



Green nudges: Do they work? Are they ethical?☆



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ABSTRACT

Environmental policies are increasingly informed by behavioral economics insights. ‘Green nudges’ in particular have been suggested as a promising new tool to encourage consumers to act in an environmentally benign way, such as choosing renewable energy sources or saving energy. While there is an emerging literature on the instrumental effectiveness of behavioral policy tools such as these, their ethical assessment has largely been neglected. This paper attempts to fill this gap by, first, providing a structured overview of the most important contributions to the literature on pro-environmental nudges and, second, offering some critical considerations that may help the practitioner come to an ethically informed assessment of nudges.

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1. Introduction

Behavioral Economics has established itself as a vibrant new subfield in modern economics (Kahneman, 2011; Thaler, 2015).¹ This gives rise to the question whether – and if so, how – insights from psychologically informed economics may also be used to improve ecological and environmental economics, in the sense of a ‘Behavioral Environmental Economics’ (Shogren et al., 2010; Shogren, 2012), and what exactly such a new field would imply for public policy-making (Carlsson and Johansson-Stenman, 2012). That latter question concerns us here. It’s fair to say that until very recently, most theorizing in environmental economics faithfully conformed to the standard neoclassical model of rational choice (Shogren and Taylor, 2008).² Accordingly, environmental policy recommendations used to focus on incentive- and information-based regulatory instruments (Venkatchalam, 2008). Real-world

consumers, though, are motivated by more than incentives and information (Michalek et al., 2015).³

Departures from the standard model of rational conduct may even be particularly important in the sphere of environmental and resource economics: after all, well-functioning markets are rare in this domain. Moreover, risk, uncertainty and complexity characterize environmental issues, but also give rise to bounded rationality (e.g. Croson and Treich, 2014; Brown and Hagen, 2010; Van den Bergh et al., 2000). At the same time, policymakers increasingly recognize human behavior to be at the core of many complex environmental problems, such as, most prominently, global warming (Van der Linden et al., 2015; Kunreuther and Weber, 2014). Also, traditional incentive-based policies often face methodological issues and problems of political feasibility (Allcott, 2011). As a practical consequence, interest in what we will refer to as *behavioral environmental policies* (henceforth BEPs) has mushroomed: these are innovative policy tools that are designed with a specific focus on behavioral factors alien to the traditional homo economicus model, such as cognitive biases or limited willpower and attention (Beckenbach, 2015).⁴

A key policy instrument advocated in this context, and a subset of BEPs, are ‘green nudges’, a part of the well-known nudge agenda popularized by Richard Thaler and Cass Sunstein (Thaler and Sunstein, 2003; Sunstein and Thaler, 2003; Thaler and Sunstein, 2008; Sunstein, 2014a) and implemented by governments across the globe.⁵ The behavior of

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¹ Most economist readers can be assumed to be familiar with the key insights of Behavioral Economics; those interested in the details may be referred to the excellent surveys by Camerer and Loewenstein (2004) and Della Vigna (2009). Van den Bergh et al. (2000) give an outline of behavioral economics insights with a focus on their relevance for environmental economics prior to *Nudge*. See also Stern (1992). The contributions by Norton et al. (1998) and Söderbaum (1994) are particularly interesting as precursors of the nudge agenda, as they argue that environmental policies should try to exploit endogenous preference change.

² An important exception to that rule was Jack Knetsch, see, e.g. Knetsch and Sinden (1984), Knetsch (1989). See also Kahneman (1986) on contingent valuation and Kahneman et al. (1990) on the Coase Theorem. Winett and Ester (1983) provide an early survey of behaviorally informed energy policy 25 years prior to *Nudge*, and Abrahamse et al. (2005) survey research on interventions aiming at voluntary changes in energy use just before the nudge agenda entered the stage.

³ This is illustrated, for instance, by the notorious ‘energy-efficiency gap’ (Allcott and Greenstone, 2012).

⁴ To illustrate, the subsidy and tax schemes discussed by Allcott and Taubinsky (2015) in the context of energy efficiency policy qualify as BEP in our sense of the term. BEPs should be understood as a subset of behaviorally informed public policies (e.g. Chetty, 2015).

⁵ See in particular (ibid.: ch. 12) on green nudging, and Sunstein (2014a). On the nudge agenda’s global impact on practical policymaking see, e.g., Whitehead et al. (2014) and Hansen and Jespersen (2013: 4).

real-world individuals can be influenced by subtle modifications of their decision context – the surrounding *choice architecture* (henceforth CA) – that would leave rational individuals unaffected. In a nutshell, the CA summarizes the way choices are presented, framed and structured (Münscher et al., 2015). To nudge someone is to deliberately intervene in a given CA, without however changing monetary incentives or the option set itself. Nudges are widely regarded as potential complements to more traditional information- and incentive-focused regulation; the hope is that adding them to the policy mix may be both more effective and more popular among the general public than relying on traditional regulatory tools alone (Thaler and Sunstein, 2008: ch. 12).⁶ As Sunstein (2014a: 13) puts it, the general aim is to develop “sensible, low-cost policies with close reference to how human beings actually think and behave.” There is an important caveat, though: to the extent that they address or exploit cognitive biases, nudges have been criticized for the partly manipulative way in which they shape human behavior, and for their unclear welfare foundations: when individual preferences are incoherent or incomplete – i.e., when nudges are most effective – it’s tricky to identify those very behavioral changes that increase ‘welfare’. To be sure, this caveat applies to those nudges that are used paternalistically (e.g. Grüne-Yanoff, 2012).

While the exact definition of nudges is a matter of some controversy (Hansen, 2016; Rebonato, 2012), we can sidestep the philosophical issues and adopt the definition that can be found in Thaler and Sunstein’s own contributions (Thaler and Sunstein, 2008, Sunstein, 2014a, 2014b): nudges are purposeful changes of people’s CA that steer their behavior in certain directions without significantly changing their monetary incentives or coercing them. An important corollary is that “a nudge is any factor that significantly alters the behavior of Humans, *even though it would be ignored by Econs*” (Thaler and Sunstein, 2008: 8, emphasis added), where ‘Econs’ refers, basically, to homo economicus.⁷ Nudges are only effective in a behavioral world, where individuals exhibit limited mental resources, i.e. limited rationality, attention, and willpower, and where preferences are often not ‘given’, but rather ‘constructed’ (Slovic, 1995; Ariely et al., 2006). Hence, nudges are interventions that aim at altering people’s behavior by either harnessing their cognitive biases or responding to them, while keeping option sets and monetary incentive structures largely intact. Importantly, they are supposed to do so in a transparent manner (Thaler and Sunstein, 2008: 244). Note that the nudge agenda still lacks a satisfactory notion of ‘transparency’ (Hansen and Jespersen, 2013: 23–27, Bovens, 2009), an issue to which we will return at the end of this paper.

Our focus, then, is on *green nudges*, i.e., nudges that aim at promoting environmentally benign behavior. Green nudges are increasingly part of the environmental policy debate in many countries.⁸ We survey the

most important research on green nudges and reflect on their potential in fostering pro-environmental behavior in a way that is both effective and ethical. Many green nudges discussed in the literature target the quantity and quality of people’s *energy consumption*, hence aiming at energy conservation. In some instances, nudges of this kind have proved highly effective (relative to potential alternatives, such as incentives, information and education campaigns, or moral suasion): Consider a local utility in Southern Germany’s Black Forest that defaults its customers into using energy from renewable sources: unless they explicitly choose to opt out – which can be done at virtually zero cost – customers are provided with this ‘green’ energy (Pichert and Katsikopoulos, 2008; Sunstein and Reisch, 2013). Or consider *Opower*, a U.S.-based company that sends reports to households informing them, on a regular basis, about how their own energy use relates to their neighbors’ use. This program makes them save energy (Allcott, 2011; Allcott and Rogers, 2014). In many other contexts, though, the impact of green nudges appears to be rather limited and highly context-dependent.

This paper offers not only a structured overview of this rapidly growing research area – an overview that is necessarily incomplete, due to the dynamics of the field – but also a (preliminary) framework that allows us to come to an ethical assessment of green nudging.⁹ In our view, it’s important, when discussing the new fashionable toolbox’s effectiveness in promoting green behavior, not to lose sight of its ethical dimension: provided that green nudges *can* be used to encourage eco-friendly behavior, we have to ask whether they *should* be used to do so? A prima facie case for the use of green nudges can be made by pointing to people’s stated preferences: when polled, a large majority of citizens (at least in rich, industrialized countries) typically claim to support pro-environmental policies – without, however, always acting on those preferences (Pichert and Katsikopoulos, 2008; Allcott and Greenstone, 2012). On the other hand, there are *normative costs* associated with nudging that need to be taken into account – in particular in terms of well-being (e.g. Qizilbash, 2012), autonomy (e.g. Hausman and Welch, 2010), personal integrity (Schubert, 2015b), and societal self-legislation (Lepenies and Malecka, 2015; Furedi, 2011). After all, psychologically informed ‘marketing’ tools to influence human behavior have been around for quite some time now, and they are notorious for being used to make people act to the benefit of others (Shaw, 2016). When green nudges are discussed in the literature, normative costs typically only get a brief mention, often in footnotes, if at all.¹⁰ Sometimes, inaccurate claims on the ethical quality of nudges can be found when, for instance, Momsen and Stoerk (2014: 376f.) take nudges to be “uncontroversial” by virtue of being “unavoidable”, or when Croson and Treich (2014: 338) opine that nudges “do not seem to raise serious fairness concerns, as they are equally applied to all.”

