Introduction: Biofutures/Biopresents

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> The UK bioscience industry faces an exciting future. The technology offers new medical opportunities that *challenge* traditional patterns of diagnosis, healthcare and disease prevention. The UK, with a *reformed* National Health Service, has an opportunity to be at the forefront of research and development [Prime Minister Blair, foreword in BIGT (2003, p. 1). My emphasis].

Introduction

Two very different reports produced for the UK government in the last three years have connected the state of our physical health with that of our material wealth. The first of these was produced in 2003 by the Bioscience Innovation and Growth Team (BIGT) titled *Improving National Health, Improving National Wealth*, whilst the second, called *Health Inequalities—Status Report on the Programme for Action*, was produced in 2005 by the Department of Health (DH).[1] The former produced a series of recommendations designed to 'secure' the economic position of the UK bioscience industry and through this the health of the UK population, whilst the latter repeated the finding that socio-economic status and physical health are strongly related, revealing significant spatial and social health inequalities across the UK (see Batty, 2005; Shaw *et al*., 2005).

These different understandings of the health–wealth link provide a useful foil to explore the central focus of this special issue, namely the construction and definition of particular problems and their solutions encompassing the technoscience of new genetics. Here the popular term technoscience is used to denote a technological context that promotes and maintains forms of scientific enquiry and understanding particular to that set of artefacts: in its simplest formulation, it posits that technology is both shaped by and shapes society. In this special issue we seek to explore the specific technoscientific context in which the biosciences—molecular biology, genetics, genomics, proteomics—are situated and subsequently promulgated: their biopresents and their biofutures.

Using the government reports above to illustrate the context of the biosciences reveals two very different approaches to understanding national healthcare. The BIGT report implies

that our health is dependent upon ensuring future industrial performance through building 'a mutually advantageous collaboration between the NHS and industry for patient benefit' (2003, p. 5). In contrast, the DH report implies that our health is dependent upon existing resource distribution with the government response, according to Shaw *et al.* (2005), consisting of an 'individualistic rhetoric of behavioural prevention [of illness]' as opposed to building 'mutually advantageous' alliances between different institutions. This is exemplified in the DH proposal for 'health trainers' for deprived areas which Caroline Flint MP, Minister for Public Health, says would assist people in adopting 'a healthier way of life' (quoted in Batty, 2005). Other wide-ranging changes to the UK health service have also been oriented towards promoting such an agenda based on personal choice, healthier lifestyles and medical innovations derived from modern biotechnology (i.e. targeted at individuals). Furthermore, this agenda has been supported by the extension of privatized provision of services across the NHS [see Pollock (2004) for a critical review].

What are the social and technological consequences of such policies? These issues have a longstanding tradition in social studies of 'new genetics' with the work by Abby Lippman (1992, p. 1473) on 'geneticization' illustrating the early concern that '[t]he individual, not society, is seen to require change' and therefore 'social problems improperly become individual pathologies'. This focus on individual responsibility for health means that as our bodies—both literal and public—in the biopresent are increasingly privatized, reduced to their medicalized and essentialized component parts (i.e. 'the gene'), then the biofuture responses—both private and public—to our bodies will also progressively privatize and medicalize our bodies thereby reinforcing the original individualist perspective (Cunningham-Burley and Boulton, 2000; Gottweis, 2005).

Linking Biofutures and Biopresents

These biofuture agendas and their technoscientific remedies are presented as the obvious solution to the constructed and naturalized problem of the biopresent. The range of possible biofutures reveals the contextual diversity in which the linkages between biofutures and biopresents occur, a diversity that is eroded as technoscientific promises and solutions marginalize some accounts of the world in favour of others. Thus the biopresent discussed above, concerning the relationship between health and wealth, privileges a biofuture in which the understanding of human well-being is based on the individual characteristics and behaviour of each physical body. The material expense incurred as a consequence of individualized responses escalates the overall cost to society accordingly, foreclosing the adoption of other possibilities or concerns (Rappert and Brown, 2000; Duster, 2003). For example, healthcare technologies derived from the biosciences produce the means to screen populations and test individuals before treatment by gene-based technologies (i.e. pharmacogenetics), where these exist. However, the integration of such technologies into treatments is strongly influenced by the subsequent increase in costs to businesses of clinical trials and the impact this will have on their priorities (Webster *et al.*, 2004). The main question to consider then is how do we identify possible biopresents and biofutures? And once we have, how do we understand their technoscientific extension?

