

Liminality in practice: A case study in life sciences research

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Abstract Contemporary health challenges (e.g., diabetes, climate change, antimicrobial resistance) are underpinned by complex interrelationships between behavioural, cultural, social, environmental and biological processes. Current experimental systems are only partially relevant to the problems they investigate, but aspirations to embed interdisciplinary working and community engagement into life scientists' work in response to this partiality have proven difficult in practice. This paper explores one UK university-based life sciences research initiative as it seeks to develop modes of working which respond to this complexity. Drawing on 'liminal hotspots' as a sensitising concept, we explore how participating academics articulate complex problems, knowledge-making, interdisciplinary working and community engagement. Our analysis shows they become recurrently 'trapped' (institutionally and epistemologically) between fixed/universalised cosmologies of biology/disease, and more contemporary cosmologies in which biology and disease are conceptualised as situated and evolving. Adopting approaches to community organising based on 'process pragmatism', we propose ways in which life scientists might radically reorganise their practice and move beyond current limiting enactments of interdisciplinary and community engaged working. In doing so, we claim that the relevance and 'humanness' of life science research will be increased.

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Introduction

So, you know, we're looking at a more holistic definition of life and we're obviously talking about human life here. But we're placing human lives within the context of the social environment that we live in, um, so that we can ensure adequate emphasis on social determinants of human life. But at the same time recognising that human life, um, includes the way in which we can intervene at the level of the cell or the organ or the genome. Um, and then, importantly, making um, [an] explicit link between human life, our social lives, with the environment...Um, because the environment is increasingly going to impact both on the social context but, and the many ways in which the environment also affects humans at the level of the organ and itself.

In this interview extract, a Senior Lecturer in Public Health presents 'life science' research activity as warranting "a more holistic definition of human life". He emphasises the interrelatedness of the social, biological (cell, organ, genome) and ecological determinants of health—conceptualisation that resonates with policy makers, researchers and funders (Department for Business, Innovation & Skills and Office for Life Sciences 2011; Landecker and Panofsky 2013; Rose 2013; Wellcome Trust 2015). No longer regarded as "within-discipline problems" (Ledford 2015, p. 309), a compelling rhetoric supports the notion that new ways of 'doing' life sciences research, involving interdisciplinary modes of working that, it is claimed, may be more successful in embracing the tangle of behavioural, cultural, social, environmental and biological factors that constitute 'wicked' contemporary health problems (Barry and Born 2014; Gleed and Marchant 2015; Nature 2015; Research Councils UK 2016; Rittel and Webber 1973; Viseu 2015a). Alongside this are equally compelling calls for stronger public engagement wherein the solution to the complexity of health problems is assumed to lie in involving the potential beneficiaries of knowledge (for example particular 'at risk' groups) more actively in knowledge-making practices—an arrangement that is supported by practical, ethical and democratic justifications (Berkman and Kawachi 2000; Corburn 2005; Israel et al. 1998; Montoya 2013). Montoya suggests "community knowledge...offers a means to ensure that humanness remains at the center of the life sciences" (Montoya 2013, p. S46) and argues that "theories of disease that do not account for the ecological, contextual, and the human in context making and being made by their world" are being destabilised (Montoya 2013, p. S52). Montoya's insistence on 'humanness' here underscores the complex relationship between the focus in life sciences research on *human* health and concerns that a focus on biological processes lose sight of "the human" and "the humane" through technological and scientific reductionisms. These arguments resonate with the literature on social determinants of health in that health outcomes and inequities are perceived as being "the result of



the conditions in which people are born, live, grow and age” (WHO 2017a, b) which are themselves patterned by interrelated issues including “governance, environment, education, employment, social security, food, housing, water, transport and energy” (WHO, 2017).

However, seductive these suggestions may be, these ‘new’ forms of engagement—between researchers from different disciplines, and between researchers and non-academic knowledge-making communities - often result in a “tangle of diverse and often incompatible disciplines and sub-disciplines, theories, concepts, arguments, bodies of evidence, experimental set-ups...riven with controversies over some rather fundamental issues” (Rose 2013, p. 8). Explorations of how health and well-being are constituted through the interplay between intercellular, psychological, biographical, social, environmental and cultural processes do not align with the experimental reductionism typical of past versions of the life sciences (Rose 2013). Life science researchers (including those from the natural and social sciences) may continue to use relatively fixed ways of thinking and experimental languages that are familiar to them but which are not attuned to the inherently variable and dynamic nature of the biological knowledge proposed by this ‘new’ version of life sciences (Lock 2005). This may go some way to explain why social scientists ‘integrated’ into life science institutions for the purposes of producing inter/trans-disciplinary research (see for example Fitzgerald et al. 2014; Rabinow and Bennett 2014; Viseu 2015b) have found the traditional knowledge gaps and power asymmetries between natural and social science disciplines very difficult to overcome. Alongside these conceptual and methodological difficulties, there are also obvious institutional barriers to collaboration, from commitments to professional or disciplinary norms, to departmental organisation, to building and campus geography, and the structure and incentives of publication, research funding and technology transfer institutions. Hence, whilst some claim that the understandings of life summoned by fields such as epigenetics open a “critical window” (Landecker and Panofsky 2013, p. 336) through which engagement between different knowledge-making communities might occur, more skeptical voices have drawn attention to how such a cosmology of life has been met with caution and confusion (Pickersgill 2016)

Through a process of empirically based theorising informed by our case study research on one university-based life science initiative in the UK, we explore how the mobilisation of interdisciplinary working and public engagement is playing out and with what consequence for notions of ‘life’. We explore ‘how’ the calls for interdisciplinary and publically engaged life science research are understood and embodied by life scientists who are attempting to grapple with a paradox that seems to underpin contemporary understandings of biological processes. That is, the more we have come to know “the more uncertain it seems we are about the meaning of this information and what to do with it” (Franklin 2014, p. 4).

Our engagement with this paradox stems from our proximity to it as interdisciplinary researchers based at Queen Mary, University of London (QMUL), keen to generate research that improves health and well-being in the broadest terms. Our disciplinary backgrounds include medicine, philosophy, science and technology studies (STS), anthropology and sociology but we regard ourselves as scholars who



work across disciplines and who share an overarching interest in health and well-being. Between us we have extensive experience of working in interdisciplinary teams of researchers and producing research with non-academic partners, such as community organisations, health service providers, health service users and policy makers (Greenhalgh et al. 2015, 2016; Swinglehurst et al. 2011).

Like many UK higher education institutions, QMUL has recently launched an interdisciplinary Life Science Initiative (LSI). The initiative has grown out of extensive preparation and planning and is a consolidation of QMUL's intention to establish a permanent Life Sciences Institute, intended to mobilise the expertise of academics from across university faculties. QMUL is situated within a borough ranked (in 2015) as the 10th most deprived in England (Tower Hamlets Council 2015a) with its associated negative impact on local population health. The LSI aspires to benefit the health, well-being and prosperity of this local community by drawing on the diverse expertise and perspectives of its members.

