

# Green nudges in Nordic cities

Increasing the use of reusable cups



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# Acknowledgements

This report was prepared by Anthesis AB and iNudgeyou. In the project, Anthesis and iNudgeyou have collaborated with Original Coffee, a Nordea office café, Nordrest, Espresso House, Circle K and Panter to test the effects of various nudging techniques to increase the use of reusable cups.

## Anthesis AB

Anthesis AB is a Swedish consulting firm with roots in academia. As a part of the Anthesis Group, the company operates in 22 countries and has a total of approximately 1,500 employees. Anthesis AB offers services in the areas of environmental economics, behavioural economics, sustainable energy systems, sustainable communities, and climate. In these areas, Anthesis AB provides strategic advisory services, business development, calculations, analysis, investigations, and research. The company possesses both broad and deep knowledge in socio-economic analyses, social sustainability, and innovation procurement, among other things. Furthermore, we have extensive experience in project and process management of multidisciplinary projects.

## iNudgeyou

iNudgeyou is a renowned independent research centre in applied behavioural science, dedicated to developing and disseminating evidence-based strategies with pro-social objectives. Regarded as one of the world's leading "nudge units," iNudgeyou has extensive experience advising organizations such as the OECD, the World Bank, and the European Commission. Employees possess extensive expertise in applying nudging techniques across diverse domains, including reducing the use of single-use cups and other applications in the restaurant industry.

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## Disclaimer

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# Summary

Plastics pollution is a major global issue, and single-use beverage cups are one of top-ten items littered around beaches. To increase the use of reusable cups, and thereby increase circularity, we in this study explore nudging as a method to shift behaviour from buying coffee and other beverages in single-use cups to reusable cups. In collaboration with coffee shops, cafeterias and gas station convenience stores in Denmark and Sweden, we test the effect of several nudging techniques. By nudging customers, we promote the sustainable behaviour without imposing restrictions or significantly altering incentives. Reusable cups are available to customers at many coffee shops, but they are not as salient as the single-use alternative. Single-use cups are also the default choice. To overcome some of the barriers facing an increased uptake of reusable cups, we implemented several nudging techniques and combination of techniques at different coffee shops. We compared sales with similar locations without any interventions to assess the effect of the different nudges. Our findings reveal that prompts are the most impactful type of nudge among those tested. However, successful prompts also require a normal implementation with a dynamic approach to ensure that instructions are followed in situations where staff already follow several instructions, may forget, and may perceive additional questions to customers as an inconvenience. We further find that increasing saliency may be necessary, but not sufficient to meaningfully impact behaviour in isolation. Installing posters had only a limited or no impact on reusable cups sales, and tests with prompts and posters combined revealed that the positive effects disappeared once prompts were removed. Leveraging social norms by providing on-going information on the behaviours of others (showing how many reusable cups had been sold) was found to have a positive impact. However, this positive effect was only in situations where customers were more likely to identify with the other customers, such as when the information was based on local behaviour rather than general, and when beverages are sold in closed settings. Closed settings refer to coffee shops in office spaces or at universities, where many customers are repeat customers, as opposed to more openly available coffee shops. Lottery based incentives were also found to have a significant impact, but mainly when the lottery was provided in the purchase moment rather than the return moment.

Nudging provides a promising method to reach impactful sustainable behaviour only if successfully implemented at scale. For coffee shops with the ambition of increasing the uptake of reusable cups, we recommend using prompts and increasing the saliency of the reusable cups. Even though saliency alone was not found to have a meaningful impact, we believe it creates awareness and facilitates a successful implementation of prompts. We advocate scaling solutions carefully,

adopting a dynamic approach to ensure that nudges are implemented with as little noise as possible. Nudges should ideally be tested at scale by both using the same nudge type at many locations (open and closed settings etc), and by using different nudge types at similar locations. Even though prompts are found to be the most impactful intervention, we do not endorse mandating coffee shops to use prompts, as they can also be perceived as an inconvenience both for customers and staff. Instead, we recommend encouraging voluntary employment of prompts and saliency. We also recommend investigating possible effects of monetary incentives, both for customers and coffee shops, as well as awareness campaigns in collaboration with coffee shops.

# Reusable cups in the Nordics and green nudges as a policy tool

"Single-use beverage cups are one of the top ten items found littered on beaches around the world. Globally, over 500 billion single-use cups are consumed annually, of which between 250 and 300 billion are plastic-lined paper cups" (UNEP, 2021). Single-use plastic pollution is a significant global environmental issue. In 2019, the UN Environment Assembly highlighted this problem, urging Member States to collaborate on solutions. That same year, the EU decided to ban various single-use plastic products "where sustainable alternatives are easily available and affordable," effective from July 3<sup>rd</sup>, 2021.

One solution is to decrease the use of single-use cups, by increasing the adoption of reusable cups. Therefore, in its goal to reduce the use of single-use cups and food containers with 50% until 2026 compared to 2022 Swedish policy has taken a first step by introducing a new ordinance on January 1<sup>st</sup> 2024. The ordinance requires coffee shops, fast food restaurants and other establishments to offer customers a reusable cup or food-container in a circular system, as an alternative to single-use ones (Förordning [2021:996] Om Engångsprodukter, 2024). While this ordinance is a step in the direction of more reusable cups being used, more will be needed to actually engage customers.

Nudging is a powerful set of techniques rooted in psychology, economics and behavioural sciences, aimed at promoting desired behaviours (Thaler & Sunstein, 2008). By making small changes to the environment around our choices and behaviours, desirable actions can be promoted, even without significantly altering financial incentives or forbidding certain options. First coined by Thaler and Sunstein in their 2008 book "Nudge - Improving Decisions about Health, Wealth, and Happiness", these techniques have gained significant traction due to their effectiveness and simplicity. While initially focused on behaviour benefitting the individual (pro-self nudges), attention has shifted towards pro-social nudges that benefit society. Specific emphasis has been placed on green nudges aimed at mitigating environmental impacts caused by human activities (Carlsson et al., 2021).

A motivating factor behind nudging lies in bridging the intention-action gap, that individuals express a desire to engage in certain behaviours but struggle to follow through. Nudges act as facilitators, making sustainable choices more accessible without impeding freedom of choice. Nudges have previously been successfully used

to promote a wide range of sustainable behaviour, including increasing vegetarian lunch uptake (Hansen et al., 2021), reducing food waste (Hansen et al., 2013) and increasing charitable donations (Gråd et al., 2021).

Commissioned by the Swedish EPA, WRAP (2023) analysed existing evidence of nudge techniques and conducted interviews with key stakeholders and customers to create a Playbook on possibilities for green nudges to be used to enhance the uptake of reusable cups in coffee shops, fast food restaurants and similar establishments. As a follow-up project, we have designed and implemented a series of nudges in Nordic cities, and this report presents the nudges implemented, results, discussion, and further recommendations.



# Nudges implemented

We tested various nudging techniques in collaboration with 21 coffee shops and cafeterias<sup>[1]</sup> in four Nordic cities. In Sweden, nudges were implemented at Espresso House (in Stockholm), Circle K (Gothenburg) and Nordrest university cafeterias (Uppsala). In Denmark, nudges were implemented at Original Coffee (Copenhagen) and an ISS coffee shop at Nordea headquarters (Amager).

Each of the Swedish coffee shops offer customers the choice between single-use cups and reusable cups through a collaboration with Panter. Panter offers a system where the customers may borrow a reusable cup free of charge if the cup is returned within a certain time frame. To borrow a cup, the customers register themselves on a web application, and scan the cup with a smartphone both when borrowing and returning the cup. Prior to our tests, each location had used the Panter system for a short while. The use of reusable cups was virtually non-existing, with a share of 0-0.3% reusable cups borrowed in 15 coffee shops.

In the ISS location in Denmark, a sustainable cup choice is presented through Kleen Hub cups, which is a similar system to Panter. Additionally, ISS gives customers the option to bring their own cup, and as so, two different types of sustainable cups are an option at ISS. In the control period before testing (4 weeks), the number of cups sold was 6499, where 2.29% of them was in a Kleen Hub cup and 1.91% was customers own cup. This leaves the proportion of customers choosing a sustainable option prior to the experiment to be 4.20%.

In Original Coffee, the shops offer customers the choice between a single-use cup and reusable cups through collaborations with New Loop. New Loop is a deposit system where the customers pay 5 DKK to borrow a cup, which the customer gets in return when delivering the cup back to any New Loop collaborator. No registration is needed, and there is no deadline for the return. Before the test, the use of reusable cups was like in Sweden almost non-existing, where the majority of the shops had a share between 0-0.3%, though one shop had 2.1%.

To increase the use of reusable cups, eight nudging techniques or combinations of techniques, were tested at twelve coffee shops. Results of the nudges are measured as the difference between the share of coffees sold in reusable cups during and before the implementation period. For some tests, observations are also available after the implementation period, enabling us to see whether effects are lasting. We also compare before- and after measurements with data from nine

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1. We mention 'Coffee shops' and 'café' throughout this report for readability but note that some of these locations are better described as 'gas station adjacent convenience stores' (Circle K), or 'University cafeteria/canteen' (Nordrest).

similar coffee shops where no changes were implemented. These are treated as “control shops”, to examine whether any changes in behaviour are not some unknown time effect that influences the number of reusable cups sold during the time period. An overview of tests is presented in [Table 1](#).

To develop the nudging techniques that were implemented, we engaged collaborating coffee shops, performed site visits, conducted behavioural analyses and discussed and selected nudging techniques together. The nudges are based on observed obstacles that customers face, hindering more use of reusable cups. Inspiration for the nudges were drawn both from the ‘Green Nudges Playbook’ (WRAP, 2022) and other previous tests as well as the general nudging literature (eg. OECD, 2019). Nudges implemented were also influenced by technical limitations and what coffee shops were willing to implement.

In the Danish tests, instructions to coffee shop staff were in Original Coffee also followed by daily monitoring, undercover visits, and feedback to coffee shops to ensure instructions were followed according to protocol. In the ISS café, monitoring visits were made at a less frequent rate (approx. every second week) but phone calls with the café manager were made weekly. In the Swedish tests, this monitoring was replaced with post-intervention discussions to establish how well instructions were followed. This ultimately compares a normal implementation with a dynamic approach in tests in Denmark with a normal implementation with a static approach in Swedish tests. The main benefit of the dynamic approach is that it can increase the implementation of the nudge, and thereby the likelihood of a positive results, especially with nudges that contains some kind of human element like a prompt. A static approach may give a better indication of the likely effects of a typical upscaling unless specific efforts are made to scale with a dynamic approach.

