CESifo WORKING PAPERS

10599
2023

August 2023

Nudging: An Experiment on Transparency, Controlling for Reactance and Decision Time

Tobias Schütze, Carsten Spitzer, Philipp C. Wichardt

CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
https://www.cesifo.org/en/wp
An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
· from the RePEc website: www.RePEc.org
· from the CESifo website: https://www.cesifo.org/en/wp

CESifo *Working Paper No. 10599*

Nudging: An Experiment on Transparency, Controlling for Reactance and Decision Time

Abstract

Is being informed about nudging detrimental to the effect of the nudge? This paper reports results from an experimental study (n = 623) testing the effects of transparency on the effectiveness of a default nudge while controlling for reactance and decision time. Overall, the data show that more people follow the default if the nudge is made transparent. More importantly, though, effects of transparency differ depending on whether people are fast or slow in their decision making. In particular, (only) slow decision makers react more positively (keeping the default) if nudging is made transparent. Moreover, the data also show an interaction of reactance and decision time in that more reactant subjects making slower decisions respond more negatively (i.e. leave the default more often). Thus, a positive effect of transparency as well as a negative impact of reactance can be established in the data if decision time is accounted for.

JEL-Codes: C900, D900, D910.

Keywords: nudging, transparency, reactance, decision time.

Tobias Schütze
Department of Economics
University of Rostock / Germany
tobias.schuetze@uni-rostock.de

Carsten Spitzer
University Medical Center
University of Rostock / Germany
carsten.spitzer@med.uni-rostock.de

Philipp C. Wichardt
Department of Economics
University of Rostock / Germany
philipp.wichardt@uni-rostock.de

This version: August 1, 2023
Declarations of interest: none
We are grateful to Fynn Kemper for helpful comments and discussions. We thank Dustin Liebetrau and Elena Saval for helpful research assistance. The usual disclaimer applies.

1 Introduction

In their seminal book 'Nudge', Thaler and Sunstein (2008) propose to utilise scientific knowledge about behavioural biases in order to nudge people towards allegedly better decisions – or, as the authors famously put it, "(to) influence choices in a way that will make choosers better off, *as judged by themselves*" (Thaler and Sunstein, 2008, p. 5; italics in original). Since then, the idea of nudging has induced multiple applications in a variety of contexts (see Beshears and Kosowsky, 2020, for a review). However, apart from applications, the proposal made by Thaler and Sunstein has also sparked a heated debate about whether nudging is inherently paternalistic or whether it is designed in a way that indeed renders typical criticism of paternalism negligible (e.g. Sugden, 2008, 2017; Sunstein, 2016, 2018; Rizzo and Whitman, 2009; Hausman and Welch, 2010; Guala and Mittone, 2015; Whitman and Rizzo, 2015; Infante et al., 2016; Kemper and Wichardt, 2022).

One of the aspects that have been criticised is that nudges often influence behaviour while being unrecognised by the individual (Hansen and Jespersen, 2013; Sunstein, 2016; Bruns et al.; 2018), thereby arguably interfering with individual autonomy (Bovens, 2009; Hausman and Welch, 2010; c.f Bruns et al, 2018). Following this line of argument, Hausman and Welch ask that "People should be informed of government efforts to exploit their decision-making foibles, even if doing so undercuts their effectiveness." (Hausman and Welch, 2010 p. 135). Despite the extensive debate around nudging, the actual effects of transparency have so far received comparably little empirical attention, though. Recent studies addressing the interplay of transparency an the effectiveness of nudging, however, find no evidence for a negative effect of informing people of the nudge (Loewenstein et al. 2015, Kroese et al. 2016, Steffen et al., 2016. Bruns et al., 2018, Bang et al. 2020); Paunov et al. (2019) even find even a positive effect of procative transparency).

Somewhat surprising to us, Bruns et al. (2018) – studying transparency´s connection with an environmental default-nudge – also find no connection between transparency and reactance, as had been hypothesized based on previous research (e.g. Arad and Rubinstein, 2018; see Bruns et al., 2018, for further references). Roughly speaking, reactance measures the degree of opposition against interference with ones autonomy either triggered by a certain situation (state reactance) or as a personal trait (trait reactance), (c.f. Brehm, 1966; Bruns et al., 2018). Accordingly, information about being nudged could trigger more deviations from the default, especially so for reactant people. Yet, Bruns et al. (2018) find no such effect.