The data that inform the paper are derived from analysis of documents relating to the LSI (the initiative website, press releases and reports) and 16 audio-recorded in-depth interviews with academics and university managers from QMUL about life science activity. A purposive, maximum diversity sample included participants from across all the faculties at QMUL, incorporating a wide range of disciplinary backgrounds, and variation in the extent of participants' involvement in the LSI activity (e.g., engaged on a regular basis to not at all). Participants were encouraged to articulate their understanding of life sciences, 'tell the story' of life sciences at QMUL, describe their experience and understanding of the initiative and explain whether and how their work related to life sciences research activity both within the LSI and more widely within broader life sciences communities. They were also invited to draw (and reflect on) a picture of what they thought the LSI looked like in practice; this activity prompted articulations on the present, ongoing and (possible) future evolution of the LSI to accompany their experiences of it to date. Interviews were transcribed and analysed to identify provisional themes, which informed six research workshops in which anonymised extracts of interview data were used to prompt discussion. Workshops took place in the context of a research symposium organised by the research team and attended by participants from within and beyond QMUL. Audio-recordings of the workshops were listened to independently (by MC and DS) and collaboratively to identify 'critical moments' or short segments of interaction in which participants constructed and 'worked through' contested issues and meanings. These segments were transcribed to enable closer analysis of participants' accounts and their attempts to address and resolve contested meanings (or not). We synthesised our analysis across these datasets to develop a critical account of how life scientists articulate their understandings of the 'life sciences', and how they account for, negotiate and challenge notions of interdisciplinarity and community engagement. Our findings provide insights into how life scientists 'work with' and 'intervene in' contemporary accounts of biology and disease and how they speculate about alternative ways of working.



In our analysis, we present the ambiguities that surround life science activity and, by focusing on participant practices of ‘interdisciplinary’ and ‘community engaged’ working, we demonstrate how such ambiguities are grappled with in practice. These two key themes in our participants’ narratives are also of central salience to broader policy discourses around life sciences (Wellcome Trust 2015). We also import the notion of ‘liminal hotspots’ (Stenner and Greco 2017; Motzkau and Clinch 2017) as a sensitising concept to generate a deeper understanding of how such ambiguities may be both detrimental and beneficial to life science practice and health outcomes. We conclude by combining the diagnostic potential of liminal hotspots with ‘process pragmatism’ to suggest ways of transforming how life science research questions are identified, framed, investigated and evaluated. Process pragmatism is an approach to community organising underpinned by its commitment to understanding how knowledge can be made in ways that produce social change (Harney et al. 2016). We speculate that by attending to liminal hotspots through practices inspired by process pragmatism it may be possible to unleash potential for new ways of working that can grapple more effectively with situated and evolving cosmologies of life and health, and ensure that humanness remains the center of life science activity.

Situating the life sciences in East London

Queen Mary, University of London (QMUL) comprises three faculties: Humanities and Social Sciences; Science and Engineering; Medicine and Dentistry. In 2015 (when this research was undertaken), the university had 21,187 registered students (15,474 undergraduates and 4842 postgraduates) from 155 countries enrolled on over 240 degree courses. QMUL is a member of the Russell Group and was rated 9th in the UK in the 2014 Research Excellence Framework (REF) the system used in the UK to assess the quality of research produced by higher education institutions.

In January 2014, a University wide Life Sciences Initiative (LSI) was launched (Queen Mary, University of London 2017a). The LSI is described as a multidisciplinary endeavour that cuts across all faculties at QMUL and defines the life sciences as “the basic sciences underpinning medicine—represented by the intersection between the social, the sciences and the biomedical sciences” (Queen Mary, University of London 2017b). The LSI aims to facilitate a broad range of life sciences activity but at the time of data collection (2015) was focusing effort on ‘post-genomic population health’, which it defines as:

...how particular genetic changes and different environments (both social and physical) affect how the body works and its susceptibility to disease, and how this can cause various health-related conditions and disorders (Queen Mary, University of London 2017c)

At the time of conducting the research the LSI was organised around four research domains incorporating all three faculties at QMUL: Society, Environment and Population Analysis, Computational Biology, Basic Biomedical Research and



Translational Biomedical Research.¹ The Society, Environment and Population Analysis domain sought to engage the faculty of Humanities and Social Science in the development of the LSI. It was primarily concerned with: understanding the social and environmental factors that shape morbidity and mortality across different societies, understanding the social, cultural ethical and legal implications of personalised medicine, exploring how life science innovations can be made accessible to all, and understanding why people choose to participate in life science research. Bringing together and developing expertise in computational biology and associated activity such as biostatistics, big data, machine learning, theory and modelling, the Computational Biology domain sought to address issues concerning mining and integrating large datasets in order to gain an understanding of the relationships between genotype, environment and phenotype. The Basic Biomedical Research domain aimed to bring together pre-existing activity around cancer biology, cardiovascular research, digestive diseases, immunology and infection, diabetes and neurosciences with structural biology, model systems and novel synthetic chemistry. It sought to integrate biomedical research (e.g., lipidomics, metabolomics and associated experimental systems such as animal models) and clinical research to elucidate the processes underpinning disease and well-being, and develop innovative therapies (e.g., vaccines, drugs). Finally, the Translational Biomedical Research domain sought to build the facilities necessary for the genotyping and ‘deeper’ phenotyping of the local east London community. This community has very high rates heart disease, cancers and diabetes and the identification of gene knockouts (specific genetic variants that make an individual more or less susceptible to developing a disease) in this population promises to aid development of targeted therapeutic innovations that might be scaled up to other populations. Through the Translational Research Domain, the LSI aspires to produce research that will be of direct benefit to the local community as well as being globally significant.

These domains were aspirational and constituted a strategic attempt to guide QMUL researchers to realise the theme of post-genomic population health. Taken together, they resonated with the UK Life Science agenda through its concern to understand how diseases affect different people in different ways in order to facilitate the development of tailored medicines (Department for Business, Innovation & Skills and Office for Life Sciences 2011). They also built on pre-existing QMUL research strengths, funded by organisations including: the Wellcome Trust, Medical Research Council, Department of Health, European Research Commission. Examples include the following: the community genomics study *East London Genes and Health* (East London Genes and Health 2016); the national genomics sequencing endeavour *The 100,000 Genomes Project* (Genomics England 2014); and the diabetes-focused epigenetics and fetal programming project *Genomic and lifestyle predictors of foetal outcome relevant to diabetes and obesity and their relevance to prevention strategies in South Asian peoples - GIFTS* (GIFTS

¹ Since the research was conducted the LSI domains have been further developed into three virtual research centres (Genomic Health, Bioengineering, Mind in Society) and one cross-cutting theme (Cross-cutting Centre for Computational Biology). The overarching theme of Post-genomic population health remains and all three faculties of QMUL remain engaged in the LSI.



2016). The LSI also aimed to contribute to the regeneration of the east London area. The development of the LSI includes the proposed establishment of a Life Sciences campus that is an integral aspect of the *Whitechapel Vision* (Tower Hamlets Council 2015) a regeneration project run by Tower Hamlets Council which includes various planned infrastructure developments including the repurposing of old hospital buildings into a civic space, new rail links, housing and retail developments.

