Do default nudges lead people to make choices inconsistent with their preferences?: An experimental investigation

Shuma Iwatani (iwatani.shuma@kwansei.ac.jp)
Graduate School of Humanities and Sociology, The University of Tokyo
7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-0033 Japan

Hidehito Honda (hitohonda.02@gmail.com)
Faculty of Psychology, Otemon Gakuin University
2-1-15, Nishiai, Ibaraki-shi, Osaka, 567-8502, Japan

Yurina Otaki (yurina.otaki@r.hit-u.ac.jp)
Graduate School of Social Sciences, Hitotsubashi University
2-1, Naka, Kunitachi-shi, Tokyo, 186-8601, Japan

Kazuhiro Ueda (ueda@g.ecc.u-tokyo.ac.jp)
Graduate School of Arts and Sciences, The University of Tokyo
3-8-1 Komaba, Meguro-Ku, Tokyo, 153-8902 Japan

Abstract

People apply more frequently when "apply" is the default choice (Apply Default architecture) than when "do not apply" is the default choice (Not-Apply Default architecture). However, Apply Default architecture might let them make choices inconsistent with their preferences as this architecture is counterintuitive. Those trying to apply might mistakenly choose to not apply under Apply Default architecture. In this study, we hypothesized that people's choices under No-Default architecture (i.e., a choice architecture without a default option) are less consistent with those under Apply Default architecture than those under Not-Apply Default architecture (Hypothesis 1). We also hypothesized that people who spent more time on making decisions would make choices consistent with their preferences because when people spend sufficient time to understand the construction of Apply Default architecture, they can make choices consistent with their preferences (Hypothesis 2). We recruited 997 participants and asked them to make decisions under No-Default and Default architectures (Apply Default or Not-Apply Default architecture). The results supported both Hypothesis 1 and Hypothesis 2. A method to help applicants make choices consistent with their preferences is finally discussed.

Keywords: choice architecture; decision-making; default nudge; application rate

Introduction

Many studies have demonstrated that the choice architecture can alter the decisions of individuals (Johnson & Goldstein, 2003). Manipulating the default choice (i.e., the preselected option that people are assumed to select if they do not specify otherwise (Brown & Krishna, 2004)) can influence decisions, even when respondents have both options—to apply or not to apply—and their freedom of choice is unrestricted. This phenomenon is called the default nudge. People are more likely to decide to "apply" when it is the default choice than when "not to apply" is the default choice (Johnson & Goldstein, 2003; Madrian & Shea, 2001). Certain government policies are designed based on the findings on default nudge. For example, in 2020, the United Kingdom switched the default choice regarding organ donation after death from "no organ donation" to "organ donation" to increase the application rate.

An issue with default nudges

However, at least one important issue has emerged from the default nudge approach: people may mistakenly express preferences that differ from their own when certain options are set as defaults (Wilkinson, 2013). Tor (2020) pointed out that nudges may lead people to make choices inconsistent with their preferences. Indeed, some people mistakenly express their preferences under a choice architecture in which "apply" is the default choice (Apply Default architecture). In 2020, Japanese people filled out a checkbox application form that enquired whether they preferred to receive COVID-19 relief from the Japanese government in the form of cash payments. The default option was to "apply" and people were instructed to check a box if they did not want to apply. Although this choice architecture was expected to increase the application rate (Johnson & Goldstein, 2003), numerous people were reported to have mistakenly checked the box and expressed that they did not want to apply, although they did want to apply (Kato & Miwa, 2020).

This inconsistency between people's personal and expressed preferences is problematic because a nudge, by definition, does not restrict any options (Thaler & Sunstein, 2021), and it is assumed that people can express their preferences both under Apply Default and Not-Apply Default architectures. Imagine a situation where people prefer to donate, but mistakenly decide not to donate under Apply Default architecture. In this situation, they are prevented from conducting socially desirable behavior (i.e., donating) by Default architecture. The inconsistency of the preferences expressed under Default architecture and people's actual preferences is a problem that must be addressed. However, to the best of our knowledge, no study has thus far investigated

In L. K. Samuelson, S. L. Frank, M. Toneva, A. Mackey, & E. Hazeltine (Eds.), *Proceedings of the 46th Annual Conference of the Cognitive Science Society.*

whether the preferences expressed under a particular choice architecture are consistent with people's personal preferences.