In order to find out more about the relation between reactance and nudging we conducted a study similar to the one by Bruns et al. (2018) albeit using an online experiment (n=623) and accounting also for decision time. As argued by Rubinstein (2013), decision time is generally highly relevant in individual decision-making. What is more, default

nudges have been argued to address primarily fast decision making (Hansen and Jesperson, 2013; cf: van Gestel et al., 2021) – referred to as system 1 by Kahneman (2011). Thus, we hypothesised that decision time may be relevant for the interplay of nudging, reactance and transparency and that overall effects may be obscured in aggregate data. Following Bruns et al. (2018), subjects in our experiment had to decide how much of a predefined endowment to donate to an environmental using different defaults (all, nothing, no default) including two transparency treatments for the "all"-default (one with a highlighted statement; c.f. salience theory, Bordalo et al., 2012).

Regarding results, we replicate earlier findings that being transparent about the nudge does not significantly affect average contributions. However, we do find (weak) positive effects of transparency on keeping the default (logit-regression). Furthermore, accounting for decision time (median split[1]), we find higher contributions for people taking more time within the transparent treatments and in the zero-default treatment (T10: 4.23 vs. 5.59, $p = 0.06$; **T**10[2]: 4.20 vs. 5.73, $p = 0.03$); N0: 2.97 vs. 4.56, $p = 0.01$).[3] Comparing treatments and accounting for decision time, we find that transparency increases default choices among people taking more time to decide (N10 vs. T10: 13.33% vs. 30.36%, $p = 0.03$; N10 vs. **T**10: 13.33% vs. 28.81%, $p = 0.04$); we find no difference for faster people. Similarly, we find higher average contributions among people taking more time for the transparency treatments (T10: 5.59 vs. 4.40, $p = 0.06$; **T**10: 5.73 vs. 4.40, $p = 0.02$), while there is again no such effect for fast decision makers.

Moreover, contrary to previous studies, we do find an impact of reactance on the effectiveness of nudging. In particular, for all treatments with "giving all" as a default (N10, T10, **T**10) deviations from the default increase with decision time for people with high trait reactance; a multinomial logit regression suggests that reactant people tend to deviate towards giving nothing (primarily in **T**10). We otherwise find no interaction of reactance with treatments, though. Regarding aggregate outcomes, this negative effect is counterbalanced by a positive effect of increased decision time on contributions in the transparency treatments.

The rest of the paper is structured as follows: In Section 2, we present the details of the experiment. Results are provided in Section 3. A brief discussion and some concluding remarks are presented in Section 4.

[1] Main results are confirmed in regressions with standardised time.

[2] The bold case indicates the highlighted transparency treatment.

[3] p-values refer to two-sided Mann-Whitney-U test for differences in contributions; two-sided test of proportions for differences in frequencies.

2 Experimental Design and Procedures

For the study, we conducted an online questionnaire implementing 5 treatments of a standard dictator game in which subjects could split a hypothetical amount of 10€ between themselves and charitable foundation. After a brief welcome text, subjects we introduced to the charitable environmental foundation – the Michael Succow Stiftung[4] – and informed that they have to determine how much of their endowment to donate by clicking on the respective amount on a horizontal bar; any discrete amount between 0 and 10€ was possible. Treatments differed in whether a default was preset to 10€ (henceforth referred to as N10), 0€ (N0) or no default was set (control). Moreover, in two treatments the 10€ default was accompanied by a transparency-statement:"Based on scientific findings, the donated amount is pre-selected so as to achieve maximal donations." – once presented as the rest of the text (T10) or highlighted in bold (**T**10). Decisions were incentivised in that every 10th response was payed as stated, which was known to the subjects.[5] In addition, all subjects received an participation fee determined by the panel provider. After having made a decision, subjects had to complete a questionnaire asking for socio-demographics, relative importance of various political topics (including climate change) and Merz's reactance scale (Merz, 1983).[6]

The subjects for our study were recruited online via Bildeni & respondi who also administered the questionnaire and made payments to subjects. The questionnaire was programmed using SoSci Survey (Leiner, 2019) and distributed by the panel provider Bildendi & respondi in august, 2022. Payments to subjects were made shortly after the survey was closed; aggregate donations to the foundation were made by the experimenters.

