

# Personalized transparency in digital nudging

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## Abstract

In this paper, a subset of nudges, digital nudges, are considered, namely cases in which nudges are introduced within digital environments and are meant to influence a choice made within that environment. It is explored how employing digital nudges unfolds the possibility to personalize not only nudging processes but as well the kind of safeguards citizens should be guaranteed to consider nudges legitimate policy tools in modern liberal democracies. Making nudges transparent to citizens is an ethical requirement whereby individual deliberation and public scrutiny are highly valued and, at least in certain cases, the same holds for making available information salient for public scrutiny. Safeguards of this kind can be tailored based on individual citizens' traits when digital nudges are in place. In the final part of the paper the answer to the normative question begs for an answer: should policymakers factually take advantage of personalized safeguards? If so, are there any limitations? The last section is devoted to discussing a challenge that arguably will emerge in further discussing personal transparency and to pointing out the merits of a specific multidisciplinary methodology in investigating descriptive and normative aspects of personalizing transparency.

## Keywords

Nudge, ethics of nudging, personalized nudges, personalized transparency of nudges.

## 1. Introduction

Nudges are policy tools discussed and in fact applied extensively in the last 15 years, since the release of *Nudge: Improving Decisions About Health, Wealth, and Happiness* by [28]. Allegedly, they offer a “third way” of policymaking between, so-to-speak, pure paternalism and pure libertarianism. These revolutionary policy tools are sharply different from traditional ones such as fines and bans in that they are meant to steer people towards targeted behaviors without hindering alternative behaviors or attaching substantial (dis)advantages to the relevant options. A nudge, as defined by Thaler and Sunstein is “any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates” [28], p 6). Hence, when we deal with nudges, we deal with soft policy tools in contrast to the hardness of bans and economic (dis)incentives. If so, how they can be effective? How, if no constraints are in place nudges can be still effective? Nudges are effective in that they treasure, namely either exploit or mitigate, the heuristic and cognitive biases featuring humans, emerging from the misuse of the so-called System-1 [13]. System-1 is a constituent element of the dual-system account of the human mind proposed by Kahneman [13]. According to the theory, the human mind can be understood by referring to two distinct systems: system 1 and system 2. System 1 refers to the unconscious and automatic cognitive processes that lead to intuitive and effortless decision-making. On the

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other hand, system 2 is responsible for conscious, reflective, and effortful cognitive processes<sup>1</sup>. As for example of nudges exploiting system-1 - namely the most common typology of nudges - we could consider SMarT. SMarT is a pension plan devised by Thaler and Benartzi to counteract the low tendency of US citizens to save [29]. This pension plan takes advantage of a combination of nudges meant to thwart the so-called 'present bias', namely the human tendency to prefer immediate gratification over long-term rewards. Furthermore, the plan asks participants to increase saving only when pay raises occur, mitigating loss aversion, which is the phenomenon for which people perceive the pain of losing something to be roughly twice as powerful as the pleasure of gaining something. Finally, by setting the enrollment to SMarT plan by default, the default effect is exploited to encourage participants to select and stick with the program, albeit with the opportunity to opt out is guaranteed. Policy tools such as SMarT have generated so much interest among scholars and policymakers to the point that nudge units appeared worldwide, starting from the establishment of the Behavioral Insights Team by the UK government in 2010 [20]. It is worth noticing that not all nudges are based on the cognitive mechanisms just mentioned or on strategies based on altering the presentation of options, such as, for instance, in the case of nudges based on the default effect. According to the definition provided by Thaler and Sunstein, other kinds of interventions can also be classified as nudges, such as those which convey information to make more alluring one of the available options. For instance, providing information in hotels about the fact that previous guests have reused towels is an example of an informational nudge, based, in this case, on peer pressure [9]. These are cases in which the information provided amounts to the nudge. The massive use of nudges worldwide and the general interest it has attracted from policy makers, scholars and the public should not lead us to believe that they are foolproof policy tools, a sort of panacea in policymaking. Indeed, many nudges failed to encourage targeted behaviors or even backfired, promoting undesired behaviors [14]. In fact, the nudge movement has suffered setbacks since the publication of *Nudge: Improving Decisions About Health, Wealth, and Happiness* [17], however, this should not lead us to take the radical position of abandoning the use of nudges. What it should do instead is develop techniques to identify the grounds for successes and failures of nudging and nudge more effectively in the future [21]. Despite some misfortunes, nudges are still attracting policy tools in line with this optimistic take on nudges, in this paper, a subset of nudges, digital nudges, is on focus and it is discussed a possible way to set them up that differs from the traditional approach to nudging. Starting off, it is discussed how making nudges transparent to citizens is an essential ethical requirement in liberal democracies wherein individual deliberation and public scrutiny are considered essential components of democratic processes (section 2). Secondly, digital nudging is analyzed. It is explored what features characterize this subset of nudges, namely the malleability of the choice environment and the ease with which data on the success rate of nudges can be collected (section 3). The article proceeds dwelling on the possibility to personalize nudges. In section 4 the key point of the paper is presented, that is that digital nudging opens the possibility to not only personalize the nudge but as well personalize the type of transparency provided to the single citizen. The subsequent section is devoted to discussing the possibility to personalize transparency and address the normative question begging for an answer: should policymakers implement personalized transparency? (section 5). Conclusions are drawn in section 6.

