

Testing ordering interventions: Introduction

1.1 Background

The production, transportation, storage, and waste of food products have a significant impact on the environment. The food supply chain is estimated to generate around 13.7 billion metric tons of carbon dioxide; this accounts for approximately 26% of anthropogenic Greenhouse Gas emissions (Poore & Nemecek, 2018). The UK government's National Food Strategy, an independent review of England's entire food system, recommends that multiple interventions are required for healthy and sustainable diets to create a long-term shift in our food culture (Dimbleby, 2021). To reduce the environmental impact of the food supply chain, consumers need to be able to access a more sustainable diet. The environmental impact of food is also concerning for consumers. For example, 73% of 1,916 surveyed adults (aged 16-75, and living in England, Wales or Northern Ireland), in a study commissioned by the Food Standards Agency (FSA), reported that it is important for them to buy food that has a low environmental impact (Heard & Bogdan, 2021). However, only 49% of those consumers considered their personal diet to be environmentally sustainable. The discrepancy between consumers' concern for the environmental impact of food and the reported sustainability of their personal diets indicates that there is a need for interventions that can help consumers to access more sustainable products.

Online supermarkets constitute an increasingly large share of grocery shopping. In December 2020, 59% of shoppers reported having used online shopping for food and groceries in the previous month, an increase on the 42% who claimed that in December 2019 (Maynard, 2021). This trend of increasing online shopping was already observed before the coronavirus pandemic: the proportion of people using a home delivery from a supermarket increased from 10% in 2012 to 17% in 2018 (Food Standards Agency, 2019). Recent data show that 12.6% of grocery sales were made online in March 2022 compared with just 8.0% three years ago (McKevitt, 2022). Further, the growth is forecast to continue, with the Institute of Grocery Distribution projecting that the market value of online food and grocery shopping will grow by approximately 21.4% in the next five years, from £22.2 billion in 2021 to £26.9 billion in 2026 (The Institute of Grocery Distribution, 2021). Therefore, it is important to understand how interventions in online shopping environments affect consumer choices in relation to the sustainability of products.

Changing the choice architecture, or the physical environment in which a decision is made, has been used to encourage healthier diets (Ensaff, 2021). It is also increasingly being applied to sustainable diets: evidence reported in a systematic review of interventions on encouraging sustainable diets indicates that physical (in-store and in-canteen) interventions that target automatic non-conscious processes are likely to be effective (Blackford, 2021). Critically, behaviours around purchasing and consumption of food may be habitual, so targeting those behaviours could involve changing the situation that triggers the habitual behaviour or inhibiting the habitual response (Riet et al., 2011).

One type of intervention that has been effective at promoting healthy consumption in physical food-purchasing environments is altering the positioning of items: a meta-analysis of 15 comparisons from 12 studies found that when food was placed further away there was a

moderate reduction in its consumption (Standardized Mean Difference -0.60 , 95% CI -0.84 to -0.36) (Hollands et al., 2019). In addition, evidence was found for an order effect regarding the positioning of options on physical menus: when healthier items were placed at the top of lists, they were more likely to be chosen (Dayan & Bar-Hillel, 2011; Mueller et al., 2020).

Ordering has also been used to help people make healthier choices when displaying products in digital environments. For instance, when food products in an experimental online supermarket were shown in ascending order of saturated fat content, the percentage of energy from saturated fat for the chosen food products decreased from a baseline of 25.7% to 20.7% (Koutoukidis et al., 2019). In addition to displaying products in an ascending order, changing products' position on a grid has also been found to have an impact on product choice. For example, in a pre-post design field experiment investigating purchases made in electronic kiosks at McDonalds, moving Coca-Cola from top-left to bottom-middle and Coke Zero from top-middle to top-left, decreased sales of Coca-Cola and increased sales of Coke Zero, without changing overall sales (Schmidtke et al., 2019). It seems unlikely that there is a unified explanation of position effects across different types of tasks, but some causes that are likely to be common across tasks are that people choose positions that are more reachable and positions that are more salient, especially if the incentive structure directs them towards those positions (Bar-Hillel, 2015). In a digital environment, the item that is at the top of the list is most reachable and salient.

