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When to consider boosting: some rules for policy-makers

RALPH HERTWIG*

Center for Adaptive Rationality, Max Planck Institute for Human Development, Berlin, Germany

Abstract: In recent years, public officials have shown a growing interest in using evidence from the behavioural sciences to promote policy goals. Much of the discussion of behaviourally informed approaches has focused on 'nudges'; that is, non-fiscal and non-regulatory interventions that steer (nudge) people in a specific direction while preserving choice. Less attention has been paid to boosts, an alternative evidence-based class of non-fiscal and non-regulatory intervention. The goal of boosts is to make it easier for people to exercise their own agency in making choices. For instance, when people are at risk of making poor health, medical or financial choices, the policy-maker – rather than steering behaviour through nudging – can take action to foster or boost individuals' own decision-making competences. Boosts range from interventions that require little time and cognitive effort on the individual's part to ones that require substantial amounts of training, effort and motivation. This article outlines six rules that policy-makers can apply in order to determine under which conditions boosts, relative to nudges, are the preferable form of non-fiscal and non-regulatory intervention. The objective is not to argue that boosts are better than nudges or vice versa, but to begin to spell out the two approaches' respective conditions for success.

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Introduction

In recent years, policy-makers have shown mounting interest in using behavioural science to make government simpler, less expensive and more effective. For instance, in 2015, former US President Barack Obama issued an Executive Order directing federal agencies to use behavioural science to improve their policies (Executive Order No. 13,707, 2015). A central provision of the

*Correspondence to: Ralph Hertwig, Center for Adaptive Rationality, Max Planck Institute for Human Development, Berlin, Germany. Email: hertwig@mpib-berlin.mpg.de

Executive Order required the government to consider "how the content, format, timing, and medium by which information is conveyed affects comprehension and action by individuals." Another provision called on agencies to devote "particular consideration to the selection and setting of default options." Under the Obama administration, behavioural science informed numerous moves by the US government, in contexts including environmental protection, health care, energy efficiency, anti-obesity policy, consumer protection, food safety and financial reform (Sunstein, 2013).

In the UK, the Behavioural Insights Team (BIT), in operation since 2010, has also enlisted behavioural science to promote change in a wide range of areas (Halpern, 2015). Many of BIT's actions involve clearer communication and better choice architecture – for example, invoking social norms when sending out tax reminders (e.g. through a text message telling late payers that nine out of ten taxpayers paid on time) and prompting drivers paying their vehicle tax to become organ donors. In 2015, Australia created its own team, the Behavioural Economics Team of Australia. In the same year, the World Bank devoted its entire annual report to the subject of behavioural science, with particular emphasis on the developing world; it subsequently created a Global Insights Team, dedicated to using psychology and behavioural insights to improve social outcomes. Behavioural science is now being used or seriously considered as a policy tool in numerous member states of the Organisation for Economic Co-operation and Development (OECD); a comprehensive collection of over 100 case studies of behavioural insights in practice has recently been compiled and published (OECD, 2017).

Much of the aforementioned discussion of behaviourally informed approaches has emphasised 'nudges'; that is, interventions that steer people in a particular direction while preserving freedom of choice (Thaler & Sunstein, 2008). Automatic enrolment in a pension plan or in green energy, for example, count as nudges (Eberling & Lotz, 2015). Freedom of choice is preserved because the ultimate decision as to whether or not to accept the default of automatic enrolment and its consequences remains with the individual. Default rules establish what happens if people do nothing. The use of social norms, as in BIT's tax compliance effort, has also been interpreted as nudging (Thaler & Sunstein, 2008).

Yet behavioural science also provides support for a distinct kind of intervention, namely 'boosts' (Grüne-Yanoff & Hertwig, 2016; see also the related 'think' approach by John *et al.*, 2011). The objective of boosts is to improve people's competence to make their own choices; the focus is on interventions that make it easier for people to exercise their own agency. For instance, by acquiring the ability to understand the statistical health information that is ubiquitous in the medical domain, patients can decide for themselves whether the

potential benefits of a medical test recommend by their physician (e.g. the prostate-specific antigen [PSA] test) outweigh the test's potential costs. The competence to reason statistically (risk literacy) is an ability that generalises from the medical to many other domains (Hoffrage *et al.*, 2000). By the same token, financial literacy is a competence that could be boosted by, for instance, teaching individuals simple financial and accounting rules (Drexler *et al.*, 2014). Parents could be equipped with simple strategies enabling them to make the family meal environment conducive to nutritional health (e.g. modelling healthy behaviour for their children; Dallacker *et al.*, 2017). These interventions can be interpreted as boosts. The goal of this article is to outline six rules that policy-makers planning to implement behaviourally informed, non-fiscal and non-regulatory interventions might consider in order to decide whether to nudge, to boost or to do both.