3 Results

In total, 712 subjects participated in and finished the survey. 623 (female: 54.41%; mean age: 45.48, std. dev.: 16.00) of these were included in the analysis.[7] Results are reported below, with p-values referring to two-sided Mann-Whitney-U test for differences in contributions and two-sided test of proportions for differences in frequencies; main findings are highlighted as *Result*. The focus is on the "give all" default treatments (N10,

[4]The Michael Succow Stiftung is an international foundation dedicated to environmental and climate protection focusing on the preservation of marshland.

[5]Note that the payment method (i.e. pay all or randomly chosen) may affect individual decisions. Yet, Charness et al. (2016), reviewing a significant amount of papers, find that paying for only a subset of periods or individuals is at least as effective as the pay all approach. Being limited in financial means, we opted for the larger number of observations.

[6]Instructions are available from the authors on request.

[7]We excluded 19 subjects that failed an attention-test, 20 under aged subjects and one diverse subject due to reasons of sample size. For data quality, we excluded 39 subjects with relative speed index > 2 and 10 subjects who spent an unreasonable long time on the decision page (> 4 minutes)

		Contribution	Nothing	Intermediate	Everything
Control		4.13 (3.56)	25.36%	57.97%	16.67%
	Short	3.94 (3.67)	30.00%	52.86%	17.14%
	Long	4.32 (3.45)	20.59%	63.24%	16.18%
	Diff. L/S	0.38	-9.41%	10.38%	-0.96%
N0		3.73 (3.43)	29.57%	57.39%	13.04%
	Short	2.97 (3.42)	43.33%	45.00%	11.67%
	Long	4.56 (3.26)	14.55%	70.91%	14.55%
	Diff. L/S	1.59***	-28.78%***	25.91%***	2.88%
N10		4.27 (3.73)	27.91%	52.71%	19.38%
	Short	4.15 (4.13)	37.68%	37.68%	24.64%
	Long	4.40 (3.23)	16.67%	70.00%	13.33%
	Diff. L/S	0.25	-21.01%***	32.32%***	-11.31%
T10		4.89 (3.91)	26.72%	44.83%	28.45%
	Short	4.23 (4.14)	38.33%	35.00%	26.67%
	Long	5.59 (3.56)	14.29%	55.36%	30.36%
	Diff. L/S	1.36*	-24.04%***	20.36%**	3.69%
T10		4.92 (3.96)	28.80%	44.80%	26.40%
	Short	4.20 (4.13)	37.88%	37.88%	24.24%
	Long	5.73 (3.62)	18.64%	52.54%	28.81%
	Diff. L/S	1.53**	-19.24%**	14.66%*	4.57%

Table 1: Average contributions and behaviour by treatment and decision time; two-sided Mann-Whitney-U test for contributions; two-sided test of proportions for behaviour.

T10, **T**10) as we are mainly interested in the effects of transparency. Regarding decision time, subjects are split according to the median within treatments where appropriate;[8] for later regression analyse standardised decision time is used.

Average Contributions

Overall, subjects on average contribute around 4-5 Euro to the charity with no differences between the base-line (Control) and the different treatments (Control: 4.13; N0: 3.73, $p = 0.37$; N10: 4.27 $p = 0.85$; T10: 4.89, $p = 0.13$; **T**10: 4.92, $p = 0.13$ – p-values for comparison with Control); see Table 1 for reference. Furthermore, in the "give all" nudge treatments (N10, T10, **T**10) average contributions do not drop if the nudge is made transparent (T10 vs. N10: 4.89 vs. 4.28, $p = 0.21$; **T**10 vs. N10: 4.92 vs. 4.28, $p = 0.21$).

However, once we account for decision time, the the data show a clear effect both within and between conditions. Within conditions, average contributions for subjects

[8]Average time spent differs between treatments (time in seconds: Control: 33.01; N0: 32.24; N10: 29.02, T10: 32.85, **T**10: 36.83).

who take more time are significantly higher than for those making faster decisions in both N0 (2.97 vs. 4.56, $p = 0.01$), T10 (4.23 vs. 5.59, $p = 0.06$) and **T**10 (4.20 vs. 5.73, $p = 0.03$). By contrast, average contributions show no such effect in the control treatment (3.94 vs. 4.32, $p = 0.38$) and N10 (4.15 vs. 4.40, $p = 0.46$). Between conditions, making the nudge transparent increases average contributions for subjects taking more time (T10 vs. N10: 5.59 vs. 4.40, $p = 0.06$; **T**10 vs. N10: 5.73 vs. 4.40, $p = 0.03$). Again, there is no such effect for subjects making fast decisions (T10 vs. N10: 4.23 vs. 4.15, $p = 0.98$; **T**10 vs. N10: 4.20 vs. 4.15, $p = 0.89$). Notably, the treatment effect is stronger in the highlighted condition than in the ordinary transparency condition.

