsibility on the other, in the Dutch approach. Here the account conveys a constructivist understanding of vocabularies (the Foucauldian ‘discourse’ is a term that JM doesn’t appear to use) as structuring the way interactional care decisions are made. In the US setting the juridical style predominates, whereas in the Dutch case no vocabulary dominates; the use of the psychosocial vocabulary
allows the parents to be engaged emotionally in the decision process. If I understand the argument here, it is that although team members’ responsibilities and perceptions may come into conflict, the aligning of different vocabularies, also enabling the emotional involvement of parents, tends to channel effort to the shared objective of the child’s recovery or other decision, thus producing an orderly direction to the trajectory of care. (Here, I wonder about the conservativeness and the lack of serious disruptiveness to the care process that JM seems to assume in her focus on the maintenance of successfully acting promptly and adequately in the face of uncertainty and doubt').

Methodology

Now I turn to just one, but an important one, of JM’s stated methodological principles, which really is the foundation of her research design. (Incidentally, the key details of this design are somewhat scattered in different parts of the book). It is important to note again here that her data come from hospitals in two contrasting healthcare systems and cultures, the US and the Netherlands. As an exponent and proponent of comparative case study methods, I was particularly interested to see JM’s approach to case studies in her research. She states that she uses four case studies as the ‘backbone to her argument’ (p8). For JM here, in fact, a clinical case is also a sociological case. She chooses complex cases ‘in which it is not exactly clear what is going on or what has to be done’, in order to ‘exnovate how treatment trajectories are preserved in uncertain circumstances’ (p6). (JM formulates the term ‘exnovate’ especially in terms of ‘hidden competencies’ of staff). The case studies chosen, therefore, can be described as follows: Tom, Esther, Maureen and Robert - in other words four very young children that have had the misfortune of encountering the very sharp end of intensive medical care in these neonatal intensive care units. (Other cases such as Ronald and Christine also make appearances). As JM notes these are ‘real’ (not her term) cases illustrating actual illness trajectories, not fictitious cases compiled by ethnographer’s license from a variety of different individual actors.

It is common in writing up research based on case study approaches that the writing of descriptive narratives of the cases is at odds with other more generic authorial aims such as explaining, interpreting, theorising, referencing to existing disciplinary knowledge and so on, and it is not surprising that the written account hops from one child to another, sometimes without clear signalling. How are the children depicted in JM’s account? The children, as written here, appear primarily through the lens of the staff and the ethnographer herself. I felt this was partly due to the writing and structuring of the book, though doubtless it is also due to the very dependent situation of the children themselves. Although they have names (unlike the staff) their parents, who make frequent, often ghostly appearances in the text, do not. The child-as-case approach, I believe therefore, somewhat downplays the visibility of the two different NICUs as distinct organisational settings themselves which the four children have passed through, and the broader dynamics of family networks which surely influence parents’ involvement in the care decision process. The analysis is frequently presented in terms of ‘the NICU’, i.e. a generic, non-contextualised representation of the settings of concern. I was intrigued by this approach to defining cases, though this reaction may be conditioned by my own engagement in case studies of, for example, healthcare settings such as NHS units, or different types of medical technology (Faulkner, 2009). What is at issue here is both a ‘unit of analysis’ issue of research design and analysis, and a presentational one.

These thoughts about the design of the research underlying the book leads me to wonder if there is a tension here between the sorts of generic conclusions that JM draws (eg – p188-90) and the sorts of conclusions that might have been drawn had a different case study design been used. In common with some varieties of STS approaches focused on micro
processes of interactional ordering (leaving aside for the moment the controversy about micro/macro and validity of such ‘levels’ of analysis), such a focus can lead to a lessened focus on what many would regard as ‘contextual’ forces and power dynamics. Where, for example, are the hospital organisation and differences between medical and clinical specialities as analytic resources? We learn little about such structural differences in JM’s account, such as the different expertises of neonatologists, paediatricians and subspecialisms of pediatrics, obstetricians, and different specialised nursing expertise. 

Therefore, I feel that the over-riding focus on the micro process level of the ‘intermediate zone’ as a hidden resource by which staff maintain an ongoing orderliness of the NICU plays down these other important features of the care setting and the innovations that might be brought into it via ‘outside’ forces such as changes to equipment caused by medical device producer innovation trends, or risk management training initiatives promulgated by hospital authorities or clinical specialties.

**Concluding comments**

Given the contemporary context of the advance of evidence-based medicine and health technology assessment (even taking into account its partly rhetorical character) it would be interesting to know how different JM’s account would have been had it been based on more recent fieldwork, rather than at a time when this key healthcare movement was in its infancy. Would the account show a more significant impact of guidelines, protocols, standardisation and technology on care decisions, or would the depiction of the neonatal critical care process remain very similar? Even allowing for the well-known established sociological insights into the negotiable, flexible, contingent and creative character of professional health care, is the social order of the clinical care setting surely does show some signs of change.

