Science and democracy on stage at the Science and Technology Select Committee

**Abstract**

In this article we explore the legalisation of mitochondrial donation in the UK as the latest iteration of an established sociotechnical imaginary of permissive yet highly scrutinised human embryo research in the country. The focus of our analysis is the work of the UK House of Commons Science and Technology Select Committee as it contributed to the debates, and ultimately, played a role in enabling the UK to become the first country in the world to legalise clinical use. Mitochondrial donation is a reproductive technology which could allow women with mitochondrial disease to have healthy, genetically related children. From 2011 an extensive process of inquiry was launched in the UK to assess safety, ethics and public attitudes. We analyse video and transcripts of the meeting, and interviews with panellists to explore three themes: contesting scientific interpretation, the labour of alignment, and resolution. We demonstrate how micro-interactions during the meeting, and the broader structure of the meeting itself, aligned with the UK sociotechnical imaginary of a permissive but scrutinising approach to human embryo regulation. We conclude that the event was one element of a larger process of review that together worked to render mitochondrial donation as knowable, ethical, desirable, and sanctionable.

**Keywords**: House of Commons Science and Technology Select Committee; Mitochondrial Donation; Performance; MRTs; biomedicine; legitimacy; sociotechnical imaginary

## Introduction

In 2015 the UK became the first country in the world to legalise mitochondrial donation[1], a reproductive technology to prevent the transition of mitochondrial disease from mother to child. Mitochondria exist in the cytoplasm of a cell, they provide energy, and are inherited through the

[1] Different terms are in use, such as Mitochondrial Replacement Therapies, Mitochondrial Replacement Techniques, or the individual techniques of Pronuclear Transfer and Maternal Spindle Transfer. In this article we use 'mitochondrial donation' to reflect the term used in UK political documents.

female line. Maternally inherited mitochondrial disease is caused by a fault in the mitochondria, which can result in a broad range of mild to severe symptoms, including fatigue, diabetes, deafness, cardiac failure or infant death (Ng et al, 2021). There is no cure for mitochondrial disease and treatment options are limited, which means that the development of reproductive options which can prevent a child from inheriting the disease have been widely welcomed by many. However, mitochondrial donation is controversial, because any child born, and their future generations following a maternal line, would inherit genetic material from three people – nuclear DNA from the intended mother and father, and mitochondrial DNA from the egg donor. This multiple inheritance led to the technique being dubbed the 'three parent baby' in some media and policy discussion. As reproductive technologies involving embryos are tightly regulated in the UK, a change in law was required to enable mitochondrial donation to move from research to clinical use. Legalisation proceeded an intense period of expert review, calls for evidence and consultations, and public and political debate, to explore whether mitochondrial donation was considered safe and ethical, and whether legalisation had public support.

Embryo research in general is highly contested, in the UK and elsewhere. It raises fundamental questions about kinship (Franklin 2013), the relationship between nature and culture (Strathern 1992), and the politics of life itself (Rose 2007). Social science commentary on mitochondrial donation increased as the techniques became more publicly visible. Much of this work focuses on the specific challenges mitochondrial donation posed to legal and ethical frameworks. These include the political use and/or biological accuracy of the 'three parent baby' label (Baylis 2013; Dimond and Stephens 2018a); the meanings of genetic identity (Turkmendag 2018); the role of the egg provider (Haimes and Taylor 2017); the distinction between treatment and enhancement (Rulli 2016); whether the technologies constitute germline modification (Newson and Wrigley 2017); and professional and religious perspectives (Bredenoord et al. 2010; Hens et al. 2015). The debates themselves were also the focus of social science enquiry. They were found to bio-objectify mitochondria (Bühler and Herbrand 2022), render egg providers invisible (Haimes and Taylor 2017), be dominated by a

politically powerful narrative of child suffering (Herbrand and Dimond 2018), and, as we expand on here, further instantiate an existing UK approach to human embryo regulation (Authors XXXX).

In the context of our broader research documenting the process of legalisation, this article focuses on a specific evidence session about mitochondrial donation organised by the House of Commons Science and Technology Select Committee. We use this meeting as a case study to explore how democratic legitimacy is staged in the context of UK biomedical policy making. We also consider how such work was achieved through micro processes of interaction in the context of this controversial in vitro fertilisation (IVF) technique. While the evidence session was just one element within the network of mechanisms and processes employed within the UK to assess mitochondrial donation, it captures core performative practices seen across the debates, and was itself a significant juncture in the process of bringing mitochondrial donation before parliament for a vote on its legalisation. Specifically, this paper will analyse the performative practices staged during the committee meeting, to demonstrate their alignment with a dominant sociotechnical imaginary that has framed decision-making about human embryo research and clinical use in the UK for decades. First, we introduce key literatures on (i) sociotechnical imaginaries, (ii) performances of legitimacy at the UK parliament, and (iii) the relation between the broader context of human embryo regulation in the UK and the legalisation of mitochondrial donation. We then outline our methods, before analysing the Select Committee's three panels in turn, and finally close with a discussion of our key findings.

**Sociotechnical imaginaries and the performance of legitimacy**

While the focus of our analysis is the micro-organisation of legitimacy performances in the under-analysed context of the House of Commons Science and Technology Select Committee, we situate this within the longer history of the UK's sociotechnical imaginary as a consultative, permissive, yet closely regulated approach to new reproductive technologies. The concept of sociotechnical imaginaries was initially developed in relation to US and South Korean approaches to nuclear power. Jasanoff and Kim described the national sociotechnical imaginary as "collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or

technological projects" (Jasanoff and Kim, 2009, p120). The concept acknowledges the significance of envisioning the future, whereby "technoscientifc imaginaries are simultaneously also 'social imaginaries', encoding collective visions of the good society" (Jasanoff and Kim 2009, p. 123). In their later work they expand and develop the concept beyond nationhood, to explore the diverse ways in which individuals, institutions and groups collectively invest in imaginaries. Jasanoff and Kim (Jasanoff 2015, p4) thus have redefined sociotechnical imaginaries, as "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology." The concept of sociotechnical imaginaries has been widely used to explore how future visions associated with scientific developments are built into "the assemblages of materiality, meaning, and morality that constitute robust forms of social life" (Jasanoff 2015 p4).