Moreover, we also find higher average contributions in **T**10 for subjects showing intermediate behaviour, i.e. making donations between 1 and 9 (N10 vs. **T**10, 4.43 vs. 5.01, $p = 0.05$) suggesting that there may be a general shift towards the intended behaviour as the nudge is made transparent and the explanation for nudging is highlighted.

Result 1 (Average Contributions) *Overall, transparency does not affect the effectiveness of the nudge in terms of average outcomes. Accounting for decision time (median split), average contributions for subjects taking more time increase under transparency but remain constant for faster decision makers.*

Default Choices

Concerning default choices, in both N0 and N10 the frequency of fast decision makers staying with the default is tangibly higher than that of slow decision makers (although only statistically significant for N0. N0: 43.33% vs. 14.55%, $p = 0.01$; N10: 24.64% vs. 13.33%, $p = 0.105$); cf. Table 1.[9] The difference for the give-all default vanishes, though, if the nudge is made transparent.

More generally, classifying subjects according to the type of contribution made – everything, nothing, intermediate – the data primarily show that people spending more time on the decision take more intermediate and fewer "give nothing" decisions in all but the control condition; cf. Figure 1 (see also Table 2 below and Table 1).

Regarding the effect of transparency (treatments N10 vs. T10, **T**10), informing people about the intention behind the preset default overall weakly – but not significantly – increases the frequency of default choices, i.e. the frequency of people giving all (N10 vs T10: 19.38% vs. 28.45%, $p = 0.096$; N10 vs. **T**10: 19.38% vs. 26.40%, $p = 0.18$; T10 vs. **T**10: 28.45% vs. 26.40%, $p = 0.72$). Yet, once we account for decision time the data show a clear differences between conditions. In both transparent conditions, the proportion of

[9] In all treatments there is a time effect in that people taking more time to decide less often give nothing (Control: 30.00% vs. 20.59%, $p = 0.20$ N0: 43.44% vs. 14.55%, $p = 0.01$; N10: 37.68% vs. 16.67%, $p = 0.01$; T10 38.33% vs. 14.29%, $p = 0.01$;**T**10: 37.88% vs. 18.64%, $p = 0.02$). The fraction of zero donations is clearly the largest for N0, though, suggesting that the primary effect is due to the default.