With so much focus in healthcare policy on innovation as a good in itself (reflected in the UK in a current 2011 government consultation), JM’s book raises challenging questions about different levels and different types of innovation. On the one hand, her account of NICUs shows the apparently irremediably negotiable nature of the care process at the micro level, but on the other, we know that care processes and pathways are the target of a wide range of powerful ‘external’ forces coming from the device and pharmaceutical industries, from patient safety and risk management reviews and policies, from the professional and policy exponents of EBM and HTA, and from the different structural patterns of healthcare delivery organisations, - in short the political economy of healthcare.

Of course, societies, cultures and the medical world have changed drastically since 1959 when Experiment Perilous was published, so one of the interesting questions raised by reading JM’s book is the extent to which the deployment of more recently coined sociological concepts adds to our understanding of the conduct of medical practice. To what extent – and this is a question that applies to a great deal of work applying STS to medicine and healthcare, including my own - do the language and concepts of STS advance our conceptual and theoretical understanding beyond some of the classics that I mentioned at the beginning of this piece?

In conclusion, Jessica Mesman’s book reminds us that clinical practice, professional medical work and medical technology are complex, evolving, multidimensional phenomena that continue to require correspondingly multi-faceted and methodologically diverse approaches, as we try to produce ever better understandings of how they work and what they mean in healthcare and society more broadly.
REFERENCES


INTRODUCTION

This book is a rich in insight into medical practice and the various disciplinary perspectives from which it may be studied. At the heart of this book are questions about knowledge (scientific and otherwise) and its limits (in various forms of uncertainty), the place of technology in contemporary health care, the constitution of ethical practice, and how these aspects relate to the actions of health care workers. It deals also with the web of relationships between doctors, nurses, parents, babies, and technology and how all of these must be made accountable to a wider juridical system, while in turn, the juridical system is insinuated into all of the above. All of these foci are also common, if not central, to both STS and Medical Sociology and Mesman elegantly combines insights from both of these fields. Yet the book speaks plainly, largely stripped of jargon and terminology, without losing any conceptual precision. The result is that it is a beautifully easy and engaging book to read, swept along as you are by gripping stories of the lives of a handful of neonatal babies and intricate (yet simple) explanations of what is involved in caring for them. But it is to the achievement of combining the insights of STS and Medical Sociology that I would like to address first.

Analytical perspectives on health care work

From an STS perspective, the field of medicine affords fertile ground for study. Lucy Suchman (2010: 203) has observed that medical practice comprises a site ‘in which the boundary between bodies and machines comes into relief, only to be rendered more contingent’. And as Casper and Berg (1995: 396) suggest, for medical sociology ‘the crucial role of technoscience in the shaping of medical work is more and more taken as a topic of investigation’. There is good reason, then, to combine analytical insights from STS and Medical Sociology in studies of health care work but it also presents some challenges, one of which is a divergence in analytical direction.

The emphasis in much of STS has been to explain the way things (organisations, relationships, practices, technologies, scientific facts) come to be, the way they are constructed. And in such stories of construction, contingencies and choice rather than forces of necessity are highlighted (Winner, 1993). Things, as they say, ‘could be otherwise’. In this way, various forms of determinism (specifically scientific and technological) are undermined. ‘Power’ has also tended to be analysed from this perspective. Actor-Network Theory, an influential approach within STS, positions power as an ‘effect’ rather than a ‘cause’. Hence, ‘power’ is not used to explain differences of privilege between one group and another, it is not a property belonging to individuals or groups, rather it is an outcome of social relations and therefore something that must itself be explained (see in particular, Latour, 1986).

However, such detailed explorations of the way things arise comes at the cost (for some) of a ‘disregard for the social consequences of technical choice’ (Winner, 1993: 368, my emphasis). As Winner observes of STS: ‘the consequences of prevailing are seldom a focus of study’. The question of how to address this criticism has persistently dogged STS (Radder, 1998; Zuiderent-Jerak and Brunn Jenson, 2007). For example, STS researcher Vicky
Singleton, when articulating the indeterminacy and ambivalence ingrained at every stage of the cervical screening programme, was challenged to decisively answer the question of whether women *should* therefore have a cervical smear test (Singleton, 1996). More recently in 2004, Bruno Latour deliberated upon whether STS had disarmed itself in its endeavours to deconstruct scientific fact. And in 2010, STS researchers such as Teun Zuiderent-Jerak were still exploring ways in which to respond to constructivism’s ‘normative deficiency’ (Zuiderent-Jerak, 2010).