The paper is organized as follows. Section 2 offers a taxonomy of nudges in general and green nudges in particular. Sections 3 through 5 discuss three important subsets of green nudges: those appealing to people’s self-image, those appealing to social conformism, and those that involve the modification of defaults, respectively. Section 6 suggests a way to assess the ethical quality of nudges, and Section 7 concludes.

2. Toward a taxonomy of (green) nudges

At the most basic level, nudges can be distinguished with respect to the ends pursued: these can be either paternalistic or non-paternalistic, i.e., they may aim at increasing the individuals’ own well-being (“save

⁶ See, e.g., Venkatchalam (2008), Brown and Hagen (2010), Croson and Treich (2014).

⁷ See the latest definition offered by Sunstein (2015b: 7). It’s also controversial whether the mere provision of information (as, e.g., with a GPS device) should qualify as a nudge (Hansen, 2016; Hansen and Jespersen, 2013). It would not if we replace the second half of the corollary mentioned above by “*even though it would be ignored by imperfectly informed Econs*.” Note that homo economicus, properly understood, is not necessarily ‘perfectly informed’ – (s)he merely processes any available information in a perfectly consistent manner.

⁸ See, e.g., for the OECD their project on “Behavioral and experimental economics for environmental policy”, <http://www.oecd.org/environment/tools-evaluation/behavioural-experimental-economics-for-env-policy.htm>, and OECD (2012), Lissowska (2011); for the EU the 2012 report of the European Commission’s Directorate for Health and Consumers, called ‘Green Behavior’ (European Commission, 2012), enlisting behavioral economics to outline pro-environmental policy initiatives: http://ec.europa.eu/environment/integration/research/newsalert/pdf/FB4_en.pdf. For the UK, see the famous ‘Nudge Unit’ and its approach to green nudging (‘Behaviour change and energy use’), in Behavioural Insights Team (2011). See also Behavioural Insights Team (2015). An overview on green nudges in the UK context is provided by RAND Europe (2012); see also House of Lords (2011), Dolan et al. (2012), and especially Halpern (2015). For France, see Oullier and Sauneron (2011). And for Germany, see Purnhagen and Reisch (2016). Very useful internet resources about nudging in general can be found at the University of Stirling’s Behavioral science blog, <http://economicpsychologypolicy.blogspot.com/>. See also <http://inudgyou.com/en> (based in Denmark), and the Norwegian GreenNudge foundation, at <http://www.greennudge.no/>. (All websites accessed august 20, 2016.)

⁹ See, e.g., Weber (2013), Croson and Treich (2014: 337–342), Ölander and Thøgersen (2014), and Lehner et al. (2016) for useful overviews of positive insights on green nudges (note, though, that some of the alleged ‘nudges’ those authors discuss are not genuine nudges). Lehner et al. (2016: 14–16) also have a brief, but somewhat unsystematic discussion on the ‘legitimacy’ of nudging. Sunstein and Reisch comment on the ethical quality of green nudges, albeit very briefly (Sunstein and Reisch, 2016: 24 f.). See also Sunstein (2016: ch. 7), focusing on the green defaults and active choosing.

¹⁰ See, for instance, Michalek et al. (2015: 2).

them from their own mistakes”) or at increasing social welfare, conceived more broadly.¹¹ Although green nudges may partly be justified on paternalistic grounds (e.g., people may save money by saving energy), for the sake of simplicity we will take them to belong to the non-paternalistic realm of applications.¹² Green nudges aim at encouraging pro-environmental behavior. In other words, they aim at encouraging people to voluntarily contribute to a public good, namely, environmental protection. It's ultimately about correcting market failures, and this makes them part of what Korobkin (2009) refers to as “Behavioral Welfareism”. Nagatsu (2015) refers to nudges that are used in a non-paternalistic way as ‘social nudges’. He offers in fact one of the very few ethical analyses of non-paternalistic nudging.¹³ Generally speaking, the ethical quality of nudges is a function, not only of the specific goals pursued, but also – and perhaps more importantly – of the specific (potentially ‘manipulative’) means employed to realize those goals.

A variety of lists of nudges are given in the literature, some of which lack consistency (as, e.g., Hausman and Welch, 2010 point out). It's uncontroversial, however, that the purposeful design of defaults, graphic images on billboards or cigarette boxes, manipulated road markings – near dangerous curves, for instance – social advertising invoking norms of conduct, ‘prompted’ (i.e., voluntary) choice, warnings, reminders, and brief cooling-off periods qualify as nudges. In our view, it should also be clear that disclosure requirements providing consumers with information in a perfectly neutral way (assuming that's possible) and measures that aim at ‘rational persuasion’ (Hausman and Welch, 2010) should not count as nudges, but rather as mere information policies that actually lack originality – and ethical complexity, for that matter. On the other hand, mandatory choice should not make it on the list either, for obvious reasons (Rebonato, 2012: 134–141).¹⁴ What's controversial, though, is whether nudges should be distinguished from what Grüne-Yanoff and Hertwig (2015) refer to as ‘boosts’, i.e., interventions that try to help people improve their decision-making by actually overcoming cognitive biases, rather than harnessing them.¹⁵

Given that the literature on green nudges is growing rapidly, we will focus on three variations of this policy tool that seem to be paradigmatic examples of the whole approach to public policy-making. Specifically, we will distinguish between

- (i) Green nudges that capitalize on consumers' desire to maintain an attractive self-image through ‘green’ behavior, by either simplifying product information or by making certain product characteristics more salient (example: eco-labels).
- (ii) Green nudges that exploit people's inclination to ‘follow the herd’, i.e. to imitate the behavior of their peers; this can be done, e.g., by conveying certain social norms through peer comparison (example: Opower's *home energy reports*, see below); it can also be done by stimulating social status competition through, e.g., encouraging consumers to signal green behavior to others.

¹¹ Paternalism is standardly defined as an intervention in an agent A's decision-making that (a) runs counter to A's manifest preferences and (b) is motivated or taken to be justified by increasing A's well-being (e.g. Dworkin, 2016). Note, though, the rather idiosyncratic understanding of the term in Thaler and Sunstein (2008: 5) and Sunstein (2014a: 53f.).

¹² Most nudges discussed in the literature can be (and have been) justified on both paternalistic and non-paternalistic grounds (e.g. Guala and Mittone, 2015). The relative weights of these grounds matter, a fact that complicates the analysis (e.g. Grill, 2007).

¹³ But see Sunstein (2016) for some thoughts on the ethics of nudging, especially (ibid.: ch. 7) on green defaults. Most ethical analyses of nudges focus on their paternalistic use – see, e.g., Bovens (2009), Fischer and Lotz (2014), Grüne-Yanoff (2012), Hausman and Welch (2010), Selinger and Whyte (2011).

¹⁴ On mandatory active choice see also Sunstein (2014b), Hedlin and Sunstein (2015), and Keller et al. (2011).

¹⁵ Note that some of the ‘green nudges’ described by Thaler and Sunstein (2008: ch. 12) do not qualify as genuine nudges, according to their own definition (Selinger and Whyte, 2011: 926f.). For instance, the U.S. ‘Toxic Release Inventory’ (ibid.: 201–03) works by providing firms with hard economic incentives – in the form of public reputation costs – to engage in pro-environmental behavior.

- (iii) Green nudges that exploit the behavioral effects of purposefully set defaults that stipulate what happens if people don't actively choose (example: energy providers offering green energy as default, see below).

Obviously, real-world examples may often transcend these analytic boundaries. Especially the boundary between (i) and (ii) is sometimes hard to draw – we suggest that green nudges belong to category (ii) as soon as their impact depends on the behavior in question being visible to others. Let's have a closer look at some representative examples of these kinds of nudges in the following three sections: Section 3 discusses our category (i), while Section 4 is about category (ii), and Section 5 is about category (iii).

3. People care about their self-image

You can motivate pro-environmental behavior by encouraging people to cultivate a positive self-image as considerate ‘pro-environmental consumers’. There are basically three ways to do so: you can either facilitate green behavior directly (by reducing cognitive costs), for instance, through simplifying the way information on certain product characteristics is provided (Section 3.1); or you can increase the salience of certain characteristics, thereby making consumers more aware of them (Section 3.2); finally, you can harness people's private sense of ‘social identity’ (Section 3.3). All this relates to the observation that consumers benefit from expressive utility (Sunstein and Reisch, 2014: 129f.): they sometimes select ‘green’ products in order to express – to themselves – certain values or to benefit from acting in accordance with their (idealized) self-image or self-understood identity. Ultimately, such interventions work by exploiting people's desire to maintain an attractive self-image, a desire deemed universal already by Adam Smith (1759/2009).¹⁶

3.1. Facilitating ‘green’ behavior

As behavioral economics tells us, real-world individuals often process information in a manner that differs markedly from the way homo economicus does. They disregard parts of it, absorb it in a biased way (in order to confirm their own prior beliefs, for instance), and they have a hard time dealing with probabilistic information. In our present context, what matters is that environmentally relevant information – on characteristics of complex products, say – is often presented in a way that does not take account of the processing capacities of real-world human beings (Lehner et al., 2016: 4–5). As Artinger et al. (2015: 207) put it, the key question is “how to structure information in an appropriate way so as to encourage pro-environmental behavior”.