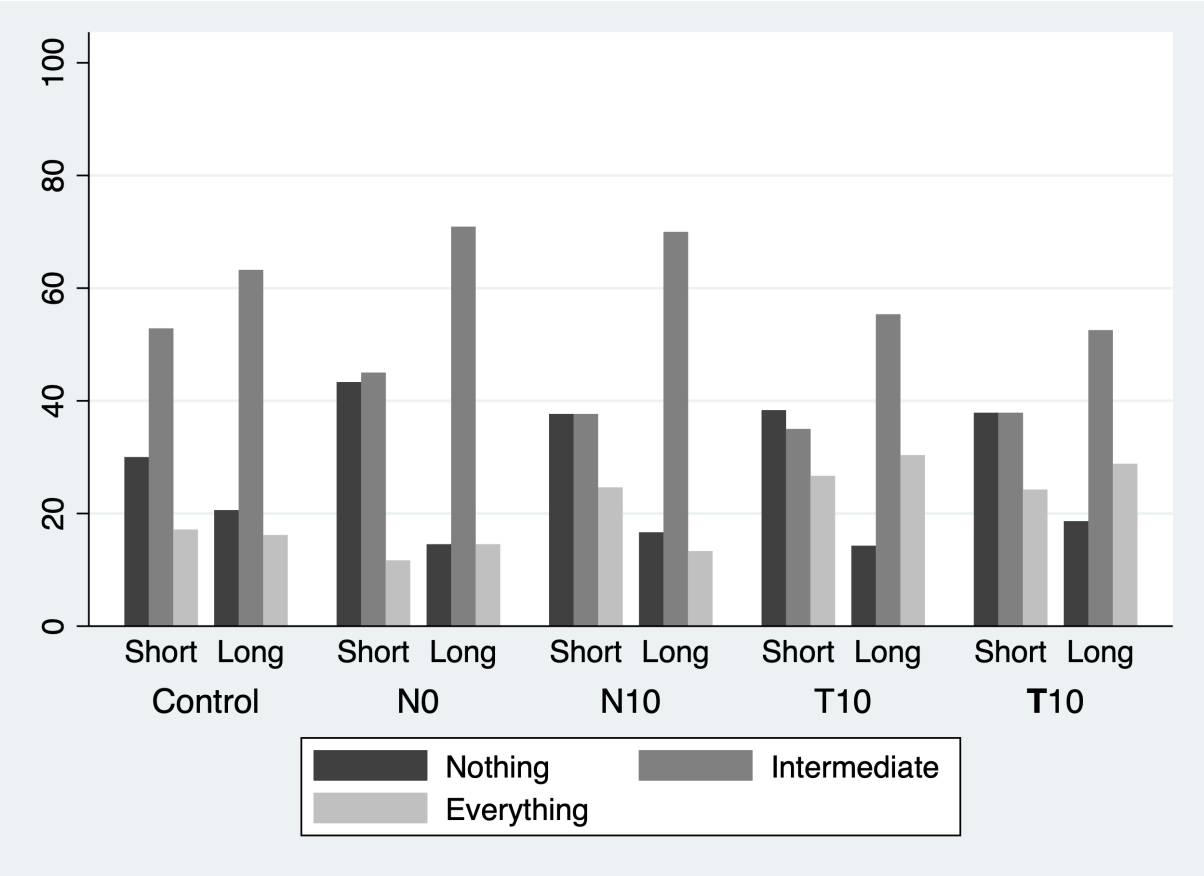

Figure 1: Classification of behaviour by decision time and treatment.

subjects staying with the default is significantly larger than in N10 for those subjects taking longer to decide (N10 vs T10: 13.33% vs. 30.36%, $p = 0.026$; N10 vs. **T**10: 13.33% vs. 28.81%, $p = 0.04$, T10 vs. **T**10: 30.36% vs. 28.81%, $p = 0.86$). Proportions are essentially equal between conditions for subjects taking less time to decide.

Result 2 (Default Choices) *Overall, transparency weakly increases the frequency of default choices (giving all). Accounting for decision time: Transparency has a positive effect on keeping the default for subjects taking more time to decide and no effect for subjects taking less time.*

Regression Analyses Including Reactance

The above results regarding transparency are also confirmed by regression analyses including standardised decision time, reactance, environmental awareness and treatment dummies as controls; cf. Table 2 and Table 3.

	(1)	(2)	(3)	(4)	(5)
T10	0.609	−0.674	0.617	−0.291	−0.248
	(0.491)	(1.978)	(0.488)	(1.946)	(1.943)
T10	0.625	1.645	0.649	1.151	0.604
	(0.483)	(2.204)	(0.482)	(2.150)	(2.195)
Reactance	−0.225	−0.252		−0.257	−0.173
	(0.252)	(0.398)		(0.402)	(0.417)
Std. time	0.320*		−0.168	−0.082	0.615
	(0.193)		(0.233)	(1.026)	(1.121)
T10 × Reactance		0.379		0.277	0.232
		(0.575)		(0.568)	(0.564)
T10× Reactance		−0.309		−0.137	0.016
		(0.644)		(0.631)	(0.643)
T10 × Std. time			0.760	2.845	2.119
			(0.476)	(1.930)	(1.946)
T10× Std. time			0.717*	4.545***	3.893**
			(0.408)	(1.454)	(1.507)
Std. time × Reactance				−0.028	−0.218
				(0.313)	(0.341)
T10 × Std. time × Reactance				−0.596	−0.419
				(0.589)	(0.588)
T10× Std. time × Reactance				−1.122***	−0.975**
				(0.429)	(0.445)
Env. Awareness					0.354***
					(0.109)
Constant	5.039***	5.132***	4.271***	5.148***	3.296**
	(0.918)	(1.390)	(0.329)	(1.409)	(1.600)
N.Obs.	370	370	370	370	370
(R^2)	0.015	0.011	0.021	0.052	0.081

Table 2: Contribution rate, linear-regression, treatment-variable with N10 base category. ***= $p < 0.01$, **= $p < 0.05$, *= $p < 0.10$.

Regarding contributions made, a linear regression analysis shows no significant influence of transparency alone, controlling for time and reactance (Table 2, model 1). However, once decision time is included into the model (as an interaction term with

treatments), salient transparency becomes relevant and shows a weak positive influence on contributions as decision makers take more time (model 3). Moreover, this effect is driven by a general positive influence of the treatment on slow decision makers which is weaker for more reactant people (model 4 and 5).