Such criticism, of inattention to consequences, can hardly be levelled at Medical Sociology which has thoroughly explored, amongst other things, the pernicious effects of medical dominance. Exploring the various manifestations of such dominance – the manifold ways in which patients are rendered passive recipients of healthcare and their participation in decision making systematically diminished, not to mention how medicine’s dominance pervades and structures doctor-nurse relationships – has been an important line of critique in medical sociology. In view of this and STS’ perceived ‘inattention to consequences’, discussion of ‘hierarchies of power’ and strategies of resistance to these can be found more readily in Medical Sociology than in STS (see for example Griffiths, 2002).

In contrast to these criticisms of constructivist STS, Mesman does not shy away from discussing ‘hierarchies of power’ and its effects. However, by the time she uses this term ‘power hierarchy’ (on p168), she has already explored in detail what she terms the ‘specificity of perspective’. By this she conveys how an individual's knowledge is born of the experiences they have access to. She takes, as her point of departure, Anspach’s (1987) articulation of ‘ecologies of knowledge’ and advances this work in three important ways: first, she points out that by concentrating on professional position, parents are excluded as producers of prognostic knowledge; second, that the concentration on professional position obscures divergence of opinion within a professional group; and finally that a specific position within an ecology of knowledge, not only shapes ‘what a person sees or knows, but also what they can do’ (Mesman, 2008: 123). Mesman, therefore, silences the critics of constructivist STS by pointing to the effects of how the construction of knowledge relates to one’s ability to act.

Mesman explains how sensory experiences contribute to specific prognostic knowledge. With sensitivity and compassion, Mesman describes the heartbreaking situation of Tom where every attempt to alleviate his suffering results only in increasing his distress; the respirator both delivers life saving oxygen but destroys the delicate structures of his immature lungs and consequently his chances of ever living independently of it; the diuretics produce kidney stones, the corticosteroids result in a stomach ulcer, every touch from the nurses agitates him to such a degree that he needs to be sedated and his oxygen levels increased; the roles of his parents are reduced to that of spectators. But it is impossible for nurses to care for Tom without touching him and so they unwillingly contribute to his anxiety.

By focusing on features like proximity, touching and observing, Mesman enables the reader to understand the particularity of experiences, how this fits within an ecology of knowledge, but further, how this explains differences within professional groups. The specificity detailed in these processes of knowledge construction mean that the concept of a ‘hierarchy of power’ is built on a rich understanding of how a particular knowledge perspective comes to be, the way this is deployed in negotiations, and to what effect. The charge of reconciling STS and Medical Sociology around the notion of power may have been challenging yet the result is particularly satisfying. Mesman (2008:169) concludes that ‘These differences in power, access to preferred data and moral perspectives complicate the position of nurses in participating in end-of-life decision-making processes.’ She also points out that whilst life
ending decisions may be shared, the burden of consequences ‘ends up inordinately on the shoulders of some – the nurses’ (Mesman, 2008: 175). Thus Mesman does not skirt around pointing out the disparities and inequities that arise from the hierarchies of power, however, intricately explaining how a power hierarchy is continually being remade in everyday practices allows her the flexibility to use such concepts without being deterministic about them.

One criticism that might be levelled at Medical Sociology from an STS perspective is that the analytical concentration on the extensive ways in which medical practice has undermined a patient’s autonomy, control and self-determination risks positioning the patient as passive and docile. Some studies within STS have sought to tell a different story, for example, in the case of fertility treatment, Cussins suggests that patients might engage temporarily with their objectification if it advances movement towards their long-term goals of becoming a parent. A process she called ‘ontological choreography’ (Cussins, 1998). Another approach has been to focus on the limits of practitioner control, showing how even unconscious patients can call the shots, directing and constraining the actions of anaesthetists (Goodwin, 2009). Here again, Mesman artfully constructs a middle-ground; without adopting the nomenclature of STS (something I will discuss below) she still portrays parents as active participants, and when discussing the uncertain trajectories of these babies, she conveys the agency of the child in shaping its own trajectory. Following an intervention by the staff:

An experimental space is created in which it is not the staff’s move but the child’s. The staff has acted and subsequently it has to become clear how the child responds, if s/he will. (Mesman, 2008: 84)

Indeed, the multiple ways of managing uncertainty that Mesman details (for example, recourse to the future as a frequent reason for refraining from action, hedging language, and protocols) describe how medical staff meet, acknowledge, and struggle with the limits of their knowledge and control.