The broad scope of the LSI, incorporating both its ambition to produce world-class research and its aspiration to ensure its connectedness to problems of local social relevance, resonates with contemporary ‘holistic’ notions of biology that attempt to bring together diverse communities of practice through the research process. Niewöhner has described a comparable phenomenon in his detailed anthropological observations of working practices in an environmental epigenetics laboratory as “a molecularisation of biography and milieu” (Niewöhner 2011, p. 13). He demonstrates how biology is increasingly understood as intimately connected to local cultural practices, individual experiences and stressors associated with e.g. food consumption, the environment, physical activity, housing, work and trauma (Klawetter 2014; Krieger 2005). Through this work, he explains that notions of ‘the universal material body’ (traditionally the preserve of the natural sciences) and the ‘contextual encultured subject’ (traditionally the preserve of social science and the humanities)—which are usually regarded as distinct from each other—are becoming increasingly blurred (Niewöhner 2011, p. 15). Their integration has implications for the nature of engagement between scholars of biology and anthropology, or more broadly, the human and natural sciences (see also Lock 2005, 2015; Rose 2013). Through the concept of ‘customary biology’—the inseparability of the social and the biological—Niewöhner offers an epistemological approach through which interdisciplinary teams might account for and work with the notions of biology, the body, health and disease that are concomitantly encultured and natural. For example he argues for the importance of ethnographic data, “rather than crude structuralist indicators of social order from epidemiological studies” (Niewöhner 2011, p. 16) to identify regularities with regard to how people dwell in their environment and how regularised dwelling practices mark their body in both social and biological terms.

In the following section, we demonstrate how life scientists at QMUL and other institutions represented at the research symposium articulate a disconnection between emerging ideas of life and traditional knowledge-making systems. Specifically, we will show how attempts to ‘do’ customary biology—and in the case of QMUL, attempts to ‘do’ post-genomic population health—are often hampered by conflicting, sometimes incommensurable epistemological commitments and associated institutional arrangements. We show how this apparent disconnection, even in the context of considerable efforts to overcome it, renders the practice of life science deeply confusing and ambivalent for those involved. We conclude by exploring how life science work might be staged differently in order to achieve something that more closely resembles customary biology, and which can potentially produce more relevant and human life science knowledge.



Exciting *and* frightening: the ambivalence of life science work

In the following quote, a senior professor of medicine at QMUL provides a response to the question of ‘what are the life sciences?’

I’m not sure, to be absolutely honest, I’m not sure I know what life sciences is.
(Interview with Professor of Medicine, QMUL)

At first glance, it seems odd that a senior clinical academic in an institution with an active life sciences initiative provides this response. But perplexity as to what life sciences *is* was frequently expressed by our participants, who struggled to describe not only what it is but who is (or should be) involved. The confusion they expressed with regard to the nature and scope of the life sciences is less surprising when considered in the context of recent advancements in how we are coming to understand life. One humanities scholar who attended the research symposium suggested a definition of the life sciences as “a concern with life...which includes all disciplines from the humanities, social and natural sciences”. This concern requires life scientists to connect different social and biological processes, whilst at the same time accommodating a range of ontological positions and epistemological approaches. Our dataset appeared to reflect the lack of shared language with which to articulate life science activity.

The multiplicity and variability of the phenomena that life scientists produce and work with was acknowledged repeatedly throughout the interviews and workshops. Reflecting more general life science discourses, there was agreement that causes of poor health were complex and challenged established modes of biomedical thinking. For example, when explaining why it was necessary that the LSI involved all three QMUL faculties (Humanities and Social Sciences, Science and Engineering, Medicine and Dentistry) a senior academic explained that the major health issues that face us today cannot simply “be addressed via technological solutions developed in the laboratory” as they are “the result of complicated social interactions...such as those that occur between people’s lifestyles, economics”, and “all sorts of things happening in the world”.

Many study participants also made it clear that it is necessary to be aware of the systems of value associated with biomedical knowledge-making (Lock and Nguyen 2010; Lock and Gordon 1988) and how such systems of value both cohered with and clashed with other systems of value and knowledge-making that sought to improve health and well-being. Participants from diverse disciplinary backgrounds described how life scientists should recognise that the framings, justifications and problematisations produced by those involved in life science work (researchers, policy makers, university strategy officers etc.) can both ameliorate *and* compound the issues that they attempt to address. Take this quote from a historian of medicine who took part in the research symposium. He is explaining why he thinks the Social Sciences and Humanities need to be engaged in life science knowledge-making:

I mean the life sciences, of course, it’s about medicine. But there is also talk of health, whether it’s social changes, environmental changes, also influence medicine and health. And crucially the way, you know, medicine itself, sort of



research that scientists do, isn't neutral. It actually changes the environment. Medical technologies are constantly changing the sort of balance. (Symposium discussion, history of medicine scholar, QMUL)

This participant proposes that although the life sciences are “of course” about medicine (an assertion which foregrounds the ‘taken-for-granted’ primacy of medicine as a discipline within the scope of life sciences) it is necessary to include a reflexive critical component which interrogates how the practice of medicine itself is continuously reconstructed in ways that are consequential for the environment in which it is practiced. As such the social and cultural determinants of health comprise not only, for example, how poverty or health behaviours modulate disease, but also attention to the constitutive effects of ‘health knowledge’ itself (for example, how poverty and behaviours are conceptualised or measured). This interpretation of life science work is perhaps not surprising coming from a critical medical historian. However, those from biomedical backgrounds expressed similar concerns about the aims and intended beneficiaries of the LSI and the consequences of framing life science activity in particular ways. For example, in the following interview extract a senior academic public health clinician draws attention to how a commercially focussed LSI might fail to address the social determinants of health:

So my fears are that the biomedical and emphasis [of the LSI] um, and the emphasis on the production of um, commercially viable products will skew the way in which priorities are set, the way in which the research agenda is set. And undermine, um, or kind of result in a neglect of some of the wider determinants of health, um, which I think are potentially more important to the challenge of sustainable health improvement (Interview with Senior Clinical Lecturer, QMUL).

Reflecting the concerns of many study participants, this academic suggests that the strategic aim of developing a life sciences hub in East London could potentially undermine the other strategic aim of improving the health of the local population. Specifically, that a focus on biomedically framed problems and ‘biotechnical’ solutions is too narrow and will not instigate the political changes that are also necessary to address the local burden of disease (arising from the combination of genetic predispositions for diabetes, cardiovascular disease, health inequalities and much else besides). These quotes suggest that there was an appetite amongst our research participants to reflect on (and speculate about) the consequences of adopting different framings of life sciences knowledge-making and that the question of how to work productively with these different framings is a challenging one. Of course these quotes arose in part because of the focus of our study, but the extent of the ‘trouble’ that emerged as participants attempted to articulate the scope, purpose and meaning of the life sciences endeavour was unexpected. Our analysis suggests that this is a consequence of the emergent and elusive nature of contemporary versions of biology and associated explanations of disease, combined with a disconnection between how life scientists conceptualise vital processes and the experimental languages and institutional structures they have available to help them make knowledge about such vital processes.