Sociotechnical imaginaries have been used to explore a range of processes as broad as corporate responsibility (Smith 2015), UK science policy (Smallman 2019), education (Matthews 2021), and automation (Wajcman 2017). In terms of biomedicine, sociotechnical imaginaries and related ideas have been used to analyse stem cell science in Spain (Stephens, Atkinson and Glasner 2013), bioprinting human skin in France (Lafontaine et al 2021), genetic screening in Australia (Karpin and Mykitiuk 2021), and across embryo research topics in the USA (Hurlbut 2017). We take this work forward by emphasising how micro-interactional performances at the Select Committee meeting operate to enact the specific UK sociotechnical imaginary around embryo politics. Overall, we assess how the diverse elements of the staging of the committee meeting, from its situatedness within Parliament, to the structuring of the panel sessions, and the micro interactions between panellists, are all important elements of performance. Together they render mitochondrial donation *knowable* as a defined and delimited process, *desirable* as a productive good, *ethical* as an accredited and responsible practice, and *sanctionable* as a process suitably positioned for proper legal authorisation. As Jasanoff and Kim highlight, processes of enactment are often given insufficient attention in the scholarly literature. In their words, "performance as a social practice gets short shrift in much of the theorizing on imaginaries, even though theatricality has been part of the machinery of statecraft and

rulership from the earliest times" (Jasanoff and Kim 2015 p9). In working to address this gap, our analysis draws upon Hilgartner's (2000) approach to performativity when science is 'on stage'. Focusing on the US National Academy of Sciences as an advisory institution, Hilgartner developed a theoretical framework to explore the performance of legitimacy and credibility of scientific advice and expertise. Hilgartner himself was influenced by both Goffman's dramaturgical approach, and by the canon of literature around science, technology, and performance. Using the analogy of everyday life as theatre, Goffman (1959) proposed that the 'front stage' is where the performance is designed for audience consumption, and 'backstage' is where individuals can rest from their performance and resolve discrepancies in script or role. Through techniques of stage management, the audience are encouraged to recognise and accept the performance as authentic.

Our study is the first to analyse performative practices within the House of Commons Science and Technology Select Committee, and as such contributes to a developing literature on performativity in the UK Parliament more broadly. Crewe (2015), for example, analysed how MPs invested extensively in the backstage work of negotiating relationships with other MPs, journalists, and experts. Crewe notes the significance of the setting: the floor of the house is set for oppositional debate whereas meeting rooms set in a horseshoe shape lend itself for discussion and collaboration. She also noted the ritualistic nature of politics - where Prime Minister's Questions, party political conferences, and select committee enquiry meetings are "replete with strict rules, symbols of power or rebellion, and status hierarchy" (p155). In another example, Geddes (2020) suggests it is the context within which parliamentarians work which is key for understanding etiquette, rituals and performances. For Geddes, these traditions are "the social context within which actors find themselves, or the 'situation' in situated agency. They are webs of belief that act as organising perspectives or ideational context for individuals, groups and other political actors." (p25). Geddes argues that traditions are important for giving meaning to parliamentary work, as they indicate what is legitimate, acceptable and imaginable within a set of beliefs. The culture and history of parliament therefore becomes a crucial element for understanding how parliament works and how it influences the work and behaviours of parliamentarians.

**Regulation of human embryo use in the UK**

The history of UK embryo research and regulation is an important context that informs current practice, and gives the UK sociotechnical imaginary a distinctive character. A key development was the establishment of an independent body to oversee research and practice in response to rapid developments in IVF technologies in the 1970s and 80s, in particular the birth of the first 'test tube' baby. A philosopher, Mary Warnock, led the Inquiry into Human Fertilisation and Embryology, which ultimately established the Human Fertilisation and Embryology Authority (HFEA) with the purpose of monitoring and licensing human tissue and embryo research in the UK under the Human Fertilisation and Embryology Act 1990. The contentious character of the early UK debates around embryo research has been noted in Mulkay's (1997) account of how it attracted intense public scrutiny, was highly contested on moral grounds, and at that time was resisted by special interest groups and 'ordinary people'. Although embryo research gained (and as our case study shows, continues to gain) parliamentary approval, it was marked out as different from other kinds of scientific research and remained restricted "by the establishment of elaborate mechanisms of external control" (Mulkay 1997 p2). Indeed, part of the promise for scientists of Warnock's initial work was that the influence of philosophers and lawyers on public policy would bring further legitimacy to scientific work. The HFEA was expected to play a key role in a 'system of surveillance' which enabled IVF to become 'publicly accountable' (Wilson 2011 p131).