## **2. Scrutiny and deliberation as ethical conditions for nudging**

Shortly after the implementation of nudges worldwide, scholars interested in the ethics of policymaking warned of issues raised by the implementation of nudges considering the values upheld in modern liberal democracies [11] and [16]. The first and arguably most discussed

issue concerns the autonomy of citizens, often understood as the ability to deliberate, and behave accordingly. As seen, nudges are soft tools, nevertheless, the gentleness of their influences could impair our ability to resist the nudge's influences and our deliberation as a result [31]. Here, soft must be intended as the condition for which any impositions, such as bans and fines, are not placed. However, this does not exclude the presence of, so to say, internal impositions. Nudges exploiting S1-processes could thwart our deliberation leveraging on our cognitive biases. Default options are examples of this, whereas informational nudges seem to be easy to be spotted. When some kinds of nudges exploiting S1-processes are in place, as in the case of default-based nudges, it seems that deliberation processes are impaired, possibly to the point of being completely dismissed. Concerning the threat posed by nudges based on S-1 to citizens' deliberation, ethicists tend to converge on two distinct positions. Firstly, it is argued that nudgers should *make deliberative processes possible*.

This is the minimum requirement in a liberal democracy concerning deliberation processes. If this is the case, then it can be argued that nudges, if they are in-principle resistible (namely allow nudgees to resist the allure of S1 if pursued, step back and so deliberate) are ethically justified, without the need for any additional safeguard. In this scenario, deliberation is a possibility that citizens should be able to actively choose to pursue, much like the consumers walking the supermarket aisles holding a shopping list or Ulysses, tied to the ship's mast when faced with the sirens. On the other hand, in the opinion of some ethicists, policymakers should not only make possible deliberative processes but additionally promote them. If so, ensuring that nudgees are made aware through disclaimers of nudges' presence is pivotal. The disclaimer would indeed serve as a warning signal that the choice environment is designed in a way meant to push people to overlook deliberation processes and instead rely on intuitive, automatic processes. For the purpose of the paper, it is immaterial to enter this debate and take a stand. Instead, the consequences of both these stances relevant to discussing personalizing transparency will be considered in §4. Despite being a less discussed issue than autonomy and deliberation processes, nudges present a further puzzling ethical issue when it comes to public scrutiny (for works that discuss this aspect [24] and [1]). The ability to knowledgeably evaluate the work of policymakers, the justification behind the policies adopted, and compare the policy introduced with available alternatives are key components in the unfolding of democratic processes. Nudgers should not be exempt from this scrutiny. As in the case of autonomy and deliberation, even regarding this, two distinct positions seem to be defensible. As for the minimal condition, public scrutinize should be made possible by policymakers. If so, not implementing any safeguard would fall short in fulfill the request. Citizens/nudgees should be able to distinguish between intentional nudges (implemented intentionally by policymakers) and accidental traits of the choice environment that yet could appear to be nudges, to evaluate the policymakers' conduct. As an example of an accidental trait consider a case of a cafeteria where a salad is placed at eye level, in that it is convenient for the cafeteria attendants because of the layout of the kitchen and not because this encourages that the salad, rather than the French fries, be picked (for the paradigmatic cafeteria example [28]). In order to