I will start from what is often called upon as the key criterion in public policy debate: namely, people's welfare. This criterion can be operationalised by means of cost–benefit analyses. From the standpoint of those who reject welfarist approaches, other concerns – above all, individual autonomy and agency – are important, and I will also consider the role of those concerns. Before turning to the dimensions entered in policy-makers' cost–benefit analyses, however, let us first consider the differences between boosts and nudges in more detail.

What distinguishes boosts from nudges?

Many policy interventions can be used to change behaviour, including mandates or bans (restricting or eliminating options), fiscal measures (monetary incentives and disincentives) or non-regulatory and non-fiscal measures. In recent years, the latter category has increasingly been equated with nudging. Nudges come in different forms. They can be, in the terms of Sunstein (2016), 'educative nudges' (e.g. disclosure requirements, warnings, labels or reminders) or 'non-educative nudges' (e.g. default rules, ordering of items on a menu or website or cafeteria design). Non-educative nudges can target or enlist cognitive or motivational biases (e.g. inertia, procrastination and loss aversion; see Rebonato, 2012) to change behaviour.

Recently, Grüne-Yanoff and Hertwig (2016; see also Hertwig & Grüne-Yanoff, in press) proposed that a distinction be drawn, on conceptual grounds, between boosts and nudges. They defined boosts as interventions that

> "[in order] to extend the decision-making competences of laypeople and professionals alike … target the individual's skills and knowledge, the available

set of decision tools, or the environment in which decisions are made" (p. 152).

Rather than merely presenting pertinent and accurate information (as educative nudges do), boosts explicitly seek to foster existing decision-making competences and to develop new ones, thus enabling individuals to translate their intentions (preferences) into behaviour – that is, to exercise personal agency. Clearly, information can be instrumental in developing an intention to engage in a specific behaviour. Such intentions are not necessarily translated into action, however. Findings on the 'intention–behaviour gap' suggest that conceptual knowledge often does not suffice, but that it needs to be supplemented with, for instance, procedural knowledge (including self-regulatory strategies; e.g. see Abraham *et al.*, 1998).

Boosts thus differ from nudges in terms of the underlying assumptions about the potential value of educative efforts, the emphasis placed on the importance of actually exercising the power of choice (as opposed to being afforded the opportunity to choose), the levers used in the intervention (Hertwig & Grüne-Yanoff, in press) and the underlying understanding of human decision-making (Grüne-Yanoff & Hertwig, 2016). Furthermore, although proponents of non-fiscal and non-regulatory approaches often share a commitment to Herbert Simon's notion of *bounded rationality*, their interpretations of its implications differ. Those in favour of nudges typically invoke the findings of Kahneman and Tversky's heuristics and biases research programme (see Rebonato, 2012), emphasising decision-makers' systematic cognitive biases and motivational shortcomings. Those in favour of boosts typically invoke findings showing that bounds on people's time, knowledge and computational powers do not prevent them from making good decisions, to the extent that they succeed in employing simple decision strategies in the appropriate contexts – that is, where there is a fit between cognition and environment (i.e. ecological rationality; Gigerenzer *et al.*, 2011).[1]

For the reasons outlined above, this article argues that it is both useful and important to understand boosts as a distinct category of behaviour change

1 Another reason to see boosts as distinct from nudges is that policy-makers, faced with the choice of whether to enlist cognitive or motivational biases or to boost individual competence (and, in the process, remove a bias once and for all), may avoid boosting and use, for example, a default rule, even though it would be in the immediate best interests of both policy-makers and individuals to boost. The reason is that policy-makers thereby retain the option of enlisting bias in the future. This possibility emerged from a game-theoretical analysis (Hertwig & Ryall, 2016). Although it is unclear to what extent the game-theoretic dynamic generalises to real policy-makers' choices, the possible existence of this dynamic highlights the importance of analysing both categories of interventions.

tools. The goal is not, however, to engage in a terminological debate about nudges and boosts (for a conceptual analysis, see Grüne-Yanoff & Hertwig, 2016). Instead, this article aims to identify rules that policy-makers could apply in order to determine the conditions under which boosts, as defined above, are preferable to nudges.

