Forum: Science & Society

Cell PRESS

Can, and should, behavioural neuroscience influence public policy?

Ben Seymour[1,2,3] and Ivo Vlaev[4]

[1] Center for Information and Neural Networks, Osaka University, 1-3 Yamadaoka, Suita, Osaka 5650871, Japan
[2] Department of Engineering, Cambridge University, Trumpington Street, Cambridge CB2 1PZ, UK
[3] Department of Clinical Neurosciences, Addenbrookes Hospital, Hills Road, Cambridge, CB2 0QQ, UK
[4] Centre for Health Policy and Department of Surgery and Cancer, Imperial College London, Queen Elizabeth the Queen Mother Wing, St Mary's Campus, London W2 1NY, UK

Recent years have seen enormous demand amongst policy makers for new insights from the behavioural sciences, especially neuroscience. This demand is matched by an increasing willingness on behalf of behavioural scientists to translate the policy implications of their work. But can neuroscience really help shape the governance of a nation? Or does this represent growing misuse of neuroscience to attach scientific authority to policy, plus a clutch of neuroscientists trying to overstate their findings for a taste of power?

A good example of where the intersection of behavioural science and policy has generated significant interest amongst political commentators is 'behaviour change' – a policy initiative that seeks to improve people's health- and well-being-related choices by using 'environmental design' as opposed to legislation [1,2]. Behaviour-change policies entered the limelight with the publication of the book 'Nudge' [3] and rapidly became a must-read item amongst politicians. Table 1 presents behaviour-change techniques proposed by two prominent frameworks within this paradigm.

Environmental design involves abating or exploiting the irrationalities and biases inherent in human decision-making to help people make more self-beneficial decisions. A paradigmatic example of environmental design highlighted in Nudge is 'save-more-tomorrow', a policy scheme designed to counter under-investment in personal pensions. In this scheme, people sign up to increased employee pension contributions, but defer the increase to their next pay raise, instead of implementing it immediately. This technique bypasses the impulsive aversion individuals habitually exhibit against increased immediate payments and exploits another common bias, the status quo bias, since no changes to pension contribution decisions are made when the next pay raise comes about (the increase was decided upon at an earlier time). This type of policy has significant appeal, first, because it offers non-legislative policy initiatives that benefit individuals, whilst preserving the freedom of individual choice ('libertarian paternalism'); and, secondly, because the policies are often inexpensive, if not free.

Although 'Nudge' was based on behavioural economics and not behavioural neuroscience, the potential of neuroscience to play an active role in shaping public policy soon started being discussed. For instance, in the United Kingdom, the Royal Society of Arts (RSA) published in 2009 a report concluding that neuroscience is contributing to a new way of thinking about behavior that has real implications for politics, policy and practice (Grist, M. *Changing the Subject*, http://bit.ly/NF2OJk). The report appears to draw on the political attractiveness of new neuroscience-based insights to promote a more palatable view of humankind: less like the uniformly selfish view of rationality prevalent in classical political economy (underpinned by rational choice theory), and more individualized, egalitarian, and socially aware. This view of society seems to epitomise the sort of society most people would like to live in and such prosocial features seem to be at the heart of policy ideas such as David Cameron's 'Big Society' – a flagship policy movement of the UK government's 2010 election manifesto, designed to empower people and social enterprises, for example, through cooperative and charitable institutions (http://bit.ly/MCs1Uy). The 'Big Society' movement conveys an aura of progressiveness, because it seems to move beyond the assumptions of the purely individualistic behaviour that underlies free-market philosophy (people behave only to maximize their own wealth) and to which the blame for recent financial crises is popularly attributed.

In an influential article in Prospect magazine ('Left brain, right brain', September 23, 2009, http://bit.ly/ODFiwp), Matthew Taylor, chief executive of the RSA and former chief advisor of political strategy to the UK Prime Minister, argued that different strands of characteristically conservative and social democratic thinking drew on different aspects of human incentives, which had a solid grounding in behavioural neuroscience. Hence he suggested that ideal, inherently centrist policy should integrate the incentive-compatible aspects of each type of thinking. This suggestion raised the possibility that neuroscience might even help map out the legendary 'third-way' [4] between these traditionally incompatible ideologies.

Soon afterwards, the Center for Strategic Analysis in France[*] and the Royal Society of Great Britain[†] also published reports positively exploring the potential of

Corresponding authors: Seymour, B. (seymour@cinet.jp); Vlaev, I. (i.vlaev@imperial.ac.uk)

[*] Oullier, O., and Saunerom, S. (March 2010) Improving public health prevention with behavioural, cognitive and neuroscience. Center for Strategic Analysis, France, http://bit.ly/O6hvZy

[†] Royal Society of Great Britain (January 2011) Brain Waves Module 1: Neuroscience, Society and Policy, http://bit.ly/MrvR57

Table 1. Behaviour change techniques proposed by two prominent frameworks within the policy initiative that seeks to improve people's health- and well-being-related choices by using 'environmental design' as opposed to legislation.