Result 3 (Contributions, Linear Regression) *Linear regression analysis confirms a (weak) positive impact of highlighted transparency of the nudge on contributions as decision time increases. In particular, making the default nudge transparent in a salient way has a tangible significant positive effect as decision makers take more time, albeit less so for more reactant subjects.*

Moreover, regarding decisions to remain with the preset default, a logit regression analysis confirms a positive effect of transparent nudging; cf. Table 3.

	(1)	(2)	(3)	(4)	(5)
T10	0.503*	0.537*	0.715**	0.744**	0.706**
	(0.303)	(0.305)	(0.345)	(0.346)	(0.348)
T10	0.400	0.436	0.614*	0.637*	0.629*
	(0.301)	(0.304)	(0.343)	(0.344)	(0.347)
Reactance		0.074		0.046	0.098
		(0.157)		(0.161)	(0.164)
Std. time		1.116*	−1.105**	0.352	0.409
		(0.613)	(0.508)	(0.860)	(0.870)
Reactance × Std. time		−0.355*		−0.436**	−0.452**
		(0.188)		(0.211)	(0.212)
T10 × Std. time			1.235**	1.285**	1.261**
			(0.545)	(0.548)	(0.555)
T10 × Std. time			1.200**	1.165**	1.126**
			(0.544)	(0.545)	(0.554)
Env. Awareness					0.135*
					(0.069)
Constant	−1.426***	−1.707***	−1.641***	−1.817***	−2.610***
	(0.223)	(0.585)	(0.276)	(0.615)	(0.749)
N.Obs.	370	370	370	370	370
Pseudo R^2	0.008	0.018	0.026	0.039	0.048

Table 3: Likelihood of keeping the default, logit regression, treatment-variable with N10 as base category. ***= $p < 0.01$, **= $p < 0.05$, *= $p < 0.10$.

Again, the clearest picture is obtained once both interactions of treatment with decision time and reactance and decision time are added (model 4 and 5). In particular, while both transparent treatments have a positive effect on staying with the default, the effect is even stronger as decision makers take more time. Moreover, while reactance itself has no impact on default choices more reactant people become less likely to stay with the default as more time is spent on the decision. Note that we find no significant treatment-interaction with reactance.

Result 4 (Default Choices, Logit Regression) *Logit regression analysis including decision time confirms a positive impact of both transparency treatments on the frequency of default choices. The effect is particularly strong as decision makers take more time.*

Furthermore, in view of the effects of reactance, we replicate findings that reactance overall does not influence average contributions in the nontransparent or non-salient transparent condition (cf. Table 2). Yet, we do find a significant negative effect on contributions for subjects making slower decisions in the highlighted transparency treatment (cf. Table 2). Moreover, also regarding the actual choice of the preset default, we find that reactance has a negative effect on slower decision makers in all treatments (cf. Table 3).

	(1) Nothing	(1) Intermediate	(2) Nothing	(2) Intermediate	(3) Nothing	(3) Intermediate	(4) Nothing	(4) Intermediate
T10	-0.427	-0.546*	-0.427	-0.561*	-0.724*	-0.789**	-1.713	0.110
	(0.361)	(0.323)	(0.363)	(0.325)	(0.421)	(0.366)	(1.852)	(1.605)
T10	-0.278	-0.472	-0.271	-0.499	-0.524	-0.711*	-3.317*	-1.792
	(0.355)	(0.321)	(0.357)	(0.323)	(0.411)	(0.365)	(1.990)	(1.677)
Reactance			0.064	-0.159	0.177	-0.121	-0.190	-0.164
			(0.181)	(0.163)	(0.193)	(0.173)	(0.398)	(0.351)
Std. time			-0.418**	0.210	-2.306**	0.210	2.473	1.375
			(0.200)	(0.138)	(1.113)	(0.922)	(2.838)	(2.560)
T10 × Std. time					-1.230*	-1.453**	-6.168*	-1.962
					(0.689)	(0.587)	(3.375)	(2.809)
T10 × Std. time					-0.949	-1.374**	-8.631**	-3.584
					(0.663)	(0.585)	(3.406)	(2.871)
Reactance × Std. time					0.802***	0.373*	-0.595	0.024
					(0.268)	(0.223)	(0.832)	(0.734)
T10 × Reactance							0.282	-0.262
							(0.514)	(0.452)
T10 × Reactance							0.796	0.348
							(0.568)	(0.488)
T10 × Std. time × Reactance							1.427	0.157
							(0.964)	(0.804)
T10 × Std. time × Reactance							2.212**	0.705
							(0.987)	(0.847)
Constant	0.365	1.001***	0.075	1.536**	-0.115	1.646**	1.139	1.781
	(0.260)	(0.234)	(0.686)	(0.606)	(0.750)	(0.657)	(1.399)	(1.254)
N.Obs.	370		370		370		370	
Pseudo R^2	0.005		0.027		0.051		0.065	