In this study, we examined the consistency between people's preferences and their preferences expressed under an architecture with a specific option set as the default (hereafter, Default architecture). We explored which Default architecture (i.e., Apply Default architecture or Not-Apply Default architecture) more strongly encouraged people to make a choice consistent with their preferences by comparing two types of consistencies: (i) the consistency of the choices under Apply Default architecture and those under a choice architecture without a default option (hereafter, No-Default architecture) and (ii) the consistency of the choices under Not-Apply Default architecture and those under No-Default architecture. We focused on the decisions under No-Default architecture and regarded them as approximations of people's preferences because they were unaffected by the default choice.

The consistency between people's preferences and preferences expressed under Default architecture

We focused on the checkbox format and examined whether Default architecture induced people to mistakenly select a choice that differed from their preference. We regard decisions under No-Default architecture as approximations of people's preferences and hypothesize that the consistency of the choices under No-Default and Apply Default architectures is lower than that of the choices under No-Default and Not-Apply Default architectures. This is because Apply Default architecture is counterintuitive in that people need to take action (i.e., checking the box) not to apply. Applying is an active behavior; thus, it is natural to assume that checking a box is required to reveal one's preference to apply. Indeed, Not-Apply Default architecture has been adopted in various situations (Dearie, 2021), and approximately 70% of people were found to have selected not applying (e.g., not to be an organ donor) as the default choice in a prior study (McKenzie et al., 2006). Additionally, in the abovementioned Japanese case, even people who preferred to apply mistakenly checked the box under Apply Default architecture and expressed their preference to not apply for special cash payments (Kato & Miwa, 2020). This case implies that people may fail to express their preferences under Apply Default architecture. Based on these assumptions, we propose the following hypothesis:

Hypothesis 1: The consistency of the choices under No-Default and Apply Default architectures is lower than that of the choices under No-Default and Not-Apply Default architectures.

How can people make choices consistent with their preferences?

Then, in what situations are people more likely to make choices consistent with their preferences? We investigate this question based on the concept of *nudge plus*. Nudge plus is "an intervention that has a reflective strategy embedded into the design of a nudge" (Banerjee & John, 2021; p.2) and tries to respect "the ability of individuals to decide for themselves to granting autonomy" (Banerjee & John, 2021; p.9). People might make choices consistent with their preferences when they think more deliberately.

In this study, we hypothesize that people make choices more consistent with their preferences when they spend more time on making decisions. According to White et al. (2021), people might not consider or understand choice alternatives when they do not spend sufficient time on making decisions. They demonstrated that people are more likely to apply under Apply Default architecture than under Not-Apply Default architecture when they have limited time to make decisions, while the difference was not found when they have sufficient time to make decisions. Based on this, we examine the following hypothesis.

Hypothesis 2: People are more likely to make choices consistent with their preferences when they spend more time on making decisions.

Overview of this study

We conducted this study to investigate our two hypotheses. Participants were asked to (i) make decisions under No-Default architecture and (ii) make decisions under Default architecture. In decision (ii), half of the participants were asked to make decisions under Apply Default architecture, while the other half were asked to make decisions under Not-Apply Default architecture. We measured how long they spent on making decisions.

We examined Hypothesis 1 by comparing the consistency between decisions (i) and (ii) under Apply Default architecture and the consistency between decisions (i) and (ii) under Not-Apply Default architecture. We examined Hypothesis 2 by investigating whether participants who spent more time on making decisions were more likely to make choices consistent with their preferences.

Method

This study was part of a research project that examined the hypothesis that the application rate under Apply Default architecture is lower (higher) than that under Not-Apply Default architecture when more (fewer) than half of people apply under No-Default architecture. We manipulated the decision-making tasks (the details are described below) to examine this hypothesis, but the detail of this hypothesis is not presented in this paper owing to space limitations.

Experimental design

We manipulated the choice architecture to examine Hypothesis 1. All the participants made decisions under Default and No-Default architectures (within-participants design). For Default architecture, we also manipulated the default options. Half of the participants were required to make decisions under Not-Apply Default architecture and the other half were required to make decisions under Apply Default architecture (between-participants design). That is, half of the participants made decisions under Apply Default and No-Default architectures, while the other half made

Table 1. Checkbox under No-Default architecture.