In our previous work we argued that the process of legalising mitochondrial donation in the UK can be understood as the latest instantiation of a broader UK sociotechnical imaginary around research and use of human embryos. This imaginary typically results in regulatory policies that are permissive in terms of embryo use compared to many other nations, but also involve highly scrutinising and bureaucratic-led licencing procedures that limit exactly who can conduct these procedures and in what circumstances (Authors xxxx). This sociotechnical imaginary has several key features. Most broadly, it locates the UK at the global forefront as a gold standard for delivering research and clinical practice that is both cutting-edge, and ethically sound (despite existing ethical controversy). In this vision the

UK leadership in biomedical research is aligned with broader UK leadership roles in other domains, as part of a package that performs the UK's global significance, in terms of economics, innovation, and regulation. The accomplishment of ethically sound practice in the face of ethical controversy is achieved through a consultative model that stages dialogue opportunities that give space to voices that oppose the specific controversial technique under scrutiny. Such dialogue opportunities are positioned as granting those voices both what is seen as a fair chance to make their case, and a form of respect that is deemed essential in a pluralistic society. This given, the opinions and prescriptions expressed by these opposing voices are then typically rejected in favour of a more permissive approach to embryo use, as these voices are positioned as minority perspectives, and thus need not shape the UK position. After reviews of ethical soundness, the appropriate body - usually the HFEA - establishes a licencing framework based upon expert review of relevant applications. Once permission is granted, the procedures can commence in accordance with the restrictions defined by the HFEA. It is then often intimated and assumed that the UK model, as an asserted gold-standard, may also be adopted or adapted into the regulatory and oversight processes of other nations, further instantiating the UK's leadership position.

This sociotechnical imaginary, and the processes that underlie it, can be found in other iterations of UK regulation of embryo use, including debates about preimplantation genetic diagnosis (Ehrich et al. 2008), egg donation and recompense (Haimes et al. 2012), human embryonic stem cell research (Mikami and Stephens 2016), and human admixed embryos (McNeil and Haran 2013; Harvey and Salter 2012). Although technical details differ, and each is distinctive in its ethical and policy context, there are parallels. Each case follows a similar pathway (for example, with an emphasis first on scientific development and then public consultation and ethical review at a later stage), and with a similar group of actors – such as the Nuffield Council on Bioethics and the HFEA – featuring recurrently. This model is used to stage discussion between diverse voices on the appropriateness of permitting a novel technique for embryo manipulation, before typically pursuing a permissive licensing regime.

The legalisation of mitochondrial donation followed this familiar and well-established pattern, although the nature and character of these specific reviews and debates reflected the specific context of requiring a parliamentary vote to sanction legality. The process of review enabled the most powerful institutions involved in the debate to conduct an assessment and subsequently express broad support for legalising mitochondrial donation. Scientific safety and efficacy were assessed by the HFEA at the request of the Department of Health (DoH), concluding that "the evidence it has seen does not suggest that these techniques are unsafe" (HFEA 2014, p. 4). The Nuffield Council on Bioethics review of ethics based on a public consultation identified key ethical issues such as identity, parentage, the status of the mitochondrial donor and implications for society and future generations. The report concluded that if proven safe and effective, "it would be ethical for families to use [the technology], if they wish to do so and have been offered an appropriate level of information and support" (NCoB 2012, pxvi). In the following year the HFEA conducted a multi-modal public consultation, using workshops, questionnaires, focus groups and open meetings to assess public understanding and attitudes towards legalisation, concluding that despite strong objections, "the overall view is that ethical concerns are outweighed by the arguments in favour" (HFEA 2013, p4). Following their own public consultation, the DoH reported that the government would proceed to put mitochondrial donation before Parliament for consideration.

There are various mechanisms, and institutions, within parliament to inform and provide advice on science and technology, as was the case for mitochondrial donation. The Parliamentary Office of Science and Technology (POST) supports the work of UK Parliament by identifying current and future trends in science and technology and acting as a 'knowledge broker' between members of parliament, experts and publics. POST organised an information session on mitochondrial donation for members of parliament with speakers including scientists and ethicists, and published an information resource for parliamentarians (POST 2014). In 2015 The House of Commons Library produced a 40-page document presenting current knowledge of mitochondrial donation and its progress through parliament. The House of Commons Science and Technology Select Committee, which has a broad remit to ensure that "government policies and decision-making are based on solid

scientific evidence and advice" (UK Parliament 2021a), organised a one-off evidence session on October 22nd 2014. It is this evidence session which is the focus of this article. In the context of multiple debates and reviews as mitochondrial donation moved through the political process of legalisation, the purpose of this Committee session and its collection of evidence from expert witnesses, was to produce a recommendation that the time was appropriate for a parliamentary vote.

In February 2015, both Houses of Parliament voted in favour of legalising mitochondrial donation under license from the HFEA. By March 2017 the Wellcome Trust Centre for Mitochondrial Research at Newcastle was granted the first UK clinical licence to conduct the procedure (Tinker et al. 2021). At the time of writing, there is yet to be any public announcements of a UK birth following the procedure, although it seems feasible such a birth may have happened. Elsewhere, the first baby announced to be born through mitochondrial donation was through an American-Mexican collaboration in 2016 (González Santos et al. 2018), and there have been several reports of pregnancies and live births across the world. Many countries have been reviewing the legal status and clinical possibility of mitochondrial donation (Ishii 2017), with the UK as one model that other countries assess when deciding their own pathway (Cohen et al. 2020).

**Methods**

Our primary data sources are the video recording of the House of Commons Science and Technology Select Committee meeting on mitochondrial donation and its transcript, a set of stakeholder interviews, and a broad range of documents relevant to the meeting. The recording of the evidence session (UK Parliament 2021b) was observed multiple times by both authors, and then watched together alongside the official transcript of the meeting, adding our own individual notations and thoughts to the transcript for discussion. Stakeholder interviews were mostly conducted in 2015 following the meeting. Interviews were conducted by Author 2, with groups actively campaigning both for and against legalisation, clinicians and healthcare professionals working in mitochondrial medicine, and representatives of key UK institutions including the HFEA and the Nuffield Council on Bioethics. Only the interviews of those who contributed to the Committee meeting are included in this

article. Most of the interviews were conducted face to face, each lasting between one and three hours, and were recorded and transcribed. Where agreed with the stakeholders, stakeholders were re-contacted about the inclusion of their interview in this article. Ethical approval was granted through [anonymised].