Normativity within STS

Having considered how Jessica reconciles potential tensions between Medical Sociology and STS leads me to reflect on what identifies a study as ‘STS’. Earlier I mentioned the criticisms of STS that it is ‘normatively deficient’ in its arguments. However, there is perhaps another kind of normativity that affects STS and this relates to how such a study should look. I have said that the book is largely devoid of STS terminology without losing any of the conceptual clarity. To explain, in some forms of STS (most notably ANT and its various reincarnations) researchers are entreated to resist making assumptions about who or what are important and instead let differences (between, for example, humans and non-humans) be demonstrated empirically. By doing so it allows inscriptions (Latour and Woolgar, 1986), microbes (Latour, 1999a), scallops (Callon, 1986), and bush pumps (de Laet and Mol, 2000), to name an iconic few, to come to the fore. The aim of such symmetrical analyses is that, if we refrain from making such apriori distinctions, it allows us to appreciate the extent to which even mundane technologies structure practice or to recover and examine the contributions of those participants assumed not to have the ability to act (Goodwin, 2009). Another prominent trope of STS has been to explore the dense sociotechnical arrangements in which bodies and technologies are intricately enfolded within one another using the concepts of hybrids (Latour, 1999b) and cyborgs (Gray, 1995, Haraway, 1991). Cyborgs epitomise the mix of technological and organic necessary to extend and enhance life, and to generate new capacities, but they also represent a powerful blurring of boundaries and convey a sense of unpredictability (Goodwin, 2009). Given Mesman’s subject area – neonatal intensive care – one might expect to find cyborgs. Mesman resists this temptation however – the descriptions in her book are elegant and simple distillations of what any outsider (rather than STS
scholars) might see if we entered, became familiar with, and learned to understand the NICU. There are no cyborgs (and to my count, only one hybrid) in this book.

But this is not the only way in which Mesman’s book is distinct from the mainstay of STS. I’d like to discuss two further examples: i) the place of the monitoring technology, the numbers they derive and their value, and ii) the way diagnoses and prognoses are made.

First though, in relation to the monitoring technology, some alignments with STS: Mesman (2008:94) makes the beautifully subtle observation that ‘The question of how the child is doing is mostly answered by a look on the screen of the monitor’. The monitor mediates between staff and child. Importantly, however, Mesman positions the technology not as a separate entity from the baby but an extension of the baby that amplifies articulation of its condition. Staff, she says, ‘watch the monitor but see the child ... as if monitor and child are one’ (Mesman, 2008: 94). A gentle invocation of the idea of a cyborg but without resorting to this (possibly insensitive) jargon.

Mesman explains how technology ‘disciplines’ practice, and so concedes agency to the technology. Respirators are inscribed with a ‘program of actions’ which determines the skills required and so the composition of the treatment team (Mesman, 2008: 100). Devices actively contribute to the way in which treatment trajectories evolve: with the poignant story of Tom, Mesman describes the escalation of intervention, here technology is an actor whose role it is difficult to contain. So, humans and machines as one, technology’s scripts disciplining practice, technology shaping treatment trajectories – all insights central to STS.

In the discussing the role of numbers, however, Mesman somewhat defies expectations. Staff members, she acknowledges, collect numbers, they provide a common language used by doctors and nurses: they read HB values, saturation values and input and output quantities of the fluid balance, and they recount hours, weeks, days, frequencies, percentages, pressure, sizes, and assessments. Pointing to the connections between neonatal practice and legal frameworks, Mesman (2008: 105) highlights the preference for quantitative data: ‘Because of its factual precision and comparability, a numerical transcription of the body is considered more reliable than its qualitative counterpart’. Yet, Mesman is quick to point out how numbers are not always considered hard facts: numbers can be a source of confusion when they contradict one another – implying different scenarios for action. Numbers can be persistently incomprehensible and are positioned, not as decisive, but as one of many sources of knowledge. However, Mesman (2008: 114, original emphasis) concludes that ‘The NICU is a quantitative practice in which both man and machine contribute to the numerical edifice erected around the child.’

So to return to my point about expectations within STS, I find it interesting that, despite clear appreciation, and detailed discussion, of the qualitative practice of making numbers meaningful, Mesman does not attempt to flatten this hierarchy between the value of qualitative and quantitative knowledge. Flattened hierarchies are commonplace in STS (possibly another reason why STS has difficulties discussing ‘power hierarchies’?); sometimes they are an inadvertent consequence of describing a network of actors (symmetrical analyses), but often they are a purposeful and politically motivated attempt to disturb the received view of what is important, for example, by making ‘invisible work’ visible – an abiding endeavour of Susan Leigh Star (eg Star and Strauss, 1999) or to recover (as did Shapin) the contributions assistants, technicians or operators have made towards scientific progress(Shapin, 1989).

My second example concerns the way diagnoses and prognoses are made. Throughout the book Mesman traces the processes by which treatment decisions are negotiated and
consensus constructed. In this she draws on with a significant body of literature in STS where decision making has been analysed as a process of alignment. However, attention within STS turned from looking at methods of closure to exploring the multiplicities, disunities and incoherences of bodies, objects and knowledges (see in particular, Berg and Mol, 1998, and Mol, 2002). Here, analyses have highlighted how differences are not necessarily resolved, they endure. So whilst attention has in recent times focused on multiplicity, incoherence, difference, ambivalence, Mesman talks of consensus (however difficult it may be to achieve) and alignment. And whilst Mesman does make clear what a convoluted process this is, in the end, however, consensus is achieved.

