

Paper for SPRU/ DIME Conference in Honour of Nick von Tunzelmann

‘Innovation as Politics:

The startling rise and reshaping of innovation in UK parliamentary discourse

1960- 2005’

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Introduction

As Nick von Tunzelmann has argued, a major, sometimes the major, influence on industrial progress has been governmental institutions and ideologies, which shape the general climate of business opinion (von Tunzelmann, 1995: 21-22). Adherence to political ideology in government policy on innovation has been particularly keen in the UK (von Tunzelmann, 2004: 331). The primary form for disseminating these ideologies is language. This paper shows systematic evidence on the political discourse of *innovation* over a forty-five year period, and analyses both its stable and changing meanings. It asks whether the term innovation has become a ‘floating signifier’, a plastic concept used for a variety of political purposes.

The term *innovation* has become central to academic, political and practitioner discussion of the economy and the future of business (Barber and White, 1987; Fagerberg and Verspagen, 2008, Martin, 2008). In the UK innovation is central to the current Government’s policies¹ and those of the opposition². Indeed, figure 1 shows that there has been a tenfold increase in the use of the term in parliamentary debates over the past forty-five-years. Researchers have taken a discourse approach to explore various aspects of innovation (e.g. Lovell, 2008; Salaman and Storey, 2002; Suchman and Bishop, 2000). A recent article by Linton begins to examine the language of innovation within the academic literature, suggesting that interpretation is influenced by one’s perspective (Linton, 2009).

Yet in addition to the academic literature, an important field of linguistic use of the term *innovation* is the field of politics. This paper starts to empirically research the use of innovation by tracing the plasticity of meaning of the term through forty-five-years of political debate in the UK Parliament; a period spanning from Wilson’s ‘white heat of technology’, through Thatcherism to Blair’s New Labour (e.g. Meredith, 2003).

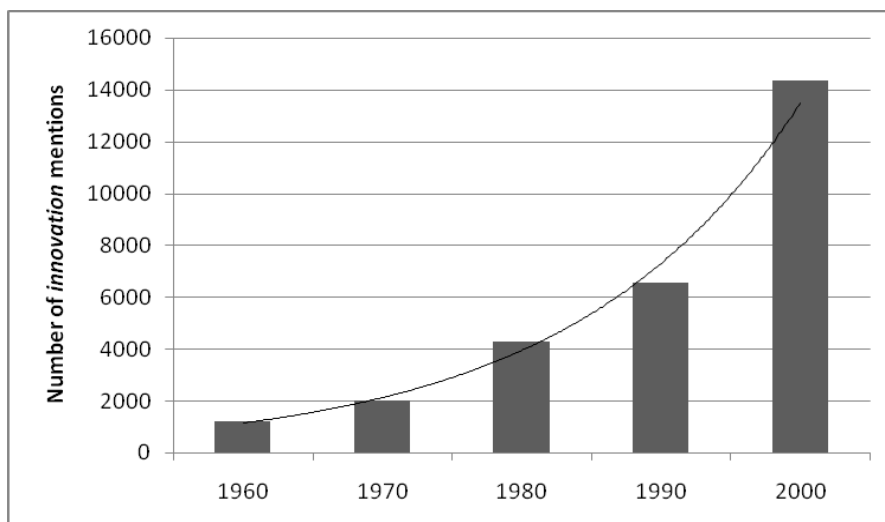


Figure 1: Number of times ‘innovation’ mentioned in parliamentary debates (source: Hansard /Millbank Systems³)

Before describing the methodological approach to the research the paper explores the conception of meaning that underpins this investigation.

Conception of meaning

Here the term *innovation* is viewed as having the potential to be a floating signifier where its meaning may bend towards whatever is the current political zeitgeist (see Levi-Strauss, 1987; Derrida, 2001; Norval, 2000). This is not suggesting some form of extreme relativism where its meaning is empty or arbitrary (see Laclau, 1996); rather that meaning has a gravitational pull towards stability (Bakhtin, 1981), but with abstract nouns of this type there is a certain plasticity that allows meaning to be moulded, especially when such terms enter the popular lexicon of political debate. Such politically charged words can become ‘stocked’ with the ‘consolidated energy’ of conceptual word-associations whose force can be incarnated in political discourse by mere use of the term; so the term becomes both weighted with symbolism and yet flexible and the text produced becomes a “system made up of forces linked together” (see discussion of the force of words in Callon et al, 1983).

For some such plasticity may ignite long-standing concerns regarding the manipulation of language by political elites and the detrimental influence it might have on free society (Ogden and Richards, 1923; Chase, 1938; Orwell, 1946, 1949; see also Joseph et al, 2001); the rise of the “spin doctor” makes these concerns seem that much more germane (see for example discussion in Esser et al, 2000). After all, political utterances of the term not only reflect the prevailing ideology, but may be considered part of creating it; they are themselves a speech-act that influences future praxis (e.g. Austin, 1975); such utterances could be considered all the more powerful when made by political elites who are likely to be at the centre of policy-making power and influence. One does not have to believe the more extreme concerns regarding the hegemonic power of language to accept that the floating signification of the term ‘innovation’ in political discourse is an interesting possibility that has the potential to give insights into government and society.

Given the importance of political use of the term *innovation* and that systematic language-based approaches (drawing upon corpus-based techniques and alike) are now established in the management research area (e.g. Bargiela-Chiappini, 2009; Bargiela-Chiappini et al, 2007; Sardinha and Barbara, 2009), it is surprising that there appears to be a dearth of empirical research that systematically looks at politician’s use of the term. There has been a wealth of research exploring policy interventions, but this has not taken a language driven approach. There has also been research that has taken a language based approach, but the focus has been on stakeholders other than politicians, for example: some have explored academic engagement with the term (Fagerberg and Verspagen, 2009; Linton, 2009) and others have looked at management’s discourse on innovation (e.g. Salaman and Storey, 2002; Suchman and Bishop, 2000). Research that is allied to the innovation research area has employed systematic language analysis techniques (e.g. Callon et al, 1983; Callon et al, 1991), but not specifically to look at the use of the term. Fagerberg and Verspagen (2009) and Linton (2009)

did take a systematic approach to looking at use of the term *innovation*, but as has already been observed they looked at the academic arena and not political usage. Lovell's (2008) discourse approach to innovation journeys in low energy housing represents the only paper the researchers surfaced (at this stage) that adopted a language based approach and included national government as part of the analysis; however, the focus of this research was not political use of the term *innovation* and a systematic replicable analysis technique like one to be proposed here was not employed.