Welfare, cost–benefit analyses and autonomy

How, at least in theory, do policy-makers choose which intervention to select? From the standpoint of nudging, the key criterion is welfare. According to Sunstein's (2014) broad definition, the term 'welfare' refers to "whatever choosers think would make their lives go well" (p. 73). Indeed, in many important situations (e.g. choices between medical treatment options or savings levels), what is primarily at stake is the choosers' welfare. Their choices do not affect others, except perhaps indirectly. One way to approach the welfare question is to analyse relevant costs and benefits from the standpoint of the chooser and the policy-maker, and to select, among the possible interventions, the one maximising the chooser's welfare.

Two components of that analysis are the costs of decisions and the costs of errors for the chooser and the policy-maker. For example, a paradigmatic nudge such as a default rule (e.g. automatic enrolment in a pension plan) typically reduces the cognitive and other costs of decisions for choosers, who are freed from devoting time and attention to the problem. Similarly, as long as the rule is not especially difficult to devise, it also reduces costs for policy-makers, whose actions can have a broad and enduring impact in exchange for a relatively small investment (e.g. changing a legal default; see Chetty *et al.*, 2014).

Consider, for illustration, the goal of promoting healthy eating. For the policy-maker, it would be costly and time consuming to teach children and adults nationwide how to interpret nutrition labels, or to equip them with the numerical processing skills that are relevant for food choice (e.g. portion-size estimation skills; Dallacker *et al.*, 2016). It is likely to be less costly and more effective to change, where possible, the choice architectures in which food choices are made (Wansink, 2014). School cafeterias, for instance, could be redesigned to present the options differently. Salad bars could be moved away from the wall and placed in front of the cash registers, thus nudging students to make healthy choices. This and other relatively inexpensive changes to the choice architecture of *all* school cafeterias (e.g. what is displayed at eye level) could reach a large population of choosers.

Although setting up default rules is relatively inexpensive, default rules may also increase the costs of errors (understood in terms of the number and magnitude of mistakes) if the policy-makers who devise them only know what fits

the statistically average person, but not what fits the individual. An organ donation default (Johnson & Goldstein, 2003), for instance, automatically makes everybody a potential donor, including those who, for whatever reason, do not wish to be donors. If the latter fail to opt out of the organ donation default, perhaps because of inertia or perceived social pressure, the default will lead to errors. (I bracket the fact that the rules for organ donation affect third parties.)

Boosts can, but need not, impose high costs for choosers and policy-makers. They can be very low in cognitive costs for the chooser – for instance, when *transparent* risk communication is used to foster the understanding of health statistics (e.g. Hoffrage *et al.*, 2000; Gigerenzer *et al.*, 2007) or when people are taught to "strategically call on automatic processes" in order to translate self-declared goals into simple action plans (i.e. harnessing implementation intentions; Gollwitzer, 1999, p. 493). Alternatively, boosts may require some hours of instruction and practice – for instance, training financial decision-making skills by teaching people simple financial and accounting heuristics (Drexler *et al.*, 2014) or implementing a 12-hour sexual assault resistance training programme (including risk assessment strategies) for first-year female university students (Senn *et al.*, 2015). To the extent that only those people who seek the competence offered by a boost will adopt it, this approach can be expected to reduce (and perhaps even eliminate) the costs of errors.

The analysis of costs and benefits also requires attention to the effectiveness of the intervention, usually measured in terms of the magnitude of its impact. Take, for instance, the objective of increasing people's retirement savings. Savings behaviour could be increased by efforts to promote financial literacy (boosting) or by default rules such as automatic enrolment (nudging). There is an ongoing debate about the effectiveness of these two distinct strategies. Willis (2011) has argued that financial literacy education has, at best, limited success. Should efforts to promote financial literacy indeed fail to meaningfully promote retirement savings, the argument against financial literacy boosts, and in favour of defaults, will be strengthened.[2]

For the welfarist, integrating factors such as the costs of decisions, the costs of errors and the effectiveness of the intervention seems, at least in theory, straightforward: which approach has the highest net benefits? Policy-makers

2 The timing of the boost and the type of boost are two key issues in this debate. 'Just-in-time' education tied to specific behaviours appears to be more effective than educative interventions that are not coordinated with the intended behaviour (Johnson *et al.*, 2013). Furthermore, financial literacy boosts seem to generate more of the desired impact when they take the form of simple heuristics conveying procedural knowledge (Drexler *et al.*, 2014) than when they are limited to the delivery of knowledge (e.g. what is compound interest?).