I wonder if Mesman’s argument and end point are tied to the examples she draws on. When I looked at these issues in my own work (Goodwin, 2009), I found in routine situations a certain degree of incoherence could be carried by, for example, disregarding a certain reading after going through a series of routine checks which provided a sense of security. But when I examined critical situations, where the urgency of the case forced the hand of practitioners, the problem with incoherent bodies came into focus: bodies that offer multiple, plausible but incompatible explanations for their presentation do not provide a direction for action. Clinicians, therefore, must work overtly to legitimate and account, as far as is possible, for each step, action, or intervention. The development of understanding clinical practice as a process of distributed decision making, with decisions shared amongst humans, devices, and routine practices, and where multiplicities, differences and incoherences exist, has been an incisive analytical resource within STS, but it fails to acknowledge that practice may not necessarily be viewed this way when questions of professional accountability are raised. In these circumstances, practice is often scrutinised retrospectively, with actions decontextualised and contrasted against ideal models of practice inscribed into guidelines and codes of conduct.

I wonder whether Mesman and I are making similar points here – actions, decisions must be made accountable and the more critical or extreme the situation, the more likely that somewhere along the line those decisions are going to be scrutinised retrospectively. In these cases some form of coherence must be forged. So perhaps it is Mesman’s care to incorporate the juridical consequences of NICU practice into her analysis along with the cases she selected – which she points out were purposely selected for their level of complexity and illuminative strength – that lead her to focus on the construction of consensus.

**Methodology**

This leads me into my two final points which focus on aspects of methodology. Firstly, following from the suggestion above, Mesman acknowledges that she focused on complex cases where it was unclear what was needed and in the case of the parents she concentrated on situations in which the staff/parent relationship was somehow challenged. Such situations are indeed analytically rich but I wonder how her analysis might have looked if she had concentrated on more routine situations and rather than moments of tension, she had looked at situations of cohesion. This question comes to mind in the light of Mesman’s own methodological orientation towards patient safety. Mesman suggests a focus not on error, troubles or weaknesses but on the ‘resources of strength’ in a practice, ‘things that go well and how they are supposed to be’ (Mesman, 2009: 1706). Might a focus on cohesion, for example, have brought Mesman to different conclusions about the position of nurses when participating in decision-making processes?

And finally, I’m interested in Mesman’s knowledge as an ethnographer. Without exception, the fieldnotes are beautiful, evocative, respectful descriptions of practice accompanied by
sensitive explanations of the different rationalities that inform participants’ actions. The fieldnotes recount such clear, plain, incisive, simple descriptions of ‘what is going on’ even when those situations are characterised by extreme levels of ambiguity and uncertainty. I was struck again and again as I read through the stories described in the book about the work this took: the filtering of what gets included/excluded from the fieldnote stories, what is known at that time and how to avoid being wise retrospectively. Furthermore, all the different parties’ prevailing rationales are so clearly presented and this understanding isn’t weighted towards any particular group (nurses/ doctors/ parents). I think it was not the purpose of the book to make methodological arguments, but as an ethnographer, and one interested in the sociology of knowledge, the ethnographer’s knowledge and its presentation here intrigues me.

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Uncertainty in Medical Innovation: Experienced Pioneers in Neonatal Care – an author’s reply

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INTRODUCTION

First I would like to express my deep gratitude to Shirlene Badger for organizing this event. Participating in such an exercise has been a great honour and I have tremendously enjoyed the opportunity. I also wish to thank Dawn Goodwin, Alex Faulkner and Paul Martin for reading my book critically and presenting such lucid comments. Their detailed observations gave me new and valuable insights into many of the issues addressed in my work.

To organize my reply I have clustered the various comments thematically. Most of the issues put forward by the critics of my book on neonatal care and its practitioners are related to the implications of my methodological choices and their intended and unintended consequences. It is not my intention to present another general methodological treatise on ‘doing ethnographic research’. Rather, I will merely try to account to my critics for my way of doing ethnographic research in this particular study. I will begin by addressing the critical commentary on the relationship between my case-study design and my conclusions. Next, I will discuss the remarks on the focus of my study, and finally, I will provide more detail regarding my handling of the context of this study.

The structure of the book

Collecting data on an intensive care unit for newborns for many months in both the Netherlands and the United States is not always easy, to say the least. On the two wards I studied I set out to track the performance and interactions of doctors, nurses and parents as closely as possible. I observed their activities, listened in on their conversations, attended their meetings, talked with them about their hopes and fears, their joys and worries. I asked them what kept them ‘going’, and asked them about their motivations and expectations. When I returned to the rather mundane world of university life, I had collected a pile of data large enough to write at least a five-volume book series about my findings. This abundance, of course, called for the need of careful data selection. After gaining a better grasp and a more comprehensive understanding of the issues covered by my data, I developed my main argument and was able to select four case studies whose protagonists would act as the main characters of my account: Tom, Esther, Robert and Maureen. Furthermore, by highlighting one child’s NICU journey (Tom’s), I hoped to provide a kind of sustained narrative line throughout the book in order that might act as a backbone to my argument. At times this approach proved a daunting balancing act between narrative and argument, requiring a careful distribution of events and analysis. However, my decision to foreground one case throughout the book also made it easier to select useful issues and elements from my other case studies and disperse them throughout the text.

