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Changing Science: The Advent of Neo-liberalism

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ABSTRACT *This paper provides a detailed analysis of the change process of academic science. The change pressures currently visible in UK science have been conceptualised as the product of three interdependent dynamics: a shift towards neo-liberal ideologies and discourses of government; a process of reconstitution of the relationship between government and science; and the resulting reshaping of science itself. Focusing on the universities and academic science, we argue that this process of transformation has adverse consequences the end result of which may be a loss of capacity within the science system to maintain knowledge bases.*

Keywords: change; neo-liberalism; science; universities.

Introduction

The activity of science has always been framed by its social and economic contexts and as such is dynamic. Until comparatively recently, change in UK science was characterised by gradual and endogenously generated organic development. In contradistinction, the practice, institutions and culture of UK publicly funded science are now subject to exogenous, policy-driven pressures for change from government.[1] These pressures arise from a neo-liberal ideology that promotes the dissolution of old public–private boundaries and the reinvention of the state as a seamless *assemblage* of institutions, actors and discourses dedicated to the furtherance of economic aims.[2]

To date, most explorations of these relatively new change processes in science have focussed on the detail of Conservative government policies between 1979 and 1997. These policies have continued largely unattenuated since.[3] Such descriptions fail to provide a detailed analysis of the workings of the change process and its likely trajectory. This paper aims to address this explanatory and predictive deficit.

The model advanced in this paper posits that the change pressures currently visible in UK science are the product of three interdependent dynamics. First, that there has been a shift towards neo-liberal ideologies and discourses of government, including the re-visioning of the nature and role of science. Second, these ideological and

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discursive shifts are reconstituting the relationship between government and science. Finally, this re-visioning of science and reconstitution of relationships will ultimately result in the reshaping of science itself. We further argue that the cycle of change will be complete, and indeed irreversible, when government's visions of science and those of scientists' converge.

The extent to which social institutions adapt to policy-driven pressures for change or accumulate tensions, which eventually result in a crisis, is also a focus of this paper.[4] We argue that there is a possibility that these pressures and tensions may go unobserved until change is inevitable and, indeed, irreversible. Moreover, frustrated government may respond to institutional inertia by heightening demands for transformation and the accumulating tensions may be destabilising, making change uncontrollable when it does finally occur.

Whilst some institutions, such as the government research establishments (GREs) have largely succumbed to the pressures for change[5] others, such as the universities, have exhibited more complex, subtle and less compliant responses. For this reason here we focus on the change processes affecting the universities. The universities are well-established and relatively conservative institutions that enjoyed a considerable degree of autonomy from the state. Universities were and remain the main performers of publicly funded research. The transformations they have undergone are both empirically demonstrable and clearly attributable to both specific policy shifts and changing government/science relationships.

We suggest that this process of transformation has at least four adverse potential consequences. First, there are developing tensions between new and traditional institutional scripts, rules and practices. Second, there has been a transfer of power and authority from the academics to management elites. Third, there has been a change in the nature of what it is to be an academic away from freethinking creativity and towards a contractual culture of compliance. Fourth, there are increasing levels of the commodification of research, customerisation of teaching, and the reorientation of both universities and academics towards new goals determined by the neo-liberal state. Finally, the end result may be a loss of capacity within the science system to maintain knowledge bases. Such potentialities concern more than funding systems and resource allocations, on which previous analyses have almost entirely focussed. Rather, they may be emblematic of the destruction of an entire set of institutions and cultures.

The remainder of this paper is organised into four further sections. The next three address in turn the three dynamics outlined above—changing visions, changing relationships and, finally, changing science. This is followed by some conclusions in which we raise the alarm with regard to future developments.