could quantify the costs and benefits of (say) default rules and compare them with the corresponding costs and benefits of boosting people's competences. From the perspective of political philosophy, of course, many people are not welfarists. Instead, they emphasise the importance of autonomy. Paradigmatic nudges such as defaults and boosts preserve autonomy in the formal sense; they do not prevent people from going their own way. But if autonomy is an important goal and, in particular, if the policy-maker's aim is to promote individual agency, there is an argument in favour of boosts. This argument is further strengthened by the possibility of errors caused, for instance, by defaults. For those who emphasise autonomy, the production of errors by passive rather than active decisions may represent a problem that cannot be offset by considerations of cost–benefit efficiency. More generally, whenever actual choice and, in particular, informed choice – rather than the formal opportunity to choose – are believed to be important because they are conducive to welfare (e.g. in terms of procedural satisfaction; Frey *et al.*, 2014) or because they are intrinsic goods, boosts should be favoured.

Rules for policy-makers

Next, I will outline some additional, less-discussed criteria that could be invoked in the process of selecting an intervention. My focus will be on the choice between boost and nudge interventions. In principle, however, the following rules could be extended to include other kinds of interventions as well. I will list six rules. The first four relate to what could be interpreted as *necessary* requirements for boosting and nudging to succeed, measured in terms of welfare. If these requirements are not met, this shortcoming cannot be offset by any other advantage an intervention may have. The remaining two criteria could and should be included in the cost–benefit calculus outlined above and thus balanced against an intervention's other costs and benefits.

Rule 1. If individuals lack the cognitive ability or motivation to acquire new skills or competences, then nudging is likely to be the more efficient intervention

In order to develop new skills and competences, people need sufficient levels of motivation and cognitive capacity (Grüne-Yanoff & Hertwig, 2016). Consider, for example, the ability to make Bayesian inferences, which is often required in the context of medical choices. Assume that a patient's routine PSA screening test has produced a positive result. To understand the meaning of that test result, several pieces of information are needed: (i) the base rate of prostate cancer, p(PC); (ii) the probability that the test is

positive if the person has prostate cancer (sensitivity or true-positive rate of the test; p[pos|PC]); and (iii) the probability that the test is positive if the person does not have prostate cancer (false-positive rate or 1 – specificity; p[pos|no PC]). On the basis of this information, the patient and his physician can use Bayes' rule to calculate the positive predictive value (PPV) of a test; that is, the probability of someone who tests positive actually having prostate cancer:

$$\mathrm{PPV} = \frac{p(PC)p(pos|PC)}{p(PC)p(\,pos|PC) + p(no\ PC)p(\,pos|no\ PC)}$$

For instance, if the base rate is about 6.3% and the test has a sensitivity of about 21% and a false-positive rate of 6%, the PPV is about 19%, which means that 81% of positive test results are false-positives (these numbers are realistic; see Arkes & Gaissmaier, 2012). Many doctors and patients do not understand these calculations. Consequently, doctors often cannot advise their patients properly (Gigerenzer *et al.*, 2007). One solution is to boost doctors' and laypeople's statistical prowess by training them to translate probabilities (or percentages) into a representation that makes it much easier to calculate the PPV.

In the present example, that would mean replacing conditional probabilities by natural frequencies[3] as follows:

> Imagine 1000 men like you are tested. Of those, 63 will have prostate cancer and, of those, 13 will test positive. Of the remaining 937 men who do not have prostate cancer, 56 will also test positive. Thus, 69 men will test positive. But only 13 of them have prostate cancer. This is the situation you are in if you test positive; the chance of you actually having prostate cancer is about one in five, or 19%.

Sedlmeier and Gigerenzer (2001) trained people to construct such frequency representations and compared the success of this approach with that of traditional and explicit rule training (i.e. teaching people to insert probabilities into Bayes' rule, as is typically done in schools). Transfer of learning to new problems was good in both rule training and representation training. However, the latter showed greater temporal stability, with no decrease in performance even after 15 weeks. This kind of training in statistical and risk literacy is relatively simple and requires a one-off time investment of less than 2 hours. However, it *does* necessitate some basic cognitive abilities (e.g.

3 Natural frequencies represent numerical information in terms of frequencies as they are experienced in a series of events. More technically, natural frequencies are frequencies that have not been normalised with respect to the base rates; that is, they still carry information about base rates.

numerical and arithmetic skills), as well as the motivation to learn to translate information from one representation into another. Without those, this statistical reasoning boost will not work.