Framing effects can also be exploited to encourage green behavior, if indirectly: to the extent that changing people's food consumption qualifies as pro-environmental policy (e.g. consuming meat contributes more to global warming than alternative choices), the cafeteria layout modifications famously suggested by Thaler and Sunstein (2008: 1–3) can be seen as a green nudge as well (Rozin et al., 2011). Nudging consumers to choose vegetables rather than beef, for instance, facilitates green behavior by reducing the mental effort needed to exercise self-control. Nudges can also reduce waste: Kallbekken and Sælen (2013) show that manipulating hotel guests' CA at the breakfast buffet can make them waste less food. Nudges in this domain may be superior to mandatory measures, as Lombardini and Lankoski (2013) show:

¹⁶ Bolderdijk et al. (2013) present field-experimental evidence that in the context of energy conservation by regular tire pressure checks appeals to ‘biospheric’ concerns are more effective than appeals to monetary self-interest, a fact that they explain by the former's ability to help consumers maintain an attractive self-image; see however Nolan et al. (2008) and Ecologic Institute (2015) for somewhat contrary evidence.

students in Finland responded to mandatory ‘vegetarian days’ in school canteens by having lunch outside!

3.2. Eco-labelling

Eco-labels are a key instrument in providing consumers with information about product characteristics deemed essential for environmentally responsible behavior. They are also an important subset of green nudges insofar as they impact behavior by increasing the *salience* of certain product characteristics, which makes consumers more aware of them.¹⁷ That implies that labels that simply inform consumers about product characteristics in a perfectly neutral way (without making use of psychological knowledge about salience effects, for instance) don’t qualify as nudges, since they would also influence the choices of homo economicus, properly understood.¹⁸

Eco-labelling also serves to confer a certain social value on environmentally relevant characteristics, at least insofar as pro-environmental behavior is in fact socially approved in the given socio-cultural context (Félonneau and Becker, 2008).¹⁹ Eco-labels can of course also be used to convey social norms, thereby activating herd behavior (see Section 4, below). The same applies to providing energy users with simple feedback regarding their current energy consumption, for instance, with the help of smart meters (Carroll et al., 2014; Joachain and Klopfer, 2014).²⁰

As traditionally understood, product labelling relies heavily on the assumption that consumers make rational choices when purchasing goods and services, which presupposes that they process any available information in a perfectly consistent, logically sound manner. Hence, providing them with additional information necessarily improves their choices.²¹ In the real world, though, things are not that simple. First of all, consumers may be attached to their daily routines and habits and unwilling to change these even when perfectly informed about, for instance, the environmental downside of the goods and services purchased (e.g. Spaargaren et al., 2013). Second, due to their limited mental resources, human beings may perceive product characteristics in a biased way – for instance, they may fail to pay sufficient attention to the long-term consequences of their choices, such as the long-term costs of heavily fuel-consuming cars.

Consider fuel-efficiency: the relevant benefits associated with purchasing fuel-efficient cars apparently lack salience – which calls for labels designed to make information on a car’s fuel-efficiency more prominent (Sunstein, 2014a: 65–67, 140–42). To generalize, ‘carbon footprints’ could be displayed, in a vivid fashion, on all sorts of consumer goods, thereby raising consumers’ awareness of this specific, and typically invisible, bundle of characteristics (Thaler and Sunstein, 2008: 206f.). For example, a household’s daily energy consumption may be made more salient by means of the ‘Ambient Orb’, a little plastic ball that changes color in sync with incoming real-time data of any kind – in our context, it could be used to serve as a feedback device signalling, e.g., the working load of the power grip by turning green, when the grid

¹⁷ An attribute of a given good is salient if, for some reason, it ‘stands out’ relative to the good’s other attributes. More technically, salience refers to the phenomenon that “when one’s attention is differentially directed to one portion of the environment rather than to others, the information contained in that portion will receive disproportionate weighting in subsequent judgments” (Taylor and Thompson, 1982: 175). The relevance of saliency in the impact of energy conservation policies should not however be overemphasized (Lynham et al., 2016).

¹⁸ See footnote 7, above.

¹⁹ Eco-labelling is a key issue already in Thaler and Sunstein (2008: ch. 12). There is extensive research on the behavioral impact of eco-labels in the context of food consumption (e.g. Brécard et al., 2009).

²⁰ See Delmas et al. (2013) for a comprehensive meta-study on experiments testing the behavioral impact of feedback provision.

²¹ Typically, it also improves markets’ allocative efficiency by reducing information asymmetries. Behavioral Economics plays an important role in increasing the efficacy of product labelling (or environmental information campaigns more generally, see Asensio and Delmas (2016)).

is underused and red during peak hours.²² Increasing people’s awareness of certain effects of climate change may also be a key to make the median voter care more about the issue of global warming – the status quo has her less involved, for people tend to lack the practical experience of immediate consequences, on a personal level, of climate change (Van der Linden et al., 2015).

In order to design effective eco-labels in the future, it’s obviously important to identify what went wrong with previous attempts to influence consumer decisions in this way. Consider the European Union’s mandatory energy labelling scheme for electrical appliances, introduced in 1995, that aimed at encouraging consumers to switch to energy efficient products. It rated appliances on a seven-point colored scale in terms of energy efficiency, ranging from A (or green) to G (or red).²³ After about 90% of refrigerators, dishwashers and washing machines had reached level A in 2003, the scheme was redesigned: new classes beyond the former A were introduced, ranging from ‘A+++’ to ‘A+’. This revision backfired, though, because consumers apparently took ‘A’ as the new reference point or *anchor*, perceiving all categories with an A as more or less identical. As a result, consumers were less likely to choose the most energy-efficient appliances.²⁴

Finally, it’s worth mentioning that the responsiveness to eco-labels seems to be mediated by ideological priors: as Gromet et al. (2013) found out, politically conservative consumers were less likely to go for a (more expensive) energy-efficient light bulb when it was labelled with an environmental message than when it contained no label at all.

3.3. Harnessing social identity

Encouraging people to reduce waste and littering is another obvious end of green nudging. One of the most successful applications of green nudges to reduce littering, specifically on highways, is the ‘Don’t mess with Texas’ social advertising campaign, initiated in 1986.²⁵ It is estimated that the campaign significantly contributed to a reduction in littering on Texas highways by about 70% between 1986 and 1990 (Mols et al., 2015: 93). Evidently, the slogan targets people’s (especially young men’s) sense of community pride, framing littering as a kind of behavior ‘true’ Texans find unacceptable (see also Grasmick et al., 1991). It seems that the effectiveness and sustainability of this particular nudge is largely due to its impact on people’s self-understanding or *social identity*, making people internalize a specific social norm (Mols et al., 2015).²⁶

4. People follow the crowd

Generally, perceiving what other people do – either directly or indirectly, through information given by a third party – has a powerful influence on agents’ behavior (Nolan et al., 2008). This disposition to follow the crowd is probably genetically hard-wired, as it served basic interests of the ancestors of modern man (Van Vugt et al., 2014). The insight that human beings are inherently social animals characteristically endowed with ‘other-regarding’ preferences – rather than the claim that people make ‘mistakes’ – may be behavioral economics’ actual key contribution to the social sciences (Gowdy, 2008). Artinger et al. (2015: 204) refer to

²² See Thompson (2007), “Desktop Orb could reform energy hogs”, <http://www.wired.com/2007/07/st-thompson-5/> (accessed august 20, 2016). While Hausman and Welch (2010: 127f.) opine that the Orb is a ‘reminder’ rather than a genuine nudge, we follow Selinger and Whyte (2011) in arguing that by virtue of working through impacting people’s moods, the Orb does qualify as a nudge.

²³ See Ölander and Thøgersen (2014: 345–349) for this paragraph.

²⁴ The specific experiment run by Ölander and Thøgersen involved TV sets. See Heinzle and Wüstenhagen (2012) for similar evidence from Germany.

²⁵ Thaler and Sunstein (2008: 64 f.). It was designed by a private advertising firm; the very first TV spot featured Stevie Ray Vaughan. See <http://www.dontmesswithtexas.org/about/> (accessed august 20, 2016).

²⁶ We include this in Section 3 (rather than 4), since the campaign’s effectiveness does apparently not depend on individuals *visibly* following a social norm. See footnote 32, below.

the underlying rule of thumb as the ‘imitate-the-majority heuristic’: depending on the specific social environment, it may serve the individual well or poorly. What matters is whether the human mind and the situational context fit together – or, to paraphrase Simon (1956), whether two blades really form a scissors.

There are a variety of ways to harness this basic human characteristic in the interests of promoting green behavior. You can communicate social norms about approved or disapproved choices, thereby harnessing people's desire to conform to social expectations, to draw ‘moral utility’ from that fact (Levitt and List, 2007), and to engage in conditional cooperation (Fischbacher et al., 2001); this can be achieved by offering peer comparisons, for instance (Section 4.1). In appropriate contexts, one may go one step further and encourage consumers to even more openly display their pro-environmental behavior, thereby fostering a specific kind of social status competition (Section 4.2).