allow the distinction between accidental traits and intentional nudges, transparency must be ensured. To distinguish the cases is pivotal in scrutinizing, even if, behaviorally, it makes no difference: the position of the salad/French fries influences the canteen visitor's behaviors, regardless of if it is an intentional or unintentional trait of the choice environment. On the other hand, a position for which policymakers should promote effective public scrutiny of nudges and not merely make it possible can be defended. If so, to make able the citizens distinguish between nudges and accidental traits of the choice environment is insufficient. The reason is twofold. First, nudges can be justified on multiple political grounds. For example, placing salad at eye level could be intended to reduce the

likelihood of making unhealthy choices (fight internalities) or to reduce the expenses incurred by citizens for treatment of those who make unhealthy choices when a universal health system is in place (fight externalities) (on the multi-justification of nudges [5]).

This ambiguity needs to be resolved if a knowledgeable evaluation has to be promoted. Second, being aware of the presence of a nudge does not necessarily imply that the nudgees are able to identify it within a complex choice environment. Nevertheless, only provided that nudgees identify the nudge, they can evaluate if the policymaker is right in expecting its effectiveness and compare the nudge with viable policy alternatives such as bans or economic (dis)incentives. Let us step into the shoes of visitors to a canteen where the salad is purposely placed at eye level. Then, suppose that canteen visitors are made aware of the presence of a nudge through a printed disclaimer provided at the start of the canteen line where it is stated that “the canteen manager has modified the choice environment in order to make you choose healthy food”. If so, the canteen visitors would not necessarily be able to detect the actual nudge (i.e., the position of the salad/French fries) and evaluate, for instance, its effectiveness. In this regard, it could be the case that the price of the French fries is remarkably lower than the price of the salad, so much so that the canteen visitors could consider the nudge to be a pointless intervention. Such kind of evaluation would have been impossible if the nudge was not detectable. Hence, to factually promote scrutiny, policymakers, apart from guaranteeing the distinction between accidental trait and intentional nudge through transparency, must provide further information on i) the political justification of the nudge and ii) the exact aspect modified within the relevant choice environment. Considering these considerations on the ethical issues raised by the employment of nudges, we are dealing with four possible combinations determined by the approaches possibly adopted: i) making possible both deliberation and public scrutiny, ii) making possible deliberation and promoting public scrutiny, iii) promoting both deliberation and public scrutiny, and iv) promoting deliberation and making possible public scrutiny. If the considerations on the safeguards ensure each combination developed above are correct, we can boil down the possible scenarios to merely two: either a) transparency should be in place or b) transparency should be in place and relevant information on the nudge should be made available (see table 1).

**Table 1**  
**Safeguards to guarantee deliberations and public scrutiny when nudges are in place.**

Head 1	Make possible public scrutiny	Promote public scrutiny
Make possible deliberation	Transparency	Transparency + further information available
Promote deliberation	Transparency	Transparency + further information available

In the further course of the article, the safeguards considered will be investigated when applied to a special kind of nudge: digital nudges. For this purpose, we must first investigate the unique characteristics of digital nudging. The next section is devoted to fulfilling this need.