Motivation and basic cognitive skills are also the prerequisites for another simple boost: a 5–10-minute expressive writing exercise has been shown to reduce test anxiety (Ramirez & Beilock, 2011), a widespread phenomenon (80% of community college students report a moderate to high degree of mathematics anxiety) related to negative outcomes such as impaired financial planning. The motivational demands for boosts that require a greater time investment will, of course, be even greater. In a study using a simple app, parents who were habitually anxious about mathematics did bedtime mathematics with their children, reading short numerical story problems and answering questions on topics such as counting, geometry, arithmetic, fractions and probability over the course of the school year. By the end of the year, these children outperformed children in a control group by almost 3 months in mathematics achievement (Berkowitz *et al.*, 2015). This is a great improvement, but it is conditioned on regular investment of time.

To conclude, if individuals' cognitive resources are, for whatever reason, severely compromised or their motivation is low, boosts that require one or both of these resources will fail. In some contexts, policy-makers may instead be able to choose a boost that requires minimal cognitive competences (e.g. Gollwitzer, 1999). But if even such competences cannot be assumed, then other kinds of interventions, such as default rules, appear preferable.

Such problematic cognitive and motivational conditions, however, also pose a challenge for policy-makers who decide in favour of nudging. Nudging (or soft paternalism; Sunstein, 2014) is suggested to be less intrusive than mandates and bans because it imposes low costs and permits people to easily reverse the choice, thus maintaining freedom of choice. Reversibility is easy in theory but may prove difficult in practice, particularly if cognitive and motivational resources are compromised or unavailable. Under such circumstances, advocates of default rules must face the possibility that they will stick, even if they are ill suited to people's preferences.

Rule 2. If policy-makers are uncertain about people's goals, if there is marked heterogeneity of goals across the population or if an individual has conflicting goals, then boosting is the less error-prone intervention

In imposing a default rule, policy-makers (choice architects) seek to steer the chooser's behaviour towards his or her ultimate goal, as judged by him or herself (e.g. greater savings or healthier food choices). This requires the policy-maker to have information about the chooser's goals; otherwise, the default may not fit those goals, leading to errors. But policy-makers do not

necessarily know what individuals care about (Rebonato, 2012). Experts may even systematically misconstrue what people want for themselves – for instance, imposing a treatment-at-all-costs medical model that ignores quality-of-life concerns (Gawande, 2014). Even choosers themselves may not always be aware of their goals; sometimes they may need to work them out, and to do that, they need transparent information and the competence to process it. Let us again take participation in cancer screening tests as an example (e.g. mammography or PSA). Depending on the quality of the test (i.e. sensitivity and specificity) and the subsequent treatment options, an individual may decide to participate in a specific screening test (e.g. screening for colorectal cancer), but not another (e.g. screening for prostate cancer). In light of this test-dependent preference to participate, nudging people to participate in *all* cancer screenings – for instance, by using gain-framed (survival) rather than loss-framed (mortality) messages – would be ethically controversial. There is a good chance, moreover, that it would not increase people's welfare (see Arkes & Gaissmaier, 2012). Here, boosting – in terms of fostering statistical literacy – would be more appropriate (assuming the boost is effective).

A related problem arises when goals are heterogeneous across a population or in conflict within a person. One-size-fits-all default rules that do not fit an individual's conflicting goals (e.g. saving for retirement versus paying for a child's education) or people's diverse situations, concerns or values may nevertheless 'stick'. Personalised default rules can reduce the risks (Sunstein, 2014), but choice architects need a great deal of information to design such rules, and this information may well be lacking.

To conclude, when goals are uncertain, heterogeneous within a person or across a population or are even in conflict within a person, boosting people's competence (e.g. risk literacy or decision skills) is likely to be more appropriate than nudging, because the boost option is less prone to error.

Rule 3. If the working of a nudge requires it to be non-transparent or even invisible to the person being nudged, then it fails the easy-reversibility test and is paternalistic

Regulatory and fiscal interventions (e.g. a law prohibiting people from riding motorcycles without helmets or the taxing of cigarettes or soft drinks) are highly visible. Visibility is an important safeguard against arbitrary and unreasonable government interventions: citizens can scrutinise them and hold the government accountable for them. Nobody is confused or fooled. Boosts are visible because they require the audience's engagement. Many nudges are also visible and public (e.g. graphic health warnings or automatic enrolment in savings plans).