So there appears to be a gap to systematically analyze political use of the term *innovation*. This research starts to address this gap by analysing the subtle temporal changes in the meaning of *innovation* within political discourse; this allows ideological nuances to be teased out and their consequences explored. This is achieved by looking at the words that surround the term *innovation* (referred to as *collocations*) (see Stubbs, 1996); it is through the context of these collocations that meaning is constructed (Frege, 1952; Firth, 1957- also see Joseph et al 2001; Callon et al, 1983; Wittgenstein, 1958, P1, § 525, §527, §652; also see overview discussion in chapter 2 of Medina, 2005). The next section explains the detail of the collocate-analysis.

Method

Figure 2 provides an overview of the approach. This research is part of a larger project into the use of the management lexicon within political language; as such it employs techniques developed for the main project and some of the explanation below draws upon generic explanations from that source. The framework for the analysis was based upon the techniques of computational corpus analysis and influenced by four core texts: Stubbs (1996), Mason (2000), Mitkov (2004) and Baker (2006)⁴ These techniques are consistent with the concept of meaning explained above (see Stubbs, 1996 discussion of Firth), they lend themselves to systematic computerised analysis (see Mason, 2004) and they have mechanisms for exploring a keyword in context (see chapter 7 of Stubbs, 1996); these approaches epistemologically resonate with Callon et al's (1983, 1991) co-word analysis, but they lend themselves more to analysis of a single key-term and they have been already adapted by others for computerization (e.g. Mason, 2004), which is needed for such a large data-sets. As Callon (1983) points out systematic analysis techniques that are based upon citation analysis clearly do not lend themselves to non-academic texts and are not appropriate here.

The first step was to establish a dataset for the analysis; ideally this would provide the natural language of political debate, be available over an extended period and be in a consistent electronic form to facilitate analysis. Fortunately, Millbank Systems have produced an electronic internet based archive of Hansard that provides an "edited verbatim report of the proceedings" of both Houses of Parliament between 1803 and 2005 (www.parliament.uk). A search for pages containing the term *innovation* was conducted and 19185 pages were downloaded and stored in a database.

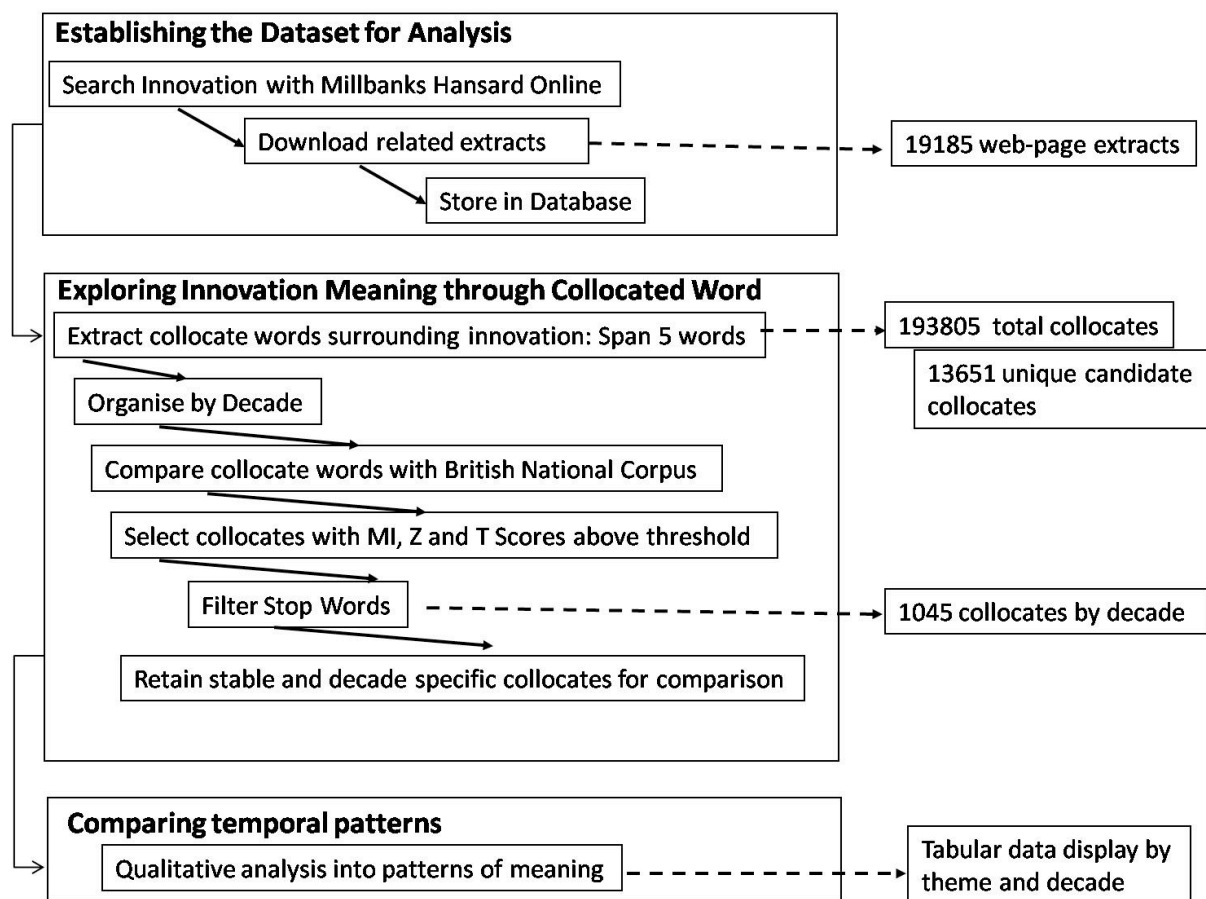


Figure 2: Overview of the method (the main structure was especially influenced by four core texts and was developed around the techniques of computational corpus analysis: Stubbs, 1996; Mason 2000; Mitkov, 2004 and Baker, 2006)

Having established the dataset for analysis the next step was to follow the proposal by Stubbs (1996) to systematically examine the words that were collocated around the term. This was achieved by extracting a span of five words either side of the term *innovation*⁴ (informed by Mason, 2000); words outside this span have been found by other researchers to be rarely important (Phillips, 2003 cites Clear, 1993) (see example key word in context (KWIC) extracts in table 1).