In their current form life sciences bring together branches of sciences (that, broadly speaking involve scientific study of living organisms), with wider social, technological and environmental considerations, but this process of integration is by no means easy or settled. For example, Niewöhner argues that environmental epigenetics is yet to be developed into a stable “experimental system” (Rheinberger 1997) due in part to the immaturity of the field, as well as the difficulty in keeping up with the deeply situated nature of epigenetic gene modification over time and across different scales and contexts. Our findings suggest that this difficulty in stabilising a productive experimental system and concomitant institutional arrangements extends beyond the sub-discipline of environmental epigenetics. In the following quote taken from the symposium a senior life science researcher articulates the difficulty of accounting for holistic notions of life within the current university organisational structures:

...there’s always a mood to link basic life science with translation through to medicine. And that’s obvious and a good thing to do. The thing is, there’s always been a bit of a tension like that, it’s where then do you put biodiversity etc. which actually also has an impact on human health, but a very different one. And that’s a tension, I think, everywhere. (Symposium discussion, Professor of Bioscience, external to QMUL)

The translational imperative (“that’s obvious”) that seeks to realise the utility of basic scientific research for medicine is described here as both an opportunity (“a good thing to do”) and a constraint (it is not sufficiently inclusive). Given that biology, disease and health are increasingly perceived as being endlessly patterned by the diversity of the environment, such a rational ‘bench to bedside’ logic risks excluding the world in which the genome is embedded and in doing so risks failing to account for many factors that shape health (Kraft et al. 2008). As this struggle to organise and categorise demonstrates, life science research can be a deeply ambivalent process that arises because pre-existing institutional structures (primarily designed around disciplines) cannot account for the multiple and constantly emergent processes (and multiple associated methods of knowledge-making) that are now believed to impact on human health. Below we demonstrate how recent applications of the concept of ‘liminality’ (Szakolczai 2009; Stenner and Greco 2017; Motzkau and Clinch 2017) might help to explain and manage consequences of the disconnection between traditional institutional knowledge-making practices and contemporary notions of life.

Originally devised to interpret rites of passage in traditional societies (van Gennep 1960) liminality describes the occasion of being suspended between two recognised social roles/structures (e.g., child/adult). During these liminal occasions—or moments of ‘anti-structure’ (Turner 1969)—the normal rules that govern social life do not apply, and as such they are deeply affective and potentially transformative in nature. Szakolczai (2009) suggests that contemporary societies are in a state of permanent liminality in that the social structures, values and referents that traditionally structure the social world are continuously being transgressed by technological advances and associated epistemic mutations. If, as Niewöhner (2011) suggests, the knowledge-making practices of a discipline like biology assume a



“universal material body” then biologists are likely to be troubled by engagement with understandings of life (as emergent, situated) that presuppose a “contextual encultured subject” since this reduces any capacity to confidently know, understand and intervene on life with certainty.

The proposition of ‘permanent liminality’ also has a psychosocial dimension as it results in people becoming “trapped in the interstitial dimension between different forms of process” (Stenner and Greco 2017, p. 152) a situation that has been defined by Stenner and Greco as a *liminal hotspot*. Our analysis suggests that life scientists often find themselves suspended in a liminal hotspot, as they attempt to produce understandings about life that are situated and emergent through institutional knowledge-making practices predicated on life as universal and fixed. Being suspended in a liminal hotspot is a deeply ambivalent experience, which on the one hand is “an intoxicating experience of freedom and possibility” (Stenner 2016, p. 65) but on the other hand is a situation that can leave “people spiralling into the chaos of angst, alienation and anomie” (Stenner 2016, p. 65). This sense of ambivalence was expressed by one of our workshop participants as he reflected on short extracts of our interview data about the nature of life sciences knowledge-making:

I think the uncertainty is the key to all this, isn’t it, because that’s just reflecting that people are thinking in silos and want to do something that’s linked to what they already understand. And this concept of something new and undefined is quite a frightening thing for people who, you know, are being challenged in their thinking. So I think the uncertainty of these quotes reflects opportunity to generate new ideas and creative thinking and people will be challenged and put into boxes. And that’s the exciting part of it, isn’t it? And it’s that thing of being able to understand before we contribute or do something is just a new way of being isn’t it? (symposium discussion, Professor of Humanities and Social Sciences, QMUL)

The liminal hotspot summoned by the requirement for researchers to move away from “thinking in silos” and to embrace alternatives that are not closely linked to what they already understand is “frightening”. At the same time it provides the opportunity to “generate new ideas and creative thinking” and a “new way of being” a life scientist. Our analysis of the data in this study indicated that the liminal hotspots summoned by life science activity can prompt glimpses of alternative possibilities for ordering life and, as Greco and Stenner (2017) suggest, may facilitate transformational “pattern shifts” for how, in this case, life science knowledge is produced. However the emotions and experiences that liminal hotspots summon often result—as this quote suggests—in individuals clinging on to pre-existing processes (i.e., disciplinary ways of producing knowledge, “put into boxes”) in order to manage their disorientation.

In the next sections we draw on the concept of liminal hotspots in our analysis of two interrelated and contested issues that arose in our data, and are present in Life Science discourses more widely. The challenges of interdisciplinary work and the meaning of ‘community engagement’ in life science research. We present a detailed account of the difficulties that life scientists face, how they account for these



difficulties and how they envisage that these may be overcome in ways that might catalyse productive transformations—or “pattern shifts” (Stenner and Greco 2017)—in their knowledge-making.

Balancing interdisciplinarity and clarity

In the following quote a senior professor of natural science from QMUL reflected on the challenges of engaging academics from across all four faculties at QMUL with the aims and scope of the LSI:

Um, and also, I think it's pretty difficult to make [the LSI] precise, more precise at the same as keeping it open enough to foster the sort of collaborations we want to foster...Um, and that's been deliberate, to a certain extent....There comes a point though when people say, 'Well I don't know what this is, I don't have any engagement with it' and so on'. (Interview with Professor of Natural Science, QMUL)

This quote points to the difficulties inherent in organising life science knowledge-making around emerging cosmologies of biology, health and well-being. Our analysis indicated that creating an environment in which different ways of thinking can be produced collaboratively is difficult to achieve and can be frustrating and disorientating for researchers, research support staff and the local community members that the LSI sought to engage. Through the LSI, efforts to support interdisciplinary ways of working brought lots of people and ideas together but did not necessarily produce a single better understanding of a phenomena, rather a ‘diversity of understandings’ that rendered LSI activity deeply confusing. In the following quote from a Professor from the faculty of Humanities and Social Sciences, the problem of producing collective action around such a diversity of understandings is described:

... unless something has an identity, and that identity can be easily articulated and understood and in more or less general terms people agree on it, then it's never going to get off the ground ...no it's because it actually just won't make sense to anybody... Like it just won't be a coherent thing, it will be like, “That's really nice, but what is [the LSI]? How do I engage with that lot?” (Interview with Professor of Social Science, QMUL)

The tricky process of bringing researchers from different disciplines together around an issue (such as diabetes prevention and treatment in the local community) was a persistent point of discussion during the workshops. The following exchange emerged from a short discussion on how effective interdisciplinary working might be achieved in practice. In this exchange one participant (Participant 3) claimed that a ‘shared goal’ or ‘fixed point’ around which people from different disciplinary backgrounds gather was a necessary component of successful interdisciplinary problem- solving. He followed this claim with a question to another researcher (Participant 4) who had achieved success in fostering successful interdisciplinary collaborations in life sciences:



Participant 3: How did you bring it together, how did you bring that group together?

Participant 4: Oh a lot of it was serendipity of working over a number of years and tinkering around and having interest in [a] certain shared, shared something, but I don't necessarily think that shared goals are always necessary (Exchange between senior academics in Engineering and Humanities; research symposium).

In this extract, participant 4 agreed that researchers involved in interdisciplinary research need a "shared something", however; they were not prepared to agree with Participant 3 that this something has to be a pre-established "shared goal". In Participant 4's view there needs also to be time ("a number of years") for "tinkering around", for unpredictable, serendipitous activity that is not pre-determined or constrained by fixed research questions, methodological approaches and defined outputs. In this version of interdisciplinarity, interested collaboration ("shared something") is prior to research processes and outcomes and is considered to be the seat of potential. The practice of research is regarded as deeply speculative and situated, rather than time-bound and goal-oriented. Such a speculative approach may attune more effectively with the holistic definition of human life described in the introduction.