Phase 1: Discursive Reframing

The policy agendas of the Conservative regimes of 1979–97 were carried by a distinct political ideology. This evinced the state was inherently and fundamentally inefficient and that it should be reduced to the absolute minimum feasible size with its functions replaced by the rigour and disciplines of the free market. From the 1980s onwards, this ideology was applied with the same vigour to science as it was to more prosaic functions such as the issuing of passports. At this time many GREs were partially or fully privatised. Those laboratories that remained in the public sector were subject to quasi-commercial pressures and performance management regimes.[6] Universities were urged in similar directions, with funding

for research based on measures of productivity through the Research Assessment Exercise and a general squeeze on state funding for the sector.[7] These reforms reflect a re-visioning of science as an activity that should be economically useful, allied to the market and accountable for the efficient use of resources.[8] This amounted to a significant discursive shift from previous conceptualisations of science as a public good and a necessary expenditure in an economy in which scientists give the gift of knowledge in exchange for undifferentiated public support.

Whilst appearing superficially quite similar, successive Labour governments since 1997 have followed an even more fundamentalist neo-liberal ideological path. In contrast to the more classical liberalism of the Thatcher regimes, neo-liberal governmental practice is not about containing the state in order to allow economic rationality to flourish unfettered. Rather, the neo-liberal state seeks to *extend* its role, utilising a plethora of disciplinary and regulatory regimes to mould organisations and individuals into activity that shapes and sustains economic development in partnership with the market.[9]

In order to achieve such control, neo-liberal states need to address the fact that human beings retain some agency. They do this by constructing discourses that frame institutional and individual thinking. Such regimes are 'rational' in the sense that the actions of the state embody some form of thinking that seeks to be explicit, clear, planned, purposive and justified. They are also 'calculative' in that actions are supported by calculative techniques and technologies.[10]

In such a context the neo-liberal state is better conceptualised as acts or series of acts exercised through bodies of knowledge, belief and opinion that combine into a collective mentality about how we should and do rule ourselves, or, as Foucault phrased it, 'governmentality'—or rather govern-mentality. Our governmentality is therefore constituted and constitutive of a complex, polymorphous and interlocking/interacting set of organised, rational routines—particular ways of doing things or '*regimes of practice*'.[11] Regimes of practice are informed by knowledges or expertise, such as medicine, accounting, audit, management skills and science.

Science as a knowledge production process has come to occupy a specific location within neo-liberal regimes. Neo-liberal states are deeply invested in the notion of the 'knowledge economy' and therefore knowledge becomes both a means of production and a commodity. As such, knowledges and sites of their production become subject to struggle for ownership or control. Such struggles are not limited to intellectual property rights—control over the codification of knowledge, that is, the ability to determine what counts as valid knowledge, is also crucial. Moreover, the sustaining discourses constitutive of neo-liberal regimes are dependent upon what Appadurai calls the 'research imagination'.[12] That is, control of what and how we think is key to the neo-liberal endeavour.

It follows therefore that science must be incorporated within the neo-liberal state's regime of practice rather than standing alone as a Mertonian exclusive and self-regulating domain. Since the 1970s, structural-functionalist notions of science in the Mertonian tradition have given ground to the, at times, extreme relativism of the constructivist school. The latter saw scientific knowledge as continuously constructed and argued therefore that it had the same legitimacy as any other form of knowledge. Hence, social constructivism refuted the Mertonian claim of exclusivity of science knowledge and thereby the exclusivity of scientific knowledge producers. This opened the way to the belief that if science could be controlled, then it should be.

Given this constructivist turn, sociology was no longer a reliable source of hard evidence on which to base this governmental reform of science. This distrust accelerated as neo-liberal rational and calculative regimes of practice developed. Neo-classical economics stepped in to fill this lacuna of expertise and policy advice. Such economic thinking provides an entirely different conceptualisation of science, one founded on notions of science as an activity that supports and sustains the knowledge economy, a commodity, a capital base that requires a return on investments made.

Phase 2: Transforming the Relationship between the State and Science

This re-conceptualisation of science had an impact on the relationship between government and the institutions of science. Such a transformation is a continuous rather than a discrete process and not one unique to the developments that form the focus of this paper. It is evident that the precursors of the government–science relationship framed by neo-liberal ideology began to emerge prior to Mrs Thatcher coming to power, albeit for different ideological reasons.