Five Words to Left	Key term	Five Words to Right
this rather dramatic [rate] of	innovation	and advance makes quite a
profits are the [source] of	innovation	, new development, more employment, more
support for technology[transfer], technological	innovation	and bringing new ideas to
on business we can [drive]	innovation	, increase investment, raise employment and

Table 1: Example key *innovation* term in context (KWIC)

This produced 13651 unique candidate collocates that were tagged in the database to their decade of origin; this paper is interested in contemporary debates so a subset of data was taken from 1960 onwards. A mechanism was needed to condense the data further to surface those collocates that are particularly significant in providing the context of meaning for the term *innovation*. An established way to achieve this in corpus linguistics is to compare the frequency of collocated words in the sample with the likelihood of them occurring by chance in another sample of ‘general’ natural language (e.g. Stubbs, 1996; Barnbrook, 1996; Mason, 2000; Church and Hanks, 1991).

In this case a bespoke application developed by one of the authors compared the collocates in sample with the probability of them occurring in the British National Corpus of natural language use; the popular Mutual Information, t-score and z-score tests of significance were used with established threshold values (Barnbrook, 1996; informed by Mason, 2000)⁵ (see table 2 for 1960 examples). The idea being that these exceptionally used collocates provide the difference in meaning between the keyword (in this case *innovation*) and any other randomly picked word. This approach is consistent with the conceptual discussion above of meaning being constructed through the context of collocates. Some may argue that this is ‘just’ picking out the unusual words, but that is the point, it is the statistically unlikely words that are information rich and determine the difference in meaning from any other arbitrary word (there are some conceptual similarities to Derrida’s, 2001 notion of ‘*differance*’ and it also consistent with discussions of meaning above e.g. Frege, 1952; Firth, 1957- also see Joseph et al 2001; Callon et al, 1983; Wittgenstein, 1958, P1, § 525, §527, §652).

Decade	Collocate	Number Of Strings	Freq	BNC Per Million	Expect	MI > 1.58	Z-Score > 3	T-Score > 2
1960	comparatively	N	1067	7	0.12804	5.773	19.205	2.597
1960	complete	N	1067	12	2.06998	2.535	6.903	2.867
1960	entirely	N	1067	6	0.73623	3.027	6.135	2.149
1960	modern	N	1067	7	1.40844	2.313	4.7128	2.113
1960	rate	N	1067	12	3.36105	1.836	4.713	2.494
1960	somewhat	N	1067	5	0.49082	3.349	6.436	2.017
1960	startling	N	1067	5	0.05335	6.550	21.416	2.212
1960	striking	N	1067	6	0.19206	4.965	13.253	2.371
1960	surely	N	1067	7	0.67221	3.380	7.718	2.392
1960	thought	N	1067	8	1.51514	2.400	5.269	2.293

Table 2: Example selection of collocates with scores above threshold

Having established the important collocated words that met the threshold values, the next stage was to analyse temporal patterns of meaning (Ragin, 1987). This was achieved by

retaining those collocates that showed in all decades and those that only occurred in particular decades; thus creating the maximum contrast between stable and floating signification for comparison (Ragin, 1987). Finally following the coding techniques of Miles and Huberman (1994) the remaining collocates were analysed into patterns of meaning and then shown in a tabular data-displays by decade. Corpus based approaches like this often draw upon quantitative and qualitative analysis techniques in this way (Baker, 2006 cites Biber et al, 1998). This research is interested in the signification of the term *innovation* and as such the emphasis in the analysis is on the additional meaning that the collocate-word brings, rather than on any other issues that might be surfaced in the KWIC. This can be shown by looking back at the KWICs in table 1. The important collocates are given in square brackets, so looking at the last row of the table, the focus is on the extra signification that the term *drive* [as in ‘drive innovation’] brings rather than any associations with investment and employment. There is still more work to be done on teasing out meaning from the contexts of the KWICs, currently observations rely on the important collocates and more work is needed to delve into the nature of how the collocate brings meaning to the term *innovation*; nevertheless keeping that caveat in mind some interesting results have already emerged that can be reported in this paper.

To enrich the insights from the results interviews were also been conducted with a small number of key innovation policy officials and innovation studies researchers; each of which brought a fascinating oral history of political engagement with ‘innovation’ and commented on the patterns that our analysis had surfaced. We hope to add to these insights, including at the NickFest conference. Having explained the approach we now move to the results.

Results

Table 3 provides an overview of the important collocate words by decade; giving the landscape of the data before delving into the patterns further. Even at this early stage it is hard not to notice the tight focus of the early and stable signification and the loosening of meaning overtime to a point where the signification of innovation almost appears fragmented in the 2000s.

Having given an overview of the data it is now timely to delve into the temporal patterns in more detail. These are presented in tables below, starting with the stable signification across the period, then tracing themes in signification in each decade and finally exploring meta-diachronic patterns over the forty-five years.

1960	1970	1980	1990	2000
comparatively * complete * entirely * modern * rate * somewhat * startling * striking * surely * thought	acceptance * airline * amendment * ballot * fairly * particular * prevent * referendum * source * tax	adoption * aid * allocated * assisted * attitude * available * aware * concentrated * constructive * curriculum * detailed * deter * disincentive * dissemination * educational * finance * fiscal * helpful * hitherto * housing * imaginative * independent * intellectual * inventiveness * lack * learned * linked * managerial * million * moratorium * package * programme * protection * spirit * stifled * stimulation * sustained	access * admirable * advisory * availability * choice * commerce * committee * constant * consultancy * contained * continuous * crucial * culture * damaging * democratic * deregulation * directed * effective * emphasis * extremely * fatigue * flourish * foresight * fundholding * generate * GP * inward * jointly * long- term * managed * novelty * potential * precisely * private * proper * pursuit * recognise * recognised * related * saying * seeking * select * shall * significant * small * spread * success * supported * talking * thinking * times * tradition * training * transfer * warmly * widely * worthwhile	10-year * 21st * added * aerospace * agenda * audit * automotive * autonomy * barrier * called * carbon * catalyst * challenge * Chancellor * changing * Children * collaborative * commissioned * compete * considering * construction * consultation * contracting * contributing * contribution * customer * definition * deliver * demonstrate * derelict * drive * driven * driver * driving * dynamic * dynamism * earned * education * efficient * energy * enhance * essential * facilitate * freight * future * global * identified * impact * included * infrastructure * innovative * intended * keen * knowledge * legislation * lost * lower * ministerial * Office * opportunity * originality * particularly * partnership * pilot * policy * procurement * public * publication * raise * raising * recommendation * recommended * regulatory * relevant * report * rightly * risk * risk-taking * role * seeing * setting * strategic * strengthening * supply * targeted * textile * tribute * winning * world-class
Constitutional * development * encourage * Government * important * industry * interesting * introduced * major * new * recent * research * technical * technological * useful				

Table 3: Overview of *innovation* important collocate-words by decade

Stable Signification

Signification Themes	Important Collocates
Important	important * major * useful
Involving Technology	* industry * technical * technological * research
Novel	* interesting * introduced * new * recent
Support	development * encourage
Involving Government	constitutional * Government *

Table 4: Stable signification themes

The stable words suggest five themes; presenting innovation as *important* (*important*, *major*); a positive progressive and instrumental force (*useful*); located in industry and involving technology and research. Thirdly, the novelty aspect of innovation is indicated (*interesting*, *introduced*, *new*, *recent*); fourthly innovation is something to be supported over time (*development*, *encourage*) and fifthly that innovation is associated with government (*constitutional*, *Government*). These are what might be considered traditional associations. They are consistent with the assumptions of conventional innovation policy, suggesting technology, industry, R&D, and that government has a role in supporting it.