### 3. The novelty of digital nudges

So far, we looked at examples of what we can refer to as traditional nudges, which are designed to alter the physical choice environment to influence people’s behavior within it. The informational nudge discussed in the previous chapter concerning towel reusing is an example

of a traditional nudge. In that case, the message is conveyed within the relevant physical environment, namely hotel rooms, and aims to encourage people to reuse towels, namely a behavior within that environment. However, traditional nudges are not the only typology of nudges available to policymakers. It is not a novel fact that nudges i) can be introduced within digital environments, such as websites, apps, search engines, and social media, and ii) can influence choices made within digital environments, rather than physical ones [30]. In fact, governments around the world are increasingly digitalizing the delivery of public services, and through the relevant digital environments, they can communicate, inform, and, potentially, nudge citizens [7]. As an exemplary instance of digital nudge - although it was introduced in an experimental setting rather than in the field by a government - we could consider the intervention implemented by [19] in one of their experimental settings. Their article aims at improving our understanding of how nudges evaluate nudges in terms of experienced autonomy, choice satisfaction and perceived threat to freedom of choice. Michaelsen and colleagues designed an experimental setting in which those assigned to the 'opt-out' condition were asked to face a digital interface where they had the opportunity to donate 20 cents, and the default option (namely the pre-selected option) was to donate. Here, the nudge should be regarded as digital since, first, it is introduced through a digital interface and, second, the targeted choice of donating is made directly within that digital environment. What matters here is to take advantage of this example to identify the structural differences between traditional and digital nudges and so the traits peculiar to the latter. More specifically, the interest is focused on those peculiar traits that can impact making possible/promoting citizens' deliberation processes and public scrutiny, namely the ethical issues relevant to nudging. In what follows it is argued that digital nudges are distinctive due to two traits, opening unexplored possibilities and ethical issues considering both deliberation processes and public scrutiny. First, digital environments are especially malleable. Regardless of the type of nudge introduced, policymakers can alter the relevant digital environment based on which citizen enters that environment. For example, in an e-government intervention pertaining to an online service for self-assessment tax returns, a default-based nudge could be introduced for one citizen, whereas an informational nudge for another. It would be impossible to do the same in a physical environment, where options are typically set following a one-size-fits-all strategy for which the same nudging strategy is in place for everyone.

For instance, back to the cafeteria, if the salad is at eye level, it is so for every canteen visitor. However, this does not amount to saying that it is always impossible to nudge differently in non-digital environments. Personalized reminders, such as those conceived by [22] for federal student aid applications, prove it. Rather, what makes digital nudges unique is the wider possibility to personalize nudges than with traditional nudges. Second, within digital environments, nudgers have the chance to collect a large amount of data regarding the interaction between choice environments and nudges, data valuable to predict the success of a certain nudge introduced within a certain context, with a particular goal, given a specific nudgee [32]. In digital nudging, it is easy to keep track of how successful a certain nudge is in encouraging a certain choice as digital nudges affect choices made directly within the digital environment. This opens the possibility of identifying the susceptibility of a specific nudgee to different kinds of nudges [10], as well as the role of decision-making style [23], psychological tendencies [12] and social networks (relevant for nudges based on peer pressure [2], in moderate the strength of a nudge in each context. Digital data can be merged and, through big data analytics, correlations relevant to predict the strength of a personalized nudge can be algorithmically determined. Malleability and ease of collecting relevant data ensure that digital nudges can not only be customized (as also in traditional nudging, although to a lesser extent) but also personalized), namely be customized on an individual level. Hence, considering digital

nudge, personalization is a viable and highly attractive possibility for policymakers (on transparency of nudge applied to new technologies [4]). However, if we relate personalizing digital nudges to the ethical need to effectively make possible/promote deliberative processes and public scrutiny, the opportunity to personalize the safeguards as well in place to guarantee such ethical needs emerges, an opportunity that has been largely overlooked so far. In the next section, some examples of such unexplored kinds of personalization are considered.