**Table 1.** Overview of tests implemented.

City	Coffee shop	# of coffee shops (# of control sites)	Nudge types
Copenhagen	Original Coffee	3 (2)	OC1: Increased visibility (poster) + verbal prompt
		1	Same as OC1 + add on: Descriptive social performance feedback loop
		1	Same as OC1 + add on: Lottery mechanism in the return moment
		1	Same as OC1 + add on: Lottery mechanism in the buying moment
Amager	Nordea Café	1 (0)	Increased visibility + verbal prompt + descriptive social performance feedback loop
Uppsala	Nordrest	1 (1)	Verbal prompt
Stockholm	Espresso House	3 (3)	Increased visibility (poster) + social norms
Gothenburg	Circle K	4 (3)	Increased visibility (poster) + gift

# Test 1. Original Coffee: Copenhagen, Denmark

## Setting

Original Coffee was included in the project, as they had an alternative option to single-use to-go cups (New Loop) and we wanted to include the open setting that this type of coffee shop presents in the Danish tests. Original Coffee is one of the largest coffee chains in Copenhagen, with 18 shops throughout the city. They have had the more sustainable New Loop option (breakeven point of 2 uses) for 1.5 years prior to the experiment. This period provided sufficient baseline data for analyses.

As stated, the reusable option works as a deposit system, where customers pay an additional 5 DKK for their hot beverage and when they return the cup, they get the 5 DKK back. Prior to the test the cups were hardly ever used, as customers had to know of them and ask for the reusable cups themselves to ever get the option. The New Loop cups were placed non-salient between the single-use cups above the coffee machine in all three shops and several of the employees did not know they had New-loop cups to offer.

## Nudges implemented

In total, four nudges were implemented and tested in three different Original Coffee shops around Copenhagen from November 6<sup>th</sup>, 2023, until February 1<sup>st</sup>, 2024. During the same period, we have data from 2 other Original Coffees serving as controls. The experiment has three intervention periods and a control period from 24<sup>th</sup> of October – 5<sup>th</sup> of November, where no intervention was implemented at any café.

The first intervention period ran between 6<sup>th</sup> of November – 19<sup>th</sup> of November. During this period, a prompt and signs were implemented in the three test-café's Store Kongensgade (SK), Bredgade (BR), and Istedgade (IS).

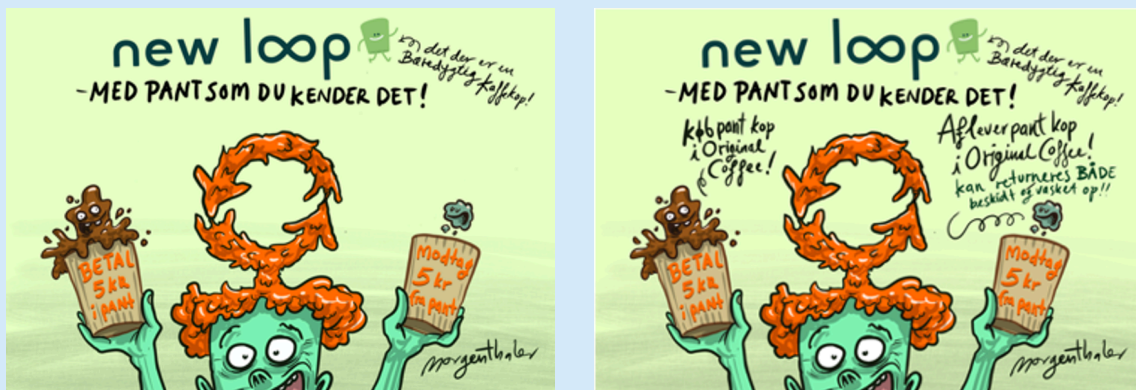
The second intervention period ran from 20<sup>th</sup> of November – 3<sup>rd</sup> of December, with one additional week at IS (10<sup>th</sup> of December). The add-on nudges were implemented in this period on top of the prompt and signs. A descriptive social performance feedback loop was implemented in SK, while a lottery mechanism in the return moment was implemented in BR, and a lottery mechanism in the buying moment was implemented in IS.

In the third intervention period, 4<sup>th</sup> of December – 1<sup>st</sup> of February, the prompt and respective add-ons were removed in BR and SK, while the signs remained. This was also done in IS after the additional week of the second intervention.

Donation boxes for the reusable to-go cups were also implemented in the three locations in all three intervention periods. This was to remove the hassle factor of returning the cups and customers could instead donate their 5 DKK deposit to charity (Red Cross Denmark).

### Intervention 1 – Prompt and communicative signs

As mentioned, the first nudge was implemented in three test-café's and contained both a prompt and communicative signs that were placed around the shops. The employees were instructed to prompt every customer who ordered a to-go coffee. Before the intervention customers were asked their order preference followed by the question; of being to-stay or to-go. The default option for to-stay is a reusable ceramic cup and for to-go is a single-use cup. The nudge-prompt happens after customers order a to-go beverage, where the employee will ask; "do you want it in a reusable New Loop cup or a single-use cup". To minimize the interaction time for each employee, signs were placed both at the front door, at the tables, and at the counter aiming to inform customers of the reusable option and to intuitively explain the deposit system behind it. They were developed in collaboration with the famous Danish comic sketcher Anders Morgenthaler, and it draws on the already existing mental model for a deposit system that Danes have. This mental model is simply when you buy a bottle or a can in Denmark there is a deposit system, where you pay 1–3DKK depending on the bottle size and then you can return it in any supermarket to get the 1–3DKK back.

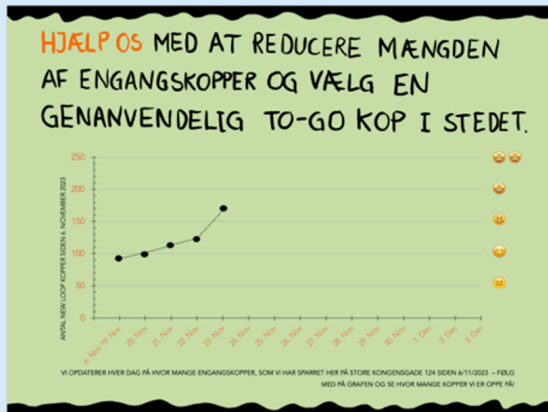


Picture 1. Signs designed by Anders Morgenthaler.

### Intervention 2A – Descriptive social performance feedback loop

A second nudge was implemented at Store Kongensgade and was designed as a descriptive social performance feedback loop. In practice it was an A3 poster graph displaying customers accumulative choice of the reusable option for to-go cups compared to single-use cups, relative to the testing period. Posters were updated

daily by the employee who opened the café, and they received a text message from iNudgeyou with the accurate number to update. This nudge was implemented as an add-on nudge, meaning that the prompt and signs were still active. Two posters were implemented to increase the likelihood of salience. One poster was placed next to the coffee menu on the wall behind the counter, and one on the coffee machine facing customers. A post-it note was added to both posters to highlight the current amount of the preferred behaviour.



**Picture 2.** The descriptive social performance feedback loop at Store Kongensgade.

### Intervention 2B – Lottery mechanism in the return moment

At Bredgade a third nudge was implemented. In this, customers had the chance of a potential gain when returning a reusable to-go cup. The design was a lottery mechanism, where customers got the chance of getting 50% off their next beverage when they returned a New Loop cup. A red die was placed at the counter next to a sign explaining the concepts. The employees were instructed to add a short explanation of the concept to their existing prompt. When customers returned the reusable New Loop cup, they were allowed to throw the die. If the dice was a 6 it provided them a 50% discount on their beverage.

### Intervention 2C – Lottery mechanism in the buying moment

The fourth nudge is similar to the previous lottery mechanism, where customers could potentially get 50% off their next beverage. However, instead of having the chance in the return moment, customers at Istedgade had the opportunity to get the discount when **buying** a to-go beverage in a reusable cup. The chance is the same, so if one rolls a sixth after choosing a New loop cup, they get 50% off their next beverage. The nudge was set up as the other lottery mechanism with a sign and a die at the counter, and the employees were instructed to add a short explanation in their prompt.



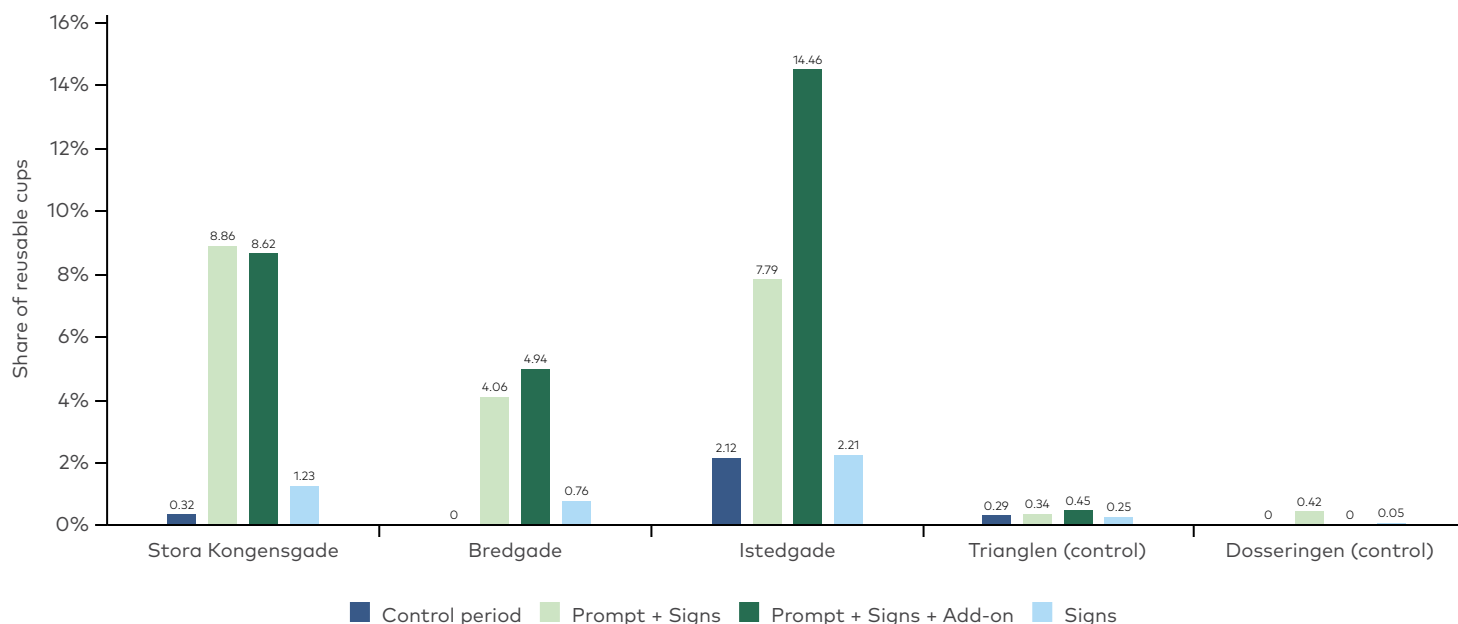
Picture 3. Lottery mechanism in the return at Bredgade.



Picture 4. Lottery mechanism in the buying moment at Istedgade.

## Results

The results of the interventions at Original Coffee are shown in Figure 1.