Floating Signification – 1960s

Important Collocates
comparatively * complete * entirely * modern * rate * somewhat * startling * striking * surely * thought

Figure 3: 1960s Collocates

The 1960s was a period where the market, it was believed could not be left to its own devices (Walker, 1993). There was a general enthusiasm for technology, Prime Minister Harold Wilson set up a Ministry for Technology, although this was short-lived. This period is famed for what is referred to as Wilson's 'white heat of technology' speech, however the actual content of the speech was much more managerialist than technological: what Wilson actually said was "The Britain that is going to be forged in the white heat of this revolution will be no place for restrictive practices or for outdated methods on either side of industry." (Walden, 2006). This modernizing managerialism was contemporaneous as Wilson was part of a new, grammar school-educated generation of politicians replacing the tired conservative establishment of Anthony Eden and Harold Macmillan (Marr, 2007). Instead of government by an elite aristocratic network the preference was for technocratic, objective methods. The words collocated with innovation in the 1960s suggest the monitoring and measurement of innovation and possibly its adjustment (*comparatively * complete * entirely * rate * somewhat *). The Wilson generation held that the modern (*modern*) approach was technical, essentially cognitive methods of planning (*thought*) and with precise measures (*comparatively*, *somewhat*, *complete*, *entirely*) you could achieve remarkable results (*startling*, *striking*, *surely*).

Floating Signification – 1970

Important Collocates
acceptance * airline * amendment * ballot * fairly * particular * prevent * referendum * source * tax

Figure 4: 1970s signification themes

The collocated words of the 1970s are more pedestrian. There is reference to airline innovations at a time when Laker Airways introduced Skytrain, the first low cost flights as well as advanced charter ticketing. The Labour government revoked its licence in 1975. There are a number of words related to political innovations (*ballot*, *referendum*, *amendment*). Referenda are rare in the UK and in the 1970s there were four important ones on membership of the EEC (1975), Scottish and Welsh devolution (1979) and Northern Ireland's remaining in the UK (1973). The use of referenda were perceived to be clever and novel ways of resolving political dilemmas. Similarly trade unions were increasingly being pressed to use ballots for more democratic decision making at a time when union power was at a peak and influencing industrial policy.

Prevent shows early concerns over the barriers to innovation, which became more acute in the next decade.

Floating Signification – 1980s

Important Collocates
adoption * aid * allocated * assisted * attitude * available * aware * concentrated * constructive * curriculum * detailed * deter * disincentive * dissemination * educational * finance * fiscal * helpful * hitherto * housing * imaginative * independent * intellectual * inventiveness * lack * learned * linked * managerial * million * moratorium * package * programme * protection * spirit * stifled * stimulation * sustained

Figure 5: 1980s signification themes

The Thatcherite 1980s were, by contrast to the 1960s, a time when the market *must* be left to its own devices and a feeling that the State's managerial powers had reached a level of delusion (Walker, 1993)- at least that was the rhetoric. William Walker argued:

The government's deepest belief, romantic and behavioural rather than managerialist, was that the individual energies released by the emancipation from past constraints could alone drive economic modernization. Technical and other forms of advance would follow... (Walker, 1993: 159-60)

The emphasis of policies was on removing the forces that were blocking innovation and progress, with any interventions carefully rationalised with market failure arguments:

Policies are therefore directed more to working with the grain of market forces, and to providing firms with assistance to improve their innovative and competitive capabilities without weakening their commercial responsibility for their own actions and the incentive for them to stand on their own feet. Intervention is directed much more at the objective of correcting failures in the market mechanism rather than towards grand strategies. (Barber and White, 1987: 26)

One of the obstacles to freeing innovation was perceived to be union power, interrupting and spoiling productivity with strikes and stoppages and resisting the introduction of new technologies and working practices. There is more evidence for the latter, which is rooted in a failure of management control and a lack of capability in the workforce to use technology effectively (Williams et al., 1983; Swords-Isherwood, 1980).

We can see these themes among the 1980s collocates. The cognitive learning aspect of innovation was stressed (*intellectual*, *learned*, *imaginative*). There was a shift of attention towards intangible and human capital, with less emphasis on physical investment in machinery and equipment. A number of innovations were introduced to the schools and universities system (*education*, *curriculum*) such as the National Curriculum and the change in the status and funding of polytechnics, which become full universities. The growing valuation of knowledge through education and training would become more apparent in the 1990s and 2000s.

There are several words referring to challenging or threatening to nullify innovation (*deter*, *disincentive*, *stifled*) the theme of removing the obstacles to industrial progress. Yet the collocates also reveal the will and drive to implement innovation, consistent with Margaret Thatcher's sensibilities (*spirit*, *attitude*).

In spite of the focus on the "Labour problem" (*managerial*) there was a growing acceptance that management needed to be upgraded as well. Management historians argue that anachronistic practices associated with personal -proprietary capitalism persisted in the UK far longer than other countries. The transition to managerial capitalism occurred through a series of intermediate stages (Wilson and Thomson, 2006); in many respects the UK still has some way to go.

We also see here the recognition of the link between innovation and finance and finance as a stage on which to perform innovation- seen, for example, in the deregulation of the financial markets and other innovations associated with monetarist policy (*finance*, *fiscal*). An alternative view is that the hold of finance over industry is seen as a socio-institutional weakness of the UK (Walker, 1993).

Other collocates:

There are a number of words expressing the desire to stimulate and support innovation, evident in a number of policy instruments and schemes of the time (*aid*, *assisted*, *helpful*, *stimulation*).

Awareness-raising among industry became an important policy objective (*aware*, *dissemination*)

In spite of the tweaking of the market and resistance to grand strategies rhetoric there were a number of large-scale ambitious programmes to develop computing and electronics, such as Alvey and ESPRIT (*package*, *programme*)

The Department of Trade and Industry's (DTI) LINK programme for industry-university partnerships began in 1986 (*linked*).