Although data selection is a tricky research challenge in its own right, my critics zoomed in on the issue of data presentation: ‘what are the effects of this specific case-study design for my conclusions?’ In other words, would another presentation of data have yielded other conclusions? To address this valid concern I wish to describe my decision-making process for the case-study design as it is.
While struggling with the question of structure, I attempted different scenarios. In one scenario each child would have the lead role in a separate chapter: ‘Tom’, ‘Esther’, ‘Robert’, ‘Maureen’. In another scenario I emphasised the geography of my two sites of fieldwork: the book was divided in two, with one part about the Dutch ward and the other about the American ward. Another option I considered was a book in which each chapter had a specific focus, like ‘people’, ‘machines’, ‘paperwork’, ‘numbers’ and so on. At one point it also seemed worthwhile to organise my research materials along disciplinary lines (philosophical reflections, anthropological insights, ethical considerations, and so on), or along the line of the medical activities involved: ‘diagnosis’, ‘treatment’ and ‘prognosis’. In each of these scenarios, surely, my case materials would be presented in quite divergent ways.

Evidently, a choice had to be made, but what exactly would be its implications? What were the advantages and drawbacks of each of these scenarios for my argument? Which lines of argumentation would I block if selecting the first or second scenario or one of the other options? These were tough questions, during the early stages of my book project. While trying to piece things together and seeking to find good reasons for each option, I realized it also seemed interesting and perhaps possible to organise my fieldwork data and the issues I wanted to address around a metaphor, such as the theatre metaphor or the travel metaphor.

After weighing all the various concerns I decided pursue the travel metaphor. I believed it would allow me more space to describe the actions and interactions of NICU staff and parents in the face of all the medical and ethical uncertainties involved. It would give me the opportunity to discuss issues related to time and space, to past events (experience) and future events (expectations), and to the people and things that accompany NICU children during their entire admission or part thereof. The travel metaphor would help me to introduce the spatial elements of the setting and its boundaries, as well as its insiders and outsiders. It would provide me with a discourse to describe how doctors and nurses make decisions and take actions under highly difficult and uncertain circumstances and how working at the cutting-edge of medical science has turned them into ‘experienced pioneers’. This specific approach would provide a structure that allowed me to present nearly all of the arguments I wanted to make. Importantly, the travel metaphor reflected my own experience of doing research and exploring a hitherto unknown and daunting domain. If anything, my fieldwork and research interests had involved an exciting and occasionally trying journey into the strange and brave new world of life in the NICU.

What then are the implications of this particular case-study design for my general conclusions? My initial response to this concern would be that a different presentation of my data would have changed neither the lives of the children I write about nor the conclusions of this book. After all, my conclusions in the book are based on their lives. At the same time, however, and as I also demonstrate in the book, every order or arrangement of data has implications for what becomes more or less visible, for what becomes important or relevant, or for what is at the centre or at the fringes. If I had favoured any one of the other ordering scenarios, some issues might not have come out as prominently. Some may not have been included at all. This particular concern needs more elaboration. In the book’s conclusion I argue that case-descriptions have particular consequences - a rule to which my work is no exception of course. Following the reflexive turn in STS, I have no other option than to argue that any change in my case-study design would certainly have had implications for the kind of conclusions presented. What exactly they would have been, or how different, is hard to say. But one can imagine that the third scenario mentioned above (a topic-based structure: people, technology, paperwork and numbers) would have excluded many of the interactions and interdependencies between the ward’s various dimensions. Likewise, the linear scenario of diagnosis, treatment and prognosis would have obscured the fact that in practice these
activities occur as part of one and the same process, rather than being sequential. Opting for the scenario of having separate accounts of my fieldwork in the Netherlands and the United States would have positioned my work in the corner of international comparative analyses. This would have required another ethnographic design (including other Dutch and American wards) and an explicit description of the specificity of, and the differences between American and Dutch cultures. Clearly, then, my answer here is yes, the thrust of my conclusions would have been different if I had designed a different study.

The focus of the book

The predominant focus of the study is on so-called hard cases: on patients with serious conditions, or on tensions between the involved people. As explained in the introduction of the book “[t]he exploration of complex cases (…) is not meant to give the impression that NICU life is totally caught up in doubts and uncertainties” (p.6). Instead this focus serves a methodological purpose. These kinds of cases served as a magnifying glass to the implicit and various strategies that are used on the NICU in order to deal with uncertainty. The question posed by the critics is how my analysis might have looked if I had concentrated more on routine cases instead of extreme cases and more on moments of cohesion instead of tension?