The analytical themes for this article – contesting scientific interpretation, the labour of alignment, and resolution - were identified while the authors watched the video recording of the meeting. We realised quickly that there were differences between the transcript and what we were watching on screen. It was clear, as Geddes (2018 p290) had previously noted about parliamentary events, that this meeting was able to "bring evidence, knowledge and scientific advice to life that no written piece of evidence could do", as the video showed key interactional modes not recorded in the transcript. We also recognised the significance of the staging of the event, that it was representative of the broader mitochondrial donation debates in microcosm, by discussing the science and ethics of the techniques, and by inviting individuals who were already prominent in the debates, most of whom were associated with key institutions. Yet there were also important differences, particularly in terms of when disagreement was welcomed and which issues were resolved, all highlighting how the meeting itself was a performance, within this broader context.

The structure of the following analysis reflects the structure of the House of Commons Science and Technology Select Committee meeting – three sessions which were divided according to topic and particular kinds of witness. In the first section of this article, we draw on our observations of the first panel and its transcript to explore the performance of contesting scientific interpretation. In the next section we draw on our interviews conducted with the key stakeholders involved in the second panel, to explore the labour of alignment. Finally, we explore how the third and final session of the Committee meeting is representative of a broader process, of moving from disagreement around the science, through to resolution and consensus about the future legalisation of mitochondrial donation. A key feature of our analysis is to show how the committee meeting renders mitochondrial donation knowable, desirable, ethical, and sanctionable. It is through this process that the legalisation of

mitochondrial donation has become the latest instantiation of a broader sociotechnical imaginary around UK human embryo politics. This, in turn, enacts the continued legitimacy of the now well-established model of political legitimacy at the core of the UK sociotechnical imaginary, and the continued performance of democratically legitimate biomedical science in the UK.

**Panel 1: Contesting scientific interpretation**

In this section we explore the performance of scientific disagreement. We highlight the work involved in demonstrating and negotiating disagreement, but also note how enabling disagreement is symbolically important in the assessment of novel technologies. We focus here on the first panel, in which contributions were invited from four expert witnesses from the science community. The topics discussed in this session include the nature of mitochondria and mitochondrial disease, and the process of reviewing scientific evidence (Questions 1 - 26, p1 - p14 of the Oral Evidence). The Chair, Mr Andrew Miller, is already seated when the filming begins, when he welcomes everyone to the room, and asks the panellists to introduce themselves: Professor Doug Turnbull, Director, Wellcome Trust Centre for Mitochondrial Research; Professor Peter Braude, King's College London; Professor Robin Lovell-Badge, MRC National Institute for Medical Research; and Dr Edward Morrow, Senior Research Fellow, University of Sussex. All four scientists had prominent roles within the mitochondrial debates. Turnbull and Morrow are both scientists working with mitochondria (Turnbull in relation to human health and Morrow in relation to evolutionary biology). As the scientist/clinician at the forefront of mitochondrial donation, Turnbull had been extensively involved in driving policy change around mitochondrial donation, with his centre being granted the first research licence to study the technique using human oocytes. Morrow had responded to calls for evidence using his published and sometimes unpublished work, by highlighting the risks of mitochondrial donation (particularly around haplotype matching[2]). Lovell-Badge and Braude were both on the expert panel which

[2] Haplotype refers to a set of genetic markers. Attempting to match the genetic markers of an egg donor and recipient (intended parent) in the case of mitochondrial donation is thought to reduce the risk to the embryo.

considered safety and efficacy, and Braude was a member of the mitochondrial donation working group for the Nuffield Council on Bioethics.

The most prominent aspect of this first panel was that Turnbull, Lovell-Badge and Braude shared the same vision of mitochondrial donation, its biological and social history, and its ethical future. When replying to questions, the three scientists took turns to contribute to the narrative of a beneficial future of mitochondrial donation. Displays of collaborative collegiality were frequently evident through physical movement, such as nodding to each other to indicate who might speak next, or in agreement of what was being said. Compared to these choreographies of togetherness, the 'fourth' witness, was identifiable as an opposition voice. Morrow was physically distanced from the others, a larger gap between his chair and the next, compared to the closeness of the chairs of Turnbull, Lovell-Badge and Braude. Morrow is also identified as intellectually distinct: the only one on the panel to have highlighted potential barriers in the process of legalising mitochondrial donation. In contrast to the others on the panel, Morrow was often brought into the conversation to defend a specific point of contention. The following extract, which occurred at the end of this panel discussion, but it is useful to start with this, highlights how an opposition view was expressed against such collegiality. On this occasion, the panel were asked about the Government's 'working' definition of genetic modification, enabling the Government to conclude that mitochondrial donation did not constitute genetic modification:

> Professor Lovell-Badge: My view is that you could call it germline modification—the HFEA used "germline therapy modification." You are not changing specific DNA sequences, which is generally how I as an experimental biologist would talk about genetic manipulation or modification [….] I do not see it as a form of genetic modification.
>
> Dr Morrow: If it is germline modification, how can it not be genetic?
>
> Professor Lovell-Badge: It is. We have not hidden from the fact that it is germline modification; we have always said that.

> Professor Braude: What we said is that it is a germline therapy; in other words, we know this is going to affect subsequent generations. […] Is it germline therapy? Yes, it is, with a very positive outcome, which is to avoid the kind of diseases that the children inevitably have if you do not do it.
>
> Chair: That is a helpful point on which to end. Gentlemen, thank you for your contributions.

In this extract, Lovell-Badge and Braude are able to co-produce their account, rendering mitochondrial donation as knowable, and specifying exactly how it should be known. Although Lovell-Badge begins with a personal account, both him and Braude then speak of 'we'. The Chair contributes by ending this particular discussion, after Braude's interjection, and without a further response from Morrow.