A moratorium on the provision of support was introduced for the Support for Innovation scheme, which by 1984 had become so popular that demand exceeded DTI budgets (Barber and Georghiou, 2008). (*moratorium*, *allocated*)

(*housing*) reflects the Thatcherite reforms such as the privatisation of council housing and growing role of Housing Associations.

Floating Signification – 1990

Important Collocates

access * admirable * advisory * availability * choice * commerce *
committee * constant * consultancy * contained * continuous * crucial *
culture * damaging * democratic * deregulation * directed * effective *
emphasis * extremely * fatigue * flourish * foresight * fundholding *
generate * GP * inward * jointly * long-term * managed * novelty *
potential * precisely * private * proper * pursuit * recognise * recognised *
related * saying * seeking * select * shall * significant * small * spread *
success * supported * talking * thinking * times * tradition * training *
transfer * warmly * widely * worthwhile

Figure 6: 1990s signification themes

Many of the 1990s-2000s words are clearly wishing to establish an urgency about innovation (*crucial*, *extremely*, *generate*, *catalyst*, *challenge*, *compete*, *drive*, *driven*, *driver*, *driving*, *dynamic*, *essential*). A recurring narrative over this time was the need to innovate in order to compete effectively with other countries, especially with emerging economies catching up fast. Lord Sainsbury referred to this narrative frequently, who was a key spokesman on innovation from 1998 to 2006 holding the post of Parliamentary Under-Secretary of State at the Department of Trade and Industry with responsibility for science and innovation in the House of Lords. Endogenous growth theory

was a growing intellectual influence on the Treasury and the DTI and reinforced the need for innovation in a dynamic sense. (*constant*, *continuous*).

(*transfer*) Technology transfer from a source to a recipient- such as institutions, organisations, teams or individuals- has been a core mechanism of the 'linear model' of innovation. It increasingly has been referred to as knowledge transfer. Eventually this was evoked in specific policy instruments, for example, the Knowledge Transfer Networks (KTNs) and Knowledge Transfer Partnerships (KTPs) scheme of university-graduate-industry interaction, which replaced the Teaching Companies Scheme in 2003.

An evaluation of the DTI's international technology transfer schemes by Peter Swann prompted development of policy rationales for intervening in the transfer process in the 1990s (Swann, 1989). It broke down the transfer process into five stages, each with its own market failures.

(*long-term*) There was a debate on short-termism versus long-termism particularly with regard to the City in the late 1980s and early 1990s. Whether risk aversion and myopia of the capital markets justified the use of public money to compensate was disputed on grounds of moral hazard (Barber and Georghiou, 2008). Taking a long-term view was the aim of the Technology Foresight programme.

(*potential*) in 1993 the White Paper 'Realising our Potential: a strategy for Science, Engineering and Technology', Command 2250, was published and became a landmark policy document that stressed the unexploited links between industry and the science base. It led to the incorporation of the Office for Science and Technology and the Technology Foresight programme.

(*managed*) Following the 1980s when the perceived 'British Labour problem' was dealt with, the 'British Management problem' came into focus. There was also recognition of the link between innovation and training (*training*). (*Deregulation*) finally appears.

With the first term of Tony Blair's New Labour government elected in 1997 there were a number of 'feelgood' words matching the rhetoric of the time, which frequently referred to innovation (*success*, *warmly*, *admirable*, *flourish*).

Floating Signification – 2000

Important Collocates

10-year * 21st * added * aerospace * agenda * audit * automotive * autonomy * barrier * called * carbon * catalyst * challenge * Chancellor * changing * children * collaborative * commissioned * compete * considering * construction * consultation * contracting * contributing * contribution * customer * definition * deliver * demonstrate * derelict * drive * driven * driver * driving * dynamic * dynamism * earned * education * efficient * energy * enhance * essential * facilitate * freight * future * global * identified * impact * included * infrastructure * innovative * intended * keen * knowledge * legislation * lost * lower * ministerial * Office * opportunity * originality * particularly * partnership * pilot * policy * procurement * public * publication * raise * raising * recommendation * recommended * regulatory * relevant * report * rightly * risk * risk-taking * role * seeing * setting * strategic * strengthening * supply * targeted * textile * tribute * winning * world-class

Figure 7: 2000s signification themes

The New Labour enthusiasm for innovation is shown with a large number of references to innovation in the 2000s. There were several health related words in the 1990s and subsequently public sector related words appeared in the 2000s- (*public*, *procurement*, *partnership*, *infrastructure*). Lord Sainsbury was very reluctant for the DTI to refer to innovation in the public services as he felt it was getting outside areas where the department was competent, but over this period there was continual reference to innovation in the public sector from the Cabinet Office and from advisors and commentators like Charlie Leadbetter. DTI really followed their lead later. There has been more and more reference to innovation in the public sector since 2005.

(*Knowledge*) Knowledge appears surprisingly late in that Peter Mandelson, then Secretary of State for Trade and Industry, released the Competitiveness White Paper ‘Building the Knowledge-Driven Economy’ in 1998 and there is a delay before MPs refer to knowledge in the 2000s. Knowledge has become associated with Mandelson, who still refers to it frequently in his current role at the Department of Business, Innovation and Skills.

(*Chancellor*) This shows how the Treasury with Gordon Brown had become a much more active player in Innovation policy, as well as many other areas of policy. The Chancellor had commissioned two important innovation-related reports, the 2005 Cox Review and the 2006 Gawers Review, for example. Backbenchers would have referred to what the Chancellor was doing on innovation as much as the DTI.

(*Global*) – 2000s- globalisation was a key theme- reductions in travel costs and low-cost competitors meant it was probably present in any government statement on innovation. It was explicit in the 2007 Sainsbury Review, The Race to the Top.

(*Office*)- possibly the Office of Science and Technology, but there were several other “Offices” set up in the 2000s related to innovation- the Office of Life Sciences, for example.

(*education*) Famously “education, education, education” were Tony Blair’s three top priorities for the New Labour government, which may explain why this noun appears in the 2000s, while (*educational*) had appeared in the 1980s with the Thatcher educational reforms.

(*opportunity*) Awareness of opportunities for innovation was acknowledged to be an important concern of policy as early as the 1980s (Barber and White, 1987), and the identification and measurement of technological opportunity had been a key theme in academic innovation studies from that time. The growing field of entrepreneurship increasingly researched the concept of entrepreneurial opportunity during the 2000s.