**Figure 1.** Share of reusable cups compared to the total of hot to-go beverages sold across the three cafés: Store Kongensgade (SK), Bredgade (BR), Istedgade (IS), and the two control cafes Trianglen (TR), Dosseringen (DO), in the four different time periods of the experiment.

During the control period the share of reusable cups is almost at 0% across the cafés, except for IS where it was 2.12%, leading to the conclusion that almost no reusable cups was chosen as the to-go cup prior to the intervention periods.

In the first intervention period the consumer behaviour starts to change, and the share of reusable cups increased in all three test-cafés to 8.86%, 4.06% (8.21%) and 7.79% in SK, BR and IS respectively. The share remained low and close to zero in the two control cafes, 0.34% and 0.42% in TR and DO respectively. The first two days at BR the reusable cups were unusually high (25%). This was detected through our undercover visits, which was performed twice per week at every café during the experiment. These were done to support the daily monitoring visits – to ensure the prompt was implemented according to the instruction. The employees added multiple elements to the prompt making it almost like a sales pitch rather than just a prompt. This might explain why the share of reusable cups were relatively higher compared to any other day in the experiment in any of the shops. After day two, we aligned with the employees to prompt in agreement with protocol, which afterwards led to a drop in the reusable cups share. We have presented the share in BR in this period both with and without these two days.



In the second intervention period the share of reusable cups increased in BR and IS to 4.94% and 14.46% respectively. The increase, however, was larger in IS, where the lottery mechanism was linked to the buying moment, compared to BR, where the lottery mechanism was associated with the returning moment. This suggests that the chance of immediate rewards is more effective compared to possible future benefits upon cup return. In SK there was a slight decrease from 8.86% to 8.62% in the share in this period. The share remained low and close to zero in the two control cafes, 0.45% and 0% in TR and DO respectively.

In the third intervention period the share dropped in all of the test-cafes to 1.23%, 0.76% and 2.21% in SK, BR and IS respectively. The shares remained low in the control-cafes, at 0.25% and 0.05% in TR and DO respectively. This indicates that the prompt was the main driver for the positive change we saw from the control period to the first intervention period. To test for significance difference-in-differences regressions are made, which can be found elaborated in the Appendix. The estimated effect sizes are all significant on either a 1% or 5% level.

Monitoring visits noted that employee enthusiasm at Istedgade likely contributed to higher implementation rates and, consequently, more effective prompts. We recognize the distinction between optimal and normal implementation inherent in real-world experiments where complete control is impossible, as discussed later in the report.

## **Test 2. ISS Café, Nordea headquarters: Amager, Denmark**

### **Setting**

In Nordea Headquarters, ISS manage a café only available for Nordea employees (approx. 2000 people) and visiting guests. The setting is what we would call a closed setting, meaning that it's only people within the closed security of the Nordea location who can access the cafe. Therefore, mainly regulars use the café, and the consumption of the beverage happens within the surrounding area. The café offers only to-go beverages, where the default prior to test was single-use cups. As mentioned, two reusable alternatives were already present prior to the experiment. One is Kleen Hub which is a metal cup with a breakeven point of 10 uses, where customers need to sign up to borrow the cup for free (similar to Panter). If they forget to return it after 10 days, there is a fee of 150DKK. Another alternative for customers is to bring their own cup with which they receive a 2DKK discount. A sign promoting this was on the counter, prior to our test.

## Nudges implemented

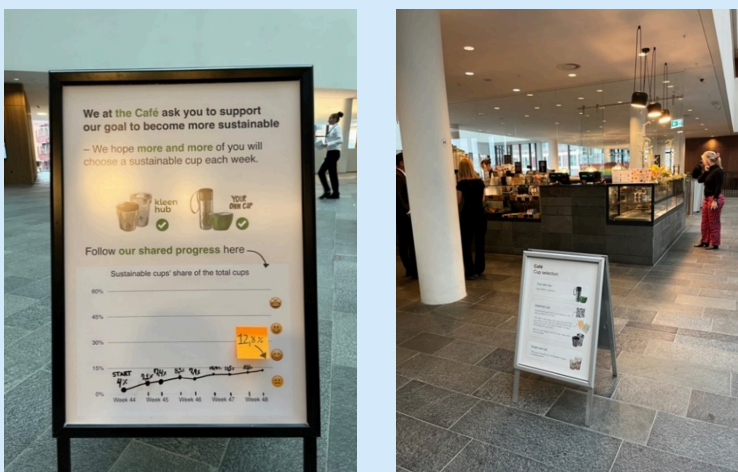
In Nordea's café the implementation involved three elements all in one intervention. A descriptive social performance feedback loop was tested along with signs placed around the cafe and on an internal-Nordea website that was displayed on small screens around the office. A prompt was also performed, but not in every transaction. The test spanned from November 6<sup>th</sup>, 2023 until March 3<sup>rd</sup>, 2024. The feedback-nudge was a graph visualising the proportion of the desired behaviour in percentage, being customers selecting one of the reusable alternatives instead of a single-use cup.

The experiment can be separated into two periods. The first period (four weeks) iNudgeyou updated the poster with the feedback loop twice a week to give the consumers as immediate feedback as possible. In second period (the remaining 13 weeks) the café updated the graph themselves on a weekly interval. We collected 5 weeks of baseline data to incorporate into the analyses, which were from the weeks leading up to the test.

### First element of the intervention: Descriptive social performance feedback loop

The main nudge at Nordea's café was designed as descriptive social performance feedback loop, that leverages on a community that was already present since we performed the experiment in a closed system with people working within Nordea. We used the nudging strategy "making it social" with the assumption that people already involved in a work-community will be more willing to shift towards a more sustainable behaviour just to improve their self-image in the community.

The continued feedback is to support the social motive to shift behaviour, and the nudge is designed on a large poster that is placed right next to the café where most employees pass by entering the building. There is also a post-it note attached to the graph to highlight the current percentage.



Picture 5. Descriptive social performance feedback loop at Nordea's café

## Second element of the intervention 2: Communicative signs

In the design phase discussions were made regarding potential behavioural insights that could be included as an element in the intervention. Due to the default single-use cup expressing "100% compostable" on its front, customers might consider that the cup is "fine to use" in an environmentally setting, and not that it's coded with polyethylene (plastic) and the compostable statement refers to a specific sorting option and not that it will be dissolved naturally like an apple. Therefore, communicative signs were also made to be visible around the café informing about what is preferred behaviour and what options of cups is present.

The framing draws on a mental model that gives an intuitive understanding of the different options and which ones are considered desirable. Another element of the signs is the norm-framing that the café asks their costumers to help them (the café) to become more sustainable by choosing a sustainable cup when buying their coffee. These different signs were placed around the cafe, including on the counter. In the first four weeks, it was posted on an online Nordea platform as well, alongside the updated graph.



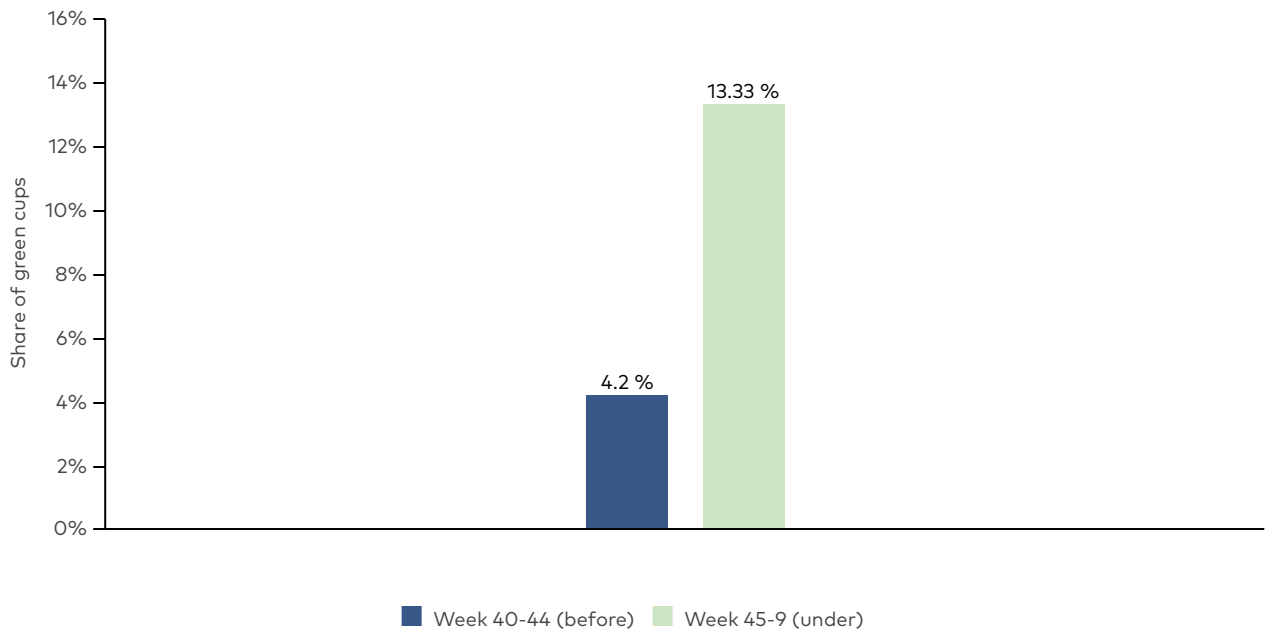
Picture 6. Communicative signs at Nordea's café

## Third element of the intervention 3: Prompt

Initially, we agreed to add a prompt where the café would ask all customers "What kind of cup do you want" in each service. After the first couple of days and talks with the Nordea manager it was agreed that they would only make an initial prompt, so every guest at least once got a prompt explaining the systems for the more sustainable behaviour and received information about the signs stating that they could follow the progress. The café manager deemed it to be unrealistic to make a prompt in every transaction because the employees take pride in knowing the customer and their usual ordering.

## Results

Figures 2, 3 & 4 present the proportion of coffee buyers choosing "a green cup" at Nordea's café for each period. Choosing "a green cup" in Nordea's café can mean one of two things: either borrowing a Kleen Hub cup or bringing their own.