Despite success in practicing this style of interdisciplinary working, Participant 4 later conceded that this approach is high risk, often fails to engage researchers and stimulate activity and is exceedingly difficult to facilitate in a contemporary UK university setting. They explained that the systems for structuring and accounting for research are at odds with this orientation, despite the rhetoric of the interdisciplinary imperative that pervades the higher education sector (see, for instance, Department for Business, Energy & Industrial Strategy 2016). To award grants most research funders require a fully formed project based on clear research objectives, that uses established methodologies and promises particular research outcomes. Moreover, for those who take part in interdisciplinary research there is the additional pressure to produce high impact research disseminated through particular discipline-bound journals associated with their field. As Participant 4 put it later in the workshop "why would a clinical researcher give their time to publish in a social science journal with an impact factor of 3?"

The following quote from a Professor of Medicine, who had secured substantial research grants, expresses frustration at the way in which the institutional structures put in place to support 'high impact' research can result in 'meaningless' activity that is irrelevant to the 'real world' of health challenges:

...because of REF [research excellence framework] and so on, when it all becomes a self-perpetuating, self-centred, meaningless business that has no link with the real world any more. Only, um, when I'm on panels somewhere for appointment of senior, senior academics, the only questions are, "What grants are you likely to get in and what papers will you write?" Nobody asks, absolutely nobody, "What do you want to find out in five years' time?" (Interview with Professor of Medicine, QMUL)



Like many critics of the culture of new managerialism in the university sector (Shaw 2007; Shore 2008; Strathern 2000) (embodied by the Research Excellence Framework or REF) this interviewee claims that research is no longer “link(ed) with the real world”. Researchers are required to render their work visible and intelligible to a defined system of accountability. Speculative and slow research that attempts to “tinker around” with the “shared something” that researchers from different backgrounds might collect around is difficult to achieve in this environment.

Returning to the concept of liminal hotspots, the prospect of interdisciplinary working summoned much ambivalence amongst our study participants. It may encourage interlocutors to gather around a “shared something” that has not yet been determined by established experimental systems. However, this orientation is difficult to sustain in an institutional environment in which discipline-bound outputs are the metric at stake (Hazelkorn 2007). As one Reader from the faculty of Humanities and Social Sciences reflected during the research symposium the realities of interdisciplinary working tend to reaffirm (rather than challenge) the hierarchical relationships between the natural and social science disciplines:

And interdisciplinary work is often configured as this free flowing, all these equal individuals in a room talking to each other and exchanging views. There is often a view that one of those disciplines is the real research and then the other ones come along and they might be fluffier and they service that real discipline that does the real work by making that real work somehow available to other people. (symposium discussion, Reader in Humanities, QMUL)

Our symposium participants recognised that the “real discipline” tended to be biomedicine. The “fluffier” disciplines were positioned in a “service” role that “make the real work available” through a translational process that assumes a linear progression of the “real” knowledge from bench to bedside. Scholars from disciplines such as English, History, Sociology, Politics, Geography and Theatre Studies (all of whom were encouraged to participate in LSI activity at QMUL and were represented at our life sciences symposium) were called upon to make specialist biomedical knowledge available and perceptible to the assumed beneficiaries of the research. This version of interdisciplinary working was unacceptable to many of our research participants. However, at the time of our study (2015) opportunities within the current university system to explore productively the liminal hotspot summoned by the disconnection between emergent ideas of life and established knowledge-making practices were rare. In spite of the desire to produce knowledge in new ways the systems in place to account for research were orientated around pre-existing discipline-bound metrics that offered no space, time or incentive for researchers from different backgrounds to “tinker around” with the “shared something” that collectively interested them. Because of this the interdisciplinary imperative that guided LSI activity was achieved through a thin translational approach that encouraged some interaction between the disciplines, but at the same time, enabled the continued production of discipline-bound outputs.



Attempting to build living communities of research

In the following quote a senior professor of medicine at QMUL reflects on the extent to which he thinks the local community should benefit from the research undertaken at QMUL:

Yes, [the LSI] should be benefiting the local and wider community...And particularly in health benefits. (Interview with Professor of Medicine, QMUL)

In tune with the aims of the LSI, academics involved in the LSI were keen that the initiative should produce research with a global reach (e.g., through the identification of gene knockouts) as well as knowledge that might directly improve the health of the local community of East London (e.g., by understanding the specific nature of diabetes in the local population of east London). Many of our participants couched the benefits of community engagement for research and community health in general and abstract terms in which the benefits percolated from the researchers, through their knowledge discoveries and subsequent public engagement activities with the community. However, for some participants community engagement was a *relationship* that was perceived to improve the quality, relevance and humanness of the knowledge produced by life scientists in two ways. First, engagement with the communities affected by specific disease was an analytical resource—a relationship that challenged and inspired their thinking. Take this quote from a mid-career biomedical researcher:

So it's not just pushing promotion on to people, it's about really engaging people's thinking about issues that we can't possibly know, you know, somebody sitting in a lab by themselves, can't possibly think through every possible bit of data. (symposium discussion, Lecturer in Biomedicine, QMUL)

This researcher was keen to extend the notion of engagement beyond “pushing promotion” (dissemination of knowledge) and frames engagement primarily as “engaging people in thinking” (data analysis) in order that data analysis is not an impoverished isolated “lab” based activity (“We can't possibly know...can't possible think through”). Second, community engagement was perceived as enriching research practice that involved making a connection with the human beneficiaries of otherwise technical research processes. In the following extract from the research symposium a biomedical researcher explains how engagement with the communities she seeks to benefit with her research shapes her practice:

And it's just the same if I have a student, and you ask the student into the clinic to see they might have a sclerosis patient, and then afterwards obviously you take some blood and you go to the lab. And you are not sitting in front of an anonymous tube. You know there's a face behind the sample. It just helps the student to make a connection. I think that's how we have to start. (symposium discussion, Lecturer in Biomedicine, QMUL)

For this researcher, being engaged with the individual patient they encounter in the clinic ensures a continued connection with the real world of suffering that they are



attempting to intervene upon. As these reflections demonstrate, when approached in this way community engagement provides an opportunity for researchers to consider how their research might connect to the world outside of the university (Wilsdon and Willis 2004). In this sense it can be suggested that when thought about in this way community engagement in research can aid in the continued comprehension of ‘contextual encultured subject’ and help combat the tendency of academic research to be “self-perpetuating, self-centred, meaningless” (see interview extract on page 23).

