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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 responsible 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 guidelines that may help the practitioner come to an ethically informed assessment of nudges.

Keywords: Nudges, Libertarian Paternalism, Behavioral Economics, Green Defaults, Autonomy

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), and what exactly such a new field would imply in the way of policy implications. 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 (Venkatachalam 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

[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*. 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 Hoffman and Spitzer (1982) 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] The notorious 'energy efficiency gap' illustrates the ineffectiveness of information and monetary incentives.

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 2008) and implemented by governments across the globe.[5] The behavior of 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. To nudge someone is to deliberately intervene in a given CA. Nudges are widely regarded as potential complements to more traditional incentive-based 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 Cass Sunstein (2014: 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: Due to their unclear welfare foundations and the potentially paternalistic and manipulative way in which these tools shape human behavior (viz., by addressing and exploiting cognitive biases), nudges raise complex ethical questions.

The exact definition of nudges is a matter of some controversy. What's typically offered as a back-of-the-envelope definition – "interventions that influence people's behavior without significantly changing their monetary incentives or coercing them" – is unhelpful, as it also lets the mere provision of information count as a nudge. We rather suggest to follow Hansen (2016) by supplementing this shorthand with the notion, originally advanced by Thaler and Sunstein (2008: 8) themselves, that "a nudge is any factor that significantly alters the behavior of Humans, *even though it would be ignored by Econs*" (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). Nudges are, then, interventions that aim at altering people's behavior by either harnessing their cognitive

[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.

[5] See in particular (ibid.: ch. 12) on green nudging, and Sunstein (2014). On the nudge agenda's global impact on practical policymaking see, e.g., Whitehead et al. (2014).

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

[7] Note that homo economicus *per se* is not necessarily perfectly informed (he just processes any information available in a perfectly rational way). An imperfectly informed homo economicus would be influenced by the provision of additional information, which excludes the latter from the list of nudging, properly understood. The asymmetry in the behavioral impact of nudging is also captured in the title of Camerer et al. (2003) who propose a related program of behaviorally informed policy-making.

biases or responding to them, while keeping option sets and monetary incentive structures largely intact.[8] Importantly, they are supposed to do so in a transparent manner (Thaler and Sunstein 2008: 244, Hansen and Jespersen 2013: 23-27).

Our focus, then, is on *green nudges*, i.e., nudges that aim at promoting environmentally responsible behavior. Green nudges are increasingly part of the environmental policy debate in many countries.[9] 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. So far, most 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, 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, 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 households reports 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.

To the best of our knowledge, this paper is the first to offer 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 allowing an ethical assessment of green nudging.[10] In our view, it's important, when discussing the new fashionable

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[8] Sunstein (2015b) defines nudges, somewhat less precisely, as "interventions that steer people in particular directions but that also allow them to go their own way… To qualify as a nudge, an intervention must not impose significant material incentives." (ibid.: 7).

[9] 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', enlisting behavioral economics to outline pro-environmental policy initiatives: http://ec.europa.eu/environment/integration/research/newsalert/pdf/fb4.pdf. For the UK, see the famous 'Nudge unit' and its approach to green nudging ('Behaviour change and energy use'), in Cabinet Office Behavioral Insights Team (2011), available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/ file/60536/behaviour-change-and-energy-use.pdf (See also House of Lords 2011, Dolan et al. 2012, and especially Halpern 2015). For France, see Oullier and Sauneron (2011): http://archives.strategie.gouv.fr/cas/system/files/2011-03-09-na-216-nudgesvertsgb_0.pdf. And for Germany, see Purnhagen and Reisch (2016). See also the Norwegian GreeNudge foundation, at http://www.greenudge.no/. Useful internet resources about nudging in general can be found at http://inudgeyou.com (based in Denmark) and the University of Stirling's Behavioral science blog, http://economicspsychologypolicy.blogspot.com/.

[10] See, e.g., 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 'nudges' they discuss are not genuine nudges). To be sure, Lehner et al. (2016: 14-16) comment briefly on the 'legitimacy' of nudging, but in a somewhat unsystematic way.