By the end of the 1960s the foundations of a changing relationship between government and science were already in place. These foundations had three constitutive elements. First, the rapidly escalating funding needs of scientific enquiry made it imperative to develop funding prioritisation mechanisms, something not possible within the then existing funding regimes.[13] Second, even if prioritisation mechanisms could be developed, the escalating cost of science was still a pressing public finance issue. Because trust in relationships is considerably easier to maintain where either the stakes are low (which they were not by now) or the level of regulation is high, the obvious solution was to imbricate universities into regimes of public accountability.[14] And third, the first post-war Labour government had signalled its conviction that science and technology could and should provide the basis for the economic regeneration of Britain—a Britain to be re-forged by the 'white heat' of technological revolution.[15]

Despite these ideas, during the 1960s scientists continued to enjoy considerable public and political support. This had financial implications as

> governments rewarded universities with generous autonomy. They subsidised them by providing funds every five years, to be allocated by academics themselves through the University Grants Committee, which provided a buffer between the two sides. The professors were allowed 'academic freedom' which could mean the freedom to study what they wished.[16]

That is, the immediate post-war years were marked by state funding regimes for universities that were characterised by the awarding of large undifferentiated block grants through intermediary institutional mechanisms designed to avoid government control.[17] Thus, when in 1967 the parliamentary Public Accounts Committee asked to inspect the accounts of universities it was rebuffed on the grounds that this would infringe academic freedom and institutional autonomy.[18] Moreover, at this time the Conservatives in Opposition maintained that 'science was not in general a proper field for detailed government control and planning' and that science demands '… individual creativity, flexibility and freedom from centralised administration'.[19]

Such discursive framings of science protected it from more overt control during the 1960s and 1970s, but, as the discursive shifts of neo-liberalism began to bite, so

new and long-mooted funding regimes began to emerge that allowed the exercise of enhanced control over the universities through funding mechanisms. Shore and Wright detail how successive Conservative governments from 1979 onwards reformed university funding mechanisms from those based on disinterested fund distribution to tight forms of financial string-pulling.[20] These changes constituted the introduction of the 'something for something' principle, with high elements of contractual obligation.

Funding became a precise policy mechanism for steering universities, with the defining features being systematic selectivity, competition and accountability.[21] Such an approach is inherently neo-liberal, with government seeking to direct and regulate those parts of civil society that cannot operate effectively within the private sector in order to ensure that they meet the knowledge economy needs of the wider society. Money spent on universities and their research became not an expense, but an investment, with an expected return in terms of commodified knowledge and expertise. This was a shift from a distribution to an exchange financial relationship. It provided an effective lever for universities to be imbricated into the wider assemblage of government. This undermined their status as autonomous actors and, we argue in the conclusion of this paper, has serious ramifications for the nature of the knowledge they produce.

This shift in the principles underpinning funding necessitated a number of structural transformations and reforms.[22] In particular, there were important implications for the academic research intermediaries.

The University Grants Committee (UGC) was established in 1919 to reflect the Haldane principle that, whilst universities should be in receipt of state funding, government should not be able to exercise an undue influence over what they did. Even as late as the 1980s, the UGC allocated block grants for research and teaching to universities in an undifferentiated and non-selective way on the basis of a quinquennial review process. The UGC itself was comprised entirely of academics.

Operating according to these principles, the UGC acted for a long time as an effective buffer, shielding the universities from government interference and control.[23]

The UGC was generally perceived to 'be doing its job' until the 1980s when swingeing cuts in the science budget were imposed by a cash-strapped government anxious to downsize public expenditure. These cuts were made thinkable by the discursive shift in the visions of science and the changing funding mentalities. However, the UGC proved to be an intermediary ill-suited to this new regime. Whilst the distribution of the reduced grant monies demanded some level of selectivity, there were no appropriate tools and procedures to do this. Hence when '… some institutions like Bath and York, suffered no cuts in their grant; others like Aston and Salford, had their allocations cut by up to 40%'.[24] The decision was hard to justify and the UGC was exposed to severe criticism. As a consequence the UGC started working more closely with the education ministry and began to develop selectivity principles. It did so through pioneering tools such as the Research Assessment Exercise, the first of which was carried out in 1986, but it had become apparent that the old UGC was not fit for the new government purposes.