Responding to this, I think my analysis would not have been all that different. First, in my book I pay ample attention to styles of ordering on the level of reasoning (repertoires), talking (vocabularies) and acting (scripts). I describe how these styles are also used in routine practices such as in the use of a respiratory machine and in the daily conversations of staff about parents. However, in a study of routine practices – rather than complex and highly uncertain cases – it is possible to miss parts of practice and styles of ordering. Second, I address not only moments of tension, but also situations of cohesion (cf. Esther’s case). In this example I describe how both the staff and the parents of Esther use prescribed styles of ordering. I highlight how the distribution of power might be different in moments of cohesion, as the end-of-life decision considering Esther demonstrates. This focus on these moments of cohesion shows that while nurses do not necessarily have more power, they certainly experience less frustration.

There is also the question of how the book would have looked if I had focussed more on incoherence and differences instead of alignment and consensus. In the beginning of the book, when introducing the world of neonatology, I focus on routine cases and describe a particular example of the functionality of an incoherent reasoning about the use of numerical data. Likewise, for example in the fifth chapter, I account for the differences among actors regarding prognosis, and how this affected the decision-making process of stopping or prolonging treatment.

In order to follow Dutch professional guidelines regarding end-of-life decisions, the staff and parents on a Dutch ward have to arrive at a consensus before taking any further actions. Therefore the convergence of their different positions is the object of analysis for one of the chapters. Here I describe the performances that bring facts and values in line with each other to legitimate decisions. However, my analysis makes clear that this involves more than just ‘following the rules’. The staff members perform several activities at various moments, including testing the robustness of facts as well as the flexibility of moral categories; exploring the available maneuvering space; examining disciplinary boundaries and the distribution of responsibilities; searching for the right words; constructing a consensus; and learning to deal with the consequences of a decision. The challenges of NICU life, in other words, require a situated morality in which the distinction between a ‘general moral category’ and ‘the child’s unique situation’ is resolved. Staff generate a custom-made morality that fits
not only the patient, but also the staff and parents. Consensus involves a distribution of responsibility and this can provide a basis for sharing the moral burden of these kinds of decisions. What may happen without this consensus became clear in the case of Maureen, where doctors, nurses and parents felt responsible but without any power to decide and act.

Following the life of Tom and other NICU patients allowed me to focus on routine cases (Tom’s initial status on the NICU) and complex cases (what Tom became), on difference (the prognosis of Tom after four months) and consensus (Tom’s prognosis after five months), as well as on cohesion (Esther) and tension (Maureen). On the NICU all these various issues and concerns are part of everyday practice.

The context of the book

My critics put forward the claim that my study presents the NICU as an independent entity, as if there is no relationship with the socio-cultural context and health care organization of which the NICU is part. First, they suggested that in my analysis the hospital organization, including its ‘contextual forces and power dynamics’, is virtually absent. Indeed, this is an omission in my book. I was aware of it at the time of data collection but feared that if I would open ‘the door’ and explicitly account for what would come in from the outside, I had to follow these multiple threads all the way outside the ward into the hospital and probably beyond. To be honest, the decision I made at the time was that data I collected within the walls of the NICU and for which I had to account was already overwhelming. In this respect, my current fieldwork has taught me that in today’s health care practice the broader health care context is much harder to ignore. The rapid changes in health technology and the public and political attention to health care, its quality and safety in particular, has led to many new (mostly non-medical) activities on the ward (for example, formalizing indicators, incident reporting and crew resource management (CRM) training). For this reason, it has become more relevant than ever to address the specific hospital context of the NICU practice.

Secondly, the comments of my critics about the lack of context in my study also tie in with the fact that my fieldwork was conducted in the nineties. What, I was asked, would my conclusion have been if it would be based on more recent fieldwork? Based on my current fieldwork on a NICU I can confirm that the styles of ordering are still in place, a view also confirmed by the staff members with whom I discussed my book. Moreover, according to them the extreme cases I describe in my book are no exception anymore and have become a common factor in the patient population.

Thirdly, as one of the critics submitted, there is the invisibility of the difference between the socio-cultural contexts in which the two NICU’s of my fieldwork are situated. Although in my study I link all empirical excerpts explicitly to either Northeastern General Hospital (United States) or the Academic Medical Centre (Netherlands), my critics observe that a thorough description of the specifics of the socio-political-historical culture in which these hospitals are located is missing: as if it would be irrelevant to me that one ward is located in the United Stated and the other in the Netherlands. My response is that of course it matters. Yet at the same time it doesn’t. Let me explain this apparent contradiction.