	Apply	Not-Apply
Campaign (5,000 yen worth of points)	□	□

Table 2. Checkbox under Not-Apply Default and Apply Default architectures.

Campaign (5,000 yen worth of points)	□

Table 3. Number of participants assigned to Not-Apply Default and Apply Default architectures for each decision-making task

Decision-making task	Not-Apply Default	Apply Default
Decision H (Decision for which more than half of the participants applied under No-Default architecture)	399	400
Decision L1 (Decision for which fewer than half of the participants applied under No-Default architecture)	402	397
Decision L2 (Decision for which fewer than half of the participants applied under No-Default architecture)	401	398

decisions under Not-Apply Default and No-Default architectures. This approach enabled the comparison of the two types of consistencies.

Under No-Default architecture, the participants were asked to check the box under "apply" or "not apply" depending on whether they wanted to apply or not apply (Table 1). Under Not-Apply Default architecture, the participants were asked to check the box (Table 2) if they wanted to apply and refrain from checking it if they did not want to apply. Under Apply Default architecture, the participants were asked to check the box (Table 2) if they did not want to apply and refrain from checking it if they wanted to apply. Based on the previous case on the application form for COVID-19 relief in Japan (Ministry of Internal Affairs and Communications, 2020), we did not provide a detailed description (e.g., "Applying to the campaign" or "Not applying to the campaign") next to the checkbox.

The participants were asked to conduct three types of decision-making tasks (Table 3): one required a decision for which more than half of them were expected to apply under No-Default architecture (decision on a high base rate; hereafter referred to as "Decision H") and the remainder required decisions for which fewer than half of them were expected to apply under No-Default architecture (two decisions on a low base rate; hereafter referred to as "Decision L1" and "Decision L2"). The participants performed all three decision-making tasks. In Decision H, they were asked to decide whether to apply for 5,000 yen worth of points. We set up this task based on an actual problem: whether to receive cash payments as COVID-19 relief from the Japanese government (Kato & Miwa, 2020). As more than 95% of households applied for the payments (Chunichi Shimbun, 2020), we assumed that more than half of the participants would apply for Decision H. As expected, for Decision H, 66.39% of the participants applied under No-Default architecture. In Decisions L1 and L2, the participants were asked to decide whether to donate. Total donations were 591 billion yen in Japan in 2007, which was only 0.11% of nominal GDP (Japan Cabinet, 2022). Although these data are from 15 years ago, we assumed that fewer than half of the participants would choose to donate. As expected, for Decisions L1 and L2, only 15.28% and 15.50% of the participants applied under No-Default architecture, respectively.