In 1987 the government proposed a radical reconstruction of the higher education system, eventually passing the 1988 Education Reform Act. This abolished the UGC and replaced it with the University Funding Council (UFC) and the Polytechnic Funding Council (PFC).

> The new councils took over in April 1989 with part-time chairmen and full-time chief executives. At least half their members were drawn from outside higher education … the universities were no longer to be funded by 'grants', which suggested to ministers unhealthy entitlement to public funds, but by 'contracts', which implied a welcome reciprocity. Finally academic tenure was abolished in universities.[25]

The UFC organised the second Research Assessment Exercise in 1989, but did not exist long enough to have any significant impact. In the early 1990s the dismantling of the binary divide between universities and polytechnics necessitated a further restructuring of the intermediary organisations.

The subsequent establishment of the four regionally based higher education funding councils (HEFCs) completed the transformation of intermediaries from buffer bodies to executive arms of government run on managerialist lines. That is, the intermediaries became organisations the primary function of which was, and still is, to promote and implement government policy. By the virtue of its size, the Higher Education Funding Council for England (HEFCE) is the most influential among the funding councils controlling an annual budget of over £4 billion.

To fulfil their new responsibilities the HEFCs needed to develop management tools and techniques that operationalised the new visions of science and funding mentalities. More specifically, the funding councils needed a rational and calculative tool enabling these to reward or punish university performance against subjective criteria of academic excellence. Such a tool was developed from the early Research Assessment Exercise.

The 1986 Research Selectivity Exercise, the precursor of the RAEs, was a fairly 'light touch' affair whereby quality judgements were based on submissions of only five publications from each department. Whilst a number of criticisms were raised, most of them questioned the rules but not the appropriateness of the 'new game'. For instance, Phillimore[26] argued that the examination of five publications per department did not provide a reliable picture of the quality and quantity of research and was therefore a questionable basis for making funding decisions.

Since 1986 there have been RAEs in 1989, 1992, 1996 and 2001 with the next one due to take place in 2008. Each successive exercise has generated debate resulting in further elaboration of the rules. Thus, there have been changes around the number of submitted outputs, the type of assessed output, the architectonic of the peer review process, the presentation of results and the assessment criteria.[27] Interestingly, the debates have continued to focus on the specifics of procedure and rules rather than on questioning the fundamentals of the game itself.

These developments appeared to be the result of a continuous process of refinement undertaken by the academic community regulating itself. However, the neo-liberal state was acting at a distance here. This happened through two complementary routes. First, it was widely accepted that science should be accountable, it should contribute to economy and society, and that this should be achieved through competition for funding based on selectivity. And second, by establishing the HEFCs it had put in place intermediary bodies that were designed to implement government policy and dedicated to doing so.

Phase 3: The Transformation of the Universities

The third phase of our model posits that the re-visioning of what science is and the reconstitution of the relationship between it and the government will ultimately result in a reshaping of science itself. In this section we explore this third phase by describing and analysing the ongoing changes in UK universities. We argue that transforming the institutions of science, such as the universities, has clear implications for the nature of knowledge that is being produced.

Universities can be conceptualised as having a set of core scripts, practices and procedures that support their constitutive functions—traditionally research and teaching. Historically, universities also comprise a periphery of auxiliary functions that both support and sustain the core activities and are products of them. We argue that the pressures for change generated by both the transformed visions of science and the changing relationship between government and science have been absorbed by the periphery in the first instance. This absorption in turn builds tensions with the core. Our analysis of this process uses four themes.

Mission Impossible?