Table 4: Multinomial logit regression of behaviour (categorical) compared donating all (default) as reference-category, treatment-variable with N10 as base category. ***= $p < 0.01$, **= $p < 0.05$, *= $p < 0.10$.

In order to find out more about the negative effect of reactance for slow decision makers, we also conducted a multinomial logit regression analysis classifying behaviour into three categories (giving nothing, intermediate, giving all); cf. Table 4. The analysis suggests that reactant subjects tend more towards giving nothing than making intermediate transfers compared to giving all (model 3). Also, the analysis suggests that this effect is mainly driven by the highlighted transparency condition (model 4); this is similar to the effect on average contributions (cf. Table 2).

Result 5 (Reactance) *For subjects taking more time to decide, higher levels of reactance (a) reduce average contributions in highlighted transparency treatment and (b) induce fewer default choices in N10, T10 and **T**10 (i.e. in all "give all" nudge treatments). Also, compared to preset default choices, reactant subjects tend more towards giving nothing (primarily if transparency is salient).*

4 Concluding Remarks

In this paper, we have presented results from an online experiment comparing a non-transparent with a transparent default nudge. Different from previous research (Bruns et al., 2018), we find both a significant impact of transparency on the effectiveness of the nudge and an interaction of reactance with transparency. However as we have seen, these results become only visible once we account for decision time.

Not accounting for time, the experiment replicates earlier findings that being transparent about the nudge neither reduces average contributions nor effectiveness of the nudge. Yet, once time spent on the decision is accounted for, average contributions and effectiveness of the nudge are higher in transparent conditions for subjects spending more time on the decision. Moreover, contrary to previous studies, reactance does have an impact on behaviour once nudging is made transparent. First of all, contributions drop for more reactant subjects who spent more time when transparency is made salient. Moreover, more reactant subjects deviate more often from the preset default if they take more time for their decision.

From a conceptual point of view, the data suggest that the distinction between fast (system 1) and slow (system 2) decision making (cf. Kahneman, 2011) may indeed be relevant in connection with nudging, which regarding default nudges is usually thought of as impacting on fast decision making (e.g. Hansen and Jesperson, 2013; van Gestel et al., 2021). While we have nothing to contribute to the debate about the plausibility of the specific distinction made by Kahneman (2011) – see, for example, Melnikoff and Bargh (2018) or van Gestel et al. (2021) – the data of our study show that controlling for decision time is relevant in relation to reactance and transparency of the nudging. Admittedly, the present data – classifying people with respect to decision time according to a median split – allow only for a rough assessment of the connection. Yet, we believe that they provide a clear hint at a relevant direction for future research regarding the effectiveness of nudging.

Finally, from a applied point of view, the results suggest being transparent about a (default) nudge will not reduce its effectiveness but may reduce some of the criticism put forward against nudging (e.g. Hausman and Welch, 2010). In how far reactance might counteract potential positive effects of transparency, is difficult to judge based on this

study. In the present study, more reactant people tend to become more opposing to the nudge if they spend time on the decision. In how far these results generalise to different settings we cannot say based on the present data. What seems likely, though, is that in order to judge potential effects the time taken to decide needs to be accounted for.

References

Arad, A., & Rubinstein, A. (2018). The people's perspective on libertarian-paternalistic policies. *The Journal of Law and Economics*, 61(2), pp. 311-333.

Bang, H., Shu, S., & Weber, E. (2020). The role of perceived effectiveness on the acceptability of choice architecture. *Behavioural Public Policy*, 4(1), pp. 50-70.

Beshears, J., & Kosowsky, H. (2020). Nudging: Progress to date and future directions. *Organizational behavior and human decision processes, 161*, pp. 3-19.

Bordalo, P., Gennaioli, N., & Shleifer, A., 2012. Salience theory of choice under risk. *The Quarterly Journal of Economics*, 127, pp. 1243–1285.