Agendas and Artefacts

As particular technological visions of the future, these biofutures promote a self-fulfilling prophecy. The promotion of certain agendas is confirmed as rational and coherent because

a specific biofuture is promoted in scenarios, policy and practice whilst others are not. In relation to medicine for example, individualized prevention and treatment is based on conceptions of humanity drawn from genetics, genomics and other biosciences that breaks down our bodies into component parts (i.e. genes, genomes, cells). The agendas of scientists, companies, universities and patients all benefit from this research direction, with scientists working in these fields richly rewarded for their efforts, both materially (i.e. stock options) and socially (i.e. status). In turn, public and private organizations have been rewarded through changes to intellectual property institutions (e.g. Bayh–Dole Act, 1980) that have reinforced an individualistic and proprietary understanding of invention that assures the legitimacy of their private appropriation of valuable intellectual property (see McAfee, 2003). Finally, patient groups have been rewarded, where they have achieved public awareness, with research investment in their particular disease or disorder, motivating other groups to pursue similar strategies (Rose, 2001).

As these agendas coalesce into biofutures, they become embedded in technologies and artefacts which confirm the self-fulfilling agendas: they both construct and naturalize the specific biofutures as obvious/inevitable. For example, Rappert and Brown (2000, p. 52) argue that '[s]tatements about the future of genetic diagnostics often present its development with a certain quality of inevitability'. This apparent inevitability is produced by embedding agendas in artefacts, yet still appearing as freely adopted by pre-empting alternatives. In modern biomedicine, the technologies and artefacts of genetic screening help to produce a perception that there are 'undesirable' characteristics that individuals need to be screened for and then correct (Duster, 2003), whether or not there is any means to do so (see Caulfield, 2000).

Solutions and Remedies

Implicit within the biofuture agendas and their embedding in artefacts is the construction and naturalization of the biopresent as a problem. A biopresent is the current state of affairs as conceived by the set of agendas that then produces the biofuture; it enables the enrolment of these agendas into the biofuture because it portrays the technological solutions as obvious. In medicine one of the most powerful biopresents is disease: it can be constructed via campaigns that medicalize and therefore naturalize specific characteristics (e.g. baldness) or behavioural traits (e.g. shyness) as problems for individuals (Moynihan, 2002; Moynihan and Cassels, 2005). The construction of problematic traits or characteristics, and their subsequent medicalization, is pursued where such 'problems' are non-fatal, helping to produce a large commercial target of 'worried well' (Angell and Relman, 2002) or lifestyle consumers (Moynihan and Cassels, 2005). Thus a new disease market for an existing product can be more profitable than the creation of a new product. This advantage partly explains why the bioscience 'revolution' has not led to a flood of new, more effective treatments (Arundel and Mintzes, 2004; Nightingale and Martin, 2004; Joppi *et al*., 2005; Mittra, 2005).[2]

The biofuture agendas and their technoscientific remedies are presented as the obvious solution to the constructed and naturalized problem of the biopresent. To do so the biofuture and its technoscientific remedy must be constituted in a specific way that not only reflects on the problem implicit within the biopresent, but also the inevitability and obviousness of the biofuture's solution. A biopresent that constructs

certain diseases and disorders as major problems to be solved by specific technological treatments, results in a biofuture that justifies its solutions as revolutionary in order to legitimate the expenditure of resources (public and private) on specific activities and enrol multiple agendas (Väliverronen, 2004). Such claims, visions and expectations are an integral part of technoscientific development (Hedgecoe and Martin, 2003). All such representations exist as an aspect of technology and no technology can exist without these representations. As Usher Fleising (2001, p. 240) argues, 'geno-hype' becomes 'an ideology where disease is defined as a market opportunity' (see also Caulfield, 2000).

Technoscientific Expectations

There has been a growing interest recently in what has come to be known as the 'sociology of technological expectations', which emphasizes the important role played by such representations—visions, promises and even ethical discourses—to the development of technologies (van Lente and Rip, 1998; Brown *et al*., 2000; Brown and Michael, 2003; Hedgecoe and Martin, 2003). These act to enrol a range of disparate actors, possibly with competing agendas, and material resources into a technoscientific system; for example, Hedgecoe and Martin (2003) have explored the importance of bioethical discourses, in particular, to the development of pharmacogenetics. A crucial aspect of this use of visions, promises and other expectations, especially in relation to the positing of a revolution in the biosciences, is the enrolment of material resources in the form of investment (Walsh, 2002). As a consequence, these representations come to form 'social institutions as well as patterns of activity' that are deliberately endorsed in an attempt to induce a self-fulfilling prophecy around a specific technoscientific discourse (Guice, 1999, pp. 81–82; see also Brown *et al*., 2000).