#### **4. The novelty of digital nudges**

Nothing prevents policymakers from personalizing the safeguards relevant to citizens' deliberative processes and public scrutiny when digital nudging is in place, namely i) transparency and ii) adding the information needed to be aware of the rationale behind the introduction of nudges and the identification of them. Personalizing the safeguards here considered looks like an appealing opportunity in that it potentially enhances the effectiveness of the safeguards in place. In what follows, some examples of personalized safeguards are considered, but no earlier than emphasizing the different meanings of "effectiveness" when referring to personalizing nudges and personalizing safeguards. When looking at personalizing nudging, "effectiveness" is related to the behavior target, that is, the effectiveness in steering the desired behavior. On the other hand, when we consider safeguards, effectiveness pertains to the strength of the safeguards in ensuring that deliberative processes and public scrutiny can, in fact, take place. Let us consider two scenarios in which the safeguards are personalized.

*Scenario 1):* Let us refer to a case in which both deliberative processes and public scrutiny should be made merely possible (see Table 1). If so, how could transparency be personalized? We can consider a case in which citizen a is characterized by a highly rational cognitive style and, consequently, tends to deliberate on many decisions. On the other hand, citizen b tends to rely on an intuitive cognitive style and rarely deliberates. We know that cognitive styles adopted by a nudgee can moderate the strength of a certain nudge [23]. Furthermore, we know that transparency is a means to raise decision makers' awareness of a specific attribute of the choice environment, and focusing on one of the attributes can draw cognitive resources, potentially reducing cognitive attention towards others [27] which could be perceived by some citizens as a disutility to the own unbound evaluation (intuitive or more reasoned) of what choice environment's traits count. If we combine these pieces of evidence, at first sight, it seems reasonable to personalize so that transparency is removed for type-a citizens, thus in cases where the likelihood that deliberative processes are invoked is high and therefore there is no need to take the risk of incurring a cognitive disutility. Instead, the exact opposite applies to type-b citizens, that is cases in which it is worth taking the risk of incurring cognitive disutility due to the intuitive and deliberation-averse cognitive style adopted.

*Scenario 2):* A second example of personalization in a scenario where deliberation processes and public scrutiny should be made possible could regard the ways to convey transparency. The signal meant to make transparent the presence of the nudge can be conveyed in various guises, verbally (written messages) or visually (suitable images) for instance. In this regard, although it appears that there is a picture- superiority effect, making transparent a nudge easier through images, this is not always the case. For instance, verbal messages can be more effective when the recipient is motivated and can understand the semantic content of the message [6]. If so, it could be sensible to personalize transparency in a way in which considering motivated citizens, able to process the semantic content of the messages, transparency is conveyed through written messages and, oppositely, through visual messages for citizens who are not. Nevertheless, the fact that it is possible to personalize safeguards in digital nudging does not imply that policymakers should take advantage of this. In fact, if ethical

considerations come into play, policymakers should be careful or at least adhere to certain restrictions. In the following section, I sketch normative considerations to the personalization of safeguards in digital nudging.