First, if there are evident cultural differences between NICU practices in the Netherlands and the US, not everything that is done and said is typical for either American doctors, nurses and parents or their Dutch counterparts. Some aspects are more specific for neonatologists, or for female doctors, or for fathers, to mention but a few categories. At the same time, in some cases the cultural context is a decisive element and where this was the case, it featured in my argument (for example in the case of life-ending decision-making). In these kinds of situations the cultural norms and values proved very apparent. For one thing, it
caused American staff members to collect more numbers and Dutch staff members to go and sit around the table with each other. The first group did so in anticipation of a possible lawsuit and they made sure to have enough hard data to back up their decision. The second group did so in the light of professional guidelines that instruct them to discuss these decisions in a multidisciplinary meeting and to come out of it with a decision based on consensus (a typical example of the Dutch ‘polder’ consensus model).

So the role of cultural context can make a huge difference and as such it is highly relevant in general. But this fact was not always highly relevant to my overall argument. Moreover, from a methodological angle, familiarity with one ward in each country seems hardly a solid base for bold claims about American ways of acting or Dutch style decision-making. This absence of a solid base is certainly a problem when aiming for an international comparative study. However, as I explain in my study, my fieldwork in the US largely served a strategic purpose: to minimise ‘cultural blindness’ by using the contrast of another medical setting in another culture – yet with the same level of advanced technology and training standards. This allowed me to see more clearly how actors operated in the Dutch NICU, as well as what ‘doing cutting-edge medicine’ entailed. This methodological decision proved quite helpful indeed.

Although I neglected the way hospital dynamics and power structures find their way into the daily practice of the NICU, while also downplaying the role of the two different cultures for the reasons mentioned, I did not refrain from paying attention to outside factors altogether. On the contrary, such factors played a major role in explaining fears of lawsuits in the United States and the multidisciplinary meetings in the Netherlands. Additionally, in my study the wider world also entered the ward in the form of culturally specific data on the rate of premature babies and teenage-mothers, on parental expectations as based on popular television series like ER, or on the admission rate of other ICU’s or surgical possibilities. In these various ways, my study accounts for the outside world and how it comes in and effects the things that go on inside the NICU.

Swimming against the tide

According to one of my critics, I tend to ‘swim against the STS tide’. Although written from an STS perspective there are three issues in which the book, according to this critic, differs from current STS studies: language, the principle of symmetry and a focus on multiplicities and differences. Although this critic considers this a noteworthy observation rather than a weak point of the book, I would like to respond to its first two elements (I have already touched on the issue of differences).

First, to the issue of language. The field of Science and Technology Studies has developed an extensive set of concepts to express and explain the complexities of the practices it studies. If my book qualifies as an STS study, its text largely avoids STS jargon. The reason for this absence has to do with my audience and the sensitivity of the practice I study. From the very start my ambition was to open up my work to a larger public than just my academic peers. If possible, doctors, nurses, parents, medical students, social workers and scholars from other disciplines should be able to understand my observations, arguments and conclusions and their implications. This decision had huge implications for the words I chose. To be accessible for a wider public required not only a less scholarly style of writing, but also the proper empathic tone, given that the practice of neonatology involves many sensitive moments and actions. For example, when I discuss the intertwining of the NICU patients with the technology that surrounds them, the notion of ‘cyborg’ may seem useful and appropriate from an academic vantage point. Most scholars will read ‘cyborg’ as a concept that is embedded in a nuanced debate. Parents, on the other hand, might relate it to bad
science fiction movies and as such consider the use of this term as insensitive.

Second, there is the issue of symmetry that is based on the observation that I do not attempt to flatten existing hierarchies, such as those between qualitative and quantitative knowledge. Although I foreground the qualitative process in which quantitative data is produced, on the NICU quantitative data is what staff members consider as more reliable, better to work with, easier to communicate, easier to measure, a potential strong defence in court, etc. It is here that doctors and nurses do not wear a stethoscope but a pocket calculator. It is the position of quantitative activities and data in their daily routines of work that makes me conclude that the NICU is a quantitative practice, despite the obvious qualitative process in which they are generated.

Finally, swimming against the tide might well be part of my nature. In my current project, which is on patient safety, I do not study the causes of medical incidents, as many researchers tend to do, but I look at the causes of medical safety. A major motivation for this is the rather surprising notion, at least in my view, that in medical practice more incidents do not occur. Considering the complexity of critical care I would expect more mistakes, errors and incidents. So besides following protocols and high levels of training, what is it that makes particular practices safe?

Let me conclude once again by thanking my critics for their insightful remarks, questions and criticisms. They are valuable not only for opening new perspectives on my own book, but also for my current research project. It would be wonderful if these comments would inspire others to reflect on their work as well. After all, most of the choices I had to make are not intrinsic to my individual research project; they are intrinsic to doing research in general.