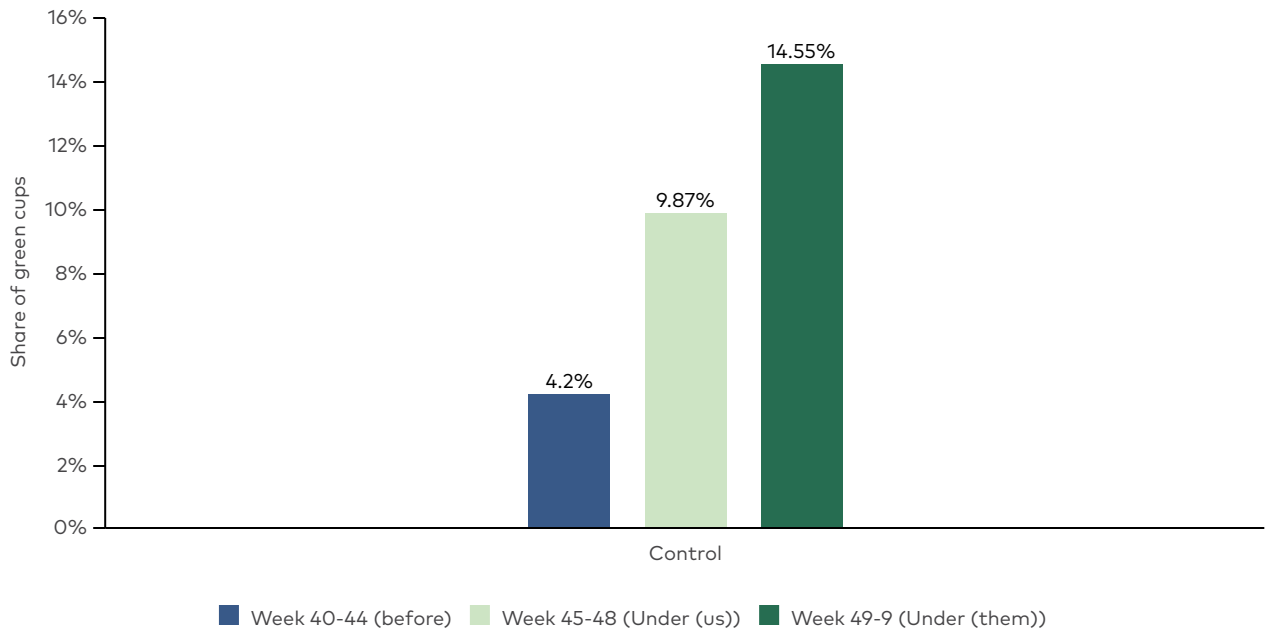
**Figure 2.** Share of green cups for the control period and the entire intervention period.

Figure 2 shows that in the 5 weeks of control 6,499 cups of coffee was sold and 4.20% of them was in green cups. In the entire intervention period of 17 weeks 20,717 cups of coffee were sold, and the proportion of green cups during that period increased to 13.33%. The average weekly share of green cups was 4.15% in the control period and 13.94% in the intervention period.

When we instead of looking at the green cups altogether, consider the share of Kleen Hub cups and own cups individually, the average weekly share of own cups is 1.87% in the control period and increased 7.33 pp to 9.20% in the treatment period. The average weekly share of Kleen Hub cups were 2.29% in the control period, and in the treatment period this increased 2.45 pp to 4.74%.

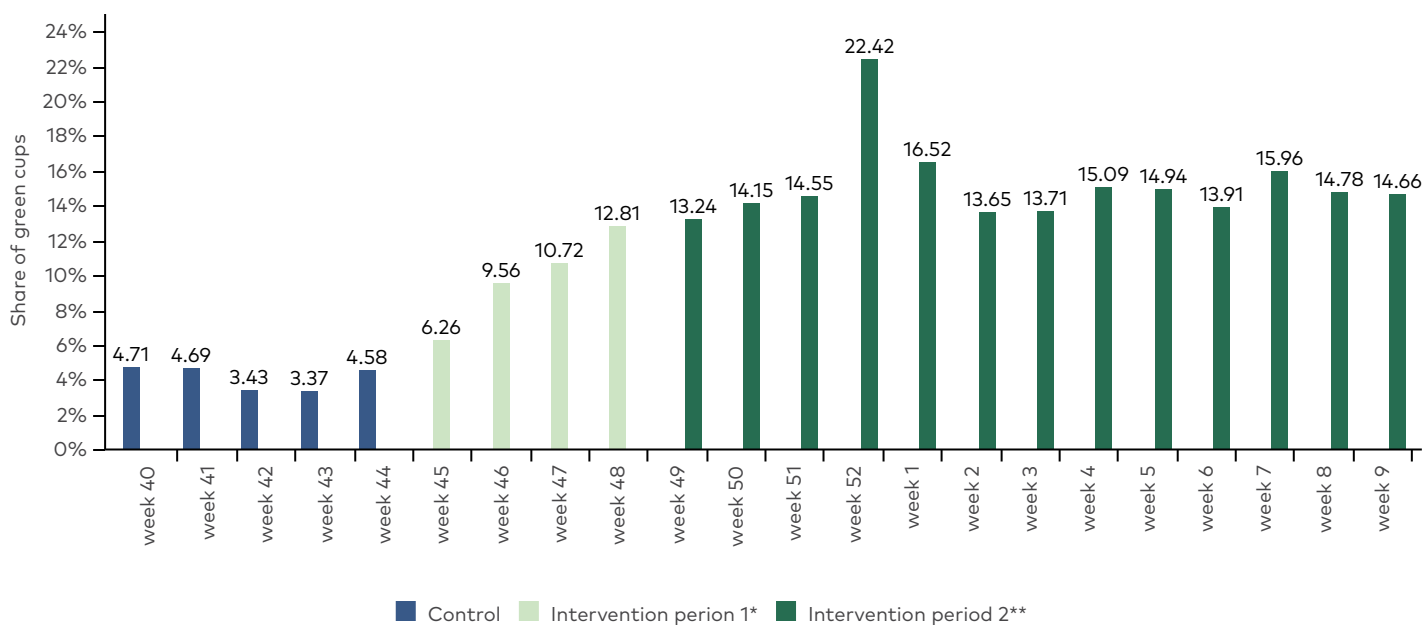
This suggests that the main part of the increase in share of green cups can be attributed to an increase in the share of own cups. Both differences are significant on a 1% significance level, however it's worth noticing that the increase is highest for customers bringing their own cup rather than borrowing a Kleen Hub cup in this

setting. A hypothesis for this could be due to the different incentive structure, where you get 2DKK discount when bringing your own cup and by choosing to borrow the Kleen Hub cup a hassle factor of a potential cost occurs that is relatively high of 150DKK.



**Figure 3.** Share of green cups across the control period and the first- and second intervention period.

Figure 3 presents the results where the intervention period is split into two. The difference is if the graph was updated 2 times weekly by iNudgeyou or 1 time weekly by the ISS's manager. In the first intervention period 5,392 cups of coffee were sold, of which 9.87% were in a green cup. The average weekly share of green cups was 9.84 %. During the second intervention period there was 15325 cups of coffee sold, of which 14.55% were in a green cup. The average weekly share of green cups was 15.20%. The effects are statistically significant on a 1% level. This intuitively indicates that there isn't any reason to update the graph more than 1 time a week. It should though be noted that the increase from control to the first intervention period is higher than from the first period to the second. This indicates that there is some kind of learning period in the closed settings at Nordea, where people over times opt-in. The next graph argues for this hypothesis.



**Figure 4.** Share of green cups displayed weekly during the experiment.

\* *iNudgeyou updates graph*

\*\* *Nordea café updates graph*

Figure 4 presents the percentage of green cups on a weekly basis and is made to investigate potential outliers, but also any time effects referred to in the above. Overall, there is an increase in the share of green cups from week 40 (4.71%) until week 9 (14.66%). The most substantial gradual increase is seen during the first intervention period in week 45 to 48, where the increase is from 4.58% to 12.81% respectively. The average weekly increase in this period is 2.06 pp (time effect). The effect is statistically significant on a 5% level, and it's the only period where the time effect is significant. This indicates that there is a learning effect in the beginning of the intervention and that there is an onboarding period of for the employees at Nordea. It though doesn't clarify if there is a potential max learning effect. Weeks 52, 1, and 7 have the highest share of green cups sold, which can be explained because these weeks are around Christmas and the Winter holiday. Here fewer people were at the office, leading to a relatively lower total sales of to-go coffee. When these weeks are excluded from the analysis, we still get significant results.

Overall, the results show a significant effect for the nudge, meaning that by implementing a descriptive social performance feedback loop, intuitive signs, and a single time prompt in Nordea's café positively increased the consumption of more sustainable options when buying to-go coffee in comparison with single-use cups. To test for significance t-tests were used. An elaboration of these test and a table summarizing the results can be found in the Appendix.

## Test 3. Nordrest: Uppsala, Sweden

### Setting

Nordrest operates restaurants/cafeterias at universities, schools, hospitals, offices, and other public spaces. Two of these cafeterias are located at Uppsala university campus, at Ekonomikum (where students in social sciences study) and Ångströmlaboratoriet (where students in natural sciences and engineering study). Both cafeterias have offered reusable cups through Panter, but with a limited share of beverages sold in the reusable alternative. To receive a reusable cup, customers had to specifically ask the staff for one, and information was available on posters.

### Nudge implemented

To increase the share of beverages sold in reusable cups, we instructed staff to specifically ask customers if they wanted their coffee (or other beverage) in a reusable cup, when they ordered coffee to-go. This prompt was provided in one of the two Nordrest cafeterias, while the other is treated as a control to compare any differences. While it's safe to say that for the two other tests in Sweden all customers in the shops had the same possibility to read the signs, we can only confirm that the likelihood that customers were asked if they wanted a reusable cup was higher during the nudge treatment, without any guarantee that all customers received this question.

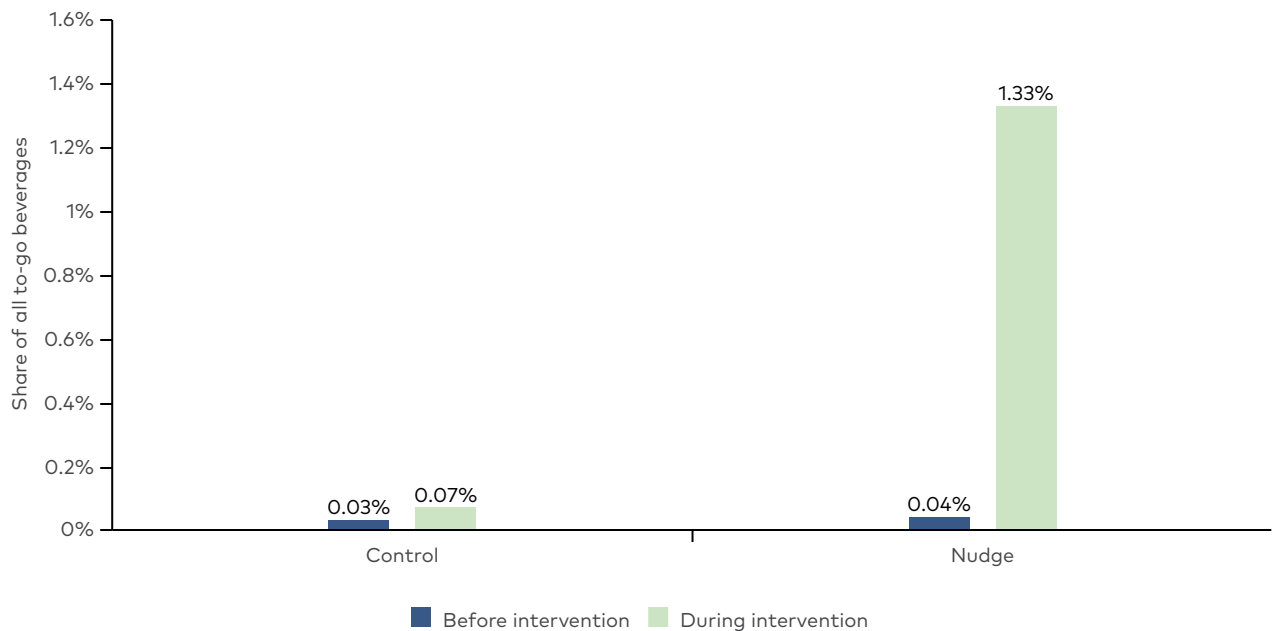
Data on the number of cups sold is available from 5<sup>th</sup> of February until 31<sup>st</sup> of March. The nudge was implemented on one of the cafeterias from 4<sup>th</sup> of March and onwards until the end of the test period. During the period 5<sup>th</sup> of February until 3<sup>rd</sup> of March the total amount of take-out coffees came to 5,932, while the equivalent number for 4<sup>th</sup> of March until 31<sup>st</sup> of March was 4,978 take out coffees.