Although the pursuit and promotion of these expectations is future-oriented, Brown and Michael (2003) argue that there is an important past-oriented aspect as well. The former they characterize as a 'fetishization of the soon to be', whilst the latter they argue results from:

> an overwhelming tendency retrospectively to account for success or failure by referring to the properties of a technology or an artefact rather than other equally important [i.e. social, economic, political] factors (Brown and Michael, 2003, pp. 6, 7).

The interpretation of the past therefore appears as another temporal orientation within technoscientific development (see Rappert, 1999); all of which point to a series of legitimating and justificatory claims that are derived from temporal periods lying outside of the *current* development stage. It can therefore be argued that the positioning of the biosciences as a revolutionary technoscientific development reinforces the impression that specific technoscientific outcomes are either inevitable or inherent, producing a technologically determinist position, which Brown and Michael (2003) suggest can cause the failure of the very technologically determined future expected because such determinism leads to the neglect of social, economic and political aspects of development. On the other hand, it is possible to argue that such an emphasis on social factors as an explanation of technoscience can, through the creation of self-fulfilling prophecies, naturalize these

social, economic and political features of technologies as the cause of their uptake and diffusion. These concerns represent the focus of the articles in this special issue.

Special Issue

In his article, Adam Bostanci compares two sets of agendas and the respective artefacts that these generate as a result of the essentialistic perspectives reproduced during the 'contest' between the Human Genome Project (HGP) and Celera Genomics to map *the human genome*. The agendas of each project are reflected in the creation of the two genome artefacts that then illustrate an overriding question: what is *the* human genome? How has each sequence been represented? Bostanci presents these issues in light of the role played by human diversity as an underlying essentialist notion used to legitimate and thereby encourage support for both projects. For example, despite the admission that the choice of DNA donor for genome sequencing was an arbitrary decision, both projects sought to ensure that racial and gender diversity was both part of the sequenced genome itself and its representation afterwards.

Michal Nahman's article deals with the contradictory meanings attached to ideas of purity and contamination that are produced in the characterization of egg donation offspring in Israel as 'a different mixture'. She argues that this represents a materialization of national identity and personhood specific to Israel, particularly the idea of 'blending the exiles', with the perception that egg donor offspring are 'more' than their parents. Such a perception is derived from the 'chosenness' of the offspring, which in turn carries over into the artefacts used to identify donor candidates by the parents in the donor clinics. Thus Nahman shows how the choices Israeli parents make—in reference to the 'preferred external features' of the donor—are tied to a concept of a global society where the personal qualities of the egg donor become central concerns. Consequently Israeli parents appear 'obsessed' with choosing egg donors with small noses and white skin, thereby materializing their national identity in relation to specific geographical preferences; i.e. white European.

Caitriona McLeish discusses the response of the US scientific community to the perceived dual-use threat from bio-weapons after the 2001 terror attack on the USA. In her analysis of their response, McLeish shows how a set of agendas came to frame the expected threat, driving the adoption of self-censorship policies by journal editors. She deals with three different proposals to limit the publication of dual-use information, starting with the 2003 statement by 32 journal editors and authors that outlined dissemination procedures for restricting publication. This McLeish follows with the 2004 Fink Committee Report and the 2005 decision by the Proceedings of the National Academy of Science to embargo an article. Throughout this discussion she explores the framing of the threat issue by the different actors involved, particularly the scientific and weapons control communities.

In their article on biobanks Helen Busby and Paul Martin highlight the use of pleas to altruism based on national identity as a means to enrol national populations in genetic research. Donors to biobanks gain no personal advantage—in terms of better treatment—so they can have no individualized motivation to cooperate. As Busby and Martin argue, donor support instead depends upon appeals to a national identity, exemplified by Benedict Anderson's concept of the 'imagined community'. Thus to support Biobank UK proponents have had to stress the progressive benefits to the national

population, future inhabitants and communities, where these are framed in terms of national groups that are themselves constructed as homogeneous (i.e. Iceland) or heterogeneous (i.e. UK). Both have been presented as potential benefits to medical research that utilizes the biobank. Consequently, the National Health Service (NHS) has been recast as a biomedical research tool that contributes to the ongoing agendas of industrial innovation in the biosciences (despite public disquiet about such an emphasis) and, therefore, to national economic interests.