(*collaborative*, *partnership*) Collaboration had become a strong aim of many policy instruments. Support for single firm R&D projects had fallen out of favour and collaboration was believed to be a way to mitigate market failures of externalities and risk, because of the public good nature of the resulting knowledge. However barriers to collaboration could also be market failures. In a sense this was bringing in Systems of Innovation thinking by the back door, as these are coordination and systems failures (Barber and Georghiou, 2008). The 2003 report by Michael Porter commissioned by the DTI stressed the need to improve networking among UK firms, which was taken up in the Innovation Review of that year as an activity to be encouraged.

(*procurement*) Procurement had long been considered an influential technology policy instrument in the DTI but the view from the Treasury had traditionally held that procurement was the simple transaction to acquire goods and services and had no particular role in innovation. This changed with the Cox Review, commissioned by the Treasury, which stressed the power of procurement in driving innovation as one its core themes.

(*risk*) Risk appears surprisingly late, since innovation is closely linked to risk. It is considered to be one of the causes of market failure that justify policy intervention (Barber and White, 1987).

(*regulatory*) Again this is somewhat surprisingly late. Regulation of technologies had been a growing concern for decades, not least for the nuclear power stations in the 1980s following the Chernobyl disaster, while the 1990s had seen several technology regulatory debates, such as the BSE and foot and mouth disease crises in agriculture, which spilled into the 2000s with regulatory post-mortems. Regulation in this area was seen to be inadequate in protecting the consumer, with suspicion of collusion between regulators and regulated, which in some cases were the same bodies (von Tunzelmann, 2004).

Conclusion and discussion

Floating Signification

A striking trend over the entire 45-year period is the proliferation of collocates. This indicates that politicians used innovation in a restricted way in the early period, largely focusing on the ‘rate’ of innovation (‘rate’, ‘comparatively’) while over time the ‘direction’ of innovation becomes more important with increasing numbers of domains (e.g. from heavy industries like ‘aerospace’, ‘automotive’ and ‘construction’ to services and logistics, ‘finance’, ‘fiscal’, ‘commerce’, ‘freight’ in the 2000s.) and stakeholders affected (‘children’, ‘customer’, ‘public’). This analysis shows how the stable meanings of innovation were used by politicians to pursue an increasingly wide range of sectoral and political interests.

The floating signification across the decades reveals contemporaneous trends: the 1980s for example stressing concerns regarding *innovation* being adversely affected by the state, immersed in the neo-liberalism of Thatcherite governments (‘deter’, ‘disincentive’, ‘protection’, ‘stifled’) (Giddens, 1998; von Tunzelmann, 1995: 135); the 1990s and 2000s referred to *innovation* in the public sector context (‘education’, ‘fundholding’, ‘GP’, ‘public’, ‘partnership’, ‘procurement’); and the 2000s surfacing the sustainability agenda (‘audit’, ‘carbon’, ‘energy’, ‘impact’).

These trends reflect changing uses of the term innovation that resonate with the broader zeitgeist, rationale and thinking of the selected decades. For example, collocates ‘foresight’ and ‘potential’ in the 1990s derive from influential white papers and policy initiatives of the time (see UK Government, 1993 and Martin, 1995). ‘Collaborative’ and ‘Partnership’ in the 2000s reflects long-standing but increasing trends of encouragement towards collaboration in UK innovation policy. The analysis also enables exploration of the contradictions and debates of eras, for example, ‘programme’ is a collocate in the Thatcherite 1980s when attention was purported to be correcting market failures, rather than grand strategies (Barber and White, 1987). In fact there were a number of large scale programmes to support specific industries during this time; such as the Alvey and ESPRIT programmes. The gap between Neo-liberal rhetoric and reality was perhaps smaller than in the US (von Tunzelmann, 2004) but still present in the UK.

These shifting sands also reflect a lack of consistency in industrial and innovation policy in the UK. There were frequent changes of Ministers and re-location of innovation in short-lived Departments. Most studies of the period refer to the succession of new initiatives as overreactions to perceived failures of previous doctrines. These mood swings of the political elite are symptomatic of economic decline of the industrial bases over most of the period. Most of the studies of ‘the UK National System of Innovation’ refer to some social tendencies and priorities but not a distinctive, persistent system as in Germany or even France. Nick von Tunzelmann puts this most succinctly: “In effect the national ‘system’ of innovation in the UK was just not sufficiently systemic.” (2004: 331). The fragmented approach to innovation policy is reflected in the proliferation of collocated words in our

study. A consistent and sustained system over time would probably have a much more limited number and range of collocates.

However in spite of these frequent shifts in priorities many specific instruments and their associated machinery persisted for long periods of time. DTI accumulated a great many schemes - around 400 by the early 1990s (Barber and Georghiou, 2008) - that formed a fragmented and overly complex offering that confused potential business users. Business support policy was as baroque as Mary Kaldor's Arsenal (1982). Good housekeeping was applied in the shape of a Business Support Review to simplify the menu.

However the 'systemicness' of the system refers not only to the longevity of institutions but also the effectiveness of the links between them. NSI scholars have long emphasised the role of productive interactions between industry, the science bases, finance, markets and intermediaries and these are argued to be lacking in the UK (Walker, 1993; von Tunzelmann, 2004). This argument seemed to have some influence, especially after the Porter report reinforced it, stressing the need to improve links and networking in the UK. These concerns are reflected in collocated words of the latter periods as policies to encourage cross-fertilisation and bridging between firms. The UK now has no shortage of bridging institutions (Carlsson and Stankiewicz, 1991) but their capability varies (Sapsed, Grantham and DeFillippi, 2007).

These co-ordination problems occur not only within policy but also are present in the management of firms. Studies refer to UK managerial weakness with co-ordination across divisions- for example between design/manufacturing/marketing- and a long history of large complex R&D and infrastructure projects that overshoot budgets and schedules. An emergent systems integration sector has improved in respect of design, development and construction (Prencipe, Davies and Hobday, 2003), but problems remain with links to operations and services. The high-profile botched handover and launch of Heathrow Airport Terminal 5 is a recent example (Davies, Gann and Douglas, 2009). Von Tunzelmann (2004) argues that the UK has been stronger in industries where co-ordinated links are less important, like pharmaceuticals, where production, marketing and distribution decisions follow naturally from development and testing. These tendencies for co-ordination difficulties are partly attributable to an individualist culture at both personal and institutional levels but also the slow maturation and professionalization of management in the UK (Wilson and Thomson, 2006). While managerial capability has slowly improved there are concerns that technical capability has continued to decline.