### Results

With the nudge implemented, the share of reusable cups sold increased from 0.04 to 1.33% in the treated cafeteria, as shown in Figure 5. This can be compared with a minor change from 0.03 to 0.07% in the control cafeteria. We can then conclude that the nudge had a positive effect, whereas any time-effects are comparably negligible. While the effect of the nudge is large in relative terms, the number of reusable cups sold is still low, at slightly more than one of every 100 single-use cups sold.

After the implementation period, we confirmed with managers how well the instructions for the verbal prompt were followed. There was a considerable risk that all customers did not receive the same treatment with the verbal prompt asking

whether they wanted their coffee in a reusable cup. Managers noted that this could have happened when staff felt that asking would be experienced as an inconvenience for the customer, when queues were long, or by staff simply forgetting. This non-full compliance would of course lower the potential for the nudge effect.



**Figure 5.** Results Nordrest.

## Test 4. Espresso House: Stockholm, Sweden

### Setting

The second test in Sweden was conducted at Espresso House coffee shops in Stockholm. Espresso House is one of the leading coffee shop chains in Sweden and throughout the Nordics. Before any tests were implemented, Espresso House offered the reusable cup alternative through collaboration with Panter. The number of reusable cups sold at selected coffee shops had however been low, at well below 1 % of all coffee sold. The visibility of the reusable option was low, and after site visits, we considered this as one of the major obstacles to reaching a higher share of reusable cups sold.



## Nudge implemented

The nudge in this test consisted of increased visibility and communication of social norms in the form of signs. These signs were larger and more colourful than previous signage. In this test, we also communicate that many other customers chose to use the reusable cup system by stating "12 000 people use reusable cups instead – test it yourself!".<sup>[2]</sup>



**Picture 7.** Poster communicating social norms at Espresso House

Data on coffee sales are available between 5<sup>th</sup> of February and the 31<sup>st</sup> of March. Six coffee shops were randomly selected into a control group and a treatment group. Again, the test began with a time period without any nudges, followed by a second time period where three of the six shops were treated with the nudge. The second time period ran between 4<sup>th</sup> of March until the end of the test period. During the first period a total of 6,538 coffee to-go was sold, while the equivalent number for the second period was 6,274.

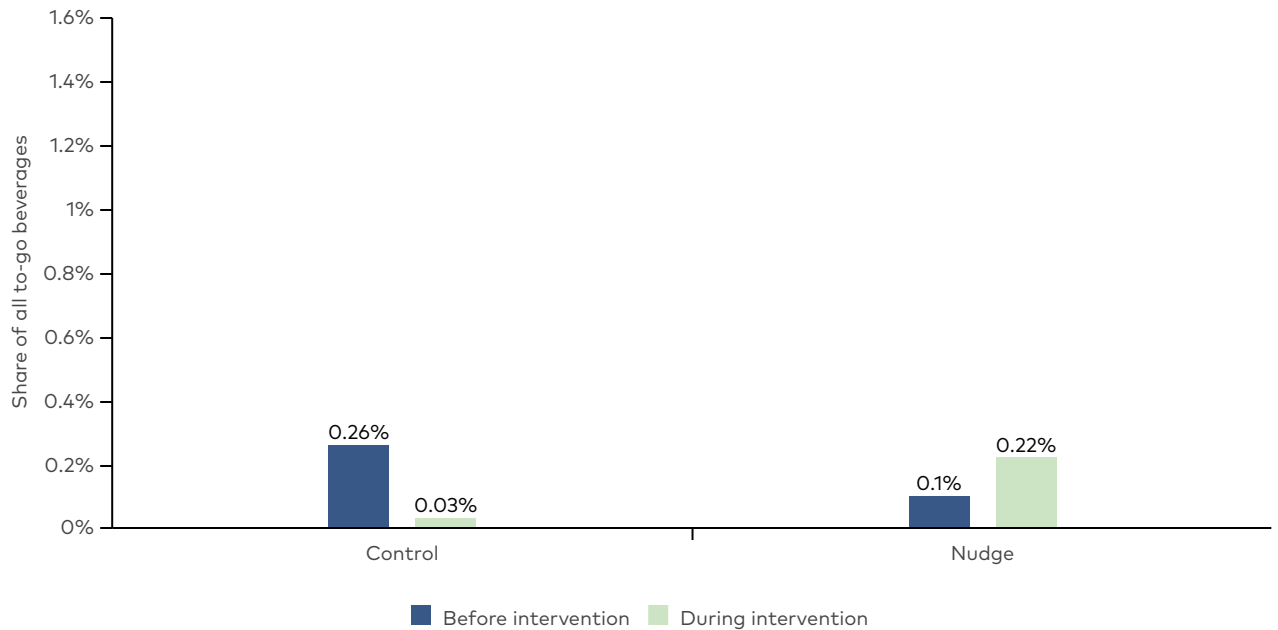
## Results

The result from this test is displayed in Figure 6. Shares of reusable cups sold are very low in all groups, both before and during the nudge intervention. In the nudge group, the share increased from 0.1 to 0.22%, but this increase is not statistically significant. Meanwhile, the share in the control group fell from 0.26 to 0.03%. These changes, however, represent such small amounts of cups sold, that we cannot establish any statistical significance or draw any practical. The higher

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2. Based on Panther numbers, not specific to the specific coffee shops.

pre-intervention share in the control group is driven by one day in one restaurant when the cups were first introduced. The results may hint at an effect in a positive direction, but the change is neither statistically nor practically significant.



**Figure 6.** Result from Espresso House

## Test 5. Circle K: Gothenburg, Sweden

### Setting

Circle K is one of the major gas stations operating in Sweden. While selling transportation fuels is their main business, they also operate convenience stores. Among other goods, they sell coffee and other beverages. Customers are mostly car-borne passing by to refill their cars with fuel, although customers may also come for the convenience store alone. Inside the store, customers are met with a strong visual profile and multiple signs and posters highlighting various offers. At the coffee station, single-use cups are highly visible while the option of reusable cups is less salient. Signs promoting the reusable cups are there (the two grey signs in Picture 1 below), but customers need to go to the counter and ask the cashiers to receive the reusable cups, in addition to registering on the Panter web-application. To promote the use of reusable cups, there was already a discount of 2 SEK when buying coffee in reusable cups instead of single-use cups.



**Picture 8.** Circle K coffee station, before nudging.

## Nudges implemented

We considered low visibility and the initial hurdle of choosing reusable cups as major obstacles for reaching higher shares of beverages sold in reusable cups. To compensate for this, we increased visibility through larger and more colourful posters (see picture 2). Posters were designed in collaboration with Panter and Studio Berget. The first time a customer registers at the Panter application, Circle K would now offer a gift of free coffee at their next visit. This was highlighted in one poster, while the other highlighted the 2 SEK discount. Treated stores included both posters.



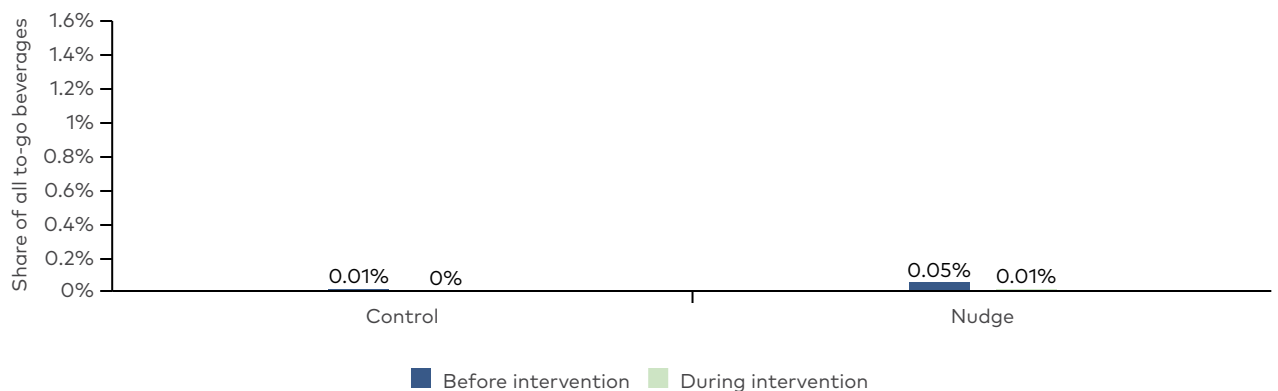
**Picture 9.** Posters at Circle K: Free coffee at next visit (left) and 2 SEK discount (right).

The test was conducted on seven Circle K stations in Gothenburg and its surroundings. The test period was divided into two time periods. The first period was a reference period, running from the 15<sup>th</sup> of January to 11<sup>th</sup> of February. The intervention period ran from 12<sup>th</sup> of February to 15<sup>th</sup> of March. During the treatment period, these changes were implemented on four of the seven stations, leaving the other three stations as a control group. For the first period a total of 27,492 coffees were sold, while the equivalent number for the second period was 34,148 coffees.

## Results

The nudging implemented at Circle K stations resulted in no positive change in behaviour, as shown in Figure 7. The number of reusable cups registered to customers was higher before the intervention period, although the total number and differences are too small to confirm any statistically significant difference. The results confirm that the increased visibility through posters, in combination with the offers of a free coffee and the pre-existing discount, was not enough to increase the use of reusable cups among the Circle K customers.

The result from this test is visualised in Figure 7. As seen on the sizes of the bars there seems to be no effect from the nudge in Circle K. The number of reusable cups sold was very low in all stores, both before and during the intervention. The number of reusable cups sold was actually higher in the nudge group before the intervention, indicating a negative effect of the nudge. We interpret this mostly as an unfortunate outlier effect, as the manager of one of the stations was very positive to the reusable cups when implemented, and thereby had a comparable high share of reusable cups during the first weeks. Either way, shares are so low that we find no statistically significant effect.