In contrast to healthy eating, there is a research gap on the effect of ordering food products by their environmental impact on consumer choices when shopping online. Nonetheless, evidence indicates that putting the most sustainable item at the top of a hard-copy menu is associated with an increase in sustainable food consumption in workplace canteens, hospitals, and educational settings (Langen et al., 2022). Consequently, it is of interest to investigate whether using product ordering can increase the choices of sustainable products in an online supermarket environment.

'Ordering' interventions are typically implemented without telling participants that the items have been ordered in a manner designed to influence their choices. They are a type of behavioural intervention or 'nudge', which aim to influence behaviour by re-designing the environment in which the choice is made (Thaler & Sunstein, 2009). One general criticism of nudges is that they are manipulative because people do not know that they are being nudged (Goodwin, 2012; Noggle, 2018; Oliver, 2013). Some researchers argued that this lack of transparency was essential for the success of nudges (Bovens, 2009). However, there is now a growing number of studies investigating the effect of disclosing to people that they are being nudged, which show that this claim is unlikely to be correct. A systematic review found that, in 14 papers with 87 tests, only two of the tests showed a negative effect of disclosure; the results of 52 of the tests indicated that there was no effect of being transparent about the nudge and 33 showed that disclosure boosted the effectiveness of nudges compared to nudges without disclosure (Bruns & Paunov, 2021). Further, being transparent about nudges can increase the feeling of autonomy of those being nudged (Wachner et al., 2020). In contrast, revealing nudges only after the event can lead to negative perceptions of the 'choice architect', who is doing the nudging (Michaelsen et al., 2021).

Studies on the effect of disclosure of nudges have mainly involved informing people that they are being given a default option (e.g., Bruns et al., 2018; Loewenstein et al., 2015; Paunov et al., 2020). Some studies of disclosure were designed to increase the choice of sustainable options (Bruns et al., 2018; Steffel et al., 2016). Two studies showed that disclosure does not decrease the effectiveness of nudges designed to promote healthy eating by making healthy items more accessible in a bricks-and-mortar environment (Cheung et al., 2019; Kroese et al., 2016). However, as far as we are aware, no studies investigated whether disclosure affects the effectiveness of nudges that use the ordering of items on a menu. This is particularly relevant for online shopping, where there is a default ordering, and where people may be given a choice of different ways to order the products, usually by price or popularity.

1.2 Causal Pathway

The existing literature suggests that showing products in ranked order of sustainability in an online supermarket environment is likely to increase sustainable purchasing when the ordering is 'covert', with no information about the ordering given to consumers. When the ordering intervention is 'overt', with consumers being told that the products have been displayed in order of sustainability, the causal pathway is thought to be more complicated. The effects of the intervention on the food system are thought to depend on whether various pre-requisites for implementing it exist and on the interaction of business and consumer behaviour. Figure 1 and Figure 2 describe how the covert ordering intervention and overt ordering intervention can work to achieve the expected outcomes. Components are coloured to indicate whether it is capacity, opportunity, motivation, or behaviour in the "COM-B" system (Michie et al., 2011).