Bovens, L. (2009). The ethics of nudge. In Preference change: Approaches from philosophy, *Economics and Psychology*, pp. 207-219. Dordrecht: Springer Netherlands.

Brehm, Jack. 1966. *A Theory of Psychological Reactance*. New York: Academic Press.

Bruns, H., Kantorowicz-Reznichenko, E., Klement, K., Jonsson, M. L., & Rahali, B. (2018). Can nudges be transparent and yet effective?. *Journal of Economic Psychology*, 65, pp. 41-59.

Charness, G., Gneezy, U., & Halladay, B., 2016. Experimental methods: Pay one or pay all. *Journal of Economic Behavior & Organization*, 131, pp. 141-150.

Guala, F., & Mittone, L. (2015). A political justification of nudging. *Review of Philosophy and Psychology*, 6, pp. 385-395.

Hansen, P. G., & Jespersen, A. M. (2013). Nudge and the manipulation of choice: A framework for the responsible use of the nudge approach to behaviour change in public policy. *European Journal of Risk Regulation*, 4(1), pp. 3-28.

Hausman, D. M., & Welch, B. (2010). Debate: To nudge or not to nudge. *Journal of Political Philosophy*, 18(1), pp. 123-136.

Infante, G., Lecouteux, G., & Sugden, R. (2016). Preference purification and the inner rational agent: a critique of the conventional wisdom of behavioural welfare economics. *Journal of Economic Methodology*, 23, pp. 1-25.

Kahneman, D. (2011). *Thinking, Fast and Slow.* Farrar, Straus and Giroux, New York.

Kemper, F., & Wichardt, P. (2022). Welfare Justifications and Responsibility in Political Decision Making – The Case of Nudging. mimeo.

Kroese, F. M., Marchiori, D. R., & De Ridder, D. T. (2016). Nudging healthy food choices: a field experiment at the train station. *Journal of Public Health*, 38(2), pp. e133-e137.

Leiner, D. J. (2019). SoSci Survey (Version 3.1.06) [Computer software]. Available at https://www.soscisurvey.de

Loewenstein, G., Bryce, C., Hagmann, D., & Rajpal, S. (2015). Warning: You are about to be nudged. *Behavioral Science & Policy*, 1(1), pp. 35-42.

Melnikoff, D. E., Bargh, J. A. (2018). The mythical number two. *Trends in cognitive sciences*, 22(4), pp. 280-293.

Merz, J. (1983). Fragebogen zur Messung der psychologischen Reaktanz. *Diagnostica*, 29, pp. 75–82.

Paunov, Y., Wänke, M., & Vogel, T. (2019). Transparency effects on policy compliance: Disclosing how defaults work can enhance their effectiveness. *Behavioural Public Policy*, 3(2), pp. 187-208.

Rizzo, M.J., & D.G. Whitman. (2009). The knowledge problem of new paternalism. *Brigham Young University Law Review 9*(4), pp. 905–968.

Rubinstein, A. (2013). Response time and decision making: An experimental study. *Judgment and Decision Making*, 8(5), pp. 540-551.

Steffel, M., Williams, E. F., & Pogacar, R. (2016). Ethically deployed defaults: Transparency and consumer protection through disclosure and preference articulation. *Journal of Marketing Research*, 53(5), pp. 865-880.

Sugden, R. (2008). Why incoherent preferences do not justify paternalism. *Constitutional Political Economy* 19(3), pp. 226-248.

Sugden, R. (2017). Do people really want to be nudged towards healthy lifestyles?. *International Review of Economics* 64(2), pp. 113-123.

Sunstein, C. R. (2016). *The ethics of influence: Government in the age of behavioral science.* Cambridge University Press, Cambridge.

Sunstein, C. R. (2018). "Better off, as judged by themselves": a comment on evaluating nudges. *International Review of Economics, 65*(1), pp. 1-8.

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness.* Penguin, London.

van Gestel, L. C., Adriaanse, M. A., & De Ridder, D. T. D. (2021). Do nudges make use of automatic processing? Unraveling the effects of a default nudge under type 1 and type 2 processing. *Comprehensive Results in Social Psychology*, 5(1-3), pp. 4-24.

Whitman, D. G., & Rizzo, M.J. (2015). The Problematic Welfare Standards of Behavioral Paternalism. *Review of Philosophy and Psychology*, 6, pp. 409–425.