**Figure 7.** Results from Circle K

# Discussion

## Comparison of results

### Impacts of different nudges

Our results show that prompts in the form of outright asking customers if they want a reusable cup was the most influential intervention to increase the use of reusable cups. This is not surprising, as it makes the option very clear for the customer, and among the nudges tested, this is the one closest to a default nudge, which is often regarded as the most impactful form of nudges (Mertens et al., 2022). However, many representatives of coffee shops have also expressed a reluctance towards disturbing customers with questions. Staff is already instructed to ask customers whether they want the beverage to go or to sit in, the size of the beverage and possibly additional questions. Too many questions are perceived to be a burden for customers. This claim is also substantiated in research, where studies have found that questions or reminders may backfire. For example, Damgaard & Gravert (2018) found that reminders for donations increases donations, but also the amount of unsubscriptions to newsletters and communication, as they are perceived as a burden.

Posters increasing the saliency of the reusable cups, along with various types of messages, were not by themselves sufficient in substantially affecting behaviour. This result is also highlighted in the tests at Original Coffee, where there was a substantial drop in the use of reusable cups when prompts were no longer provided, but posters remained. Visitors in coffee shops, restaurants, gas stations and similar stores are exposed to many different messages about offers to buy, or actions to take. Therefore signs, no matter how good they are, run the risk of disappearing in the overwhelming communication, or written communication is simply not sufficient to change behaviour, when other obstacles are present. We believe increasing saliency is still a good step towards enhancing the desired behaviour, but it should not be expected to influence behaviour in isolation. It may, however, facilitate the prompts, as it is easier to ask the customer about reusable cups if it is also communicated on posters visible at the right moment. It should also be noted that our interventions increased the saliency of reusable cups, but the standard option of single-use cups are still even more salient, as many single-use cups are often located in plain sight where customers can choose their beverage, while reusable cups are typically more difficult to spot for the customer. In general, there are clear opportunities for further saliency improvements in most coffee shops.

Some coffee shops offer a discount for beverages when customers choose or bring their own reusable cups. Financial incentives are usually believed to be a strong motivator for choices, but we find no significant impact of visually increasing the saliency of this discount on posters in Sweden. The lottery mechanism tested at some of the Original Coffee locations also provided a form of monetary incentive. Our results showed a strong positive effect of this lottery mechanism, but only being significant in the buying moment opposed to the return moment. It should be noted that the share of the reusable cups increased significantly in intervention period with the return moment, but that the effect is most likely to be driven by the prompt. The incentive of a chance for a reduced price when returning the cup might have been too distant from the moment customers decide between a reusable and single-use cup.

Our findings on the impact of social norms differ depending on how the social norms were communicated. The Green Nudges Playbook advocates communicating social norms to leverage behaviour change, but it is important to highlight the different possibilities with social norms. Previous research has found that simply stating how much others are engaged in a desired behaviour, can have a substantial effect on the increase of this behaviour. In one of the most influential studies on the effect of communicating social norms, Allcott (2011) showed that household energy consumption could be lowered by communicating differences in consumption with similar households. However, subsequent research has had varying success in replicating this finding. For example, Gravert & Olsson Collentine (2021) showed that communicating social norms had minimal effect on the uptake of public transport. Our results also indicate that this approach may not be enough. However, when communicating social norms more actively with a continuously updated graph and numbers on the use of reusable cups at the location where customers buy their beverages, our results show stronger effect. Whether social norms impact our behaviour also depends on which group of people we receive information about, and whether we identify ourselves within that group. Because of this, social norm nudging is also more likely to succeed in a closed setting rather than an open setting.

## Settings

Coffee is everywhere, bought in all kinds of settings, from offices and gas stations to universities and sports stadiums. Therefore, it's important to make a few notes on these different settings, because they have relevance for the applicability of nudges. As the results illustrate, using the same nudge in different settings can result in different impact. A truck driver might not react to a nudge implemented at a gas station, that works on the professor who just needs a coffee while performing a lecture. We advocate for the need to investigate one's context to understand what might work and what might not, and not to think that an effective nudge would be effective everywhere.

Two overall settings can be identified to have an influence on the applicability of the nudges. We call them open- and closed settings. Closed settings refer to contexts where people are consuming their beverages within the surrounding area of the purchase. The customers are usually regulars and examples could be workplaces like Nordea, Universities like Nordrest or events and festivals. Open settings are the opposite. Here there are fewer regulars and people do not necessarily consume their hot beverages in the surrounding area. These two settings have a substantial impact on the applicability of nudges. As shown in the experiment, the prompt is more likely to successfully be implemented by organisations that operates in open settings. That is because employees can feel uneasy or unprofessional if they are performing the prompt continuously to the same regulars, which are more frequent to happen in closed settings opposed to open settings. The social norm nudges also differ in results depending on the setting. In the closed setting of Nordea, the result was significantly higher than in the open system of Original Coffee's at Store Kongensgade. This is logical, since social norm nudges leverages on already existing communities, and in closed settings customers are more likely to identify stronger with each other and thereby influence each other more.

## Systems

The aim for the experiments is to evaluate and test if different nudges can be used to limit the use of single-use cups by getting people to choose a reusable alternative. These alternative options can vary in both material and how they are systemized. In the Swedish tests, Panter was used as the reusable alternative which is like the Kleen Hub cup tested in Nordea, Denmark. In these scenarios, customers can for free choose the more sustainable option instead of the single-use cup. It is though only free if they return it, as they otherwise they will be fined. This system is based on the idea that a reusable alternative will be chosen at a higher frequency if the initial payment isn't different from ordinary single-use cups. The obstacle is here another behavioural barrier, where people need to use relatively long time to sign up to the system. We tried testing sign-up time with Kleen Hub and it took little over 3 minutes, which in theory is a small investment to make, but in practise this can be too much of a barrier for people to opt-in.

The system used at Original Coffee operates in a different way, where customers pay a deposit fee when buying the hot beverage (5DKK), which they will get back when they return the New Loop cup. Here the initial barrier isn't time to sign up, but the additional 5DKK that one need to pay as a deposit.

What is interesting with these two systems is that they try to overcome two different behavioural barriers for people choosing the reusable option. The results from the test show that it in practise is easier to nudge people to opt-in to a system like New Loop, since the initial time barrier simply is too inconvenient compared to the extra money. At Nordea the main driver for the effect wasn't the

Kleen Hub cup, but the option of bringing one's own cups emphasising the sign-up barrier. Kleen Hub have post-experiment changed their registration process to be easier for people to opt in to.

As stated, Nordea had a third option of a reusable cup, being that customers could bring their own cup and get 2DKK discount. In theory, this is a great alternative, but in practice it's very important to notice the previous distinction between open- vs closed settings. In a closed setting, this option can work since people are regulars and maybe even have a personal space or desk, like in Nordea. This setting provides the possibility for people to store their cups close to where they buy their coffee and not necessarily have to remember to bring their cups from home every day. Here people have both the possibility of allocating their used cups after they are done drinking their coffee and have it at easy hand when needing it the next time. In the open setting, people would not have the ability to allocate their used cup nor have it at easy access in the coffee-buying moment. They would at all times need to remember their cup every time they were about to buy coffee.

The above highlights the difference between the two initial barriers for the systems, but a combined barrier also exist. It is the inconvenience of carrying a reusable cup around until you can return it, which naturally is more present in open settings opposed to closed settings. This barrier is a major implication for shifting consumer behaviour towards sustainability in open settings, which quickly becomes a broad problem to solve and therefore relevant for future research.

## Optimal and normal implementation

When conducting field experiments, one serves the *practical interest* by using the appropriate experience, theory, and scientific methodology. To serve the practical interest is to develop theories and insights that is applicable to the real-world, which is why we distinguish between *scientific praxis* and *applied scientific praxis*, leading in this case to the discussion between optimal and normal implementation (Hansen, in press). When implementing nudges in the real-world that incorporate a human element like instruction to a prompt, nudging can rarely be without *noise*.

Noise occurs for example when employees forget to prompt, if the coffee machine shuts down or if employees get sick – it's all that cannot be controlled for when you're testing in the real world. Optimal implementation is what happens in laboratory studies, where the curiosity of science is of focus. Conducting field experiment often results in normal implementations where noise cannot be avoided – only limited.

To minimise noise, we did daily monitory visits and two undercover visits per week at Original Coffee. Every potential noise was written down, where employees were asked if, for instance, they had performed the prompt correctly, how they felt about doing it, any reaction from customers, or if anything unusual had happened. The undercover visits were performed to double-check their answers in performing the



prompt. When reading these notes, it's clear that we are talking about a normal implementation, meaning that some of our undercover visits show that not every employee did the prompt in every transaction. It was also openly reported in the monitoring visits, where employees expressed a struggle in always remembering the prompt, and that they were not comfortable in continuing to do this to regulars or tourists. During the experiment, we therefore tried to tackle these barriers with a dynamic approach by correcting the prompt a bit (not a yes or no question, like some accidentally did), stressing the importance of always asking from an experimental point of view, and making a highlighted poster at counter for the employees to be reminded to prompt.

In the tests with a more static approach, monitoring and controlling that instructions were followed in detail was kept at a minimum. Instead, we had follow-up discussions with the collaborators to gauge how instructions were followed. Indeed, noise was present during the intervention and likely to a significant amount. Instructed prompts were not provided zealously, to avoid inconveniencing the customer or the staff themselves. The reason for the static approach was to test the results of an approach that is likely to be followed when scaling up chain- or market wide. When scaling, a dynamic approach with monitoring becomes time-consuming and expensive. Managers (or consultants) may instruct staff to follow a certain practice, but ensuring full compliance is far from guaranteed. Using a more static approach for some of these tests also allows comparisons with the results from the more dynamic approach. These results are important for conclusions regarding possibilities for scaling. One should expect results similar to test results only if the methodological approach is similar at scale. If the approach is dynamic (monitoring and controlling that instructions are followed), one should expect results similar to the tests with a dynamic approach. If the approach is static (instructing prompts, but limited monitoring and control), one should expect weaker results, similar to tests with a static approach.

To sum up, the nudges can be said to have a normal implementation, both with a dynamic and static approach. However, the implementation is closer to an optimal implementation using a more dynamic approach. The fact that implementation was not optimal makes the results even better – just imagine what could have happened if we could make sure that the nudges was 100% correctly implemented each time someone needed a to-go cup.

## Returned cups

The experiments conducted within this project give the opportunity to test in to-go settings, where a reusable alternative for the single-used cup already had been implemented but with no great success. As the Playbook tries to assist, the goal is to get more people to freely choose a reusable cup with the overall intention to reduce plastic waste and environmental pollution. It's hard to argue against this objective. However, it's crucial for regulators and decision-makers to consider potential unintended consequences that can arise during such changes. In the current case of this project, the objective is to reduce plastic waste and environmental pollution by encouraging more customers to choose reusable cups and using nudging as a tool for this. This is also the main objective of the playbook with no success criteria of the cup being returned, leaving the return of cups more as a sidenote.

To solve a complex problem effectively, we must consider all critical elements of the system in which the problem operates. The potential of using nudging as a policy tool becomes much greater if we take all critical elements into account when we use it. The challenge then becomes how to incentivize people to reuse these products consistently and to actually reuse the reusable products.