Figure 1. Flow of the experimental tasks

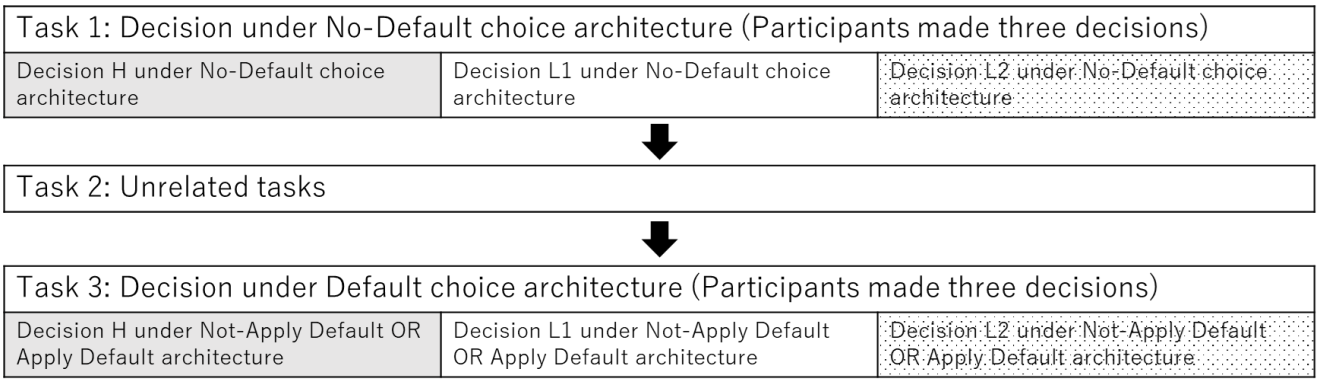
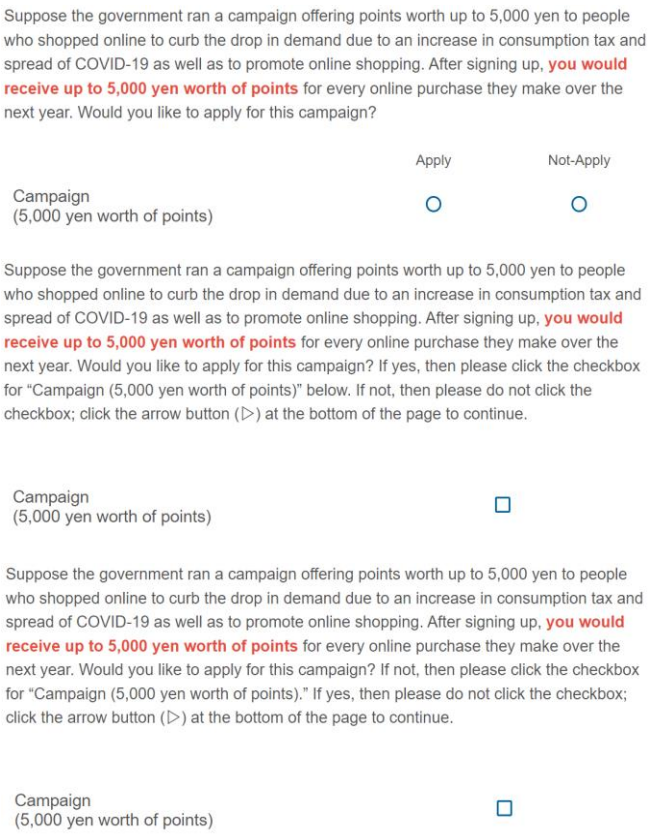


Figure 2. Experimental tasks under No-Default (Top), Not-Apply Default (Middle), and Apply Default (Bottom) architectures.



Participants

We used G*Power version 3.1.9.7 (Faul et al., 2007) to calculate the minimum required sample to conduct a χ^2 test with $w = .13$, $\alpha = .05$, power = .95, and one degree of freedom. The minimum sample size was 769 participants. We collected data from 997 people in Japan aged 20–69 years through a research company (Rakuten Insight; https://insight.rakuten.co.jp/en/). We excluded 196 respondents with missing data and two respondents who indicated their ages as 9 and 100 years. Thus, data from 799 respondents were analyzed (M_{age} = 47.92, SD_{age}= 11.49; male: 447 participants, female: 347 participants, other: 5 participants). Table 3 presents the number of participants assigned to Not-Apply Default and Apply Default architectures for each decision-making task (Decisions H, L1, and L2). All the participants were asked to provide written informed consent to participate in this online study after being informed of the experiment's purpose.

Experimental tasks and procedures

As shown in Figure 1, the participants made their decision under No-Default architecture (Task 1) followed by Default architecture (Task 3). They were asked to conduct an irrelevant task (Task 2) before the decision-making under Default architecture. This is because decisions under No-Default architecture may affect the following decisions under Default architecture. In Task 1, the participants made three decisions (Decisions H, L1, and L2) under No-Default architecture. In Task 2, they then engaged in an unrelated task in which they were asked to indicate the amount of money that was as attractive as a gamble with a specific probability of winning 10,000 yen. In Task 3, the participants performed the three decision-making tasks (Decisions H, L1, and L2) under Default architecture (i.e., Not-Apply Default architecture or Apply Default architecture). The choice architecture was independently and randomly determined for each decision-making task. As an example, experimental tasks for Decision H under No-Default, Not-Apply Default, and Apply Default architecture were depicted in Figure 2.

Results

Examination of Hypothesis 1

We tested Hypothesis 1: The consistency of the choices under No-Default and Apply Default architectures is lower than that of the choices under No-Default and Not-Apply Default architectures. As shown in Table 4 and Figure 3, the consistency of the choices under No-Default and Not-Apply Default architectures was significantly higher than that of the choices under No-Default and Apply Default architectures for all the decision-making tasks (Decision H: $\chi^2_{(1)} = 63.51$, $p < .001$, $\varphi = .29$; Decision L1: $\chi^2_{(1)} = 107.64$, $p < .001$, $\varphi = .37$; Decision L2: $\chi^2_{(1)} = 107.00$, $p < .001$, $\varphi = .37$). This result supported Hypothesis 1.