The Broadening or 'De-teching' of Innovation

The meaning of innovation has broadened, from a restrictive definition based on technology to application to a vast range of phenomena, as seen in the spread of collocated words (see figure 8). To some extent this is official policy; John Barber of the then Department of Trade

and Industry and Geoff White of Her Majesty’s Treasury wrote in 1987 “...innovation can be thought of as the successful exploitation of technical change” (25). DTI and its successors, DIUS and BIS in the 2000s worked with the definition “The successful exploitation of new ideas”³.

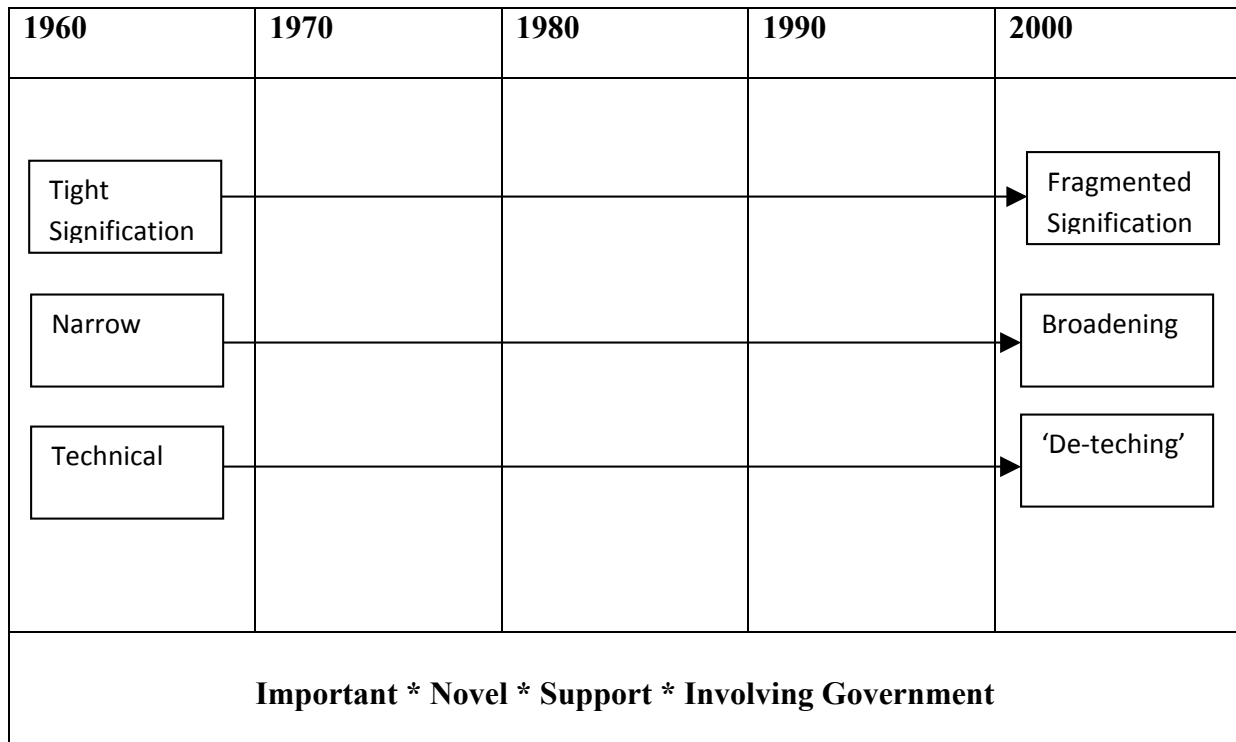


Figure 8: Summary of temporal signification

This later broad definition was praised by the 2007 policy mix peer review from the EU Member States as part of the CREST programme, which argued that by potentially covering non-technical innovations such as management practices, service provision, and business models, the country was placed in a favourable position in “being able to stimulate, develop and capitalise upon innovation in its broadest sense” (Cunningham et al., 2007: 15).

Less charitably, some might argue that the *de-teching* of innovation may be linked to the perceived anti-technology orientation of the UK. Histories of the UK system agree that there has been a comparative deficiency in UK managers’ ability to see and exploit technological opportunities; they are generally less engineering educated and aware of technology (Pavitt, 1980; Barber and White, 1987; Walker, 1993; von Tunzelmann, 2004; Barber and Georghiou,

³ John Barber, who continued to be a keen observer of the academic and policy debates, has revised his definition, suggesting in 2008: "Innovation is the process by which firms and other organisations master new product designs, production processes and business methods and commercially exploit them or bring them into use. New means new to the firm or organisation, if not to the world, nation or sector." (http://www.innovationindex.org.uk/forum/topics/2132323:Topic:289?xg_source=activity). This builds on a definition by Richard Nelson, which is more inclusive of diffusion and adoption.

2008). This is possibly changing with the increasing role of information and communications technologies in management tasks and business activities in general.

While services sectors and productivity had improved and showed dynamism over the 1960s and 1970s traditional technological innovation indicators showed that the UK declined over this period, failing to match the growth in R&D investment of other countries, while the share of world technological output, as measured by patents declined. Walker (1993) attributes this to a prioritisation of services- retail, property, and finance over manufacturing and technology- reflecting the values of the elite, both in business and in politics. UK preferences represented the opposite pole to Germany and Japan, and contrasting incentives to corporate behaviour with regard to financial markets.

R&D intensity rapidly built up in the post war years through the 1950s to the 1970s. The UK stood 2nd in R&D intensity in 1967 and had fallen to 6th in 1983 (Patel and Pavitt, 1989). It continued to decline relative to comparable countries France, Germany and the USA until the end of the century (von Tunzelmann, 2004).

In terms of technical employment, the proportion of qualified scientists and engineers (QSEs) working in industry fell from 11.5 per thousand to just over 9, from 1981 to 1993. The UK was the only one of 17 OECD countries failing to sustain growth, although total QSEs increased in the mid 1990s (Ibid.).

The UK science base punched above its weight in publications, citations and international prizes, but patenting was less impressive. US patents per million of population peaked in the early 1970s then declined in the 1980s, it recovered slightly before declining again in the 1990s. This was broadly comparable to France, while Germany had forged ahead (von Tunzelmann, 2004).

It is therefore ironic to see such a growth in the political use of the term innovation over this period of decline. However the decline is observed through technological measures. Innovation as a concept has been deployed in other areas, and stakeholders and advocates of these other areas rightly point out that the exploitation of new ideas is important for them as much as in technology and manufacturing. There is a tension between the positive innovation agenda of New Labour- searching for and celebrating innovation everywhere- and a traditional technological view that would insist that innovation only occurs in 64% of firms, as measured by the Community Innovation Survey. In their own terms both views are right.