Framework	Behaviour Change Technique	Definition
Nudge [3] describes opportunities for influencing choices by taking better account of how people actually respond to the context within which their decisions are made – the 'choice architecture'.	Incentives	Humans respond to incentives rationally, as well as in a heuristic way (such as strongly avoiding losses)
	Understand mapping from choice to welfare	Transform information about possible outcomes associated with available choice options into units that translate more easily into actual use
	Defaults	Options that are assumed as preselected if the individual does not make an active choice of another available alternative
	Give feedback	Provide salient warning signs in a way that supply information when people are doing well and when they are making errors
	Expect error	Assume error is inevitable and make the required action a habit by using recurrent cues and prompts
	Structure complex choices	Redesign the environment when people make choices among complex (multi-attribute) alternatives, so that the environment is manageable by mental habits
MINDSPACE [5] presents a summary categorisation of a body of (largely contextual) effects on behaviour that have been observed in experimental settings in the laboratory and in the field.	Messenger	Individuals are heavily influenced by who communicates information to them
	Incentives	Responses to incentives are shaped by predictable mental shortcuts, such as strongly avoiding losses
	Norms	Individuals are strongly influenced by what others do
	Defaults	People 'go with the flow' of pre-set options
	Salience	People's attention is drawn to what is novel and seems relevant to them
	Priming	An individual's acts are often influenced by sub-conscious cues
	Affect	Emotional associations can powerfully shape people's actions
	Commitments	Individuals seek to be consistent with their public promises, and reciprocate acts
	Ego	Individuals act in ways that make them feel better about themselves

neuroscience to inform policy. In the context of public health, both noted the broadening of the applicability of neuroscience beyond the well-established ground of the management of existing health pathologies (i.e., smoking, drug addiction, pathological obesity), towards the prevention of these pathologies based on behavioural change. This marked a fundamental shift in focus away from the pathologies of the individual and toward the pathologies of society. Elsewhere, the growing enthusiasm for what was now sometimes being called 'neuropolitics' spawned many websites and blogs (for example, http://neuropolitics.org), and even departments and academic courses (for example, the 'Center for Neuropolicy' at Emory University), embracing not just behaviour change, but a broader intersection of neuroscience and policy in domains such as education, law, and ethics.

For behaviour change, it was the publication of Mindspace by the UK Institute of Government (commissioned by the Cabinet Office) that provided the first substantive, comprehensive framework for new policy initiatives based on behavioural science[‡] [5] (see Table 1). The report also attracted significant attention in the media as it was the basis for establishing the 'Behaviour Insight Team' at the Cabinet Office, which was charged with the task of developing ways to supplement the more traditional tools of government with policy that encourages behaviour change (http://bit.ly/LuocFv). Mindspace drew on the breadth of the decision-sciences to generate a handbook for policy makers, highlighting the sensitivity of behavior to constructs such as social norms, existing defaults, impulsivity, emotion, and unconscious primes. A cross-party House of Lords report in 2011[§], with the benefit of a rapidly expanding evidence base from small pilot projects, concluded with enthusiasm for behaviour change, albeit when used in conjunction with more traditional methods of legislation.

However, although Mindspace champions the potential of recent advances in behavioural decision-science, it remains far less clear whether neuroscience has any particular contribution to make. For example, despite a strong neuroscience literature on temporal discounting (the preference for smaller sooner over larger later rewards) and default bias (the tendency to choose in accordance with default options or the status quo) in humans [6], it is difficult to see how this literature informs policies such as 'save-more-tomorrow', which draws purely on the behavioural and psychological literature. In fact, it is difficult to find any substantial insights from neuroscience in any domains of behaviour-change policy.

Therefore, in the absence of any concrete examples in which neuroscience directly informs policy, why has the perceived usefulness of neuroscience become so detached from its actual usefulness? There are a number of possible reasons. One is likely to be a relentless enthusiasm for neuroscience by the media (termed 'neuromania'), in which neuroscience explanations are often over-stated by

[‡] Dolan P. *et al.* (March 2010) MINDSPACE: Influencing Behaviour Through Public Policy, Cabinet Office and Institute for Government, UK, http://bit.ly/OM6ZEe

[§] House of Lords Science and Technology Committee (July 2011) Behaviour Change, Authority of the House of Lords, UK, http://bit.ly/Nepyp5

journalists when describing the results of research [7]. Inevitably, this leads to public perception of an overly advanced state of our understanding of the brain basis of behaviour that infiltrates the perception of even the most well-informed political thinkers. A second reason may be the desire for scientific authority to justify policy. Results from surveys place trust ratings for politicians at about 14%, but for scientists at about 71% (Ipsos MORI, 2011, Political and Social Trends: Trust in Professions, http://bit.ly/NQLW61), hence it is easy to see why this creates a potential incentive amongst policy makers to make ambitious extrapolations of laboratory research to public policy. Lastly, there is always the risk that that hidden personal or financial incentives amongst scientists might emerge, in the form of advancing their personal political ideologies or stimulating a market in which they can profit from future lucrative consultancies.