Universities first developed as teaching institutions, with research later incorporated as a further core function.[28] In traditional terms, contemporary universities therefore produce professional elites through teaching and research and knowledge of a predominantly 'understanding' as distinct from 'transforming' variety. Universities have attracted funding and developed particular and unique scripts, structures and social practices to support these twin 'constitutive' functions. This has necessitated and made desirable some degree of interaction with the rest of society, but such work has until recently been perceived of as incidental rather than core to the work of the universities.

The repositioning of the universities as key actors in the 'knowledge economies' of neo-liberal states generated the imperative for what has come to be called the 'third mission'. This requires higher education institutions to contribute to and provide the conditions for achieving government policies regarding '… regional competitiveness; urban and rural regeneration; lifelong learning and employability; social wellbeing and health; sustainability and environment; and regional decision making'.[29] It also is a call for the universities to reach out and is focused particularly on the exchange of knowledge between higher education and business. The third mission has also been defined as a

> … stream of activities … concerned with the generation, use, application and exploitation of knowledge and other university capabilities outside academic environments. In other words, the Third Stream is about the interactions between universities and the rest of society.[30]

The third mission is part of the neo-liberal rhetoric of the state for usefulness of science and an expression of the drive for control and immediate application. It also embodies government attempts to transfer some of the responsibility for funding academic science to non-public sources, most notably industry by supporting universities to develop capabilities to engage directly with it. What promoted such activities from 'incidental' to 'core' was the explicit designation of state funding to support them. This funding stream is significant—for instance about £140 million

has been allocated through the Higher Education Innovation Fund (HEIF) alone. Acquiring a third mission has some clear implications for the universities.

This reprioritisation of external engagement inevitably creates imperatives for fundamental change. Functional overload is particularly likely given that exactly what is included in the third mission is not clear and this '… seems to be in some cases read by the state to be an open invitation to pile more and more new functions on universities'.[31] Some argue that the three missions of the universities complement rather than contradict each other.[32] In practice however, under a regime of declining public funding, it is likely that third mission work may come to dominate, which in turn is likely to affect adversely the capacity of the universities to conduct 'understanding' type research, to publish their results and to teach and train the next generation. That is, the third mission might lead to 'damage by neglect'.[33]

Further manifestations of third mission pressures are evident in the development of the 'entrepreneurial' university—

> … a university that has developed a comprehensive internal system for the commercialisation and commodification of its knowledge. This system includes not just structures such as liaison or technology transfer offices … but also incentives for adjusting lines of study and the allocation of research budgets to the demand in the private and public sectors.[34]

These developments prompt the emergence of new scripts, which have the potential to conflict with persisting old ones. For instance, consider the example of incentive systems operating within the universities. Keeping universities financially afloat currently and crucially depends on their financially remunerative engagement in third mission activities. It is therefore in the interest of university academics to carry out consultancy type research and provide academic services. At the same time the status of academics within the institution and the wider research community, as well as their promotion, depends on their ability to carry out 'understanding' type research and produce academic publications.

All Managers Rise …

Traditionally, universities have been self-governing institutions founded on principles of collegiality. These were quasi-hierarchies, based on academic reputation and operational responsibility, and on committees exercising decision-making power. But in response to neo-liberal pressures for change, this traditional governance form has been displaced by corporate management hierarchies deploying governance regimes founded on surveillance, positional authority and audit (especially of the 'quality' of teaching and research). These are hierarchies that exercise executive authority. These changes express 'a pervasive government led belief in the power of better management'.[35] It is very likely that the rise of 'managerialism'[36] as a governance form for universities conflicts fundamentally with the needs of the academic profession.