Figure 1: Causal schema for covert ordering intervention

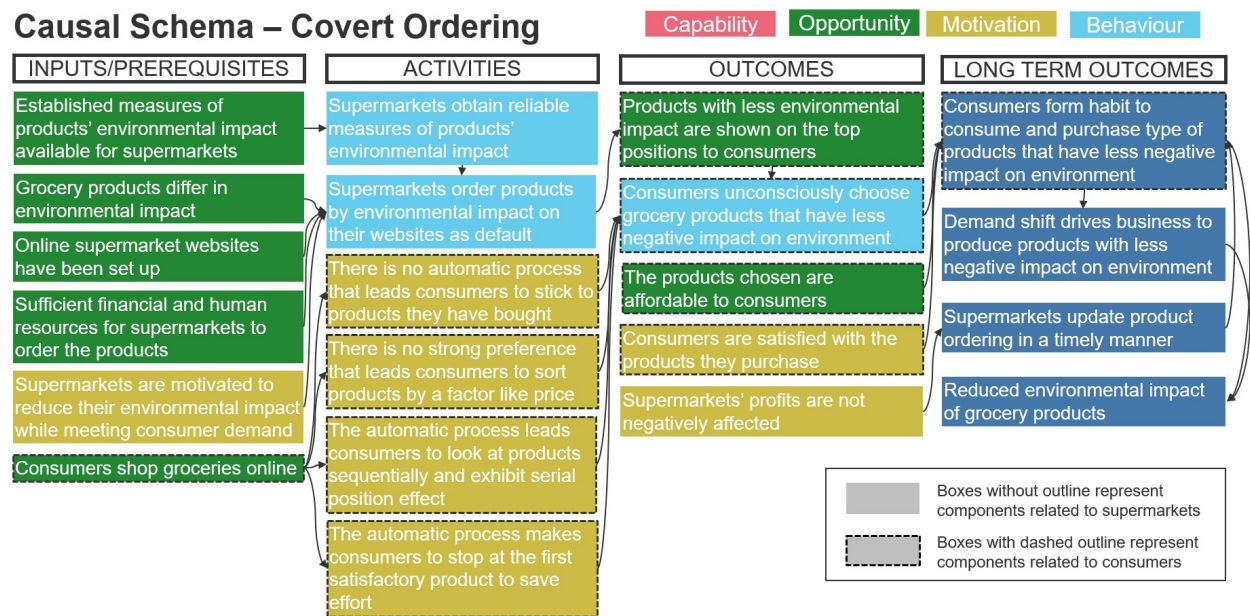
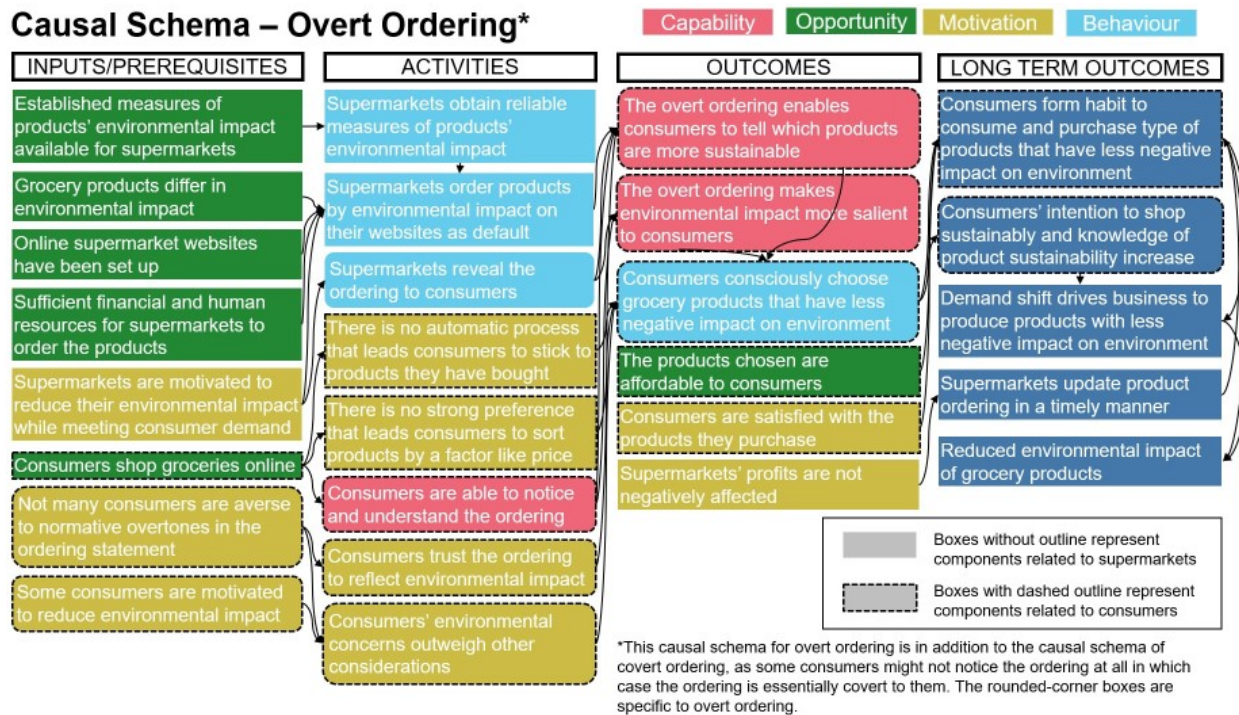