Finally, Michael Hopkins focuses on the 'hidden research system' of cytogenetic testing in the NHS that evolved from a reconfiguration of existing artefacts through experimental practice. He provides a detailed history of the cytogenetic agendas throughout the twentieth century that arose as diseases came to be associated with chromosomal abnormalities. In turn the coupling of cytogenetics with amniocentesis facilitated the expansion of techniques into prenatal testing and the growth of a particular community of practice (i.e. the Clinical Genetics Society) centred on the new service provided from this technoscience. In this case, it appears as though the various agendas arose from the reconfiguration of artefacts and the development of techniques in response to new influences on the network (i.e. reducing the length of waiting times for results).

Social Science Roles and Responsibility

So what do these biofutures and biopresents mean for the work of social scientists? There is at least one crucial way that the social sciences, as well as the social world more generally, are affected by the production of biofutures and biopresents—that is in relation to resource allocation, both in terms of research focus and material expenditure. Such a concern is especially relevant for social scientists now in several jurisdictions including the UK, USA and EU amongst others. A growth of social science research interest in the 'biosciences' is evident over the last few decades, especially since 2000, as a search of the BIDS International Bibliography of the Social Sciences shows.[3] The increasing level of material expenditure on bioscience research can be illustrated in reference to the concerted UK investment in social research on 'genomics' over the past few years; for example, the Economic and Social Research Council (ESRC) alone is spending £12.5 million over 10 years (Diamond and Woodgate, 2005). The proliferation of research centres and programmes across a number of countries focused on the various aspects of 'new genetics' represents a strong commitment to a particular technoscientific field that may not prove to fulfil its potential for solutions to a multitude of social problems as touted by its advocates. What happens to the other research agendas, ones that concentrate on other ways of understanding the world?

Why does this matter? And what does it all mean? The work of Ferraro *et al*. (2005) provides an important analysis of this very issue, although in relation to economic thought rather than the biosciences. They argue that social scientists are subject to what Anthony Giddens calls the 'double hermeneutic' in that when we describe the world we inevitably modify it through our theories because they prescribe particular approaches to understanding the world that encourage and endorse particular policies and decisions. Thus we contribute to a self-fulfilling prophecy in which the prescribed policies and decisions reinforce the original theory by 'proving' its accuracy. If we report on the biosciences in terms that corroborate the expectations of individualized lives and privatized bodies, then our descriptions can promote a particular socio-economic system (i.e. private

appropriation) that reproduces certain cultural expectations (i.e. individualism). We have to ask whether we wish our own research to promote these agendas and, if not, how do we avoid doing so.

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The special issue itself draws upon papers presented at the annual colloquia of the Postgraduate Forum on Genetics and Society (PFGS). The PFGS is a postgraduate and postdoctoral network that seeks to promote interdisciplinary engagement in the social, legal and ethical study of modern biotechnology and new genetics. The colloquia are organized annually by postgraduate students and provide an opportunity for students to present their work to their peers drawn from across the globe. For more information go to http://www.pfgs.org.

Notes

[1]The DH release strategy for the report was strongly criticized by Shaw *et al.* (2005) in a *British Medical Journal* (BMJ) editorial. They charged that the current government's release strategy was an almost direct replication of the previous Conservative administration's response to two previous reports detailing the link between health inequalities and socio-economic inequalities: the 1980 *Black Report* and 1987 *Health Divide*. This claim was refuted by the Minister for Public Health, Caroline Flint in a response to the BMJ piece (Flint, 2005).

[2]David Rasnick (2003, p. 356) has been particularly scathing in his analysis of the 'biotechnology bubble machine' arguing that most biopharmaceutical products are 'for rare diseases with small markets' or 'plain don't work'.

[3]The clearest indication of this growth can be shown from a simple search of BIDS International Bibliography of the Social Sciences. Such a search reveals that for the 1980s there was an annual average of just over 27 articles concerning a 'genetic' topic: a figure that has subsequently increased to nearly 62 for the 1990s and 245 for the first half of the 2000s. A similar level of increase is also evident in relation to both 'biology' and 'biotechnology' topics, as shown in Table A1 in the Appendix. The search shows that the interest in genetics should, on current trends, by the end of the decade have increased eight-fold from the 1990s.

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Appendix

Table A1. Average annual number of articles with reference to the 'biosciences' per decade

Search word	1970–1979	1980–1989	1990–1999	2000–2004
'Genetic'	17.7	27.4	61.9	245
'Biology'	18	36.9	134.1	338
'Biotechnology'	0	7.5	62.8	137.2
'Stem cell'	0	0	0	5

Source: BIDS International Bibliography of the Social Sciences, June 2005.