Of central importance in this shift has been the changed role and position of the vice-chancellor. The vice-chancellors of British universities used to be the 'embodiment' of the institution and they were respected academics doing their duty. This was a part of the generally collegial culture that had emerged and was guarded with a passion—

> … they (the English) did not turn professors into civil servants appointed and paid by the state … Critically, the chair did not become a base unit, with its incumbent dominating all in sight, nor did junior faculty labour as unpaid assistants … Instead, … members of the academic staff were colleagues, with a common stake in the development of their unit.[37]

In 1985 the Jarratt Report advocated, as part of a corporatisation of universities, the translation of the vice-chancellors to Chief Executive Officers of knowledge corporations. The subsequent demarcation of vice-chancellors as managerial elite was marked by a substantial increase in their salaries. Currently, in the UK '… eighteen vice-chancellors earn more than £200,000 and 33 earn more than Tony Blair whose salary is £184,000'.[38] On the one hand this signalled and, on the other, promoted the redefinition of the position of the vice-chancellor to a 'top manager'. Assigned responsibilities for achieving increased efficiency and improved performance also meant that the position started to attract a different kind of applicant—today many of them are managers increasingly recruited from outside academe. This reflects a widespread belief that 'management' is a function that can be successfully divorced from any specific context and ubiquitously applied—the ultimate transferable skill. It is symptomatic that some vice-chancellors have started re-branding themselves as 'presidents'.

There has also been a shift away from the committee-based, consensus-oriented collegial academy towards management by appointed executives. This transfer of decision-making power leads to the development of managerial lines of responsibility, thus transforming traditional quasi-hierarchies in which power and control are personalised into corporate hierarchies in which power and control are positional. Moreover, devolving budgets to faculties, departments and research centres involves their heads in managerial lines of financial responsibility and makes them accountable to higher authority. Failure to demonstrate financial viability can lead to closure and lack of compliance with managerial decisions or initiatives can be punished.

An important implication of this transformation is the transfer of power and authority from those in whom the core functions of the university were vested (the academics) to management elites who embody the peripheral functions of the traditional university. This transfer of power gave management elites, acting in response to external levers, the ability to affect and transform the core of the universities. This has spawned a host of audit regulation and surveillance practices through which management attempts to micro-manage the everyday working lives of academics. This will have inevitable repercussions on the shape nature and functioning of universities as sites of knowledge creation.

From 'Temple' to 'Factory'

We now turn our attention to the work practices of academics working within universities. It can be argued that knowledge discovery through research and its dissemination has become a systematised, managed and audited production process.[39] Traditional notions of individual scholarly pursuit have metamorphosed into Fordist and indeed post-Fordist modes of knowledge production. Both academic research and teaching are implicated in these changes.

Rhetorically speaking, we characterise the traditional university as a temple. The university-as-temple existed as a self-contained sanctuary dedicated to the pursuit of

knowledge for its own sake. This does not imply that the generated knowledge was socially and economically irrelevant, but rather that it was not contracted, specified or demanded. In the temple, academic effort was not directly linked to auditable outcomes. Work was undertaken out of professional duty and service rather than as a result of contractual obligation; competition was on the basis of academic excellence alone; admission to the academy was through a process of apprenticeship and initiation; and the relationship between academics and students was as between master and disciple. Finally, the university was, ontologically speaking, a brotherhood of scholars, past and present, academics and students.

In the neo-liberal conditions of Fordist and post-Fordist knowledge production evident in neo-liberal regimes, knowledge is, in contradistinction, expected to meet defined social and economic objectives. The contractual nature of this process requires outcomes to be designated and auditable. This generates an epistemic shift as academics produce what they can sell and what is immediately and directly useable by 'customers'. The factory requires a disciplined and flexible workforce, necessitating the ending of notions of brotherhood and community and basing workplace relationships on best employment practice. There is also a shift in what it is to be an academic from free thinking intellectualism to the performance of research routines. Teaching becomes less a process of inducting students in the academic community and more one of delivering standardised output to students as customers. In essence, all these changes reflect the ever-increasing commodification of knowledge and customerisation of teaching.

These transformations cut to the very core of the traditional Western university. If producing knowledge is one of the core functions of universities and the process through which this is done is changing, than it follows that what is defined as 'knowledge' is also bound to change. We would argue that academic knowledge is increasingly characterised as knowledge that is short term and of immediate use to non-academic domains. That is, research knowledge is increasingly defined as that which solves practical problems rather than striving for deeper understanding.