Before the experiment at Original Coffee, we wanted to tackle this issue and decided to track return data as well. We also placed donation boxes for reusable cups in each shop, providing customers with an easy way to return cups for those who didn't care about the discount. Additionally, with the 2B nudge (Bredgade) we wanted to see if offering rewards upon cup return would increase return rates. The add-on nudges of 2B and 2C were designed to see if a nudge effectively could include making customers both buy and return the reusable cups.

The data showed no immediate change in return rates during the intervention, but a higher return rate in the subsequent weeks at Bredgade compared to other locations. This suggests that customers may have been motivated to opt in initially but either forgot about or were unaware of the expiration of the return discount. The data also revealed that only 51% of reusable cups were returned between all shops during the experiment. With only about half of reusable cups returned over three months, it's clear that successfully changing consumers preferred choice in a to-go-coffee setting – getting them to reuse the reusable products – requires addressing the 'entire' desired behaviour, including considerations of return as well.

A final note to mention to the return cup discussion, is that the share of reusable cups sold is also affected by how convenient it is to return the cups. Turning to the Fogg-behavioural-model (2009), a behaviour is determined by a cue (like a prompt), the ability to perform it and one's motivation behind it. As stated, the designs of reusable systems differ, and may require varying levels of motivations for customers to select the reusable cups. The Kleen Hub and Panter option require

time for sign-up, and you need pay 5 DKK extra for the New Loop cup. The results show that by increasing the motivation, e.g. with the of rolling a die (Istedgade) or contributing to the community (Nordea), there is an increase in the share of reusable cups. However, none of the nudges are created to influence the ability of the behaviour, meaning in this case the return of the reusable cups. When deciding between a reusable- and single-use cup it's natural to think of how convenient it will be to get rid of. The ability factor is here much lower for reusable cups compared to single-use cups, and thereby a higher motivation is needed to choose the reusable cup. This argues for the need to test interventions aiming at increasing the ability factor for customers and making it easier for customers to return the cups.

## Applying behavioural interventions in practice

When discussing normal vs optimal implementation, dynamic vs static approaches, and the issue of cup return, the importance of context and setting becomes evident. We therefore wish to emphasise the importance of this to all policymakers and private agents who want to apply nudging to help citizens and customers make more sustainable choices. When using nudges and behavioural insights in practice, one needs to consider the following perspectives before applying strategies blindly.

Strategies such as prompt or social norms are overall broad categories which in practice can be conceptualised in many different ways with equally different effects. The nudges tested in this report present substantial differences in their effect even though some of them are similar and fall under the same strategy, such as prompt or social norms. Even within the same test setting using the same strategy of reward, we see different effects based only on a differentiation of how the strategy is conceptualised – the lottery mechanisms. Therefore, strategies cannot be implemented as plug-and-play solutions for those seeking to apply behavioural insights to encourage the use of sustainable coffee cups.

To identify what strategy to use and how to conceptualise them, one needs an examination of the issue relative to the specific context. Using a behavioural model and undergoing an extensive behaviour project might not be possible nor feasible for the layman. However, an examination of the behavioural context and setting should at minimum precede any nudge development. The goal is here to objectively identify different behavioural barriers and to prioritize their importance.

Both in theory and in practice the diagnostic approach is of most importance when working within the behavioural science paradigm (Hansen, 2019). One needs to develop a nudge-solution based on overcoming the barriers that exists in the specific context, which is why the identification of the barriers is important. For instance, you cannot nudge a consumer to choose a sustainable cup by using social norms, if the customer does not identify with the norm-group. Nor is the nudge effective to change behaviour if the issue is a matter costumer belief about sustainable cups.

When applying the nudge-approach to create any kind of behaviour change, practitioners need also to be aware that unforeseen side-effects might happen. This furthermore stresses the importance of sufficient examination of the context, as some side effects create an outcome worse than the starting point. As so, when applying the nudge approach to influence cup choice practitioners needs to consider what side effect might follow the implementation of the nudge – such as how to get customers to reuse the reusable cups.

## Recommendations for scaling

### Recommended approach for scaling

The results of controlled tests at a limited number of establishments are interesting in themselves, but the real social impact is possible only once solutions with positive effect are successfully scaled. Our recommendations are to focus on scaling interventions first in the same domain (reusable cups) and in the same regions (Nordic cities), before possibly expanding to other domains (reusable food containers) and other regions. These are also important forms of scaling, but careful considerations when scaling in the same domain and region is a necessary first step. Our recommendations for scaling are heavily influenced by research by John List and other researchers, and readers specifically interested in recommendations for scaling behavioural interventions (and ideas in general) are advised to read *The Voltage Effect* (List, 2022).

When scaling, it is important to base implementation strategies on evidence of which implementations that work. When doing so, you are creating evidence-based policies. However, it is equally, or even more important to consider policy-based evidence. This is evidence that is generated specifically to be relevant for when policies are implemented at scale. When scaling, there's a risk that interventions are not controlled as carefully as they were during pilot testing. If the implementation design and control is not the same as during pilot testing, there's also a substantial risk that results will differ. As our results indicate that a dynamic approach leads to greater impact than a static approach, any scaling attempt should also be conducted with a more dynamic approach, to make sure that nudges are implemented as intended.

## Expected effects at scale

When scaling, it is also crucial to consider what can go wrong as small-scale tests are implemented much wider. First of all, it is important to have reasonable expectations of possible results. In the nudging literature, and especially outside of academia, you are often confronted with a widespread optimism of the impacts of nudges. This is partly an effect of successful implementations being disproportionately showcased and used as promising examples. These successful implementations are not always as successful at scale, or when implemented in other settings. Similarly, scaling up in closed settings and in open settings are likely to yield different results. Circular systems for reusable cups are likely more attractive for customers in closed setting, and social norm nudges are likely more effective in these settings, as customers may know or identify more with other customers. At the same time, prompts may be perceived more as an inconvenience or burden at closed settings, since they are more likely to be repeated for each customer.

With a successful intervention, one has to understand why the intervention is successful. If any important ingredient does not scale well, attempts of scaling is likely to fail. In our tests, we have noted that interventions were most successful when managers and staff were enthusiastic about interventions. Ensuring staff enthusiasm will then be a key component when scaling interventions widely. Enthusiasm has likely influenced our tests also in the form of a form of selection bias, since certain coffee shops or chains were more enthusiastic toward this project. Coffee shops choosing to collaborate were of course more enthusiastic than those not choosing to participate, and when attempting to scale this should be kept in mind.

When scaling an intervention, it is also important to consider possible unintended consequences. For example, regardless of whether businesses instruct their staff to provide prompts to customers, or if this were to be required or somehow promoted by official agencies, possible inconveniences for customers or staff needs to be considered. As research has shown, too frequent prompts can be a burden for people, and may result in actions taken to avoid the prompts, as shown by Damsgaard & Gravert (2018) in the context of prompts for charitable giving.

Additional impacts of scaling may include various spill-over effects that may arise at scale, but not for smaller implementations. In our case, the most likely spill-over effect of upscaling may be a positive, based on additional people observing the use of reusable cups. Reusable cups are currently uncommon, while single-use cups are ubiquitous. If more and more people use reusable cups, they would naturally become more salient, and additional people making this choice would become more likely. It is also important to note that with increased use of reusable cups, the follow-up action of returning the cups also becomes crucial. Successfully nudging customers to buy coffee in reusable cups in circular systems should not be considered a success unless customers also return the cups.

## **Recommendations for businesses (coffee shops etc)**

For businesses that want to increase the use of reusable cups, we recommend using prompts asking customers if they want their beverage in a reusable cup. Among our interventions, this is proven to be the most impactful. As these questions are also perceived as an inconvenience, strategies where they are used for a certain initial time period may also be considered. However, one should also be aware that the positive effect is likely to disappear once the prompts are no longer used. An alternative would be that staff ask questions, but at their own impression of when this would not be burdensome. For example, it could be avoided for repeat customers who always choose single-use cups, when queues are long, or when the customer is in a hurry. This approach would not yield the same effect as when always asking but would also have less unintended consequences of being an inconvenience for customers and staff.

We also recommend increasing the salience of reusable cups in comparison to single-use cups. Information material such as posters are one step. This has been proven insufficient for behaviour change, but we still believe increasing saliency is necessary to facilitate behaviour change and also increase the chances of successfully implemented prompts. Additional steps to increase saliency can also be taken, as the single-use alternative is still the most salient, even with posters highlighting the reusable alternative. If reusable cups were made clearly visible, similar to how single-use cups are visible, the alternative would become more on top of the mind of the customers.

We also want to emphasize the need to focus not only on choosing a reusable cup, but also on returning the cups after use. Similar to the choice of using them, this has to be made as easy as possible. At university cafeterias, office coffee shops and similar locations, we also recommend installing return stations not only at the coffee shop, but also at the exit of the building. This would further facilitate the return of the cups and increase the likelihood of habit formation that increases the success of circular systems for reusable cups.

## **Recommendations for policy makers**

For policy development, we believe additional steps are necessary. The ordinance recently implemented in Sweden is one step towards more reusable cups, but in isolation will likely lead to no impact on behaviour change. Forcing coffee shops to use verbal prompts would likely increase the uptake, but this would be ill-advised, as there is an aversion towards more questions for customers, which may very well be justified. However, we recommend promoting the use of prompts by showcasing their potential and the importance of behaviour change.

Similarly, we also recommend promoting increased saliency of the reusable alternative compared to the single-use cups. This creates awareness that can facilitate behaviour change, even though more would be needed than only installing posters.

Another possible venue would be to focus on incentives, both for customers and coffee shops. While some coffee shops already provide monetary incentives for customers choosing a reusable cup, our studies are not enough to determine their potential impacts, since these tests focused on green nudging. Our tests revealed positive impacts from lottery mechanisms that leverage incentives, but simply increasing the saliency of price discounts was not enough to meaningfully increase the uptake of reusable cups. While price discounts may not have led to an important uptake, it may be warranted to investigate possible behavioural effects of some form of tax on the unsustainable options, or subsidy for the sustainable options. More testing would however be recommended before establishing any recommendations, as increasing saliency of discounts was only tested at one of the coffee shops in this study. Incentives are also important for coffee shop managers and staff. Currently, there are no financial incentives for promoting reusable cups, which is typically more expensive for the coffee shop.

To address multiple obstacles facing increased uptake of reusable cups, one could consider an awareness campaign led by national environmental protection agencies in collaboration with coffee shops. The focus should be on increasing awareness, enhancing the saliency of reusable cups, and providing motivation for coffee shops to increase their efforts. Campaign administrators could work with collaborating coffee shops by providing guidance and communication materials. Tracking the uptake of reusable cups should be central, and a friendly competition could be organized, providing motivation for coffee shops to become the most sustainable in terms of their share of to-go beverages sold in reusable cups. Various funding models could be considered.