These articulations by our participants of what community engagement should mean offered some insights into opportunities to structure research and develop research problems in ways that place a central focus on the experience of ‘being with’, or becoming a community. As such the role of community members shifts from that of beneficiary to fellow knowledge-maker, a version of engagement that the following interviewee encapsulates:

Because there isn’t this kind of high level thinking about...really important questions like, ‘What do you...do you work *with* a community...or do you do something *to* a community?’ (Professor, Faculty of Humanities and Social Science, QMUL)

This and other interviewees suggest that “high level thinking” about the nature of the relationship with the community is rare and, by implication, suggests that there is greater capacity to work with communities. But what factors stifle capacity for this kind of engagement? In the following extract from the symposium a PhD researcher explains the problems they have experienced when trying to embed community knowledge (garnered through community engagement activities) in the research process:

Something I’ve been thinking about is how we use what does come out of our activities. So when you do...when you have planned a research project, and you bring it to a group and that, they need everything, from stuff that needs to be changed. But you bring it to another group and they don’t. So kind of like, how you actually synthesise what is said and how you actually make it meaningful? And also what status and value do you give it? (symposium discussion, PhD student in Health Services Research, QMUL)

What is being highlighted here is that the “working with” version of engagement with the community is very difficult to integrate into the experimental systems allied to life sciences. Community knowledge about an issue may have value as a resource for researchers, but when it comes to “synthesising” and making it “meaningful”—in relation to research design, associated analytical conventions and hierarchies of data/evidence—it becomes problematic. There are no approaches available to care for and value the data and evidence that arises from community interactions. As the researcher quoted above subsequently asked of the workshop participants: does the knowledge garnered from community engagement in research activity ever have the power to “trump” pre-existing research plans and methodological approaches that have already been scrutinised and agreed by research funders? What does the space for community engagement look like given these kinds of constraints? The above



quote, and these subsequent questions imply that there are important challenges regarding the politics of knowledge and the distribution of power that current forms of community engagement raise. This is despite that assumption by many life scientists (certainly in our study) that patient and public participation activities are an intrinsic part of their work that provide a means of contextualising and situating their research activity.

This uncertainty about how to include community knowledge also concerns the timing of community engagement in the research process. Typically, community engagement is done once the ‘real’ scientific work (the identification of research aims/questions, research design and so on) is well underway. Researchers tend to control the experimental narrative in a ‘top down’ manner as the following quote from a researcher at our symposium suggests:

I would, one of the things that I’ve observed in this, so far, in some of the quotes and in the question itself, is that there’s a kind of top-down emphasis, like it’s up to [the institution] to engage and it’s up to us, as scientists, if we’re scientists, we have to do it and we set terms of engagement. And we decide whether or not patient input is considered, we decide whether or not this is scientific evidence, and there’s less emphasis on dialogue and on starting the conversation (symposium discussion, Reader in Social Science, QMUL)

What is troubling about this state of affairs for the researcher quoted above is the undemocratic nature of the research process—the scientists “set terms of engagement” and the kind of evidence that can be included in research. In effect the subjects, or more precisely, “experts by experience” (The People’s Knowledge Editorial Collective 2017), of specific problems are distanced from the process of knowledge-making. In spite of the desire to enact the imperative of community engagement, our study participants reported that members of the community were often *not* meaningfully included in their own or their colleagues’ research. The voices of these ‘experts by experience’ did not necessarily carry the epistemological weight necessary to be able make knowledge with professional scientists and become embedded in and transform the knowledge-making system. Again we can see the characteristics of a liminal hotspot in this occasion of “epistemic injustice” (Fricker 2007) (wrong done to someone specifically in their capacity as ‘knower’). New understandings of health and well-being require the ‘contextual encultured subject’ to be a primary interlocutor in the process of framing and conducting life science research. However, in the context of the LSI at QMUL, pre-existing processes and value systems of life science knowledge-making did not readily accommodate this kind of inclusion. Consequently, it was suggested by many of our participants that community engagement in life science research is often thin and perpetuates research practice that is disassociated from the very worlds it seeks to know and intervene upon. Our participants were well aware of this paradox but at the time of the study (2015) there seemed to be little (if any) opportunity for them to develop new forms of experimental and research process that could facilitate the kind of engagement they desire.

In the following section we import theory from the fields of environmental justice (Corburn 2005; Montoya 2013) and pragmatist approaches to community organising



(Harney et al. 2016; Harney and Wills, 2017) to suggest how a new ecology of research practice—one that can attune to situated and emergent notions of health and well-being—might be accomplished in the kind of work undertaken in the LSI.

Working with the ‘shared something’

Though our data analysis we have demonstrated the difficulties of ‘doing’ something akin to customary biology in the contemporary university setting. The proposition that such an approach is necessary was borne out in the views of our study participants. They broadly agreed that contemporary health problems are underpinned by multiple behavioural, cultural, social, environmental and biological processes, but expressed disquiet about the extent to which current enactments of interdisciplinary and community engaged working are able to comprehend and work with this proposition. The lens of ‘liminal hotspots’ has enabled us to illuminate the nature and extent of this disquiet and possible approaches to organising practice that might attend to it effectively.

The liminal hotspot summoned by the relationship between epistemological and institutional processes associated “the universal material body” (Niewöhner 2011, p. 15) and the “contextual encultured subject” (Niewöhner 2011, p. 15) was often encountered in ways that did not catalyse new forms of knowledge-making (“pattern shifts”) across disciplines and with the communities it sought to benefit, despite the potential to do so. The climate of accountability that pervades contemporary university life favours “fast” and “benchmarked” science (Stengers 2011; Mueller 2014) and does not provide the time, space or incentives for researchers to engage in speculative, serendipitous and “slow” life science knowledge-making that can contribute to the propagation of the “shared something” that can be collectively acted on. Likewise, although optimistically constructed as a democratic form of knowledge-making that can inform a ‘situated’ approach to life science research, the depth and breadth of community engagement remains limited. The persistence of epistemological and institutional processes associated with “the universal material body” barred “experts by experience” from collecting around and propagating the “shared something” around which knowledge could be made. Our findings have encouraged us to consider alternative ways of staging and enacting life science knowledge-making that may enable the “shared something” to flourish.

Reflecting on his involvement in a community led regeneration project of a city, which, like east London, brings together “a unique constellation of demographic, social, and structural challenges” (Montoya 2013, p. S45), Montoya claims that those concerned with improving health and well-being need to develop epistemological frameworks that are able to account for human well-being “as part of a complex adaptive system” (Montoya 2013, p. S53). This includes an understanding of the factors that shape health as being “in a process of coemergence and coevolution” (Montoya 2013, p. S53) and that “can only be understood in context” (Montoya 2013, p. S53). In order to propagate such epistemological frameworks Montoya insists it is necessary to re-conceptualise what we mean by ‘community’,



and ‘knowledge’ and the relationship between them. For Montoya community is a “verb”: it is “created through human activity with one another and their surroundings” (Montoya 2013, p. S53) rather than a pre-existing group identifiable through particular characteristics. Through the activity of community the boundaries between academic and local knowledge practitioners are softened allowing for connections to “be made between concepts, people, nonhumans, institutions, problems” (Montoya 2013, p. S53). For Montoya, transforming community into such a quality of action can only occur “under conditions of interdependence, radical trust in the local expertise, and when university researchers attempt to translate their knowledge practices into action.” (Montoya, 2013, p. S53) Through practices of “community knowledge” (community + knowledge) (Montoya 2013, p. S52) it becomes possible for researchers and the perceived beneficiaries of research to collectively attune to, empathise with and care for the contextual encultured subject. Montoya illustrates what this ecology of research practice might entail in the following:

Imagine, if you will, an epigenetic research apparatus that begins with community knowledge and builds upward a research infrastructure, epistemic culture, and research enterprise as if this deeply human practice were more important than the medical technologies that have been built by the research imaginaries in the postgenomic era (Montoya 2013, p. S52).