But some nudges, such as the order of items on a menu, may 'fly under the radar' of the person being nudged, potentially influencing their behaviour without their awareness or the recognition that they could act differently. For example, people appear not to realise that the amount they eat is substantially driven by the portion size of a snack. As a result, they do not adjust their subsequent intake to compensate for consuming a larger amount (Wansink, 2014). Similarly, shoppers may not be aware that they pay more attention to, and are much more likely to buy, products placed at eye level than products placed above or below it ('eye level is buy level'). That is, the *mechanisms* that retailers use to 'nudge' shoppers may be invisible to consumers.

If the desired behavioural effects of a public policy nudge, such as the order of items on a choice menu, depend on people *not* being told that this intervention had been implemented – because, if informed, they would perceive it to be manipulative and categorically override it – then a boost has significant advantages, at least on ethical grounds, and may for that reason be more appropriate. How people respond when being told about either an intervention or its underlying mechanisms is an empirical question (for evidence, see Loewenstein *et al.*, 2015), but also raises ethical concerns.

Some have argued that it is not ethically necessary for governments to specify that an intervention has been implemented, especially if it would make the intervention less effective (see Bovens in House of Lords Science and Technology Select Committee, 2011). From this standpoint, it suffices that a perceptive person could discern for him or herself that an intervention is in place. However, this criterion may be too weak for several reasons. First, a person's ability to discern an intervention as such (e.g. a default or a different order) is distinct from the ability to discern how it changes his or her behaviour – particularly if the direction of the effect is counterintuitive. Second, if most people are, in practice, unable to discern how an intervention changes their behaviour, its underlying mechanism will essentially be hidden, rendering it difficult for people to reverse their choice and compromising their freedom of choice. Third, if most people who are told about a nudge and its targeted effects would reject it, then the nudge lacks acceptability and public authorisation.

More generally, if an intervention or its underlying mechanism is invisible, it does not treat people with respect, and it may undermine their dignity and agency. In a free society, I believe, public officials should generally follow a version of John Rawls' publicity principle: they should not adopt policies that they could not defend in public. If a transparent intervention ran into public opprobrium, there would be good reason not to adopt it. Furthermore, in a free society, it should ideally be difficult to keep things hidden, and an intervention that officials try to hide will hopefully come into the open – compromising the entire enterprise.

Rule 4. If governments do not (always) act benevolently, or if they permit the private sector to create 'toxic' choice architectures, then boosting will provide better protection for individuals

Choice architectures are ubiquitous and their systematic impacts can rarely be avoided. The private sector nudges, as does the government. There is little doubt that both private and public choice architectures can have illicit goals or be manipulative (e.g. Nestle, 2015). Governments influenced by wealthy donors or lobbyists, for example, may act in a way that does not have the welfare of the citizens at heart, but that favours particular interest groups. Thus, nudges used by public officials may, in the worst-case scenario, be coercive and manipulative (Rebonato, 2012). To promote both welfare and autonomy under such circumstances, it is desirable for individuals to be equipped with the competence to see through and to counteract illicit or manipulative nudges – and toxic choice environments more generally.

Take, for instance, the problem of asymmetric framing in the medical domain. One widely used industry technique is to report the benefits of medical interventions in the form of relative risks (big numbers) and their harms and side effects in the form of absolute risks (small numbers). This asymmetry magnifies the representation of benefits and minimises harms. To inoculate patients against this industry nudge, they should be equipped with the skills to see through this and other manipulative techniques and to understand both absolute and relative risks and health statistics more generally (Gigerenzer *et al.*, 2007).

The phenomenon of defensive decision-making is another example of how a choice environment can become toxic. Although highly prevalent in medicine, defensive decision-making is not limited to this field. In medicine, it describes the behaviour of doctors who alter their clinical decisions in response to the threat of being sued for medical malpractice. The option they pursue is not necessarily the best for the patient, but is motivated by the threat of liability. Defensive practices include ordering more diagnostic tests, prescribing more medication than is medically indicated or suggesting unwarranted invasive procedures. Such practices are prevalent in high-liability specialties (e.g. gynaecology, radiology and orthopaedic surgery) in the USA (Studdert *et al.*, 2005), but are also relatively common in less litigious health environments. Within such an environment, patients should not blindly follow their doctors' advice; rather, they also need to understand the relevant numbers (e.g. health statistics).

To conclude, citizens need to be enabled to discern and competently navigate public and commercial choice environments in which choice architects do not act benevolently and financial conflicts of interest are endemic. Without boosting people's skills to see through toxic choice environments, this will be barely

possible, or its effects limited. Next, I discuss two somewhat neglected dimensions that should be entered into a cost–benefit analysis in order to determine which intervention maximises welfare.