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, ultimately acting on these preferences (Pichert and Katsikopoulos 2008). On the other hand, there are *normative costs* associated with nudging that need to be taken into account – in particular in terms of welfare (e.g. Qizilbash 2012), autonomy (e.g. Hausman and Welch 2010), personal integrity (Schubert 2015b), and societal self-legislation (Lepenies and Malecka 2015). When green nudges are discussed in the literature, normative costs typically only get a brief mention, often in footnotes, if at all.[11] Sometimes, inaccurate claims by some advocates of nudging find themselves uncritically reproduced 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 or at increasing social welfare, conceived more broadly.[12] Although green nudges may partly be justified on paternalistic grounds (e.g., people may save money by saving energy), we will take them to belong to the non-paternalistic realm of applications. Green nudges are ultimately about correcting market failures, which makes them part of what Korobkin (2009) refers to as Behavioral Welfarism. Nagatsu (2015) refers to nudges that are

[11] See, for instance, Michalek et al. (2015: 2).

[12] Paternalism is standardly defined as an intervention in an agent A's freedom of choice that (a) runs counter to A's manifest preferences and (b) is motivated by increasing A's well-being (e.g. Dworkin 2014).

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]

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, say – social advertising invoking norms of conduct, 'prompted' (i.e., voluntary) choice, warnings, reminders, and brief cooling-off periods qualify as nudges. 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.

Interestingly, some of the purportedly green nudges Thaler and Sunstein (2008) describe in their chapter 12 – entitled, without false modesty, 'Saving the Planet' – are not actually nudges. Consider the (apparently quite successful) U.S. *Toxic Release Inventory*, where firms are obligated to report the quantities of potentially hazardous chemicals released into the environment. The information is then made available to the public (ibid.: 201f.), allowing pressure groups to set up an environmental 'blacklist' and target the 'worst offender', which lets Thaler and Sunstein conclude: "If companies are able to reduce emissions at low cost, they will do so in order to avoid blame" (ibid.: 202). Since it clearly changes one party's choice set, such a measure should not qualify as a nudge at all (Selinger and Whyte 2011: 926f.).[15]

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

[13] See also Bovens (2009). Most ethical analyses of nudges focus on their *paternalistic* use – see, e.g., 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] Analogous reasoning applies to their suggestion to create an international 'Greenhouse Gas Inventory' requiring disclosure of most significant emitters (ibid.: 203). Sunstein also refers to this idea in Sunstein (2009).

(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: home energy reports offering households peer comparisons with respect to their energy use); it can also be done by stimulating social status competition through, e.g., encouraging consumers to signal green behavior to others.

(iii) Green nudges that exploit the behavioral effects of purposefully set *defaults* that stipulate what happens if people don't actively choose (example: an energy provider offering power from renewable sources as the default, with the possibility to opt out anytime at trivial cost).

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 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 (3.1); or you can increase the salience of certain characteristics, thereby making consumers more aware of them (3.2); finally, you can harness people's sense of 'social identity' (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).[16]

3.1 Facilitating 'green' behavior

As behavioral economics tells us, real-world individuals often process information in a way 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 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 notorious cafeteria layout modifications 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, say, 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: 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 in impacting behavior by increasing the *salience* of certain

[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.

product characteristics, which makes consumers more aware of them.[17] Eco-labelling also serves to confer a certain social value on these characteristics, at least insofar as pro-environmental behavior is in fact socially approved in the given socio-cultural context (Félonneau and Becker 2008).[18] 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 Klopfert 2014).[19]

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.[20] 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, say, 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 signaling, e.g., the working load of the power grip by turning green, say, 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).

[18] 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).

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

[20] Typically, it also improves markets' allocative efficiency by reducing information asymmetries. Behavioral Economics plays an important role in increasing the efficacy of product labelling.

is underused and red during peak hours.[21] 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 rated appliances on a seven-point colored scale in terms of energy efficiency, ranging from A (or green) to G (or red).[22] 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.[23]

Finally, it's also noteworthy 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.[24] 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

[21] See Thompson (2007), "Desktop Orb could reform energy hogs", http://www.wired.com/2007/07/st-thompson-5/. 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.
[22] See Ölander and Thøgersen (2014: 345-349) for this paragraph.
[23] The specific experiment run by Ölander and Thøgersen involved TV sets. See Heinzle and Wüstenhagen (2012) for similar evidence from Germany.
[24] Thaler and Sunstein (2008: 64f.). It was designed by a private advertising firm; the very first TV spot featured Stevie Ray Vaughn. See http://www.dontmesswithtexas.org/about/.