The role of the opposition voice is important to consider in debates about new technologies, as inviting alternative voices onto the stage supports the legitimacy and transparency of the review process. Focusing again on this first panel, the following sections explore how Morrow's views were given respect and noted as legitimate, while at the same time being identified as minority, with the potential to be disregarded. One way in which this was achieved was by marking Morrow's views as qualitatively different. Morrow's work was defined as 'theoretical' and 'statistical', an implicit suggestion that this means less relevant, a claim which is further supported by contrasting opposition with patient need. For example, when asked why the expert panel did not recommend haplogroup matching more strongly in their report, Lovell-Badge replied: "I think the concern in Dr Morrow's argument is really a statistical one. If you look really hard at thousands and thousands of cases, eventually you might possibly see something, but we are talking about patients where you can predict with pretty much 100% certainty that they will suffer, so it is very different". Later on in the session, the issue of using statistics is discussed once more, again in comparison to patient's realness, this time by the questioner:

> Chair: Taking us forward and assuming we are dealing with real patients, science is rarely about certainty. I do not think I have heard anything that implies that Professor Turnbull thinks Dr Morrow is a crank. He is a legitimate scientist. Do you think it would be proper in counselling patients about the pros and cons of techniques that you are developing to include in that counselling process an understanding of everything, including people's reservations, like those of Dr Morrow?

After Turnbull had addressed the question about counselling patients, the Chair continued:

> Chair: Not in terms of the statistical gobbledygook that some processes use, but simple, basic information. [41.40 video recording, p10 Oral Evidence]

But how and when being 'theoretical' or 'statistical work' is considered problematic is context dependent. In this case, what is significant is whose work is being described. For example, following a discussion about the differences between the two techniques of mitochondrial donation, Braude comments about one of the techniques, "It may turn out that efficiency is slightly better - it is just theoretical, but you can see why" [4.13 video recording, Q15, 38.13 p10 Oral Evidence]. On this occasion, this theoretical argument was not ruled out, dismissed, or presented as a barrier.

Another route through which the opposition voice was respectfully listened to and acknowledged, yet equally respectfully dismissed, was when views were individualised, and identified as not based within a community consensus. On one occasion, this was emphasised by Lovell-Badge when he describes some of the evidence submitted to the scientific panel as "scientifically interesting" but not "significant enough" [8.42 video recording; p3 Oral Evidence], and in his specific description of Morrow's views as "below the radar" [Q5, p4 Oral evidence]. On another occasion, Turnbull describes Morrow's concern as "a hypothesis and a theory", and a "theoretical risk", which compares to "a certainty of these diseases being transmitted". Although he reminds the audience "It is very important that we listen to the arguments of Dr Morrow and others", Turnbull provides the context

through which these views can be respectfully dismissed, in this case, because "Evolutionary biologists themselves cannot agree which is the right way forward".

In contrast to the explanation that Morrow represents a lone voice, independence is represented as a positive value when identifying with a majority opinion, and one that should be celebrated in contested domains. This was the case when Braude talked about the work of the scientific panel, declaring "We have no reason to take a particular line; we are all independent scientists with no affiliations to make this happen one way or another." (26.10 video recording; p7 Oral Evidence)

**Panel 2: The labour of alignment**

In this second section we draw on interviews with members of the second panel session to explore the collective actions of the witnesses and their orchestrated division of labour. Through these interviews, we make visible the backstage work required to produce the performance of coherence and collegiality. The panellists, and our interviewees, are Peter Thompson, Chief Executive of the Human Fertilisation and Embryology Authority (HFEA), Professor Jonathan Montgomery, Chair of the Nuffield Council on Bioethics and an academic lawyer, and Robert Meadowcroft, Chief Executive of the Muscular Dystrophy Campaign. At the evidence session, all three represented organisations which had a key role in the legalisation of mitochondrial donation: the HFEA as regulator, the Nuffield Council on Bioethics which initiated the public ethical debates, and the Muscular Dystrophy Campaign which had invested in the scientific development of mitochondrial donation.

Interviews conducted with the panellists revealed a keen awareness that taking part in this event was a performance. Particularly prominent was their labour prior to the event, in terms of thinking through the role they were expected to play and how their individual and collective performance appeared to an audience. Part of the backstage work required of a panel witness is the personal time and effort spent in preparation. As with the first panel, panellists had varying experience of prior involvement in

this political process. Whereas Montgomery uses 'we' in his account to signify his role as representative of Nuffield Council on Bioethics, his personal experience was significant to how he approached the role. He had not been on a select committee panel before, explaining "I hadn't done it before, so it was a new experience for me". Thompson (HFEA) and Meadowcroft (Muscular Dystrophy Campaign) had both been involved in previous policy debates involving discussion with government, Meadowcroft as representative of a neurological charity in stem cell debates and Thompson in his role as chief executive of the HFEA. In the extract below from the interview with Thompson, Thompson indicates how understanding the process helped to inform his preparation:

> Well, you hope you know your stuff. You might do particular extra work beforehand, depending on what sort of person you are. You spend quite a lot of time I think trying to work out where the lines of enquiry are likely to go […] I don't remember exactly how I prepared. You know, I felt pretty – you know, we've been doing this for quite some time.

Thompson explains his understanding of the event was that it was not going to be confrontational or oppositional, and that he would not be required to defend himself. Although witnesses might not be given specific questions before-hand, knowing the 'general gist' was identified as an aid to the performance. Thompson noted that an 'appearance' at a parliamentary committee needed to be given respect, "I treat every appearance before parliamentary committee with a great deal of seriousness". But he was also reflexive about the limits to a role and script when representing a large organisation, "I won't necessarily know a huge amount of the detail because I don't need to; I can't know everything". Parliamentary committees are not just about what is said, but who is invited as witness, and the manner of their performance. Thompson highlights an important aspect of the performance in front of parliamentary committees, where knowledge of the event, and understanding of what is required, including taking the role seriously and responding in a manner which is clear, precise and trustworthy, requires preparatory work and experience.