It is important to consider both making the desired behaviour easy and making customers motivated to adopt the desired behaviour. Results from the Green nudges playbook show that there is already a substantial level of motivation among customers. However, making the behaviour easy should not only concern the choice of the reusable cup, but also making it easy to return the cup after use. Individual businesses can make this easier, but only to some degree, for example by allowing to return at their respective establishments and increasing the saliency of this option. For customers, it would facilitate a lot with a common system where various brands (ideally all) work together, providing the same option to customers and establishing multiple locations where returns can be made easily. What policymakers can do would be to facilitate this networking between actors, and possibly offer some incentives for the establishment or operation of such system.

## Recommendations for additional tests

Finally, we recommend additional testing on the effects of behavioural interventions, with a specific focus on the effects at scale. We recommend scaling specific nudge types (ie verbal prompts, with and without increased saliency) at many locations and over a longer time-period. We also recommend scaling different nudges at similar locations (within the same coffee shop chains), to carefully evaluate the effect of different nudges while keeping the surroundings as even as possible between test locations.

## Recommendations in bullet points

Recommended approach for scaling:

- Scale in the same domain and region before scaling to other domains and regions.
- An active approach needs to be taken to achieve the highest possible impact.
- Have reasonable expectation of impacts.

Recommendations for businesses that want to increase the use of reusable cups:

- Ask customers if they want a reusable cup.
- Increase the saliency of the reusable cup alternative.
- Also focus on promoting returning cups and making the return as simple as possible.

Recommendations for policy development:

- Encourage the use of verbal prompts, without forcing it.
- Encourage increasing saliency of reusable cups compared to single-use cups.
- Consider possibilities for an awareness campaign in collaboration with coffee shops.

Recommendations for additional tests:

- Test scale one type of nudge at many locations.
- Test scale different nudges at similar locations (same chain).



# Conclusions

In summary, this report provides evidence that nudges can be effectful in steering people's choices towards reusable cups instead of single-use cups. It should, however, be noted that the effectiveness of the nudges is not guaranteed. It's highly context dependent and a thorough understanding of the operational context is crucial for maximizing the potential impact of the nudge.

The field experiments conducted in various settings revealed that a normal implementation with a dynamic approach yielded significantly higher increases in sustainable behaviour, with prompts showing the most consistent effect. The lottery mechanism and the descriptive social performance feedback loop were also effective, particularly in closed settings. These findings suggest that the same nudge can have varying impacts in open versus closed settings, highlighting the importance of understanding the context in designing interventions. Additionally, the study indicates that simple sign-based interventions, while cheap to implement, are not particularly effective in reducing single-cup waste on their own. However, combining signs with prompts, social performance feedback, or lottery mechanisms can enhance their impact on promoting sustainable alternatives. It is also important to note that nudging should have a greater potential to influence behaviour if implemented already in the design phase of circular solution system set-ups, rather than as an addition to already existing solutions. Nudges are no silver bullet solution and should rather be seen as a complement to other efforts in increasing the use of reusable cups. While stronger policies such as regulations banning the use of single-use cups may be more impactful, these would also create a new behavioural challenge with the increased need to make sure that the reusable cups are actually reused and not disposed, which would only exacerbate the environmental issues.

Our recommendations for businesses that want to increase the uptake of reusable cups include using prompts for customers and enhancing saliency to create awareness and facilitate successful prompts. We do not endorse mandating prompts, but rather encouraging a voluntary employment of both prompts and saliency. Further investigations would be warranted for successful implementation of nudges at larger scale. Investigations of monetary incentives for both businesses and customers, as well as awareness campaigns and joint return systems in collaboration with coffee shops could also be avenues for further testing.

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# Appendix – Statistical analysis

## Statistical analysis of the test conducted at Original Coffee

A difference-in-difference regression (DiD) was conducted to estimate the effect size and test if the effect of the interventions were statistically significant. Using this approach, difference in the change in the share of reusable cups in the test-cafes relative to the control cafes, is used as the estimate for the effect of the treatment. The results are presented in Table A1.

The estimated DiD treatment effect of the first intervention period (prompt & signs) shows an effect of 6.26 percentage points (pp) compared to the control (CI = [3.53 – 9.00]). The effect is statistically significant on a 1% level.

The estimated DiD treatment effect of the second intervention period (prompt & signs & add-on) shows an effect of 8.33 pp compared to the control (CI = [5.91 – 10.74]). This effect is statistically significant on a 1% level. Testing the effect separated for each intervention the effect measured is still significant on a 1% level, however with varying effect size of (8.05 pp, 4.64 pp, 11.89 pp). This indicates that the interventions had positive effects on the consumption of reusable to-go coffee in the two intervention periods compared to the control.

Two-sample t-tests were conducted to test the effect of each add-on. We compare the mean of the share in the first intervention period (sign & prompt) to the mean of the share in the second intervention period (sign & prompt & add) to identify the effect of the add-on. This is done separately for each test-café. The estimated effect of the add-ons in both Bredgade and Store Kongensgade was below 2 pp, and not significant. The estimated effect of the add-on in Istedgade (lottery mechanism in the point of purchase) was 6.8 pp compared to the first intervention period. This effect is statistically significant on a 1% level. An overview of the effects can be found in the table below.

By graphical inspection, we identified a few outliers (e.g. the two first days of the first treatment period in BR). In the statistical analyses, outliers were identified by using the Z-score. Observations that differed more than 3 standard deviations from the mean are defined as outliers. We ran the regressions of the dataset without the outliers, and the effects were still statistically significant although the effect size was not as large as when the outliers are in the estimated.

**Table A1.** Summarized of the effect measured in Original Coffee ( $P < |t|$ ).

	Store Kongensgade, Bredgade, & Istedgade	Store Kongensgade	Bredgade	Istedgade
<i>Difference-in-Difference (<math>P &lt;  t </math>) Observations</i>	(N=135)	(N=81)	(N=81)	(N=102)
Prompt & Signs	0,0626*** (0,0093)			
Prompt & Signs & add- on nudge	0,0833** (0,0230)			
Prompt & Signs & Social feedback loop		0,0805*** (0,0006)		
Prompt & Signs & Lottery mechanism (return)			0,0464*** (0,0006)	
Prompt & Signs & Lottery mechanism (buying)				0,1198*** (0,0004)
Robust standard errors in parentheses *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$				
<i>To-sample t-test (mean) Observations</i>		(N=28)	(N=28)	(N=35)
Social feedback loop		-0,0007 (0,0209)		
Lottery mechanism (return)			0,0142 (0,0265)	
Lottery mechanism (buying)				0,0682*** (0,0162)
Standard errors in parentheses *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$				

## Statistical analysis of the test conducted at Nordea

The following is an elaboration of the statistical analysis made for the experiment conducted at Nordea. Table A2 shows the summarized results.

To test the hypothesis, that the share of green cups was larger in the treatment period compared to the control period a one-tailed t-test was conducted (Figure 2). The test show that there is an increase in the average weekly share of green cups of 9.78 percentage points (CI: [7.97 - 11.59]) moving from the control period to the treatment period. The difference is significant on a 1% significance level.

Figure 3 divide the treatment period into two. A one-tailed t-test was conducted to test whether the increase from the control period to the first treatment period is statistically significant. The test shows that the increase is 5.68 pp (CI: [1.44% - 9.93%]), and that the difference is significant on a 5% significance level.

Furthermore, another one-tailed t-test was conducted to test whether the increase from the control period to the second treatment period is statistically significant. We find that the increase is 11.04 pp increase compared to the control (CI: [9.51%–12.58%]). It is significant on a 1% significance level.

When comparing the two intervention periods, a two-tailed t-test is performed to see if there is a statistically significant difference between the two periods. The average weekly share of green cups sold in the second treatment period was 5.36 pp (CI: [2.39%–8.33%]) larger compared to the first treatment period. The difference is significant on a 1% level.

Figure 4 displays the weekly share of green cups sold during the entire experiment. It indicates that there is a learning period where the use of green cups gradually increases, especially in the first intervention period. To test the statistical significance of these trends, one-tailed t-tests is conducted for the three periods. We call the gradually increase the average weekly growth. In the control period, the average weekly growth rate is not significantly different from zero (0.03 pp). The same goes for the second treatment period (0.14 pp). The first treatment period has an average weekly growth in the share of green cups on 2.06 pp (CI: [0.61–3.51],  $p=0.0101$  on the one-tailed t-test). This is significant on a 5% level. This suggest that there is a learning effect in the beginning of the intervention, and that the gradual increase doesn't continue in the second intervention period.

**Table A2.** Summarize of the effect measured in Nordea's café ( $P < |t|$ ).

Nordea café	
<i>Two-sample t-test (mean)</i>	
Descriptive social performance feedback loop (combined) ( <i>n</i> =27216)	0,0978*** (0,0086)
Descriptive social performance feedback loop (Under iNudgeyou) ( <i>n</i> =11891)	0,0568** (0,0140)
Descriptive social performance feedback loop (Under Nordea Café) ( <i>n</i> =21824)	0,1104*** (0,0072)
Descriptive social performance feedback loop (comparing the two intervention periods) ( <i>n</i> =20717)	0,0536*** (0,0139)
<i>One-sample t-test</i>	
Time effect for control period	-0,0003 (0,0050)
Time effect for intervention 1	0,0206** (0,0045)
Time effect for intervention 2	0,0014 (0,0086)
Standard errors in parentheses *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$	

## Statistical analysis of the tests conducted in Sweden

To test if the nudges gave results significant different from zero, we conducted difference in difference regressions for the three Swedish interventions. The results from these regressions are displayed in Table A3. The regressions are run on the share of reusable cups with the variable "nudge" as the major variable of interest. As seen in the table, the nudge conducted on Nordrest had a significant effect on the share. This statement is further strengthened by the fact that neither the time effect nor the effect from being in a certain group of the stores had a significant effect on the share of reusable cups. The  $R^2$  value in the column for Nordrest, further indicates that around 30 percent of the variation in share of reusable cups on Nordrest is due to the intervention. Note that the magnitude of the positive effect from Nordrest is only 1.13 percentage units. For Espresso House and Circle K we see no effects from the interventions statistically different from zero.

**Table A3.** Difference in difference regressions for Sweden.

	Share reusable cups		
	Nordrest	Espresso House	Circle K
nudge	0.01126*** (0.00355)	0.00264 (0.00236)	-0.00017 (0.00018)
customers	0.00001** (0.000004)	-0.000001 (0.00001)	0.000001*** (0.0000003)
time_treatment	0.00082 (0.00062)	-0.00020 (0.00115)	-0.00014 (0.00012)
butik_treatment	0.00016 (0.00056)	-0.00038 (0.00075)	0.00020 (0.00016)
Constant	-0.00472** (0.00237)	0.00135 (0.00097)	-0.00034 (0.00024)
Observations	78	332	392
$R^2$	0.31704	0.00889	0.04978
Adjusted $R^2$	0.27962	-0.00323	0.03996

*Regressions ran with robust standard errors. \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$*



# About this publication

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