This quality of action chimes with recent approaches to community organising underpinned by pragmatist philosophy. Such approaches provide further suggestions for how this form of activity might be fostered by university researchers and ‘experts by experience’. Montoya’s call to action resonates with the pragmatist belief in the “radical contingency” of human life and the “makeshift” nature of truth (Barnes 2008 cited in Harney et al. 2016). The pragmatist formulation of life (an ontological position) supports a particular approach to knowledge-making (i.e., an epistemological orientation) in which different communities are invited to gather around a shared concern, and—through deliberation—formulate a problem that they have the collective interest and expertise to address. As the pragmatist philosopher John Dewey outlines in *The Public and Its Problems* (Dewey 1954) the public can be defined “as a community of affected interests whereby people gather together to form a common understanding and will to act around an issue of shared concern” (Harney et al. 2016, p. 4). In this sense, pragmatist approaches to community organising provide a process through which epistemological frameworks can be experimented with and situated knowledge (Haraway 1988) making can occur.

In a recent report on “Community University Partnerships” (CUPs) produced by pragmatist geographers at QMUL (Harney and Wills 2017) a new ecology of research practice, akin to those suggested by Montoya and resonant with the concerns of our research participants, is outlined. The report presents a critique of top down public engagement activities in which “universities approach the question of social impact as a means of meeting the outside demands to widen participation and demonstrate impact in the REF” (Harney and Wills 2017, p. 7). The authors are concerned—as were our case study participants—that this approach results in “superficial” (Harney and Wills 2017, p. 7) impact that is “unlikely to have much



lasting or significant effect on the complex social issues that exist in the world” (Harney and Wills 2017, p. 7). They suggest that Higher Education Institutions (HEIs) are “uniquely placed” (Harney and Wills 2017, p. 7) to “act as credible and prestigious spaces for knowledge generation” (Harney and Wills 2017, p. 7) that can contribute to “finding solutions to society’s most pressing issues by working collaboratively with non-academics to generate new ideas and institutions for addressing them” (Harney and Wills 2017, p. 8). Three potential modes of partnership are outlined (Community Based Research, Knowledge Exchange and Student and Staff Volunteering) to achieve this, which share a common commitment to “the principle of reciprocity, involving the two-way flow of knowledge information and benefits” (Harney and Wills 2017, p. 9). The ‘community’ associated with CUPs is always “defined variously by identity, place or issue” (Harney and Wills 2017, p. 9). We suggest that community university partnerships offer potential to support new repertoires of practice enabling researchers and their co-producers of knowledge to do ‘customary biology’, attend meaningfully to contemporary understandings of the body, the person, disease and health, and re-situate ‘humanness’ at the centre of life sciences.

Final observations

We have conducted this research as situated actors within our own organisation, with established working relationships with some of the participants in the Life Sciences Initiative, and a stake in its development. This presents some challenges to our data collection, analysis, interpretation and theorising. Immersion in the assemblage of practices we were studying behoves us to be as reflexive as we can practically be. Just as some interpretations are “obvious” to us—as they were to participants with whom we share a similar frame of reference—so too are certain silences. Some statements we take at face value, whereas others we open up to more detailed scrutiny. Our attempts to capture this phenomenology in motion reflect the very difficulties our participants have in constructing workable interdisciplinarity. (Callard and Fitzgerald 2015) The “obviousness” of some of the tropes used in our participants’ discussions may lead some readers to feel unsurprised by the data. We argue that this “lack of surprise” is an achievement. On the one hand, when actors in our symposium say (more or less) what one might expect a historian or a professor of medicine or a community organiser to say; they articulate a shared set of norms that is enabling of interdisciplinarity, rather than the mute incomprehension, which might be present if no such norms existed. On the other, some articulate incomprehension—which our research also highlights—is likewise an achievement: a reassertion of particular power relations, disciplinary norms, and claims of territory. (Biagioli 1990)

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References

- Barnes, T. 2008. American pragmatism: Towards a geographical introduction. *Geoforum* 39 (4): 1542–1554.
- Barry, A., and G. Born. 2014. *Interdisciplinarity: reconfigurations of the social and natural sciences*. London: Routledge.
- Berkman, L.F., and I. Kawachi. 2000. *Social epidemiology*. Oxford: Oxford University Press.
- Biagioli, M. 1990. The anthropology of incommensurability. *Studies in History and Philosophy of Science Part A* 21 (2): 183–209.
- Callard, F., and D. Fitzgerald. 2015. *Rethinking interdisciplinarity across the social sciences and neurosciences*. Basingstoke: Palgrave MacMillan.
- Corburn, J. 2005. *Street science: community knowledge and environmental health justice*. Cambridge: MIT Press.
- Department for Business, Innovation & Skills, Office for Life Sciences, 2011. UK life sciences strategy. London.
- Dewey, J. 1954. *The public and its problems*. Athens: Swallow Press.
- East London Genes and Health. 2016. Home | East London Genes & Health [WWW Document]. <http://www.genesandhealth.org/>. Accessed 18 Sept 2016.
- Emmerich, N., D. Swinglehurst, J. Maybin, S. Park, and S. Quilligan. 2015. Caring for quality of care: symbolic violence and the bureaucracies of audit. *BMC Medical Ethics* 16: 23. <https://doi.org/10.1186/s12910-015-0006-z>.
- Fitzgerald, D., M.M. Littlefield, K.J. Knudsen, J. Tonks, and M.J. Dietz. 2014. Ambivalence, equivocation and the politics of experimental knowledge: a transdisciplinary neuroscience encounter. *Social Studies of Science*. <https://doi.org/10.1177/0306312714531473>.
- Franklin, S. 2014. Analogic return: the reproductive life of conceptuality. *Theory, Culture & Society* 31: 243–261. <https://doi.org/10.1177/0263276413510953>.
- Fricker, M. 2007. *Epistemic injustice: power and the ethics of knowing*. St. Wotton-under-Edge: Clarendon Press.
- Genomics England. 2014. The 100,000 Genomes Project, [online]. London: Genomics England. <https://www.genomicsengland.co.uk/the-100000-genomes-project/>. Accessed 7 July 2017.
- GIFTS, Welcome to GIFTS. [online]. London: GIFTS.<http://www.gifts-project.eu/>, Accessed 7 July 2017.
- Gleed, A., Marchant, D., 2015. Interdisciplinarity: Survey Report for the Global Research Council 2016. Global Research Council.
- Greenhalgh, T., M. Clinch, N. Afsar, Y. Choudhury, R. Sudra, D. Campbell-Richards, A. Claydon, G.A. Hitman, P. Hanson, and S. Finer. 2015. Socio-cultural influences on the behaviour of South Asian women with diabetes in pregnancy: qualitative study using a multi-level theoretical approach. *BMC Medicine* 13: 120. <https://doi.org/10.1186/s12916-015-0360-1>.
- Greenhalgh, T., S. Vijayaraghavan, J. Wherton, S. Shaw, E. Byrne, D. Campbell-Richards, S. Bhattacharya, P. Hanson, S. Ramoutar, C. Gutteridge, I. Hodgkinson, A. Collard, and J. Morris. 2016. Virtual online consultations: advantages and limitations (VOCAL) study. *British Medical Journal Open* 6: e009388. <https://doi.org/10.1136/bmjopen-2015-009388>.
- Haraway, Donna. 1988. Situated knowledges: the science question in feminism and the privilege of partial perspective. *Feminist Studies* 14 (3): 575–599. <https://doi.org/10.2307/3178066>.
- Harney, L., J. McCurry, J. Scott, and J. Wills. 2016. Developing “process pragmatism” to underpin engaged research in human geography. *Progress in Human Geography*. <https://doi.org/10.1177/0309132515623367>.
- Harney, L., and J. Wills. 2017. *Infrastructures for impact: community-university partnerships in the UK and USA*. London: Mile End Institute, QMUL.
- Hazelkorn, E. 2007. The impact of league tables and ranking systems on higher education decision-making. *Higher Education Management and Policy* 19 (2): 87–110.
- Israel, B.A., A.J. Schulz, E.A. Parker, and A.B. Becker. 1998. Review of community-based research: assessing partnership approaches to improve public health. *Annual Review of Public Health* 19: 173–202. <https://doi.org/10.1146/annurev.publhealth.19.1.173>.