Could behavioural neuroscience inform public policy in the future, however? Under the assumption that neuroscience promises ever more sophisticated mechanistic insights into behavior [8], beyond the more descriptive models of behavioural economics, the answer may well be yes. The value of neuroscience in the future would be increased by the ability to identify new aspects of behaviour, inspired by mechanistic models, not previously identified by psychology and behavioural economics. This is unlikely to come from a single neuroimaging study, however, but from several neuroscientific contributions to the general body of research into the understanding of behaviour, which is also informed by all the interdisciplinary decision sciences.

We suggest several areas where this might occur. The first is the understanding of value: traditional political economy assumes a stable construct of value. In health economics, for example, current political strategy champions individual choice in a market of independent providers [9], a policy that fundamentally rests on the assumption of individual stable judgments to optimize efficiency. However, emerging data, especially from neuroscience, suggests that value is constructed on-the-go, based on a multitude of factors, such as prior beliefs, anchors, comparators, and recent experience, something that is likely to be particularly important for health states such as pain [10]. Therefore, a unifying account for how value is constructed could have significant implications for core theory underlying market efficiency.

Another area is the understanding of cultural learning. Although often also disallowed by legislation, behaviours such as drink-driving are considered socially unacceptable and people defend this norm without hesitation. Although such status is the ideal outcome for many politically undesirable behaviours (e.g., graffiti, not recycling, smoking in public spaces), we currently know very little about how and why certain behaviours become the morally or socially (un)acceptable norms of public behaviour, whereas others do not. There is substantial current interest in neuroscience regarding how social and cultural norms are learned and represented, insights from which from may conceivably inform policy campaigns that might exploit this knowledge for the public good [11].

A third area involves the understanding of subjective well-being. Traditionally, politicians have drawn on economic models of behaviour that have assumed that personal income is a good proxy for an individual's sense of well-being or happiness [12]. However, a substantial amount of evidence now suggests that this is largely not the case, with other factors, such as a sense of control and optimism, being much better predictors [13]. These constructs are studied in the new field of computational psychiatry, which aims to understand mood disorders, such as depression, from a neurobiological perspective, based on normative models of behaviour [14]. It seems entirely possible that the insights from this new field will have implications for policy designed to maximize individual well-being across the population in general.

In conclusion, we suggest that the intersection of behavioural neuroscience and public policy should be approached with caution. The reputation of science is based on the public perception of rationality, political and religious impartiality, and freedom from conflicts of interest – financial or otherwise. The vast majority of scientists are passionate about maintaining this state of affairs, so anything that seems to bypass the rigour of the process of scientific evidence and peer review, which are less common in the political arena, needs to be approached with caution. A corollary benefit, however, would be to cultivate a stronger sense of the importance of evidence acquisition amongst policy makers. This is particularly important, given the well-documented difficulty of translating individual behaviour (microeconomics) to the population level (macroeconomics).

References

1 Marteau, T.M. *et al.* (2011) Judging nudging: can nudging improve population health? *BMJ* 342, d228
2 Loewenstein, G. *et al.* (2007) Asymmetric paternalism to improve health behaviors. *J. Am. Med. Assoc.* 298, 2415–2417
3 Thaler, R.H. and Sunstein, C.R. (2008) *Nudge: Improving Decisions about Health, Wealth, and Happiness*, Yale University Press
4 Giddens, A. (1999) *The Third Way – The Renewal of Social Democracy*, Polity
5 Dolan, P. *et al.* (2012) Influencing behaviour: the mindspace way. *J. Econ. Psychol.* 33, 264–277
6 Glimcher, P.W. *et al.*, eds (2009) *Neuroeconomics: Decision Making and the Brain*, Academic Press
7 O'Connor, C. *et al.* (2012) Neuroscience in the public sphere. *Neuron* 74, 220–226
8 Rangel, A. *et al.* (2008) A framework for studying the neurobiology of value-based decision-making. *Nat. Rev. Neurosci.* 9, 545–556
9 Le Grand, J. (2007) *The Other Invisible Hand: Delivering Public Services through Choice and Competition*, Princeton University Press
10 Vlaev, I. *et al.* (2011) Does the brain calculate value? *Trends Cogn. Sci.* 15, 546–554
11 Seymour, B. *et al.* (2007) The neurobiology of punishment. *Nat. Rev. Neurosci.* 8, 300–311
12 Becker, G. and Stigler, G.J. (1977) 'De Gustibus Non Est Disputandum'. *Am. Econ. Rev.* 67, 76–90
13 White, M.P. and Dolan, P. (2009) Accounting for the richness of our daily activities. *Psychol. Sci.* 20, 1000–1008
14 Montague, P.R. *et al.* (2012) Computational psychiatry. *Trends Cogn. Sci.* 16, 72–80

1364-6613/$ – see front matter
http://dx.doi.org/10.1016/j.tics.2012.07.005 Trends in Cognitive Sciences xx (2012) 1–3