Rule 5. If the policy-maker aims to foster generalisable and lasting behaviours, boosting seems, ceteris paribus, to be more expedient

Redesigning school cafeterias to promote healthier food choices is a paradigmatic example of a public policy nudge (Thaler & Sunstein, 2008), but school cafeterias are just one context in which high-school students make food choices. Each context has its own choice architecture, and many are not under the control of a benevolent choice architect. For instance, many students have countless opportunities to buy and consume junk food on their way home from school; once home, they are bombarded with television food advertisements.

If the goal is to promote healthy food choices that promise to be generalisable across a wide range of (benevolently or commercially constructed) choice architectures, including architectures that are harder to reach by nudges than by boosts (e.g. the family dinner table; Dallacker *et al.*, 2017), then boosts (e.g. in the form of a set of simple, memorable rules for eating wisely; Pollan, 2009) are more likely to succeed than nudges. Indeed, one of the advantages of boosts is that people can apply them independently of the given choice architecture. A nudge in the form of cafeteria design, in contrast, is restricted to the specific context in which it is implemented.

In theory, boosts aim to produce long-lasting behavioural effects by instilling a new competence or fostering an existing one. This is less clear in the case of nudges. One-time nudges (e.g. the organ donation opt-out default or automatic enrolment in a savings plan or green energy) may cease to have the desired behavioural effect as soon as they are removed. In contrast, many-time nudges that affect behaviour repeatedly (e.g. daily food choices in a rearranged cafeteria) may produce behavioural routines through learning (e.g. healthy food choices). These routines may 'survive' the removal of the initial choice architecture and generalise to other dietary decisions.

In the service of lasting behaviours, let me also emphasise the importance of self-nudging. Self-nudging means that people intentionally nudge themselves in order to self-regulate their behaviour and break self-destructive habits (akin to Thomas Schelling's self-commitment devices). For example, people can rearrange their kitchen so that sweets and snacks are placed out of convenient reach and healthier foods are stored at eye level. A user can set his or her browser to open with a news page rather than a sports page. When the nudger and the nudged are one and the same person, as in the case of self-nudging, autonomy and agency remain intact.

To nudge him or herself, however, the individual has to have the same insights into the nudging intervention and the underlying mechanism as the choice architect (unlike in the conception of nudging of Thaler & Sunstein, 2008). The nudge thus becomes a boost insofar as individuals first need to be educated about the rationale of the self-nudging intervention, its mechanisms and effects and how those effects can be harnessed. Indeed, this is the approach that is often taken in behaviour change programmes in health psychology (e.g. Michie *et al.*, 2008).

Rule 6. If there is substantial danger of unanticipated (unpredictable) and undesired consequences of a nudging or boosting intervention, then consider the respective alternative

The risk of unintended and undesirable behavioural consequences ('behavioural spillovers'; Dolan & Galizzi, 2015) is an insufficiently explored dimension of some forms of nudging. For example, past good deeds can liberate individuals to engage in behaviours that are immoral, unethical or otherwise problematic – behaviours that they would otherwise avoid. Something akin to this 'moral self-licensing' (e.g. Monin & Miller, 2001) may also occur when people are nudged in certain ways. For instance, if a choice architecture nudges individuals to make healthier food choices by, for instance, rearranging foods in the cafeteria (order, eye level, etc.), people who had salad for lunch may feel liberated to consume more calories later (afternoon snacks or dinner) than they otherwise would have done. In the financial domain, automatic enrolment in pension plans has been shown to substantially increase participation (Chetty *et al.*, 2014), but people who feel safe in the knowledge that they are investing in their retirement may feel liberated to engage in more discretionary spending then they otherwise would have done.

Whether a nudge has such unintended negative behavioural effects is an empirical question, as is the magnitude of any such effects. Should they exist for a specific nudge, however, then a boost may be the more advisable intervention. Although it may be tempting to argue that boosts are less likely to have unintended negative consequences than nudges – because boosts are less likely to be designed as local repairs with unanticipated consequences in some other domain – the very nature of unintended consequences is that they are difficult to anticipate. Therefore, boosts, like nudges, need to be evaluated in terms of their intended and unintended consequences.

Finally, some unintended consequences may, of course, be desirable in nature. For instance, people who are nudged repeatedly to adopt healthier food choices may extend this behaviour to other domains (e.g. exercising). As with negative spillover effects, whether such effects occur – and for what forms of nudging or boosting

– is an empirical question. If positive spillover effects occur, they would, of course, add a desirable and little-explored dimension to both forms of policy intervention.