## **5. Discussion. Should personalized transparency be applied?**

In this section, some preliminary thoughts on the normative implications of personalizing safeguards are developed. Deliberation and public scrutiny are essential to the functioning of democratic processes, key values in modern liberal democracies. In light of that, it looks reasonable that personalizing safeguards can be legitimately done as long as it does not impair the goal of enabling/promoting deliberation processes and public scrutiny at the individual level. If it is reasonable to believe that a kind of personalization of the safeguards (that could be introduced for the sake of non-essential aspects of democratic processes), could put off citizens from engaging in deliberative processes and scrutinizing policymakers' work, then such kind of personalization should be avoided. For instance, considering Scenario 1, it seems unjustifiable for a policymaker to personalize the safeguards implemented for a citizen with a highly rational cognitive style removing transparency if this limits the chance that the citizen adopts deliberative processes and scrutinizes. This holds true regardless of the potential benefits of personalization, considering Scenario 1 avoiding the risk of imposing a disutility for citizens in terms of their own unbound evaluation of what choice environment's traits count. Here, a quick digression is necessary concerning the methodologies we can adopt to identify the conditions under which deliberation and scrutiny are factually impaired. This is a challenge anything but plain. Indeed, we cannot rely on data on nudges' behaviors in facing the challenge. In the cafeteria example the relevant options for nudges are i) picking the salad, ii) picking French fries. An outside observer cannot say, looking at the choice made by a nudgee, if she relies on a deliberate choice or otherwise. For instance, if a certain nudgee prefers French fries, it could be so after deliberation for which, knowing the exceptional quality of those French fries, she decides to treat herself for once. Considering the unusability of behavioral data, we could explore the possibility to rely on neuroscience to distinguish cases in which deliberation facing a transparent nudge is likely to emerge from cases in which is not (for work in which neuroscience is applied to nudging [8],[18],[15]. Considering Scenario 2), where personalization pertains to how transparency is signaled and it is known that verbal signals are more effective for type-a citizens and visual messages for type-b citizens, personalized interventions should be deemed legitimate and desirable.

## **6. Conclusion**

In this article, a subset of nudges, digital nudges, is explored and their potential for personalization are highlighted. In the previous sections it has been discussed how personalization can be applied as well to safeguards designed to make possible/promote deliberative processes and public scrutiny, provided some examples related to transparency and explored the possibility to personalize transparency from a normative viewpoint. This paper does not pretend to cover all the possible kinds of personalization of transparency and neither exhaustively answers the question concerning what policymakers should do with the chance for personalized safeguards when nudging. Instead, the aspiration of the paper is to open the discussion on a topic so far vastly neglected and ideally promote the constitution of an interdisciplinary community engaged in investigating the descriptive and normative aspect of personalizing safeguards in nudging. In line with this intention, in what follows a challenge that arguably will emerge in further discussing personal transparency is considered and the

merits of an interdisciplinary methodological attitude are sketched. In section 4 it has been pointed out the difference in the meaning of “effectiveness” when referring to personalizing nudges and when referring to personalizing safeguards. What has been overlooked is the possibility that the optimal, i.e., more effective, personalization of safeguard could impair the strength of a nudge. Experts of nudging are aware of the risk of psychological reactance when nudges are made transparent, but, overall, it seems that transparency does not reduce nudges’ strength [3]. However, so far, we are oblivious to the impact of personalized, and so more effective, forms of transparency. This needs to be investigated and, on the occasions that the personalized transparency weakens nudge’s strength, policymakers should strike a balance, led by evaluations on the importance of the nudge’s behavioral target and the consequences of placing suboptimal transparency in terms of individual deliberation and public scrutiny. Such assessments should be made on a case-by-case basis by policymakers. Finally, it should be noted how, considering the nature of the issues outlined concerning personalizing transparency, when interventions meant to personalize safeguards in nudging are conceived an interdisciplinary approach is much needed. The approach could be inspired by the “Integrative Social Robotics” method paradigm developed by [25] given which a multidisciplinary approach is advocated, arguing that investigations into what social robots can do should progress in tandem with investigations into what they should do. This method paradigm aims to create a complex investigation that incorporates value-theoretic research from the early stages of social robots’ development (see the Integrative Social Robotics’ quality principles in [26]). This method paradigm should be applied even when considering different technologies provided that normative and descriptive aspects are closely linked, as in the case of personalizing transparency through digital means. Personalizing interventions meant to improve the functioning of democratic processes is a subject of great interest and it would be beneficial to further research the introduction of personalized safeguards when nudges are introduced by private entities and when self-nudging is in place. Policymakers, ethicists, and experts in technologies have a lot of work ahead on personalized transparency.