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).

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). The insight that human beings are inherently social animals characteristically endowed with 'other-regarding' preferences – rather than 'erroneous' decision makers – may in fact be behavioral economics' key contribution to the social sciences (Gowdy 2008). Artinger et al. (2015: 204) refer to 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 (4.1). In appropriate contexts, one may go one step further and encourage consumers to openly display their pro-environmental behavior, thereby fostering a specific kind of social status competition (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). 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:

- A California-based company called Opower and its partnering energy providers offered the setting for what is perhaps the best known field experiment on the impact of descriptive norms so far.[25] The goal is to induce consumers to save energy.[26] 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'.[27] 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).[28]

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 a 11 to 20 % short-run and a 5 % long-run price increase.

- Another much-cited case study concerns *towel reuse* by hotel guests, i.e. indirect water conservation. As Goldstein et al. (2013) showed, communicating descriptive social norms may be an effective means to motivate guests to reuse their towels (instead of having them changed every day), 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 percent, 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 percent' of other hotel

[25] 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. (2009). 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).
[26] As Allcott and Rogers (2014: 3004) explain, private utilities participate in these programs in order to comply with state energy conservation requirements.
[27] 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).
[28] A similar program had been implemented in Helsinki/Finland from 1989 through 1992, decreasing energy use by 1-1.5 % (Arvola et al. (1993).

guests reused their towels (ibid.). It's 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 (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.[29] 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).[30]

3.2 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.[31] Apparently, it takes time for recipients to establish a corresponding habit to save energy (Michalek et al. 15: 15f).

Second, again regarding energy conservation, household's responsiveness seems to depend critically on their personal ideological priors: As Kahn and Costa (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 percent, it only lead to a 0.7 percent 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

[29] 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').

[30] 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.

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

targeted to specific groups in order to be made more effective. This reflects what we have seen with respect to ideologically mediated responsiveness to green nudges in the case of eco-labels (see above, section 3.2).

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).[32]

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 was 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.

[32] 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).

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!").[33] Nolan et al. (2008) report a reduction in energy use of about 10 percent 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 above-average water users (Ferraro and Miranda 2013).[34] 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).[35] 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.[36]

As we have seen, expressive considerations involve people's self-image – they may, however, also involve *signaling 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* (Sexton and Sexton 2011). To be sure, in order to be useful for social status signaling, the respective green behavior must be sufficiently visible: A classic example is the purchase and use of Toyota's

[33] 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.).

[34] 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.).

[35] Which, in this case, would have meant increasing one's water consumption.

[36] The behavioral impact of 'social comparisons' on energy consumption has been studied for decades – one pioneering study being Midden et al. (1983).

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 competition in the context of environmentally relevant behavior has turned out to be a highly effective green nudge (e.g. Bühren and Daskalakis 2015).[37]

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 signaling device that changes color dependent on their personal carbon footprint: how many electricity they use, how many airplane trips they make etc. Tierney suggests to label the device the 'IPed'.[38] 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).[39]

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.[40] This is a paradigmatic example of a behaviorally effective redesign of agents' CA (it should however not be trivialized as just

[37] See also Thaler and Sunstein (2008: 208).
[38] See Tierney (2008), available at: http://www.nytimes.com/2008/03/25/science/25tier.html?_r (accessed january 30, 2016).
[39] 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.
[40] See Carroll et al. (2009) for a formal model of optimal default design.

another case of information framing).[41] 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. Specifically, default changes can be used to increase enrollment in green energy provision (e.g. Sunstein and Reisch 2014, Toft et al. 2015).[42]

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 politically rather conservative population of about 2,500, 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 2006, about 1 % of all German households used green energy (ibid.: 66). 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 (ibid.). 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.[43]

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

[41] As done, e.g., by Pichert and Katsikopoulos 2008: 66.
[42] See on defaults generally Smith et al. (2013).
[43] 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.

time and energy pricing to directly reflect the amount of power used during different times of the day. This comes at a cost, though: Part of the electricity consumption is remotely controlled by the energy provider, which may raise privacy concerns.[44]

Other examples include the switch to double-printing printing machines at Rutgers University (New Brunswick, NJ), which saved the equivalent of 620 trees in a single semester (Oullier and Sauneron 2011: 4),[45] 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 CO_2 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 Leon 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.[46] Note, though, that sticking with whatever default is in place may also be perfectly rational in that it may save time and effort, especially when the default allows one to bypass potentially awkward trade-offs between, say, 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.[47]

- 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

[44] 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 dec. 15, 2015).