4.1. Offering peer comparisons

How can the social dimension of human behavior be exploited for the pro-environmental cause? First of all, we should distinguish between *descriptive norms* that merely inform consumers about the prevalence of certain behaviors among their peers (providing some kind of decisional shortcut), and *injunctive norms* that directly convey to them a normative message about what constitutes commonly (dis)approved and potentially sanctioned conduct in their respective socio-cultural context (Cialdini and Trost, 1998; Cialdini, 2003). Currently, most research about green nudging focuses on the former, i.e. on how, e.g., eco-labels may be used to communicate descriptive norms. Beyond that, the behavioral impact of descriptive norms has been studied in the context of littering and recycling (Cialdini et al., 1990; Schultz, 1999), transportation behavior (Kormos et al., 2015), and energy conservation (Kantola et al., 1984). Let's have a look at the two most important cases of peer comparison-based green nudges discussed in the literature so far:

- An Arlington, Virginia-based company called Opower and its partnering energy providers have offered the setting for what is perhaps the best known field experiment on the impact of descriptive norms so far.²⁷ The goal is to induce consumers to save energy.²⁸ Allcott (2011: 1082) describes the series of experiments, initiated in 2008, as “one of the most notable non-price energy conservation programs.” About 600,000 households across the U.S. participated in the treatment and control groups. The former received *home energy reports* (HER), at least quarterly, containing data on their energy consumption relative to their neighbors.²⁹ These reports qualify as descriptive norm messages to the extent that they present the data in a way that draws people's attention to the existence of a social norm to save energy – which suggests, albeit indirectly, that following that norm is normatively expected (Schultz et al., 2007).³⁰ Overall, messages of this kind have proved moderately successful in reducing energy consumption: Allcott (2011: 1093) reports that the average treatment effects range from 1.4 to 3.3% of baseline usage,

which according to him corresponds to an 11 to 20% short-run and a 5% long-run price increase (ibid.).

- Another much-cited case study concerns *towel reuse* by hotel guests, i.e. indirect water conservation. As Goldstein et al. (2008b) showed, communicating descriptive social norms may be an effective means to motivate guests to reuse their towels (instead of having them changed daily), thereby avoiding unnecessary laundering: placing a note into the bathroom of a given hotel indicating the overall percentage of clients who reuse their towels (“Join your fellow guests in helping to save the environment”) caused an increase in the rate of reuse from 35.1 to 44.1%, as compared to a setting where guests were only informed about the environmental benefits of towel reuse, without reference to social comparison (Goldstein et al. 2008a). Towel reuse could be boosted even more by communicating, as a fact, that ‘75%’ of other hotel guests reused their towels (ibid.). It is worth noting, however, that the percentages communicated to hotel guests in this particular psychological study were not necessarily truthful – that's an issue of obvious ethical concern to which we'll come back below, in Section 6.

Bohner and Schlüter (2014) tried to replicate the results reported by Goldstein and coauthors. In two German hotels, they were unable to confirm the findings that descriptive norm messages (deceptively claiming that ‘75%’ of other guests reuse towels) were more effective than simple messages appealing to environmental concerns.³¹ A meta-study prepared for the European Commission concludes from these and other studies that direct appeals to consumers that explicitly mention the environment are relatively ineffective and should therefore be avoided when designing green nudges, concluding: “Don't mention the environment when trying to make people act more green.” (Ecologic Institute, 2015).³²

4.2. The pitfalls of peer comparison

There are three important caveats that have to be accounted for when devising green nudges that capitalize on people's desire to follow the herd. First of all, with respect to energy conservation (Opower's HERs), the behavioral impact, while positive, was hardly persistent – Allcott and Rogers (2014) identify a ‘cyclical pattern of action and backsliding’ that however attenuates over time, generating moderate reductions in energy use.³³ Apparently, it takes time for recipients to establish a corresponding habit to save energy (Michalek et al., 2015: 15f).

Second, again regarding energy conservation, household's responsiveness seems to depend critically on their personal ideological priors: as Costa and Kahn (2013) found out, the effectiveness of HER depended on whether a given household identified as Democrat or Republican. While descriptive normative messages made the former reduce energy use by 3.1%, it only lead to a 0.7% reduction among Republican-leaning consumers. Conservatives as well as high-electricity users also were more likely to dislike the home energy reports or to claim that they were ‘useless’ (ibid.: 696). Hence, ideology seems to mediate the responsiveness to peer-comparison-type green nudges, thus indicating how they should be targeted to specific groups in order to be made more effective. This reflects what we have seen with respect to

²⁷ Being, as of 2011, the “largest randomized field experiment in history” (Allcott, 2011: 1082), it was directly inspired by Schultz et al. (2007) and Nolan et al. (2008). In turn, it has informed the most highly ranked journal articles in the area of green nudging, to wit, Allcott (2011), Costa and Kahn (2013), and Allcott and Rogers (2014).

²⁸ As Allcott and Rogers (2014: 3004) explain, profit-maximizing utilities participate in these programs in order to comply with state energy conservation requirements.

²⁹ A sample is given in the appendix of Costa and Kahn (2013: 698f.). The particular HER discussed by the authors compares the household's own energy consumption with the usage of (a) all neighbors with similar-sized homes and heat type, (b) neighbors who are in the bottom 20th percentile of electricity usage, and (c) the household itself in the same month a year previously. Moreover, the report provides personalized tips for conserving energy (ibid.: 682).

³⁰ A similar program had been implemented in Helsinki/Finland from 1989 through 1992, decreasing energy use by 1–1.5% (Arvola et al. (1993). See also the survey by Darby (2006).

³¹ They were also unable to replicate Goldstein et al.'s findings that the effectiveness of a norm message varied with both the proximity of the reference group (‘other guests in this hotel’ vs ‘other guests in this room’) and temporal proximity (‘currently’ vs ‘two years ago’).

³² One might object that peer comparison does not belong to our category (ii), according to our approach to delineate this category (see above). Note though that its impact depends on the fact that one's own energy use is visible to *someone* – in this case, the energy provider.

³³ Intuitively, consumers immediately react to a HER, but these efforts decay after a while, unless the treatment is repeated (ibid.).

ideologically mediated responsiveness to green nudges in the case of eco-labels (see above, Section 3.2).³⁴

Third, regarding both energy and indirect water conservation, some studies report a 'boomerang effect': those households that, ex ante, consumed below average levels of energy or water actually *increased* their consumption after receiving the norm messages. This should not come as a surprise: when people are given the information that some undesired ('gray') behavior is in fact quite common among their peers, this may lead them to increase their own propensity to engage in that very behavior. In that case, knowledge about the descriptive norm seems to provide agents with a 'moral license' to keep engaging in gray behavior (Cialdini et al., 2006). Alternatively, this phenomenon may be seen as resulting from what social psychologists refer to as 'normalization': individuals move closer to the norm they perceive as currently prevailing among their peers (Sherif, 1935).³⁵

There are basically two ways to counter this boomerang effect: first, one may complement the descriptive norm with an implicit injunctive norm, e.g., by printing smiling faces on comparative energy reports when energy consumption turns out to be below average (and frowning faces otherwise). Conveying social (dis)approval in this manner apparently reversed the boomerang effect in the case of the Opower experiment (Allcott and Rogers, 2014).

The second option has been suggested by Demarque et al. (2015): they present evidence that the boomerang effect can be countered by conveying injunctive norms in an implicit manner, to wit, through the sophisticated framing of descriptive norms about minority behavior. Specifically, they propose to exploit the linguistic polarity characteristics of verbal and numerical qualifiers. To illustrate, one may present a given descriptive norm using words such as 'a few', 'some', 'at least', 'more and more' or 'almost' (as in: "A few hotel guests decide to reuse towels..."). These are verbal quantifiers with a *positive* polarity in that they make people think about reasons *for* performing the behavior in question. In contrast, words such as 'not all' or 'at most' draw attention to reasons *against* performing the behavior. Demarque et al. (2015) present experimental evidence – using an online shopping interface for buying groceries, with real financial stakes involved – demonstrating that even non-prevailing behavior can be successfully encouraged by providing truthful descriptive norm messages, but systematically framing them in the way described.

Other areas where descriptive norms and peer comparisons were tried out include the use of fans instead of energy-intensive air conditioners and direct water conservation. As to the former, Nolan et al. (2008) showed that, among four alternative measures to encourage households to switch to fans – to wit, messages referring to environmental protection, intergenerational social responsibility and material self-interest, respectively, and descriptive norms – the latter intervention proved most effective: it involved informing people about the high percentage of households in their neighborhood that had already switched to fans ("The most popular choice in your community!").³⁶ Nolan et al. (2008) report a reduction in energy use of about 10% due to what they refer to as 'normative social influence'.

As to the latter (direct water conservation), a field experiment with about 100,000 randomly selected households in the metropolitan area of Atlanta, Georgia, in 2007, provided evidence that those households were most responsive to descriptive norm messages that were relatively wealthy, owner-occupied and exhibiting above-average water use

(Ferraro and Miranda, 2013).³⁷ In contrast to Schultz et al. (2007), the authors did not find any evidence for people responding with an *increase* in 'gray' behavior (i.e., the boomerang effect).³⁸ Nonetheless, any behavioral impact waned over time. Ferraro and Miranda (2013) conclude that norm-based messages should target those subgroups known to be most responsive, thereby making the program cost-effective (ibid.).

4.3. Encouraging social status competition

You can go one step beyond appealing to social conformism by encouraging people to signal their pro-environmental behavior to others, thereby stimulating social status competition. The behavioral impact of 'social comparisons' on energy consumption has been studied for decades – one pioneering study being Midden et al. (1983).