- Klawetter, S. 2014. Conceptualizing social determinants of maternal and infant health disparities. *Affilia* 29: 131–141. <https://doi.org/10.1177/0886109913516451>.
- Kraft, A., N. Brown, and P. Martin. 2008. From bedside to bench? Communities of promise, translational research and the making of blood stem cells. *Science as Culture* 17 (1): 29–41.
- Krieger, N. 2005. Embodiment: a conceptual glossary for epidemiology. *Journal of Epidemiology and Community Health* 59: 350–355. <https://doi.org/10.1136/jech.2004.024562>.
- Landecker, H., and A. Panofsky. 2013. From social structure to gene regulation, and back: a critical introduction to environmental epigenetics for sociology. *Annual Review of Sociology* 39: 333–357. <https://doi.org/10.1146/annurev-soc-071312-145707>.
- Ledford, H. 2015. How to solve the world's biggest problems. *Nature* 525: 308–311. <https://doi.org/10.1038/525308a>.
- Lock, M. 2005. Eclipse of the gene and the return of divination. *Current Anthropology* 46: S47.
- Lock, M. 2015. Comprehending the body in the era of the epigenome. *Current Anthropology* 56: 151–177. <https://doi.org/10.1086/680350>.
- Lock, M.M., and D. Gordon. 1988. *Biomedicine examined, culture, illness, and healing*. Dordrecht, Boston: Kluwer Academic Publishers.
- Lock, M., and V.-K. Nguyen. 2010. *An anthropology of biomedicine*. New York: Wiley.
- Montoya, M.J. 2013. Potential futures for a healthy city: community, knowledge, and hope for the sciences of life. *Current Anthropology* 54: S45–S55. <https://doi.org/10.1086/671114>.
- Motzkau, J.F., and M. Clinch. 2017. Managing suspended transition in medicine and law: liminal hotspots as resources for change. *Theory & Psychology* 27: 270–289.
- Mueller, R. 2014. Postdoctoral life scientists and supervision work in the new corporate university: a case study of changes in the cultural norms of science. *Minerva* 52 (3): 329–349.
- Nature. 2015. Mind meld. *Nature* 525: 289–290. <https://doi.org/10.1038/525289b>.
- Niewöhner, J. 2011. Epigenetics: Embedded bodies and the molecularisation of biography and milieu. *BioSocieties* 6: 279–298. <https://doi.org/10.1057/biosoc.2011.4>.
- Pickersgill, M. 2016. Epistemic modesty, ostentatiousness and the uncertainties of epigenetics: on the knowledge machinery of (social) science. *Sociological Review Monograph* 64: 186–202. <https://doi.org/10.1002/2059-7932.12020>.
- Queen Mary, University of London, 2017a. Life sciences launch presentations [online]. London: QMUL. <http://www.qmul.ac.uk/lifesciences/news-events/news/2014/150112.html> Accessed 7 July 2017.
- Queen Mary, University of London, 2017b. About Life Sciences [online]. London: QMUL. <http://www.qmul.ac.uk/lifesciences/about/index.html>. Accessed 7 July 2017.
- Queen Mary, University of London, 2017c. Research Life Sciences [online]. London: QMUL. URL <http://www.qmul.ac.uk/lifesciences/research/index.html>. Accessed 7 July 2017.
- Rabinow, P., and G. Bennett. 2014. *Designing human practices*. Chicago: University of Chicago Press.
- Research Councils UK. 2016. RCUK Strategic Priorities and Spending Plan 2016–2020.
- Rittel, H., and M. Webber. 1973. Dilemmas in a general theory of planning. *Policy Sciences* 4: 155–169.
- Rose, N. 2013. The human sciences in a biological age. *Theory Culture & Society* 30: 3–34. <https://doi.org/10.1177/0263276412456569>.
- Shaw, S.E. 2007. Driving our alternative ways of seeing: The significance of neo-liberal policy mechanisms for UK primary care research. *Social Theory & Health* 5: 316–337.
- Shore, C. 2008. Audit culture and illiberal governance: Universities and the politics of accountability. *Anthropological Theory* 8: 278–298. <https://doi.org/10.1177/1463499608093815>.
- Stengers, I. 2011. Another science is possible! A plea for slow science. *Naugarial lecture chair Willy Calewaert 2011–2012 (VUB)*. Brussel: Vrije Universiteit.
- Stenner, P. 2016. Liminality: Un-Wohl-Gefühle und der *affective turn*. In *Un-Wohl-Gefühle Eine Kulturanalyse Gegenwärtiger Befindlichkeiten*, ed. E. Mixa, S.M. Pritz, M. Tumeltshammer, and M. Greco, 45–68. Bielefeld: Verlag.
- Stenner, P., and M. Greco. 2017. Liminality and affectivity: introducing liminal hotspots. *Theory & Psychology* 27 (2): 141.
- Strathern, M. 2000. *Audit cultures: Anthropological studies in accountability, ethics and the academy*. New York, London: Routledge.
- Swinglehurst, D., T. Greenhalgh, J. Russell, and M. Myall. 2011. Receptionist input to quality and safety in repeat prescribing in UK general practice: ethnographic case study. *BMJ* 343: d6788. <https://doi.org/10.1136/bmj.d6788>.
- Szakolczai, A. 2009. Liminality and experience: Structuring transitory situations and transformative events. *International Political Anthropology* 2: 141–172.



- The People's Knowledge Editorial Collective. 2017. *People's knowledge and participatory action research: escaping the white-walled labyrinth*. Rugby: Practical Action.
- Tower Hamlets Council. 2015. *Delivering the Whitechapel vision: regeneration prospectus*. London: Tower Hamlets.
- Trust, Wellcome. 2015. *One science: life at the interface—supporting interdisciplinary research, frontiers*. London: Wellcome Trust.
- Turner, V. 1969. *Communitas. The ritual process structure and anti structure*. New York: Aldine De Gruyter.
- van Gennep, A. 1960. *The rites of passage*. London: Routledge.
- Viseu, A. 2015a. Integration of social science into research is crucial. *Nature* 525: 291. <https://doi.org/10.1038/525291a>.
- Viseu, A. 2015b. Caring for nanotechnology? Being an integrated social scientist. *Social Studies of Science*. <https://doi.org/10.1177/0306312715598666>.
- WHO. 2017. WHO | Social determinants of health [online]. Geneva: WHO. http://www.who.int/social_determinants/en/. Accessed 7 July 2017.
- WHO. 2017. WHO | Social determinants of health [online]. Geneva: WHO. http://www.who.int/social_determinants/en/. Accessed 7 July 2017.
- Wilsdon, J., and R. Willis. 2004. *See-through science: why public engagement needs to move upstream. project report*. London: Demos.

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