The customerisation of teaching, particularly at post-graduate level, has attenuated the notion of education as induction into a particular set of institutional and professional norms and values, turning it instead into the consumption of training. This is reflected in the considerable external pressure exerted on the universities to redefine doctoral work as 'research training'. Of course, some of these advanced students eventually become academics themselves, carrying with them these new norms and values of neo-liberal science.

Universities FC?

External pressures have generated imperatives for universities to operate strategically in a competitive globalised environment. Performance pressures require universities to learn to play the game well. These exogenous pressures are becoming operationalised within universities through management elites and universities are becoming self-regulating in the performativity stakes. The management hierarchies now in place facilitate the transmission of institutional performance pressures down to the level of individuals as academics are reconstructed as neo-liberal subjects.[40]

An example from the RAE is illustrative here. Game playing commences with the competition to 'pack' panels with 'suitable' members sympathetic to particular research orientations. An implicit assumption is that a higher level of organisational

representation on an RAE panel is likely to lead to positive benefits in terms of scores. Universities also embark on successive rounds of internal mock audits and strategic external reviews. The feedback from such processes in turn leads to further tactical and strategic repositioning work, such as encouraging staff to take on certain types of research activity. Universities also aim to put in place optimal staff teams in RAE terms. This may involve restructuring the workforce through redundancies and early retirements and also entering labour markets to lure desirable staff.

Such institutional game playing has serious repercussions at the level of the individual. This may be reflected in areas such as publication strategies,[41] research grant applications, promotion prospects or even deciding to transfer to another institution. This is part of the epistemic shift to Fordist and post-Fordist labour processes.

Playing these games naturally generates new goalposts. That is universities and the academics within them have been re-orientated towards new core goals determined by the neo-liberal state.

Conclusion

In this paper we argue that the profound changes affecting science, and in particular academic science, are an inevitable consequence of three interdependent dynamics. First, there is a clear discursive shift of government ideology towards neo-liberalism. This incorporates a re-visioning of the nature, role and place in society of science. Second, this re-visioning of science along neo-liberal lines has precipitated the reconstitution of the relationship between government and science by establishing new funding mentalities and new research intermediaries, which deploy new policy tools and mechanisms. And third, the re-visioning of science and the changed relationship between science and government has initiated the reshaping of science itself within the academy.

The broad principles of the new funding mentalities, such as increased selectivity in funding decisions, a degree of prioritisation and imperatives for promoting economic competitiveness, have intuitive appeal. But, we argue, their operationalisation has serious repercussions for universities and academic science more generally. By embracing the third mission and developing as corporatised hierarchies, the universities have already experienced changes in their peripheries that conflict with their core, thus threatening a crisis in the very heart of the institution. This is evidenced in a number of ways. First, there are developing tensions between new and traditional institutional scripts, rules and practices. Second, there has been a transfer of power and authority from the academics to management elites. Third, there has been a change in the nature of what it is to be an academic away from free-thinking creativity and towards a contractual culture of compliance. Fourth, there are increasing levels of the commodification of research, customerisation of teaching; and the re-orientation of both universities and academics towards new goals determined by the neo-liberal state. This change process is not yet complete or irreversible in that the visions of government and the scientists about the nature of science have not fully converged—conflict and argument still exists. Given that the transmission of the traditional norms and values of academia has also been affected, however, this may be only a matter of time.

We have argued that the change of the process through which academic knowledge is produced by necessity changes the nature of this knowledge. There is an

observable epistemic shift whereby academics research in areas which generate financial support, they generate knowledge that they can sell and tend to present it as immediately and directly useable by 'customers'. We believe that such and similar developments will gradually erode the capacity of universities and academics to generate 'understanding' type knowledge, which is their exclusive domain. It is ironic indeed that the changes effected in universities in pursuit of neo-liberal economic goals may ultimately, by neo-liberalising science, permanently disable it from being economically useful in this traditional way.

To paraphrase Max Weber, intellectuals and academics are the salt of the Earth and it looks like that salt is losing its taste. Do we want to live on Earth without taste?

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