Examination of Hypothesis 2

We tested Hypothesis 2: People are more likely to make choices consistent with their preferences when they spend more time on making decisions. Before examining the hypothesis, we excluded the data that were three or more standard deviations above the mean. The average times spent making decisions under Default architecture were 16.87, 15.91, and 16.84 seconds in Decisions H, L1, and L2, respectively. Moreover, the standard deviations were 17.78, 21.31, and 16.42, respectively. In total, we excluded the data of 28 participants and analyzed 771 participants' data.

We conducted a logistic regression analysis. The dependent variable was decision consistency, defined as consistency with those made under No-Default architecture (Consistent = 1, Inconsistent = 0). The independent variables were the choice architecture (Not-Apply Default = 1, Apply Default = 0) and the time spent on making decisions under Default architecture.

First, we found a statistically significant main effect of the choice architecture (b = 1.54, $p < .001$ for Decision H; b = 1.39, $p < .001$ for Decision L1; b = 1.90, $p < .001$ for Decision L2; Figure 4). The consistency of the choices under No-Default and Not-Apply Default architectures was higher than

Table 4. The number of participants who applied (or did not apply) under No-Default and Not-Apply Default architectures.

Decision H		Not-Apply Default architecture		Apply Default architecture	
		Applied	Did not apply	Applied	Did not apply
No-Default architecture	Applied	235	51	140	147
	Did not apply	41	55	55	58

Decision L1		Not-Apply Default architecture		Apply Default architecture	
		Applied	Did not apply	Applied	Did not apply
No-Default architecture	Applied	48	18	22	39
	Did not apply	56	280	175	161

Decision L2		Not-Apply Default architecture		Apply Default architecture	
		Applied	Did not apply	Applied	Did not apply
No-Default architecture	Applied	36	15	22	39
	Did not apply	62	288	179	158

Figure 3. Choice architecture and consistency of the choices under No-Default and Default architectures for each decision-making task

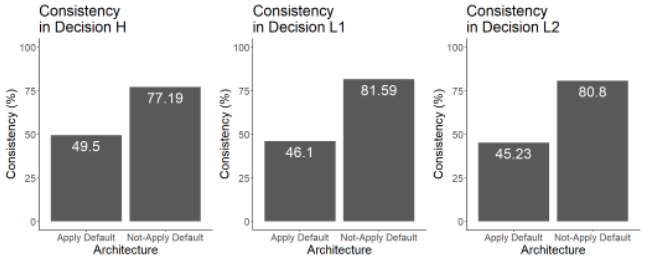
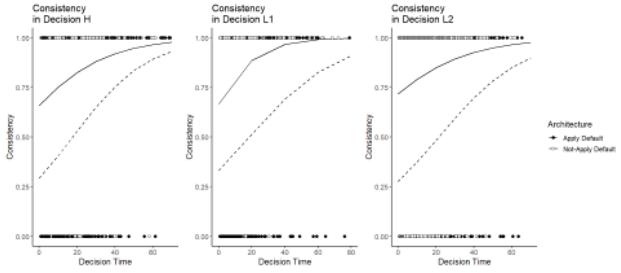


Figure 4. Time spent on making decisions and consistency of the choices under No-Default and Default architectures for each decision-making task



that of the choices under No-Default and Apply Default architectures. This result supported Hypothesis 1.

Second, we found a statistically significant main effect of the time spent on making decisions (b = 0.05, p < .001 for Decision H; b = 0.04, p < .001 for Decision L1; b = 0.05, p < .001 for Decision L2). The participants who spent longer making decisions were more likely to make choices consistent with their preferences. This result supported Hypothesis 2.

Third, we did not find a statistically significant interaction effect (b = -0.01, p < .74 for Decision H; b = 0.03, p < .12 for Decision L1; b = -0.01, p < .76 for Decision L2).