As we have seen, expressive considerations involve people's self-image – they may, however, also involve *signalling to other people*: consumers then wish to signal their values and commitments to their peers or other people in general, and that desire may influence their choices. In our present context, they may engage in *conspicuous conservation* (Griskevicius et al., 2010; Sexton and Sexton, 2014). To be sure, in order to be useful for social status signalling, the respective green behavior must be sufficiently visible: a classic example is the purchase and use of Toyota's hybrid car, the Prius (ibid.). Stickers that tell others about the fuel efficiency of one's own car are another way to express and signal one's green credentials (Thaler and Sunstein, 2008: 204f.). The desire for social status may be harnessed through, first, communicating a specific social norm that prevails among the relevant peer group (a descriptive norm, see above), in order to, second, encourage some kind of competition that rewards those who score best in light of that very social norm. Generally, implementing some kind of rivalry in the context of environmentally relevant behavior has turned out to be a highly effective green nudge (e.g. Bühren and Daskalakis, 2015).³⁹

Depending on the specific application, it may only take one step (or rather mouse-click) to go from mere descriptive norm communication to social status competition: consumers might, for instance, be encouraged to communicate their 'Ambient Orb' data via Facebook (Thompson, 2007). Thaler and Sunstein (2008: 207f.) introduce an idea they attribute to New York Times columnist John Tierney: people might be encouraged to wear a piece of jewelry (such as a lapel pin) endowed with a signalling device that changes color dependent on their personal carbon footprint: how much electricity they use, how many airplane trips they make etc. Tierney suggests to label the device the 'IPed'.⁴⁰ Note two interesting aspects of the kind of 'friendly competition' this would imply (Thaler and Sunstein, 2008: 207). First, it avoids the problem that notoriously besets many kinds of status competition, to wit, their tendency to usher in zero-sum outcomes (Frey, 2008: 171f.). Second, the IPed may not only prove effective in achieving its goal – to reduce people's carbon footprint – but also contribute to a better informed and more rational public discourse on the causes of global warming: people may start realizing, for instance, that "recycling glass bottles and avoiding plastic bags at the grocery store will not offset your car's emissions" (Tierney, 2008).⁴¹

³⁴ See Torgler and Garcia-Valinas and Torgler (2007) and van den Bergh (2008) for earlier studies on the role of individuals' socio-demographic characteristics more generally in the context of environmental policy.

³⁵ The general lesson is worth noting: "If environmentalists lament the fact that few people are choosing green energy, they may aggravate the problem by drawing attention to, and thus reinforcing, a social norm that they hope to change" (Sunstein and Reisch, 2014: 129).

³⁶ Interestingly, descriptive norms had been anticipated to be the 'least motivational' of the four interventions by the very same San Marcos/California residents in a prior study. People seem to be unable to infer the true cause of their own behavior (ibid.).

³⁷ Specifically, messages combining technical information, moral suasion and peer comparison proved to have the most markedly heterogeneous impact. Alternative interventions consisted of either 'pure technical information' or 'weak social norm messages' without peer comparison (ibid.).

³⁸ Which, in this case, would have meant increasing one's water consumption.

³⁹ See also Thaler and Sunstein (2008: 208).

⁴⁰ See Tierney (2008), available at: http://www.nytimes.com/2008/03/25/science/25tier.html?_r (accessed august 20, 2016).

⁴¹ The effectiveness of exploiting social status competition is apparently not confined to Western cultural contexts, as shown by the behavioral responses of farmers in China's Wolong Nature Reserve, studied by Chen et al. (2009) in the context of participation in a 'payment for ecosystem services' (PES) program.

5. People stick with the default

You can motivate pro-environmental behavior by carefully setting the default, i.e., the option that prevails when people don't engage in active choice.⁴² This is a paradigmatic example of a behaviorally effective redesign of agents' CA.⁴³ People often dislike to engage in active choice, which adds to their bounded rationality (Beshears et al., 2008). Setting 'green defaults' has been shown to be a particularly powerful example of a green nudge whose impact has even been shown to be largely independent of pre-existing personal environmental attitudes (Vetter and Kutzner, 2016). Specifically, default changes can be used to increase enrollment in green energy provision (e.g. Sunstein and Reisch, 2014, Toft et al., 2014).⁴⁴

5.1. Examples

Pichert and Katsikopoulos (2008) demonstrate the behavioral impact of default changes with two natural field and two lab experiments. The first natural experiment took (and still takes) place in the small town of Schönau, located in southern Germany's Black Forest region. Schönau is characterized by a rather politically conservative population of about 2500, with above-average income levels. In the years following the Chernobyl accident in 1986, there were heated debates about whether a local environmental initiative should buy and run Schönau's electricity grid and the local energy provider, EWS. In 1998, the initiative won a respective vote by a narrow margin, and changed EWS' energy default to 'green' energy sources. In 2006, more than 99% of electricity meters were still supplied by EWS, and this number has hardly changed since (Sunstein and Reisch, 2014; Pichert and Katsikopoulos, 2008). Note that in 2016, about 16% of German energy providers automatically enroll their clients in green energy sources (Sunstein and Reisch, 2016: 5). Lab experiments confirmed the general hypothesis that people are more likely to choose the green option when that option is presented as the default relative to when it is presented as an alternative (Pichert and Katsikopoulos, 2008). The second natural experiment involved 'Energiedienst GmbH', an energy provider supplying a grid in southern Germany. In 1999, it introduced a green default along two alternatives, to wit, a slightly cheaper grey option and a more expensive, even 'greener' option.⁴⁵

The power of default changes has also been demonstrated with respect to the choice between incandescent light bulbs and (more energy-efficient) fluorescent bulbs (Dinner et al., 2011). In that purely experimental study, though, defaults turned out to be rather less sticky than in the natural field experiments reported above. Ölander and Thøgersen (2014) report on the behavioral impact of default changes in the context of the adoption of Smart Grid technologies in Danish consumers' homes. Smart Grids are a prerequisite for expanding the share of renewable energy sources: they allow consumers to track their electricity use in real time and energy pricing to directly reflect the amount of power used during different times of the day. This comes at a normative cost, though: part of the electricity consumption is remotely controlled by the energy provider, which may raise privacy concerns.⁴⁶

Other examples include the switch to double-print settings in printing machines at Rutgers University (New Brunswick, New Jersey),

which saved the equivalent of 620 trees in a single semester (Oullier and Sauneron, 2011: 4),⁴⁷ and the choice to participate in carbon offset programs, where evidence shows that consumers (in this particular case: conference participants traveling by plane) were more willing to pay for measures that compensate for the impact of their own consumption on CO₂ emissions if the default option was the opt-out option, i.e., if the conference fee already included the – optional – contribution to a carbon offset policy (Araña and León, 2013).

5.2. Psychological factors behind the power of defaults

Simplifying somewhat, three basic psychological factors have been suggested to be causally responsible for the behavioral impact of defaults: inertia, loss aversion, and implicit recommendation.⁴⁸ Note, though, that sticking with whatever default is in place does not necessarily reflect bounded rationality; it may rather be perfectly rational in that it may save time and effort, especially when the default allows one to bypass potentially awkward trade-offs between (in our present context) money and some environmental goal (Pichert and Katsikopoulos, 2008: 65). Identifying which of these factors does in fact make defaults such a powerful force in shaping people's behavior is not only important for the technical design of this particular green nudge – it also matters for their ethical assessment, as we will see in Section 6, below.⁴⁹

- Quite obviously, *inertia* (behavioral economics' 'status quo bias') may play a role: people may sometimes be unwilling to get up and focus on the relevant trade-offs between, say, some environmental goal and immediate monetary savings. Such trade-offs may also be complex or even morally charged. In other words, a non-trivial 'cognitive effort tax' may be involved, and people may wish to avoid that. Brown et al. (2013) were able to demonstrate that factor when studying the behavior of OECD employees (in Paris) during the winter months: a one degree Celsius decrease in their offices' thermostat settings caused a significant reduction in energy use. People didn't much care and avoided the trivial effort to correct the settings. A two-degree reduction, however, backfired in that it motivated employees, now shivering, to overcome their inertia and to reset the thermostat. In other words, only the 2 degree reduction made employees reveal their underlying preference with respect to desired room temperatures. Discomfort leads people to overcome their inertia and engage in active choice, which has the important implication that sometimes, larger default changes may result in less effective green nudging (Brown et al., 2013).
- People may stick to the default because of *loss aversion*: in that case, the default seems to establish a reference point, making people perceive it as some kind of endowment, and opting out of the default as involving the loss of that endowment.⁵⁰ Since people dislike losses far more than they like objectively identical gains, and the default rule in place determines what counts as a loss and as a gain, this implies that the default will stick. Pichert and Katsikopoulos (2008: 69f.) provide some confirming experimental evidence when showing that in the lab, people's willingness to accept foregoing green electricity systematically exceeded their willingness to pay for the green option. The power of loss aversion is also nicely illustrated by Homonoff

⁴² See Carroll et al. (2009) for a formal model of optimal default design.

⁴³ It should however not be trivialized as just another case of information framing, as done, e.g., by Pichert and Katsikopoulos, 2008: 66.

⁴⁴ See on defaults generally Smith et al. (2013).

⁴⁵ Ebeling and Lotz (2015) provide further evidence on the behavioral impact of default changes, using a RCT with a German energy provider and about 40,000 households.

⁴⁶ The European Union's 'Third European Energy Liberalization Package' aims at having smart meter systems installed in 80% of European households by 2020. See Directive 2009/72/EC of the European Parliament and the Council of 13 July 2009, available at: <https://www.energy-community.org/pls/portal/docs/1164180.PDF> (accessed august 20, 2016).

⁴⁷ See also Egebark and Ekstrom (2013) for a related example from a Swedish university, noting that default modification had a much larger impact than moral suasion, education, and even a 10% tax on paper products (ibid.).

⁴⁸ See Sunstein and Reisch (2014: 140–144) for an overview and Smith et al. (2013) for a much more detailed elaboration. We abstract from a fourth potential factor, namely, 'anticipated guilt', that has been suggested by Theotokis and Manganari (2014) to be powerful in the context of environmental defaults.

⁴⁹ See also Fischer and Lotz (2014).