Meadowcroft also indicated how previous experience of working with parliamentary committees enabled him to understand the process and what was expected of his role. Whereas Thompson recognised the breadth and limits in representing the HFEA, Meadowcroft highlighted both the responsibilities of his role as patient representative and how this role was managed and supported by the Committee itself:

> I'm very fortunate in that the work I've done, I've done several Select Committees over the past fifteen years, maybe longer. So one knows what to expect. Usually as a patient organisation representative, you are – they tend to treat you with kid gloves. But you still feel a heavy responsibility, I have to say. You are aware of the responsibility for your trustees, supporters, the patient group.

Meadowcroft reflected on what kind of performance would be required, revealing the extensive thought and preparation involved in the presentation of self. As a representative of a patient organisation, he recognised the importance of thinking about how his voice would be received by the audience, "I don't think people warm to a patient organisation voice that is strident or is harsh or appears not to be listening". As with Thompson identifying his own role as an 'appearance', Meadowcroft recognised how his own demeanour and voice would be assessed as part of his performance.

Through the interviews it was evident that the three panellists consciously recognised how their own role contributed to the broader performance of the panel, and to the meeting more generally. In recognising what he brought to the performance, "I have multiple hats that I bring to bear and experiences", Montgomery was aware of what was expected of him in terms of moving on the conversation. He identified that his role was not to repeat previous discussions, such as the issues raised in the Nuffield Council on Bioethics 2012 report: "So it's not so much about the moral position Nuffield took. It's about the implication of that moral position for regulatory decisions".

The panellists not only recognised their own role in the process, but also reflected on how their accounts aligned with others. Reflecting on how the roles and scripts would be divided was important for

demonstrating respect to the committee members and the process itself. In his interview, Meadowcroft reflected on the division of labour between the panels:

> So I had confidence in what they [Braude and Lovell-Badge] were going to say and what I was going to say, interestingly, yeah. I was confident they were very capable of answering difficult scientific questions in a way that was both reassuring, factual and precise, yeah. So that's one. And second, I felt beforehand rightly or wrongly that they would get the technical questions and I would get patient organisation type questions; you know, what does it mean for you and why are you supporting this? Why do you back this research? Those sorts of questions, yeah. And that's how it turned out to be.

In his interview, Thompson also reflected on role allocation. Here he describes how an effective performance might involve work behind the scenes:

> Interviewer: And do you contact the other people who are also before the committee on the same panel?
>
> Thompson: Not normally, no. I don't remember whether I did in this case. Sometimes you might, sometimes not – particularly sometimes I think – it can be helpful sometimes to work out who's going to sort of focus on what, because there is a danger you all end up saying sort of the same thing and wasting the committee's time. […] So in my own mind that would divvy up as being Jonathan [Montgomery] would largely take many of the broader ethical questions. Robert [Meadowcroft] would look at the kind of patient perspective, and I would offer sort of, you know, insights into how you might regulate it; how you – you know, what the administration of it might look like, what the checks and balances in the system might be and so on. And from memory, I think that's pretty much how the questions got divvied up too. So the committee clearly had a view of, you know, who they were – what kind of evidence they wanted from what kind of witness.

In Thompson's account we can clearly see how this division of labour positions each of the three panellists as rendering mitochondrial donation ethical, desirable, and the process for rendering it sanctionable. The representatives of Nuffield Council on Bioethics, the patient group, and the HFEA were aligned, with a core function each. This given, the three individual performances are not mutually exclusive, as the effective performance of each reinforces the enactment of the others, often in a relation of mutual dependence. This was achieved without needing to negotiate the voice of dissent that we saw in the first panel.

While Thompson suggests that roles were already allocated through the invitation process, the other panellists suggested that managing these roles and scripts, and the boundaries between them, involved close negotiations backstage. Montgomery for example reflected on the significance of the long relationship between the organisations that he and other panellists represented. Describing a recent event, Montgomery discussed how he monitored Thompson's reactions to ensure boundaries were protected:

> I was talking about how Nuffield worked and Peter [Thompson] was talking about how the HFEA operated. So we'd just been chatting generally about the sorts of ways things were being approached, so I guess at that point it was clear to me that Peter didn't feel we were muscling in on his territory and, on that basis, it felt to be fairly safe.

Montgomery describes one moment with Thompson which was particularly important for him because of the alignment of the two organisations:

> There was one conversation. Before we went to the Select Committee, the Friday before, we booked a telephone conversation, Peter and I, just to check what we thought we were going to cover so that we didn't duplicate and didn't flatly contradict without being aware of what's going on. But my memory is I said, "This is what they've given me to say," and he said, "This is what they've given me to say." He might at that point have said, "I need to be careful to preserve the

> independence of the licensing committee." I don't specifically recall that, but he might have done at that point. But that's the only coordinating conversation that I remember and, because we had a limited amount of time in front of the Select Committee, it was about understanding what we were going to be talking about.

Panellists revealed an acute awareness of their role, in terms of behaviour and how they contributed to the discussion. Their accounts suggest the importance of aligning towards the same direction so each would support rather than contradict the other, which could risk undermining the legitimacy of the process. Montgomery suggested considerable investment in forming a mutuality, re-enforcing the process, and ensuring continuity:

> The HFEA, I think, was probably quite keen on us [Nuffield Council on Bioethics] continuing to be the one who talked about the ethics in the space because they would not have credibility as an independent adjudicator if they were saying too much that was positive about the ethics of using the technologies. So it's quite important for them that they were quiet.

The separation of science and ethics, and related division of labour is a common characteristic of the broader process of assessing and regulating new technologies (Lewens 2019), and this was the case for assessing mitochondrial donation. However, it is interesting to note that in this event, the panels were not divided according to science and ethics, further supporting our claim that the House of Commons Science and Technology Select Committee meeting itself performed an important role in moving the process towards legalisation, rather than replicating previous discussions.