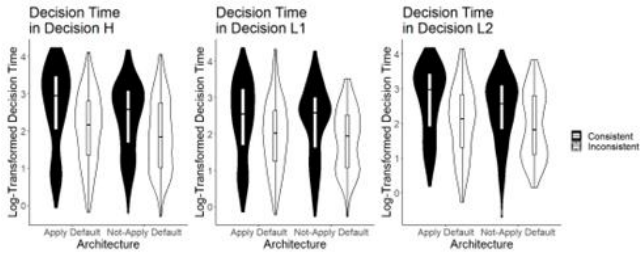
Additional analysis: Is Apply Default architecture more counterintuitive than Not-Apply Default architecture?

We additionally examined whether Apply Default architecture was counterintuitive. If it was true, people would spend more time on making decisions under Apply Default architecture than under Not-Apply Default architecture. We conducted an analysis of variance, with the time spent on making decisions under Default architecture as the dependent variable. The independent variables were the choice architecture (Apply Default or Not-Apply Default) and decision consistency (Consistent or Inconsistent). As the skewness of the dependent variable was high, we log-transformed it before the analysis. Through this transformation, the absolute skewness value decreased from 1.25 to 0.40.

First, we found a statistically significant main effect of the choice architecture for Decision H (F [1, 767] = 8.66, p < .01, η^2_p = .01) and for Decision L2 (F [1, 767] = 5.31, p < .03, η^2_p = .01; Figure 5). The participants spent more time on making decisions under Apply Default architecture than under Not-Apply Default architecture. This result implies that Apply Default architecture was counterintuitive for the participants. There was no main effect of the choice architecture for Decision L1 (F [1, 767] = 1.34, p < .25, η^2_p = .00).

Second, we found a statistically significant main effect of decision consistency (F [1, 767] = 44.45, p < .001, η^2_p = .05 for Decision H; F [1, 767] = 32.67, p < .001, η^2_p = .04 for Decision L1; F [1, 767] = 41.14, p < .001, η^2_p = .05 for Decision L2). The participants who made choices consistent with their actual preferences spent more time on making decisions under Default architecture than those who made choices inconsistent with their actual preferences.

Figure 5. Log-transformed time spent on making decisions under Default Architecture for each decision-making task



Third, we did not find a statistically significant interaction effect (F [1, 767] = 0.31, $p < .58$, $\eta^2_p = .00$ for Decision H; F [1, 767] = 0.11, $p < .74$, $\eta^2_p = .00$ for Decision L1; F [1, 767] = 1.18, $p < .28$, $\eta^2_p = .00$ for Decision L2).

Discussion

Summary of the results

In this study, we examined whether people's choices under Default architecture were consistent with their preferences. We regarded decisions under No-Default architecture as approximations of people's preferences and demonstrated that the consistency of the choices under No-Default and Apply Default architectures was lower than that of the choices under No-Default and Not-Apply Default architectures (Figure 3). Further, our additional analysis partially demonstrated that the participants spent more time on making decisions under Apply Default architecture than under Not-Apply Default architecture (Figure 5). These results imply that Apply Default architecture is counterintuitive for the participants and might lead them to make choices inconsistent with their preferences. This inconsistency should be avoided because nudges should not restrict their freedom of choice and people should select what they prefer to select even under Apply Default architecture.

We also focused on the time the participants spent on making decisions and demonstrated that they were more likely to make choices consistent with their preferences when they spent more time on making decisions (Figure 4). This result implies that by letting people spend more time on making decisions, they are more likely to make choices consistent with their preferences. For example, by gradually displaying the survey question one character at a time, the participants spent more time on making decisions, which could have helped them make choices consistent with their preferences. This suggestion is consistent with the goal and concept of nudge plus, which adds a reflective strategy into the design of a nudge and tries to respect people's autonomy for decision making (Banerjee & John, 2021). Future studies must investigate an effective intervention to allow them to make choices consistent with their preferences.

Limitations

Our study has some limitations. First, it is still unclear whether participants *mistakenly* selected choices under Apply Default architecture which were inconsistent with their choices under No-Default architecture. When they notice "apply" is set as a default choice under Apply Default architecture, even those who did not apply under No-Default architecture might infer an expectation to apply (c.f., information leakage; McKenzie et al., 2006) and change their preferences. To examine this possibility, future studies should measure their choices under No-Default architecture after Default architecture as well as before it. If their preferences change through noticing "apply" set as a default choice, they would apply under No-Default architecture after their decisions under Default architecture. Contrarily, if they mistakenly apply under Apply Default architecture, they would not apply under No-Default architecture.