Among some administrators of innovation policy development and delivery the New Labour enthusiasm for innovation in so many guises was a dilution "...outside of those officials most closely concerned with technology and innovation policy, understanding of the variety of different ways in which innovation takes place was as poor as it had been in the past. Understanding in the wider policy community of the nature of innovation processes was equally poor except for the relative few who took a deep interest in the subject" (Barber and Georgiou, 2008: 50). There was perhaps frustration that amidst the hyperbole of the first New Labour term spending on DTI Support Schemes for technology and innovation remained flat in spite of OECD data showing spending was less than in all other Advanced

Industrialised Countries. Minor and repackaged schemes were announced “for political effect” (Ibid: 51)

However it is also fair to observe a pro-manufacturing bias within the innovation studies and innovation policy communities. Available measures and statistics favoured by these communities usually did not cover services and intangibles, many of which have considerable innovation, not only in financial and business services but also in the development, use, and modification of ICTs, such as in architecture, advertising, as well as other cultural or creative industries that are ‘digital natives’ like web design and video game development. New Labour identified UK strengths in these sectors, which are mentioned rather dismissively in some of the innovation literature. Nevertheless the tension between a restricted working definition of technological innovation as favoured by many analysts and the broader one is unresolved. In the period after 2005 when our data ends the role of the National Endowment for Science, Technology and the Arts (NESTA) has played a key role here in driving exploration into broader forms of innovation research and measurement, including a new Innovation Index (see <http://www.innovationindex.org.uk/>). While recognising the floating signification over the decades we should also remember that the stable collocated words over the entire period coalesce around the restricted view of innovation: e.g. industry, technical, technological.

Missing Words

The dataset of collocated words contains some surprising words, but it is also puzzling for the words it lacks. We might expect to see reference to ‘science’ and the ‘universities’, given the sustained policy attention these have received, even if ‘research’ is present in the stable collocates. Similarly we do not see ‘systems’ in spite of the influence of the National/ Regional/ Sectoral Systems of Innovation paradigm on the innovation studies field and on policy makers. ‘Clusters’, ‘information’ (as in IT or the Information Society), ‘networks’, ‘competitiveness’ have all been key words in policy discourse that are absent here and the title of the Department currently responsible for innovation policy combines innovation with ‘business’ and ‘skills’, neither of which feature in the list of collocates.

There are three possible explanations for these missing words. Firstly there is a rather mundane technical explanation, which is that they are so closely related to the word innovation in everyday language- as evident in the British National Corpus- that they would not appear as remarkable words with the method of the study. However this filtering out has not prevented other obvious key words from appearing, like ‘new’, ‘technological’ in the stable collocates and ‘novelty’, ‘foresight’ and ‘knowledge’ in the floating ones.

A second potential explanation may be political in nature, in that there has been a divergence in discourse between the executive and the legislative in the government system. Commentators and stakeholders have argued that Parliament was distanced from executive decision-making and actions under the Thatcher and Blair governments, and that its role was gradually emasculated. The priorities and discourse of parliamentarians may therefore have

developed in different directions than those of the political executive and its administration. Members of Parliament represent broader interests and communities than innovation policy makers and so their engagement with the innovation agenda will mirror these broader concerns.

A third possible reason is a lack of appreciation of the subtler points of innovation dynamics among parliamentarians. As in the observations about the lack of technical and engineering knowledge among British managers this may also be true of MPs, the majority of whom are more likely to be trained in law, finance, humanities or social sciences than engineering.

This means that innovation policy suffers a lack of a well-informed and well-equipped legislature to examine its initiatives and the thinking behind them. Barber and Georgiou argue:

“...there has been an absence of an informed community of stakeholders providing the ballast needed to prevent inadequately considered policy changes from being implemented.” (67)

We might also look at the role of the Science, Technology and Innovation Studies project, from its beginnings with SPRU in the 1960s to its lineage of influential scholars such as Freeman, Pavitt and von Tunzelmann and subsequent diffusion of alumni and fellow travellers; has the innovation studies community been too successful in attracting interest in the term and phenomenon, but only at a shallow level? Has innovation become a positive ‘catch-all’ concept, as the saying goes, like motherhood and apple pie; bland, universal and over-used beyond usefulness?

A more accurate understanding of innovation among politicians may be emerging, but slowly. One observation is that words in our dataset frequently appear later than one might expect, in that key words associated with policy initiatives or shifts, or important White Papers seem to appear in the decade after they were introduced, suggesting a lag between specialist policy pronouncements and their absorption and application by MPs.

This paper has discussed the dataset of words collocated with innovation with reference to the history and zeitgeist of their times. Further research is needed in analysing the context of the words in their Hansard quotations more systematically and completely to investigate hypotheses such as the time-lag mentioned above. Secondly we intend to compare the data from Hansard with collocated words from publications, speeches and statements from the parts of government specifically charged with the design, development and delivery of innovation policy, mainly DTI, DIUS and the current Department for BIS. We may then get a stronger sense of the words that were ‘missing’ from the Parliamentary data, and the extent of the knowledge, or interest gap between the executive and the legislative in this area. This line of research is one of several in the field that is investigating the use and meaning of language, which has been a neglected source of data in innovation studies, with its predilection for well-established numeric indicators such as patents, R&D spending and publication counts.

Notes

1. See page on Department of Business, Innovation and Skills website at <http://www.dius.gov.uk/innovation>.
2. See David Cameron news-release on Conservative Party website at :http://www.conservatives.com/News/Speeches/2008/04/David_Cameron_Innovation_must_be_at_the_heart_of_public_policy.aspx
3. The electronic Hansard at Millbank systems is only available to 2005 so the figure has been extrapolated for that decade.
4. Using a bespoke Java application developed by one of the authors. The bespoke Java modules developed by one of the authors drew inspiration from a number of sources: scraping the webpages was informed by Blum et al, (1998) and Trottier (2002, chapter eight). Stripping them of their superfluous html tags by Friedl (2006), tokenising them by Mason (2000, chapter seven) and collocate analysis especially Stubbs (1996), Mason (2000), Mitkov (2004) and Baker (2006). Thanks to developers of Java language, MySQL and MS Access.
5. MI, z-score and t-scores were calculated by the program using the formula from Barnbrook (1996) and Mason (2000):

Mutual Information (MI) = $\text{Log}_2(\text{Observed/Expected})$ (see Shannon, 1951)

z-score = $(\text{Observed}-\text{Expected}) / \text{Standard Deviation of occurrence of word in corpus}$

t-score = $(\text{Observed}-\text{Expected})/\text{Square Root of Observed}$

Barnbrook's (1996) threshold values of significance were employed: the MI threshold was 1.58, the t-score threshold was 2 and the z-score 3

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