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## References

- [1] Alemanno A and Spina N. Nudging legally: On the checks and balances of be-havioural regulation. *International Journal of Constitutional Law* **12(2)**:429–4 [https://doi.org/doi.org/10.1093/icon/mou033\(2014\)12\(2\):429-4](https://doi.org/doi.org/10.1093/icon/mou033(2014)12(2):429-4)
- [2] Bicchieri C. *Norms in the wild: How to diagnose, measure, and change social norms*. Oxford: Oxford University Press (2016)
- [3] Bruns H, Kantorowicz-Reznichenko E, Klement K, Jonsson, ML, and Rahali B. Can nudges be transparent and yet effective? *Journal of Economic Psychology* **65**: 41–59. <https://doi.org/doi.org/10.1016/j.joep.2018.02.002> (2018)
- [4] Calboli S. Robot Nudgers. What About Transparency? *Software Engineering and Formal Methods. SEFM 2022 Collocated Workshops, Lecture Notes in Computer Science* **vol. 13765**, Springer International



- Publishing In P Masci, C Bernarde- schi, P Graziani, M Koddenbrock, M Palmieri (Eds.) (2023)
- [5] Calboli S, and Cevolani G. Nudging. Ethical concerns on alien control, experience, abstraction, and scientific image of the world. In P. Graziani, C. Calosi, and G. Tarozzi (Eds). Urbino: Franco Angeli (2019).
  - [6] Childers TL, and Houston MJ. Conditions for a picturesuperiority ef- fect on consumer memory. *Journal of Consumer Research* **11(2)**: 643–654 <https://doi.org/doi.org/10.1086/209001> (1984)
  - [7] Collier B, Flynn G, Stewart J, and Thomas D. Influence government: Exploring practices, ethics, and power in the use of targeted advertising by the UK state. *Big Data & Society* **9(1)**. <https://doi.org/doi.org/10.1177/20539517221078756> (2022)
  - [8] Felsen G, and Reiner PB. What can Neuroscience Contribute to the De- bate Over Nudging? *Review of Philosophy and Psychology* **6(3)**: 469–479. <https://doi.org/doi.org/10.1007/s13164-015-0240-9> (2015)
  - [9] Goldstein NJ, Cialdini, RB, and Griskevicius V. A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels. *Journal of Con- sumer Research* **35(3)**: 472–482. <https://doi.org/doi.org/10.1086/586910> (2008)
  - [10] Ingendahl M, Hummel D, Maedche A, and Vogel T. Who can be nudged? Examining nudging effectiveness in the context of need for cognition and need for uniqueness. *Journal of Consumer Behaviour* **20(2)**: 324–336. <https://doi.org/doi.org/10.1002/cb.1861> (2021)
  - [11] Ivanković V, and Engelen B. Nudging, transparency, and watchfulness. *Social Theory and Practice* **45(1)**: 43–73. <https://doi.org/doi.org/10.5840/soctheorpract20191751> (2019)
  - [12] Jeske D, Coventry L, Briggs P, and Van Moorsel A. Nudging whom how: IT proficiency, impulse control and secure behaviour. *Human Factors in Computing Systems* (2014)
  - [13] Kahneman D. *Thinking, Fast and Slow*. New York: Macmillan (2011).
  - [14] Krijnen JM, Tannenbaum D, and Fox CR. Choice architecture 2.0: Behavioral policy as an implicit social interaction. *Behavioral Science & Policy* **3(2)**: 1–18. <https://doi.org/doi.org/10.1353/bsp.2017.0010> (2017)
  - [15] Lieberman MD. Social Cognitive Neuroscience: A Review of Core Processes. *Annual Review of Psychology*, **58(1)**: 259–289. <https://doi.org/https://doi.org/10.1146/annurev.psych.58.110405.085654> (2007)
  - [16] Hansen, PG The Definition of Nudge and Libertarian Paternalism: Does the Hand Fit the Glove?. *European Journal of Risk Regulation* **7(1)**: 155–74. <https://doi.org/doi.org/10.1017/s1867299x00005468> (2016)
  - [17] Maier MA, Bartoš F, Stanley TD, Shanks DR, Harris AJL, and Wagenmak- ers E. No evidence for nudging after adjusting for publication bias. *Proceed- ings of the National Academy of Sciences of the United States of America*, **119(31)** <https://doi.org/doi.org/10.1073/pnas.2200300119> (2022)
  - [18] Mega LF, Gigerenzer G, and Volz KG. Do intuitive and deliberate judgments rely on two distinct neural systems? A case study in face processing. *Frontiers in Hu- man Neuroscience* **9** <https://doi.org/doi.org/10.3389/fnhum.2015.00456> (2015)
  - [19] Michaelsen P, Johansson LO, and Hedesström M. Experiencing De- fault Nudges: Autonomy, Manipulation, and Choice-