⁵⁰ Technically, loss aversion refers to the phenomenon that an agent's utility depends on her reference point, i.e., it matters whether one arrives at a certain endowment by gaining some amount or by losing some amount.

(2013), finding that charging a \$0.05 tax on grocery bags had a significant negative effect on bag use, while a \$0.05 bonus for using reusable bags had essentially zero impact.

- People may perceive the given default as an *implicit endorsement* by some external authority (McKenzie et al., 2006). Many people appear to think that whatever default is in place, it has been chosen for a (good) reason. This holds especially when people lack expertise or relevant experience or when the product in question is complex (note that all these typically apply in the environmental context). Importantly, trust plays a key role when implicit endorsement is involved (Sunstein and Reisch, 2014: 141). It should be noted, though, that the effect of default settings seems to attenuate with the nudgees' experience, as shown by a study testing the way environmental and resource economists reacted to default settings (concerning a CO₂ offsetting program) at the 2008 annual EAERE conference in Gothenburg/Sweden (Löfgren et al., 2012).⁵¹

6. Towards a framework to assess the ethical quality of green nudges

Given the popularity of behavioral environmental policies and, particularly, green nudges in contemporary academia and policy circles, it's remarkable that the ethical aspects of green nudging (as opposed to the ethical aspects of paternalistic nudges) are seldom discussed – despite the widely shared insight that, as Croson and Treich (2014: 342) put it, “understanding the risks and concerns involved with any intervention is pivotal to ensuring its appropriate implementation.”

How could a conceptual framework look like that allows us to assess, in a systematic way, the ethical quality of green nudges? First of all, we have to distinguish between nudges and choice architecture: nudges are *intentional modifications* of parts of the CA.⁵² Why is this distinction ethically relevant? While the behavioral impact of any given CA is unavoidable and, as such, hardly criticizable (a fact repeatedly stressed by Thaler and Sunstein), nudges themselves, let alone paternalistic ones, are often avoidable: note, for instance, that a given CA may be the product of an impersonal process of spontaneous ordering, or it may be possible to replace nudges by non-nudges such as mandatory choice.⁵³ Second, the behavioral *effectiveness* of a given green nudge – whose exact determination is often marred by methodological issues (Grüne-Yanoff, 2016) – enters any ethical assessment as a matter of course. Given the urgency of problems such as global warming, ineffective nudges are unethical: they might be implemented by self-interested policymakers to simulate problem-solving activity, to the detriment of genuine policy solutions (Cookson, 2013; Schubert, 2017).

Beyond the questions of inevitability and behavioral effectiveness, we suggest to proceed in four steps. First, we clear the ground with respect to the legitimacy of non-paternalistic nudging in general (Section 6.1); then, we examine the objections claiming that nudging compromises people's ‘autonomy’ (Section 6.2), and the objections concerning nudges' impact on ‘self-legislation’ and the character of public democratic deliberation (Section 6.3). Finally, we briefly discuss the fairness of green nudges (Section 6.4). Keep in mind that despite the aim to ‘systematize’ them, the considerations discussed below should not be understood as inputs in any kind of quasi-algorithm that allows us to somehow compute – *more geometrico* – the ethical quality of a given nudge. The latter will always depend on intricate value trade-offs whose solution, in a democratic setting, is ultimately up to the citizens themselves (Schubert, 2014).

⁵¹ EAERE stands for the ‘European Association of Environmental and Resource Economists’.

⁵² See the Introduction, above, on the definitions.

⁵³ Given the existence of spontaneously evolved CAs, the very term *choice architecture* may be misleading. The key distinction between CA and intentional modifications of CA is often neglected in the literature on nudges in general, and green nudges in particular (e.g. Momsen and Stoerk, 2014: 376f.).

6.1. On the ends of non-paternalistic nudging

Nudging can be assessed with respect to the ends pursued or with respect to the characteristic means used to realize those ends. Perhaps surprisingly, it's the *ends* pursued that seem to dominate people's attitude toward nudging in general (Tannenbaum et al., 2014), which, in our present context, is reflected in the observation that sometimes, people generally in favor of a pro-environmental agenda are more supportive and responsive to green nudges than people not so predisposed (Attari et al., 2009; Costa and Kahn, 2013). While quite a few studies have explored people's attitudes toward paternalistic nudges, to the best of our knowledge only Reisch and Sunstein (2016), Hagman et al. (2015) and Sunstein (2015a) have so far studied attitudes toward non-paternalistic nudges.⁵⁴

As to the Reisch and Sunstein study, they find majority support for most nudges presented to those polled (in six European nations); perhaps more importantly, they find that support for a given nudge is critically dependent on the support for the specific ends pursued. As to Hagman et al., comparing answers by U.S. and Swedish respondents, they find that of the two green nudges included in their questionnaires – to wit, peer comparisons aiming at energy conservation, and defaults on participation in a carbon offsetting program – the former was deemed acceptable by a majority in both countries, while the latter gained only majority support among Swedes.⁵⁵ Sunstein (2015a: 9–13) reports similarly mixed results on whether U.S. citizens accept green defaults: while a majority across partisan lines supported those fostering renewable energy, defaulting people into participation in a carbon offsetting program was clearly rejected.

The most important distinction concerns the question whether paternalistic or non-paternalistic ends are pursued, i.e., whether the goal is to increase the individual's own welfare or social welfare in general. Most ideas to put nudging into practice aim at the former, as indicated by the name of the normative program that is typically associated with nudges: ‘Libertarian Paternalism’. Paternalistic nudging faces a lot of objections – such as the violation of consumer sovereignty (and, closely related, the condescending attitude that comes with it), the pretense of knowledge involved, or the unclear welfare foundations – that have been extensively discussed elsewhere.⁵⁶ As stated in the Introduction, we understand green nudging as exclusively non-paternalistic in nature.

Green nudges, then, aim at increasing social welfare. We know, however, that talking about ‘welfare’ is somewhat tricky in a behavioral world, where people lack the kind of preferences (‘given, consistent and stable’) whose satisfaction is seen as constitutive of well-being or welfare in standard normative economics.⁵⁷ While this problem is directly relevant for paternalistic nudging with its focus on individual well-being, it seems to be rather less threatening for non-paternalistic nudges that deal with negative externalities. As Van den Bergh et al. (2000: 55) put it, in a behavioral world, “the notion of externalities can be maintained, as it depends merely on the *existence* of utility and

⁵⁴ See in particular Felsen et al. (2013) and Jung and Mellers (2016). To be sure, Jung and Mellers (2016) also include one green nudge in their online survey, but it only appears as part of a more general non-paternalistic nudge, and a rather obscure one at that.

⁵⁵ Specifically, the former was accepted by 67% (U.S.) and 66% (Sweden), respectively, and the latter was accepted by 46% and 61%, respectively. Note, though, that both green nudges – particularly the default – were also judged as ‘intrusive to freedom of choice’ by majorities in both countries! Hagman et al. thus partly confirm a hunch by Arad and Rubinstein (2015: 5) who deem it unlikely that non-paternalistic nudges would be “perceived negatively.”

⁵⁶ See, e.g., Bovens (2009), Hausman and Welch (2010), Schnellenbach (2012, 2016). The unclear epistemic foundations of nudging are nicely captured by Smith (2007: 155), stressing the infinite regress involved when possibly cognitively biased policymakers hire ‘experts’ who are themselves possibly cognitively biased, etc. See also Rebonato (2012: ch. 6).

⁵⁷ This problem is only beginning to receive the attention it deserves, see, e.g., Sugden (2008), Angner (2016: ch. 12), Schubert and Cordes (2013), and Schubert (2015a). Related issues were already discussed by Witt and Schubert (2008). See Smith and Moore (2010) on some implications of using non-orthodox welfare concepts for applied cost-benefit analysis in an environmental context.

production functions, and requires neither maximizing behaviour nor specific assumptions regarding preferences or production structures” (emphasis added).⁵⁸ Sunstein (2009) opines, in an interview, that “when we buy certain goods or use certain energy or drive certain cars ... we inflict harm on others, so our own judgments about our own welfare aren’t complete.” In traditional welfare economics, either the agent’s private cost-benefit calculus has to be modified by a corrective (Pigouvian) tax or markets have to be established where none existed before, to wit, in emissions or clean water. Green nudges provide policymakers with a third instrument, which directly addresses the issue that, as Emmett (2014) puts it, the institutional (or rather, ‘choice-architectural’) status quo is typically “structured so that the easiest, most culturally normal, default actions in western societies are often harmful to the environment and other people.”⁵⁹ One key argument in favor of the green nudge agenda – independent of any practical implementation – is, of course, that it makes citizens aware of these typically hidden, problematic features of the institutional status quo (Sunstein and Reisch, 2016: 5, 6, 25).

Given that we seem to be on safe ground here (see also Nagatsu, 2015), it is not necessary to dwell too much on people’s *stated preferences* as a potential source of legitimacy regarding the targeted ends of green nudging: a majority keeps telling pollsters that they support nudges – as long as those are sufficiently overt, which genuine nudges are supposed to be (see above). Unfortunately, though, those stated preferences cannot be taken at face value: people often use them to derive expressive utility from the attractive self-image conveyed thereby (e.g. Kauder et al., 2016). What’s more, when it comes to ‘moral’ preferences in general and environmental preferences in particular, people often fail to act upon their stated preferences, even if their monetary or informational endowments would allow them to do so.⁶⁰

6.2. Do nudges compromise people’s ‘autonomy’?

While the advocates of nudging explicitly pursue a welfarist program and appear to either conflate autonomy with freedom of choice or to downplay autonomy-related concerns altogether,⁶¹ most critics agree that even nudges that fully preserve nominal freedom of choice risk compromising the autonomy of the individuals exposed to and influenced by them (e.g. Hausman and Welch, 2010). At first sight, this point seems intuitive: after all, nudges are most effective in situations where individuals lack complete preferences – in that case, nudges interfere with processes of preference formation. In the limit, this interference may substitute the nudge’s preferences and values for the nudgee’s own preferences, generating ‘fragmented selves’ (Bovens, 2009).