Conclusions

The main goal of this article was to place a spotlight on boosts – a distinct kind of behaviourally informed policy intervention that has, in my view, received too little attention in work on choice architectures and in public policy circles. When people are at risk of making poor choices, one important response is to boost their competences. Boosting can be done in many ways, such as by ensuring transparent communication (e.g. that appeals to, rather than confounds, people's intuitions), by offering information and education (e.g. brief, comprehensible statements of fact), by instilling or fostering specific cognitive or behavioural competences (such as financial and accounting rules of thumb [Drexler *et al.*, 2014], simple food choice rules [e.g., Pollan, 2009], risk literacy skills [Gigerenzer *et al.*, 2007] and strategic use of goal-attainment strategies [Gollwitzer, 1999]) or by helping people to overcome their anxieties and motivational problems (e.g. Berkowitz *et al.*, 2015).

Such boosts, which aim to give choosers agency, make assumptions about people's cognitive and motivational abilities. If people cannot or are not motivated to engage with them, boosts will not be effective interventions. From the point of view of policy-makers, some boosts may lack cost effectiveness to the extent that they require choice architects to invest significant time and money. Yet boosts have the advantage – at least in theory – of producing more lasting behaviours (rather than short-term changes). The risk of imposing a one-size-fits-all solution on a heterogeneous population is smaller. They are more likely to offer competences that generalise beyond a benevolently designed choice architecture to commercially constructed and even toxic choice architectures. To the extent that boosts promote people's capacity to choose for themselves, they also have obvious advantages when measured against concerns for autonomy. Arguments in favour of boosts are clearly weakest when individuals have low levels of competence or motivation and when effective boosts would, from the point of view of the policy-maker, be costly to implement. Furthermore, boosts and nudges need to be evaluated against their intended as well as unintended adverse consequences.

Niches for boosts, nudges and both

Nudges and boosts are not perfect substitutes. For instance, no nudge has been proposed to reduce mathematics and test anxiety (Ramirez & Beilock, 2011; Berkowitz *et al.*, 2015) or to foster risk literacy (Gigerenzer *et al.*, 2007).

Conversely, to my knowledge, no boost has been designed to control vehicle speeding (cf. the nudge of painting narrower white lines on roads to create the visual illusion of speed; Thaler & Sunstein, 2008) or to increase students' enrolment in medical plans (cf. the nudge of automatic enrolment). Yet there are many behavioural domains in which policy-makers can choose between nudging and boosting, including the contexts of self-control problems (e.g. food choice), financial decisions and medical decisions. The rules outlined in this article are intended to give policy-makers some guidance in this choice. In many domains, the two approaches may well complement each other and thus amplify the desired behavioural effects. For instance, the redesign of school cafeterias could easily be combined with the provision of simple but smart food choice rules (Pollan, 2009).

Boosting does not equal more schooling

Although some boosts (e.g. expressive writing to reduce test anxiety and representation training for statistical information; Ramirez & Beilock, 2011; Sedlmeier & Gigerenzer, 2001) could easily be included in school curricula, boosting, as understood here, is not identical to traditional formal education and schooling for several reasons. First, boosts, like nudges, need to be rooted in empirical evidence. Each of the (small selection of) boosts outlined in this article has been informed by laboratory or field studies. Although what happens in the classroom is increasingly subject to empirical testing, it seems fair to say that not all instructional techniques are empirically validated. Second, the primary goal of boosts is not to offer accurate declarative knowledge and general procedural competences such as reading, writing, grammar and algebra. Instead, boosts offer competences in domains that school curricula either do not explicitly address or fail to deal with effectively (e.g. financial decision-making, healthy food choice, medical decisions, self-control problems, anxieties and specific risk assessment and prevention skills; Senn *et al.*, 2015). Finally, boosts should be able to enhance such procedural competences with limited time and effort, rather than through years of schooling.

Ongoing empirical evaluation

Let me conclude with an observation on the role of the behavioural sciences. The nudge approach has done the immeasurable service of drawing policy-makers' attention to the evidence mustered by the behavioural sciences. More such evidence is needed. In outlining the conditions under which nudging or boosting appear to be the more appropriate interventions, this article has raised a number of empirical questions. For instance, do specific nudges or boosts have unintended (from the choice architect's point of view)

adverse effects? What is the magnitude of any such effects? How do people respond when told about a specific intervention – with acceptance or resistance? These and related questions suggest that an ongoing evaluation of any such intervention is needed. Of course, the same also holds for policy interventions other than the non-regulatory and non-fiscal ones discussed here.

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