- Satisfaction as Judged by People Themselves. *Behavioral Public Policy* **1–22** <https://doi.org/doi.org/10.1017/bpp.2020.45> (2021)
- [20] OECD. *Behavioural Insights and Public Policy: Lessons from Around the World*. Paris: OECD Publishing.
- [21] Osman M, McLachlan S, Fenton NE, Neil M, Löfstedt R, and Meder B. Learning from behavioral changes that fail. *Trends in Cognitive Science* (2020)
- [22] Page LC, Castleman BL, and Meyer K. Customized Nudging to Improve FAFSA Completion and Income Verification. *Educational Evaluation and Policy Analysis* **42(1)**: 3–21 <https://doi.org/doi.org/10.3102/016237371987691> (2020)
- [23] Peer E, Egelman S, Harbach M, Malkin N, Mathur A, and Frik A. Nudge me right: Personalizing online security nudges to people’s decision-making styles. *Computers in Human Behavior* **109** <https://doi.org/doi.org/10.1016/j.chb.2020.10634> (2020)
- [24] Schmidt A. The Power to Nudge. *American Political Science Review* **111(2)**: 404–417 <https://doi.org/doi.org/10.1017/S0003055417000028> (2017)
- [25] Seibt J. Integrative Social Robotics—A new method paradigm to solve the description problem and the regulation problem? In J Seibt, M Nørskov, SS Andersen. *What Social Robots Can and Should Do*. Springer, New York, 104–114. (2016)
- [26] Seibt J, Damholdt M, and Vestergaard C. Five Principles of Integrative Social Robotics <https://doi.org/10.3233/978-1-61499-931-7-28> (2018)
- [27] Spiegel R. On the Equilibrium Effects of Nudging. *The Journal of Legal Studies* **44(2)**: 389–416 <https://doi.org/doi.org/10.1086/684291> (2014)
- [28] Thaler RH, and Sunstein CR. *Nudge: Improving Decisions About Health, Wealth, and Happiness*. New Haven: Yale University Press (2008) - Thaler RH, Sunstein CR. *Nudge: The Final Edition (Revised ed.)*. Penguin Books (2021)
- [29] Thaler RH, and Benartzi S. Save More Tomorrow®: Using Behavioral Economics to Increase Employee Saving. *Journal of Political Economy* **112**: 164–187 (2004)
- [30] Weinmann M, Schneider C, and Brocke JV. Digital Nudging in Business & Information Systems Engineering **58(6)**: 433–436 <https://doi.org/doi.org/10.1007/s12599-016-0453-1> (2016)
- [31] Wilkinson TM. Nudging and Manipulation, *Political Studies* **61(2)**: 341–355. <https://doi.org/doi.org/10.1111/j.1467-9248.2012.00974.x> (2012)
- [32] K Yeung. Hypernudge: Big Data as a mode of regulation by design in Information. *Communication & Society*. **20(1)**: 118–136 <https://doi.org/doi.org/10.1080/1369118x.2016.11867>