Figure 2: Causal scheme for overt ordering intervention

Causal Schema – Overt Ordering*



Both interventions work under the prerequisites that supermarkets have set up online supermarket websites/applications and consumers shop online for groceries. For supermarkets to implement the ordering interventions, firstly there need to be established measures of products' environmental impact available for supermarkets to obtain and use, and there should be variation across products in terms of environmental impact. There need to be sufficient financial and human resources for supermarkets to carry out ordering the products, and supermarkets also need to be motivated to meet environmental targets while meeting consumer demand. For consumers to be exposed to the ordering interventions, they should not be led by the automatic process to simply stick to products they have bought or be driven by a strong preference to sort products according to a particular factor such as price which will immediately overwrite the default ordering. If these conditions are met, products with less negative environmental impact will be shown to the consumers in the top positions on the product pages. When the ordering is covert, automatic processes should lead consumers to look at products sequentially in the order they are displayed and stop at the first satisfactory product (satisficing) to save effort (Bar-Hillel, 2015; Caplin et al., 2011). Therefore, we expect that consumers will unconsciously choose products with less negative impact on environment as an outcome. If the products chosen are affordable and satisfactory to the consumers, then over time consumers will form habits to choose and consume type of products that are less harmful to the environment, and this demand shift will drive business to produce more products with less harm to the environment. Provided that the different product choices do not negatively affect supermarkets' profits, supermarkets will keep using the ordering and update to reflect any changes (could be due to new products or reformulation of existing products), which will reinforce the demand shift. And the overall long-term outcome will be reduced negative environmental impact of grocery shopping.

When the ordering intervention is overt, for the consumers who do not notice the ordering statement, the same mechanism of covert ordering applies; otherwise, a different mechanism is at work. Revealing the ordering to consumers provides information about which products are more sustainable, making the notion of environmental impact more salient in the online supermarket environment and possibly also conveying a normative message that they ought to choose sustainable products. For overt ordering to have such effects, consumers need to notice and understand the product ordering; moreover, they need to trust that the ordering reflects the environmental impact correctly. When these conditions are met, if a consumer is not averse to receiving messages about what they ought to do, and their other considerations like price and

taste do not outweigh their concern for environment, they will consciously choose products that have less negative impact on the environment as an outcome. In addition to long-term outcomes of habit formation and demand shift as discussed for covert ordering intervention, an overt ordering intervention may also increase consumers' intention to shop sustainably and their knowledge of product sustainability over time, which adds an extra contribution to the ultimate aim of reducing negative impact on environment. Note that as the covert ordering intervention takes advantage of the automatic process of consumers, there is no capability component (as classified by COM-B) in its causal pathway; while when the ordering is overt, consumers engage in reflective processes instead, and the intervention works through increasing consumers' psychological capabilities.

The randomised controlled trial in this study simplifies away from many of the considerations in real life as shown in Figure 1 and Figure 2, and focuses on whether implementing the covert and overt ordering interventions can achieve the desired immediate outcomes as predicted by the theory in a simulated online supermarket environment. Crucially, for the covert ordering intervention to work in the simplified experimental environment, participants are expected to explore the product options in the order they are displayed and pay more attention to products higher up on the list. And for the overt ordering intervention, whether participants are averse to normative overtones about what they should buy, whether they notice, understand, and trust the ordering, and whether their environmental concern is high enough to outweigh other considerations, will all matter for the results.

1.3 Objectives

In this study, we investigated the effect of an ordering intervention on product choice using a randomised controlled trial. Specifically, we showed products in a vertical list with an ascending order of products' carbon footprint (from lowest carbon footprint/most sustainable to highest footprint/least sustainable), and we examined the effect of this ordering on product choices in an online supermarket environment. In addition, we compared the effect of an ordering intervention that was covert, where no information about the ordering was given, to an ordering intervention that was overt, where a statement with information about the ordering was displayed.

We aimed to test the following two hypotheses.

Hypothesis 1: A covert ordering intervention can shift consumer choices in an online supermarket environment towards more sustainable options compared to when products are randomly ordered.

Hypothesis 2: Making an ordering intervention overt does not affect the choice of sustainable options compared to when the ordering intervention is covert.