[45] 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.).

[46] 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 (2015) to be powerful in the context of environmental defaults.

[47] See also Fischer and Lotz (2014).

people may wish to avoid that. Brown et al. (2013) were able to demonstrate that factor when studying the behavior of OECD employees 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 the 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.[48] Since people dislike losses far more than 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 pay for green electricity systematically exceeded their willingness to accept. The power of loss aversion is also nicely illustrated by Homonoff (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). 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 CO_2 offsetting program) at the 2008 annual EAERE conference in Gothenburg/Sweden (Löfgren et al. 2012).

[48] 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.

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 these innovative regulatory tools 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.[49] This distinction is ethically relevant insofar as while the behavioral impact of the CA is unavoidable, nudges themselves are often avoidable; for instance, it may be possible to replace them by mandatory choice (a non-nudge).[50] Second, note that the behavioral *effectiveness* of a given green nudge – whose exact determination is 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, at the detriment of genuine solutions (Cookson 2013).

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' (6.2), and the objections concerning nudges' impact on 'self-legislation' and the character of public democratic deliberation (6.3). Finally, we briefly discuss the fairness of green nudges (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 that, in a democratic setting, are ultimately up to the citizens themselves (Schubert 2014).

[49] See the Introduction, above, on the definitions.
[50] Again, see the definition offered in the Introduction. This key distinction 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, the ends pursued 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, Kahn and Costa 2013). While quite a few studies have explored people's attitudes toward paternalistic nudges, to the best of our knowledge only Hagman et al. (2015) study attitudes toward non-paternalistic nudges.[51] Comparing answers by U.S. and Swedish respondents, they found 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.[52]

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, the pretense of knowledge involved, or the unclear welfare foundations – that have been extensively discussed elsewhere.[53] 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 welfare in standard normative economics.[54] While this problem is directly relevant for paternalistic nudging with its focus on individual welfare, it seems to be rather less threatening for non-

[51] 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 appeared a spart of a more general non-paternalistic nudge, and a rather obscure one at that.

[52] Specifically, the former was accepted by 67 % (U.S.) and 66 % (Sweden), respectively, and the latter was accepted by 46 % and 61 %, respectively. Paradoxically, both green nudges – particularly the default – were also judged as 'intrusive to freedom of choice' by majorities in both countries!

[53] 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.

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

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 production functions, and requires neither maximizing behaviour nor specific assumptions regarding preferences or production structures" (emphasis added). 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 often "structured so that the easiest, most culturally normal, default actions in western societies are often harmful to the environment and other people."[55] One key argument in favor of the green nudge agenda (independent of any practical implementation) is, of course, that it makes citizens aware of this typically hidden, problematic features of the institutional status quo.

Given that we seem to be on safe ground here (see also Nagatsu 2015), it's 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 they are sufficiently overt, which genuine nudges are supposed to be (see above).[56] 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. 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.[57]

6.2 Do nudges compromise people's 'autonomy'?

Most critics agree that nudges compromise the autonomy of the individuals exposed to and influenced by them. 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 nudger's

[55] See also Sunstein and Reisch (2014).
[56] Attari et al. (2009) found that subjects preferred soft to hard regulation (note, however, that 'soft regulation' included non-nudges such as monetary incentives, see ibid.).
[57] 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.

preferences and values for the nudgee's own preferences, generating 'fragmented selves' and making the nudgee a mere 'bystander' to her own choices (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, say, 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).[58]

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

[58] 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.

access to the deep psychic sources of our motives (Buss 1994: 96).[59] The self can misunderstand itself. It may even *want* to misunderstand itself: Self-deception has been uncovered as an important source of well-being in behavioral economics.[60]

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 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' makes an individual act autonomously (ibid.: 659). On this view, then, it seems that nudging – 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 (LeGrand and New 2015: 108-110): 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 'welfare costs'). 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).[61] Nudges may also 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).