Second, we only focused on a checkbox format architecture where a short description (e.g., "Campaign") was provided next to the checkbox, while a detailed description (e.g., "Applying to the campaign" or "Not applying to the campaign") was not provided. This architecture and description were based on a previous case on the application form for COVID-19 relief in Japan (Ministry of Internal Affairs and Communications, 2020), which added no detailed description next to the checkbox. However, some choice architectures add more detailed descriptions next to the checkbox. When companies ask their users, using checkbox architectures, whether they would like to receive promotional e-mails, they sometimes add a more detailed description (e.g., "I want to receive news") next to the checkbox. Future studies should provide a more detailed description next to the checkbox and examine these hypotheses.

Third, whether the choices under No-Default architecture reflect personal preferences remains unclear. We assumed that the choices under No-Default architecture, which were not influenced by the default choice, were closer to personal preferences. This assumption is consistent with the conventional method for estimating personal preferences used by Kahneman and Tversky (1979). The participants in their study were instructed to choose one of two options. Neither of the two options was set as the default (i.e., No-Default architecture) and the selected options were regarded as the participants' preferences. Future studies should confirm whether the choices under No-Default architecture truly reflect personal preferences.

Fourth, our study was not an incentive-compatible experimental design. Even when participants applied for a campaign, they did not gain any points. Contrarily, in actual cases, people can gain actual points when they apply, and thus they might select a choice consistent with their preferences even under Apply Default architecture. Relatedly, people with strong preferences might be more attentive to the architecture and could make choices consistent with their preferences (Sunstein, 2017). Future studies should measure the strength of participants' preferences and conduct incentive-compatible experimental designs.

References

Banerjee, S., & John, P. (2021). Nudge plus: incorporating reflection into behavioral public policy. *Behavioural Public Policy*, *8*, 1-16.

Brown, C. L., & Krishna, A. (2004). The skeptical shopper: A metacognitive account for the effects of default options on choice. *Journal of Consumer Research*, *31*, 529-539.

Chunichi Shimbun. (2020). 10 mannen setai kyufuritsu zenkoku 98.6% ['100,000 yen, household benefit rate 98.6% nationwide'] (in Japanese). Retrieved January 11, 2024 from https://www.chunichi.co.jp/article/113275

Dearie, K. J. (2021). Opt in vs opt out. Retrieved January 11, 2024 from https://termly.io/resources/articles/opt-in-vs-opt-out/

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175-191.

Japan Cabinet. Office, 2020. kifukin no kokusai hikaku. ["International Comparison of Donations"] (in Japanese). Retrieved January 11, 2024 from https://www.npo-homepage.go.jp/kifu/kifu-shirou/kifu-hikaku

Johnson, E. J., & Goldstein, D. (2003). Do defaults save lives?. *Science*, *302*, 1338-1339.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47, 263-291

Kato, K., & Miwa, Y. (2020). 10 mannen shinsei de misu aitsugu chekkurran ni otoshiana ['A string of mistakes in 100,000 yen applications'] (in Japanese). Retrieved January 11, 2024 from https://www.tokyo-np.co.jp/article/16713

Madrian, B. C., & Shea, D. F. (2001). The power of suggestion: Inertia in 401 (k) participation and savings behavior. *The Quarterly Journal of Economics*, *116*, 1149-1187.

McKenzie, C. R., Liersch, M. J., & Finkelstein, S. R. (2006). Recommendations implicit in policy defaults. *Psychological Science*, *17*, 414-420.

Ministry of Internal Affairs and Communications (2020). Tokubetsu Teigaku Kyuhukin Shinseisho ['Application form for special cash payments'] (in Japanese). Retrieved January 11, 2024 from https://www.soumu.go.jp/main_content/000715650.pdf

Sunstein, C. R. (2017). Nudges that fail. *Behavioural Public Policy*, *1*, 4-25.

Thaler, R. H., & Sunstein, C. R. (2021). *Nudge: The final edition.* Yale University Press.

Tor, A. (2020). Nudges that should fail?. *Behavioural Public Policy*, *4*, 316-342.

White, B. X., Jiang, D., & Albarracín, D. (2021). The limits of defaults: The influence of decision time on default effects. *Social Cognition*, *39*, 543-569.

Wilkinson, T. M. (2013). Nudging and manipulation. *Political Studies*, *61*, 341-355.