**Panel 3: Resolution**

The final panel was made up of two senior figures within the Department of Health, Jane Ellison MP, Parliamentary Under-Secretary of State for Public Health, and Professor Dame Sally Davies, Chief

Medical Officer. The topics discussed in this session included who might benefit from the techniques, the government's definition of genetic modification and the follow up of future children born through the technique (questions 43 – 66, pages 22 - 30 of the Oral Evidence). As we will show, the key performative aspect of this panel was in rendering mitochondrial donation as sanctionable, through an account of the UK as the appropriate leader nation in doing so.

This session was notable because it consisted of members of the government, who ultimately had authority over the process of legalisation. The session began with the Chair welcoming both witnesses and asking them to explain what needed to happen before Parliament could vote on the regulations. Ellison explained the current position:

> Having heard all that and having found the debate very useful, hearing from a very wide cross-section, I am now actively seeking cross-Government approvals and clearances and asking for parliamentary time in this Session to bring the regulations before the House. I cannot be more precise at this stage, because the process has not completed, but that is an update on the position I gave the House at the end of the debate, and I am actively seeking all of those things.

When asked by a questioner about Britain being "the first in the world", Ellison emphasised how other countries have indicated their support and interest in the UK's position towards mitochondrial donation, but that Britain was not working in isolation. She describes how the regulations, "were Parliament to approve them, would influence the approach of those countries and states to the new technologies … It is extremely useful to put on record that Britain is not some sort of outlier or isolated case; we are pathfinders and innovators and I am extremely proud of that". Ellison concludes, by highlighting the legality of the process, "… all the advice I have is that we are proceeding in a perfectly legal way".

In contrast to the other panel sessions, there was an explicit recognition of the status of the House of Commons Science and Technology Select Committee meeting, and its significance in being a formal record of events. This session was notable for acknowledging the role the meeting would play in the broader process of legalisation, with the panellists representing, and enacting, that authority. Several times reference was made to putting the sentiments, or statements, 'on record'. This was the case when Davies explained her support for legalisation, "…if we go forward. Let me put on record that I hope we will, both scientifically and for those families". Following a discussion about the expectation that overseas patients would pay for their treatment, a committee member said: "Given the current debate, it is probably helpful to have that on the record".

Alongside providing an overview of the process, Davies and Ellison worked to emphasise their authority in making and supporting key decisions. This was the case during an extended discussion about the use of a 'working' definition of gene modification which the department of health had mobilized, and we saw how this was discussed in the first panel. This position had attracted considerable concern within the mitochondrial debates, broadly criticised for suggesting a pro-stance towards mitochondrial donation to enable its legalisation. Here Davies made her authority over the process very clear, "Let me take responsibility for that", explaining "It is not that that is what it is; it is so that we can have a conversation and know what we are talking about". Ellison supported this decision, "I think the rationale Dame Sally has presented for the definition is perfectly sensible and reasonable… I am very comfortable that it is a reasonable definition that has helped us to have a sensible debate." Such utterances show the relatedness of rendering mitochondrial donation as knowable and sanctionable; defining how it should be known here is explicitly linked to the process for how it should be sanctioned.

Throughout this panel, Davies and Ellison were able to express their authority by either resolving issues or re-defining them as future questions, and the responsibility of another trusted organisation within the system. Some issues were presented as unresolved, yet unproblematic. When asked about

the ‘follow up’ of children born through the technique, Ellison refers to the current state of knowledge:

> “I do not have a detailed view, because it is something I would expect HFEA to talk to scientists about. I do not think that at this stage we have to have all of that detail outlined. It is clearly a completely sensible thing for us to know, but at this point I do not think it is an essential piece of detailed planning to have in place to go to the next stage of the process. Any clinic licensed by the HFEA to do this technique would need to satisfy the regulator that they had thought it through and had a proper regime in place. That is why we have a regulator. I know that is something they would do. We have had conversations about the fact that, in principle, it would be part of the regime they would need to put in place.”

There are several important ways in which Ellison performs categorical work here. First of all, Ellison suggests that it would be the role of another institution (the HFEA) to gather that information. Secondly, uncertainty is legitimised, it is acceptable that Ellison does not have the information, and that this should not be considered a barrier. Indeed, she explicitly states that it should not prevent “the next stage of the process”. Finally, Ellison asserts trust in the system, that those conversation would have been had, because the system requires those conversations to have been had.

**Discussion: Mitochondrial donation on stage**

The meeting of the House of Commons Science and Technology Select Committee performed important staging work. It articulated a moment where the mitochondrial donation debates were considered settled enough to introduce a meaningful parliamentary vote. After the session, the Chair of the Committee Andrew Miller MP wrote to Jane Ellison, Parliamentary Under-Secretary of State for Public Health, to confirm the committee’s decision, that “there is sufficient information for Parliament to come to a rational conclusion about these technologies…. We have concluded that the science needs to be considered alongside the broader social issues involved and that further delay will

serve no good purpose" (Miller 2014). The letter encouraged Jane Ellison to "get the legislation before Parliament as soon as possible to provide good time for all MPs (and Peers) to consider the details of the Government proposal ahead of debate in the House." The importance of these reviews, and the evidence session analysed in this article, was asserted by Jane Ellison MP, Parliamentary Under-Secretary of State for Public Health, who introduced the pre-vote debate:

> There has been much parliamentary scrutiny of the proposals, including three parliamentary debates and over 200 parliamentary questions in both Houses. As part of this parliamentary scrutiny, the Science and Technology Committee held an evidence session into mitochondrial donation in October last year. […] Given the extensive scrutiny in this Parliament, I believe it is right to allow this Parliament to decide whether to take the next step for mitochondrial donation, which can progress only with these regulations.
>
> Jane Ellison: 3 Feb 2015: Column 161