6.3 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

[59] 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.'
[60] See, for instance, the psychological insights on attribution bias (e.g. Pal 2007).
[61] Note that people's feelings or perceptions of being in control can potentially be manipulated in turn. That's why this subjective notion of 'autonomy' only qualifies as a normative cost in terms of (procedural) well-being or welfare.

'autonomy' considerations (see above), nudging may compromise people's *ability to form 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. Active choice, though, is extremely valuable – not so much for the results it brings about, but rather for the fact that it *constitutes* an agent's identity or character over time (Korsgaard 2009). Human beings face the existential task to 'make something of themselves' (Buchanan 1999). 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. 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.[62] Conceptually, it's 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 'systems' (to wit, the quick and intuitive 'system 1', and the slow and reflective 'system 2'),[63] 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' 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

[62] See Schubert (2015b) for an elaboration of the argument given in this section.
[63] See Kahneman (2011).

another party trying to use cognitive biases as a resource in the interest of behavior management (Leggett 2014). In that sense, they 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. Persuasion would crowd out deliberation. One may argue that using nudges that exploit cognitive biases is disrespectful *per se*: It treats people 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.[64]

In short, green nudges, when used exclusively, may 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).[65]

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 way. This is obviously not the case with the traditional toolbox. The, otherwise important, finding that transparency does not eliminate, but merely reduce, the behavioral impact of nudges (Loewenstein et al. 2014) does not make a difference in this regard.

While the literature on the impact of nudging on the surrounding legal-institutional context of a given country, say, is still in its infancy, it seems important nonetheless to make people aware of this risk when deciding, collectively, on where to use green nudges.[66]

6.4 On the fairness of green nudges

Environmental policy measures in general won't work unless they are perceived as fair (Gowdy 2008). The question of the fairness of green nudges is obviously highly relevant for the question whether it's politically feasible to implement these tools. We should distinguish between (i)

[64] 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).
[65] 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."
[66] On the legal-institutional ramifications of nudging in general, see Lepenies and Malecka (2015).

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 (2013), "for those who are unable to detect or resist default effects – especially those due to cognitive biases – defaults may not offer the freedom of 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."[67]

As to the latter question (regarding the way the roots of society's problems are perceived), nudges have been criticized for diverting attention – a scarce resource in a behavioral world (see above) – 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), 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 nudges - 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).[68] Green nudges risk representing an individualistic approach

[67] Analogous reasoning applies to 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).

[68] 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).

that overlooks the deeper socio-cultural roots of the environmental problems purportedly addressed.[69]

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 environmentally responsible 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 effectiveness:[70] Their impact may be highly context-dependent. It may, for instance, depend on ideological or other predispositions of nudgees (e.g., their ideological priors, their degree of empathy, or whether they hold individualistic or communitarian views),[71] a fact that may only partially be mitigated when more technologically advanced 'personalized' nudges enter the stage.[72] By virtue of appealing to people's biases, and on a subconscious level at that, they may not generate robust and durable behavior change needed to come to truly sustainable problem solutions in the environmental realm. Moreover, their isolated use may detract attention and political willpower away from alternative instruments that may be more difficult to implement, but also much more effective (e.g. Loewenstein and Ubel 2010, Schnellenbach and Schubert 2015). Revealingly, 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). As Gowdy (2008: 639) puts it, "Moving away from a fossil fuel economy requires institutional change, not merely modifying individual behavior

[69] This in turn reflects the criticism that behavioral economics, in particular the now dominant 'new' variant (Kahneman, Thaler et al.) pursues an overly individualistic research agenda, narrowly focused on individual biases (e.g. Ross 2014).

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

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

[72] See Sunstein (2014a: 98f.); Goldstein et al. (2008b) and Smith et al. (2013: 166-168) consider the related idea of 'smart defaults'.

at the margin." It's 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?[73]

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 ethical. 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 generate durable behavior change, are the key prerequisites to make green nudges both effective and ethical.

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[73] 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 environmental domain is given by Disney et al. (2013).

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