To see the practical relevance of arguments like this, consider Smith et al. (2013), who argue that the ethical quality of default modifications is a function of the mental processes involved: to the extent that the default’s behavioral impact is due to cognitive biases, a given default change may be ethically problematic by virtue of the fact that its impact reflects ‘choice without awareness’ (ibid.: 161). In contrast, when defaults are primarily understood as implicit endorsement – and correctly so –, they rather express and foster a kind of social intelligence on the part of consumers (ibid.). On the other hand, there are also nudges, such as limited cooling-off periods, that always enhance individuals’ autonomy (Hausman and Welch, 2010: 132f.). In our present context, feedback

provision on energy use might be seen as exemplifying that latter category. In general, autonomy considerations would enter the overall ethical assessment of green nudging as one kind of ‘normative costs’ (or ‘benefits’), to be weighed against benefits (or costs) in terms of welfare.

There is, however, a problem with the autonomy argument: the specific notion of ‘autonomy’ typically employed by the critics of nudges cannot be coherently applied in our behavioral world (recall: that’s a world where individuals lack consistent and stable preferences). For autonomy is often defined in a way that is overly demanding in terms of rationality and self-knowledge. Consider Hausman and Welch (2010) who understand autonomy as “the *control* an individual has over her own evaluation, deliberation and choice” (ibid.: 128, FN 16; emphasis added). Or consider Bovens (2009), suggesting that the coherence (or lack thereof) of the preference structure an individual ends up with after being nudged indicates her autonomy losses: as he puts it, with fragmented preferences, an agent risks being eventually unable to recognize herself in her own actions (ibid.: 212–14).⁶²

What’s wrong with autonomy conceptions of this kind? They demand a level of self-knowledge or self-transparency on the part of the individual that cannot be found in a behavioral world. A realistic model of man should take account of the fact that human behavior is typically influenced by a variety of causal factors operating at a subconscious level. We rarely have access to the deep psychic sources of our own motives (Buss, 1994: 96).⁶³ The self sometimes misunderstands itself. It may even *want* to misunderstand itself: self-deception has been uncovered as an important source of well-being in behavioral economics.⁶⁴

While the jury is basically still out on the issue of how to think about autonomy in a behavioral world, one promising approach has been defended by Buss (2012), who argues that we should abandon the view that people act autonomously to the extent that they put a lot of critical reflection into the formation and adjustment of their motives, which ideally makes them respond the right way to changes in incentives. In a nutshell, Buss argues that either acting in accordance with one’s character or else in accordance with conditions of ‘minimal human flourishing’, objectively defined, makes an individual act autonomously (ibid.: 659). On this view, then, it seems that nudges – and green nudges to boot – hardly ever compromise people’s autonomy.

This conclusion seems somehow unsatisfying. Intuitively, policy tools that interfere with people’s preference formation are not unconditionally harmless. While autonomy, understood ‘objectively’, may not be compromised, people exposed to nudging may nonetheless *feel* subjectively manipulated by certain nudges (Le Grand and New, 2015): to the extent that they do, they experience procedural disutility – for the subjective experience of self-determined choice can be hedonically valuable. Hence, a consistently welfarist policymaker would need to account for such concerns (which would, then, be subsumed under ‘normative costs in terms of well-being’). There’s also empirical evidence that nudges lose their technical effectiveness if agents feel manipulated in forming their own preferences (ibid., see also Rebonato, 2012: sect. 8.3): in that case, an ethical issue has important implications for assessing the instrumental quality of nudging. Nudges may also provoke reactance and result in public resentment, alienating people from the agenda pursued by policy-makers who might be perceived as relying on illegitimate means (Felsen et al., 2013; Arad and Rubinstein, 2015).

⁵⁸ As Claassen (2016) notes, though, it does require normative presuppositions that are not always recognized as such in standard welfare economics. Let’s however not travel down that path in the present paper.

⁵⁹ See also Sunstein and Reisch (2014).

⁶⁰ Again, see Pichert and Katsikopoulos (2008) and Allcott and Greenstone (2012). Hence, it seems a bit premature to use, as Kaenzig et al. (2013) do, stated ‘green’ preferences as sufficient grounds for arguing that the status quo – characterized, as it is, by mostly ‘gray’ defaults – lacks legitimacy.

⁶¹ See, e.g. Sunstein (2015c) and Sunstein and Reisch (2016: 24). Sunstein (2014a: 135) even goes so far as to downgrade autonomy to the status of a mere moral ‘heuristic’. See McCrudden and Kling (2015: 96–100) on his idiosyncratic understanding of autonomy.

⁶² A more prominent account of autonomy, suggested by Frankfurt (1971) requires the individual to adopt some ‘higher’ meta-preference standpoint and *endorse* (or identify with) not just the psychological elements involved in the formation of her preferences, but rather her preferences themselves or, alternatively, their historical genesis (e.g. Christman, 2005). To our knowledge, this account has not yet been explicitly used in ethical discussions on nudging, despite its popularity in contemporary ethics (Buss, 1994: 95f.). Buss’ objections, sketched below, apply to this account as well.

⁶³ As Christman (2005: 338) points out, ‘only a marginal proportion of the self implicated in behavior and social interaction can ever be said to be available to conscious reflection ... Hence, a person’s inner picture of her motivational matrix can be highly incomplete and ... inaccurate.’

⁶⁴ See, for instance, the psychological insights on attribution bias (e.g. Pal, 2007).

6.3. Do nudges compromise 'self-legislation'?

The following considerations may be the most important in our present context, yet they have so far been largely neglected in the critical literature on nudging. In a nutshell, and quite beyond 'autonomy' considerations (see above), nudging may compromise people's *ability to form (or learn) preferences*. This problem is relevant on both the individual and the societal level.

On the individual level, what's arguably at stake in nudging people is their personal *integrity*. Nudges work by systematically relieving agents from the need to muster mental and cognitive effort: green defaults allow you to act in a pro-environmental way without even thinking about it; framing the cafeteria experience allows you to go with the vegetables with a minimum level of self-control; peer comparison allows you to 'save' willpower when deciding upon your energy use, and so on. All this contributes to the fact that nudges (including green nudges) systematically discourage agents from engaging in active choice. While this relieving function is essential for safeguarding agency (Sunstein, 2014a: 130f., 137), too much of a good thing can be harmful. For active choice is extremely valuable — not so much for the results or the procedural utility it instrumentally brings about, but rather for the fact that it *constitutes* an agent's identity or character over time, which is a precondition for committing to principles (Korsgaard, 2009; Buchanan, 1999). Human beings face the existential task to 'make something of themselves' (ibid.). In discouraging active choice, nudges may compromise the ability to cope with this task, an impact that can only be experienced over the long haul (see also White, 2013).

Note the potential for a vicious circle: the more individuals lose their identity as recognizable agents, the more they need to rely on the support nudges so seductively provide.⁶⁵ Conceptually, it is noteworthy that the Korsgaard-Buchanan perspective sketched here contrasts with the 'multiple selves' view that dominates behavioral economics thinking (and the nudge agenda, for that matter): rather than splitting individuals into two conflicting 'systems' (to wit, the quick and intuitive 'system 1', and the slow and reflective 'system 2'),⁶⁶ on the view outlined here individuals appear as unitary, integrated wholes.

The personal integrity argument easily generalizes to the societal and political level: nudges may affect the character of public democratic deliberation and collective decision-making in a problematic way. When government intervenes by using psychological 'tricks' rather than bans or monetary incentives, it changes the nature of public policy-making (John et al., 2009). This problem has two aspects: organizing environmental policy around the toolset of green nudges may, first, undermine the perceived legitimacy of government. Citizens will typically not *expect* it to implement policies of this kind in order to steer behavior in certain directions, however well-meaning the ends that are supposedly pursued thereby. This may add to their potential alienation toward the public policy agenda, counteracting green nudges' — and other tools' — effectiveness. One may add that green nudges, rather than actively engaging the public in open, rational deliberation on policy goals and means, degrade the government to the role of just another party trying to use cognitive biases as a resource in the interest of behavior management (Leggett, 2014). Some fear that a general focus on the 'psycocratic' instruments forecloses public discourse on "what the values associated with 'good behaviour' should be" (Whitehead et al., 2016: 30). In that sense, nudges may have not only an alienating, but also a *depoliticizing* effect.