Our analysis has demonstrated how the dramaturgy of the select committee meeting worked to render mitochondrial donation as knowable, ethical, desirable, and sanctionable. These four features were key elements of the broader UK process that enacted an ethical future for mitochondrial donation and reiterated an existing political and normative sociotechnical imaginary around embryo use. The four processes were evident across the three panels, even though each panel was distinct. The first panel drew upon scientific expertise, and functioned to not just render mitochondrial donation knowable, but to also assert how it should be known: as a safe and important technique that should be permissible in a predefined set of circumstances. This panel was notable in that it included different perspectives. This was achieved by inviting Dr Morrow, who provided an alternative way of knowing mitochondrial donation, onto the stage. The panel then staged the respectful marginalisation of Morrow's account. The presence of the opposition voice is important to note. It enabled the meeting to be an opportunity for exploration and open debate, and therefore part of performing transparency and fairness. UK political debates benefit, and indeed rely on, the presence of in-principle, religious and 'minority' scientific views to support transparency but not necessarily shape the outcome.

The second panel was a contrast to the first because it did not involve an opposition voice. The witnesses for this panel were representatives of key institutions involved with regulation, ethics and patients, and all institutions which directly or indirectly supported the legalisation of mitochondrial donation. Each speaker, as supported by an informally arranged division of labour, contributed to making mitochondrial donation meaningful. The presence and performance of Montgomery from the Nuffield Council on Bioethics rendered it ethical, Meadowcroft from Muscular Dystrophy UK rendered it desirable, and Thompson from the HFEA rendered it sanctionable. As part of this, the second panel embodied a key moment in the legalisation process, as it acted as a symbolic bridge between the disagreement over the science in the first panel, and the reaching of consensus as represented by the third panel. This consensus state was anticipatable before the panel, as the views of each panellist were already known, and were aligned with the dominant perspective of the rightness of legalising mitochondrial donation. The personal reflections of the panellists suggest an awareness of who they represented, how they shaped their account, and how they shared the stage with others. This was a space for conscious alignment, achieved by the panellists investing their time and effort to ensure that their individual accounts did not contradict the collaborative and collective performance.

The third panel was distinct from the previous two as both witnesses worked with one script. The account here sought to consolidate the meanings and renderings of the previous panels while further solidifying the performance of mitochondrial donation as sanctionable. In this panel, the panellists spoke with authority about the overall process. Representing the government (and Department of Health), their words were designed to be put 'on the record', unresolved issues were not identified as barriers but instead classified as the responsibility of other trusted agents in the system, or a question for the future. Throughout, the panellists and committee members emphasised notions of trust in the system, the UK as a site of world leading regulation, and a future orientation towards a world in which mitochondrial donation was legalised. Thus the order of the panels was also performative here, reflecting disagreement and subsequent settlement through many voices in the first panel, allowing

the process to move towards consensus in the second panel, and finally regulation and future focused in the third panel.

**Conclusion: microinteraction, performance, and sustaining a sociotechnical imaginary**

The culmination of the scientific, ethical and public reviews and consultations were the debates within the Houses of Parliament, following which both the House of Commons and House of Lords voted for legalisation by a clear majority. Our research revealed just some of the labour necessary to maintain and continue this sociotechnical imaginary. The House of Commons Science and Technology Select Committee session was a site of knowledge production. It was a meeting with collectively sanctioned roles, rites and rituals, and we explored the backstage work, reflections, vulnerabilities, relationship making and the personal and professional accounting that enabled the committee to do its work and reach its conclusion. As with documenting how disagreement is managed at scientific conferences (McKinlay and Potter, 1987) or how ethics committees reach decisions (Hedgecoe, 2020), often mundane activities and interactions are significant in how individuals and institutions function and therefore are important to document. We remind the reader that it is important to understand *how* a committee reaches a decision, and how the system itself performs or signifies accountability in the decision-making process. Such performances, in this case, of mitochondrial donation as knowable, ethical, desirable, and sanctionable, remain crucial for developing our understanding of the relationship between science, politics and biomedical policy. These are staged both through mundane interactional exchanges (such as turn taking patterns, paying respect, questioning and strategic use of language) and through mechanisms as broad as historically established institutional forms (such as the House of Commons Science and Technology Select Committee itself, and the state sanctioned growth of the IVF sector).

We have sought to show how the Science and Technology Committee represented a front stage performance of legitimate decision-making around UK biomedical policy. The meeting was one element of a process that placed science on stage, as well as UK science governance. The legalisation of mitochondrial donation is the latest iteration of a particular UK sociotechnical imaginary around

the embryo and human tissue research and use. This sociotechnical imaginary forms a recognisable pattern of public consultation, scientific and ethical review, and licencing procedures, that is used by the UK to assert its practices as the 'gold standard' on these issues. It was through this process that mitochondrial donation was assessed, considered knowable, ethical, desirable, and sanctionable, and therefore as appropriate for legalisation. Subsequently, the legalisation of mitochondrial donation also works to further instantiate the imaginary as the accepted practice of UK biomedical decision-making, particularly on issues related to the embryo, and importantly, furthers the imaginaries' durability, and further asserts the appropriateness of the national approach.

The House of Commons Science and Technology Select Committee evidence session was one small part of these broader processes, but one that evidences dynamics that have been core to the continued further instantiation of this mode of asserted legitimacy, and the regulated liberalisation of human embryo work. It is important that social science analysis remains attendant to the interrelation of broad policy moves over time, and the localised and easily forgotten micro-interactions which contribute to their enactment. This article has conducted this important analysis in the context of mitochondrial donation, to stress how political legitimacy around embryo politics has been made in the UK. We urge the need for future studies, to analyse how the performances occur in subsequent iterations of this particular sociotechnical imaginary.

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