Second, by transforming the nature of public deliberation, a nudging state may contribute to also transforming individuals in their role as participants in the game of politics: they would no longer be addressed as rational *citizens* deserving of respect, but rather as affect-driven and biased agents, prone to manipulation. Non-rational persuasion would crowd out deliberation. One may argue that using nudges that exploit

cognitive biases is disrespectful *per se*: people are being treated as mere means, not as ends (White, 2013: 135). This is particularly evident, for instance, when deceptive messages are used in the context of peer comparisons, as in some of the 'towel reuse' experiments sketched in Section 4.1, above.⁶⁷

In short, if green nudges were to be used exclusively (which, we hasten to add, no advocate of nudging demands, but which may nonetheless be a tempting option for policy-makers, see Schubert, 2017), they might be judged as depriving "society of the chance to engage in self-legislation" (Lepenies and Malecka, 2015: 432), where "self-legislation" means "the control a social collective has over its evaluation, deliberation and choice of social institutions" (ibid.: FN 14).⁶⁸

A closely related point is that green nudges differ from traditional incentive- and information-based policy tools in one particularly worrying respect: it's not hard to imagine that there is a latent incentive on the part of policymakers to use nudges in a non-transparent (and arguably more effective) way, which would transform genuine nudges into pseudo-nudges.⁶⁹ This is obviously not the case with the traditional toolbox — on the contrary, monetary incentives work better, the more transparent they are. The, otherwise important, finding that transparency does not eliminate, but merely reduces, the behavioral impact of nudges (Loewenstein et al., 2015; Bruns et al., 2016) does not make a difference in this regard. Hence, a constitutional framework should be agreed upon that monitors the way policy-makers and bureaucrats use nudges in general and green nudges in particular (Schubert, 2014, Schnellenbach, 2016).

While the literature on the impact of nudging on the surrounding legal-institutional context of a given country is still in its infancy, it seems important nonetheless to make people aware of this risk when deciding, collectively, on when and where to use green nudges.⁷⁰

6.4. Are green nudges 'fair'?

Environmental policy measures in general won't work unless they are perceived as *fair* (Gowdy, 2008). The issue of the fairness of green nudges is obviously highly relevant for the question whether it is politically feasible to implement these tools. We should distinguish between (i) their redistributive impact and (ii) a more fundamental question that concerns the way the ultimate causes of society's problems are perceived.

As to the former issue, we have to ask to what extent nudges redistribute either well-being or freedom among the heterogeneous population exposed to its effects. Let's follow Mullainathan and Shafir (2014) and assume that the poor face relatively higher cognitive load than the rich (the authors refer to this as a 'bandwidth tax'): for one thing, struggling with making ends meet on a regular basis consumes scarce cognitive resources (Shah et al., 2012). Nudging's redistributive impact is, then, highly context-dependent. With some nudges, the relatively poor may benefit by being relieved from cognitive load — consider simplified information or information feedback. With other nudges, however, those facing higher cognitive load are likely to lose, in the sense of not being able to enjoy the freedom nudges supposedly grant people. As Smith et al. (2013: 165) put it, referring to Goodwin (2012), "for those who are unable to detect or resist default effects — especially those due to cognitive biases — defaults may not offer the freedom of

⁶⁷ The use of deceptive or factually wrong descriptive norms (to counteract the boomerang effect) may not only be ethically problematic *per se*, but may damage the trust government relies on in order to keep using green nudges as an instrument (Demarque et al., 2015: 168).

⁶⁸ Smith (2007: 155) puts it thus: "People should not want policymakers to become adept at persuading us to invest in infrastructure supporting that persuasion. Where does it end? Abuse seems likely."

⁶⁹ By definition, genuine nudges are transparent (see Section 2, above, and references given there).

⁷⁰ On the legal-institutional ramifications of nudging in general, see Lepenies and Malecka (2015).

⁶⁵ See Schubert (2015b) for an elaboration of the argument given in this section.

⁶⁶ See Kahneman (2011).

choice that libertarian paternalism suggests". Applied to our present context, *Lehner et al. (2016)* argue that "it is democratically worrying to use nudging to influence the behavior of those not able to identify a nudge, while allowing those that are able to identify it (and thus avoid it) escape the costs while benefitting from the gains."⁷¹

As to the latter question (regarding the way in which the roots of society's problems are perceived), nudges have been criticized for diverting attention – a scarce resource in a behavioral world – away from the actual socio-institutional factors that are at the origin of many of the societal problems nudges are supposedly responding to. While the overarching normative program of 'Libertarian Paternalism' may be praised for its genuine institutional focus (*Reiss, 2013: ch. 15*), one may argue that the widespread implementation of nudges could "lead to a culture where the blame for all society's ills is pinned on the mindsets of individuals. This might distract from broader understandings of societal problems, and the need for robust and evenly-applied policy instruments" (*Emmett, 2014*). This may be particularly worrying when certain green nudges induce feelings of shame or guilt on the part of the nudgees – which may be the case with nudges involving social status competition (see above, *Section 4.3*) or even with green defaults whose behavioral impact may be due to feelings of guilt (*Theotokis and Manganari, 2014*).⁷² Green nudges risk promoting an individualistic approach that overlooks the deeper socio-cultural roots of the environmental problems purportedly addressed, thereby relieving policy-makers from the cumbersome task of actually fixing the flawed institutions at the heart of market failure, properly understood.⁷³

7. Concluding remarks

To what extent can behavioral economics, with its more nuanced understanding of human decision-making, improve environmental policies? We have seen that the toolbox containing green nudges does have some promising innovative instruments public policy might use in order to promote pro-environmental behavior. There are at least three important caveats, though, that should be heeded before jumping to the decision to actually implement green nudges.

First, many green nudges seem to be rather limited with respect to their behavioral effectiveness⁷⁴: their impact may be highly context-dependent. It may, for instance, depend on the exact way framing is being used in the design of green nudges (e.g. *Asensio and Delmas, 2016*) and on ideological or other predispositions of nudgees (e.g., their degree of empathy, or whether they hold individualistic or communitarian views),⁷⁵ a fact that may only partially be mitigated when more technologically advanced 'personalized' nudges enter the stage.⁷⁶ Note that there are theoretical reasons to predict that green nudges may not generate robust and durable behavior change: insofar as they harness people's biases, their effectiveness hinges on whether people learn about those biases and correct them. This is the key difference to regulatory tools that are based on monetary incentives. Hence, empirical evidence that, for instance, the impact of peer comparison wanes over

time should not come as a surprise (*Allcott and Rogers, 2014*). Moreover, to the extent that they are used as complements to more traditional tools, their use may detract attention and political willpower away from alternative policy mixes that may be more difficult to implement, but also much more effective (e.g. *Loewenstein and Ubel, 2010*).⁷⁷ Note that *Thaler and Sunstein (2008: 200)* themselves concede that "the most important step in dealing with environmental problems is getting the prices right", while also opining that nudges might be "politically more palatable" (*ibid.*).

Second, and closely related, green nudges should, as a rule, be seen as complements to, rather than substitutes for, traditional incentive-based measures (*Dietz et al., 2009, Ferraro and Miranda, 2013: 377f., Lehner et al., 2016*). This is, however, standardly conceded by the main advocates of green nudging (*Sunstein, 2015b*). As *Gowdy (2008: 639)* puts it, "Moving away from a fossil fuel economy requires institutional change, not merely modifying individual behavior at the margin." It is probably at the intersection of 'soft', bias-targeting tools such as nudges on the one hand, and incentive-based instruments on the other hand that behavioral economics will prove to be most useful in advising public policy-making. This research should focus on the question: How do material incentives actually work in the real world, among actual human beings?⁷⁸

Third and finally, ensuring that green nudges are organized in a transparent way seems to be the key step any behaviorally informed environmental policy should make in the future in order to make green nudges both effective and ethical.⁷⁹ We suggest implementing the criterion of 'token transparency', proposed by *Bovens (2009)*: nudges should only be deemed ethically legitimate to the extent that they are devised in a way that it's possible, in principle, "for everyone who is watchful to unmask the manipulation" (*ibid.*: 217). Basic transparency, thus understood, coupled with the condition that they reliably generate durable behavior change, are the key prerequisites to make green nudges both effective and ethical.

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⁷¹ Analogous reasoning applies to the potential redistributive impact of different kinds of nudges: for instance, nudges aimed at 'System 1' (graphic warnings, say) may have a larger impact on intuitively thinking consumers, as compared to more analytically thinking peers. Whether those nudges would therefore be more popular among the former is however hard to say, see *Hagman et al. (2015: 443)*.

⁷² Feelings of shame and guilt may in turn undermine personal integrity, discussed above. They are also tantamount to a 'psychic tax' with no revenue (*Glaeser, 2006*).

⁷³ This in turn reflects the criticism that behavioral economics, in particular the now dominant 'new' variant (represented by, e.g., Kahneman and Thaler) pursues an overly individualistic research agenda, narrowly focused on individual biases (e.g. *Ross, 2014*).

⁷⁴ To illustrate, *Stern et al. (2010)* compute that utility grant programs have the potential to reduce carbon emissions by 123 Mt per annum, compared to the 12.7 Mt savings generated through peer comparison measures, as estimated by *Allcott and Mullainathan (2010)*.

⁷⁵ See *Costa and Kahn (2013)*, *Jung and Mellers (2016)* in a U.S. context, and *Hagman et al. (2015)* with a study involving U.S. and Swedish respondents.

⁷⁶ See *Sunstein (2016: 183–185)*, *Sunstein (2014a: 98f.)*, *Goldstein et al. (2008b)* and *Smith et al. (2013: 166–168)* consider the related idea of 'smart defaults'.

⁷⁷ Arguments such as this one refer to a behaviorally informed view of policy-making, known as 'Behavioral Political Economy' (*Schnellenbach and Schubert, 2015*).

⁷⁸ This seems to be a surprisingly under-researched issue, but see *Frey and Eichenberger (1994)* and *Gneezy and Rustichini (2000)* for pioneering efforts. An application to the environmental domain is given by *Disney et al. (2013)*.

⁷⁹ See again *Loewenstein et al. (2015)* and *Bruns et al. (2016)* on evidence showing that transparency does not eliminate nudges' effectiveness.

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